SCRUTINISING THE ASYMMETRIC IMPACT OF MACROECONOMIC VARIABLES TO STOCK RETURN IN MALAYSIA

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DECLARATION

We hereby declare that:

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

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

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

(4) The word count of this research report is 10914 words.

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DEDICATION

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
APT	Arbitrage Pricing Theory
CUSUM	Cumulative Sum
DJIA	Dow Jones Industrial Average
ECM	Asymmetric Error Correction
FTSE	Financial Times Stock Exchange
GDP	Gross Domestic Product
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
M-TAR	Momentum – Threshold Autoregressive
PP	Phillips-Perron
QE	Quantitative Easing
TAR	Threshold Autoregressive
US	United States
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model

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PREFACE

The stock market plays an important role in a country as a primary market where companies issue their stocks to raise funds to finance their everyday business or capital expenditure. Often, the stock market is used to gauge the liquidity or the healthiness of an economy. Due to this reason, there are many researches in the literature that study the impact of macroeconomic variables to stock return.

The common perspective is that macroeconomic variables impact stock return symmetrically, that is, positive and negative announcement of macroeconomic news would impact stock return in an equal manner, direction and magnitude. However, that is not really the case because investors tend to overreact to negative news. Thus, this study seeks to scrutinise into the asymmetric impacts of each macroeconomic variables to stock return.

Having found asymmetric impact of some of these macroeconomic variables to stock return, this piece of information is significant for researchers, investors, companies and the government. Researchers could further the study by considering the asymmetric impact of macroeconomic variables to stock return. Investors should understand such market behavior and consider this in their investment decisions. Companies should formulate a strategic decision as and when negative macroeconomic news is expected and the government should smooth out negative macroeconomic announcements to cushion the blow of a downturn.

ABSTRACT

The market reaction towards the announcement of the recovery of the job data in the United States, which signifies the potential tapering of the Quantitative Easing 3 program, was much larger than how it was when Central Banks attempt to inject money into the economy to cushion against the impact of a credit crunch. This insinuates a possible asymmetric relationship between macroeconomic variables and stock return.

However, most previous researchers have found significant relationships between macroeconomic variables and stock return assuming that the relationships are symmetric. This study seeks to scrutinise into the asymmetric impacts of each macroeconomic variables to stock return and has found negative asymmetric relationship between stock price and oil price and exchange rate respectively.

CHAPTER 1: INTRODUCTION

1.1 Issue

Of late, the Federal Reserve's decision with regards to the tapering of the Quantitative Easing 3 has become an issue covered heavily by various news media. Each announcement regarding the QE3 made by the Chairman of the Fed, Ben Bernanke is so influential, so much so that it affects the global economy. On June 24, 2013, when Bernanke announced a more optimistic view of the economy (signaling a potential tapering of the QE3), the global stock market plummeted (Tse, 2013). The Dow Jones Industrial Average (DJIA) plummeted by 0.9%, NASDAQ dropped 1.09%, and the Shanghai Composite index slid 5.3%.

The literature on macroeconomic determinants of stock returns has already been well studied. However, recent economic issues are intriguing enough to make a comeback to this study. The following paragraphs would explain why it is so.

Theoretically, a better state of economy will increase stock returns because businesses have favorable macroeconomic environments to operate in. This is consistent with the finding of Ibrahim and Yusof (2001) in their study of macroeconomic determinants of stock returns that has found positive relationship between stock returns and GDP. However, this argument may not prove to be true all the time. When the GDP growth estimates of the United States for the first quarter of 2013 was announced to be 0.6% short of its expectation of 2.4%, gains of 0.96% and 1.02% were recorded in the S & P 500 and Dow Jones Industrial Average respectively (Wu, 2013). In contrast, when the GDP growth estimate in the same quarter for the Philippines was announced to be better than expected, the Philippines Stock Exchange index went down by 3.81% (Philstar.com, 2013).

Apart from that, theory has it that unemployment is negatively correlated with stock returns. This is because a lower unemployment rate indicates economic recovery and improved consumer confidence, thereby leading to a rally in stock prices. Nevertheless, this argument was once again countered when the global stock market slumped albeit US releasing a favorable unemployment figure (Robertson, 2013). These situations are contrary to the classical theories covered in existing literature and are worth studying.

When attempting to explain this series of peculiar phenomena, the initial purpose of the QE 3 – to stimulate the economy provides insights. In this case, as the monetary base deepens, market interest rates drop, thereby encouraging growth in businesses in the economy. In contrast, if the authority announces favorable statistics on economic indicators such as GDP and unemployment, investors start to worry that the QE 3 will be tapered. Consequently, they expect businesses to be negatively impacted by high costs of borrowing and many start selling their stocks to avoid from suffering losses.

Just after Bernanke made the series of announcements stating a recovery of the US economy, the Chinese Central Bank, People's Bank of China pledged to support bank liquidity to cushion the credit squeeze that could potentially be brought about by the halting of QE 3. This resulted in a rebound in the global stock market – the Hang Seng Composite Index rose by 2.4%, the Shanghai Composite Index shot up by 0.06%, while the FBM Kuala Lumpur Composite Index was up 0.7%.

Looking at these figures, it is observed that rebounds in the global stock market happen at a relatively smaller scale than slumps. The way investors react more strongly towards bad news than good ones somehow reflects the their pessimistic behavior.

The Japanese Stock Exchange reflects a clearer picture of asymmetry responses of investors towards favorable and unfavorable economic events. Theoretically, export-driven nations would witness their stock prices rally as their currencies depreciate. This is because foreign demands for Japanese goods increase when they perceive that these Japanese products are cheaper. An increase in foreign demands translates into profits for these Japanese businesses, thereby causing the stock prices to rally. On May 30, 2013, when the Japanese yen appreciated by 0.72%, Nikkei 225 slumped for 5% (Bloomberg, 2013). However, when the Japanese yen depreciated by 3.01 % on July 11, 2013, the Nikkei 225 index climbed only for less than 0.3%. It is once again proven that investors are more sensitive to bad news than to good news.

The issues laid out thus far are somehow against the Efficient Market Hypothesis, which states that stock prices efficiently reflect all the information about an individual stock and the stock market as a whole, and present or past prices are of no use to predict the future stock price movements. In other words, the EMH argues that information related to stocks is incorporated into their prices quickly, and there is no way for investors to use this piece of information to gain abnormal return (Mlalkiel, 2003).

However, given the global issues presented, it is deduced that investors overreact to bad news than to good news. If that is the case, does this portray that investors are irrational? If they are, then does the Efficient Market Hypothesis still hold?

This paper aims to study the impact of macroeconomic factors i.e. inflation rate, Gross Domestic Production, unemployment rate and exchange rate towards stock returns. Through the study, the paper should be able to find out: 1) whether there really is asymmetry in the responses of investors facing good news and bad news and 2) to what extent does each macroeconomic factor have to change for investors to act irrationally.

1.2 Problem Statement

Referring to the facts laid out in the previous section, it could be argued that investors behave towards good and bad macroeconomic news irrationally. This is because investors panic when there is sign that the QE 3 would be tapered, so much so that the global stock market recorded a slump when such favorable macroeconomic news is released. However, when the Chinese central bank pledged to cushion the effect of a credit squeeze, the stock market did not rebound at the same scale. With facts suggesting that negative macroeconomic shocks induce greater impacts on stock prices than positive ones, does it imply that good and bad macroeconomic news impact stock returns asymmetrically?

Nevertheless, when reviewing the literature, studies on asymmetric impact of macroeconomic variables towards stock returns could hardly be found. This could insinuate that previous studies might have been done with the assumption that macroeconomic variables affect stock returns at the same scale when both good news and bad news are made public. The asymmetrical impact of macroeconomic variables to stock returns must not be underestimated. If these asymmetric impacts are found to be significant, then the classical macroeconomic theories that assume the absence of these effects could prove to be inadequate.

Even if previous studies were done with the assumption that macroeconomic variables affect stock returns asymmetrically, it applied for macroeconomic variables as a whole and did not detail the extent to which each variable impact stock returns asymmetrically.

1.3 Objectives

1.3.1 General Objective

This paper seeks to assess the relationship between stock prices and macroeconomic variables.

1.3.2 Specific Objectives

Specifically, this paper aims to achieve the following objectives:

1. To prove that there exists an asymmetry impact of good news and bad news towards stock returns.
2. To specify the threshold where stock returns start to react to each good or bad macroeconomic announcement i.e. inflation rate, Gross Domestic Product, exchange rate and oil price.
3. To identify the relationship between shock in stock return and shock in inflation rate, Gross Domestic Product, exchange rate and oil price respectively.

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Framework

In the finance industry, pricing common stocks has been of a great concern. Investors, financial institutions, corporations and governments have been using various frameworks to determine the fair value of common stocks to aid their investment decision-making process.

Perhaps the earliest theoretical framework on the pricing of common stocks that is the most widely accepted by the general public is the Capital Asset Pricing Theory (CAPM). Extended by Sharpe (1964), Lintner (1965), Black, Jensen and Scholes (1972), the CAPM is a theory that utilizes the stock market index to explain common stock return (Kandir, 2008). It argues that only market risks that are non-diversifiable are able to influence expected stock return (Sabetfar, Cheng, Mohamad, & Noordin, 2011) – an argument that faces widespread criticism due to its various restrictive assumptions.

Ross (1976), realizing that the CAPM's argument of attributing stock return to stock market solely is unrealistic, developed the Arbitrage Pricing Theory (APT) which included many other micro and macro factors in the determination of the price of common stocks. The introduction of this theory was able to provide a comprehensive study of various macroeconomic variables in determining common stock prices (Ross, 1976), as opposed to the CAPM previously presented. Roll, Richard and Ross (1980), when attempting to extend the APT developed by Ross (1976), found that the discount rate would change with interest rates and risk premium. They also found that expected dividends would differ with interest rate, inflation rate, real production, money supply and exchange rate.

However, the list of factors affecting the price of common stock as mentioned above is not exhaustive as there is no theoretical framework for the selection of macroeconomic variables (Kandir, 2008). Because of this, the literature has found many studies that examine the relationship between macroeconomic variables and stock returns all over the world: In developed nations such as the United States (Chen, Roll & Ross, 1986; Chen, 1991), Japan (Mukherjee & Naka, 1995), Singapore (Mookerjee & Yu, 1997) and New Zealand (Gan, Lee, Au Yong, & Zhang, 2006) as well as developing nations such as Malaysia (Ibrahim, 1999; Ibrahim & Hassanuddeen, 2003), India (Mukherjee, 1988; Bhattacharya & Mukherjee, 2001) Bangladesh (Ahmed, 1999) and Pakistan (Nishat & Saghir, 1991; Nishat & Shaheen, 2004).

2.2 Relationship between Macroeconomic Variables and Stock Prices

This section examines into the literature that files the relationship between stock prices and each macroeconomic variables.

2.2.1 Inflation

Perhaps the most studied macroeconomic variable is inflation rate. Irving Fisher (1930) argues that real asset returns should move in a one-to-one basis with expected inflation rates. Consistent with the Fisher's theory, Geske and Roll (1983) argued of a positive relationship between inflation rate and stock return by reasoning that equities are good hedges against inflation because the underlying hedged in the case of buying equities are real assets – companies. In other words, when inflation increases, investors would perceive equities, among all other securities, as investment vehicles that could prevent their cash from devaluing, and demand more stocks, thereby pushing prices of stocks upwards. Choudry (2001) affirms this argument by proving that this phenomenon is particularly significant in high inflation nations such as Argentina, Chile, Mexico and Venezuela.

