THE INFLUENCE OF THE FINANCIAL, EXTERNAL AND REAL OUTPUT INDICATORS ON MALAYSIAN STOCK MARKET

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ABSTRACT

This research investigated the linkages between the movements of the financial, external and real output indicators with the FTSE/BM in the long-run and short-run to determine the viability of using available information as indicators to predict Malaysian stock prices. The co integration and causality approach was used to determine the influence of macroeconomic variables changes on the FTSE/BM Top 100 Index, and monthly data was used for the analysis from the period September 1998 to October 2011. A Johansen co integration test indicated a positive long-run relationship between the FTSE/BM Top 100 Index and oil prices, industrial production, and consumer price index, and a negative long-run relationship with money supply, interest rate, and exchange rate. The error correction model estimated that the speed of adjustment was only 21.6%, which indicates that the Malaysian stock market converges on equilibrium within five months. Granger causality tests showed no causal relationship between the Malaysian stock market and the interest rate, but showed bidirectional movement with consumer price index and unidirectional movement from money supply and oil price with respect to the Malaysian stock market; in addition, unidirectional movement was found from the Malaysian stock market to the exchange rate and industrial production. The conclusion was that the Bursa Malaysia is an inefficient stock market with respect to macroeconomic variable such as money supply, oil price, and consumer price index because Malaysian stock market prices could be predicted using available information for these variables in the short run for the study's selected time period.

Keywords: FTSE/BM Stock Prices, Arbitrage Pricing Theory, Macroeconomics, Co integration and Granger Causality.

ABSTRAK

Kajian ini menyiasat hubungan antara pergerakan petunjuk *output* kewangan, luaran dan nyata dengan FTSE/BM dalam jangka panjang dan jangka pendek untuk menentukan kebolehgunaan maklumat yang ada sebagai petunjuk untuk meramal harga saham di Malaysia. Integrasi bersama dan pendekatan sebab dan akibat telah digunakan untuk menentukan pengaruh perubahan pembolehubah makroekonomi pada Indeks Top 100 FTSE/ BM, dan data bulanan telah digunakan untuk analisis dari tempoh September 1998 hingga Oktober 2011.Ujian bersama integrasi A Johansen menunjukkan hubungan jangka panjang yang positif antara Indeks Top 100 FTSE/ BM dan harga minyak, pengeluaran perindustrian, dan indeks harga pengguna, dan hubungan negatif jangka panjang dengan bekalan wang, kadar faedah dan kadar pertukaran Model pembetulan ralat dianggarkan bahawa kelajuan pelarasan adalah hanya 21.6%, yang menunjukkan bahawa pasaran saham Malaysia tertumpu kepada keseimbangan dalam tempoh lima bulan. Ujian sebab dan akibat Granger menunjukkan tiada hubungan sebab dan akibat antara pasaran saham Malaysia dan kadar faedah tetapi menunjukkan pergerakan dwiarah dengan indeks harga pengguna dan gerakan satu arah dari bekalan wang dan harga minyak berkenaan kepada pasaran saham Malaysia; di samping itu, pergerakan satu arah didapati daripada pasaran saham Malaysia kepada kadar pertukaran dan pengeluaran perindustrian. Kesimpulannya, Bursa Malaysia adalah suatu pasaran saham yang tidak cekap berkenaan pembolehubah makroekonomi seperti penawaran wang, harga minyak, dan indeks harga pengguna kerana harga pasaran saham Malaysia boleh diramalkan dengan menggunakan maklumat yang ada untuk pembolehubah tersebut dalam jangka masa pendek dipilih untuk kajian.

Kata kunci: Harga Saham FTSE/BM, Teori penentuan harga arbitraj, Makroekonomi, Integrasi bersama dan *Granger Causality*.

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ABBREVIATIONS

ACF: Autocorrelation function.

ADF: Augmented Dickey-Fuller unit root test.

AFC: Asian Financial Crisis.

AIC: Akaike Information Criterion.

APT: Arbitrage Price Theory.

ASEAN: Association of Southeast Asian Nations.

BM: Bursa Malaysia.

BNM: Bank Negara Malaysia.

CAPM: Capital Asset Price Model.

CMA: Capital Market Authority in Saudi Arabia.

CPI: Consumer Price Index.

DOS: Department of Statistics, Malaysia.

ECM: Error Correction Model.

EIA: US Energy Information Administration.

EFM: Emerging Financial Market.

EMH: Efficient Market Hypothesis.

ER: Exchange Rate.

ESIS: Electronic Share Information System.

FTSE/BM: Financial Times Stock Exchange/Bursa Malaysia.

GDP: Gross Domestic Product.

GNP: Gross National Product.

HQ: Hannan-Quinn Information Criterion.

IFS: International Finical Statistics.

IMF: International Monetary Fund.

IP: Industrial Production.

IR: Interest Rate.

JJ: Johansen-Juselius Test.

KLCI: Kuala Lumpur Composite Index.

KLSE: Kuala Lumpur Stock Exchange.

Log: log likelihood ratio.

M1: Narrow Money Supply that consists of Currency outside banks and demand deposits.

M2: Narrow Money Supply that consists of M1and time and savings deposits.

MC: Market Capitalization.

MSCI: Morgan Stanley Capital International.

OP: Oil Price.

OPEC: Organization of the Petroleum Exporting Countries.

PACF: Partial Autocorrelation Function.

PEMANDU: Performance Management and Delivery Unit

PP: Phillips-Perron Unit Root Test.

S&P 500: Standard and Poor 500 Index.

SIC: Schwarz Information Criterion.

SES: Stock Exchange of Singapore.

UN: United Nation.

VAR: Vector autoregressive.

VECM: Vector Error Correction Model.

WTI: Western Texas intermediate oil price.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The financial markets enhance economic performance efficiently by allowing investors to allocate their resources or savings to productive investments (Greenwood & Smith, 1997), and also reduce information and transaction costs (Levine, 1997), then make more funds available for investment. The efficient market hypothesis has been one of the most actively researched areas in finance over the last several years in developed and emerging, or developing, countries' financial markets (Dhankar, 1991; Fama, 1991; Fitzpatrick, 1995; Glen, 2005; Guevara, 2001; Januskevicious, 2003; Johansen, 199; Saunders, 1994).

According to efficient market hypothesis based on Fama (1970), in an efficient market, all the relevant information about the changes in macroeconomic factors are fully reflected in the current stock prices and therefore, investors would not be earned abnormal profits in such markets. If the conclusion of Efficient Market Hypothesis is to be believed; then the changes of any macroeconomic variables should not affect the stock prices or returns much. The weak form refers to the concept that the market is efficient if the volume information and stock prices movements cannot be predicted accurately by using the historical information (Fama, 1991). Francis (1993) stated that the stock prices are time-invariant if no systematic,

regular, or organized patterns exist, and consequently, markets exhibit weak form efficiency; however the existence of variation in the time series of prices of security markets enables the investors to earn abnormal returns.

Market efficiency tests in developing or emerging markets display mixed evidence. A stock market is efficient, in the sense that stock prices quickly and accurately reflect all available information. The efficient market hypothesis implies that financial markets are efficient in processing information. A competition among profit-maximizing investors in an efficient market ensures that current and past information is fully reflected in current stock prices so that investors will not be able to developed profitable trading rules with this information.

Stock exchange performance has attained a significant role in global economics and financial markets, due to their impact on corporate finance and economic activity. For instance, Adjasi and Biekpe (2006) stated that stock exchanges enable firms to acquire capital quickly, due to the ease with which securities are traded. Stock exchange activity, thus, plays an important role in helping to determine the effects of macroeconomic activities. The review of literature shows several studies that examined the stock prices movements; perhaps one important subject that has received increasing attention from economists, financial, investors and policy-makers is the dynamic effects of macroeconomic indicators on the stock prices. Ibrahim and Yusoff (1999) found that macroeconomic forces have systematic influences on stock prices via their influences on expected future cash flows. Chakravarty (2005) also viewed that stock exchange prices are highly sensitive to fundamental

macroeconomic indicators. Mehr (2005) observed that the effects of public policies on economic growth can be measured by the increase in stock exchange prices.

There are many studies were done on weak form efficiency of various stock markets in developed economies (Abeysekera, 2001; Abrosimova & Linowski, 2002; Apergis & Eleptherou, 2001; Dockery, Vergari & Vergari, 2001; Januskevicius, 2003; Jarrett & Kyper, 2005a, 2005b, 2006; Kvedaras & Basdevant, 2004; Laopodis, 2003; Payne & Sahu, 2004). However, unlike establish stock markets of advanced countries, the stock markets of emerging economies began to develop rapidly only in the last two and half decades. While there have been numerous attempts to develop and stabilize the stock markets, the emerging economies are characterized as the most volatile stock markets (Engel and Rangel, 2005). Some studies done in emerging or developing economies, for instance, Mobarek and Keasey (2000) and Akhter and Misir (2005) for Bangladesh, Babaker (2004) for Arab stock exchanges, Asiri, (2008) and Rao and Shankaraiah (2003) for Bahrain, and Halmos (2008) for Hungary, similarly Lim, Habibullah and Hinich (2009) for Chinese stock markets, Awad and Daraghma (2009) tested the Palestinian stock market, Okpara (2010) for Nigeria, Bashir, Ilyas and Furrukh, (2011) for the Pakistani stock market.

One of the earliest studies in emerging countries attempted to provide an assessment of stock market behavior and macroeconomic variables was conducted by Kwon, Shin, and Bacon (1997) for the South Korean stock market from January 1980 until December 1992. The independent variables consisted of a production index, inflation and expected inflation, risk premium, term structure, dividend yield, trade balance,

foreign exchange rate, oil price, and money supply that were time series regressed on monthly returns of the value-weighted Korea Composite Stock Price Index (KOSPI). Their results showed that the Korean stock market was more sensitive to real economic and international trading activities, measured in terms of foreign exchange rates, trade balance, the money supply, and the production index, than that of the U.S. and Japanese stock indexes. These markets have been shown to be sensitive to inflationary variables such as the change in unexpected inflation, expected inflation, the risk premium, and term structure (Burmeister & Wall, 1986; Chen, 1991; Chen, Roll, & Ross, 1986; Hamao, 1988). The growing linkages between macroeconomic variables and the movement of stock prices for the developed countries have been documented in the literature over the past several years (Booth & Booth, 1997; Chen, 2003; Fama, 1981; Kaneko & Lee, 1995; Lee, 1992; Mavrides, 2000; Maysami & Koh, 2000; Mukherjee & Naka, 1995; Sadorsky, 2003).

Studies on the linkages between stock markets and macroeconomic variables for industrialized economies have extended the analysis to the cases of developing economies. An illustrative list of studies for developed economies, which identify such factors as industrial production, inflation, interest rate, money supply and so forth, are important in explaining stock prices (Clare & Thomas, 1994; Chen, et al., 1986; Chen, 1991; Cheung & Ng, 1998; Darrat & Dickens, 1999; Fama, 1981, 1990; Flannery & Protopapadakis, 2002; Gjerde & Saettem, 1999; Mukherjee & Naka, 1995). The few notable studies for developing economies are Maysami and Koh (2000) for Singapore, and Kwon and Shin (1999) for South Korea, and Habibullah and Baharumshah (1996) and Ibrahim (1999) for Malaysia. Bhattacharya and Mookherjee (2001) and Chakravarty (2005) investigated macroeconomic indicators

and stock exchanges in India. Asaolu & Ogunmuyiwa (2011) for Nigeria, Chinzara (2011) for South Africa, Ali (2011) for Bangladesh, meanwhile, for Turkey (Kandir, 2008; Gunsel, Tursey & Rjoub, 2008; Eryigit, 2009; Buyuksalvarci, 2010), and Ali, Rehman, Yilmaz, Khan, & Afzal, (2010) for Pakistan. Chen, Kim, and Kim (2005) examined the impact of macro- and non-macroeconomic variables on the Chinese stock market with a special reference on the hotel stock returns.

In the Malaysian context, studies investigated the dynamic interactions between stock market and economic activities by conjecturing that the stock market leads the movement of macroeconomic variables (Ibrahim 2000; Ibrahim & Aziz, 2003; Janor, Halid & Rahman, 2005). And some studies have been done in East Asian such as (Bailey & Chung, 1996; Ibrahim and Aziz, 2003; Kwon & Shin, 1999). There are some studies done cross-country, for instance, Basher & Sadorsky, (2006); Cheung & Ng, (1998); Nandha & Hammoudeh, (2007); Wongbangpo & Sharma, (2002); and Nandha & Faff, (2008).

Concentrating primarily on the US stock exchanges, such early studies attempted to capture the effects of economic forces in a theoretical framework based on the Arbitrage Pricing Theory (APT) developed by Ross (1976). Chen et al. (1986) first illustrated that economic forces affect discount rates, the ability of firms to generate cash flows, and future dividend payouts, and provided the basis for the belief that a long-run equilibrium existed between stock prices and macroeconomic variables. Granger (1986) and Johansen and Juselius (1990), proposed to determine the existence of long-run equilibria among selected variables through cointegration

analysis, paving the way for a (by now) preferred approach to examining the economic variables and stock markets relationships.

Ibrahim and Yusoff (2001) found a negative relationship between stock prices and money supply in the long-run, but the analysis was actually between the stock prices (KLCI) and macroeconomic variables, which were real output as a measure of industrial production, money supply (M2), price level as a measure of consumer price index, and exchange rate. The composite index is positively related to the consumer price index and negatively related to M2. The positive association between the composite index and the consumer price index seems to support the view that the stock prices are a good hedge against inflation. Another study that was conducted by Yusoff (2003) on the effects of monetary policy on the Malaysian stock market showed that there was cointegration between the monetary policy variables and stock prices, with a negative relation between inflation and stock prices and money supply.

Islam (2003) replicated the above studies to examine the short-run dynamic adjustment and the long-run equilibrium relationships between four macroeconomic variables (interest rate, inflation rate, exchange rate, and the industrial productivity) and the Kuala Lumpur Stock Exchange (KLSE) Composite Index. His conclusions were similar: There existed statistically significant short-run (dynamic) and long-run (equilibrium) relationships among the macroeconomic variables and the KLSE stock returns. Ibrahim (1999) also investigated the dynamic interactions between the KLSE Composite Index, and seven macroeconomic variables (industrial production index, money supply M1 and M2, consumer price index, foreign reserves, credit aggregates,

and exchange rate). Observing that macroeconomic variables led the Malaysian stock indices, this study concluded that the Malaysian stock market was inefficient.

In another study, Ibrahim and Aziz (2003) analyzed the linkage between stock prices and four macroeconomic variables. They discovered that there was a positive short-run and long-run relationship between stocks prices with the consumer price index, while; stock prices had a negative association with money supply and the exchange rate. Results for Chong and Koh (2003) results were similar; they showed that stock prices, economic activities, real interest rates and real money balances in Malaysia were linked in the long-run both in the pre- and post-capital control periods.

Cheng, Ling and Arsad (2006) observed at the dynamics between macroeconomic variables and the Malaysian stock indices (Kuala Lumpur Composite Index) during the period of 1996-2005. They found that the inflation rate, industrial production, crude oil price and Treasury Bills' rate have a long-run relationship with the Malaysian stock market. Results indicated that consumer price index, industrial production index, crude oil price and treasury bills are significantly and negatively related to the Kuala Lumpur Composite Index in the long-run, except the industrial production index coupled with a positive coefficient. Another study by Rahman, Sidek and Tafri (2009) found that macroeconomic variables and stock prices for the case of the Malaysian Stock Exchange change and do perform and have a cointegrative relationship with changes in money supply, exchange rate, reverse and industrial production index, and also found that the Malaysian stock market has

stronger dynamic interactions with the reverse and industrial production index as compared to money supply, interest rate, and exchange rate.

However, up to date, a negligible amount of research has been conducted for Malaysian stock market and economic factors and thus the conclusion might be inadequate. The relationship of some macroeconomic factors could vary from market to market; may change in different sample periods and also in different frequency of the data. Thus, more in-depth studies are needed to understand the macroeconomic variables that might influence the Malaysian stock market. Moreover, the country like Malaysia is particular importance to study such relationship since it is one among the fastest growing economies. Furthermore, the capital market has undergone tremendous changes after the adoption of liberalization policy and it became more open to international investors.

The reforming market and the significant economic potential have been attracting a large number of foreign institutional investors into the Malaysian stock market. In this end, how does and at what extent the Malaysian stock market responds to the changes in macroeconomic factors remains an open empirical question? Understanding the macroeconomic variables that could impact the stock market index, with the recent data can be useful for investors, traders as well as the policy makers. However, mixed results or inconsistent findings have been found by different researchers regarding the causal relationship between macroeconomic indicators and stock prices for the case of Malaysia. This study will use different indicators, and will use more recent available data after the financial crisis in July

1997 to determine the Malaysian stock market form of efficiency through analysis of the causal relationship between the macroeconomics variables and stock prices in Malaysia.

1.2 Problem Statement

As world financial markets became more closely linked toward the end of the twentieth century, national stock markets increasingly reacted to each other with minor or major impacts. Nearly simultaneous collapses of world stock markets in oil embargo of OPEC in 1974, Black Monday in October 1987 when the crash began in Hong Kong, the Asian financial crisis in July 1997 and the global financial crisis in the middle of 2007 and into 2008 caused the fall of world stock markets, large financial institutions collapsed or had been bought out, and governments in even the wealthiest nations had to come up with rescue packages to bail out their financial systems, the above just a few clear examples of the increasing interdependence and contagion in the global stock markets (Park & Ratti, 2008). There is consensus between scholars on the fact that the financial markets plays a significant role in the whole economy, thus any collapses in stock markets will lead to slowing of the business cycle and economic life in the country (Asaolu & Ogunmuyiwa, 2011; Chinzara, 2011; Ali 2011).

