THE MACROECONOMIC DETERMINANTS OF STOCK MARKET MOVEMENT IN DEVELOPING COUNTRY: EVIDENCE FROM MALAYSIA

BY

CH'NG YONG QIANG
LOH SIEW KIN
SOO CHIN LING
TAN KAH MAN

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

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	Name of Student:	Student ID:	Signature:
1.	Ch'ng Yong Qiang	09ABB06320	_____
2.	Loh Siew Kin	09ABB08148	_____
3.	Soo Chin Ling	09ABB08149	_____
4.	Tan Kah Man	09ABB07882	_____

Date: _____

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Ch'ng Yong Qiang (ID: 09ABB06320)
Loh Siew Kin (ID: 09ABB08148)
Soo Chin Ling (ID: 09ABB08149)
Tan Kah Man (ID: 09ABB07882)

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ADF	Augmented Dickey Fuller
APT	Arbitrage Pricing Theory
CAPM	Capital Asset Pricing Model
CPI	Consumer Price Index
ECM	Error Correction Model
EMH	Efficient Market Hypotheses
EPS	Earning Per Share
FTSE	FTSE Bursa Malaysia KLCI (formerly known as KLCI)
IPI	Industrial Production Index
IR	Interest Rate (1-month Deposit Rate)
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
LNCPI	Natural Logarithm of Consumer Price Index
LNIPI	Natural Logarithm of Industrial Production Index
LNKLCI	Natural Logarithm of Kuala Lumpur Composite Index
PP	Phillips-Perron
VAR	Vector Auto Regression
XRAT	Exchange Rate

PREFACE

This journal has been prepared to assist the readers to gain more knowledge of how the macroeconomic variable (interest rate, industrial production index, exchange rate and consumer price index) affects the movement of stock market in Malaysia. On top of that, the overview results of this paper will bring attention of reader to the fact that macroeconomic variable would have a significant impact on stock market of emerging market. In order to ensure that the result of this paper is accurate and reliable, several empirical tests have been run. Additionally, the result of this paper was consistent and supported by previous researchers. Hence, by understanding the relationship between macroeconomic variable and stock market movement, readers would have broader knowledge in the prediction of trends in financial market, thus achieve a better view and direction while they are looking into the market preferable.

ABSTRACT

This paper aimed to examine the impact of microeconomic variables on the stock market in Malaysia. The selected macroeconomic variables are interest rate, industrial production index, exchange rate and consumer price index while representative stock index is Kuala Lumpur Composite Index. Unit root test, Johansen Cointegration Test and Error Correction Mechanism are applied to run the regression test for all the data on monthly basis from year 1997 to year 2011. By adopting there empirical model, we explored there are existence of relationships between selected macroeconomic variables and Malaysia's stock market. Moreover, the results showed consistent with existing studies. This paper has contributed new evidence proven to the existing research studies and provides clearer view on Malaysian stock market to investors as well as government bodies.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

In the past, there are many researchers conducted on the research about the interactions between stock market movements and macroeconomic variables such as gross domestic product, money supply, interest rate, reserve, industrial production index, exchange rate and many others. This is an interesting research topic for parties such as investors, financial officers and government because these determinants can serve as indicators in improving a country's economy. In the first chapter, we are going to illustrate the overview of the research background, describe the problem statement, define the research questions, study the development of hypotheses and examine the significances of this research project. Last but not least, this chapter also explains on the outlines of each chapter.

1.1 Research Background

This section outlined the research background of this research project which included the keywords like stock market, macroeconomics variables, and developing country. The explanations of these keywords will cover under this part. In our case, Malaysia is the chosen developing country in examining the impact of various macroeconomic variables on stock market movements.

As referred to Bursa Malaysia (2012), the industrial index which represented stock market movements was launched on 2 January, 1970. At that time, 30 industrial stocks were included in the industrial index. By the year of 1985, the industrial representatives noted that industrial index was not enough to reflect the performance of stock market. They claimed that the index which needed by Malaysia's stock market is an index that can reflects market performance and can be an indicator in government policy. Apart from that, the index should sensitive

to the expectations of investors and the economy changes. As a result, KLSE composite index which also known as Kuala Lumpur Composite Index (KLCI) was introduced.

According to Bursa Malaysia (2012), there were records for the milestones of KLCI since the year of 1986.

4 April 1986	:	There were 83 companies which calculated for three times a day and the KLCI was considered as open ended index, 250 lots per annum were the trading volume criteria.
30 January 1990	:	The frequency of calculation was rises to every fifteen minutes.
29 May 1992	:	The trading volume was rises to 1000 lots instead of 250 lots, per annum.
18 April 1995	:	Composition of KLCI changed and fixed it at 100 and roses the frequency of computation to every 60 seconds.
19 March 1998	:	Objectives were enhanced to better trace on economy.
25 May 2005	:	Practice of index adjusting for dividends was discontinued.
6 July 2009	:	Change the name to FTSE Bursa Malaysia KLCI and started to use the new methodology for index calculation.
9 Jun 2011	:	Rule of liquidity screening was enhanced in order to make the index become more consistent with global standards.

Besides, there are six benefits of the FTSE Bursa Malaysia KLCI (FTSE) which included (Bursa Malaysia, 2012):

1. FTSE can provide global relevance, recognition and reach. This can be explained as the index is weighted by the stock market capitalization which adopted the internationally recognized index calculation method.

2. Market barometers which composite of primary market movers can accurately defines the market activities and remain representative of the Malaysian stock market. FTSE is composed by 30 largest companies from

various sectors in the Malaysia while these companies representing Malaysia's stock market movements.

3. The calculation methodology of FTSE stresses on free float and liquidity screens for a clearer representation of the market. The participation of 30 companies is more liquidity and more marketable out of the 1000 companies from the main market.

4. A smaller basket of 30 stocks is easier to manage and more appealing for the creation of index-linked products in promoting the market liquidity. There are much more difficulties to manage huge amount of stocks in index calculations.

5. Increasing the index calculation frequency from 60 seconds to 15 seconds can traces the market pulse more efficiently and closely. New FTSE index applied a more frequent market index tracking, so it helps users to track the market index more accurate. In addition, it also can reflect Malaysia's market condition faster, which will give a better view on overall market conditions to users.

6. The continuity of FTSE index value conserves the historical movements of Malaysia's stock market. The index continues the value of the historical data, this helps the researcher easier to conduct their researches due to the historical market trend and data remain unchanged.

1.1.1 Stock Market

Previously, there are lots of economic analysts, market investors and policy makers believed that stock market variations have a very significant relationship with macroeconomic variables (Ibrahim & Yusoff, 2001). Basically, stock market is a global network where stock exchange or financial transactions between firms and investors take place. Alternatively,

stock market is defining as a place or a channel that allows shares issue and shares trading among investors and share issuers. In between, stock is referring to the share of ownership in a corporation (Teweles & Bradley, 1998).

By trading stocks in the stock market, those limited liability companies or stock issuers could raise additional financial capitals from corporate investors or individual investors. Furthermore, financial intermediaries such as investment banks and financial brokers exist in the transactions between investors and stock issuers. They act as the middle person that facilitates funds from a surplus unit (investors) to a deficit unit (stock issuers). Assuming that two situations arise: First, when the stock prices rise or the stock issuers getting profit, the investors can either receive dividend from the stocks or sell the stocks in the secondary market to gain profit. Second, if the share price is moving to unfavorable direction, investors can bear the losses themselves by selling the shares in a lower price on secondary market or holding the shares and wait the stock prices to rebound. Anyhow, the existence of stock market is important since it is a channel for investors to sell or purchase stock no matter the stock prices going up or down.

Referring to Ali, Rehman, Yilmaz, Khan and Afzal (2010), the researchers described that stock prices indicated the discounted present value of the firm's future cash flows. This explained that the changes in any macroeconomic variables such as inflation rate, exchange rate, interest rate and others factors may bring uncertainties to the stock market movements because cash flow can affected by macroeconomic factors. Therefore, this research project is to examine the possible relationships among the macroeconomics variables and Malaysia's stock market movements.

Malaysia's stock market is chosen as the research object in this research project since Malaysia has been cited as developing country in many previous studies and its economy is getting less attention from other

developed country. However, according to Acikalin, Aktas and Unal (2008), the rapid growing economies in developing countries have lured the attentions of developed countries that are seeking for higher return in their investments. The foreign investors invest cash flow into developing countries in the form of foreign portfolio investment (FPI) and foreign direct investment (FDI).

1.1.2 Macroeconomics Variables

Macroeconomic variables are factors that influenced the economy broadly from all aspects. The difference between macroeconomic variables and microeconomics variables is where the macroeconomics variables can affect the entire economy while microeconomics variables may only bring effect to a minor sector or individual organization.

According to existing researchers, they noted that macroeconomics factors are important in determining stock market movements and it is also considered by investors during the process of decision making. A research of Acikalin et al. (2008) found that investors will depend on macroeconomic variables to make decision when they lack of company information and when they do not have sufficient knowledge about stock market. In addition, as cited in Ali et al. (2010), previous researchers had mentioned that the stock price is sensitive and influences by the macroeconomic variables. From these previous researches, we can assume that macroeconomic variables are significant and important in affecting the Malaysia's stock market movements.

Thus, this research project is placing the macroeconomic variables as independent variables to examine Malaysia's stock market movements. Nowadays, there are lots of macroeconomic variables have been discovered by economists such as money supply (M1, M2, M3), gross domestic product, oil prices, inflation rate, interest rate and others.

However, there are only four variables chosen as independent variables in this research project which are interest rate (IR), industrial production index (IPI), exchange rate (XRAT), and consumer price index (CPI).

As cited in the research of Rahman, Sidek and Tafri (2009), Chen et al. (1986) claimed that financial theories show some of the macroeconomic variable such as interest rates, expected inflation, industrial production and the grade bond should systematically affect the stock market. In addition, many existing studies also found that the factors which significantly influenced the stock market are interest rates, reserves, industrial production, inflation rate, money growth and exchange rates. Therefore, the selection of these four variables is derived from the evidences of previous researchers.

1.1.3 Developing Country

As mentioned before, Malaysia is taking as the research object or as dependant variable in this research project. As referred to Al-Sharkas (2004) and Frimpong (2009), the researchers stated that majority of the previous studies considered that developed countries' stock markets are more efficient comparing to the developing countries. Therefore, researches in developing country need to take more attention compared to developed country.

According to World Trade Organization (n.d.), the term of developing country do not has a clear and specific definition. From WTO official website, it stated that a member will classify themselves whether they are belonging to developed country. However, according to West and Desai (n.d.), developing nations have following characteristics:

a) Low income and low standard of living
b) High inequality, insufficient education and poor health

c) Productivity level is lower and higher population growth
d) High unemployment rate

As referred to the World Bank, Malaysia is belongs to upper middle income group ($3,976-$12,275) where it shows the average figure of $7760 in year 2011 (The World Bank, 2011; The World Bank, 2012). According to rule of classification of World Bank where countries that belong to low and middle income group also considered as developing countries. Thus, this has proved that Malaysia is a developing country (The World Bank, 2010). Moreover, it is also means that Malaysia is currently towards the developed country because now it is belonging to upper middle income group instead of low income group.