Apart from that, in high and prolonged inflationary nations, inflation rates might not be able to predict future stock returns (Abugri, 2008). This is because the high inflation has been taking place in that particular nation on a prolonged basis, and investors would no longer pay attention to the signals that are indicated by inflation rates. This therefore explains situations in which inflation rates may be insignificant in determining stock returns.

However, Fama's (1981) proxy hypothesis argues that there is negative relationship between stock return and inflation in the long run. Adrangi, Chatrath, and San Viccente (2000), who studied the cointegration between stock return and inflation in Brazil using the Vector Error Correction Model, affirmed this argument. Not only that, Islam, Watanapalachaikul and Billington (2004), Maysami and Koh (2000), Nishat and Shaheen (2004) and Sari and Soytas (2005), in their studies in Thailand, Singapore, Pakistan and the United States, have found similar relationship between inflation rate and stock return.

Apart from that, it is also argued that stock return drops when inflation increases because the effective rate of return on stocks would be offset by the increase in inflation. In other words, future cash flows (dividends), when discounted to its present value, would decrease.

A working paper by the National Bureau of Economic Research that dates back to 1983 argues that an increase in inflation rate would result in a drop in stock price because there is a higher perceived riskiness of the equity market among investors and businesses. Pindyck (1984) explained that increased inflation would diminish the return on equity for a company, due to a rise in the cost of doing business in a business environment that faces an increase in cost of general goods and services in the entire economy. As a result, investors perceive inflation as negative news that would hamper the company's profit and decide to sell these stocks, thereby pushing stock prices down.

There are therefore mixed results as to the relationship between inflation rate and stock return. One study that could perhaps accommodate for both sides of the argument is the one by Ding (2006). The paper has argued that both positive and negative responses of stock returns towards inflation are dependent on the nature of the monetary policy. The rationale provided is supported by Kaul (1987), which stated that if the monetary policy is pro-cyclical, then stock returns and inflation would be positively correlated whereas if the monetary policy were counter-cyclical, then the duo would be negatively correlated.

In this case, a countercyclical monetary policy is one that the authority uses to reverse the cyclical conditions of the economy. For example, when the Fed implemented the Quantitative Easing 3, it was intended to ameliorate the worsening unemployment conditions in the US. On the other hand, a monetary policy is pro-cyclical when it attempts to increase the fluctuation of the economy. For example, in times of an economy downturn, banks would be instructed by the Basel authority to increase their capital ratios as security measures. However, these would mean that the banks are able to lend less, and this could further contribute the recession.

2.2.2 Exchange Rate

Apart from that, the relationship between stock market return and exchange rates has also been widely documented by enormous literatures. Exchange rates variable is one of the most significant macroeconomic variables in influencing the stock prices (Menike, 2006). The exchange rate is defined as the price of one unit of foreign currency in local currency terms. The increase of exchange rates represent a currency depreciation for the home country, since the exchange rate is defined as the price of one unit of foreign currency in local currency terms.

Number of studies had documented a negative relationship between stock prices and exchange rates. Menike (2006), Pilinkus (2009), Bilson, Brailsford, & Hooper (2001) and Rahman, Sidek, & Tafri(2009) maintained that stock return will decrease when the exchange rate increases (depreciation in currency). When the currency of the country depreciated, it will indirectly signal out informations for the investors (internationally and locally). These information might be viewed differently by different investors. Commonly, investor will react negatively to the depreciation of a country currency. They would perceive that the country's currency has become weaker and lots of negative information will spread and lead to the capital outflow of the foreign direct investment. There might be minority of investor who will have opinion that the depreciation of currency is the chance to buy in in order to earn some abnormal profit in the future. However, the negative effect would usually dominate the postive effect of the currency depreciation due to the behavior of the irrational investors. When the capital outflow occurred, the stock market will be affected direclty and prices or return of equity will drop.

However, conflicting results were found by Sohail & Hussain (2009), Jecheche (2012), Iqbal, Khattak, Khattak, & Ullah (2012) and Frimpong (2009). All of these authors come in same conclusion stated that there is a postive relationship between exchange rate and stock prices. When a country is an export dominant economy, the depreciaton of the country's currency might be a good news for the country since it depends heavily on its exports activities. When the currency of the country become cheaper for the other countries, these countries will be attracted by the cheaper goods and increase their imports from the export country since the purchasing power of them are improved. On the other hand, the exporting country will enjoy the benefit of improving Balance of Payment (BoP) from increased numbers of exports. By having a good or positive Balance of Payment (BoP), the country's economic will be stimulated since the exports and imports are the important components of the Gross Domestic Product (GDP) of a country. The GDP of a country is consists of Consumption, Income, Government Expenditure and Net Exports. When there is an improvement in the exports, the amount of net export will directly being affected and increase, assuming the imports to be constant. GDP, which is also stated as one of the major variables to influence the stock market positively will be able to contribute a positive effect to the equity prices of the country.The increasing equity prices will provide the investors with excess return by variety of forms such as high capital gains or dividends.

By analyzing both result from variety of journal articles, the usage of countries and data could be the reason of the contradict results. The study on different countries such as developed countries and developing countries can have different result since these countries could have economic policies that are different from one another. Apart from that, while conducting the study, countries have to be categorized into export-dominant or import-dominant.

2.2.3 Oil Price

Perhaps the earliest study on oil price and stock returns dates back to the post-World War II period, where Hamilton (1983) determined the relationship between oil price and other macroeconomic variable. Today, studies assessing the oil price – stock price relationship are well documented in both developing (Basher & Sadorsky, 2006) and developed nations (Park & Ratti, 2008).

The most classical theory arguing a negative relationship between oil price and stock price is one by Fisher (1930), who asserted that the price of an asset is determined through the expectation of its associated discounted cash flow. Therefore, it is deduced that any factor that is taken into consideration into the calculation of future cash flows has significant effect towards the price of stocks. It is undeniable that the theory as proposed by Fisher (1930) could be oversimplified, thus leading to the then researchers furthering the study on this subject matter, who have generally rationalized their findings by categorizing sample countries as oil-exporting and oil-importing nations.

A positive relationship is found between oil prices and stock returns in oil-exporting nations such as Gulf Cooperation Council countries that include Arabia, Kuwait and Bahrain (Arouri & Rault, 2011; Bashar & Sadosky, 2006) andNorway (Bjornland, 2009; Park & Ratti, 2008). Jimenez-Rodriguez and Sanchez (2005) rationalize such relationship by arguing that a country gains more export income as oil price increases, thus encouraging domestic expenditure and investments. This would as a result boost local productivity and stock returns are positively impacted by such circumstances (Filis, Degiannakis, & Floros, 2011).

On the other hand, a negative relationship is found between oil prices and stock returns in European nations (Arouri & Nguyen, 2010; LeBlanc & Chinn, 2004) and the United States (Hooker, 1996, Backus & Crucini, 2000). Kim and Loungani (1992) explains this phenomenon by arguing that an increase in oil price will cause these oil importers to suffer a higher cost of production, thereby leading to a discouragement of demand and consumer spending due to higher prices (Bernanke, 2006; Abel & Bernanke, 2011). This could in turn result in poorer productivity and worsen unemployment (Lardic & Mignon, 2006; Brown & Yücel, 2002) – phenomena to which the stock equity market would negatively respond (Jones & Kaul, 1996).

Affirming the above argument is a study by Beenstock and Chan (1998) whose study in London has attributed input (fuel) costs as a significant factor determining stock returns. A theory considering the effect of oil price being indirectly fed into stock prices through other macroeconomic variables (Filis, Degiannakis, & Floros, 2011) implies that an increase in oil price would mean increased costs and lower profits and thus a lower stock price in general. This is a finding based on an argument that crude oil demand is of low price elasticity and oil demands are indifferent to price (Jung & Park, 2011). For example, the technology, healthcare and consumer services sector in the US are negatively impacted by increases in oil price (Malik & Ewing, 2009).

Perhaps a paper more relevant to this study is one that has explored the area of asymmetrical responses of stock returns towards oil prices (Chiou & Lee, 2009). Employing a daily data on S&P 500 that spans January 1992 to November 2006, the paper has found a negative asymmetrical effect between increased oil price volatility and returns on the stock index, that is, only a significant increase in oil price could result in a slight increase in returns on S&P 500.

Despite rigorous findings on both oil-exporting and oil-importing nations that claim a positive and negative relationship between oil prices and stock return respectively, studies have also found insignificant relationship between oil price and stock returns. In this case, Al Janabi, Hatemi-J and Irandoust (2010) found little evidence to prove such relationship GCC countries. Consistent with their finding, Al-Fayoumi (2009) concluded that the oil price-stock return relationship is weak in oil-importing nations. There are several rationales backing this finding: Bernanke, Gertler and Watson (1997) claimed that countries are able to ameliorate the negative inflationary impacts brought about by oil price shocks through the implementation of the right monetary policies whereas the International Energy Agency (2009) reasoned that firms are now better able to absorb increased costs in factors of production due to higher productivity.

2.2.4 Gross Domestic Product

Gross Domestic Product (GDP) is a measure of overall economic wellbeing in an economy as it is a measure of outputs and activity of a nation over a fiscal year. While conducting their research, many researchers require a high sample size and therefore prefer the use of monthly data. Nevertheless, GDP data are commonly available in quarters. Therefore, many choose to take industrial production index (which is available monthly) as a proxy for GDP (Tsouma, 2009).

Unlike other macroeconomic variables who present mixed results as to the direction of influence towards stock prices, the influence of GDP towards stock returns are mostly found to be positive. For example, Mukherjee & Naka (1995), Abugri (2008), and Laopodis (2011) have found a positive relationship between GDP and stock returns in Japan, Chile, Italy and Germany respectively when conducting their study using cointegration analysis and the VAR model. Furthermore, in the study of Latin American stock markets, Abugri (2008) has found that positive shocks on industrial productions are significant in determining stock returns in Chile. It was observed that such positive relationship is short as it is only found in the first and sixth months. Chen (2009) affirms this finding by proving that industrial production index growth is only capable of predicting stock returns in the United States for the short run, and its predictability would lapse within a year. This could be explained by arguing that industrial production growths are associated with an indication of stronger cash flows in the future that would increase stock returns (Fama, Stock returns, expected returns and real activity, 1990). Apart from that, it is also argued that financial securities such as stocks are claims against future outputs, and an increased level of economic activity would therefore imply higher level of output in the future, thus increasing a higher stock return (Cheung, He, & Ng, 1997).

However, there are also studies in which industrial production is found to have no predictive ability in stock prices. For example, in France (Laopodis, 2011),Argentina (Abugri, 2008), Mexico (Abugri, 2008) and South Africa (Gupta & Modise, 2013). This is consistent with the finding of Tsouma (2009), who attempted to determine the bi-directional relationship between stock returns and economic activity in 22 matured and 19 emerging markets using the Granger-causality method and concluded that the Granger-causality that runs from economic activity to stock returns is weak and negligible. Instead, he found significant positive one-directional relationship flowing from stock returns to economic activities. Affirming this finding is a study that is done by (Chakravarty, 2005) based on data from the Indian stock market.