The Malaysian economy strengthened in 2006, with real gross domestic product (GDP) expanded by 5.9%, In addition, Malaysia held the 21th position in a global ranking for ease in doing business (Information Guide, 2011). The Malaysian stock

market capitalization percentage to GDP ratio has been growing rapidly, according to the recent data published by the World Bank and Ministry of Finance/Malaysia, where the Malaysian market capitalization at the end period of July 2011had becomes RM1.339.3 billion, while in the end period of 2008 was RM663.8 billion, and in 2003 was RM640 billion. In addition the market capitalization/GDP ratio was 172.3% and 89.4% in 2007 and 2008, respectively, while intensely changed in the first half of 2011 to become 325.2% (Economic Report 2011-2012, 2011) (See Appendix B).

Malaysian capital markets have lost some of their vibrancy. Over the last nine years, the total market capitalization on Bursa Malaysia has grown at a rate of 10% per annum, while stock markets in neighboring Indonesia and Singapore have grown at 24% and 17%, respectively. The Malaysian liquidity ranking in Asia has dropped from 3rd in 1996 to 14th in 2010 because of the lack of liquidity and diversity in the capital markets. There is also limited diversity in the market, be it in terms of investors, in terms of products, or in terms of currency (PEMANDU, A Roadmap for Malaysia, 2011). According to the latest information in 2011 from the MSCI Database, Malaysia's total market capitalization weighting has shrunk to only 3.2% in 2010 from 6% in 2000 of the EFM Asia (12 countries indices, excluding the Japanese index)(See Appendix D) because Malaysian capital markets lack the critical mass to attract significant levels of investment. At this scale, international fund managers can afford to disregard Bursa Malaysia. The economic conditions were not that favorable during the financial crisis in 1997. Instability in the international financial markets in turn spilled over into the domestic financial markets. Continued waves of adjustment in both the currency and stock markets, coupled with the

decline in domestic and export demand subsequently prompted a shift to more growth-promoting policies. One of the institutions that were affected was the Malaysian stock market.

In general, the Malaysian stock market contributes to the best allocation of capital resources among numerous users (Ibrahim & Aziz, 2003). The roles of the stock market are mainly to facilitate and encourage the mobilization of funds, direct them towards efficient economic activities, provide adequate liquidity for investors, and encourage the creation of large-scale enterprises. The Malaysian stock market index (FTSE/BM) is the comprehensive indicator of the Bursa Malaysia Top 100 index performance (Bursa Malaysia Annual Report, 2009). The FTSE/BM represents share prices of 100 corporations (Ali et al., 2010). These companies are chosen because their operations cover a broad spectrum of economic performance in Malaysia and more significantly, reflect stock market activities with fair accuracy.

In 2009, Bursa Malaysia collaborated with the FTSE group in launching the FTSE Bursa Malaysia Index Series, which consists of tradable and benchmark indices. FTSE group is an independent company jointly owned by the Financial Times and the London Stock Exchange, thus forming the F-T and SE based on the original acronym. Bursa Malaysia's ongoing efforts to maintain globalization necessitates the collaboration with FTSE, which have some of the benefits from the collaboration: Firstly, investable to ensure no restrictions on purchasing the securities, the indices are ensured accurate representation of the securities available for investment through FTSE calculation methods, secondly, tradable liquidity is important in trading to

ensure stock availability as well as ease of trading. Hence, by employing liquidity screening on all stocks the tradability of the index series is enhanced, thirdly, transparent, and by incorporating international index construction standards, indices are more transparently managed.

Stock prices depend on the supply and demand for the stock; one of the factors that cause stock prices to be more volatile is the limited supply of new issues despite strong demand for the stocks (Buyuksalvarci, 2010). This restriction of supply leads to more price fluctuations, which are common to all stock markets (Tursoy, Gunsel & Rjoub, 2008). However, two things prevent an infinite price increase in the stock market. Firstly, the amount of money available in any country is finite. As the bull market proceeds, more and more of the country's savings are invested in the stock market and eventually the people involved might face liquidity problems. This tends to limit their exposure to liquidity risk. Secondly, the price rises typically experienced in a bull market would result in quoted companies having unrealistic market values that will eventually tumble down as investors realize that these rises cannot go on forever (Ali, 2011).

Specifically, this demand and supply for stocks is related to economic performance. Macroeconomic variables, such as financial, external, and real output indicators are observed to cause certain reactions on stock market performance (Gay, 2008). Financial indicators that influence the stock market are the money supply and interest rate (Ibrahim & Aziz, 2003; Janor et al, 2005; Wongbangpo & Sharma, 2002). There are other factors that can influence the investor's decision-making to invest in the

stock market (Ibrahim, 2011), such as the expected return (dividend) that is paid by the company (Cheng et at, 2011; Okpara, 2010), investors use the information that they hear to make decisions to invest in the stock market (Ibrahim, 2011) and investors value the future returns by discounting back the present value (Eita, 2011).

External indicators are very important in influencing the stock market, including the exchange rate and oil price (Gay, (2008); Hondroyiannis & Papapetrou, (2001); Park & Ratti, (2008). Firstly, Malaysia is an export-dominated country (U.S Annual Energy Outlook, 2011). For an export-dominated country currency depreciation will have an unfavorable impact on the domestic stock market (Park & Ratti, 2008). As the Malaysian currency depreciates against the U.S. dollar, products imported become more expensive (Wongbangpo & Sharma, 2002). As a result, if the demand for these goods is elastic, the volume of imports would increase, which in turn causes lower cash flows, profits, and the stock price of the domestic companies (Eita, 2011). Secondly, the Brent, West Texas Intermediate, and OPEC basket for oil price used different measurements as the proxy for global oil price (Cologni & Manera, 2009; Oberndorfer, 2009; Hammoudeh & Choi, 2006). According to Basher and Sadorsky (2006), oil regarded as the lifeblood of modern economics. However, there have not been many studies done with regards to oil price shock and the Malaysian economy. In spite of also been an emerging economy endowed with rich natural resources, including oil. It is also a significant exporter of petroleum in the South East Asian region (Duasa, 2006).

Malaysia regard as exporter and an importer of oil. Crude oil is accounted the second major source of Malaysian export commodities with an average of 18 million metric tons annually (BNM Annual Report, 2009). Based on the UN database and records of the Malaysian Department of Statistics', Malaysia is also an importer of oil with an average of 7.9 million metric tons per year. In other words, Malaysia is the net exporter of oil in the world (Appendix B); therefore, oil prices play an important role in the Malaysian economy. For oil importer countries, an increase in oil prices will lead to an increase in production costs, and hence to decreased future cash flow, leading to a negative impact on the stock market and *vice versa* (Cologni & Manera, 2009; Papapertrou, 2001; Park, 2007; Nandha & Faff, 2008), hence, that is why information about external indicators such as the exchange rate and oil price is very important to understanding stock market movement.

In addition to the financial and external indicators, real output indicators are very important in influencing the stock market. Firstly, the industrial production index is an important determinant of stock market prices or returns (Janor, et al, 2005). There is a general consensus that an increase in economic activity causes stock market prices to increase, and has been documented by empirical studies (Chen et al., 1986; Chen, Kim & Kim, 2005; Fama, 1990; Mukherjee & Naka, 1995; Wongbangpo & Sharma, 2002; Yartey, 2008). Secondly, the consumer price index also affects the stock prices due to the relationship between the consumer price index (inflation) and stock market returns (Buyuksalvarci, 2010). There is consensus among economists that the relationship between the consumer price index and real output is negative, but stock market prices and real output are positively related (Chen et al., 1986).

According to Fama, the negative association between stock market and consumer price index results was found in the relationship between the consumer price index and future output (Fama, 1991). An increase in the consumer price index causes uncertainty and reduces future economic activity (Yartey, 2008). The returns on the stock market reflects future earnings of the firm and an economic decline predicted by an increase in the consumer price index will cause a reduction of stock price, hence the relationship between stock market prices and the consumer price index is negative. Empirical studies provided mixed results: some studies (Choudhry, 2001; Gultekin, 1983; Firth, 1979; Kyriacou, Madsen & Mase, 2006) found a positive relationship between inflation and prices, while others (Osei 2006; Kassimatis & Spyrou, 2001) demonstrated that the relationship between the consumer price index and stock market prices is negative.

Therefore, many scholars found that information about the financial, external, and real output indicators are very important to understand the movement in a stock market. Few studies have been undertaken in this field of study in Malaysia (Cheng, Ling & Arsad, 2006; Chon & Koh, 2003; Islam, 2003; Ibrahim & Aziz, 2003). Meanwhile, an analysis of the dynamic linkages between the stock prices and financial, external, and real output indicators are important in order to determine the efficiency degree of the market (Janor, Halid & Reham, 2005; Rahman, Sidek & Tafri, 2009). Indeed, this could be an important part for the policy-makers and investors in achieving their own objectives and forecasting future movements of the stock market.

As potential investors begin to view the emerging financial markets as part of their investment strategies and portfolios, they will need to examine how emerging financial market stock markets react to past performance and macroeconomic changes or shocks (Ali, 2011). If stock market returns are not correlated with previous returns, the stock market exhibits no memory or knowledge of past returns, as stipulated by the weak-form of market efficiency (Gay, 2008). Also, if stock market returns of emerging financial markets are not correlated with any publicly available information, then they will seem to exhibit semi-strong market efficiency (Ali, 2011).

By determining whether Bursa Malaysia is an informationally-efficient market, investors could take these results in their investment planning (Rahman et al., 2009). An important question is, how efficient do the stock market participants incorporate information contained in macroeconomic variables? If the market is inefficient with respect to relevant information, then it would have some impact on micro- and macro-levels of the economy. Micro-level (individual investors) implies an ability by an individual to earn consistently higher than normal rates of return, while the macro-level (policy makers), could raise serious doubts about the ability of the market to perform its classical role as a channel to finance the most productive sectors.

An efficient stock market is characterized by one in which stock prices adjust rapidly to the arrival of new information (Singh, Mehta & Varsha, 2011). Therefore, the current prices of stocks reflect all the information about the stock. Championed by

Fama (1970), the semi-strong form of the efficient market hypothesis states that stock prices must contain all relevant information, including publicly available information. This has important implications for policy-makers and the stock-broking industry alike (Ali et al., 2010). Policy makers should feel free to conduct national macroeconomic policies without the apprehension of influencing capital formation and the stock trade process (Rahman et al., 2009). In addition, economic theory suggested that stock prices should reflect expectations about future corporate performance. Corporate profits generally reflect the level of economic activities (Singh et al., 2011). If stock prices accurately reveal the underlying fundamentals, then the stock prices should be employed as leading indicators of future economic activities (Asaolu & Ogunmuyiwa, 2011).

Hence, three problem statements can be made from the analysis of the Malaysian market. Firstly, changes in the stock prices are affected by the changes in macroeconomic performance in the well-developed markets, but results are inconclusive for the emerging or developing markets. Secondly, the predictive role of the stock market on macroeconomic activities is inconclusive for both the developed and emerging or developing markets. Thirdly, that there is a unidirectional or bidirectional relationship between macroeconomic performance and stock market returns for both developed and developing economies is still subject to further research. Therefore, the causal relations and dynamic interactions among macroeconomic variables and stock prices are important in the formulation of a nation's macroeconomic policy.

However, there are various studies that have been done previously to determine the relationship between stock market prices and different macroeconomic variables for emerging economies with inconsistent findings (Akhter & Misir, 2005; Asiri, 2008; Awad & Daraghma, 2009; Babaker, 2004; Bashir, et al., 2011; Halmos, 2008; Lim, Habibullah & Hinich, 2009; Mobarek & Keasey, 2000; Okpara, 2010; Rao & Shankaraiah, 2003). The studies have shown different results in the the existence of a weak form of market efficiency among the emerging financial markets for respective periods of study and countries. Most of the studies covered the period before the Asian financial crisis in July 1997. Since then, there is a lack of studies that deal with the influence of the underlying macroeconomic variables and the Malaysian stock market after the financial crisis to determine the degree of market efficiency.

Hence, this study investigates the relationship between stock market prices and underlying macroeconomic variables, for Malaysia as a member country of ASEAN, for the period after the Asian financial crisis in July 1997, to determine whether the weak form of market efficiency exists in Malaysian stock market.

1.3 Research Questions

Based on the problem statement, this study will answer the following questions:

1. Is there any potential linkage in the long and short run between the financial indicators (money supply, interest rate) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011?
2. Is there any potential linkage in the long and short run between the external indicators (exchange rate, oil price) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011?
3. Is there any potential linkage in the long and short run between the real output indicators (industrial production, consumer price index) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011?
4. Does the Malaysian stock market exhibits the characteristics of a weak form of market efficiency?

1.4 Research Objectives

The objectives of this study are as follows:

General Objective:

To investigate the potential linkage in the long-run and short-run between the financial, external, real output indicators and the Malaysian stock market prices after the financial crisis in 1997 from September 1998 until October 2011.

Specific Objectives:

1. To test the potential linkage in the long-run and short-run between the financial indicators (money supply, interest rate) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011.
2. To test the potential linkage in the long-run and short-run between the external indicators (exchange rate, oil price) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011.
3. To test the potential linkage in the long-run and short-run between the real output indicators (industrial production, consumer price index) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011.
4. To ascertain whether the Malaysian stock market exhibits the characteristics of a weak form of market efficiency.

1.5 Significance of the Study

Some relevant issues highlighted provide motivations to conduct the study in this field. It is hoped that the findings of this study would provide meaningful insights and contribution to the body of knowledge, policy-makers and investors.

1.5.1 Body of Knowledge

The research into the relationship between stock market prices and macroeconomic variables has been extensive for other developed and efficient market hypothesis countries. However, the available research into this phenomenon is limited with respect to the ten countries identified as the ASEAN.

This study would fill the gaps in the literature that the studies of financial, external and real output indicators with the stock market lack, where the majority of the existing studies concentrate on developed economies, such as the United States and OECD countries, which represent established markets in world economy. This study aims to explore the financial, external and real output changes with stock prices for emerging economies. Past studies showed that little attention has been devoted to examine the effects of the change of previous variables on the market for other types of economies, especially emerging or developing countries such as ASEAN, MENA and BRIC. Therefore, the findings are expected to provide empirical evidence on the

impact of financial, external, and real output indicators to stock prices in the Malaysia context, and are likely to hold implications, especially for other economies in Southeast Asia, and for other small emerging economies in general, as well.

This study will strengthen the theoretical framework of the relationship between the stock market prices and the financial, external and real output variables from the perspective of developing or emerging economies like Malaysia, as well as of emerging financial market countries. In addition, his study intends to be a primer into further research of relationships between stock market prices and other domestic and international factors for Malaysia and the emerging financial markets to enhance investor portfolio understanding and evaluation in terms of the sensitivity of stock market prices on the effect of the financial indicators of money supply and interest rate, external indicators such as exchange rate and oil prices with the industrial production index and the consumer price index being a proxy for the real output factors.

1.5.2 Policy-Makers

This study will help the policy-makers in recognizing in advance the extent of the financial, external, and real output factors that have an effect on stock prices and guide them in policy design, with the understanding and the application of the right policy tools, the detrimental effect of financial, external, and real output variables in the economy and stock market could be avoided or lessened, therefore it is a very

crucial point for policy-makers to adopt appropriate policies in managing stock markets after seeing the effect of these factors.

It is hoped that the findings would help the policy-makers regulate the bodies to better understand the stock market behavior towards achieving the desired financial objectives. In addition, by knowing and showing which financial, external and real output indicators affect the stock market more. For instance, the policy makers may formulate measures in times of any economic turmoil due to oil price shocks, and may include adopting both monetary and fiscal policies to spur economic growth, stabilize inflation and the unemployment rate, because when the crude oil price increased, it forced the Malaysian government to eventually pass the escalating costs on to the consumers, thus the new price provoked strong reactions from both the corporations and consumers. The decision was made by the government in line with lower global crude oil prices and also due to the public and political pressures, which lead to say that this study attempts to prevent the Malaysian policy-makers from changing the decision several times during short periods by depending only on the external factors.

Finally, the United States experienced an economic financial crisis due to sub-prime issues during 2007 and 2008. This could also impact investors' confidence, especially when the Malaysian export market and several financial institutions can be said to have been partly affected. The deteriorating investor confidence could negatively affect the Malaysian stock market, thus this study will help policy-makers

to avoid this situation in the future. In addition, the results of this study will help the market

management to increase the degree of efficiency of the market to achieve its goals and objectives; also, it would be useful in developing the public policies to monitor the market performance and to anticipate any potential for a severe setback in order to avoid it.

1.5.3 Investors

This study analyses the impact of the financial, external and real indicators on the Malaysian Stock Market Composite Index, which is important for investors to make necessary investment decisions. The results of this study will assist the management of the companies in Malaysia for any recurrence of any crisis such as oil prices, exchange rate and so on, which would have an impact on the world economy, which could lead to an effect on the Malaysia economy. The investors may redirect their business model in preparation for the economic volatility. The investors may also have a head-start in making decisions in operational and capital expenditure by using best industry practices without the need to reinvent the wheel. The success of every business entity depends very much on its strategic plan.