In Malaysia context, "Vision 2020" program has been introduced by Malaysia former Prime Minister, Datuk Sri Dr. Mahathir Bin Mohamad in year 1991. Generally, this program aimed to achieve the target where Malaysia can became a fully developed country by the year 2020 from the aspects of economies, educations, politics, mental frameworks, sciences & technologies and others (Office of the Prime Minister of Malaysia, 2010). In this program, nine challenges are set as the guidelines to lead Malaysia becoming a fully developed country. The “Vision 2020” program is failed if any of the challenges are not fulfilled. On the other words, it is also means that Malaysia can only be known as developed country if these nine challenges have been achieved.

Although Malaysia classified as developing country along these years, but Malaysia has been elevated to advance emerging market status from secondary emerging market (Edy, 2011). Malaysia elevated to advanced emerging market after fulfilled the “quality of market assessment”. This statement was announced by FTSE Group, a global index provider, they said that the elevation of Malaysia will gain the attention of global investors. After the announcement, Malaysia was officially listed in the

advance emerging market list and joins with other advance emerging market such as Brazil, Hungary, Mexico and others.

1.2 Problem Statement

Initially, stock markets or company performance are more likely been affected by two major factors: internal factors and external factors. Internal factor is defining as an occasion of an element that brings significant effects to one party or company (Goncalves and Quintella, 2006). For example, Earnings per share (EPS), dividend payoff, marketing strategies company culture and etc are classified as internal factors. Meanwhile, external factors can refer to the factors which are not caused by a society body and cannot control by the body itself, and the effects can be on an industry rather than a single body. External factors include political issues, investor behavior, interest rate, exchange rate or other macroeconomic factors.

Sometimes, investors can predict the future's stock price based on the dividend payoff, market trends and market preferable. However, if the related parties do not have sufficient knowledge regarding the factors such as macroeconomics factors, this will lead the party towards an undesirable directions or unfavorable results. In reality, majority investors realized that macroeconomic variables play a very important role in determining the financial market value or stock prices. However, not all parties do understand and have a very clear view on the significant of these factors in affecting the stock market movements. Thus, they have to depend on the researches done by researchers.

Based on previous researchers who studied the impacts of macroeconomic variables (independent variables) to the stock market movements (dependant variables), we can obtain the relationships and the significance of the independent variables to dependent variable. However, the changes of independent variables might lead to different results with previous researcher's frameworks. Therefore, this research project is reporting the latest relationships of independent variables

with dependent variable based on the latest available data which obtained from year 1997 to year 2011 on monthly basis. In addition, this research will find out whether the latest interactions between macroeconomics variables and stock prices had changed by compared with previous findings.

1.3 Research Objectives

Under this section, we are going to illustrate the general objective and specific objectives on this research perhaps it can give readers a designated, solid and achievable goal.

1.3.1 General Objective

The primary objective of this research project is to examine the impacts or the effects of macroeconomics variables on Malaysia's stock market index (FTSE) from the beginning of year 1997 to the end of year 2011.

1.3.2 Specific Objectives

i. To determine the impact of interest rate (IR) on Malaysian stock market index (FTSE).

ii. To determine the impact of industrial production index (IPI) on Malaysian stock market index (FTSE).

iii. To determine the impact of exchange rate (XRAT) on Malaysian stock market index (FTSE).

iv. To determine the impact of consumer price index (CPI) on the Malaysian stock market index (FTSE).

1.4 Research Questions

This section describes and questions the problems arise in this research project. The questions which going to examine are as follows:

i. What relationship and how significant is interest rate (IR) in affecting the stock market index (FTSE) in Malaysia from beginning of year 1997 to end of year 2011?

ii. What relationship and how significant is industrial production index (IPI) in affecting the stock market index (FTSE) in Malaysia from beginning of year 1997 to end of year 2011?

iii. What relationship and how significant is exchange rate (XRAT) in affecting the stock market index (FTSE) in Malaysia from beginning of year 1997 to end of year 2011?

iv. What relationship and how significant is consumer price index (CPI) in affecting the stock market index (FTSE) in Malaysia from beginning of year 1997 to end of year 2011?

1.5 Hypotheses of the Study

This section is briefly stating the hypotheses in this research project on the impacts of these four independent variables: interest rate (IR), industrial production index (IPI), exchange rate (XRAT), and consumer price index (CPI) to the dependent variable: Kuala Lumpur Composite Index (FTSE).

i. Hypothesis 1: Interest rate (IR) has a significant and negative relationship with FTSE.

ii. Hypothesis 2: Industrial production index (IPI) has a significant and positive relationship with FTSE.

iii. Hypothesis 3: Exchange rate (XRAT) has a significant and negative relationship with FTSE.

iv. Hypothesis 4: Consumer price index (CPI) has a significant and negative relationship with FTSE.

1.6 Significance of the Study

This section describes the significance and the contributions of this research project to the government bodies, educational field and investors.

1.6.1 Government

Regulatory bodies or policy makers are able to have deeper and clearer understanding on the relationship of various macroeconomic variables to the Malaysia's stock market movements. The stock market performance of a country can be a reflection of that country's economy conditions. Usually, investors can predict or estimate future economy directions but they do not have enough authority to prevent or change the stock market movements. In contrast, government can control or minimize the losses by using monetary policies. By referring to the findings of this research, related parties can implement suitable policies on the market in order to achieve their desire goals.

1.6.2 Education

The results from the study can contribute more evidences to strengthen the theoretical frameworks and provides additional proof to previous researches. From the review of previous studies, we found that not much researchers use deposit rate as independent variable. Most of the previous researchers choose to use real interest rate, treasury bills rate or base lending rate. In this case, we examine the impact of deposit rate on Malaysian stock market movements. It is interesting to find out whether deposit rate is significant to influences the stock market in Malaysia. Since not much researchers studied the interactions between stock market and deposit rate, this research can provides new evidences or references to support existing studies.

1.6.3 Investors

The findings of this research project enable individual investors as well as corporate investors to have a clearer view on the volatility of macroeconomic variables to the changes of stock prices. Macroeconomic variables are external factors and investors cannot avoid from the changes in macroeconomic variables. Therefore, investors would able to have vigilant strategies or plans if they understood the macroeconomic variables movements in order to hedge the possibility of economic uncertainty. Besides, investors will be able to minimize their losses if they could distinguish the interactions between that particular variables and stock price.

1.7 Chapter Layout

Initially, the first chapter of this research project provides an overview of the research followed by second chapter which discusses on the articles of previous

researchers and theoretical frameworks. Then, the third chapter is exploring the methodologies that will be adopted in this research project. After that, progression of data analysis is taking part in the forth chapter based on the methodologies adopted and obtained data. Lastly, based on the results generated in previous chapter, the last chapter will covers the findings, recommendations and conclusion of the research project.

1.8 Conclusion

In conclusion, this chapter illustrates the overview of this research project such as important keywords in this research, the problems statement regarding the financial stock market, research questions, hypotheses of study and the examination of significance of study. The following chapter is going to review and discuss the point of views of previous researchers' studies which related with this research topic.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, we are going to review the findings and opinions from previous researchers on the relationships between macroeconomic variables and stock market index. This topic has been widely discussed before and in this research project we are going to examine the relationships between macroeconomics variables and the stock market index in Malaysia. The studies from previous researchers will be taken as references and guidelines in this research project. Other than that, the theoretical frameworks that have been implemented by previous researchers will be review under this section. In addition, the proposed theoretical frameworks and hypotheses in this research project will also cover.

2.1 Review of the Literature

In this research, the independent variables are macroeconomic variables while the dependant variable is Malaysia's stock market index. There are four macroeconomic variables have been chosen to examine the stock market movements. These macroeconomic variables are interest rate (IR), industrial production index (IPI), exchange rate (XRAT) and consumer price index (CPI). On the next section, we are going to review the relationships between stock market movements and these macroeconomic variables based on the findings from previous studies.

2.1.1 Stock Market Index

Stock indices and stock prices are two different matters. A stock price is the value of one particular company while stock index represents the stock

prices of a group of companies. However, a stock index does not representing all companies' stock prices in stock market. The companies which included in a stock index are influential and representative, typically referred to large capitalization companies in the stock market.

In Malaysia, there are different stock indices in the stock market. For this research project, FTSE Bursa Malaysia KLCI (FTSE) is chosen as dependant variable. The index for FTSE is referring to the 30 top companies in the stock market. They are classified by their market capitalization on the main market of Bursa Malaysia (FTSE International Limited, 2012). Besides, FTSE is one of the main indices in the index series of Bursa Malaysia. According to FTSE Asia Research (2009), FTSE represented about 65% of full market capitalization and covered about 70% of FTSE Bursa Malaysia EMAS index, with just 30 companies and these companies was covered major industries in Malaysia. Thus, FTSE was chosen in this research project because it represents the top 30 highest market capitalization from the stock market, which also means that their value of tradable shares is highest in the stock market and able to bring large effect to the market.

2.1.2 Interest Rate

Interest rate can be classified into many types, previous researchers adopted nominal interest rate, real interest rate or Treasury bill rate (risk-free rate) to prove the interactions between interest rate and stock prices movements. Yet, one-month deposit rate has been chosen in this research. Deposit rate refers to the amount of money paid on cash deposit by financial institution or banks in term of interest. Generally banks will pay deposit interest to those depositors who have saving or investment accounts with them.

Generally, there are negative relationships between deposit rate and stock prices. Deposit rate would have an impact on stock market as when the deposit rate is high, consumer will tend to save more in financial institutions in order to earn more interest income. When their savings increase or they prefer to put money in bank account rather than in investments, the demand for stock will decreased and thus lead to the drop of stock prices (Cagli, Halac & Taskin, 2010). In Contrast, when deposit rate is low, investors tend to invest their money in stock market rather than put in banks. In this situation, the stock prices will rise. In the study of Singh and Arora (n.d.), interest can be a source of income and at the same time, a source of expenses. They claimed that the alternation in interest rate can affects the income level directly, and affects the cost indirectly. The result from Singh and Arora shows that there is significant negative relationship between deposit rate and stock index and the impact is clearer during long term.

However, in the research of Pal and Mittal (2011), deposit rate do not has a significant relationship with stock prices. Similarly, in the research of Alam and Uddin (2009), the results show that bank deposit rate is not significantly affected stock price in Malaysia. On the contrary, the researchers found that the changes in deposit rate affected the stock price changes inversely. The researchers examined on developed and developing country, they found macroeconomic factors are significant negative effect on Japan’s stock market.

2.1.3 Industrial Production Index

Industrial production index is representing the industrial production output or real economic activity of a country, the data is give out by the Federal Reserve Board every month. Industrial production index is positive related with stock index is due to when industrial production index increase, it is also represented the firm have to produce more to fulfill the demand. In

this case, the economy is in good condition, so the stock index will increase. Thus, this explained the industrial production index is affecting stock market positively.