Perhaps the most significant finding in the studies that assess the relationship between GDP and stock returns is one that has found asymmetry impact of positive and negative GDP shocks towards stock returns. Based on the study of Ho & Tsui (2004), who regressed the volatility of real GDP to that of stock returns in China, asymmetric volatility between RGDP and stock returns was found. It was shown that negative RGDP shocks impact stock volatility at a greater scale than positive shocks. The methodology that was used in this study was the exponential GARCH model, as made popular by Nelson (1991), who captured conditional volatility in RDGP using the same approach.

CHAPTER 3: METHODOLOGIES

3.1 Introduction

In order to fulfil the objectives of this study, time series analysis is employed to detect the asymmetrical impacts that macroeconomic variables have on stock prices.

This study is built on the theoretical framework of the Arbitrage Pricing Model (APT) (Ross, 1976). The advantage of this model is that there is no fixed model that is required in order to utilise the research framework (Cuthbertson & Nitzsche, 2004). Ross (1976) explained that researchers are free to include any variables that they deem significant in determining stock returns.

Therefore, the Threshold Autoregressive (TAR) Model and Momentum-Threshold Autoregressive (M-TAR) Model are used to prove and detect the threshold of each macroeconomic variable at which investors would behave asymmetrically to positive and negative news circulated in the market.

To ensure accuracy of results, the pre-requisite of proceeding with the TAR and MTAR models is Unit Root Test. It is vital to conduct the Unit Root Test because it ensures the stationarity of the time series data used. Gujarati and Porter (2009) emphasised on the importance of the stationarity of time series data and elaborated that researchers would be faced with spurious and inaccurate results in an event that non-stationary data is employed in a test. Therefore, the Augmented Dickey Fuller (ADF) Test and Phillips-Perron (PP) Test are run in order to ensure the stationarity of the data set extracted earlier from Datastream before proceeding with the TAR and MTAR models.

In order to detect the change in investors' behaviour arising from positive and negative news respectively, the Threshold Autoregressive (TAR) Model is used.

To inquire into the momentum at which investors react to market information, Momentum-Threshold Autoregressive (M-TAR) Model is employed.

The results extracted from these tests cannot be considered unbiased and efficient until a series of diagnostic checking tests are conducted. Therefore, the CUSUM and CUSUM of Squares Tests are employed to check for the robustness of the model.

3.2 Scope of Study

This study employs macroeconomic data for Malaysia extracted from Datastream. The sample period of the study is from January 1994 – December 2012.

Data for Inflation Rate, Oil Price and Exchange Rate are monthly data because it is the highest acceptable frequency of data that could provide reasonably sufficient information to detect the trend in stock returns. If data is taken on a daily basis, then the problem of leptokurtosis would occur. When the set of data has a leptokurtic distribution, the data set would display high volatility and researchers would be unable to spot the trend amid highly fluctuating data. However, because Gross Domestic Product data is not released monthly, the test was run using quarterly Gross Domestic Product data.

3.3 Model Specification: Asymmetric Error Correction Model

$$\Delta KLCI_t = \alpha_t + Z\,plus_t + Z\,minus_t + \beta \sum_{i=1}^{n} \Delta\, KLCI_{t-i} + \beta \sum_{i=1}^{n} x_{k_{t-i}} + \varepsilon_i$$

(Equation 3.1)

Where

KLCI = Log of FTSE Bursa Malaysia KLCI

x_k = Set of Conditional Variables

x_1 = Log of Exchange Rate (Malaysian Ringgit against US Dollar)

x_2 = Log of Consumer Price Index

x_3 = Log of Gross Domestic Product

x_4 = Log of Oil Price (USD per barrel)

In order to capture the elasticity component of the independent variables and dependent variable, these variables are transformed into the natural log form. The interpretation of these data in the later chapter could be performed as a percentage change in dependent variable for a given percentage change in independent variables.

The insertion of lagged independent and dependent variables in Equation 3.1 is necessary to capture the gradual change in investor's behaviour (Gujarati & Porter, 2009). Not only that, it is also considered that investor's change in behaviour in the current period could be dependent on the one of the previous period, indicating a strong correlation between the duo. Gujarati and Porter (2009) argued in an event that lagged variables are excluded from the model, it might be diagnosed with autocorrelation.

The endogenous variable of this research is FTSE Bursa Malaysia KLCI, taken as a proxy for stock prices. In Equation 3.1, α is the constant algebraic term whereas β is the coefficient for each independent variable namely Inflation Rate, Exchange Rate, Oil Price and Gross Domestic Product. Finally, ε_t refers to the error term used to capture the effect of a possibly omitted variable, unavailability of data and intrinsic randomness of human behaviour.

Macroeconomic variables included in this study include Inflation Rate, Oil Price, Exchange Rate and Gross Domestic Product. Geske and Rolle (1983) argued that inflation rate has a positive relationship with stock return due to the perception that stocks are good hedges against inflation. Menike (2006) and Pilinkus (2009) argue of a negative relationship between exchange rate and stock return because investors tend to perceive depreciation of currency (increase in exchange rate) negatively. Furthermore, Arouri and Rault (2011) found positive relationship between oil price and stock return. They explained that oil-exporting nations would generate higher income when oil price is higher, thus increasing the domestic expenditure and investments. Finally, Gross Domestic Product (GDP) is positively related with stock return (Mukherjee & Naka, 1995; Laopodis, 2011). Table 3.1 details our expectation of the relationship between various macroeconomic variables and stock return.

Table 3.1: Expected Relationship between Variables

Macroeconomic Variables	**Relationship with Stock Return**
Inflation Rate	Positive
Exchange Rate	Negative
Oil Price	Positive
Gross Domestic Product	Positive

3.4 Econometrical Methodologies

Utilising time series analysis to discover and assess the asymmetric relationship between stock price and macroeconomic variables, this study commenced with Unit Root Tests namely Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. The test is continued with Threshold Autoregressive (TAR) model, Momentum-Threshold Autoregressive (M-TAR) model and Asymmetric Error

Correction Model. To conclude the robustness of the test, diagnostic checking was conducted using CUSUM and CUSUM of Squares test.

3.5 An Overview of Time Series Data

Before proceeding with building the intended econometrical models, researchers would conduct Unit Root Test to ensure the stationarity of the time series data employed. This is because time series data are inherently seasonally unadjusted and portray clear trends over time.

The consequences of using a data set that is non-stationary, according to the assumptions made by the Classical Linear Regression Model, is that spurious regression results would be presented. This happens when the coefficient of determination of the model, together with the t-statistic for each independent variable, would appear to be statistically significant given the appropriate level of significance when they are not. In other words, such data would indicate a pseudo-meaningful relationship between the independent variable and dependent variable.

The treatment for non-stationary data at the level form is to perform differentiation at first level on the time series data. This ensures that researchers would not be observing a non-stationary trend in the data set employed. Nonetheless, this could only solve the problem partially as researchers would be blinded from the spurious regression. This is because differentiating the data at first level only eliminates the long run (low-frequency) while retaining the short run (high frequency) characteristics of data.

Nonetheless, researchers must be aware of the importance of long run (low-frequency) data whenever a time series model is employed in a particular study. The rationale behind the insertion of lagged variables into the model is to mitigate the elimination of the long run characteristics of data through differentiation performed in the earlier step. Furthermore, spurious results could be spotted in a model added with lagged variables due to the random-walk characteristics of the data.

In order to investigate the long-run relationship of variables in a multivariate model, co-integration test will be performed. Two or more economic series are said to be co-integrated when they are observed to have long-run equilibrium relationship. This method reassures the stationarity of data if the variables concerned are co-integrated in nature because they would display convergence over time, presenting a constant difference between the duo upon integration to the same order.

3.6 Unit Root Tests

The pre-requisite of estimating an econometric model is to conduct the Unit Root Test to ensure the stationarity of time series data employed. When the mean, variance and covariance of the data set employed is time-invariant, they are considered to be stationary. In this case, if the mean and variance of the data vary over time in the sample period employed, this implies non-stationarity of data.

Variables that are non-stationary imply an existence of unit roots whereas stationary variables imply inexistence of unit roots. In this case, when dependent and independent variables are non-stationary, estimated results from the model regressed will be spurious and inaccurate. In non-stationary models, each value observed in the regression would be far off from its mean value. Furthermore, the variances of the observation in the results of a test employing non-stationary series approach infinity across the sample period.

Assuming that no structural break exists in the time series, hypothesis testing would be applicable for unit root tests. Furthermore, a large sample size should be employed to ensure a more reliable hypothesis testing. When the series is found to be non-stationary, it has to be differentiated for d times to obtain stationarity.

In order to examine the long-run relationship between independent and dependent variables, all variables should have one unit root I(1). This means that the variables are co-integrated and will converge with one another in the long run. This has to be the case to prove a significant relationship between macroeconomic variables and stock price before researchers proceed with detecting the existence of asymmetry in such relationship.

Considering that each unit root test has its own limitation, two approaches namely Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test will be used to ensure robustness of results.

3.6.1 Augmented Dickey Fuller (ADF) Test

Augmented Dickey Fuller (ADF) Test, developed by Dickey and Fuller in 1979, is used to detect the stationarity of time series data.

This test is performed after the model is created. The ADF test is suitable for series for higher order correlation, assuming that the dependent variable series follows an AR(p) process. Under this assumption, the lagged differentiated term of the dependent variable, y, will be inserted at the right hand side of the equation as one of the independent variable. In this case, the dependent variable is regressed on the independent variables including the trend variable β_{2t}, lagged dependent variable, $\beta_3 Y_{t-1}$, and the sum of lagged changes in dependent variable $\alpha i \Sigma \Delta Y_{t-i}$.

$$\Delta Y_t = \alpha Y_{t-1} + x_t'\delta + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \ldots + \beta_p \Delta Y_{t-p} + v_t$$

Equation 3.2

H_0 : α = 0 (Y_t has unit root/ non stationary), I(1)
H_1: α < 0 (Y_t has no unit root/ stationary), I(0)

In this case, the result should be non-stationary in the level form of the test. The null hypothesis formed, i.e. there is a unit root should not be rejected at the significance level of 90%, 95% and 99%. That being said, the test-statistics should have an α larger than 0.1, 0.05 and 0.01 in each significance level respectively. In other words, the larger the α of the test-statistics, the higher is the probability that the null hypothesis will not be rejected.

H_0: Unit roots of 2, I(2)
H_1: There is a unit root/non-stationary, I(1)

In the first difference, the intended result is to obtain 1 unit root. This means that we need to reject the null hypothesis at the significance level of 90%, 95% and 99%. That being said, the test-statistics should have an αsmaller than 0.1, 0.05 and 0.01 in each significance level respectively. In other words, the smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

3.6.2 Phillips-Perron (PP) Test

Phillips and Perron (1988) Test is different from the ADF test in the sense that the former disregards any serial correlation found in the regression. This solves the problem of the ADF method as there might exists the problem of serial correlation.

The null and alternative hypotheses for the PP Test for variables at the level form are as follows:

H_0 : α = 0 (Y_t has unit root/non-stationary), I(1)
H_1: α < 0 (Y_t has no unit root/stationary), I(0)

In this case, the result should be non-stationary in the level form of the test. The null hypothesis formed, i.e. there is a unit root should not be rejected at the significance level of 90%, 95% and 99%. That being said, the test-statistics should have anα larger than 0.1, 0.05 and 0.01 in each significance level respectively. In other words, the larger the α of the test-statistics, the higher is the probability that the null hypothesis will not be rejected.