The outcome of this study will assist the investment of the rational decision-making of the stock investors by depending on these findings when the Malaysian stock market goes through an economic downturn due to any change or volatility in

financial, external or real output indicators. The personal and corporate investors would be able to proactively strategize their investments according to the changes in the financial policy.

In conclusion, researchers, policy-makers and financial investors found the relationship between macroeconomic variables and stock prices very important to be investigated for many reasons. First, it helps policy-makers to understand the full effect of prevailing and upcoming policies and regulations. Second, if investors were aware of this relationship, and fully understood it, then they would reduce risk exposure for their investments. Knowing which force leads the other can help in reducing the shock factor because the public will be somewhat aware of what might happen in the economy or the financial market, and thus will be able to take protective measures. And third, it helps to further studies by adding other macroeconomic variables under the main indicators in this study. In other words, in general, the growth of Malaysian Economy is related to the growth of indexes in Bursa Malaysia. As a result, the fund manager and investor will need to consider all economy factors that will influence their stock return before choosing or making certain investment.

1.6 Scope of the Study

This study utilizes Malaysian macroeconomic monthly time series data for the period after the Asian financial crisis from September 1998 to October 2011. Six independent variables will be used in this study; financial indicators (money supply and interest rate), external indicators (exchange rate and oil price) and real output indicators (industrial production and consumer price index) with FTSE/BM Top 100 Index as the dependent variable. In addition, the tool that will be used in this study will be limited and followed the standard procedure of time series analysis, which applied the commonly used Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1979, 1981), and Phillips and Perron (1988) unit root tests to determine the variables' stationarity properties or integration order. Briefly stated, a variable is said to be integrated of order d, written 1(d), if it requires differencing d times to achieve stationarity, the cointegration test by Johansen's (1988, 1991), the error correction model (ECM), and Granger causality to analyze the dynamic equilibrium in the short-run and long-run between the financial, external, and real output indicators and stock price. Samples among the variables will be investigated by using cointegration and the error correction model. By doing this, the short-run and the long-run relationships among the variables will be established in order to test the efficient market hypothesis after the financial crisis in July 1997.

1.7 Limitations of the Study

Despite the objective of determining and recognizing the relationships between the financial, external, and real indicators with the stock price, this study is subject to several limitations.

Firstly, this study is limited to the FTSE Bursa Malaysia Top 100 Index, which represents the stock market in Malaysia. It does not study the sectors listed on the market, as well, does not study the individual companies listed on the stock exchange or private companies. Thus, the research does not indicate sectors or companies that would be badly affected by the changes in the financial, external, and real indicators.

Secondly, there are other factors that can attribute to the volatility of the stock market. These factors include political risk and non-macroeconomic events, such as elections, natural diseases, infectious diseases and sport events (Cheng, et al., 2011). Malaysia experienced political turmoil from 2003 to 2008, where there was a change of Prime Ministers and the Cabinet line-up in October 2003. The 12th general election was held in March 2008 and the ruling party had lost many parliamentary seats, as well as control over several states. This could also be one of the reasons that impeded investors' confidence.

Lastly, this study only analyzes the influence of selected macroeconomic and, as such, the scope of this study emphasized in explaining the kind of relationships that exist between them. These selected variables are related directly to the shock market. In addition, the selection of the variables to be included in the model was based on their importance to the market as found in other studies.

1.8 Organization of the Dissertation

This study consists of five chapters. The first chapter introduces a general understanding of the study, which includes the application of financial indicators measures by money supply and interest rate, external indicator measures by exchange rate and oil price, and real output indicators, including the industrial production index and the consumer price index in the Malaysia stock market. It also includes the research questions and the objectives of the study, as well as the significance of the study.

In Chapter two, the literature review discusses an overview of the macroeconomic variables and stock market. This chapter reviews previous works done on the relationships between the macroeconomic variables and the stock market in different contexts by dividing into developed countries, developing or emerging countries, a mix between developed and developing countries, and the Malaysian context, as well.

In Chapter three, the methodology describes the model specification, theoretical framework, and collection and analysis of the data with operational definitions. In Chapter four, will be discussed the empirical results of the study by employing unit root test, Johansen's cointegration test, error correction model test and Pairwise Grangers Causality test. Finally, the Chapter fifth provides the conclusion and implications; also this chapter provides recommendation for the further works.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter includes the description of the Malaysian stock market in its past and current situation. It explains the efficient market background, while the last part of this chapter reviews the previous studies done that are related to this area of study, by dividing it into four sections: firstly, the studies that were done in developed countries, secondly, the studies that were done in developing or emerging countries, thirdly, the studies that were done in emerging or developing and developed countries (mixed), and lastly, the studies that were done in the Malaysian context.

2.2 Underpinning Theory

The underpinning theory of this study will be primarily based on two theoretical constructs; the first theoretical construct will be the Arbitrage Pricing Theory (APT). The second theoretical construct will be the Economic Theory (ET).

2.2.1 Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory, developed by Ross (1976), was proposed as an alternative to the Capital Asset Pricing Model, because the CAPM assumes security returns are jointly, normally distributed random variables, which have instead been observed as not being normally distributed, making it appear the model does not adequately explain the variation in stock returns (empirical studies show low beta stocks may offer higher returns than the model would predict). The Arbitrage pricing theory has become influential in the pricing of security assets. However, the Arbitrage Pricing Theory is more general than CAPM, since it allows the equilibrium returns of assets to be dependent on many factors, not just one (Groenewold & Fraser, 1997). Arbitrage Pricing Theory holds that the expected return of a financial asset can be modeled as a linear function of various macroeconomic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient.

Arbitrage Pricing Theory links stock returns to several variables that characterize several sources of income volatility. The uniqueness of these variables depends on the model's underlying assumptions. The Arbitrage Pricing Theory states that the realized return on asset is composed of the expected return on that asset at the beginning of a time period and the unexpected realization of *k* risk factors during that time period plus firm-specific risk.

Several studies now exist that investigate the relationship between stock market returns and a range of macroeconomic factors. One way of linking macroeconomic variables and stock market returns is through Arbitrage Pricing Theory. Empirical works based on the APT are characterized by modeling a short-run relationship between macroeconomic variables and the stock price in terms of first differences, assuming trend stationarity (Black et al., 1997; Fama, 1981, 1990; Ferson & Harvey, 1991).

Chen et al. (1986) first illustrated that economic forces affect discount rates, the ability of firms to generate cash flows, and future dividend payouts, provided the basis for the belief that a long-run equilibrium existed between stock prices and macroeconomic variables. Najand and Rahman (1991) also applied the Schwetz (1989) volatility measure and found evidence of the existence of a causal relationship between share returns and inflation. Johansen and Juselius (1990) proposed to determine the existence of long-run equilibrium among selected variables through cointegration analysis, paving the way for a (by now) preferred approach to examining the economic variable -stock market relationship. Bracker, Docking and Koch (1999) used Arbitrage Pricing Theory and found that macroeconomic variables were significantly influenced by the extent of international stock market integration. The interdependence in stock prices across countries reveals economic integration in the form of foreign direct investment and trade linkages.

Hence, the arbitrage pricing theory provides an important theoretical framework that shows the conduits through which the behaviour of macroeconomic variables are factored into stock prices (Chen et al., 1986; Chen, 1991; Clare & Thomas, 1994; Flannery & Protopapadakis, 2002; Gjerde and Saettem, 1999; Mukherjee and Naka, 1995), and studies that were done in East-Asian countries (Bailey & Chung, 1996; Ibrahim & Aziz, 2003; Kwon & Shin, 1999; Mookerjee and Yu, 1997; Wongbangpo & Sharma, 2002). In specific, the macroeconomic variables that were employed in the previous studies were based on APA tests, for instance, industrial production (Altay, 2003; Beenstock & Chan, 1988; Burnmeister & Wall, 1986; Chan, Chen & Hsieh, 1985; Chen, et al., 1986; Ozcam, 1997), inflation (Altay, 2003; Chan, et al., 1985; Chen, et al., 1986; Burnmeister & Wall, 1986; Chen & Jordan, 1993), oil price (Chan, et al., 1985; Chen & Jordan, 1993; Clare & Thomas, 1994; Roselee & Fung, 2009), money supply (Altay, 2003; Beenstock & Chan, 1988; Clare & Thomas, 1994; Ozcam, 1997), gold price (Clare & Thomas, 1994; Tursoy et al., 2008; Yoruk, 2000), gross domestic product (Cheng, 1995; Kandir, 2008; Kryzanowski & Zhang, 1992; Roselee & Fung, 2009), interest rate (Altay, 2003; Burmeister & MacElroy, 1988; Etia, 2011; Ozcam, 1997; Tursoy, et al., 2008), export (Beenstock & Chan, 1988; Saunders, 1994), import (Altay, 2003), exchange rate (Etia, 2011; Kandir, 2008; Ozcam, 1997), and so on.

2.2.2 Economic Theory

Economic theory suggested that stock prices should reflect expectations about countries' economic performance in the future. There is no theoretical model that is generally accepted to link macroeconomic variables to stock market development, the causal relations and dynamic interactions among macroeconomic variables and stock prices are important in the formulation of the nation's macroeconomic policy (Bernanke & Kuttner, 2005; Bodurtha, Cho & Senbet, 1989; Fama, 1981; Finn, 2000; Gunasekarage, Pisedtasalasai & power, 2004; Guo & Kliesen, 2005; Hamilton, 1988; Sadorsky, 1999; Vuyyuri, 2005). Different researchers used either micro - economic variables like the amount of dividend, dividend yield, dividend announcement, rating announcement, price earnings multiples, initial public offerings, earnings per share, accounting profit etc. or macroeconomic factors like, GDP, consumption, foreign exchange rate, broad money supply, international crude oil price, industrial production index (Arnold & Vrugt, 2006; Beltratti & Morana, 2006; Chowdhury & Rahman, 2004; Chowdhury, Mollik & Akhter, 2006; Corradi, Distaso & Mele, 2010; Diebold & Yılmaz, 2007; Fraser & Power, 1997; Morelli, 2002; Teresiene, Aarma & Dubauskas 2008), in order to establish the predictable and the causal relationship among the variables with the stock prices.

Chen et al. (1986) had explored a set of macroeconomic variables as systematic influences on stock market returns and had examined their influence on asset pricing. In their study, several macroeconomic variables were found to be significant in

explaining expected stock returns such as industrial production, changes in the risk premium, twists in the yield curve, and somewhat more weakly, measures of unanticipated inflation and changes in expected inflation during periods when these variables were highly volatile. They found that the NYSE index is insignificant on pricing or expected returns compared to the macroeconomic variables. They also examined the influence on pricing of exposure to changes in real per capita consumption, and found that this variable was insignificant. There was also no overall effect of the oil price on asset pricing. They concluded that stock returns are exposed to systematic economic news, and stocks are priced in accordance with their exposure.

Many other empirical studies found that macroeconomic variables such as interest rate, money supply, macroeconomic stability, exchange rate, level of financial development, and economic activity are determinants of stock market development. These variables can predict the behaviour of the stock market. Groenewold and Fraser (1997) saw that stock returns are influenced by three classes of factors: real domestic activity, nominal domestic influences and foreign variables. They found that securities in the Australian stock markets are affected mainly by inflation rate and by monetary variables.

Rotemberg and Woodford (1996) investigated the impact of oil price shocks on output and real wages with a simple aggregative model by assuming imperfect competition in the product market. According to economic theory, for instance, oil price changes influence economic activity through both supply and demand channels.

Supply side effects could be explained based on the fact that oil is an important input in production. Therefore, oil price changes have demand side effects through consumption and investment. Furthermore, consumption is affected indirectly by its positive relation with disposal income. When the oil price increases, an income transfer occurs from oil- importing countries to oil -exporting countries.

Therefore, consumption in oil- importing countries decreases and the magnitude of this effect is greater, the more the shocks are perceived to be long-lasting; also an increase in oil price will lead to an increase in production costs, and hence to decreased future cash flow, leading to a negative impact on the stock market. Furthermore, oil price changes impact the economic situation through foreign exchange market and inflation, in addition to this, inflation is ultimately translated into nominal interest rate, and an increase in nominal interest rates increase the discount rate, which results in reduction of the present value of cash flows, so it is said that an increase in inflation is negatively related to stock prices.

2.3 Efficient Market

In the review of the market efficiency literature, Fama (1991) described the market efficiency hypothesis to simply mean that security prices fully reflect all available information, with a more sensible version of the efficiency hypothesis being that security prices reflect information to the point where marginal benefits of acting on

information (profits to be made) do not exceed the marginal costs (information and trading costs).

Stock markets play an important role in the financial sector of each economy (Ibrahim, 2011). An efficient capital market can promote economic growth and prosperity by stabilizing the financial sector and providing an important investment channel that contributes to attract domestic and foreign capital (Ali, 2011). Capital market efficiency means the unanticipated portion of the return on a security is unpredictable, and over a sufficient number of observations, does not differ systematically from zero (Gay, 2008). The unanticipated portion is the actual return less what was expected, based on some fundamental analysis (Chen, et al., 1986).

According to Fama (1970), a market is efficient if prices rationally, fully, and instantaneously reflect all relevant available information and no profit opportunities are left unexplained. In an efficient market, past information is of no use in predicting future prices and the market should react only to new information. However, since this is unpredictable by definition, price changes or returns in an efficient market cannot be predicted. Also, Fama defined market efficiency in the forms of weak, semi-strong, or strong. The weak-form of market efficiency means the unanticipated return is not correlated with previous unanticipated returns, thus the market has no memory and knowledge of past returns, and they have no bearing on determining future returns. Semi-strong market efficiency means that market returns are not correlated with any publicly available information. And lastly, with the strong-form of market efficiency, the unanticipated return is not correlated with any

information, be it public or insider, since all available information is already being reflected in present returns.

Efficient market can be defined also as capital transferring from the net saver to net borrowers efficiently. In other words, it can be said that capital can be transferred from all productive investments, which yields a return greater that that available from lending, but with a surplus of funds (Hodgkinson, 1991). Meanwhile, borrowers will have insufficient funds to invest in all available productive investments that yield a return greater than the cost of borrowing. Hence, efficient methods to transfer the surplus from lenders to borrowers are needed in order to optimize capital allocation.

An efficient market is defined as informationally efficient if the market is alert to all accessible information by utilizing it appropriately (Fama, 1970, 1991). Laopodis (2003) suggested that the markets' increased openness and transparency should be efficiently reflected by the prices, equally to the entire general public, however a predictable pattern for some is evidence against the market efficiency. Directly or indirectly, the pattern may affect stock returns and investment decisions. Various types of identifiable patterns include the day- of -week effect (Hussain, 1996), the January effect (Haugen & Jorion, 1996), the size effect (Chatterjee & Maniam, 1997), the Ramadhan effect (Hussain, 1998), month- of -the year effects (Keong, Yat & Ling, 2010), etc., which implies that stock returns are not distributed identically across days, weeks, or months.

Fama (1976) defined efficient capital markets as those where the joint distribution of security prices within a period, given the set of information that the market uses to determine security prices, is identical to the joint distribution of prices that would exist if all relevant information available within that period were used. This implies that there must be no distinction between the information the market uses and the set of all relevant information. Applying information theory, this also implies that a net cost, the utility value of the gain from information to an individual, is nil.

Fama (1991) reiterated his earlier division of work that was done on market efficiency in 1970 into three categories: (1) weak-form, or how past returns predict future returns, (2) semi-strong, or how quickly prices reflect public information announcements, and (3) strong-form, or if any investors have private information not fully reflected in market prices (insider-trading). In addition to these previous identified categories of market efficiency, Fama further provided clarification of each category by suggesting changes to them: (1) the weak-form, instead of being concerned with the forecast power of past returns, covered the more general area of tests of return predictability using multifactor testing in recent literature, (2) semi-strong market efficiency, in dealing with the adjustment of prices to public announcements, should use the common title of event studies as has been described in contemporary literature, and (3) a more descriptive title to describe the strong-form of market efficiency should be tests for private information to determine if specific investors have information not reflected in market prices.

Fama noted only two pre-1970 studies dealing with market efficiency and information advantages of individual agents with information not made available to the public. These studies focused on NYSE specialists who use their monopolistic access to the book of limit orders to generate trading profits and corporate insiders having access to information not reflected in prices. These early studies provided evidence that suggested private information was not common among professional investment managers. Since then, the profitability of insider trading has been established in detail, with evidence showing that some security analysts have information not reflected in stock prices, and evidence of professional investment managers having access to private information has apparently warranted more discussion and research in this area.

The efficient market hypothesis was one of the most actively researched areas in finance over the last several decades (Fama, 1991; Glen, 2005; Guevara, 2001; Januskevicious, 2003; Johnson, 1991), and has been investigated extensively in the developing as well as developed countries' financial markets (Dhankar, 1991; Fitzpatrick, 1995; Saunders, 1994). The weak form refers to the concept that the market is efficient if the stocks' past prices, volume information and stock price movements cannot be predicted accurately by using the historical information. Francis (1993) stated that the stock prices are time invariant if no systematic, regular, or organized patterns exist and consequently, markets exhibit weak form efficiency; however the existence of variation in time series of prices of security markets enables the investors to earn abnormal returns; that means in finance, the efficient-market hypothesis emphasizes that financial markets are "informationally efficient". That is,

one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information available at the time the investment is made.