There are many previous researchers have pointed that the stock price and industrial production index is positively related (Rahman et al., 2009; Singh, 2010; Al-Sharkas, 2004; Sohail & Hussain, 2009; Humpe & Macmillan, 2007). Moreover, Singh (2010) derived that a high industrial production index means that the economy of the country is in healthy. Studies of Al-Sharkas (2004) also stated that industrial production is one of the positive determinant factors of stock prices. Another research of Ali et al. (2010) stated that industrial production is an essential factor in explaining stock price. They noted that there is co-integration between indexes of industrial production with stock exchange prices. Besides, research of Maysami, Lee, Hamzah (2004) stated that industrial production have a great impact on the stock index. They noted there is evidence that stock returns are positively and significantly related to the level of real economic activity as proxies by the industrial production index.

On the other hand, the research of Oskenbayev, Yilmaz and Chagirov (2011) stated that there are long run and short run relationships between the industrial production index and stock index. The coefficients signs and magnitudes of industrial production are consistent with the theoretical background. To add to that, the empirical results from previous researches (Humpe & Macmillan, 2007; Sohail & Hussain, 2009; Cagli et al., 2010) show that industrial production index is significant on determining the stock prices in long run and it is significantly positive related to stock price. Study of Rahman et al. (2009) suggested that industrial production show stronger dynamic interaction than the other monetary policy variables. When industrial production increases, it will lead to the increase of stock market. Hence, it has a significantly positive relationship with stock market.

Yet, there are also researchers who found that industrial production index is not significant in explaining stock price. Research of Mohammad, Hussain, Jalil, Adnan and Ali (2009) also claimed that industrial production is insignificantly affect stock price. They stated that increase in industrial production do not affect stock prices as it is neglect able effect to stock price.

Other than that, research of Dritsaki and Sc. (2005) shows that industrial production index has a bilateral causal relationship with stock price. It is similar with the findings of the research by Brahmasrene and Jiranyakul (2007). In a study of Brahmasrene and Jiranyakul (2007), the relationship between stock price and industrial production index can be positive after the crisis while it is negative during the crisis. He explained that during crisis industrial production index will decreases but at the same time, the stock index increase. This is due to speculator invest in real estate and financial sectors, they buy the asset and hold it. The researchers have mentioned that these two sectors are major part of stock index, so the actions of speculators have increased the stock index.

2.1.4 Exchange Rate

Exchange rate is the value of one country's currency in exchange for another country's currency. The exchange rate in this research is express as Ringgit Malaysia (MYR) per one US dollar (USD). An increase in exchange rate indicated that MYR depreciated against USD. It is also noted that an increases of exchange rate can give negative impact to stock prices.

$$\frac{\uparrow MYR}{USD} indicated\ MYR\ depreciate\ against\ USD$$

$$\frac{\downarrow MYR}{USD} indicated\ MYR\ appreciate\ against\ USD$$

The depreciation of a country currency affects the country become less attractive to invest and the cost of production also increased (Adam and Tweneboah, 2008). As referred to Aydemir & Demirhan (2009), if the domestic currency was depreciated, this may lead the demand of the domestic currency to decreases. Therefore, it will cause the foreign direct investment decreases. So, the stock prices drop when investors demand less on a stock. This negative relationship also proved in the research of Oskenbayev et al. (2011), Rahman et al. (2009) and Singh (2010). At the same time, studies of Brahmasrene and Jiranyakul (2007) shows that exchange rate have a negative impact with stock prices. Singh (2010) explained that when domestic currency depreciated the cost of production become larger. When producer cannot pass the cost to the consumer by increase goods price, company earned lesser and lead to the stock price to drops.

In contrary, there are some researchers found that the relationship between exchange rate and stock price is positive (Maysami et al., 2004; Frimpong, 2009). From the study of Frimpong (2009), the result showed exchange rate impact positively on stock price. He stated that a stronger domestic currency will lowers the cost of import and allows local producers to be more competitive globally. Thereby creating a favorable news observation on the stock market would results in generating positive returns on stocks. Studies of Maysami et al. (2004) indicated that the depreciation of currency can increase the export to other country. Hence, economy become well and the stock price tend to rise when profit of the company has increased.

However, Ibrahim and Yusoff (2001) noted that there can be negative and positive relationship between exchange rate and stock price. This is due to when exchange rate increases or in other words, currency depreciated, investments will reduces yet at the same time export increases. These two scenarios can happen at the same time and the effect on stock price movements is depending on which factor is more influential. If the amount

of export is more than the amount reduced in investments, the interaction between exchange rate and stock price is positive. But, if the amount reduced in investments more than amount earned in export, exchange rate can say has negative impact on stock prices. Although there are lots of researchers proved that exchange rate is significant in affecting stock price, but a research from Ali et al. (2010) stated that exchange rate is having no co-integration with stock price.

2.1.5 Consumer Price Index

Consumer price index measures the average price level changes of consumer goods and services, such as food, transportation, housing and etc. It is frequently used in identifying the inflation rate in a country over time, by comparing the price level in two or multiple periods (Bureau of Labor Statistic, 2007). From previous studies, there are many researchers found that consumer price index has significant impact on stock price and they have a reverse relationship. When the price of goods or services increases, the purchasing power of investors reduced. In this case, investors do not have more funds or excess money to invest in stock market and this will lead to the decline of stock prices. In contrast, when the price of goods decreases, the purchasing power of investors increased and they will have excess money in hand. Investors can invest in stock market and lead to the rises of stock prices.

According to Humpe and Macmillan (2009), consumer price index is significantly negative related to stock prices. They stated that negative impact of the consumer price index towards stock prices is indirectly, via the coefficient on industrial production. On top of that, they noted that results showed were broadly in line with the existing theory and evidence as it is consistent with previous researcher's studies. Besides, the studies of Al-Sharkas (2004) and Sohail and Hussain (2009) have the same empirical evidence with previous researchers. Al-Sharkas (2004) indicated

that the exists of a reverse relationship among the consumer price index and stock prices while Sohail and Hussain (2009) stated that stock prices showed significantly negative relations with consumer price index in long-run which suggested that stock market did not provide hedge against inflation.

Additionally, Ibrahim and Yusoff (2001) suggested where the inclusion of the price level in the study can increase and improve the predictability on Malaysian stock prices. This also indicated that the participation of price level or consumer price index in study is important. Other than that, they noted that Malaysian stock market movements contain information on the movement of consumer prices in future. From the studies of Frimpong (2009), the research proved that the relationship between consumer price index and stock prices are significantly negative related.

However, in a research of Adam and Tweneboah (2008), consumer price index is positively related and has significant impact. Although is contrary with previous studies, but the researcher mentioned that the stock market may be having a good hedge against inflation. In addition, the significant and positive relationship between consumer price index and FTSE also supported by a study of Ibrahim and Yusoff (2001). The researchers stated that Malaysia stock price is hedged against the inflation.

2.2 Review of Relevant Theoretical Models

All along the time, the relationships between macroeconomic variables and stock price movement were supported by macroeconomic theories. Those macroeconomic theories serve as the bases for this idea where there are relationships exist between them. There are few popular theoretical models being adopted in previous researches such as Arbitrage Pricing theory (APT) and Efficient Market Hypothesis (EMH).

2.2.1 Arbitrage Pricing theory (APT)

Arbitrage Pricing Theory (APT) is a single period model which introduced by Stephen Ross at 1976. It is a model which addresses the relationships between expected returns of assets and macroeconomic factors in linear functional form (Huberman & Wang, 2005). Arbitrage Pricing Theory holds the assumptions where the market is a frictionless and perfectly competitive, and investors believed that the assets returns are express in *k*-factors (Tho, 2009). In the research of Tho (2009), the researcher stated that Arbitrage Pricing Theory can be expressed in following form if follow the two assumptions:

$$R_j = E_j + b_{j1}F_1 + b_{j2}F_2 + \ldots + b_{jk}F_k + \mathcal{E}_j$$

Where R_j is the random rate of return for jth asset; E_j is expected rate of return on *j*th asset; b_{jk} is the sensitivity of jth asset to *k*-factor; F_k is the mean zero *k*th factor to the assets returns; $\mathcal{E}_j$ is non-systematic risk

When the market is come together with no arbitrage assumption, the formula can be derived as:

$$E_j = r_f + b_{j1}\beta_1 + b_{j2}\beta_2 + b_{j3}\beta_3 + \ldots + b_{jk}\beta_k$$

Where E_j is the expected return of an asset; r_f is the risk free rate, or the return of riskless asset, normally it is refers to Treasury bills; b_{jk} is the sensitivity between asset and *k* factor; β_k is the risk premium of the *k* factor

Ackalin et al. (2008) have mentioned in their research that Arbitrage pricing theory can uses to studies the macroeconomic variables and stock market's relationships. An early stage of this theory is used to tests the relationship between macroeconomic variables and stock index by using functional form. However, as stated in Brahmasrene and Jiranyakul (2007),

the Arbitrage Pricing Theory has a shortcoming which is it use risk free rate as constant rate.

2.2.2 Efficient Market Hypothesis (EMH)

Efficient Market Hypothesis was first introduced by Fama at 1970. In a study of Clarke, Jandik and Mandelker (n.d.), Efficient Market Hypothesis (EMH) can also call as Random Walk Theory. They stated that Efficient Market Hypothesis referred to the asset prices of a company is totally influences by the changes in company's information, which also means that the available information of the company are fully reflected in the company's asset prices. In this case, no investors can gain additional profit from the asset prices changes. Clarke et al. (n.d.) also mentioned in their study where it is very hard to earn abnormal profit according to Efficient Market Hypothesis (EMH).

Efficient Market Hypothesis (EMH) can classify into three categories which are strong form, semi-strong form and weak form (Clarke et al., n.d.). In weak form efficiency, the current asset prices are reflects the company historical information. Semi-strong form efficiency included the public information and historical information. The strong form efficiency included all the information available included historical, public and private information. For weak form and semi-strong form efficiency, investors unable to gain abnormal profit because all the information in hands are public and available to everyone, so the asset price is in fair value. In strong form efficiency, private information or known as insider information just available to individual inside the company and they cannot purchase their company share to earn abnormal profit with this information, it is an illegal manner. Thus, in any form of market efficiency, investors cannot gain any excess profit according to the theory of Efficient Market Hypothesis (EMH), as stated in the study of Clarke et al. (n.d.).

Besides, as mentioned in previous researches, Efficient Market Hypothesis is a theory where investors cannot make abnormal profit by just predict the future stock price. This is due to the theory indicates that in efficient market, the competition among investors will affects the information to be fully reflected on the stock price (Frimpong, 2009). Thus, it is impossible for investors to gains abnormal profit when the market is efficient and can track the new information very fast.

2.3 Proposed Theoretical/ Conceptual Framework

In this research project, we are going to use Capital Asset Pricing Model (CAPM) and Discounted Cash Flow model to serve as the basis for explaining the relationship between macroeconomic variables and stock prices. These theories are critical since it can support and give evidences on this research, because it shows how macroeconomics variables and stock prices can related to each other.