On the other hand, the null and alternative hypotheses for the PP Test for variables at the first difference are as follows:

H_0: Unit roots of 2, I(2)
H_1: There is a unit root/non-stationary, I(1)

In the first difference, the intended result is to obtain 1 unit root. This means that the null hypothesis needs to be rejected at the significance level of 90%, 95% and 99%. That being said, the test-statistics should have an α smaller than 0.1, 0.05 and 0.01 in each significance level respectively. In other words, the smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

3.7 Threshold Autoregressive (TAR) Model

The Threshold Autoregressive (TAR) Model is defined as:

$$\Delta\mu_t = I_t p_1 \mu_{t-1} + (1-I_t) p_2 \mu_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta\mu_{t-1} + \varepsilon_t \qquad \textit{(Equation 3.3)}$$

Where $\varepsilon_t \sim$ I.I.D $(0, \sigma^2)$.

However, I_t indicates the Heaviside indicator and the function is as follow:

$$I_t = \begin{cases} 1, if\ \mu_{t-1} \geq \tau \\ 0, if\ \mu_{t-1} < \tau \end{cases} \qquad \textit{(Equation 3.4)}$$

In this case, the Heaviside indicator I_t is dependent on the level of μ_{t-1}.τ (tau) signifies the threshold that would trigger a change in investor's behaviour. When stock price is higher than τ (tau), then a change in behaviour will be observed. For example, an investor will buy the stock of a company when positive news is released, when the stock price rises higher than the τ (tau) value. The Heaviside indicator is a dummy variable by itself, whereby a dummy of 1 signifies change investor's behaviour whereas a dummy of 0 signifies no change in investor's behaviour.

Ultimately, this test is carried out to observe the positive and negative changes in investor's behaviour reacted towards the release of positive or negative news associated with the stock.

Then, the test is continued with the F-joint test. It is conducted to detect long run relationship, or co-integration between the various macroeconomic variables and stock price.

The null and alternative hypotheses of F-joint test are as follows:

$H_0 : p_1 = p_2 = 0$
$H_1 : p_1 \neq p_2 \neq 0$

The null hypothesis, indicating that there is no long-run relationship between the macroeconomic variables and stock price, should be rejected at the significance levels of 90%, 95% and 99%. With this in mind, the test-statistics should have an α smaller than 0.1, 0.05 and 0.01 in each significance level respectively. The smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

Finally, the F-equal test will be conducted to detect asymmetric adjustment among investors (Enders & Siklos, 2001).

The null and alternative hypotheses of F-equal test are as follows:

$H_0 : p_1 = p_2$
$H_1 : p_1 \neq p_2$

The null hypothesis, indicating that there is no asymmetric adjustment among investors, should be rejected at the significance levels of 90%, 95% and 99%. With this in mind, the test-statistics should have an α smaller than 0.1, 0.05 and 0.01 in each significance level respectively. The smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

3.8 Momentum – Threshold Autoregressive (M-TAR) Model

The Momentum-Threshold Autoregressive Model is defined as follows:

$\Delta\mu_t = I_t p_1 \mu_{t-1}$ + (1-I)$p_2 \mu_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta\mu_{t-1} + \varepsilon_t$ (Equation 3.5)

Where ε_t*~I.I.D (0,* σ^2*).*

However, the Heaviside indicator, M_t and its function differs from TAR Model explained in the previous section,

$M_t = \begin{cases} 1, if\ \Delta\mu_{t-1} \geq \tau \\ 0, if\ \Delta\mu_{t-1} < \tau \end{cases}$ (Equation 3.6)

The Heaviside indicator is dependent on the level of μ_{t-1}. The M-TAR model is advantageous over TAR model because it could detect fluctuation of data and smoothen it out to avoid a leptokurtic distribution of data that would otherwise present spurious results to the study.

Similar to TAR, τ (tau) signifies the threshold that would trigger a change in investor's behaviour. When stock price is higher than τ (tau), then investors would change their behaviour. The Heaviside indicator is a dummy variable, whereby a dummy of 1 signifies change investor's behaviour whereas a dummy of 0 signifies no change in investor's behaviour. This test is carried out to observe the positive and negative changes in investor's behaviour reacted towards the release of positive or negative news associated with the stock.

Then, the test is continued with the F-joint test to detect long run relationship, or co-integration between the various macroeconomic variables and stock price.

The null and alternative hypotheses of F-joint test are as follows:

$H_0 : p_1 = p_2 = 0$
$H_1 : p_1 \neq p_2 \neq 0$

The null hypothesis, indicating that there is no long-run relationship between the macroeconomic variables and stock price, should be rejected at the significance levels of 90%, 95% and 99%. With this in mind, the test-statistics should have an α smaller than 0.1, 0.05 and 0.01 in each significance level respectively. The smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

Finally, the F-equal test will be conducted to detect asymmetric adjustment among investors (Enders & Siklos, 2001).

The null and alternative hypotheses of F-equal test are as follow:

$H_0 : p_1 = p_2$
$H_1 : p_1 \neq p_2$

The null hypothesis, indicating that there is no asymmetric adjustment among investors, should be rejected at the significance levels of 90%, 95% and 99%. With this in mind, the test-statistics should have an α smaller than 0.1, 0.05 and 0.01 in each significance level respectively. The smaller the α of the test-statistics, the higher is the probability that the null hypothesis will be rejected.

3.9 Impulse Response Test

In order to detect the response of a data series as a result of a one-time shock in another set of data, the impulse response test is carried out.

This test provides information about the relative importance of each macroeconomic variable affecting stock prices. Furthermore, this test attempts to detect the positive and negative shocks that flow from the macroeconomic variables to stock prices and vice versa.

Graphical method is used in this test to observe the relationship between the independent and dependent variables. Result for this test is presented in Chapter 4.

3.10 Conclusion

The research methodologies employed in this study are explained in detail in this chapter. Upon data collection from Datastream and Yahoo! Finance, a series of tests as explained in this section are conducted to observe and assess the long run relationship between stock prices and various macroeconomic variables namely Inflation Rate, Exchange Rate, Oil Price and Gross Domestic Product (GDP) in Malaysia. The a priori expectation of the relationship between the dependent and independent variables have also been laid out in this chapter.

CHAPTER 4: INTERPRETATION OF RESULTS

4.1 Introduction

This chapter reports the results of the tests employed, including the Unit Root Tests (ADF and PP), Threshold Autoregressive (TAR) Model, Momentum-Threshold Autoregressive (M-TAR) Model, Asymmetric Error Correction Model (ECM) and diagnostic checking tests (CUSUM and CUSUM of Squares).

4.2 Unit Root Tests

To ensure stationarity of the data extracted as independent and dependent variables, the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test have to be conducted. Otherwise, the results obtained from the study would be spurious and inaccurate. For further elaborations on the consequences of employing nonstationary data, please refer to the Chapter 3 on Methodologies.

For the Augmented Dickey-Fuller (ADF) test, the null hypothesis that states variables are stationary in the level form should not be rejected. When the same test is conducted for variables in the first difference, then the null hypothesis that states variables are non-stationary should be rejected so that variables consist of one unit root, I(1).

Similarly, for Phillips-Perron (PP) test, the null hypothesis states that variables are stationary in the level form should not be rejected. When the same test is conducted for variables in the first difference, then the null hypothesis that states variables are non-stationary should not be rejected.

Table 4.1 Result of Unit Root Test (ADF)

	LEVEL FORM		FIRST DIFFERENCE	
VARIABLES	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LSP	-1.6033 (0)	-2.5305 (0)	-9.4448 (0) ***	-9.4824 (0) ***
LER	-1.9508 (0)	-1.7468 (0)	-9.4202 (0) ***	-9.5363 (0) ***
LINF	-2.4016 (2)	-2.8475 (0)	-7.9744 (1) ***	-6.6380 (3) ***
LGDP	-0.5275 (5)	-2.5194 (5)	-5.3562 (4) ***	-5.3245 (4) ***
LOIL	-0.8038 (0)	-2.7928 (0)	-7.7500 (0) ***	-7.7032 (0) ***

NOTE: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Number in parentheses is the number of lag length. Lag length for the ADF unit root test is based on AIC (Akaike Information Criterion). The bandwidth for the PP unit test is based on the Newey-West estimator using the Default (Barlett Kernel). The unit root tests include a constant and linear trend. The null hypothesis under ADF and PP test is the presence of a unit root.

Table 4.2 Result Of Unit Root Test (PP)

	LEVEL FORM		FIRST DIFFERENCE	
VARIABLES	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LSP	-1.7741 (4)	-2.6427 (4)	-9.3920 (4) ***	-9.4343 (4) ***
LER	-1.9619 (2)	-1.7410 (2)	-9.3916 (2) ***	-9.5270 (3) ***
LINF	-2.7843 (8)*	-2.9544 (1)	-9.4300 (9) ***	-9.4303 (9) ***
LGDP	-1.4490 (29)	-3.7889 (6)	-12.5058 (56)***	-13.6527 (54) ***
LOIL	-0.8268 (3)	-2.9637 (1)	-7.7374 (6) ***	-7.6835 (6) ***

NOTE: *,**,*** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. Number in parentheses is the number of lag length. Lag length for the ADF unit root test is based on AIC (Akaike Information Criterion). The bandwidth for the PP unit test is based on the Newey-West estimator using the Default (Barlett Kernel). The unit root tests include a constant and linear trend. The null hypothesis under ADF and PP test is the presence of a unit root.

Table 4.1 tabulates the results for ADF test that tested the intercept as well as the trend and intercept for variables in the level form and first difference form respectively. According to the results of ADF test, the test-statistics of the variables' intercept as well as trend and intercept in the level form are greater than the critical value, α even at the 10% significance level.

Therefore, ADF test was conducted for all variables in their first difference form to detect their dynamic stationarity. The test-statistics of the variables' intercept as well as trend and intercept in their first difference are smaller than the critical value, α even at the 1% significance level.

Furthermore, Table 4.2 presents the results for PP test that tested the intercept as well as the trend and intercept for variables in the level form and first difference form respectively. According to the results in Table 4.2, the test-statistics of all of the variables' intercept as well as trend and intercept in the level form, except GDP (Trend & Intercept) and Inflation (Intercept), are greater than the critical value, α even at the 10% significance level. The intercept of inflation at the level form has a p-value of 0.053, indicating rejection of null hypothesis at 10% significance level; whereas the trend and intercept of GDP at the level form has a p-value of 0.225, indicating rejection of null hypothesis at 5% significance level. Though so, rejection of null hypotheses in these two cases is not at its most specific levels. Thus, these variables were also taken into consideration for PP test in the first difference.

Therefore, the same test was conducted for all variables in their first difference form to detect their dynamic stationarity. The test-statistics of the variables' intercept as well as trend and intercept in their first difference are smaller than the critical value, α even at the 1% significance level.

4.3 Threshold Autoregressive (TAR) Model & Momentum – Threshold Autoregressive (M-TAR) Model

After verifying that all the variables employed have stationary distribution, the Threshold Autoregressive (TAR) and Momentum-Threshold (M-TAR) models are used to detect asymmetric relationship between the dependent variable, stock price and each independent variables namely Gross Domestic Product (GDP), Inflation, Oil Price and Exchange Rate, by setting the Threshold value (tau) as zero or unknown.

Rejection of the null hypothesis of F-joint indicates that there is long-term relationship between the macroeconomic variable and stock return whereas the rejection of the null hypothesis of F-equal indicates an asymmetric relationship between the macroeconomic variable and stock return. For results to be considered significant, the variables tested have to fulfil the following criteria: (1) reject the null hypothesis of F-joint, and (2) reject the null hypothesis of F-equal at the given significance level.