The worthwhile studies on weak form efficiency of various stock markets from developed economies are, for instance, (Abeysekera, 2001; Abrosimova & Linowski, 2002; Apergis & Eleptherou, 2001; Dockery, Vergari & Vergari, 2001; Januskevicius, 2003; Jarrett & Kyper, 2005a, 2005b, 2006; Kvedaras & Basdevant, 2004; Laopodis, 2003; Payne & Sahu, 2004).

Emerging markets speculations are common with open market policy, in that large investors can easily speculate on the market (Roselee & Fung, 2009). As a less organized market without market makers and timely available information, there always remains the possibility to make profits by large investors and insiders (Gay, 2008). The ability to predict stock price changes based on a given set of information lies behind the notion of stock market efficiency. The lower market efficiency, the greater the predictability of stock price changes. The weak form of efficiency market hypothesis tests measures whether past series of share prices or returns can be used to successfully predict future share prices or returns (Buyuksalvarci, 2010).

The major empirical investigation of the above test measures the statistical dependence between price changes. If no dependence is found (i.e., price changes are random), then this provides evidence in support of the weak form of efficiency market hypothesis, which implies that no profitable investment trading strategy can be derived based on past prices (Eita, 2011). On the other hand, if dependence is found, for example, price increases are generally followed by price increases in the

next period, and *vice versa*, clearly indicates that this can be the basis of profitable investment rule and violates the assumption of the weak form of the market efficiency hypothesis. However, whether any trading rule is profitable depends largely on the operating cost (such as brokerage cost, interest cost, trading settlement procedure) and on whether transactions can be made at the exact prices quoted in the market (Chinzara, 2011).

Similarly, Okpara (2010) ruled out the possibility of making excess returns in the Nigerian Stock Market. Ozer and Ertokatli (2010) did not find the evidence to accept the efficient market hypothesis for the same stock exchange. In conjunction with that, it was concluded the Malaysian stock market (KLSE) is a weak form efficient market (Habibullah & Bahrumshad, 1996; Isa, 1989; Lian, 2002).

In general, the results of previous research evidence that the market of developed economies are generally weak form efficient. That means the successive returns are independent and follow the random walk principle (Fama, 1970). On the other hand, the research findings on the market of developing and less developed countries are controversial. Some of the researchers found evidence of weak form efficiency and cannot reject the random walk hypothesis in emerging markets (Ojah & Karemera, 1999). Whereas, the others found the evidence of non-randomness in stock price behavior and rejected the weak-form efficiency in the developing and emerging markets (Claessens, Dasgupta & Glen, 1995; Gay, 2008). Furthermore, from numerous studies in developed countries, beginning with Fama (1970), is that the weak form of market efficiency promulgates the nonexistence of exploitable patterns in past trading records (Asiri, 2008; Mananyi & Struthers, 1997; Rao & Shankaraiah,

2003; Washburn & Binkley, 1990). Jarrett and Kyper (2006) theorized that the weak form capital market efficiency hypothesis assumes the absence of predictable properties of time series of traded security prices in organized markets.

This study concluded that the stock market cannot help investors to gain abnormal profits in their investments because the stock market has already incorporated the information provided; if the Bursa Malaysia is still in a weak form of efficient market, investors can take this opportunity to gain abnormal profits from their investments.

Recently, many studies conducted in the finance literature focused more on relationships between the financial, external and real output indicators with the stock market. In examining this relationship between these variables, researchers could gain information about the market efficiency and forecast future movements, also to achieve the goals and objectives for economists, policy-makers and individual investors. This study will use the Fama (1970) definition, that a market is efficient if prices rationally, fully, and instantaneously reflect all relevant available information and no profit opportunities are left unexplained, Fama (1970) also defined market efficiency in the forms of weak, semi-strong, or strong, the weak form referring to the concept that the market is efficient if the volume information and stock prices movements cannot be predicted accurately by using the historical information.

2.4 Macroeconomic Variables and Stock Markets

There are many studies done in the last several years to find the relationships between the stock prices or stock returns and different macroeconomic variables in the world. There were different results found from the previous literature related to the relationship between the macroeconomic variables and stock prices or stock returns in terms of both the long-run and short-run. Therefore, the study reviews the past literature by dividing it to four categories, Developed Countries, Developing Countries, Mixed, and Malaysia. In addition, the study separates Malaysia from the emerging and developing countries to highlight the past literature in Malaysia.

2.4.1 Macroeconomic Variables and Stock Markets in Developed Countries

Chen et al. (1986) was the first study to select macroeconomic variables to estimate U.S. stock returns and apply the arbitrage price theory models. They employed seven macroeconomic variables, namely: term structure, industrial production, risk premium, inflation, market return, consumption, and oil prices in the period of January 1953-November 1984. In this study, they found a strong relationship between the macroeconomic variables and the expected stock returns. They noted that industrial production, changes in risk premium, twists in the yield curve, measure of unanticipated inflation of changes in expected inflation during periods when these variables are highly volatile are significant in explaining expected

returns. They concluded the asset prices react sensitively to economic news, especially to unanticipated news.

Sadorsky (1999) investigated the dynamic interaction between oil price, production, interest rate of a 3-month T-bill, and oil prices including (S&P 500) stock returns using an unrestricted VAR with US monthly data from January 1947 to April 1996. He presented variance decompositions and impulse response functions to analyze the dynamic effect of oil price shocks. After unit root and cointegration tests, he ran an unrestricted VAR with ordering of interest rates, real oil price, industrial production and real stock returns. He found that oil price changes and oil price volatility have a significantly negative impact on real stock returns; in addition, he found that industrial production and interest rates responded positively to real stock return shocks. In particular, he divided the full sample period into two sub-periods, pre-1986 and post-1986, because in 1986 the oil price declined significantly and the oil price has been more volatile since 1986. In the post-1986 period oil price changes and oil price volatility have a larger impact on the economy than in the pre-1986 period. He noted that the response of the stock market to oil price shocks is asymmetric. When he used asymmetric oil price shocks (positive oil price changes and negative oil price changes), positive shocks explained more forecast error of variance in real stock returns, industrial production and interest rates than negative shocks during the full sample period. For the post-1986 period, positive and negative oil price shocks explained almost the same fraction of forecast error variance of real stock returns, while in the pre-1986 period positive oil price shocks contributed more to the forecast error variance in real stock returns than negative oil price shocks. This study found that the positive oil price volatility shocks had a

greater influence on stock returns and industrial production than negative oil price volatility shocks, as well as he found that the oil price movements explained more forecast error variance in stock returns than interest rates in the post-1986 period.

Mauro (2000) analyzed the relationship between stock returns and output growth for emerging and advanced economies by using yearly or quarterly data from 1970 - 1990 data on real stock returns, consumer price inflation, real GDP, industrial production, consumer prices, narrow money, broad money, and private credit. He tested whether the correlation between stock returns and output growth in advanced countries such as the US is applicable to emerging economies, and what type of countries tend to display a stronger association between output growth and lagged stock returns. He found a positive and significant correlation between output growths and lagged stock returns in several advanced and developing countries. These relationships are quite robust, so he concluded that the development of stock prices should be taken into account in forecasting output in both advanced and emerging countries.

Flannery and Protopapadakis (2004) re-evaluated the effect of some macro announcement series on US stock returns. Among these series, six macroeconomic variables, namely, balance of trade, housing starts, employment, consumer price index, M1, and producer price index seem to affect stock returns. On the other hand, two popular measures of aggregate economic activity (real GNP and industrial production) do not appear to be related with stock returns. Also, Hamao (1988) replicated the Chen et al. (1986) study in the multi-factor APT framework for the Japanese stock market. He put on view that the stock returns are significantly

influenced by the changes in expected inflation and the unexpected changes in both the risk premium and the slope of the term structure of interest rates.

Ratanapakorn and Sharma (2007) used a Granger causality approach in order to investigate the long-run and short-run relationships between the US Stock Price Index (S&P 500) and six macroeconomic variables (industrial production, money supply, Treasury bill rate, government bond rate, inflation, and Japanese Yen/US Dollar exchange rate) over the period 1975 until 1999. In the long-run relationship, they found that the stock prices negatively related to the long-run interest rate, and had a positive relationship between stock prices and the money supply, industrial production, inflation, the exchange rate and the short-run interest rate. They concluded that in the Granger causality sense, every macroeconomic variable causes the stock prices to fluctuate in the long-run, but not in the short-run.

Park (2007) tested the relationship between oil price shocks and stock markets in the US and 13 European countries using monthly data during the period 1986-2005. This study used an unrestricted multivariate (VAR). He found that oil prices play a crucial role in the stock markets of oil- importing countries. In most oil- importing countries, oil price shocks have a greater impact than interest rate shocks. On the contrary, in oil- exporting countries, oil price shocks have a smaller impact on the stock markets than interest rate shocks do.

Chen (2008) investigated whether macroeconomic variables can predict recessions in the stock market. Series such as interest rate spread, inflation rates, money stocks, aggregate output, and unemployment rates were evaluated individually. Empirical evidence from monthly data on the Standard and Poor's (S&P 500) price index suggested that among the macroeconomic variables that were considered, yield curve spreads and inflation rates are the most useful predictors of recessions in the U.S. stock market according to in-sample and out-of sample forecasting performance.

Poon and Taylor (1991) paralleled the Chen et al. study on the United Kingdom market. Their results showed that macroeconomic variables do not appear to affect share returns in the United Kingdom as they do in the U.S. They suggested that either different macroeconomic factors have an influence on share returns in the United Kingdom, or the methodology employed by Chen et al. (1986) was inefficient.

Clare and Thomas (1994) examined the macroeconomic sources of risk priced in the UK stock market between 1983 and 1990 using monthly data on 840 stocks to form both beta-sorted and market value- sorted portfolios using the methodology proposed by Chen et al. (1986) and Chan, Chen and Hsieh (1985) for the US. This study found that several intuitively plausible macroeconomic variables were priced over this period using the beta- sorted portfolios, and that once these variables are included there is little role for the return on the market. However, when the market value-sorted portfolios were used, only inflation and a measure of equity market 'expense' relative to gilts was priced; furthermore, with the market value- sorted portfolios a role for the market return was found.

Priestley (1996) pre-specified the factors that may carry a risk premium in the U.K. stock market. Seven macroeconomic and financial factors; namely, default risk, industrial production, exchange rate, retail sales, money supply, unexpected inflation, change in expected inflation, terms structure of interest rates, commodity prices and market portfolio. For the APT model, with the factor generating from the rate of change approach, all factors were significant.

Joseph (2002) investigated the effect of foreign exchange and interest rate changes on U.K. firms in the chemical, electrical, engineering and pharmaceutical industries for the period of 1988 to 2000. The study employed two different measures of foreign exchange rate, along with a measure of interest rate changes. The results revealed that industry returns were more negatively affected by interest rate changes than by foreign exchange rate changes. The negative effects of interest rate changes and foreign exchange rate changes appeared more evident for the electrical and engineering sectors, whereas these effects were positive for the pharmaceutical industry. Additionally, the results at the portfolio-level were generally similar with those based on the firm-level analysis, except that the short-run foreign exchange rate impact was very weak at the portfolio level. Overall, the results at the individual firm level implied that the impact of foreign exchange rate and interest rate changes had adverse effects on stock returns.

Gunsel and Cukur (2007) examined the relationship between the macroeconomic variables and U.K. stock exchange market used monthly data for the period of 1980-

1993 to investigate the performance of the Arbitrage Pricing Theory in the London Stock Exchange through seven macroeconomic variables (term structure of interest rate, the risk premium, the exchange rate, the money supply and unanticipated inflation); this study added two industry specific variables, such as sectoral dividend yield and sectoral unexpected production. This study found that macroeconomic variables had a significant effect on the U.K. stock exchange market. They noted that a macroeconomic factor might affect one industry positively, but another industry negatively; therefore, each of the factors might affect different industries in a different manner.

Brown and Otsuki (1990) explored the effects of the money supply, a production index, crude oil price, exchange rates, call money rates, and a residual market error on the Japanese stock market. They observed that these factors are associated with significant risk premiums in Japanese equities. Another study was done in Japan by Mukherjee and Naka (1995), who examined the effect of stock prices on six macroeconomic variables by using a vector error correction model (VECM) that covered 240 monthly observations for each variable from January 1971 to December 1990. They concluded that a cointegrating relation indeed existed and that stock prices contributed to this relation, then they found positive relationship between Tokyo stock prices, the exchange rate, money supply and industrial production, whereas the relationship between Tokyo stock prices and inflation and interest rates was mixed.

Humpe and Macmillan (2007) examined whether a number of macroeconomic variables influence the stock prices in the US and Japan. A cointegration analysis

was applied in order to model the long-run relationship between industrial production, consumer price index, money supply, long-run interest rates and stock prices in the US and Japan. For the US, they found the data to be consistent with a single cointegrating vector where stock prices were positively related to industrial production and negatively related to both the consumer price index and a long-run interest rate. They also found an insignificant (although positive) relationship between US and prices and the money supply. However, for the Japanese market they found two cointegrating vectors. For one vector, prices were influenced positively by industrial production and negatively by the money supply. For the second cointegrating vector, they found industrial production to be negatively influenced by the consumer price index and the long-run interest rate. These contrasting results may be due to the slump in the Japanese economy during the 1990s and the consequent liquidity trap.

Darrat (1990) tested the effect of monetary and fiscal policy on share returns in Canada and concluded that budget deficits, long-run bond rates, interest rate volatility and industrial production determine share returns. Meanwhile, Ajayi and Mougoue (1996) showed that an increase in stock prices has a negative short-run effect on domestic currency, but in the long-run this effect is positive, while currency depreciation has short-run and long-run effects on the stock market.

Jones and Kaul (1996) studied the reaction of the stock markets to oil shocks during the postwar period in Canada, Japan, the United Kingdom and the United States of America. They had used current and future changes of the real cash flows and/or

changes in expected returns in conducting their research. Their findings were that, for the United States of America and Canada, the reaction of stock prices to oil shocks can be completely accounted for by the impact of these shocks on real cash flows alone. Whereas, in the United Kingdom and Japan, changes in the oil prices seemed to cause larger changes in stock prices than could be justified by subsequent changes in real cash flows or by changing expected returns. It was also found that there is a negative relation between changes in oil price and stock returns. In other words, their findings indicated that oil price changes have a detrimental impact on output and real stock returns in all four countries.

Another study done by Nasseh and Strauss (2000) investigated the relationship between stock prices and domestic and international macroeconomic activity in six countries on the European continent; France, Germany, Italy, the Netherlands, Switzerland, and the U.K. by using a cointegration approach. This study consisted of quarterly data during the period from 1962 to 1995. They found that Industrial Production Indices and Business Surveys of Manufacturing Order (BSM) can explain movement of stock prices in the long-run. They also found a negative influence of interest rates on stock prices. In spite of that, the short-run interest rate is positively affected by stock prices.

Oertmann, Rendu and Zimmermann (2000) investigated the impact of domestic and international interest rates on European financial corporations' equity returns with monthly data from the period January 1982 to March 1995 by developing multifactor models to review the sensitivity of equity returns to market returns and interest rate

movements. They found that the stock returns of financial corporations were negatively affected by unexpected changes in interest rates in all countries.

Arestis, Demetriades, and Luintel (2001) examined the role of stock markets on economic growth in five developed markets, Germany, the United States, Japan, the United Kingdom and France. In addition to stock market development measures, they also included measures of banking sector development and market volatility. Their results suggested the relative dominance of the banking sector development as compared to stock market development in their long-run relations with economic performance. However, they noted the significant, although small, contribution of stock markets to output growth in France, Germany and Japan.

Cunado and De-Gracia (2003) reported different results than the predicted. The study on oil price impact that was conducted on 15 European countries gave mixed results. They concluded that the use of either world oil price index or a national real price index is part of the explanation of the difference. Moreover, they could not find any cointegrating long-run relationship between oil prices and economic activity, except for the United Kingdom and Ireland. Therefore, they suggested that the impact of oil shocks on economic activity is limited to the short-run period.

Cunado and De-Gracia (2005) extended their analysis by conducting a comparative study on the influences of oil price changes for some small and open economies for Asian countries, including Malaysia, Singapore, the Philippines, Thailand, and OECD countries as well. The results suggested that oil prices have a statistically significant effect on both economic growth and inflation, although the impact is

limited to the short-run. When comparing the two studies, they figured that the effect on the Asian countries was found to be marginal relative to the effect on OECD countries.

Hyde (2007) conducted a study to investigate the sensitivity of stock returns to market, interest rate and exchange rate shocks at the industry level in the four major European economies: France, Germany, Italy, and the UK. While, the market exposure was the most significant factor, the study also found a significant level of exposure to exchange rate risk in industries of all four markets. Interest rate risk was significant only in Germany and France. All three sources of risk contained significant information relating to future cash flows and excess returns.

Pilinkus (2010) investigated the relationships between stock prices and ten macroeconomic variables for Lithuania, Estonia, and Latvia by applied time series techniques. According to the VAR analysis, the coefficients of the lagged stock market index, the trade balance, and foreign direct investment are significant. In the Johansen cointegration analysis, the coefficients of gross domestic product, foreign direct investment, the state debt, the harmonized consumer price index, the money supply, exports, imports, the trade balance, and short-run interest rates are significant. The long-run relationship is different from the short-run relationship and increases the explanatory power to 99%. Classification of macroeconomic variables into the leading, coincident, and lagging indicators improves forecast performance.