2.3.1 Capital Asset Pricing Model (CAPM)

Capital Asset Pricing Model (CAPM) is a model that uses to estimates or calculate the asset returns. CAPM was developed by William Sharpe in 1964 and John Lentner in 1965 (Fama & French, 2004). This model is based on the earlier model which introduced by Harry Markowitz in 1959 by adding two additional assumptions in Markowitz's model. The first assumption which added is the model has to be a complete agreement, which mean that the model can gives the stock price at time *t.* The second assumption in CAPM is the borrowing and lending rates are both using risk-free rate.

$$E(R_j) = R_f + \beta_{jM}[E(R_M) - R_f]$$

where $E(R_j)$ is the expected return on asset j; R_f is risk-free rate, normally it is referring to the interest rate for Treasury bills; β_{jM} is the market beta for asset j, which also referred to the risk premium of asset j; $E(R_M)$ is the expected market return of asset j; $[E(R_M) - R_f]$ is referred to the premium for one unit of β

From the model, it is assumed there is zero risk in Treasury bills. The model shows that the return of an asset is more influenced by the market beta or market risk of an asset. On the other words, higher risk can results in higher return. In the study of Fama and French (2004), the premium for one unit of β (market risk) will positive when risk free rate lower than expected market return.

2.2.2 Discounted Cash Flow Model

Discounted Cash Flow Model is uses to estimate the present value or current stock price by discounting back the company's future cash flow (Frimpong, 2009). This model indicates that the future cash flow of company is equivalent to the present value of the stock price. The model can be derived into following formula:

$$P = \sum_{t=1}^{n} \frac{CF_t}{(1 + RRR)^t}$$

Where P is the asset or security prices; CF_t is company's cash flow in future; RRR is the required rate of return of an asset or security

In the study of Frimpong (2009), he noted that the changes in cash flow will directly impact on the asset prices and there is an inverse relationship between asset prices and required rate of return. When required rate of return of asset increased, the asset price will drops. Thus, the cash flow of a company is important in determine the company stock price as well as a

country stock index. Besides, Frimpong (2009) also mentioned that the stock index in one country can be influenced by the determinants of economic growth. The determinants of economic growth can be money supply, inflation rate, exchanges rate and variables that can affect stock prices by influenced the company cash flow (Ibrahim & Yusoff, 2001).

2.4 Hypotheses Development

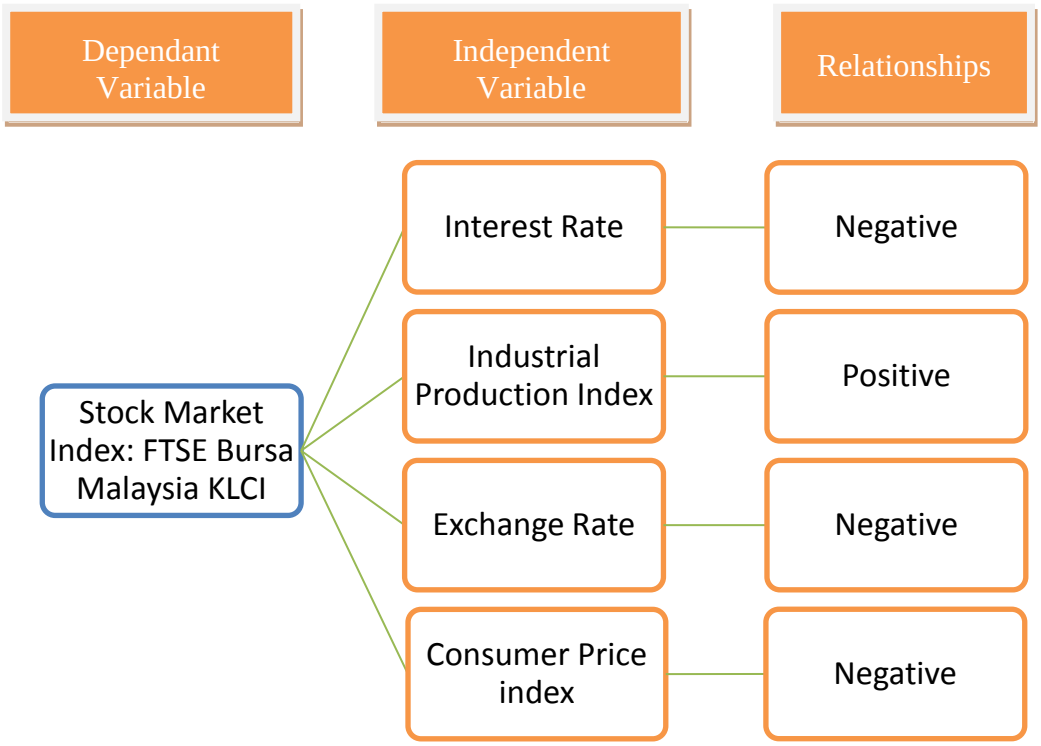

Diagram 1: Relationship between dependent and independent variables

This section discusses on the relationship between the dependent variable (FTSE) and the independent variables namely interest rate (IR), industrial production index (IPI), exchange rate (XRAT) and consumer price index (CPI). In addition, these hypotheses are supported by the theoretical framework provided in the previous researcher studies. Diagram 1 has illustrates the relationships between chosen macroeconomics variables and stock market index.

2.4.1 Interest Rate

H_0 : There is no significant relationship between interest rate and stock market index.

H_1 : There is significant relationship between interest rate and stock market index.

Hypothesis: Reject H_0, interest rate is significant and has a negative relationship with stock market index

2.4.2 Industrial Production Index

H_0: There is no significant relationship between industrial production index and stock market index.

H_1: There is significant relationship between industrial production index and stock market index.

Hypothesis: Reject H_0, industrial production index is significant and has a positive relationship with stock market index.

2.4.3 Exchange Rate

H_0 : There is no significant relationship between exchange rate and stock market index.

H_1 : There is significant relationship between exchange rate and stock market index.

Hypothesis: Reject H_0, exchange rate is significant and has a negative relationship with stock market index.

2.4.4 Consumer Price Index

H_0 : There is no significant relationship between consumer price index and stock market index.

H_1 : There is significant relationship between consumer price index and stock market index.

Hypothesis: Reject H_0, consumer price index is significant and has a negative relationship with stock market index.

2.5 Conclusion

Generally, this chapter is mainly discussing on the points of views from the previous researchers regarding the influences of independent variables on the dependent variable. Besides, various sort of theoretical frameworks that implemented by the previous researchers also been explained in this chapter. After reviewing previous researcher's studies, we have proposed our own theoretical frameworks that applied in this research project and running hypotheses based on the proposed frameworks. The following chapter is going to explain the methodologies implement in this research project include designing model, data collections, data analysis and so on.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In this chapter, we will discuss on the research methodologies that going to implement in this research project. Primarily, research methodology is a specification of a series of method used in data collection as well as data analysis. In the research design section, we are going to explain the type of data use in the research project. Meanwhile, we continue to state and cite the sources of the data collected. After that, the tools and software which we employed will cover in the research instrument section. At the same time, the stated methodology approaches used is adopted for testing the relationship between the dependant (FTSE) and the independent variables (macroeconomic variables). Then, we going to cover the data analysis of the research study and followed by conclusion of this chapter.

3.1 Research Design

Our research project uses the FTSE index as our dependent variables while macroeconomic variables such as interest rate (IR), industrial production index (IPI), exchange rate (XRAT) and consumer price index (CPI) have been chosen as our independent variables. All variables are quantitative data and this research project is considered as a quantitative research. In addition, this research project conducts as an exploratory research because it more relies on the secondary data resources. Moreover, exploratory research can determine and review the best research design, data collection method and sometime it even can conclude the problem that does not exist before. Lastly, we are going to examine and explain how significant and the relationship between the macroeconomic variables and FTSE based on the secondary source data we obtained.

3.2 Data Collection Methods

In this research project, we are going to adopt time series data to generate the result of relationship between dependent and independent variables. Basically, time series data is an ordered sequence of values or observations of a variable in at equally spaced time intervals. It is often arises when monitoring industrial processes or tracking corporate business metrics as well as using for many applications such as economic forecasting, sales forecasting, stock market analysis and many others.

Monthly basis time series data is collected and applied to examine the relationship. The time series data obtained is attached in appendices (Appendix 1-5). The sample period span of dependent and independent variables is taken from January 1997 to December 201l. This reserach is carried out by a total of 180 sample size. Chosen of monthly time series data instead of quarterly or annually time series data brings higher accuracy and clearer effect to the result of the research. The monthly data for dependent variable, FTSE index is collected from Yahoo Finance official website. Meanwhile, the date of other independent variables of 1-month deposit rate, exchange rate, industrial production index and consumer price index are collected from Data Stream.

3.2.1 Secondary Source Data

Data is deserved as the one of most important elements in a research project. Researches can be carry out in different fields which can conduct in different type of methodology, however, the researches is based on the data which is analyzed and interpreted in order to obtain information required. Generally, data can be classified into primary and secondary data. In this research study, secondary data is chosen as the input. Additionally, secondary data is collected from a source that already been published in any form, mostly like books, journals and periodicals.

Based on Boslaugh (2007), secondary source data are able to bring advantages to a research comparing to primary source data. One of the advantages working with secondary source data is cost saving because there are some other else has collected the data, so the researchers does not have to spend extra sources in their field of research. However, mostly of the secondary data set must be purchased, but the cost is certainly lower than the expense of transportation and salaries. Secondly, applying secondary source data is less time consuming since the data has collected by some other else and it has structurally stored in electronic format. Thus, the researchers do not have to spend extra time in data colleting and have more time to analyze the data. In this research, most of the secondary source data is obtained from journals, published articles and books. Additionally, internet data source like Google, Yahoo and specific official website also provide useful data for this research project.

3.3 Data Analysis

Ali et al. (2010) implemented their data analysis by using two main software programs which are Microsoft Excel and E-Views. As well as in this research study, we are employing the Microsoft Excel and the E-Views program as our research instruments in order to conduct data analyzing. Microsoft Office is business software which can helps us to do word processing, spreadsheets, presentation graphics, collaboration and customization. However, E-views is a statistical software which apply with the functions of forecast, modeling and powerful statistical.

As discussed above, our initial step in progressing research methodology is collecting the time series data of each variable. We collect time series data of the dependant (FTSE) and independent variables (macroeconomic variables) from Yahoo Finance and Data Stream respectively. After that, we sort the collected data into Microsoft Excel. Next, we import the Excel sheet into the Eviews program for data analysis. Various tests are adopted in order to examine the relationship

between the dependent variable and the independent variables. Lastly, the Eviews program shows us the result of relationship and the significant level of independent variables to the dependent variable.

However, we realized that during the period of 1997 to 2011, Malaysia Ringgit (MYR) was pegged with US Dollar (USD) at MYR3.80 per USD starting from September of 1998 until June of 2005 (Appendix 4.1 and 4.2). According to Hasan (2002), MYR was very volatile during the Asian financial crisis at year 1997 and this has forced the government to peg the MYR against the USD. On top of that, Malaysia had gained economic stability and improved its economic fundamentals with the fixed exchange rate between MYR and USD (Talib, n.d.).