This chapter presents only results that are found to be significant, i.e. only results that indicate a long run relationship and an asymmetric relationship between the independent variable and dependent variable would be shown. Two variables namely oil price and exchange rate are found to have such characteristics and are tabulated in Table 4.3 and Table 4.4 respectively.

TABLE 4.3: TAR & MTAR Results for Oil Price

	TAR; 0	**TAR; UNKNOWN**	**MTAR; 0**	**MTAR; UNKNOWN**
Above Theshold	-0.045792	-0.024416	-0.117737	-0.190417
Below Threshold	-0.103484	-0.164688	-0.037994	-0.049382
Tau	0.000000	-0.213603	0.000000	0.063555
F-Joint	5.797092	9.602727*	6.502503	7.755796
F-Equality	1.528179*	8.810054*	2.877943*	5.276052

NOTE: *, **, *** indicate the rejection of null hypothesis at 10%, 5% and 1% significance level

TABLE 4.4: TAR & MTAR Results for Exchange Rate

	TAR; 0	**TAR; UNKNOWN**	**MTAR; 0**	**MTAR; UNKNOWN**
Above Theshold	-0.000249	-0.021904	-0.094750	-0.271575
Below Threshold	-0.054888	-0.137935	-0.063963	-0.042018
Tau	0.000000	-0.188363	0.000000	0.063058
F-Joint	2.578393	6.303466	3.918936	8.528441*
F-Equality	2.901220*	4.864728	0.298981	9.124969*

NOTE: *, **, *** indicate the rejection of null hypothesis at 10%, 5% and 1% significance level

4.4 Asymmetric Error Correction Model (AECM)

Table 4.5 Result of Asymmetric ECM Model

VARIABLES	TAR			M-TAR		
	ZPLUS	**ZMINUS**	**AIC**	**MPLUS**	**MMINUS**	**AIC**
Oil Price	0.015276	0.128811***	-2.533852	-	-	-
Exchange rate	-	-	-	0.063713***	-0.213506***	-2.772418

NOTE: *,**,*** indicates the rejection of null hypothesis at 10%, 5% and 1% of significance level. Lag selections are based on parsimony. Zplus and Mplus indicate positive shock when good news is released whereas zminus and zplus indicate negative shock in response to the bad news. If zplus is not equal to zminus or mplus is not equal to mminus, the positive shock and negative shock of macroeconomic variables on stock return are not equal.

The results of this study are presented in Table 4.5. Both zplus and zminus (mplus and mminus) are of utmost importance when the Asymmetric ECM is used because they indicate the existence of asymmetric relationship between the macroeconomic variable and stock price. When either one of the coefficient value of zplus and zminus of any of the macroeconomic variable fulfils the following criteria (1) coefficient value is negative, and (2) coefficient value is significant at 10% significance value, then the impact of the macroeconomic variable to stock price is said to be asymmetric.

In this case, stock return in Malaysia is impacted asymmetrically by oil price and exchange rate respectively. Given that the zminus, 0.1288 is significant at the 1% significance level, it implies that negative shock on oil price would significantly impact the Malaysian stock market at the speed of adjustment to the long-run equilibrium at 12.88%. On the other hand, the zplus, 0.01528 is insignificant even at the 10% significance level, thus indicating insufficient evidence to prove that positive shock on oil price would impact the Malaysian stock market significantly.

Furthermore, given the mminus, -0.213506 is significant at the 1% significance level, it implies that negative shock on change in exchange rate would significantly impact the Malaysian stock market at the speed of adjustment to the long-run equilibrium at 21.35%. On the other hand, the mplus, 0.06371 is also significant at the 1% significance level, indicating that a positive shock in exchange rate would significantly impact the Malaysian stock market at the speed of adjustment to the long-run equilibrium at 6.371%.

4.5 Impulse Response Test

The results for impulse response test conducted for macroeceonomic variables found to have asymmetric long-run relationship with stock returns namely oil price and exchange rate are presented in Figure 4.1 and Figure 4.2.

Through graphical observation, it is found that current KLCI, exchange rate and oil price data are positively influenced by their respective previous shocks in observations. The graphical method used in the impulse response test confirms that a negative shock in exchange rate would result in an asymmetric impact on stock returns.

Considering that the confidence interval of the response of KLCI (stock returns) to oil price as well as KLCI to exchange rate consists of zero, there is insufficient evidence that shocks in the Malaysian stock index (KLCI) could be used to explain the shocks in these independent variables respectively.

Figure 4.1: Impulse Response on Oil Price

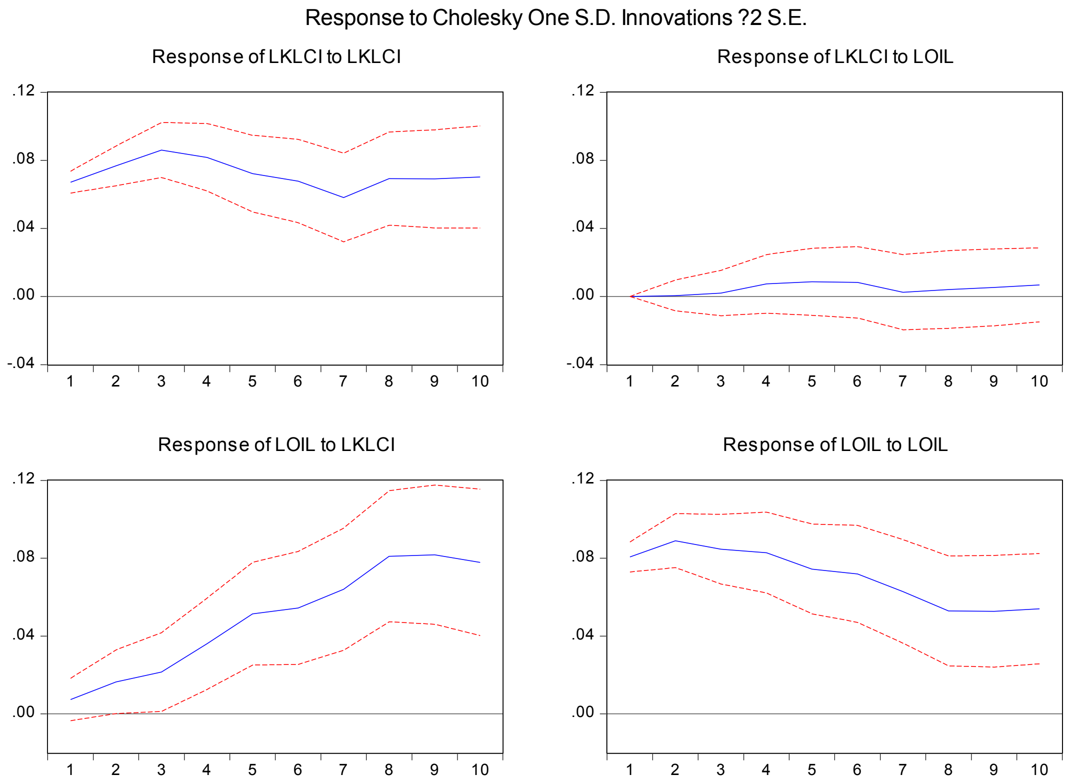
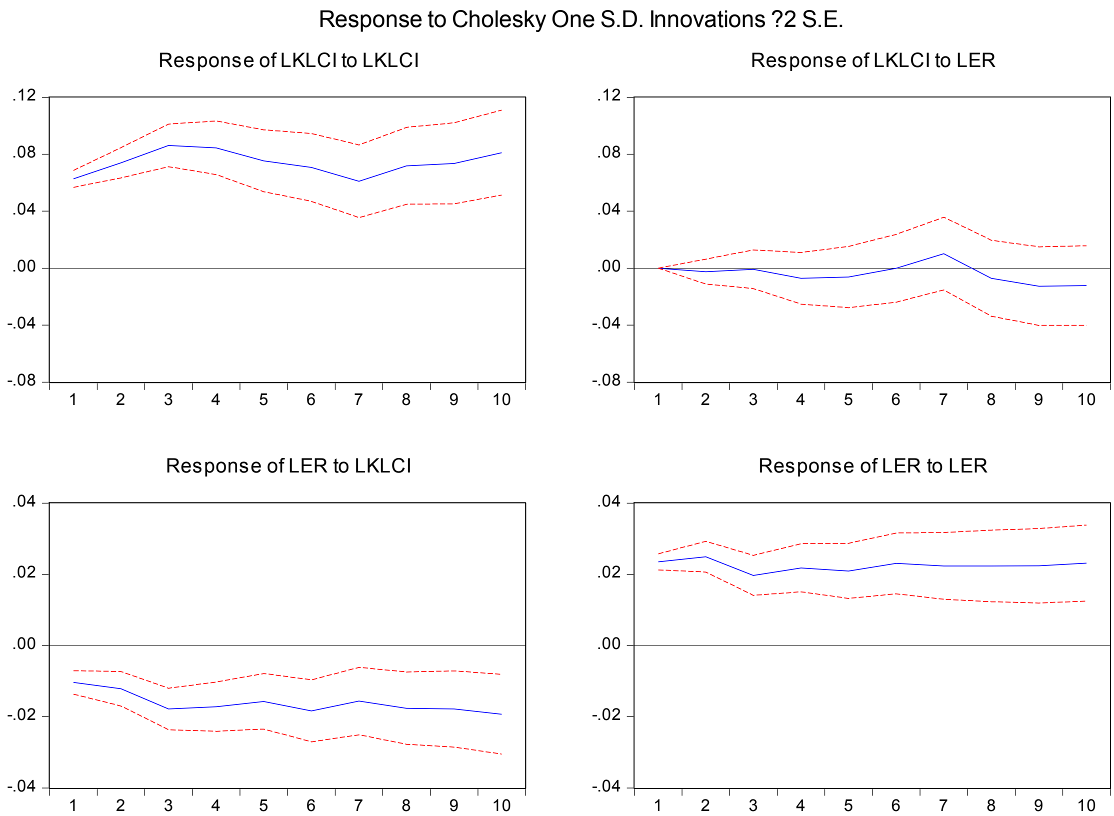


Figure 4.2: Impulse Response on Exchange Rate



4.6 Diagnostic Checking

CUSUM and CUSUM of Squares test are the diagnostic checking tests required to examine whether the models employed are efficient and unbiased.

4.6.1 CUSUM Test

The results of the CUSUM test for TAR (Oil Price) and M-TAR (Exchange Rate) are presented in Figure 4.3 and Figure 4.4 respectively. At each point, the value of the cumulative sum of residuals is plotted against the upper and lower bound of a 95% confidence interval. For the result to qualify as a significant one, the recursive estimate for the cumulative sum of residuals must fall within the 95% confidence interval boundary.

The results below indicate that the Asymmetric ECM model employed is significant as a whole at the 5% significance level. When each of the plots of the cumulative sum of residuals falls inside the 95% confidence level, it is concluded that the Asymmetric ECM model is fit and properly structured.

4.6.2 CUSUM of Squares Test

To ensure the robustness of the CUSUM test performed earlier, CUSUM of Square test is used. The results of the CUSUM of Squares test performed for TAR (Oil Price) and M-TAR (Exchange Rate) are tabulated in Figure 4.5 and Figure 4.6 respectively. Similar to CUSUM test, cumulative variance on each plot must fall within the boundaries of the 95% confidence interval.