Gjerde and Saettem (1999) examined the relationship between stock returns and seven macroeconomic factors (interest rates, inflation, industrial production, consumption, the OECD industrial production index, foreign exchange rate and oil price) by using a multivariate vector autoregression (VAR) approach on Norwegian data. After unit root tests using the Augmented Dickey-Fuller and Phillips-Perron tests, they ran a VAR model. This study found that Norway's strong dependency on oil, which is reflected in the stock market and responds rationally to oil price changes, is consistent with recent US and Japanese findings, where the real interest rate plays a major role as well in the Norwegian economy, and interest rate changes affect the stock market negatively.

Surprisingly, the relationship between stock returns and domestic activity is different from those of big economies such as the US and Japan, where stock markets rationally signal changes in real activity. However, in Norway changes in real stock returns do not have a significant influence on domestic economic activity, while industrial production significantly affects real stock returns. This means that the Norwegian stock market responds inaccurately to economic news from the real sector. According to them, one of the reasons could be from the difference between the companies listed in the stock market and companies in the domestic industry. If most companies listed on the stock exchange are large exporting companies, while the industrial production index contains a substantial portion of small companies, then the stock market could not lead industrial production. In the forecast error variance decomposition analysis, industrial production explains 8% of the variance of real stock returns 24 months after industrial production shock occurs, while innovations in real stock returns contribute only 1% to the variance of changes in

industrial production. This study concluded that, except for the response of economic activity to real stock return shocks, most results from major economies are valid in a small, open economy like Norway with less mature financial markets.

Papapetrou (2001) tested the dynamic relationships between the oil price, real stock prices, interest rates, real economic activity and employment with monthly data from January 1989 through June1999 in Greece. He also used an unrestricted VAR approach, but chose a generalized impulse response function and generalized variance decomposition analysis to look at the interrelationship between the variables. He ran two VARs: industrial production specifications (real oil price, real stock returns, interest rates, industrial production), and employment specifications (real oil price, real stock returns, interest rates, employment). He found that an oil price shock has an immediate negative impact on the stock market as well as industrial production and employment. So, a positive oil price shock depresses real stock returns. According to the forecast error variance decomposition analysis, volatility in real stock returns variability is attributed to oil price shocks more than interest rate shocks. However, stock returns do not rationally signal (or lead) changes in real activity and employment in his analysis, since growth in industrial production and employment respond negatively to real stock returns.

Hondroyiannis and Papapetrou (2001) studied the dynamic interactions among indicators of economic activity, such as industrial production, interest rate and exchange rate, the performance of the foreign stock market, oil prices, and stock returns to examine whether economic activity movements affect the performance of

the stock market for Greece by utilizing the multivariate vector autoregressive model (VAR). The empirical evidence suggested that stock returns do not lead changes in real economic activity, while the macroeconomic activity and foreign stock market changes only partially explain stock market movements. Oil price changes explain stock price movements and have a negative impact on macroeconomic activity.

In addition, Spyrou (2001) tested the relationship between stock returns and inflation for the emerging economy of Greece during the 1990s. The results of the study suggested a negative and significant relationship between stock returns and inflation for the period up to 1995, whereas the relationship was insignificant for the remaining period. Another study was done by Dritsaki and Dritsaki-Bargiota (2005) that examined the causal pattern between credit, stock market and economic development for Greece. They found evidence that the stock market development tends to follow credit market and economic development.

Patra and Poshakwale (2006) tested the relationship between the Athens Stock Exchange General Index and five macroeconomic variables. They used monthly data on the Athens Stock Exchange Index, consumer price index, money supply, exchange rate, and trading volume to examine the short-run dynamic adjustments and the long-run equilibrium relationships between selected macroeconomic variables, trading volume and stock returns in the emerging Greek stock market during the period from 1990 to 1999. The results found that changes in inflation, money supply, and trading activity have significant short-run effects on the stock returns in the Athens stock market. The results also implied that, except for the

exchange rate, lagged changes in inflation, money supply and trading volume can be used in predicting short-run movements in stock prices in the Athens Stock Exchange. However, they found that there is no short-run or long-run equilibrium relationship between the exchange rates and stock prices. They point out that the lack of relationship between stock prices and exchange rate can be interpreted by the attempts of the Greek government in order to join the European Monetary Union (EMU). Overall, the results of this research are consistent with the theoretical arguments and practical developments that occurred in the Greek stock markets during the sample period. The results also implied that the Athens Stock Exchange is inefficient, because publicly available information on macroeconomic variables and trading volumes can be potentially used in predicting stock prices.

Gan, Lee, Yong & Zhang (2006) examined the relationships between the New Zealand stock market index and a set of seven macroeconomic variables from January 1990 to January 2003 using cointegration and Granger causality tests, and also investigated the short-run dynamic linkages between the NZSE40 and macroeconomic variables using innovation accounting analyses. They found that there exists a long-run relationship between New Zealand's stock market index (NZSE40) and the macroeconomic variables tested. The NZSE40 is consistently determined by the interest rate, money supply and real GDP and there is no evidence that the New Zealand Stock Index is a leading indicator for changes in macroeconomic variables and the Granger causality test results showed that NZSE40 is not a leading indicator for changes in macroeconomic variables. However, Mazur and Alexander (2001) found no significant role of New Zealand stock market development on the level of real output.

Panetta (2002) conducted a study to determine the relationship between stock returns and macroeconomic variables. This study included five macroeconomic factors (term structure spread, exchange rate, industrial production, oil prices and inflation) that influenced Italian equity returns and tested the strength of their relation with securities returns. The relationship between stock returns and the macroeconomic variables was found to be highly unstable for both individual securities and portfolios; moreover the instability was not confined to a particular time period or to shares in a particular risk class, but had been detected in each of the sub-periods that had been considered, and for shares in all risk classes.

Tsoukalas (2003) observed the relationships between stock prices and macroeconomic factors like exchange rate, industrial production, money supply and consumer price index from 1975 to 1998 by using a vector autoregressive model (VAR) in the emerging Cypriot equity market. The results indicated a good relationship between stock prices and the macroeconomic factors. According to him, because of higher demand for services like tourism and off-shore banking, it is not surprising to see the strong relationship between stock prices and exchange rate in the Cypriot economy. Tsoukalas added that relationships between stock prices and the rest of the other macroeconomic variables such as industrial production, money supply, and consumer prices reflect macroeconomic policies implemented by the Cyprian monetary and fiscal authorities.

Faff and Brailsford (1999) studied the sensitivity of oil price factors and the Australian stock market during the period from 1983 to 1996. They had hypothesized that there are four industries in which oil price changes are expected to have a net impact on revenue of the companies. The industries are gold, solid fuels, oil and gas, and diversified resources. They found that there is significant positive oil price sensitivity in the oil and gas and diversified resources industries. They had also found that negative oil price sensitivity is be greatest in industries with a relatively high proportion of their costs devoted to oil-based inputs such as transportation industries. However, they had predicted the negative sensitivity may be due to the fact that the companies may have passed on higher fuel costs to their customers by increasing prices of their goods and services.

Simpson and Evans (2003) tested the dynamic interaction between the two macroeconomic variables (interest rate and exchange rate) and bank stock returns. They employed the regression model, cointegration and Granger causality tests from VAR models. They found that there is no cointegration between the Australian bank stock returns and exchange rate and interest rate in the short-run and long-run.

Chaudhuri and Smiles (2004) investigated the long-run relationship between stock prices and changes in real macroeconomic activities (real GDP, real private consumption, real money, and real oil price) in the Australian stock market from the year1960 to 1998. They found long-run relationships between stock prices and real macroeconomic activities. At the same time, their results indicated that foreign stock

markets, such as the American and New Zealand market, significantly affect the Australian stock return movement.

McSweeney and Worthington (2007) examined the role of crude oil as a pricing factor in Australian excess industry returns over the period January 1980 to August 2006 by employing a multifactor model on Australian industry returns. A dynamic model is also specified to provide insights into the relationship between the stock market and past oil price movements. The macroeconomic factors (the market portfolio, oil prices, exchange rates and the term premium). The nine industries included banking, diversified financials, energy, insurance, media, property trusts, materials, retailing and transportation. The results indicated that oil prices are an important determinant of returns in the banking, energy, materials, retailing, and transportation industries. The findings also suggested that the effects of oil price movements are persistent – retail excess returns, for example, are negatively related to current and one-month and three-month lagged oil price changes. Nonetheless, the proportion of variation in excess returns explained by the contemporaneous and lagged oil prices appears to have declined during the sample period.

As mentioned in above section, many studies had been published about the relationships between stock prices or returns and macroeconomic variables in well-developed countries such as the US, Japan and European countries, which represent established markets in the world economy. In addition, this growing on the linkages between stock markets and macroeconomic variables for industrialized economies

have extended the analysis to the cases of developing or emerging economies which illustrated in the next section.

2.4.2 Macroeconomic Variables and Stock Markets in Emerging or Developing Countries (Except Malaysia)

Kwon et al. (1997) conducted a study in the South Korean stock market between January 1980 and December 1992. The independent variables consisted of the production index, inflation and expected inflation, risk premium, term structure, dividend yield, trade balance, foreign exchange rate, oil price, and money supply that were time series regressed on monthly returns of the value-weighted Korea Composite Stock Price Index (KOSPI). Their results showed that the Korean stock market was more sensitive to real economic and international trading activities, measured in terms of foreign exchange rates, trade balance, the money supply, and the production index, than that of the U.S. and Japanese stock indexes. These markets have been shown to be sensitive to inflationary variables, such as the change in unexpected inflation, expected inflation, the risk premium, and term structure (Burmeister & Wall, 1986; Chen 1991; Chen, et al., 1986; Hamao, 1988). Another study done by Chung, Kwon and Shin (1999) examined the role of macroeconomic variables in estimating Korean stock prices. Stock indices seem to be cointegrated with the combination of the four macroeconomic variables, namely, trade balance, foreign exchange rate, industrial production, and money supply.

Zhao (1999) investigated the relationships between inflation, output (industrial production) and stock prices in the Chinese economy covering the period from 1993 to 1998. The results showed a significant and negative relation between stock prices and inflation. It also gives a clear picture where output growth negatively and significantly affects stock prices.

Another study was done by Cong, Wei, Jiao and Fan (2008), which investigated the interactive relationships between oil price shocks and the Chinese stock market using multivariate vector auto-regression. China's role in the world oil market is said to have become more important. Since 2003, China has taken the place of Japan of being the second largest world oil consumer. They found that oil price shocks do not show statistically significant impact on the real stock returns of most Chinese stock market indices, except for the manufacturing index and some oil companies. Some "important" oil price shocks depressed oil company stock prices. Increase in oil volatility may have increased speculations in the mining index and petrochemicals index, which raised their stock returns.

Wang (2010) investigated the time series relationship between stock market volatility and macroeconomic variable volatility for China using exponential generalized autoregressive conditional heteroskedasticity (EGARCH) and lag-augmented VAR (LA-VAR) models. This study found evidence that there is a bilateral relationship

between inflation and stock prices, while a unidirectional relationship exists between the interest rate and stock prices, with the direction from stock prices to the interest rate. In addition, a significant relationship between stock prices and real GDP was not found. The results suggested that China's stock market is likely to be less efficient than those in the U.S. and other developed countries, and is somewhat separated from the real economy of China.

Nath and Smantha (2002) documented the type of causal relationship between stock prices and macroeconomic factors in India. They applied the Toda and Yamamoto methodology for the period from 1992 to 2001; they mention that changes in industrial production affect the stock prices. As well, Bhattacharya and Mukherjee (2002) found the same results concerning the previous study done by Nath and Smatha. Similarly, another study done in (2003) by Nath and Smantha when they tested the dynamic relationship between the Indian Rupee and stock market price index in India by using the daily data for the period from March 1993 to December 2002. They employed the unit root to test the stationary, cointegrationand Causality test. They found that returns in these two markets are not interrelated; in addition, they indicated that the returns in the stock market had causal influence on returns in the exchange rate and *vice versa*.

Mukhopadhyay and Sakar (2003) conducted a systematic analysis of the Indian stock market returns prior to and after market liberalization and the influence of macroeconomic factors on returns. Specifically for the post-liberalization period (since 1995), real economic activity, inflation, money supply growth, FDI, and the

NASDAQ-index were significant in explaining variations in Indian stock returns. The nominal exchange rate, while significant during the pre-liberalization period (1989-1995), was found to not be significant after liberalization. Chakravarty (2005) also examined the positive relationship between industrial production and stock prices using the Granger causality test and observed a unidirectional movement from industrial production to stock prices in India.

Vuyyuri (2005) found the cointegrating relationship and the causality between the financial variables (interest rates, inflation rate, exchange rate, stock return) and the real sectors (as the proxy by industrial productivity) of the Indian economy by using monthly observations from 1992 through 2002. Johansen multivariate cointegration test supported the long-run equilibrium relationship between the financial sector and the real sector, and the Granger test showed unidirectional Granger causality between the financial sector and real sector of the economy.

Recently, a new study done in India by Kumar (2011) established and validates the long-run relationship of stock prices with exchange rate and inflation in the Indian context. There were numerous studies on the relationship of stock indices with macroeconomic variables. This gave a strong subjective background to test the existence of any such relationship in India. The research primarily dealt with an empirical method by combining different statistical techniques to check the presence of cointegration between the stock index (Sensex) and other variables. Cointegration is a well-accepted indicator of a long-run relationship between more than one time series variables. The study took into consideration the past ten years' experience of

the Indian economy reflected in the stock index, wholesale price index and exchange rates. A causal relationship could not be established without the existence of cointegration between the selected macroeconomic variables. This study investigated the causal relationship between stock prices and macroeconomic variables in India using monthly data for the period from 1st April 2006 to 31st March 2010, by employing the econometric techniques of unit– root tests, cointegration and the Granger causality test that were applied between the NSE Index 'Nifty' and the macroeconomic variables (real effective economic rate (REER), foreign exchange reserve (FER), and balance of trade (BoT), foreign direct investment (FDI), index of industrial production (IIP), and the wholesale price index (WPI)). He found that there is no cointegration between Nifty and all other variables except the wholesale price index (WPI), as per the Johansen cointegration test. Therefore, a causal relationship between such macroeconomic variables having no cointegration with Nifty is not established, Nifty does not Granger cause WPI and WPI also does not Granger cause Nifty.

Nishat and Shaheen (2004) found industrial production having the largest positive relationship with stock prices in Pakistan. Mohammad, Hussain, Jalil and Ali (2009) examined the relationship between macroeconomic variables and the Karachi Stock Exchange in the context of Pakistan. They used quarterly data for the foreign exchange rate, foreign exchange reserve, gross fixed capital formation, money supply, interest rate, industrial production index, and whole sales price index. The results showed that exchange rate and exchange reserve highly affected stock prices.

Ali et al. (2010) examined the causal relationship between macroeconomic indicators and stock market prices in Pakistan. The data from June 1990 to December 2008 was used to analyze the causal relationship between various macroeconomic variables and stock exchange prices. The set of macroeconomic indicators included; inflation, exchange rate, balance of trade, and index of industrial production, whereas the stock exchange prices were represented by the general price index of the Karachi Stock Exchange, which is the largest stock exchange in Pakistan. The statistical techniques used included the unit root Augmented Dickey Fuller test, Johansen's cointegration and Granger's causality test. They found cointegration between the industrial production index and stock exchange prices. However, no causal relationship was found between the macroeconomic indicators and stock exchange prices in Pakistan, which means the performance of macroeconomic indicators cannot be used to predict stock prices; moreover, stock prices in Pakistan do not reflect the macroeconomic conditions of the country.

In another study in Pakistan done by Bashir et al. (2011), they examined the weak form informational efficiency of the banking sector in emerging markets of Pakistan. However, in Pakistan, the stock market is very sensitive to political mayhem, expectations, speculation, and insider information, qualifying it logically to test the efficient market hypothesis. This study used the daily closing stock prices for the individual firm level from June 1997 to April 15, 2009 for eleven high volume trading banks listed on the Karachi Stock Exchange. The statistical techniques used include Augmented Dickey Fuller and Phillips-Perron tests in order to check stationarity, while cointegration and VAR tests were applied to examine the weak form efficiency. The results refuted the null hypothesis of the weak form efficient

market hypothesis in the banking sector. Moreover, the prices exhibited predictable and exploitable patterns, concluding the inefficiency of the banking sector for KSE.

Singh, Mehta and Varsha (2011) investigated the casual relationship between index returns and certain crucial macroeconomic variables, namely, employment rate, exchange rate, GDP, inflation and money supply in Taiwan. The analysis was based on stock portfolios rather than single stocks. In portfolio construction, four criteria were used: market capitalization, price/earnings ratio (P/E ratio), PBR, and yield. The purpose was to make a finer point with respect to the relationship between economic growth and the stock market, especially in terms of stock prices. This study found that exchange rate and GDP seem to affect the returns of all portfolios, while inflation rate, exchange rate, and money supply had a negative relationship with returns for portfolios of big- and medium-sized companies.