In spite of this, we insist to adopt USD because it is the most important reserve currency in the world. In addition, the lending and debt settlement of a nation is denominated in USD (Forextraders, 2011). Thus, the exchange rate between USD and MYR is the most suitable exchange rate since the use of USD is more widely compare to other currency. Moreover, Mehta (2012) stated that Malaysia is remaining as leading exporter to US among the Asean countries. The statistics shows that by comparing to other major exporter such as Japan, the average export volume to US is much higher along the past 15 years (Appendix 6). Apart from that, US as the major trading partner of Malaysia is not just an export market for Malaysia, but it also provided sources like biotech, new technologies, venture capitalists and financial expertise (The Malaysian Insider, 2010).

In order to observe the effect of the independent variables (macroeconomic factors) on the dependent variable (FTSE), the general model is taking place as follow:

$$LNFTSE_t = \beta_1 IR_t + \beta_2 LNIPI_t + \beta_3 XRAT_t + \beta_4 LNCPI_t + \varepsilon_t$$

where	*LN*FTSE	=	Log of FTSE Bursa Malaysia KLCI index
	IR	=	Interest Rate (1-month Deposit Rate)
	*LN*IPI	=	Log of Industrial Production Index
	XRAT	=	Exchange Rate (MYR against USD)

*LN*CPI = Log of Consumer Price Index

β_0 is the intercept value; other βs are the coefficients and measures the change in dependent variable with the respect to each independent variable

Using a model for logs is more beneficial because the variance changes in the logs series model is more stable compared to the original series model (Cagli et al., 2010; Frimpong, 2009). However, according to Simon Fraser University (n.d.), IR and XRAT are excluded in transforming into natural logarithm form because both variables are fluctuating in around a certain level. Therefore, out of IR and XRAT, the rest of the variable including FTSE are transforming into natural logarithm.

As the equation stated above, we evaluate the relationship between both dependent variable and independent variables by conducting several tests which included unit root test, Johansen cointegration test and the error correction model. The following is the introduction of those tests.

3.3.1 Unit Root test

Unit root test is used to test whether the time series variables is stationary or non-stationary, or find out the data trend from a model's variables. The variables tested by applying an autoregressive model (University of Washington, n.d.). The favorable outcome of unit root test is the time series is stationary.

For a stationary time series, its autocovariance, mean and variance are unchanged over time (Gujarati, 2003). If the result of variables obtained is non-stationary, then the behavior of time series data just can study or examine for particular time period. Thus, it is not applicable to other periods, and it is impossible to observe the trend of non-stationary time series data in more than one period (Gujarati, 2003). For example, in this

research, we examine the relationship within fifteen years. Therefore, it is important to have a stationary time series data in order to proceed to Johansen Cointegrating test and Error Correction Mechanism. There are few types of unit root tests. The most frequently used is Augmented Dickey-Fuller (ADF) test followed by Phillips-Perron (PP) test.

(i) Augmented Dickey-Fuller (ADF) test

Augmented Dickey-Fuller test is revolute from Dickey-Fuller test and it is usually uses to tests for large sample size and more complicated model. This test was developed by David Dickey and Wayne Fuller at 1984 and the regression for the test is (University of Washington, n.d.):

$$y_t = \beta' D_t + \emptyset y_{t-1} + \sum_{j=1}^{p} \varphi_j \Delta y_{t-j} + \varepsilon_t$$

where y_t is refers to I (1) which also means that $\emptyset$=1; D_t is vector of deterministic terms; Δy_{t-j} use to approximate ARMA structure of error, p is lagged different terms, which set to make sure the error is uncorrelated; ε_t is error term, which assumed homoskedastic.

(ii) Phillips-Perron (PP) test

This test was developed by Peter Phillips and Pierre Perron at 1988. The difference between Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests is PP test can overcome the serial correlation problem as well as heteroskedasticity. The regression of PP test is as follow (University of Washington, n.d.):

$$\Delta y_t = \beta' D_t + \pi y_{t-1} + \mu_t$$

Where Δy_t is I (0), it implies that π is equals to zero; D_t is vector of deterministic terms; μ_t can referred I (0) and it may be heteroskedasticity.

3.3.2 Johansen Cointegration test

The main function of cointegration analysis is to test the equilibrium or long run relationship between the dependent variable and the independent variables in various research studies previously. If long run associationship existed among series data, the variables are considered cointegrated (Sohail & Hussain, 2009; Acikalin et al., 2008).

In order to find out the existence and number of long run cointegrating relationship among variables, Johansen cointegrating procedure is applied. By adopting the Johansen method, we have to consider all series data are endogenous which expressed in a simple linear function with lagged value in each series data at specify critical value. Meanwhile, the procedure is based on maximum likelihood and give Trace Value test and Maximum Eigen Value test statistic in detecting the number of cointegrating vectors or as known as cointegrating relationships in the model (Sohail & Hussain, 2009). The Johansen procedure is explain as follow equation:

$$y_t = A_0 + \sum_{i=1}^{k} A_j y_{t-i} + \varepsilon_t$$

where A_0 is an ($n \times 1$) vector of constant, y_t is an ($n \times 1$) vector of non-stationary variables, k is the number of lags, A_j is a ($n \times n$) matrix of coefficient and ε_t is assumed to be a ($n \times 1$) vector of Gaussian error terms (Sohail & Hussain, 2009).

3.3.3 Error Correction Model (ECM)

Once the cointegrating relationship between dependent and independent variable has been defined in the cointegration test, the next step is to proceed with the estimation of error correction model. Gujarati (2003) stated that although the variables are cointegrated or equilibrium in long run, but there may be disequilibrium during short run. However, the error correction process enable a proportion of disequilibrium in one period is corrected in the next period. On the other hand, it is also means that the changes in dependent variable is relates to the past period disequilibria. Thus, a general equation for ECM is expressed as follow:

$$\Delta Y_t = \propto_0 + \propto_1 \Delta X_t - \propto_2 \hat{u}_{t-1} + \varepsilon_t$$

where α_1 is denote short run elasticity on the change in X_t and thus affect Y_t, $\hat{u}_{t-1}$ is the one-period lagged value of error correction term with its coefficient, α_2 which denoting the speed of adjustment to long run equilibrium and ε_t is the random error term (Gujarati, 2003; Frimpong, 2009).

3.4 Conclusion

Generally, this chapter is outlined the research methodology used in this research project. We applied quantitative technique and exploratory research in conjunction with our research objective. Monthly time series data set like FTSE index figure and macroeconomic variables data set are collected from Data Stream as well as specific financial official website. Moreover, several tests include Augmented Dickey-Fuller test, Phillip Perron test, Johansen Cointegration test and Error Correction Model are taking place to run data analysis and it will be further discuss in the following chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, we are going to interpret the analysis results based on the research methodology that discussed in the previous chapter. In addition, we also going to explore and explain the relationship between the dependent variable (FTSE) and the independent variables (IR, IPI, XRAT and CPI). The results are obtained from the research methodologies approach which including unit root test, cointegration test and error correction model (ECM). All the stated econometric tests are running and done by E-views application. As the conclusion of the chapter, we are concluding the test results that we obtained from the respective tests.

4.1 Unit Root test

Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test have been applied to examine the stationarity of each time series data by using E-view software. We are running both unit root tests by examining the lag length using Akaike Information Critiria (AIC) and 5 maximum lag lengths is chosen. In this case, we are testing both intercept and intercept plus time trend for the level and first difference in both ADF and PP tests. The results of ADF and PP test are described in Table 4.1.

Table 4.1 Unit Root Test

Variables		Augmented Dickey-Fuller		Phillips-Perron	
		Intercept + Trend	Intercept	Intercept + Trend	Intercept
LNFTSE	Level	-4.562463 * (0.0016)	-1.530113 (0.5162)	-4.188492 * (0.0057)	-1.705916 (0.4266)
	First Difference	-7.352882 * (0.0000)	-7.232614 * (0.0000)	-14.48114 * (0.0000)	-13.71745 * (0.0000)
IR	Level	-2.311603 (0.4251)	-2.010160 (0.2823)	-2.317132 (0.4221)	-1.967495 (0.3011)
	First Difference	-9.336445 * (0.0000)	-9.309192 * (0.0000)	-11.05616 * (0.0000)	-11.03461 * (0.0000)
LNIPI	Level	-1.704086 (0.7456)	-1.489278 (0.5369)	-2.402174 (0.3772)	-1.428551 (0.5674)
	First Difference	-15.42491 * (0.0000)	-15.47023 * (0.0000)	-21.02352 * (0.0000)	-21.06352 * (0.0000)
XRAT	Level	-4.159273 * (0.0063)	-3.220229 (0.0204)	-4.159273 * (0.0063)	-3.220229 (0.0204)
	First Difference	-13.91002 * (0.0000)	-13.69271 * (0.0000)	-13.91002 * (0.0000)	-13.69271 * (0.0000)
LNCPI	Level	-2.677964 (0.2471)	-0.407429 (0.9041)	-2.745035 (0.2200)	-0.515719 (0.8840)
	First Difference	-9.382986 * (0.0000)	-9.410084 * (0.0000)	-9.382986 * (0.0000)	-9.410084 * (0.0000)

Notes: The value in bracket is refer as probability value (p-value); The sign * indicate that statistical significance at 1%; Value is based on Mackinnon-Haug-Michelis (1999) p-values.

4.1.1 Augmented Dickey-Fuller (ADF) test

Initially, there are two elements that include in the test equation namely intercept and intercept plus trend which applying to examine the existence of unit root of each series data whether at level form or first-differencing.

By the way, we are adopting the intercept and intercept plus trend in running the Augmented Dickey- Fuller test.

Analytically, the result obtained from the Table 4.1 showing that each of the series in intercept and intercept plus trend at level form is appear with the presence of unit root or said that the series data are non-stationary data at 1% significant level excluded FTSE and XRAT when testing with the intercept plus trend. Thus, all of the series have to test for the first - differencing in order to obtain stationary. Based on the result of first-differencing in ADF test, all series are rejecting the null hypothesis and resulted that all series are stationary with the absence of unit root when testing with 1% level of significant.

We concluded that all series namely LNFTSE, IR, LNIPI, XRAT and LNCPI are stationary when testing for the first-differencing in the ADF test. Thus, all series are consider integrated of order one, I (1).

4.1.2 Phillips-Perron (PP) test

Similar with ADF test, there are two elements that examine the level of stationary of each series and we adopted both intercept and intercept plus trend in running PP test.

The result from PP test shows the result as similar as ADF test. Every series at level form do not reject null hypothesis at 1% significant level and resulted that all series are non-stationary with the existence of unit root except LNFTSE as well as XRAT which resulted to reject null hypothesis when testing on intercept plus trend. All series have to proceed to first-differencing in order to obtain stationary. The PP test results show that all series at first-differencing tend to reject null hypothesis at 1% significant level when testing on first-differencing and obtain stationary with the absence of unit root.

To conclude the result from PP test, all series namely LNFTSE, IR, LNIPI, XRAT and LNCPI have obtained stationary at first differencing. Thus, all series are considered integrated of order one, I (1) in PP test. All series are obtaining stationary when testing the first-differencing in both ADF and PP test and we can summaries that all series are integrated of order one, I(1) in testing unit root test.