It is shown that the plots for cumulative variance for both Figure 4.5 and Figure 4.6 fall slightly out of the boundaries. This is still acceptable, considering that the Asymmetric ECM Models for both countries are still significant at the 90% confidence interval.

Figure 4.3 CUSUM Test for TAR (Oil Price)

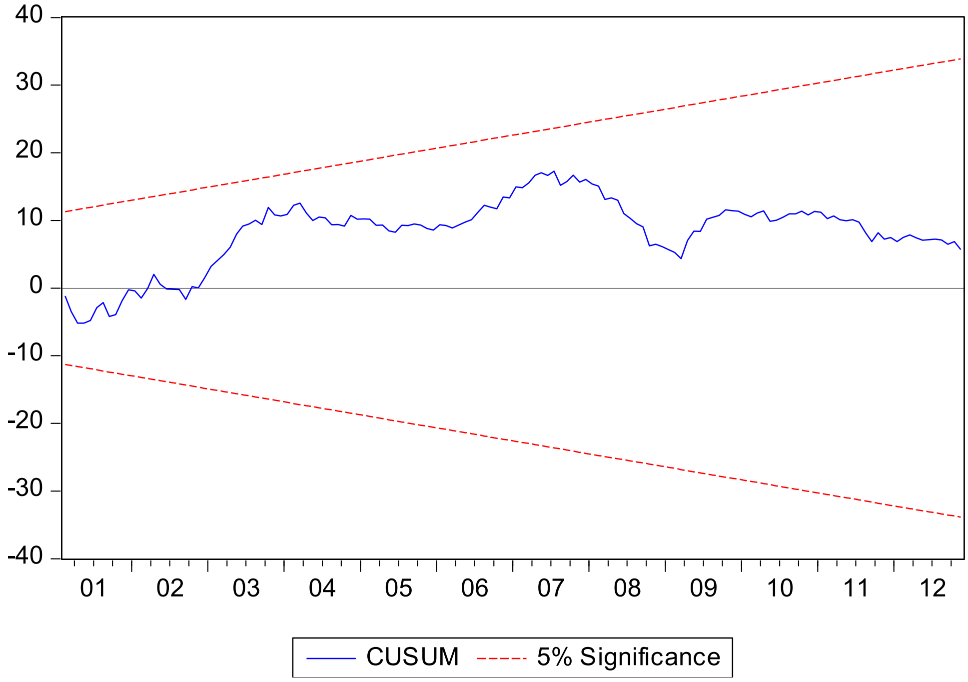


Figure 4.4: CUSUM Test for MTAR (Exchange Rate)

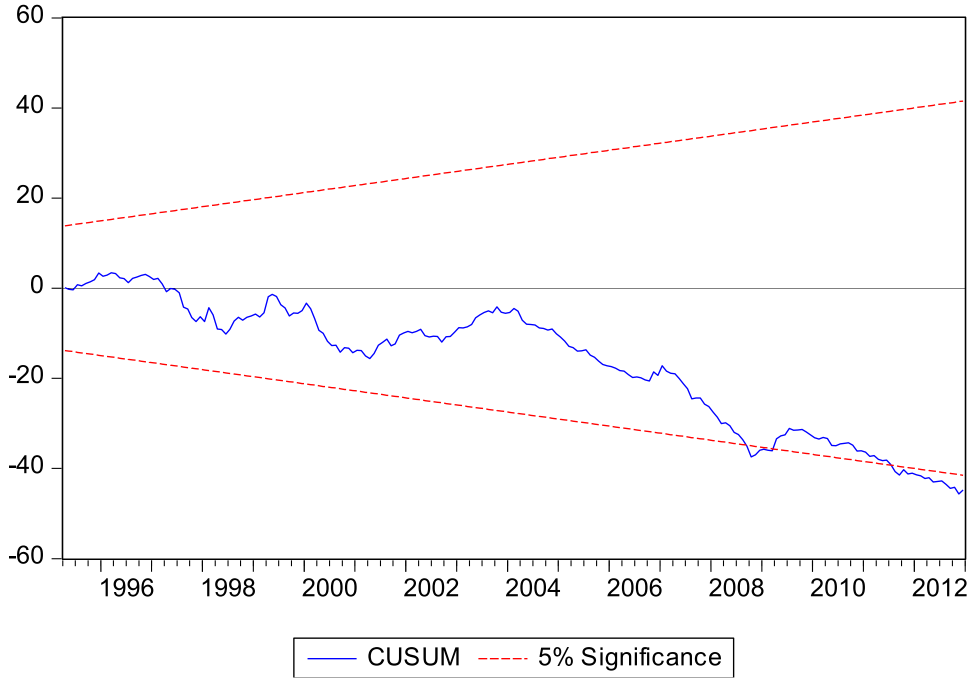


Figure 4.5: CUSUM of Squares Test for TAR (Oil Price)

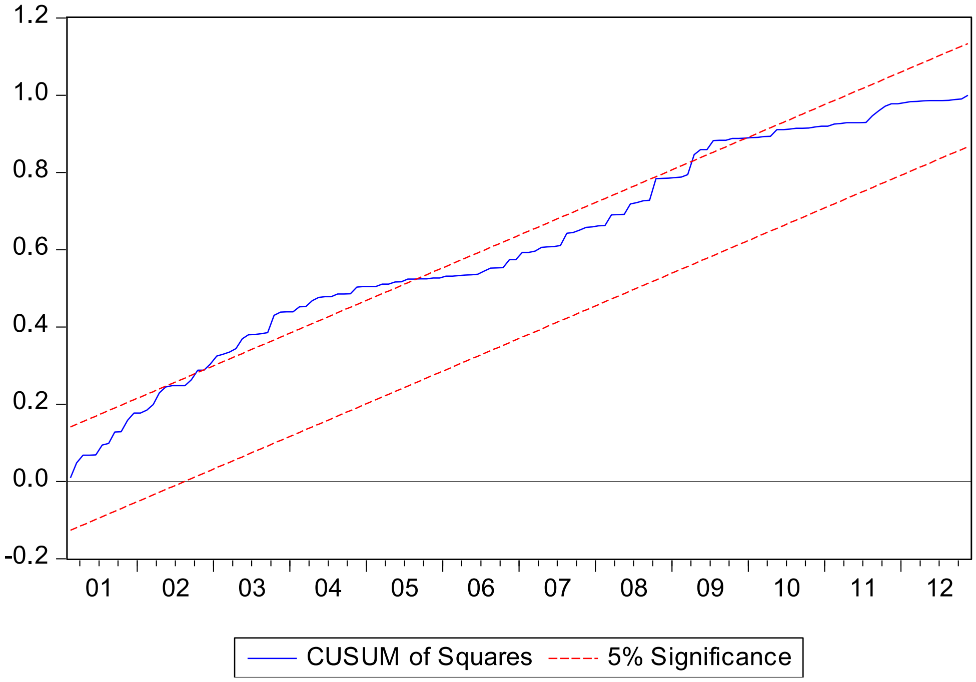
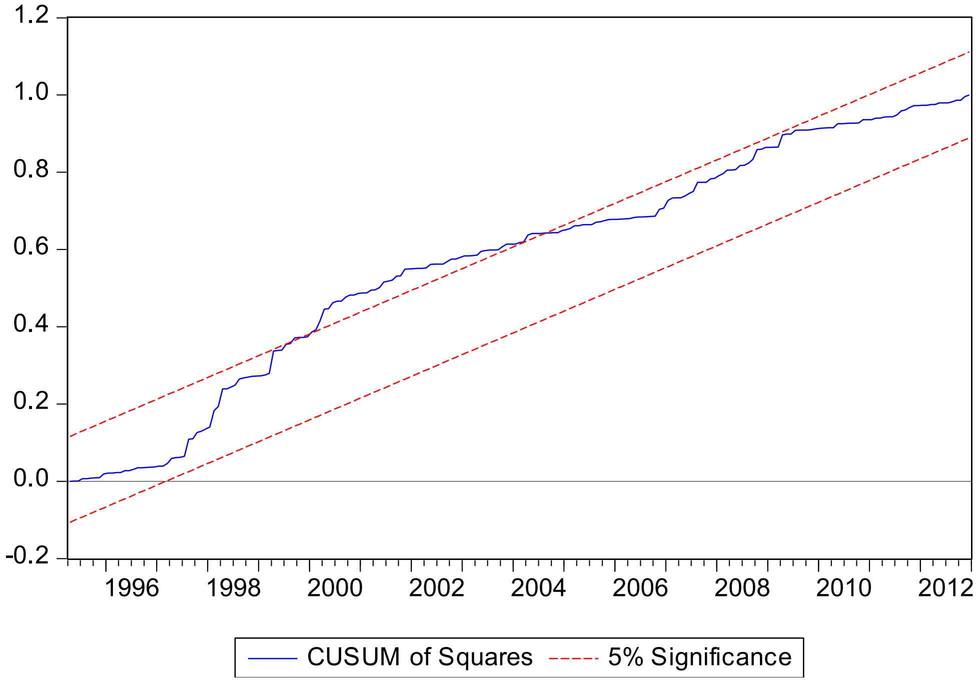


Figure 4.6: CUSUM of Squares Test for MTAR (Exchange Rate)



4.7 Discussion of Major Findings

Prior to the TAR and M-TAR Models, the variables employed in this study underwent the unit root tests ADF and PP. All variables are proven to be non-stationary at the level form and stationary at first difference with the significance level of at least 10%.

According to the empirical results obtained from the Asymmetric ECM in Table 4.5, it is found that there is asymmetric relationship between stock price and oil price as well as stock price and exchange rate. In the Threshold Autoregressive (TAR) Model and Momentum-Threshold Autoregressive (M-TAR) Mode, the null hypothesis for F-joint and F-equal respectively are rejected at 5% significance level, thus signifying the existence of long-run asymmetric relationship between each macroeconomic variable and stock return.

In Table 4.5, the zplus and zminus (mplus and mminus) indicate the speed with which stock price adjusts to positive or negative shocks on the macroeconomic variables. From the Asymmetric Error Correction Model, it is found that a negative shock in oil price would impact stock return asymmetrically at 12.88%. Furthermore, a positive shock in change in exchange rate would impact stock return asymmetrically at 6.371%, whereas a negative shock in change in exchange rate would impact stock return asymmetrically at 21.35%.

According to the impulse response test, shocks in exchange rates are negatively related to shocks in stock returns. This signifies that the Malaysian stock market would slump in response to a shock in exchange rates as hot money is withdrawn when the market opens.

The final results obtained are tested with diagnostic checking tests namely CUSUM test and CUSUM of Squares Test. With the plots falling by or within the upper and lower bound of 95% confidence interval, it could be concluded that the model adopted was accurate and appropriate. In short, the Asymmetric ECM captured the effect of the asymmetric relationship between stock prices and oil price as well as stock prices and exchange rate.

The theoretical framework of this study is built on the Arbitrage Pricing Theory (Ross, 1976), which attributed the movement of common stock prices to a comprehensive list of macroeconomic variables namely interest rate, inflation rate, real production, money supply and exchange rate.

The most commonly found methodology that is used to determine the relationship between macroeconomic variables and stock price is the Error Correction Model (ECM). Using ECM, Asmy, Rohilina and Hassama (2009) detected a symmetric relationship between macroeconomic variables and stock price in Malaysia. Pal and Mittal (2011) as well as Kyereboah-Coleman and Agyire-Tettey (2008) used the same approach to determine the relationship between macroeconomic variables and stock prices in India and Karachi respectively.