Cheng, Tzeng and Kang (2011) studied the impact of non-macroeconomic variables on Taiwan electronic stock returns by applying multiple regressions. These non - macroeconomic variables include presidential elections in Taiwan: the 1st of March, 1996; the 2nd of March 2000; the 3rd of March 2004; March 2008; the financial crisis (the Asia financial crisis (July 1997), the global financial crisis (August 2007)); sports events (the World Games 2009 in Kaohsiung (July 2009), the 21st Summer Deaflympic (September 2009)); diseases (the SARS disease (April 2003), influenza A (H1N1) (April 2009)) and the natural disasters (the September 21st Earthquake (September 1999) and the 88 floods (August 2009)). Events were all significant except the second presidential election, SARS disease, the 88 floods, and the 21st

Summer Deaflympics, but the effects were almost the same as predictions. The second regression results indicated that the macroeconomic variables of this study followed Chen, Kim, and Jeong (2005) and Chiang and Kee (2009) in the methods and variables from their researches. The six variables of customer price index, industrial production, money supply (M2), exchange rate, 10-year government bond yield (LGB), and 3-month bank interest rate of the First Commercial Bank (STB) were included. Industrial production, money supply (M2), and exchange rate were significant and had a positive impact on stock returns. The third regression incorporated three significant macroeconomic variables into the first regression as a test of robustness, but the results did not change. That means the power of prediction for non-macroeconomic events was better than for macroeconomic variables. It seemed the non-macroeconomic events had a more relatively obvious influence on Taiwanese electronic stock returns than the macroeconomic variables did. The results can be offered to investors and policy-makers as references for those who are interested in the Taiwan electronic industry.

Bailey and Chung (1996) examined the impact of macroeconomic risks on the Philippines equity market. Findings of the study showed that financial fluctuations, exchange rate movements and political changes for owners of Philippine equities cannot explain Philippine stock returns. Achsani and Strohe (2002) examined the relationship between the stock return and interest rate, oil prices and real economic activity in Indonesia and concluded that stock returns react negatively to changes in interest rates, but positively to oil prices and real economic activity.

Another study done in the Southeast Asian region, but in the context of Thailand by Islam and Watanapalachaikul (2003), showed a strong, significant long-run relationship between stock prices and macroeconomic factors (interest rate, bond prices, foreign exchange rate, price earnings ratio, market capitalization, and consumer price index) from 1992 to 2001 in Thailand.

Ibrahim (2011) examined the stock market and macroeconomic performance relationship for Thailand using quarterly data from 1993 to 2007. He evaluated the causal patterns between a measure of stock market development and measures of macroeconomic performance, which is essential to evaluate whether stock market development 'causes' growth. This study used standard time-series econometrics of cointegration and vector autoregression (VAR), this study also examined the superexogeneity of the stock market development within the error correction setting. The cointegration test results suggested the presence of a long-run relationship among the variables, namely, real gross domestic product (GDP), market capitalization ratio, investment ratio, and the aggregate price level. Further, the impulse response functions and variance decompositions simulated from the estimated VAR models clearly indicated positive and sizeable contributions of stock market development to real GDP as well as the investment ratio. The superexogeneity test indicated that the stock market development is superexogenous within the system. Thus, the relationship between economic development and stock market development is structurally invariant to policy shifts. There is a strong case for policy prescription to promote the development of its stock market as a catalyst to economic growth in the case of Thailand.

Fung and Lie (1990) found that the stock index is related to money demand but it has no relationship with macroeconomic fundamentals in the Singapore stock market. The same results were obtained for the Taiwan stock market by Leigh (1997). Another study was done by Mukherjee and Yu (1997), who investigated the effect of macroeconomic variables on the Singapore stock market. The results suggested that stock prices are cointegrated with both measures of the money supply and aggregate foreign exchange reserves. However, stock prices and exchange rates do not have a long-run relationship.

Maysami and Koh (2000) tested the relationships between the Singapore stock index and selected macroeconomic variables over a seven-year period from 1988 to 1995 and they found that there existed a positive relationship between stock returns and changes in money supply, but negative relationships between stock returns with changes in price levels, short-run and long-run interest rates, and exchange rates. Meanwhile, this study found that inflation, money supply growth, changes in short-run and long-run interest rate, and variations in exchange rate formed a cointegrating relation with changes in Singapore's stock market levels. Another study was done by Maysami (2000), who studied the relationship between macroeconomic variables and stock market return and concluded that the Singapore stock market and the property index form a cointegrating relationship with changes in the short-run and long-run interest rates, industrial production, price levels, exchange rate, and money supply.

Maysami, Howe and Hamzah (2004) found a positive relationship between inflation rate and Singapore stock returns. This is contrary to other studies that suggested a negative relationship. The reason given by the authors is the active role of government in preventing price escalation after the economy continued to progress after the Asian financial crisis in July 1997. The relationship between short-run and long-run interest rate is found to be positive and negative, respectively. This is because the long-run interest rate serves to be a better proxy for nominal risk-free component, which are used in the discount rate for stock valuation models, and may also serve as a proxy for expected inflation in the discount rate. The relation between money supply and stock return was also found to be positive.

Tursoy et al. (2008) examined the effect of macroeconomic variables on portfolio returns based on the arbitrage pricing theory, which was tested in the Turkish stock market for the period from February 2001 up to September 2005 on a monthly basis. They tested 13 macroeconomic variables (money supply, industrial production, crude oil price, consumer price index, import, export, gold price, exchange rate, interest rate, gross domestic product, foreign reserve, unemployment rate and market pressure index) against 11 industry portfolios of the Istanbul Stock Exchange to observe the effects of those variables on stock returns using the ordinary least square technique; they observed that there are some differences among the industry sector portfolios. However, each portfolio may affect different industries in a different manner by use

of the macroeconomic variables, where a macroeconomic factor may affect one industry positively, but affect another industry negatively. The results indicated that there was no significant pricing relation between the stock return and the tested macroeconomic variables.

A study done by Kandir (2008) investigated the role of seven macroeconomic factors in explaining Turkish stock returns in the period from July 1997 to June 2005, based on the APT. Macroeconomic variables used in this study were growth rate of industrial production index, change in consumer price index, growth rate of narrowly- defined money supply, change in exchange rate, interest rate, growth rate of international crude oil price, and return on the MSCI World Equity Index, and the analysis was based on stock portfolios rather than single stocks. The results revealed that exchange rate, interest rate, and world market return seem to affect all of the portfolio returns, while inflation rate was significant for only three of the twelve portfolios. On the other hand, industrial production, money supply, and oil prices do not appear to have any significant effect on stock returns. Findings also suggested that macroeconomic factors have a widespread effect on stock returns, since characteristic portfolios do not seem to be influenced in a different manner by the macroeconomic variables.

Eryigit (2009) also found that the price changes of oil or energy affect emerging economies' markets more than developed markets. He had studied the impact of oil prices changes in both US Dollars and Turkish Lira on sub-sector indices in the Istanbul Stock Exchange. This study found that oil price changes have statistically significant positive effects on trading and services, consumer products, industrial products, manufacturing and financial sector covering insurance, but do not have significant impact on transportation and other financial sectors.

Buyuksalvarcı (2010) investigated the effects of macroeconomic variables on the Turkish Stock Exchange Market within the arbitrage pricing theory framework using monthly data, and extending from January of 2003 to March of 2010. This study employed a multiple regression model to test the relationship between macroeconomic variables; consumer price index, money market, interest rate, gold price, industrial production index, oil price, foreign exchange rate, and money supply with the main Turkish stock market Index (Istanbul Stock Exchange Index-100). The results indicated that interest rate, industrial production index, oil price, and foreign exchange rate have a negative effect on the Istanbul Index returns, while money supply positively influenced the Istanbul Index returns. On the other hand, inflation rate and gold price do not appear to have any significant effect on Index returns.

Kyereboah-Coleman and Agyire-Tettey (2008) investigated the impact of macroeconomic indicators on the Ghana stock market, where lending rates from deposit money banks have an adverse effect on stock market performance. This study also found inflation to be negatively related to stock market performance and this effect takes time because of the presence of a lag period.

In the same year another study was done by Tweneboah (2008), which examined the impact of macroeconomic variables on stock prices in the Data bank stock index to represent the stock market and inward foreign directs investments, where the Treasury bill rate (as a measure of interest rates), the consumer price index (as a measure of inflation), average crude oil prices, and the exchange rate were used as macroeconomic variables. They analyzed quarterly data for the above variables from 1991 to 2007, and employed cointegration test and vector error correction models (VECM). The study established that there is cointegration between macroeconomic variables and stock prices in Ghana, indicating a long-run relationship. The VECM analyses showed that the lagged values of interest rate and inflation have a significant influence on the stock market. The inward foreign direct investments, the oil prices, and the exchange rate demonstrated a weak influence on price changes.

Ralph and Eriki (2001) conducted study on Nigerian stock market which found that there exists a negative relationship between stock prices and inflation. Besides, they also show that the stock prices are also strongly motivated by the level of economic activity, as measured by GDP, interest rate, money stock, and financial deregulation. Asaolu and Ogunmuyiwa (2011) investigated the impact of macroeconomic variables

(external debt (ED), exchange rate (ER), foreign capital inflow (FCI), investment (INV), industrial output (INDO) and inflation rate (INF)) on Average Share Price (ASP) in the Nigerian context, and goes further to determine whether changes in macroeconomic variables explain movements in stock prices in Nigeria. Various econometric analyses, such as the Augmented Dickey Fuller (ADF) test, Granger causality test, cointegration, and error correction method (ECM) were employed on time series data from 1986-2007. The results revealed that a weak relationship exists between ASP and the chosen macroeconomic variables in Nigeria. The findings further pointed that the ASP is not a leading indicator of macroeconomic performance in Nigeria, and also found a long-run relationship between ASP and the macroeconomic variables.

Rad (2011) examined the relationship between the Tehran Stock Exchange (TSE) price index with three macroeconomic variables (consumer price index, exchange rate, money supply) from 2001 to 2007 using an unrestricted vector autoregressive (VAR) model, as well as the analysis based on impulse response function, which indicated that the response of the Tehran Stock Exchange price index to shocks in the macroeconomic variables such as consumer price index, free market exchange rate, and liquidity (M) is weak. In addition, generalized forecast error variance decomposition revealed that the share of the macroeconomic variables in fluctuations of the TSE price index is about 12 per cent. This study showed that political shocks or other economic forces can affect the TSE price index in Iran.

Mashayekh, Moradkhani and Jafari (2011) investigated the relationship between a set of economic variables (inflation rate, interest rate of one-year investing deposits in state banks, interest rate of bonds, and the growth rate of gold price) and Tehran Stock Exchange (TSE) indicators from April 1998 to March 2008. This study found from the VAR model and the Johansen cointegration test that there was a positive relationship between inflation rate and stock returns, as well as the growth rate of Tehran Stock Market transactions volume the long-run. The results indicated that an increase in bank interest rate through drawing investments resulted in a reduction in the stock transaction volume growth and return and *vice versa*. Therefore, stock and money markets can be considered as two competing and supplementary markets in the long-run, but the bonds are not competitive investment opportunities for stocks, and the increase in its return rate has no negative effects on the Tehran Stock Exchange. The results indicated that the gold market could be a substitute for the stock market from the vector error correction model results in the short-run, and gold return has an important role in explaining the stock market trend, but this relationship is not meaningful in the long-run.

Oskenbayev, Yilmaz and Chagirov (2011) investigated the causal relationship between macroeconomic indicators and the Kazakhstan Stock Exchange (KASE) index. Using the bound testing approach, within the Autoregressive Distributed Lag (ARDL) model framework, this study examined their long-run relationship. The Johansen Cointegration test, the Engel-Granger two-step approach, and the Granger causality test revealed that the main determinants of the KASE are income per capita, inflation, and the exchange rate, and a dummy variable accounting for the impact of worldwide crises impact. Other effects on the stock index comes from the oil price

volatility measure, causing a windfall gain effect as a consequence of rapid, but temporary, increases in oil prices. The results indicated the existence of a cointegration between these series, implying violation of the market efficiency hypothesis. The results of this study are in compliance, not only with the theory, but also with the issues in practice.

Maghyereh (2002) examined the long-run relationship between the Jordanian stock prices and selected macroeconomic variables by using Johansen's cointegration analysis with the monthly data from 1987 to 2000. The results indicated that macroeconomic variables are reflected in stock prices in the Jordanian capital market. Abu-Libdeh and Harasheh (2011) investigated the correlation and causality relationships between Palestine stock prices and five macroeconomic variables (GDP, inflation, exchange rate, Libor rate and balance of trade). This study used two methodologies in order to determine the relationships, the first. They used a regression analysis for ten years' worth of quarterly data for the studied variables. The second one, a unit root test was conducted on the studied variables in order to perform a Granger-causality test to assess the causality relationship. The results of the regression analysis as a whole indicated a significant relationship between the macroeconomic variables used and stock prices. Moreover, the causality analysis negated any kind of causal relationships between each particular macroeconomic variable and Palestinian stock prices.

Al-Jafari (2011) tested the weak-form efficiency of the Bahrain Stock Market using unit root tests, serial correlation test, and runs tests. The study used daily observations of the Bahrain all- share index and employed parametric tests, utilizing the serial correlation test, and the Augmented Dickey-Fuller (unit root) test. The nonparametric tests employed the runs test and the Phillips-Perron (PP) test to examine the randomness and the behavior of the Bahrain Stock Market. Results of the previous parametric and nonparametric tests suggested that past movements in stock prices cannot be used to forecast their future movements, the study results found that the Bahrain securities market is informationally inefficient at the weak-level, implying that the prudent investor will realize abnormal returns by using historical sequences of stock prices, data related to trading volumes, and other market- generated information.

Maghyereh and Al-Kandari (2007) used alternative tests whereby they had adopted application of rank tests for a nonlinear cointegration relationship between oil prices and the stock markets in GCC countries. The results found that oil price impacts the stock price indices in GCC countries in a nonlinear fashion, where this analysis is consistent with some other studies (such as Mork, 1989; Mork & Olson, 1994; Hamilton, 1996). The significance of the results of their study had given insights to the policy-makers of the GCC countries, whereby they should keep an eye on the effects of changes in oil price levels on their own economies and stock markets. For individual and institutional investors, the nonlinear relationship between oil price and stock markets implies predictability in the GCC stock markets.

Hsing (2011) examined the relationship between Hungary's stock market index and relevant macroeconomic variables. The GARCH model was applied in the empirical work. He found that Hungary's stock market index has a positive relationship with real GDP, the ratio of the government debt to GDP, the nominal effective exchange rate, and the German stock market index, with a negative relationship with the real interest rate, the expected inflation rate and the government bond yield in the Euro area, and a quadratic relationship with real money supply (M2). It indicated that there is a positive (negative) relationship if real money supply (M2) is less (greater) than the critical value of 9,563 billion Forints.

The above review shows that there is a list of literature on a particular developing or emerging country to investigate the relationship between the macroeconomic variables and stock market prices or returns by using different methodologies and most of these studies have found significant long-run and short-run relationships between stock prices or stock returns and macroeconomic variables.

2.4.3 Macroeconomic Variables and Stock Markets in Developed and Developing Countries (Mixed Countries)

Muradoglu, Taskin, and Bigan (2000) investigated possible causality between 19 emerging market returns and exchange rates, interest rates, inflation, and industrial production from 1976 to 1997. Their results revealed that the relationship between stock returns and macroeconomic variables were mainly due to the relative size of the respective stock market and their integration with world markets. In their study

of the Greek stock market between 1980 and 1992 and its relationship to 18 macroeconomic variables, Diacogiannis, Tsiritakis, and Manolas (2001) found significant high loadings between stock returns and 13 of the 19 macroeconomic variables for both periods, 1980-1986 and 1986-1992.

Guimaraes and Olaf (2000) presented a study on the impact of oil price increase on the global economy. In particular, the differential impact of an oil price increase of US$5 per barrel on developed and developing countries was assessed. The study shows that the impact is found to be greater for developed countries than for developing countries as a group. In regional analyses, the results obtained varied widely, depending on the relative size of oil imports to exporting countries. Oil shocks are explained to lead to lower aggregate demand, since the oil price increase redistributed income between the countries that are net oil importers and oil exporters. This study also found that the degree of influence of oil price changes on oil importing countries is different from those of oil-exporting and small open economies. The contributing factors for these differences are explained by different oil intensity levels in domestic production, exports, imports, and degree of openness of an economy. In addition, the study also provided evidence that oil price changes tend to be positively correlated with the economic growth of the oil- producing countries. The study also provided estimates of the first round impact of higher oil prices on GDP growth for some ASEAN countries, namely, Indonesia (+0.5%), Malaysia (+0.2%), Philippines (-0.5%), and Thailand (-0.4%).

Bilson, Timothy, and Vincent (2001) used a value- weighted world market index and some macroeconomic variables for explaining stock returns in selected emerging markets. The findings suggested that goods prices and real activity have limited ability to explain the variation in returns. Money supply has greater importance, while the most significant variables are the exchange rate and the world market return. In addition, Fifield, Power, and Sinclair (2002) found that the global and local economic factors explain returns in emerging stock markets. Their findings showed that local economic variables namely, GDP, inflation, money and interest rates are significant in explaining emerging stock markets.

Kassimatis and Spyrou (2001) examined the contribution of stock and credit market expansion to economic development in five emerging markets in Chile, India, Mexico, South Korea and Taiwan. They documented the presence of long-run relations between measures of stock market, credit market, and economic development in all countries. More importantly, they noted the positive contribution of the stock market development to the economic performance of Chile, Mexico and South Korea. While the stock market capitalization and real industrial production are independent in India, they are negatively related in Taiwan with a causal relation running from the former to the latter.