4.2 Johansen Cointegration Test

After tested for the level of stationary of each variable in unit root test, the next step is involve estimating and determining the number of long run relationship in our model. We determine the number of long run association ship by examining the Johansen Cointegration test with estimate by the lag length of 5. The result of Johansen Cointegration test is showing in the Table 4.2.

Table 4.2 Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace & Maximum Eigen-value)

Null Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
None	115.7700 *	69.81889	57.47061 *	33.87687
At most 1	58.29939 *	47.85613	24.83116	27.58434
At most 2	33.46824 *	29.79707	21.87595 *	21.13162
At most 3	11.59228	15.49471	11.54749	14.2646
At most 4	0.044794	3.841466	0.044794	3.841466

Note: The null hypothesis for these two tests is the data generated are not cointegrated. Trace test indicate 3 cointegrating equations at 5% level while Maximum Eigen-Value test indicate 1 cointegrating equation at 5% level. * denotes the rejection of null hypothesis at 5% level; Refer to Appendix 7.0 & 7.1.

Table 4.2 indicate that the Trace and Maximum Eigen-value statistics recognized three cointegrating vectors and one cointegrating vector respectively at 5% level

of significant among all these variables namely LNFTSE, IR, LNIPI, XRAT and LNCPI.

However, we are accepting the Maximum Eigen-value statistic which recognized one cointegrating vector to estimate the long run relationship. Additionally, we able to fulfill the objective of this research study which examine the relationship between the dependent variable and the independent variables by recognized there is only one cointegrating vector. Thus, the general long run normalized relationship between FTSE and other independent variables as follow:

$$LNFTSE_t + \beta_1 IR_t + \beta_2 LNIPI_t - \beta_3 XRAT_t - \beta_4 LNCPI_t = 0$$

In order to obtain the accurate and correct sign of each independent variable to dependent variable, we have to move the independent variables namely IR, LNIPI, XRAT and LNCPI from the left-hand side to the right-hand side. This also means that we have to reverse the signs of the estimated coefficients of independent variables except the dependent variable. Therefore, in our case, the estimated long run equation is as follow (Appendix 6.1):

$$\underset{}{LNFTSE_t} = \underset{(0.16872)}{-0.028819 IR_t} + \underset{(1.82539)}{3.102990 LNIPI_t} - \underset{(0.61392)}{4.825048 XRAT_t} - \underset{(3.73601)}{15.76985 LNCPI_t}$$

The value in bracket is indicating standard error. From the equation above, we found that IR, XRAT and LNCPI are having negative relationships whereas LNIPI is having positive relationship with the stock market index. In conclude, these interactions are consistent with the research hypotheses.

4.3 Error Correction Model (ECM)

Since we explore that there are existence of cointegrating relationship among all the variables which indicate that error correction model can be applied to test on the dynamic relationship in short run. Error correction model (ECM) is describing the short run dynamic and adjustment toward the long run equilibrium path (Frimpong, 2009). In this research project, we are conducting ECM by applying least square method which includes an error correction term to estimate an equation. To investigate the short run relationship, we estimated the model by using an optimal lag length of 1. Thus, the ECM results and the short run equation are illustrated as follow:

Table 4.3 Error Correction Model

Variable	Coefficient	Standard Error	t-Statistic	Probabilities
ECM(-1)	-0.102389	0.048995	-2.089769 **	0.0381
ΔLNFTSE(-1)	0.223405	0.087431	2.555215 **	0.0115
ΔIR(-1)	-0.051655	0.018854	-2.739729 *	0.0068
ΔLNIPI(-1)	-0.183477	0.105674	-1.736261 ***	0.0843
ΔXRAT(-1)	0.100099	0.055282	1.810706 ***	0.0719
ΔLNCPI(-1)	1.061558	1.305300	0.813268	0.4172
C	-0.002631	0.006006	-0.438073	0.6619

R-squared	0.148431	Mean dependent var	0.001046
Adjusted R-Squared	0.118551	S.D. dependent var	0.075980
S.E. of regression	0.071334	Akaike info criterion	-2.404362
Sum squared resid	0.870135	Schwarz criterion	-2.279236
Log likelihood	220.9882	Hannan-Quinn criter.	-2.353620
F-statistic	4.967632	Durbin-Watson stat	2.114263
Prob(F-statistic)	0.000103		

Note: Δ denotes the first-differencing of series. Dependent variable is ΔLNFTSE. (-1) represent the one lagged value of these series. *, ** and *** indicate statistical significant at 1%, 5% and 10% respectively; Refer to Appendix 8.0.

$$\Delta LNFTSE_t = -0.002631 + 0.223405\Delta LNFTSE_{(t-1)} - 0.051655\Delta IR_{(t-1)} - 0.183477\Delta LNIPI_{(t-1)} + 0.100099\Delta XRAT_{(t-1)} + 1.061558\Delta LNCPI_{(t-1)} - 0.102389ECM(-1)$$

The table and equation above is reporting the result of ECM. The sign and coefficient of ECM is explaining that the direction and the speed of adjustment in long run equilibrium (Frimpong, 2009). Based on the result, ECM is negatively and significantly affected the current stock market prices at 5%. It is consistent with the previous studies which stated that the error correction coefficient should be negative and significant. The researcher, Frimpong (2009) explained that a negative sign means that the deviation of model from long run relation can be corrected by an increase in dependent variable, provided variance is equals to zero independent variables. In our case, the coefficient of ECM is corrected to the long run disequilibrium with the adjustment of 10% every month which equivalent to approximately ten months (1/0.10=10) in order to achieve long run equilibrium.

The ECM results show that the lag of ΔLNFTSE has a positive and significant result to the current stock market prices. In addition, IR is maintained it negative relationship and it is significantly affect the current FTSE at 5% level. Although IPI is significant at 10% level, but it has negative relationship with current FTSE, so it is not consistent with the previous research study. The lag of exchange rate and consumer price index are not significant to the current stock market prices. At the same time, both variables also do not have the correct theoretical relationship to the current FTSE.

4.4 Conclusion

As conclusion, this chapter is interpreting the outputs from the various research methodology approaches such as unit root test, Johansen cointegration test as well as Error Correction Model (ECM). The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test examine the stationary of the series data and resulting that all series data is integrate of order one, I(1). The results allow us to proceed to

the Johansen Cointegration test. The Johansen Cointegration test shows the existence of three cointegrating vectors that describe the relationship between the dependent variable, FTSE and the independent variables namely IR, IPI, XRAT and CPI. However, we are only select one cointegrating vector as our model in order to fulfill the objective of this research project. In addition, the result of ECM test which been used to examine the short run relationship between dependent and independent variables has showed in this chapter. Lastly, a general conclusion is going to be drawn in the following chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

On previous chapter, we investigated the relationships between macroeconomic variables and Malaysia's stock index by adopting unit root test, Johansen Cointegrating test and Error Correction Model. Under this chapter, we will discuss on the findings from previous chapter to verify the research objectives and hypothesis testing of this study. Besides, implications of study will also cover under this chapter, and then followed by the limitations and recommendations of the study. Finally, this chapter also summarizes the whole research project, after reviewed the research objectives, discussed on previous researches and examined the relationships between stock index and macroeconomics variables.

5.1 Summary of Statistical Analyses

Table 5.1 Summary of Statistical Analyses

	Hypothesis	Coefficient	Conclusion
i.	IR has significant and negative relationship with FTSE	-0.028819	Reject
ii.	IPI has significant and positive relationship with FTSE	3.102990***	Support
iii.	XRAT has significant and negative relationship with FTSE	-4.825048*	Support
iv.	CPI has significant and negative relationship with FTSE	-15.76985*	Support

Note: * and *** denote 1% and 10% level of significant respectively; Refer to Appendix 7.1.

From table 5.1, the results showed all variables are consistent with research hypotheses, except IR. After tested, we found out IR has no significant effect on FTSE while IPI, XRAT and CPI has significant relationship with FTSE. Although IR does not have significant effect on FTSE, yet there is inverse relationship between IR and FTSE. For the rest of independent variables, IPI is positively affected FTSE at 10% level of significant, whereas XRAT and CPI are negatively related with FTSE at 1% level of significant.

5.2 Discussion of Major Findings

This research project is aimed to examine the relationships between Malaysian stock market and macroeconomic variables such as interest rate (IR), industrial production index (IPI), exchange rate (XRAT) and consumer price index (CPI). The findings shown are consistent with our hypotheses except IR where it has insignificant negative relationship with FTSE. Apart from this, IPI has significant positive relationship with FTSE, whereas XRAT and CPI have significant negative relationship with FTSE.

In this research project, we adopted deposit rate as representatives of interest rate. The relationship between IR and FTSE is inconsistent with hypothesis which stated interest rate has significant and negative relationships with FTSE. Although the result showed insignificant relationship, but it is supported by some existing researches where these researchers also found that there is no significant relationship between deposit rate and stock prices (Pal & Mittal, 2011). The researcher, Alam and Uddin (2009) also has similar result where deposit rate does not impact the stock market movements in Malaysia but have inverse relationship. Therefore, it gives us an implication where investors in Malaysia do not value it as important factors or deposit rate in Malaysia is too low.

Industrial Production index in this research is referring to Malaysia’s real economic activity. The results showed consistent with research hypothesis that stated IPI has positive and significant relationships with FTSE. The results also

consistent with previous studies (Singh, 2010; Rahman et al., 2009; Humpe & Macmillan, 2007) where IPI is significantly positive related with stock index. A healthy economy usually having higher IPI, and it also implied that stock market condition is in healthy (Singh, 2010). The positive relationship in our result highlighted that higher industrial output can generate more return to company, and this will attract more investors to invest in the company. Hence, stock prices rise as demand for company share increased. This also proved that IPI is an important determinant in stock prices changes because it represents the economic activity and its effect on stock prices is directly related.

Exchange rate expressed as the strength of a country currency against foreign currency, in this case, MYR against USD. The findings indicating XRAT has negative and significant impact on FTSE and it is consistent with our research hypothesis. A negative relationship between XRAT and FTSE is due to investors are prefer to invest in country that has stronger currency value. When exchange rate increased or MYR depreciated against USD, it implies that Malaysia will become less attractive to invest compare to other countries (Adam and Tweneboah, 2008). Apart from that, when Malaysia's currency depreciated, the cost for imported on raw material also increased. Thus, an increase in exchange rate can increase the cost of production of a company. Rising in cost of production may be contribute to inflation of product prices and indirectly affected stock market towards unfavorable directions.

Consumer price index sometime can also referred to inflation rate of a country. Similar with the result of XRAT, the findings of CPI is consistent with hypothesis where it affected FTSE negatively and significantly. The negative relationship between CPI and FTSE is supported by Humpe and Macmillan (2009), Al-Sharkas (2004), Sohail and Hussain (2009) and etc. In case CPI or inflation raise, this can lower the purchasing power of investors, and they have to scarify the fund for investment and spend on consumption. This has explained the inverse relationship between CPI and FTSE.