Besides, a more basic approach was used to determine the relationship between the duo. Simple regression model (Rehman, Yousof, Ejaz, & Sardar, 2011) (Frimpong, 2009)and multiple regression model (Kandir 2008) were employed in their respective investigations aimed towards the same research objectives.

Furthermore, in a study to find out the relationship between macroeconomic variables and stock prices in Ghana and Pakistan respectively, Frimpong (2009) as well as Sohail and Hussain (2009) used the Vector Error Correction Model (VECM). Mukherjee and Naka (1995) supported this approach, assuming that error correction would occur in these independent variables.

Moreover, Johansen-Juselius cointegration test was employed to capture the long-run equilibrium relationship between macroeconomic variables and stock returns (Humpe & Macmillan, 2009 Yahyazadehfar & Babaie, 2012 & Puah & Jayaraman, 2007). Yahyazadehfar and Babaie (2012) further investigated the relationship by using the Granger-causality test to detect the short-term causal relationships and determine the direction with which the dependent variable and independent variables flow.

As indicated by in the major findings of this paper, stock prices react asymmetrically to different shocks in macroeconomic variables. The reaction is similar to the realistic stock market because investors do not react equally when faced with positive and negative shocks. Thus, the stock market is not completely symmetric, as assumed by the previous researchers in this field.

Nonetheless, the methodologies listed above assume that the relationship between stock price and macroeconomic variables are symmetric, which is unlikely to be realistic. In order to solve the problem faced by these methodologies, this paper uses the TAR and M-TAR models to investigate whether or not there is asymmetric relationship between the macroeconomic variables and stock price. Cho, Ho, Lee et. al. (2013) employed similar methodology to investigate the relationship between the duo, but the paper was limited only to explanation on macroeconomic variables as a whole. This paper seeks to scrutinise the asymmetric effect of each macroeconomic variables to stock return.

4.8 Conclusion

The diagnostic checking tests namely CUSUM and CUSUM of Squares Test proved that the Asymmetric Error Correction Model employed is fit and appropriate. Thus, it could be concluded that oil price has negative asymmetric relationship with stock price, whereas change in exchange rate have positive and negative asymmetric relationship with stock price.

CHAPTER 5: CONCLUSION

5.1 Summary of Study

Pal and Mittal (2011), Kyereboah-Coleman and Agyire-Tettey (2008) and Asmy, Rohilina and Hassama (2009) detected a symmetric relationship between macroeconomic variables and stock price in India, Karachi and Malaysia respectively. However, this is not quite the case as major stock markets around the world slumped upon the announcement of a minor recovery in the job data of the United States. The Dow Jones Industrial Average (DJIA) plummeted by 0.9%, NASDAQ dropped 1.09%, and the Shanghai Composite index slid 5.3% in response to the potential tapering of the Quantitative Easing initiative started by the Federal Reserve to boost the economy. This issue is intriguing enough to challenge the assumptions made by past studies that the relationship between stock price and macroeconomic variables are symmetric.

To solve the problem faced by these methodologies, this paper uses the TAR and M-TAR models to investigate whether or not there is asymmetric relationship between the macroeconomic variables and stock prices in Malaysia. Though Cho, Ho, Lee, Tan and Yap (2013) employed a similar methodology to investigate the relationship between the duo, the paper was limited only to explanation on macroeconomic variables as a whole. This paper seeks to scrutinise the asymmetric effect and determine the impact of shocks on each macroeconomic variables to stock return and vice versa.

In conclusion, Malaysia's stock return is asymmetrically influenced by a negative shock in oil price as well as a negative and positive shock in change in exchange rate. This conclusion is made based on the results obtained as presented in Table 4.3 and Table 4.4. The speed with which these factors are reflected on stock prices differ, as presented by the zplus and zminus (mplus and mminus) in Table 4.5. Shocks in exchange rate are important in determining shocks in stock returns. This signifies the relative impact that is brought about to the Malaysian stock market should hot money is withdrawn from the market.

5.2 Policy Implications

This research extends the study by Cho, Ho, Lee, Tan and Yap (2013), who employed the TAR and M-TAR models to evaluate the asymmetric impact between stock prices and macroeconomic variables as a whole among four countries namely Indonesia, Malaysia, Thailand and Philippines. This paper scrutinised the impacts caused on Malaysian stock prices by each specific macroeconomic variables. Contrary to the findings of the precedent researchers which claim that macroeconomic variables generally have asymmetric impact on stock returns, this paper has found asymmetric impact on stock prices to be led by only two macroeconomic variables: oil price and exchange rate.

Secondly, investors should also be informed that these are the two factors which would result stock prices to react differently when positive and negative news are released respectively. Knowing that macroeconomic factors such as exchange rate and oil price would affect stock returns asymmetrically, investors should obtain more information and study these indicators before they make their investment decisions. Upon knowing that negative macroeconomic announcements are going to be made, investors should switch to stocks with a lower beta or other investment vehicles such as debt or cash securities to cushion their investment position against a slump.

Thirdly, the management of companies should also understand that investors respond to positive and negative announcements about the company asymmetrically. The government is obliged to disclose all macroeconomic information to investors or other stakeholders during quarterly, half-yearly and annual announcements. Through this study, the management should be able to understand that negative announcements would impact the share price of their company at a larger scale than positive announcements. Therefore, the government should plan their strategies when they intend to release unfavourable news. The government could consider hinting negative news to the public rather than giving investors and the general public a surprise. Through this method, investors would factor in the negative news released by the government gradually, rather than withdrawing their funds in panic as soon as negative news is announced.

Finally, other researchers should consider using the TAR and M-TAR models when estimating the impacts of macroeconomic variables to stock prices. Many researches filed in the literature assume a symmetric relationship between stock price and each macroeconomic variable, but this study has proven the otherwise. Therefore, in order to obtain a more realistic and reliable result, the TAR and M-TAR models could help other researchers to detect an asymmetric relationship between stock price and the macroeconomic variables.

5.3 Limitations and Recommendations for Further Study

Due to limited resources, this study is confined within the Malaysian stock market. As suggestion in this paper's issue, the announcement of the macroeconomic variables in the United States would affect the global economy. Thus, these announcements could potentially impact not only a specific country, but also a particular region or continent. Therefore, in order to capture the effect of spillover of these announcements, future researchers could consider studying more neighbouring countries. That being done, researchers could detect whether the asymmetric impact holds true for every nation.

REFERENCES

Abel, B. A., & Bernanke, B. S. (2001). *Macroeconomics.* New York: Addison Wesley Longman Inc.

Abugri, B. A. (2008). Empirical relationship between macroeconomic volatility and stock returns: Evidence from Latin American markets. *International Review of Financial Analysis, 17*(2), 396-410.

Adrangi, B., Chatrath, A., & Sanvicente, A. Z. (2000). Inflation, output, and stock prices: Evidence from Brazil. *The Journal of Applied Business Research, 18*(1), 61-77.

Ahmed, M. F. (1999). Stock market, macroeconomic variables and causality: The Bangladesh case. *Savings and Development*, *23*(2), 2.

Al Janabi, M. A., Hatemi-J, A., & Irandoust, M. (2010). An empirical investigation of the informational efficiency of the GCC equity markets: Evidence from bootstrap simulation. *International Review of Financial Analysis, 19*(1), 47-54.

Al-Fayoumi, A. N. (2009). Oil prices and stock market returns in oil importing countries: The case of Turkey, Tunisia and Jordan. *European Journal of Economics, Finance and Administrative Sciences*, *16*, 86-101.

Arouri, M. E., & Nguyen, D. K. (2010). Oil prices, stock markets and portfolio investment: Evidence from sector analysis in Europe over the last decade. *Energy Policy, 38*(8), 4528-4539.

Arouri, M. E., & Rault, C. (2011). Oil prices and stock markets in GCC countries: Empirical evidence from panel analysis. *International Journal of Finance and Economics*.

Asmy, M., Rohilina, W., & Hassama, A. A. (2009). Effects of macroeconomic variables on stock prices in Malaysia: An approach of error correction model. *Munich Personal RePec Archive,* 1-34.

Backus, K. D., & Crucini, M. J. (2000). Oil prices and the terms of trade. *Journal of International Economics, 50,* 115-134.

Basher, S. A., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. *Global Finance Journal, 17*(2), 224-251.

Beenstock, M., & Chan, K. F. (1998). Economic forces in the London stock market. *Oxford Bulletin of Economics and Statistics, 50*(1), 27-39.

Bernanke, S. B. (2006). The economic outlook. *Remarks before the National Italian American Foundation*.

Bernanke, S. B., Gertler, M., & Watson, M. (1997). Systematic monetary policy and the effects of oil price shocks. *Brookings Papers on Economic Activity, 1*, 91-148.

Bhattacharya, B. & Mukherjee, J. (2001). Causal relationship stock market and exchange rate, foreign exchange reserves and value of trade balance: Case study of India. *Department of Economics, Jadavpur University*.

Bilson, C., Brailsford, T., & Hooper, V. (2001). Selecting macroeconomic variables as explanatory factors of emerging stock market returns. *Pacific-Basin Finance Journal, 9*(4), 401-426.

Bjornland, C. H. (2009). Oil price shocks and stock market booms in oil exporting country. *Scottish Journal of Political Economy, 2*(5), 232-254.

Black , F., Jensen, & Scholes, M. (1972). The Capital Asset Pricing Model: Some empirical tests in studies in the theory of capital market. *Michael C. Jensen*, 79-121.

Bloomberg. (2013, May 30). *Nikkei 225 Declines 5% as Yen Weighs on Exporters*. Retrieved June 30, 2013, from Bloomberg Business Week: http://www.businessweek.com/videos/2013-05-30/nikkei-225-declines-5-percent-as-yen-weighs-on-exporters

Brown, P. A., & Yucel, M. K. (2002). Energy prices and aggregate economic activity: an interpretative survey. *The Quarterly Review of Economics and Finance, 42*(2), 193-208.

Charkravarty, S. (2005). Stock market and macro economic behavior in India. *Institute of Economic Growth*.

Chatziantoniou, I., & Kontonikas, A. (2008). The impact of monetary policy on stock prices. *Journal of Policy Modelling, 30*(1), 33-35.

Chen, N. (1991). Financial investment opportunities and the macro economy. *Journal of Finance, 46*(2), 529-554.

Chen, N. F., Roll, R., & Ross, S. (1986). Economic forces and the stock market. *Journal of Business, 59*(3), 383-403.

Chen, S.-S. (2009). Predicting the bear stock market: Macroeconomic variables as leading indicators. *Journal of Banking & Finance, 33*(2), 211-223.

Cheung, Y., He, J., & Ng, K. L. (1997). What are the global sources of rational variation in international equity returns?. *Journal of International Money and Finance, , 16*(6), 821-836.

Chiou, J. S., & Lee, Y. H. (2009). Jump dynamics and volatility: Oil and the stock markets. *Energy, 34*(6), 788-796.

Cho, P. Y., Ho, M. G., Lee, C. H., Tan, S. Y., & Yap, P. J. (2013). The asymmetric effect of macroeconomics variables on stock prices: An empirical evidence of ASEAN-4. *UTAR Research Repository*, 1-79.

Choudhry, T. (2001). Inflation and rates of return on stocks: Evidence from high inflation countries. *Journal of International Financial Markets, Institutions and Money, 11*(1), 75-96.