Maysami and Sims (2001a, 2002) employed the error correction modeling technique to examine the relationship between macroeconomic variables and stock returns in Hong Kong and Singapore using the Hendry (1986) approach, which allowed making inferences to the short-run relationship between macroeconomic variables, as

well as the long-run adjustment to equilibrium. The results confirmed the influence of interest rate, inflation, money supply, exchange rate, and real activity, along with a dummy variable on the stock market indices in Hong Kong and Singapore. Meanwhile, Maysami and Sims (2001b) used the error correction technique to examine the relationship between macroeconomic variables and stock returns in Japan and Korea. They analyzed the influence of interest rate, inflation, money supply, exchange rate, and real activity, along with a dummy variable to capture the impact of the 1997 Asian financial crisis. The results confirmed the influence of macroeconomic variables on the stock market indices in both of the countries under study (Japan and Korea), though the type and magnitude of the associations differed depending on the country's financial structure.

Wongbangpo and Sharma (2002) explored the relationship between the stock returns for the ASEAN-5 countries of Indonesia, Malaysia, the Philippines, Singapore, and Thailand and five macroeconomic variables by observing both short-run and long-run relationships between respective stock indexes and the macroeconomic variables of gross national product, the consumer price index, the money supply, the interest rate, and exchange rate. This study found that in the long-run all five stock price indexes were positively related to growth in output, and negatively to the aggregate price level. But a negative long-run relationship between stock prices and interest rates was noted for the Philippines, Singapore, and Thailand, and found to be positive for Indonesia and Malaysia. In the end, causality tests detected an overall relationship between macroeconomic variables and stock prices for all five ASEAN equity markets.

Al-Khazali and Pyun (2004) found that a positive relationship between stock prices and inflation is also seen in the Pacific-Basin: Australia, Hong Kong, Indonesia, Japan, South Korea, Malaysia, the Philippines, Singapore, and Thailand. This study found the negative relationships between stock returns and inflation in the short-run, while cointegration tests on the same markets display a positive relationship between the same variables over the long-run. They suggested that the stock prices in Asia, like those in the U.S. and Europe, appear to reflect a time-varying memory associated with inflation shocks that make stock portfolios a reasonably good hedge against inflation in the long-run.

Caporale, Howells, and Soliman (2005) examined the causal pattern between real output, stock market development, and investment or investment productivity for four emerging markets in Chile, Korea, Malaysia and the Philippines. The evidence tends to support the finance-led growth from the stock market perspective in these countries. They further point out the importance of investment productivity as a transmission channel from stock markets to economic growth in the long-run.

Nandha and Hammoudeh (2007) tested the relationship between beta risk and realized stock index returns in the presence of oil and exchange rate sensitivities for fifteen countries in the Asia-Pacific region using the international factor model and weekly data during the period May 1994 to June 2004. They found that no country shows sensitivity to oil prices measured in US dollars, regardless of whether the oil market is up or down. Basher & Sadorsky (2006) investigated the relationship

between oil price risk and emerging stock market returns and found that oil price has more impact on emerging markets than on developed countries. Emerging economies tend to be more energy- intensive than more advanced economies, and are therefore more exposed to higher oil prices.

Chuang et al. (2007) determined whether macroeconomic variables, in particular, money supply and budget deficit, are important in predicting stock prices in the four Asian Tigers (Asian Dragons) Taiwan, Hong Kong, Singapore and South Korea, by using the quarterly data on stock price indices, money supply, and budget deficits that were employed in this study. The results were broadly consistent with the general economic literature on macroeconomics, and suggested that there exists a long-run equilibrium relationship between macroeconomic policies and stock prices for the four countries studied; stock prices do not necessarily adjust quickly and fully to changes in either monetary or fiscal policies, in the short-run.

Gay (2008) conducted a study on the effect of macroeconomic variables on stock market returns for four emerging economies: Brazil, Russia, India and China, and affirmed that there was no significant relationship between present and past market returns with macroeconomic variables, suggesting that the markets of Brazil, Russia, India and China exhibited the weak form of market efficiency. Also, no significant relationship was found between the respective exchange rates and oil prices on the stock market index prices of the four countries.

Mahmood and Dinniah (2009) examined the dynamic relationship between stock prices and macroeconomic variables in the six Asian-Pacific selected countries of Malaysia, Korea, Thailand, Hong Kong, Japan and Australia. The monthly data on stock price indices, foreign exchange rates, consumer price index, and industrial production index, spanning from January 1993 to December 2002 were used. In particular, they focused their analysis on the long-run equilibrium and short-run multivariate causality between these variables. The results indicated the existence of a long-run equilibrium relationship between stock price indices and among variables in only four countries, i.e., Japan, Korea, Hong Kong and Australia. As for short-run relationships, all countries except for Hong Kong and Thailand showed some interactions. The Hong Kong market showed a relationship only between exchange rate and stock price, while the Thai market reported significant interaction only between output and stock prices.

N'zue (2006) analyzed the relationship between stock market and economic development for Côte D'Ivoire. This study found evidence for their cointegration or long-run relation, particularly when their relation is framed in a multivariate setting. He further noted long-run feedback effects between the two variables, and short-run unidirectional causality from stock market development to real activity.

Enisan and Olufisayo (2009) attempted to uncover the long-run relation and causal nexus between stock market development and economic growth in seven sub-Saharan African countries; Côte D'Ivoire, Egypt, Kenya, Morocco, Nigeria, South

Africa, and Zimbabwe. They noted the presence of cointegration in only Egypt and South Africa. Moreover, in a VECM setting, the finance-led growth hypothesis is further supported for the two countries. Finally, estimating VAR in first differences for the remaining countries, they noted bidirectional causality between stock market development and economic performance for all countries except Nigeria.

Eita (2011) investigated the macroeconomic (economic activity, interest rates, inflation, money supply, and exchange rates) determinants of stock market prices in Namibia using a vector error correction model for the period 1998 to 2009. The study showed that the prices of the stock market in Namibia are determined by economic activity, inflation, interest rate, money supply and exchange rate. Regardless of the measure of stock market prices used, the results revealed that there is a positive relationship between stock market prices on one hand, and money supply and economic activity on the other hand. An increase in money supply and economic activity causes stock market prices to increase. This suggested that an increase in money supply leads to economic expansion through increased cash flows and that stock prices would benefit from such an expansionary monetary policy.

An increase in economic activity benefits stock market prices. Inflation increases are associated with decreases in stock market prices. This result suggested that Namibian equities are not a hedge against Namibian inflation. The results implied that if there is an economic slowdown predicted by inflation increases, stock prices will be depressed. An increase in interest rates causes stock prices to be reduced, suggested that higher interest rates would make cash flows worth less after being discounted. The effect will be a decrease in investment, and reduced stock market returns.

Contractionary monetary policy through an increase in the interest rate would decrease equity returns and stock market prices. Exogeneity test results showed that in the first variation of the estimated equation, the interest rate is weakly exogenous, while money supply, exchange rate, inflation and GDP are not weakly exogenous.

However, these variables (money supply, exchange rate, inflation and GDP) moved stock market prices away from equilibrium. Disequilibrium in the stock market price is corrected only through adjustments in the stock market itself. The second variation results showed that the exchange rate, money supply, inflation, and interest rates moved stock market prices away from equilibrium.

Chinzara (2011) analyzed how systematic risk emanating from the macroeconomic variables is transmitted into South African stock market volatility using augmented autoregressive Generalised Autoregressive Conditional Heteroskedastic (GARCH) and vector autoregression models with imposing dummies for the 1997-1998 Asian and the 2007-2009 sub-prime financial crisis; the study further analyses whether financial crises affect the relationship between macroeconomic uncertainty and stock market volatility. This study found that macroeconomic uncertainty significantly influences stock market volatility, Although volatilities in (inflation, gold price, oil price) also seem to play a role, it was found that volatility in short-run interest rates and exchange rates are the most important, suggesting that South African domestic financial markets are increasingly becoming interdependent. Finally, the results showed that financial crisis increased volatility in the stock market, and in most macroeconomic variables.

A study was done in South America by Choudhry (2001), which studied the relationship between inflation rate and current stock returns. The results showed a positive relationship between inflation and stock prices in the high inflation economies of Argentina, Chile, Mexico and Venezuela. The findings of the study were in contrast to evidence of a negative relationship stated by previous research. The current international integration of financial markets provided a way for currency depreciation to influence stock prices.

Amoateng and Kargar (2004) explored the dynamic relationships between two macroeconomic variables (oil, exchange rates) with stock prices in the four key markets in the MENA region (Egypt, Jordan, Israel and Saudi Arabia) using data from January 1999 to December 2002. They found that crude oil future prices took a relatively short-run for crude spot oil prices and exchange rate to reach equilibrium with stock prices when there was a shock in the system of Saudi Arabia and Egypt. But, crude oil futures prices took a long-run to reach equilibrium with stock prices in Israel when there was a shock to the system. They also suggested that in both the short-run and long-run investors' decisions in these markets were influenced by oil and currency prices.

Cheung and Ng (1998) investigated the relationship between stock prices and some macroeconomic factors, namely, real oil price, total personal consumption, money supply and GNP in Canada, Germany, Italy, Japan and the USA using the Johanson cointegration technique. They found empirical evidence of long-run co-movements

between five national stock market indexes, where there appears to be a long-run co-movement between the selected macroeconomic variables and real stock market prices. They mention that increases in oil prices generally cause a rise in the production cost, and then fall in aggregate economic activity.

Grammenos and Arkoulis (2002) studied the relationship of global macroeconomic factors, which includes oil prices with a specific industry, shipping, and stock returns internationally for the period 1989 to 1998. They had included 36 shipping companies that are listed on 10 stock exchanges worldwide. The objective of this study was to examine the long-run impact of several sources of global risk on international shipping stock returns. They had formed a multifactor model using macroeconomic factors of, namely, exchange rates, global inflation, changes in oil prices, industrial production growth, and laid-up tonnage, a factor specific to the shipping industry. In deriving the returns of a company, the risk-free interest rates were taken into account. It was found that oil price and laid-up tonnage are negatively related to shipping stock returns, whereas the exchange rate exhibited a positive relationship. No significant relationship was detected regarding the global measures of inflation and industrial production.

DeStefano (2004) examined whether movements in economic factors dictated by the dividend discount model can explain broad movements in stock returns over the business cycle. As anticipated, stock returns decrease throughout economic expansions and become negative during the first half of a recession. Returns are largest during the second half of recessions, suggesting an important role for

expected earnings. These results are consistent with the notion that expected stock returns vary inversely with economic conditions, yet suggested that realized returns are especially poor indicators of expected returns prior to turning points in the business cycle.

Flannery and Protopapadakis (2004) estimated a GARCH model of daily equity returns, in which realized returns and their conditional volatility depend on seventeen macro series' announcements. They found six candidates for priced factors: Three nominal (CPI, PPI, and a Monetary Aggregate) and three real (the balance of trade, the employment report, and housing starts).

Boucher (2004) considered a new perspective on the relationship between stock prices and inflation, by estimating the common long-run trend in real stock prices, as reflected in the earning-price ratio, and both expected and realized inflation. They studied the role of the transitory deviations from the common trend in the earning-price ratio and realized inflation for predicting stock market fluctuations. In particular, they found that these deviations exhibit substantial in- sample and out-of sample forecasting abilities for both real stock returns and excess returns. Moreover, they found that this variable provides information about future stock returns at short and intermediate horizons that is not captured by other popular forecasting variables.

Sadorsky (2008) agreed with findings by Choe (2002) when he investigated the empirical relationship between firm size, oil prices, and stock prices. The empirical

results showed that increases in firm size or oil prices reduce stock price returns. They also found that changes in oil prices have an asymmetric effect on stock prices. Increases in oil prices have a greater effect on stock returns than decreases in oil prices. It is also the case that when asymmetric oil price changes are considered, the effect of firm size shows up most pronounced for medium-sized firms. He had given an example of being the middle child in a family; it is tough being a medium-sized firm. Medium-sized firms do not enjoy the production efficiency and financial leverage of large firms, nor do they have the flexibility and responsiveness of small firms. Thus, medium-sized firms are more likely to be more adversely affected, in terms of stock prices, by changes in oil prices.

Nandha & Faff (2008) conducted a study to examine the impact of oil price changes on 35 industry sectors based on the standard FTSE Global Classification System. They found that oil price changes have a negative impact on equity returns from all industries, with the exception of mining, and oil and gas. They were of the opinion that the broad oil price impacted across industries, because crude oil has a huge array of by-products, which find applications from aviation fuel to shampoo and shoes. Moreover, higher oil prices might have an impact on interest rates and discourage consumer confidence, creating indirect channels for reflecting higher oil prices into equity prices. Their analysis had demonstrated that oil price increases and decreases have a symmetric impact on the equity markets.

Henriques and Sadorsky (2008) studied the alternative energy and oil and how they impact the financial performance of the alternative companies. However,

they argued that, although it is widely accepted that rising oil prices are good for the financial performance of alternative energy companies, there are no measurements on just how sensitive the financial performance of alternative energy companies are to changes in oil prices. Then they developed four variable vector autoregression models and estimated in order to investigate the empirical relationship between alternative energy stock prices, technology stock prices, oil prices, and interest rates. Their findings showed that technology stock prices and oil prices each individually Granger cause the stock prices of alternative energy companies. He also found that a shock to technology stock prices has a larger impact on alternative energy stock prices than does a shock to oil prices.

As shown by the literature review provided above, a variety of methodologies have been used in past studies to determine the relationship between stock market prices and macroeconomic variables for developed and emerging countries together in the same study. On the whole, the studies have shown different results on the existence of a weak-form of market efficiency among these markets for respective periods of study and countries. The previous studies in this section extend the knowledge base of the relationship between stock market returns and underlying macroeconomic variables by comparison between developed and developing countries. The next section will focus only on the studies which done in Malaysian context.

2.4.4 Macroeconomic Variables and Stock Market in the Malaysian Context

Habibullah and Baharumshah (1996) investigated the relationship between stock returns and macroeconomic variables using VAR based models in the Malaysia context; they applied a residual-based cointegration test on the Malaysian Market by taking various stock indices, money supply, and output using monthly data for the period of January 1978 to September 1992. They found no evidence of cointegration among these variables and also concluded that the Malaysian Market was informationally efficient with respect to output and money supply.

The comprehensive study that was done by Ghazali and Yakob (1997) determined the relationship between money supply and stock prices, and employed the Vector Auto-regression (VAR) methodology to examine the relationship between the two variables by incorporating four variables, namely, stock prices, money, income and interest rate, into the VAR system. The result of the Granger causality test showed the presence of a significant unidirectional relationship running from money supply to stock prices. The impulse response function (IRF) indicated that stock prices response positively following monetary expansion and the impact peaks after seven months from the initial shock, which means stock prices reflect real economic performance. This study concluded that their findings were consistent with the long-run effect of money on the real sector.

Similar results were found by Habibullah (1998), which investigated the relationship between money supply and stock prices in the KLSE to determine the level of market informational efficiency using the cointegration and error correction model (ECM). This study found that the two variables (stock prices and money) are non-stationary in their level form, but are cointegrated in the long-run with the presence of error correction representation. This study found from the error correction model that money supply, represented by M3, Granger-caused stock prices, but not *vice versa*. This study concluded that the finding was inconsistent with the efficient market hypothesis, since market participants would be able to predict stock prices in the market using information on broad money supply (M3) as a trading rule to earn excess returns.

Ibrahim (1999) investigated the dynamic interactions between the KLSE Composite Index, and seven macroeconomic variables (industrial production index, money supply M1 and M2, consumer price index, foreign reserves, credit aggregates, and exchange rate) using cointegration and the Granger causality test. This study observed that macroeconomic variables led the Malaysian stock indices; he concluded that the Malaysian stock market was informationally inefficient. Ibrahim and Yusoff (2001) analyzed the dynamic interactions among four macroeconomic variables (real output, price level, money supply, exchange rate) and equity prices for the Malaysian case using time-series techniques of cointegration and vector autoregression, variance decompositions, and impulse-response functions. They found a negative relationship between stock prices and money supply in the long-run, but the actual analysis between the stock prices (KLCI) and the macroeconomic variables, which are real output as a measure of industrial production (IP), money

supply (M2), price level as a measure of consumer price index (CPI) and exchange rate, showed that the KLCI is positively related to CPI and negatively related to M2. The positive association between KLCI and CPI seems to support the view that the stock prices are a good hedge against inflation.

Abeysinghe (2001) studied the impact of oil price changes by focusing on only 12 economies, which includes the ASEAN-5 countries (Indonesia, Malaysia, Singapore, the Philippines, and Thailand) using data over the 1978-1998 periods. This study evaluated the direct and indirect effects of oil prices on GDP growth of these economies. Using a reduced form of bilateral export functions and structural VAR models to link up the GDP series through a trade matrix as proposed by Abeysinghe and Forbes (2001), the study demonstrated that high oil prices affect these economies both directly and indirectly (works through the network of an economy's trading partners). The results found that the shock to one country is found to have a statistically significant impact on other countries, even if they are relatively minor bilateral trading partners.

Maysami and Sims (2002) employed the error correction modeling technique to examine the relationship between macroeconomic variables and stock returns in Malaysia and Thailand through the employment of Hendry's (1986) approach, which allowed making inferences to the short-run relationship between macroeconomic variables and the long-run adjustment to equilibrium. They analyzed the influence of interest rate, inflation, money supply, exchange rate and real activity, along with a dummy variable to capture the impact of the 1997 Asian financial crisis. The results

confirmed the influence of macroeconomic variables on the stock market indices in both countries under study, though the type and magnitude of the associations differed depending on the country's financial structure.