5.3 Implications of the Study

5.3.1 Managerial Implications

This research can help investors and policy makers to have a better understanding on the relationships between stock market in developing country and macroeconomic variables Based on the results which discussed on previous sections, it implied that IPI, XRAT and CPI do have potential impact on stock index while IR does not. The finding of IR indicated that investors and policy makers do not have to pay much attention on the changes in deposit rate since the fluctuation of deposit rate would not have significant effect on FTSE. Thus, investors and policy makers should be more concern on the movement of IPI, XRAT and CPI.

The findings suggested that an increase in IPI can motivate the stock index to growth due to investors expected for higher future dividend (Hussainey & Ngoc, 2009). When industrial generate higher output, investors are encouraged to demand more on stocks since the economic is in well performance. For policy makers, the main thing they have to concern is the decline of IPI, because it brings the effect where the companies' future dividend will decrease and investors tend to demand lesser on share and lead to stock index to decrease. In this case, applying suitable monetary policy may boost the industrial production index.

On the other hand, the result indicates that there is significant negative relationship between exchange rate and FTSE. If the exchange rate increases or Malaysia Ringgit depreciated, FTSE will decreases. Adam and Tweneboah (2008) mentioned in their research that depreciation of a country currency will make the country become less attractive to invest. This has affected the stock index of Malaysia to decrease because foreign investment reduced. However, at the same time, export increased because foreigners can purchase cheaper domestic goods (Ibrahim & Yusoff, 2001).

This implied that policy maker can stimulate the net export since rising export generated positive return on stock market.

Apart from that, CPI or inflation also shows significant negative impact on FTSE since inflation occurred can reduce the purchasing power of consumers as well as investors. Thus, the result support the idea where policy maker should have a good hedging strategy in order to minimize the losses incurred during inflation. The result also indicated inflation is not a good phenomenon because it constrains the growth of stock market. In order to prevent the rising of financial losses, policy maker should adopt suitable monetary policy when inflation occurred.

5.4 Limitations of the Study

There are various sorts of macroeconomics variables in reality. Nevertheless, we could not implement all the macroeconomic variables into this research paper to test their determinants on the Malaysian stock index. This is due to we could not plug in too much of macroeconomic variables in a same model, as it would cause the model to become very complexity. On top of that, it might lead to the outcomes showed become not reliable and affect the accuracy of the research paper. Hence, we could only chose four macroeconomic variables to apply in this research to ensure the accuracy of the results.

Other than that, the daily data definitely will increase the accuracy of the results compared to monthly and yearly data. However, there are many macroeconomic variables cannot obtain the daily data. This is due to the effect of the macroeconomic variables can only be examined over a long period of time. In spite of this, there are still existing some of the macroeconomic variables which can be traced the daily data. In this paper, we use 1 month deposit rate as one of the independent variables hence we need to align the time period with other independent variables. As a result, we can only use the monthly data but not daily data.

At the same time, data that we collected to examine the relationship between dependent variables and independent variables is falls between year 1997 and year 2011. During year 1997, an Asian financial crisis has been occurred (Nanto, 1998). The economy of most countries in Asia included Malaysia were affected by the crisis. Moreover, the economy circumstances in Malaysia was being affected and suffered a great impact of loses due to the subsistence of Asian financial crisis. Apart from that, US subprime crisis also occurred in year 2007. Thus, the data collected during year 1997 and year 2007 might affected the outcome of this research paper as the crisis has influenced the economy. Hence, it may lead to a dissimilar outcome as if the impacts brought by data of pre-crisis and post-crisis are huge enough.

5.5 Recommendations for Future Research

In this research paper, we only use IR, IPI, XRAT and CPI as the independent variables. Therefore, we recommended future researchers to implement other macroeconomic variables in their research in order to investigate the impact of the macroeconomic variables on the stock market movement.

Besides, we suggest future researchers to test on the macroeconomic variables which are able to collect the daily data and apply into the statistical model. This is because it can increase the accuracy of the results. In the econometric theory, increasing the sample size will lead the estimator become unbiased (Seddighi, Lawler and Katos, 2000). Since we used the monthly data basis in this research hence the numbers of observation definitely do not larger than the daily data basis.

Additionally, we also recommend future researchers to examine whether there is diverse result if selected separate data of pre-crisis and post crisis. A dissimilar outcome may present as the data of pre-crisis and post crisis would influence the economy circumstances. Thus, by selecting different data period of pre-crisis and post-crisis, future researcher could investigate whether period of data selected would bring an impact to the emerging stock market.

5.6 Conclusion

In this research project, the main objective is to examine the relationship between FTSE and macroeconomics variables such as interest rate (IR), industrial production index (IPI), exchange rate (XRAT) and consumer price index (CPI). After reviewed previous studies which related with this topic, we defined our hypotheses where IR, XRAT and CPI should have significant negative relationship with FTSE and IPI has significant positive relationship with FTSE. In order to verify the objective and hypotheses, unit root test, Johansen Cointegrating test and ECM have adopted in this research.

The results showed are consistent with the hypotheses and we achieved the objective in this research where we found out there are relationships exists between macroeconomics variables and Malaysia's stock index. The relationships of IPI, XRAT and CPI are all consistent with hypotheses except IR. IR shows insignificant result, which means that it does not bring an essential impact to the stock market movement in Malaysia. From our results, we found out the changes of the macroeconomic variables can be use to forecast the future stock market movements. Therefore, this research enables government, investors, academicians and the corporate investors to have a better decision making on investment. Besides, it is also help to improve the knowledge regarding the relationship between macroeconomic variables and Malaysia's stock index.

As conclusion, the impact given by macroeconomic variables to the stock index in developing country, Malaysia are consistent with theories and previous studies. We hope that the findings in this research can contribute to government and investors. In spite of there are limitations in this research, but that also provides an idea and recommendations for future research.

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Appendices

Time Series Data

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	1216.72	1270.67	1203.1	1080.17	1104.83	1077.3
1998	569.51	745.36	719.52	625.97	538.24	455.64
1999	591.43	542.23	502.82	674.96	743.04	811.1
2000	922.1	982.24	974.38	898.35	911.51	833.37
2001	727.73	709.39	647.48	584.5	572.88	592.99
2002	718.82	708.91	756.1	793.99	741.76	725.44
2003	664.77	646.8	635.72	630.37	671.46	691.96
2004	818.94	879.24	901.85	838.21	810.67	819.86
2005	916.27	907.38	871.35	878.96	860.73	888.32
2006	914.01	928.94	926.63	949.23	927.78	914.69
2007	1189.35	1196.45	1246.87	1322.25	1346.89	1354.38
2008	1393.25	1357.4	1247.52	1279.86	1276.1	1186.57
2009	884.45	890.67	872.55	990.74	1044.11	1075.24
2010	1259.16	1270.78	1320.57	1346.38	1285.01	1314.02
2011	1519.94	1491.25	1545.13	1534.95	1558.29	1579.07

Appendix 1.0: First semi-annual FTSE from year 1997 to 2011 (Source: Yahoo Finance)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	1012.84	804.4	814.57	664.69	545.44	594.44
1998	402.65	302.91	373.52	405.33	501.47	586.13
1999	768.69	767.06	675.45	742.87	734.66	812.33
2000	798.83	795.84	713.51	752.36	729.95	679.64
2001	659.4	687.16	615.34	600.07	638.02	696.09
2002	721.59	711.36	638.01	659.57	629.22	646.32
2003	720.56	743.3	733.45	817.12	779.28	793.94
2004	833.98	827.98	849.96	861.14	917.19	907.43
2005	937.39	913.56	927.54	910.76	896.13	899.79
2006	935.85	958.12	967.55	988.3	1080.66	1096.24
2007	1373.71	1273.93	1336.3	1413.65	1396.98	1445.03
2008	1163.09	1100.5	1018.68	863.61	866.14	876.75
2009	1174.9	1174.27	1202.08	1243.23	1259.11	1272.78
2010	1360.92	1422.49	1463.5	1505.66	1485.23	1518.91
2011	1548.81	1447.27	1387.13	1491.89	1472.1	1530.73

Appendix 1.1: Second semi-annual FTSE from year 1997 to 2011 (Source: Yahoo Finance)

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	7.1	7.1	7.1	7.1	7.2	7.5
1998	8.2	8.2	8.5	8.8	9.3	9.75
1999	5.5	5.5	5	4	3.75	3.75
2000	3.25	3.2	3.2	3.2	3.2	3.2
2001	3.45	3.45	3.45	3.45	3.45	3.45
2002	3.2	3.2	3.2	3.2	3.2	3.2
2003	3.2	3.2	3.2	3.2	3.2	3.2
2004	3.2	3.2	3.2	3	3	3
2005	3	3	3	3	3	3
2006	3.1	3.1	3.1	3.1	3.1	3.1
2007	3.1	3.1	3.1	3	3	3
2008	3	3	3	3	3	3
2009	2.5	2	2	2	2	2
2010	2	2	2.25	2.25	2.5	2.5
2011	2.15	2.15	2.15	2.15	2.3	2.3

Appendix 2.0: First semi-annual 1-month deposit rate from year 1997 to 2011

(Source: Data Stream 5.1)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	7.8	7.3	7.5	8.1	8.7	8.2
1998	10.3	9.5	6	6	5.7	5.7
1999	3.75	3.75	3.75	3.25	3.25	3.25
2000	3.2	3.45	3.45	3.45	3.45	3.45
2001	3.45	3.45	3.45	3.2	3.45	3.45
2002	3.2	3.2	3.2	3.2	3.2	3.2
2003	3.2	3.2	3.2	3.2	3.2	3.2
2004	3	3	3	3	3	3
2005	3	3	3	3	3	3.1
2006	3.1	3.1	3.1	3.1	3.1	3.1
2007	3	3	3	3	3	3
2008	3	3	3	3	3	3
2009	2	2	2	2	2	2
2010	1.85	1.85	1.85	1.85	2.15	2.15
2011	2.3	2.3	2.3	2.3	2.3	2.3

Appendix 2.1: Second semi-annual 1-month deposit rate from year 1997 to 2011

(Source: Data Stream 5.1)

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	63.3	59.7	62.7	65.6	67.3	63.2
1998	64.1	57.5	62.7	63	61.7	59.4
1999	56.2	59.3	64.5	65.7	65.6	65.1
2000	72.4	72.4	80.6	74.6	80.1	80.8
2001	77	74.5	78.4	77.2	76.5	74.8
2002	79.4	70.3	80	78	76.7	80
2003	83.7	77.2	87.6	86.8	87.7	87.3
2004	93.5	91.3	99.4	97	97.7	96.9
2005	97.9	90.7	105	98.9	98.8	100.2
2006	102.6	97.8	110.2	103.4	104.9	107
2007	105.7	95.5	108.2	104.5	107.4	105.8
2008	116	105	111.5	109.3	110	108.2
2009	95.6	92.1	97.4	96.6	97.9	97.9
2010	108.1	96.5	111.1	106	110.5	106.9
2011	108.6	100.8	113.8	105.8	104.3	108.2