Cuthbertson, K., & Nitzsche, D. (2004). *Quantitative Fiancial Economics: Stocks, Bonds and Foreign Exchange* (2nd ed.). England: John Wiley & Sons Ltd.

Du, D. (2006). Monetary policy, stock returns and inflation. *Journal of Economics and Business, 58*(1), 36-54.

Enders, W., & Siklos, P. (2001). Cointegration and threshold adjustment. *Journal of Business and Economic Statistics, 19*(2), 166-176.

Fama, E. F. (1981). Stock returns, real activity, inflation and money. *American Economic Review, 71*(4), 545-565.

Fama, E. F. (1990). Stock returns, expected returns and real activity. *Journal of Finance, 45*(4), 1089-1108.

Filis, G., Degiannakis, S., & Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International Review of Financial Analysis, 20*(3), 152-164.

Fisher, I. (1930). The Theory of Interest, as determined by impatience to spend income and opportunity to invest it. *The Theory of Interest*, 161-165.

Frimpong, J. M. (2009). Economic forces and the stock market in a developing economy: Cointegration evidence from Ghana. *European Journal of Economics, Finance and Administrative Sciences*, 124-135.

Gan, C., Lee, M., Au Yong, H. H., & Zhang, J. (2006). Macroeconomic variables and stock market interactions: New Zealand evidence. *Investment Management and Financial Innovations, 3*(4), 89-101.

Geske, R., & Roll, R. (1983). The fiscal and monetary linkage between stock returns and inflation. *The Journal of Finance, 38*(1), 1-33.

Gujarati, D. C., & Porter, D. C. (2009). *Basic Econometrics* (5th ed.). New York: McGraw-Hill.

Gupta, R., & Modise, M. P. (2013). Macroeconomic variables and South African stock return predictability. *Economic Modelling, 30*, 612-622.

Hamilton, J. D. (1983). Oil and the macroeconomy since World War II. *Journal of Political Economy, 91*(2), 228-248.

Ho, K., & Tsui, A. K. (2004). Analysis of real GDP growth rates of greater China:. *China Economic Review, 15*(4), 424-442.

Hooker, A. M. (1996). What happened to the oil price–macroeconomy relationship? *Journal of Monetary Economics, 38*(2), 195-213.

Ibrahim, H. M. (1999). Macroeconomic indicators and stock prices in Malaysia: An empirical analysis. *Asian Economic Journal, 13*(2), 219-231.

Ibrahim, M. H., & Hassanuddeen, A. (2003). Macroeconomic variables and the Malaysian equity market: A view through rolling subsamples. *Journal of Economic Studies,* (30), 6-27.

Ibrahim, M. H., & Yusoff, W. S. (2001). Macroeconomic variables, exchange rate and stock price: A Malaysia perspective. *IIUM Journal of Economics and Management, 9*(2), 141-163.

International Energy Agency. (2009). The impact of the financial and economic crisis on global energy investment.

Islam, S. M., Watanapalachaikul, S., & Billington, N. (2004). A time series analysis and modelling of the Thai stock market.

Jecheche, P. (2012). An empirical investigation of arbitrage pricing theory: A case on Zimbabwe. *Research in Business & Economics Journal, 6*, 1-14.

Jimenez-Rodriguez, R., & Sanchez, M. (2005). Oil price shocks and real GDP growth: Empirical evidence for some OECD countries. *Applied Economics, 37*(2), 201-228.

Jones, M. C., & Kaul, G. (1996). Oil and stock markets. *The Journal of Finance, 51*(2), 463-491.

Jung, H., & Park, C. (2011). Stock market reaction to oil price shock: A comparison between an oil-exporting and an oil-importing economy. *Journal of Economic Theory and Econometrics, 22*, 1-29.

Kandir, S. Y. (2008). Macroeconomic variables, firm characteristics and stock returns: Evidence from Turkey. *International Research Journal of Finance and Economics*, 36-45.

Kaul, G. (1987). Stock returns and inflation: The role of the monetary sector. *Journal of Financial Economics, 18*(2), 253-276.

Khatak, S. R., Khatak, M., & Ullah, I. (2012). Testing the arbitrage pricing theory on Karachi stock. *Interdisciplinary Journal of Contemporary Research in Business, 4*(8), 839-853.

Kim, I. M., & Loungani, P. (1992). The role of energy in real business cycle models. *Journal of Monetary Economics, 29*(2), 173-189.

Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Impact of macroeconomic indicators on stock market performance: The case of the Ghana Stock Exchange. *The Journal of Risk Finance, 9*(4), 365-378.

Laopodis, N. T. (2011). Equity prices and macroeconomic fundamentals: International evidence. *Journal of International Financial Markets, Institutions and Money, 21*(2), 247-276.

Lardic, S., & Mignon, V. (2006). Oil prices and economic activity: An asymmetric cointegration approach. *Energy Economics, 34*(18), 3910-3915.

LeBlanc, M., & Chinn, D. M. (2004). Do high oil prices presage inflation? The evidence from G5 countries. *Business Economics, 34*, 38-48.

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics, 47*(1), 13-37.

Malik, F., & Ewing, B. (2009). Volatility transmission between oil prices and equity sector returns. *International Review of Financial Analysis, 18*(3), 95-100.

Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives, 17*(1), 59-82.

Maysami, R. C., & Koh, T. S. (2000). A vector error correction model of the Singapore stock market. *International Review of Economics and Finance, 9*(1), 79-96.

Menike, L. M. (2006). The Effect of Macroeconomic Variables on Stock Prices in Emerging Sri Lankan Stock Market. *Sabaragamuwa university journal, 6*(1), 50-67.

Mookherjee, R. (1988). The stock market and the economy: The Indian experience. *Indian Economy Revolution*.

Mukherjee, R. T., & Yu, Q. (1997). Macroeconomic variables and stock prices in a small open economy: The case of Singapore. *Pacific-Basin Finance Journal, 5*(3), 377-388.

Mukherjee, T. K., & Naka, A. (1995). Dynamic linkage between macroeconomic variables and Japanese stock market: An application of a Vector Error Correction Model. *The Journal of Finance Research, 18*(2), 223-237.

Nelson, D. B. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica, 59*(2), 347-370.

Nishat, M., & Saghir, M. (1991). The stock market and Pakistan economy. *Savings and Development, 15*(2), 131-145.

Nishat, M., & Shaheen, N. (2004). Maecroeconomic factors and Pakistani equity market. *The Pakistan Development Review, 43*(4), 619-637.

Pal, K., & Mittal, R. (2011). Impact of macroeconomic indicators on Indian capital markets. *The Journal of Risk Finance, 12*(2), 84-97.

Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the U.S. and 13 European coutnries. *Energy Economics, 30*(5), 2587-2608.

Philstar.com. (2013, May 30). *Phl stocks tumble on US Fed concerns; Q1 GDP fails to cheer market*. Retrieved June 30, 2013, from Philstar.com Business: http://www.philstar.com/business/2013/05/30/948222/phl-stocks-tumble-us-fed-concerns-q1-gdp-fails-cheer-market

Pilinkus, D. (2009). Stock market and macroeconomic variables: Evidences from Lithuania. *Journal of Economics and Management, 14*, 884-891.

Pindyck, R. S. (1984). Risk, inflation and the stock market. *American Economic Review, 74*(3), 335-351.

Puah, C. H., & Jayaraman, T. (2007). Macroeconomic activities and stock prices in a South Pacific Island Economy. *International Journal of Economics and Management, 1*(2), 229-244.

Rahman, A. A., Mohd Sidek, N. Z., & Tafri, F. H. (2009). Macroeconomic determinants of Malaysian stock market. *African Journal of Business Management , 3*(3), 095-106.

Rehman, A., Yousof, U., Ejaz, A., & Sardar, S. (2011). Relation of stock market return with interest rates. *Interdisciplinary Journal of Contemporary Research in Business*, 1020-1026.

Robertson, D. (2013, June 7). *US adds 175,000 jobs as recovery continues*. Retrieved July 1, 2013, from The Times: http://www.thetimes.co.uk/tto/business/economics/article3785426.ece

Roll, R., & Ross, S. A. (1980). An empirical investigation of the arbitrage pricing theory. *The Journal of Finance, 35*(5), 1073-1103.

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economics Theory, 13*(3), 341-360.

S. A., & Sadorsky, P. (2006 October 19). Oil price risk and emerging stock markets. *Global Financial Journal, 17*(2), 224-251.

Sabetfar, P., Cheng, F. F., Mohamad, S., & Noordin, B. A. (2011). Test of arbitrage pricing theory on the Tehran stock exchange: The case of a Shariah-compliant close economy. *3*(3), 109-119.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics, 21*(5), 17-28.

Sari, R., & Soytas, U. (2005). Inflation, stock returns, and real activity: Evidence from a high inflation country. *Empirical Economics Letters, 4*(3), 181-192.

Sharpe, W. F. (1964). The factors in NYSE security returns. *Journal of Portfolio Management*, 5-19.

Sohail, N., & Hussain, Z. (2009). Long-run and short-run relationship between macroeconomic variables and stock prices in Pakistan: The case of Lahore Stock Exchange. *Pakistan Economic and Social Review*, 183-198.

Tse, A. (2013, June 24). *Stocks Tumble as Fed Presidents Send Competing Messages*. Retrieved July 1, 2013, from The Street: http://www.thestreet.com/story/11958965/1/stocks-tumble-amid-china-fed-worries.html?puc=TSMKTWATCH&cm_ven=TSMKTWATCH

Tsouma, E. (2009). Stock returns and economic activity in mature and emerging markets. *The Quarterly Review of Economics and Finance, 49*(2), 668-685.

Wu, M. (2013, June 26). *US Market Roundup – Stocks Higher Despite GDP Disappointment*. Retrieved July 1, 2013, from Market Pulse FX: http://forexblog.oanda.com/20130626/us-market-roundup-stocks-higher-despite-gdp-disappointment/

Yahyazadehfar, M., & Babaie, A. (2012). Macroeconomic variables and stock price: New evidence from Iran. *Middle-East Journal of Scientific Research, 11*(4), 408-415.

APPENDICES

Appendix 1.1 – Dow Jones Industrial Average (DJIA)

Source: Yahoo! Finance. (2013). *DJIA*. Retrieved Mar 29 2014, from http://finance.yahoo.com/echarts?s=%5EDJI+Interactive#symbol=%5EDJI;range=1d

Appendix 1.2 – NASDAQ Composite

Source: Yahoo! Finance. (2013). NASDAQ Composite. Retrieved Mar 29 2014, from http://finance.yahoo.com/echarts?s=%5EIXIC+Interactive#symbol=%5EIXIC;range=1d

Appendix 1.3 – Kuala Lumpur Composite Index (KCLI)

Source: Yahoo! Finance. (2013). KLCI. Retrieved Mar 29 2014, from http://finance.yahoo.com/echarts?s=%5EKLSE+Interactive#symbol=%5EKLSE;range=1d

Appendix 1.4 – Shanghai Composite Index (SSE)

Source: Yahoo! Finance. (2013). SSE. Retrieved Mar 29 2014, from http://finance.yahoo.com/echarts?s=000001.SS+Interactive#symbol=000001.SS;range=1d

Appendix 1.5 – Nikkei 225 Composite Index

Source: Yahoo! Finance. (2013). SSE. Retrieved Mar 29 2014, from http://finance.yahoo.com/echarts?s=%5EN225+Interactive#symbol=%5EN225;range=1d