Appendix 3.0: First semi-annual industrial production index from year 1997 to 2011 (Source: Data Stream 5.1)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	68.7	67.9	66.6	69.9	67.1	69
1998	68.7	60	59.4	62.3	58.8	62.4
1999	68	68	71.8	70.9	71.6	73.9
2000	81.7	83.6	82.9	81.9	82.7	79.9
2001	80	77.9	76.1	78.4	76	74.9
2002	85.1	84.9	83.5	85.1	81.9	80.1
2003	89.6	89.6	89.6	90.9	88.5	95.1
2004	100.1	100	97.9	100.8	92.8	100.5
2005	101.8	104	104.3	106.3	100.5	102.2
2006	108.2	109.3	107.5	104.2	107.9	108.3
2007	109	109	108.3	108.8	110.1	115.1
2008	114.2	111	107.2	105.9	101.7	96.9
2009	105.2	103.2	100.7	106.9	101.5	104.2
2010	108.2	107.4	106.5	109.7	105.8	108.8
2011	107.7	111.3	109.7	112.8	107.6	112.1

Appendix 3.1: Second semi-annual industrial production index from year 1997 to 2011 (Source: Data Stream 5.1)

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	2.4862	2.4838	2.479	2.5144	2.514	2.5235
1998	4.545	3.675	3.643	3.7365	3.8785	4.175
1999	3.8	3.8	3.8	3.8	3.8	3.8
2000	3.8	3.8	3.8	3.8	3.8	3.8
2001	3.8	3.8	3.8	3.8	3.8	3.8
2002	3.8	3.8	3.8	3.8	3.8	3.8
2003	3.8	3.8	3.8	3.8	3.8	3.8
2004	3.8	3.8	3.8	3.8	3.8	3.8
2005	3.8	3.8	3.8	3.8	3.8	3.8
2006	3.751	3.7135	3.686	3.6255	3.629	3.675
2007	3.5015	3.506	3.456	3.423	3.4045	3.4545
2008	3.236	3.189	3.1875	3.158	3.2435	3.2665
2009	3.6085	3.6925	3.647	3.561	3.5075	3.5225
2010	3.413	3.409	3.273	3.1905	3.253	3.2575
2011	3.0595	3.0515	3.0259	2.9735	3.0115	3.0205

Appendix 4.0: First semi-annual exchange rate from year 1997 to 2011 (Source: Data Stream 5.1)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	2.636	2.962	3.1975	3.437	3.501	3.89
1998	4.1425	4.22	3.8	3.8	3.8	3.8
1999	3.8	3.8	3.8	3.8	3.8	3.8
2000	3.8	3.8	3.8	3.8	3.8	3.8
2001	3.8	3.8	3.8	3.8	3.8	3.8
2002	3.8	3.8	3.8	3.8	3.8	3.8
2003	3.8	3.8	3.8	3.8	3.8	3.8
2004	3.8	3.8	3.8	3.8	3.8	3.8
2005	3.7505	3.7698	3.7692	3.7748	3.7783	3.78
2006	3.6535	3.677	3.6845	3.648	3.618	3.5315
2007	3.454	3.5035	3.417	3.3418	3.3585	3.3065
2008	3.263	3.3895	3.4575	3.5625	3.6175	3.464
2009	3.52	3.526	3.4745	3.4075	3.3875	3.4245
2010	3.1875	3.1375	3.0875	3.1095	3.1575	3.0835
2011	2.9555	2.9803	3.191	3.0735	3.1725	3.177

Appendix 4.1: Second semi-annual exchange rate from year 1997 to 2011 (Source: Data Stream 5.1)

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	72.7	73.1	73	72.8	73.2	73.1
1998	75.2	76.3	76.7	76.9	77.1	77.6
1999	79	79.2	79	79.1	79.4	79.3
2000	80.3	80.4	80.3	80.3	80.4	80.4
2001	81.5	81.7	81.5	81.6	81.7	81.6
2002	82.4	82.6	83.2	83.1	83.2	83.3
2003	83.8	83.9	83.8	83.9	84	83.9
2004	84.6	84.6	84.6	84.7	85	85
2005	86.6	86.7	86.7	86.8	87.5	87.7
2006	89.4	89.5	90.8	90.8	91	91.1
2007	92.3	92.3	92.2	92.2	92.3	92.5
2008	94.4	94.7	94.7	95	95.8	99.6
2009	98.1	98.3	98.1	97.9	98.1	98.2
2010	99.4	99.4	99.4	99.4	99.6	99.7
2011	101.8	102.3	102.4	102.6	102.9	103.2

Appendix 5.0: First semi-annual consumer price index from year 1997 to 2011

(Source: Data Stream 5.1)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	73.2	73.4	73.6	73.8	74.1	74.4
1998	77.4	77.5	77.6	77.7	78.2	78.4
1999	79.4	79.3	79.3	79.3	79.5	80.3
2000	80.5	80.5	80.5	80.8	80.9	81.3
2001	81.6	81.5	81.6	81.5	82.1	82.2
2002	83.3	83.2	83.3	83.2	83.4	83.6
2003	84.1	84	84.2	84.2	84.3	84.6
2004	85.2	85.2	85.5	86	86.2	86.3
2005	87.7	88.3	88.5	88.7	89	89.1
2006	91.3	91.2	91.4	91.4	91.7	91.8
2007	92.8	93	93.1	93.2	93.8	94
2008	100.7	100.9	100.7	100.3	99.1	98.2
2009	98.3	98.4	98.7	98.8	99	99.2
2010	100	100.3	100.4	100.6	100.8	101.2
2011	103.4	103.6	103.8	104	104.1	104.2

Appendix 5.1: Second semi-annual consumer price index from year 1997 to 2011

(Source: Data Stream 5.1)

Years	JAN	FEB	MAR	APR	MAY	JUN
1997	2536.5	2279.3	3443.3	2697.4	3086.6	2900.5
1998	4605.7	4594.2	5305.3	4863.7	4675.4	5288.3
1999	4464.2	4879.5	5661	5951.2	6024.5	6003.5
2000	4772.9	5398.7	6467.4	5975.1	6421.9	6793.6
2001	5663.8	5825.9	5696.2	5157.4	5372.4	6198.5
2002	5434.5	4785.7	6440.2	6404.7	6144.8	6329.4
2003	6041.1	4829.3	6341.3	6589.4	6211.6	6905.3
2004	6566.8	5791.4	6911.8	7722	7309.8	7730.6
2005	6884.2	6437.5	8297.2	8982.4	8546.8	9430.4
2006	8211.2	7306.6	8997.6	9232	9190.2	9686.1
2007	8142.5	7486	8098	7418.6	7921.3	7507.5
2008	7171.8	6048.5	6347.2	7910.2	7852.6	7077.5
2009	4799.9	4144.3	4557.7	4886.8	4940.8	4994.6
2010	4917.2	4249.7	5766.2	5199.7	5121.8	5354.2
2011	4547	4177.2	5098.3	4896.1	4659.7	4964.5

Appendix 6.0: First semi-annual Malaysia Export to US from year 1997 to 2011 (Source: Data Stream 5.1)

Years	JUL	AUG	SEP	OCT	NOV	DEC
1997	3174.7	4001.2	4104	4296.3	3930.3	4665.6
1998	5184.8	5664.7	5403.3	5847.8	5232.8	5463.4
1999	6618.9	6503.5	6217.7	5850	5777.5	6431.9
2000	6998.1	7255.3	7372.6	6624.1	6685.2	5814.6
2001	5759.4	5752	5472.2	6054.5	5478.2	5203.5
2002	7084.6	6669.6	6569	5610.6	5193.6	4825.3
2003	6946.6	6241.2	6766.2	7276.9	6232.4	7625.5
2004	8268.1	8264.8	8431.6	8405.6	6635.5	8137.3
2005	9662.9	9743.6	9514.2	9709.4	7950.5	9874
2006	9597.3	10668.3	9874.7	9065.5	9102.7	9653.8
2007	7620.9	8195.3	8704.1	7939	7609.4	7876.5
2008	7778.4	6946.3	7372.6	6438.8	6300.6	5483.7
2009	5520.5	5092.2	4772.7	5941.4	5475.2	5457.7
2010	5610.6	5116.1	4564	5296.8	4551.6	5208.2
2011	4774.6	5005.7	4961	5004.4	4470	5062

Appendix 6.1: Second semi-annual Malaysia Export to US from year 1997 to 2011 (Source: Data Stream 5.1)

Eviews Test Outputs

Date: 04/01/12 Time: 12:19
Sample (adjusted): 1997M07 2011M12
Included observations: 174 after adjustments
Trend assumption: Linear deterministic trend
Series: LNFTSE IR LNIPI XRAT LNCPI
Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.281285	115.7700	69.81889	0.0000
At most 1 *	0.132993	58.29939	47.85613	0.0039
At most 2 *	0.118142	33.46824	29.79707	0.0181
At most 3	0.064211	11.59228	15.49471	0.1776
At most 4	0.000257	0.044794	3.841466	0.8324

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.281285	57.47061	33.87687	0.0000
At most 1	0.132993	24.83116	27.58434	0.1082
At most 2 *	0.118142	21.87595	21.13162	0.0392
At most 3	0.064211	11.54749	14.26460	0.1288
At most 4	0.000257	0.044794	3.841466	0.8324

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 7.0: Output of Johansen Cointegration test (Trace and Max Eigen-value)

1 Cointegrating Equation(s):		Log likelihood	1513.003	
Normalized cointegrating coefficients (standard error in parentheses)				
LNFTSE	IR	LNIPI	XRAT	LNCPI
1.000000	0.028819	-3.102990	4.825048	15.76985
	(0.16872)	(1.82539)	(0.61392)	(3.73601)
Adjustment coefficients (standard error in parentheses)				
D(LNFTSE)	0.019412			
	(0.00494)			
D(IR)	-0.072015			
	(0.02224)			
D(LNIPI)	-0.004973			
	(0.00294)			
D(XRAT)	-0.045868			
	(0.00677)			
D(LNCPI)	-0.000557			
	(0.00029)			

Appendix 7.1: Output of Johansen Long-run Normalized Cointegrating

Dependent Variable: D(LNFTSE)
Method: Least Squares
Date: 04/01/12 Time: 12:29
Sample (adjusted): 1997M03 2011M12
Included observations: 178 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.102389	0.048995	-2.089769	0.0381
D(LNFTSE(-1))	0.223405	0.087431	2.555215	0.0115
D(IR(-1))	-0.051655	0.018854	-2.739729	0.0068
D(LNIPI(-1))	-0.183477	0.105674	-1.736261	0.0843
D(XRAT(-1))	0.100099	0.055282	1.810706	0.0719
D(LNCPI(-1))	1.061558	1.305300	0.813268	0.4172
C	-0.002631	0.006006	-0.438073	0.6619

R-squared	0.148431	Mean dependent var	0.001046
Adjusted R-squared	0.118551	S.D. dependent var	0.075980
S.E. of regression	0.071334	Akaike info criterion	-2.404362
Sum squared resid	0.870135	Schwarz criterion	-2.279236
Log likelihood	220.9882	Hannan-Quinn criter.	-2.353620
F-statistic	4.967632	Durbin-Watson stat	2.114263
Prob(F-statistic)	0.000103		

Appendix 8.0: Output for estimation of Error Correction Model