Ibrahim and Aziz (2003) examined the causal relations and dynamic linkages between the Malaysian stock market and four macroeconomic variables, namely, the industrial production, the money supply, the price level and the bilateral exchange rate *vis-à-vis*, the US dollar. The analysis relies on standard and well-accepted techniques of cointegration and VAR to uncover the long-run relationship and short-run interactions among the variables using data that spanned about 22 years. From the VAR, they computed variance decompositions and simulated impulse response functions to trace the strength of the Granger causal links among them and the responses of a variable to innovations in other variables. The study results suggested the presence of a long-run relationship between these variables and the stock prices and substantial short-run interactions among them, in particular, documented the positive short-run and long-run relationships between the stock prices and two macroeconomic variables. The exchange rate, however, was negatively associated with the stock prices. For the money supply, it documents immediate positive liquidity effects and negative long-run effects of money supply expansion on the stock prices. It also notes the predictive role of the stock prices for the macroeconomic variables. However, there seems to be irregularities in the data when observations from the recent crisis are included. Finally, the study documented the disappearance of the immediate positive liquidity effects of the money supply shocks and unstable interactions between the stock prices and the exchange rate over time, which means, at least in the long-run, movements in the Malaysian equity market are

tied to its economic fundamentals. Moreover, the dynamic responses of the stock prices to changes in macroeconomic variables, especially its lagged responses to real economic activity, spell inefficiency in the Malaysian equity market. With the exception of its diminishing responses to money supply, the inefficiency of the market seems to persist over time. Accordingly, investors may gain by exploiting information contained in macroeconomic variables for investment decisions, then making profit above the average in the market.

Another study was done by Islam (2003) that confirmed the above studies by examining the short-run dynamic adjustment and the long-run equilibrium relationships between four macroeconomic variables (interest rate, inflation rate, exchange rate, and the industrial productivity) and the Kuala Lumpur Stock Exchange (KLSE) Composite Index. His conclusions were similar: There existed statistically significant short-run (dynamic) and long-run (equilibrium) relationships among the macroeconomic variables and the KLSE stock returns. Results by Chong and Goh (2003) were similar: They showed that stock prices, economic activities, real interest rates, and real money balances in Malaysia were linked in the long-run, both in the pre- and post-capital control periods.

Yusoff (2003) investigated the effects of monetary policy on the Malaysian stock market, and showed that there is cointegration between the monetary policy variables and stock prices, with a negative relation between inflation, money supply, and stock prices. Janor, Halid, and Abdul Rahman (2005) examined the stock market as a predictor of the economic activity in Malaysia and its sensitivity to different stock

market conditions by using the Johansen cointegration, variance decomposition, and the Autoregressive Distributed Lags bound test, which seemed to confirm previous findings of Fama (1990) and others, who found evidence that stock markets can lead changes to the economic activity. For the whole period under study, the Johansen cointegration and the variance decomposition showed that the Malaysian stock market lead changes in economic activity. However, the results from the ARDL showed no relationship between the two variables. Different findings are found for different sub-periods. All the three tests suggested that the stock market lead changes in economic activity only during the sub-period from May 1986 to July 1998. This implies that the stock market as a predictor of economic activity is sensitive to different stock market conditions.

Ibrahim (2007) further contributed to the subject by examining the experience of Malaysia using standard time-series econometrics. The findings tended to suggest the importance of the financial markets, particularly the stock market in explaining Malaysia's macroeconomic performance. Azman-Saini, Habibullah, Law and Dayang-Afizzah (2006) used in their study the Granger non-causality test, which found that the Malaysian stock prices were led by the exchange rate during the crisis period. During the crisis period, the Malaysian Ringgit depreciated against the US dollar and it significantly influenced the Malaysian stock prices.

Rahman, et al. (2009) investigated the interactions between selected macroeconomic variables and stock prices in Malaysia by testing a vector error correction model. They found that changes in the Malaysian stock market index do perform a

cointegrating relationship with changes in money supply, interest rate, exchange rate, reserves, and industrial production index. The study lag exclusion test showed that all six variables contributed significantly to the cointegrating relationship. They found that the Malaysian stock market is sensitive to changes in the macroeconomic variables, and based on the variance decomposition analysis, this study highlights that the Malaysian stock market has stronger dynamic interaction with reserves and industrial production index as compared to money supply, interest rate, and exchange rate.

Mohamed, Wisam, Aris and Md (2009) tested the short-run and long-run causal relationship between the Kuala Lumpur Composite Index (KLCI) and selected macroeconomic variables, namely, inflation, money supply, and nominal effective exchange rate during the pre- and post-crisis period from 1987 until 1995, and from 1999 until 2007, by using monthly data. The methodology used in this study was time series econometric techniques, i.e., the unit root test, cointegration test, error correction model (ECM), variance decomposition, and impulse response function. The findings showed that there is cointegration between stock prices and the macroeconomic variables. The results suggested that inflation, money supply and exchange rate seem to significantly affect the KLCI. These variables had been emphasized as the policy instruments by the government in order to stabilize stock prices.

Another new study, done by Roselee and Fung (2009), aimed at the predictability of the stock return of different sizes of firms listed in Bursa Malaysia for the period of January 1996 until July 2007 based on arbitrage pricing theory, which suggested that the systematic forces that influence stock returns are those macroeconomic variables that change the expected cash flows and the discount factors. In this study, the macroeconomic variables being examined were consumer price index, industrial production index, money supply (M3), interbank money market transaction, three-month and six-month Treasury bills, discount rate, and crude oil prices by using factor analysis and panel data regression techniques. The results of this study were that stock returns are significantly influenced by a number of systematic forces, and their behavior can be explained only through the combined explanatory power of macroeconomic factors and firm size.

Mohamed, Ali, Abdullah and Azman (2011) tested the relationship between the consumer product index and industrial product index with macroeconomic variables, namely interest rate (base lending rate), inflation rate (consumer price index), and money supply (M2). The methodology used was multiple regression analysis to identify the relationship between both of the stock market indices and the macroeconomic variables. The sample data taken for the period of 15 years was then computed using SPSS. Results showed that all variables have significant correlations with the indices, whilst BLR and CPI have a negative relationship with consumer product index and industrial product index in Bursa Malaysia. Results also showed that M2 has a positive relationship with the consumer product index and industrial product index in Bursa Malaysia, which means that all variables have significant relationships with the stock market indices.

The Malaysian stock market is of special interest as its unique features may trigger a different pattern of stock price movement either from the developed or other emerging economies. From the microeconomic perspective, the Market Efficiency Hypothesis and dividend policy are the main issues that distinguish the Malaysian stock market behavior from other countries. For market efficiency hypothesis, Neoh (1989) concludes that the U.S stock market is more efficient than the Malaysian. His efficiency measure is based on the fundamental factor of asset pricing. As the U.S firms only takes into account the factors of true value in pricing their stocks, the Malaysian firms includes other non-fundamental factors like bonus issues, etc.

Besides, unlike most of the developed markets, the Malaysian stock market seems to be in the weak form of efficiency in the sense that it does not follow the random walk theory (Ibrahim & Rahman, 2003). From the macroeconomic perspective, studying the interaction of macroeconomic variables and the Malaysian stock market index is the primary interest because of three reasons; Firstly, Malaysia pursues a trade-led approach to stimulate its economy which means Malaysia is an export-dominated country (U.S Annual Energy Outlook, 2011). For an export-dominated country currency depreciation will have an unfavorable impact on the domestic stock market (Park & Ratti, 2008). Secondly, its stock market development is considered rapidly growing on one standard measure of the level of stock market development is the market capitalization to GDP ratio. According to the Malaysian ministry of finance, the market capitalization to GDP ratio in 1990, 2000, and 2010 for Malaysia is 110.4%, 127.0% and 166.5% respectively (Ministry of finance, Economic Report 2011-2012, 2011). Thirdly, Malaysia does not adopt a freely exchange rate system

like developed countries and has more capital control (Ming-Shiun et al, 2007). Against these differences, studying the Malaysian context is important in order to provide a deeper understanding of this subject in enhancing a better decision making for the monetary policy and attractive new investment.

In conclusion, based on the above literature review in Malaysia which used different macroeconomic variables, this study selected six variables among the many macroeconomic variables based on their theoretical importance, performance measures of the economy, and also their uses and findings in the previous empirical literature. The level of real economic activity is regarded as the crucial determinants of stock market prices. A review of the above literature reveals that there has been no well-known study of the strength and direction of linkage between stock prices and key economic variables in Malaysia. However, regional stock markets such as Malaysia have not been fully explored because of their small sizes and geographic locations. In this study, which examined the relationships between the FTSE/BM Top 100 Index and a set of six macroeconomic variables (money supply, interest rate, exchange rate, oil price, industrial production and consumer price index) from September 1998 to October 2011 using Johansen cointegration test, the Malaysia as country known as the ASEAN member for the period after the Asian financial crisis in July 1997, to determine whether the weak-form of market efficiency continues to exist in the emerging market.

From the macroeconomic perspective, studying the linkages of macroeconomic variables with the Malaysian stock market is the primary interest and limited to the Malaysian context because of several reasons;

The Malaysian economy is one of the faster emerging countries, growing more than 4.6% on average in the last three years with GDP growth forecast at 5% in 2012 (Malaysian Economic Outlook, 2011). Malaysia is considered one of the advanced emerging markets according to the FTSE Group, with another eight countries, also verifying Malaysia as one of the twenty one emerging market by the MSCI Barra , Dow Jones and Emerging Financial Markets Index (Appendix D).

Malaysia is considered as an important oil exporting country outside the OPEC organization, and an active member in the ASEAN organization, and the South East Asian region, as well. Malaysia is both an exporter and importer of oil and crude petroleum, which accounts for Malaysia being the second major exporter after the palm oil with an average of 18 million metric tons annually, as well the higher oil-based revenue allowing the government to undertake development spending on infrastructure, education, healthcare and enhancing the country's productive capacity because the oil revenue amounted to RM 63.7 billion in 2008 to account for 39.9% of the overall government revenue (Bank Negara Malaysia Annual Report, 2009). Based on the UN database and the Malaysian Department of Statistics, it mentions that Malaysia is also an importer of oil with an average of 7.9 million metric tons per year; in other words, Malaysia is the net exporter of oil in the world (World Economic Outlook Database, 2011).

The Malaysian stock market capitalization percentage to GDP ratio has been growing rapidly. According to the World Bank and Ministry of Finance/Malaysia, the Malaysian market capitalization in the end period of July 2011 become RM1.3393 billion, while in the end period of 2008 was RM663.8 billion; in addition, the market capitalization/GDP ratio was 172.3% and 89.4 in 2007 and 2008, respectively, while intensity changed in the first half of 2011 to become 325.2% (Economic Report 2011-2012, 2011). Malaysia is different from the developed countries because it did not adopt a free exchange rate system and has more capital control (Ming-Shiun, Chi-Wing, Liu, 2007).

2.5 Summary

There have been many attempts in the past to find the relationships between the stock prices and macroeconomic variables. All these studies found significant short-run and long-run relationships between stock prices or stock returns and the macroeconomic variables.

There are long lists of literature on the macroeconomic variables and their effects on stock prices from the above discussions. Therefore, this study finds that it is interesting to investigate these effects and their relationship with stock prices after the financial crisis of 1997 in the Malaysian context, to examine whether they are consistent with the prior studies to determine the efficiency form in Bursa Malaysia. These variables are chosen, taking into account the empirical literature, in order to cover a wide spread of economic processes in the Malaysian economy.

Although the majority of past researchers studied the relationship of macroeconomic factors, including oil prices and the economic activity and the general stock market, up to now, no research has been conducted on the specific impact of the financial, external, and real output indicators together as a comprehensive study, including money supply, interest rate, exchange rate, oil price, industrial production and consumer price index on Malaysian financial market, or specifically on the Malaysian stock market performance. The significance of this research is to ascertain the impact of these indicators on the stock market in the Malaysian context, where the country aims to become a developed country by the year 2020.

The review of the theoretical and empirical literature suggested that the following factors can potentially affect stock prices. These factors are money supply, interest rate, exchange rate, oil price, industrial production, and consumer price index. This study will examine the effect of the macroeconomic variables on the stock price in the Malaysian stock market, which has a different structure and institutional characteristics from developed stock markets because Malaysia does not adopt a freely exchange rate system and has more capital control like developed countries (Ming-Shiun et al, 2007). Therefore, it is critical to ascertain whether stock returns in Malaysia respond differently to economic variables.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The study will use time series data from secondary sources that will be collected from different databases, such as Bank Negara Malaysia, the International Monetary Fund, the US Energy Information Administration, the Department of Statistics Malaysia and Bursa Malaysia database. This chapter will present the model specifications. Moreover, the study will discuss the econometrics technique, which will consist of the application of the Unit Root Augmented Dickey Fuller (ADF) test and (PP) test, Johansen's cointegration test, error correction model, and the Granger causality test. E-views 5.1 statistical package will be used for the analysis. Moreover, this chapter includes the hypothesis and operational definitions as well.

3.2 Model Specifications

In this study, six macroeconomic variables were divided into three groups: the first group involves financial indicators representing money supply and interest rate; the second group involves external indicators represented by the exchange rate and oil price, and the third group presents the real output indicators, which are implemented by the index of industrial production and the consumer price index. This model is

based on the interrelationship among the four markets (securities market, goods market, money market and labor market). Walras' law allows any one of these markets to be dropped from analysis, and the labor market will be dropped from this study. In addition, this study will be conducted in Malaysia as a trade- oriented country. Also, this study will include external competitiveness indicators that play a significant role in the economy. The security market is represented by stock price indices, the money supply and interest rate will be under the financial indicators (Wongbangpo & Sharma, 2002; Vuyyuri, 2005), and the exchange rate and the global oil price will be under the external indicators (Gay, 2008). Finally, the goods market variables were considered as the index of industrial production and the consumer price index (Wongbangpo & Sharma, 2002), therefore this study will analyze the relationship between these four markets.

SP = F (M1, IR, ER, OP, IIP, CPI,)

Where *SP is Stock Prices*

M1 is Money supply

IR is Interest Rate

ER is Exchange Rate

OP is Oil Price

IIP is Index of Industrial Productions

CPI is Consumer Price Index

Thus, the current study will use both theories, Arbitrage Pricing Theory and Economic Theory, to explain how the macroeconomic variables (financial, external and real output) influence the stock market price. Figure 3.1 illustrates the relationship between macroeconomic variables (financial, external and real output) and their influence on the stock market price. The figure presents an overview of the relationship between variables to be tested in this study. The first independent variable of the present study is financial indicators capturing the two elements of money supply and interest rate. Meanwhile, the second independent variable of the study is external indicators, which include exchange rate and oil price. The third independent variable of the study is real output, which includes the industrial production and consumer price index. The FTSE Bursa Malaysia Top 100 Index is the dependent variable of the present study. It is also hypothesized that the degree of efficiency of stock market price. Figure 3.1 shows the framework for the current study. Econometric techniques based on the theoretical model will be carried out in order to look at the relationship between the independent variables and the stock prices:

Table 3.1
Macroeconomic variables Studies based on APT

Money supply	(Altay, 2003; Beenstock & Chan, 1988; Clare & Thomas, 1994; Ozcam, 1997)
Interest rate	(Altay, 2003; Burmeister & MacElroy, 1988; Etia, 2011; Ozcam, 1997; Tursoy, et al., 2008)
Exchange rate	(Etia, 2011; Kandir, 2008; Ozcam, 1997)
Oil price	(Chan, et al., 1985; Chen & Jordan, 1993; Clare & Thomas, 1994; Roselee & Fung, 2009)
Industrial production	(Altay, 2003; Beenstock & Chan, 1988; Burnmeister & Wall, 1986; Chan, Chen & Hsieh, 1985; Chen, et al., 1986; Ozcam, 1997)

Table 3.1 (Continued)

inflation	(Altay, 2003; Chan, et al., 1985; Chen, et al., 1986; Burnmeister & Wall, 1986; Chen & Jordan, 1993)
Other Macroeconomic Variables	
Gold price	(Clare & Thomas, 1994; Tursoy et al., 2008; Yoruk, 2000)
GDP	(Cheng, 1995; Kandir, 2008; Kryzanowski & Zhang, 1992; Roselee & Fung, 2009)
Export Import	(Altay, 2003; Beenstock & Chan, 1988; Saunders, 1994)

$$Yi = \beta_0 + \beta_1(M1) + \beta_2(IR) + \beta_3(ER) + \beta_4(OP) + \beta_5(IP) + \beta_6(CPI) + \varepsilon_t$$

(3.1)

Where Y is dependent variable represent a stock price which here is defined as the FTSE/BM Top 100 Index, β0 is intercept of the model. M1, IR, ER, OP, IIP and CPI are the independent variables. SP is stock price in a lagged (past) period of time, M1 is the money supply and IR is the interest rate, which represent the financial indicators. ER is the exchange rate and OP is the global oil prices which represent the external indicators. IP is the index of industrial production and CPI is the inflation rate, which represent the real output indicators. β 1,β 2, β 3, β 4, β 5 and β 6 are the parameters in the model. $\mathcal{E}$ Denotes the error term disturbances.

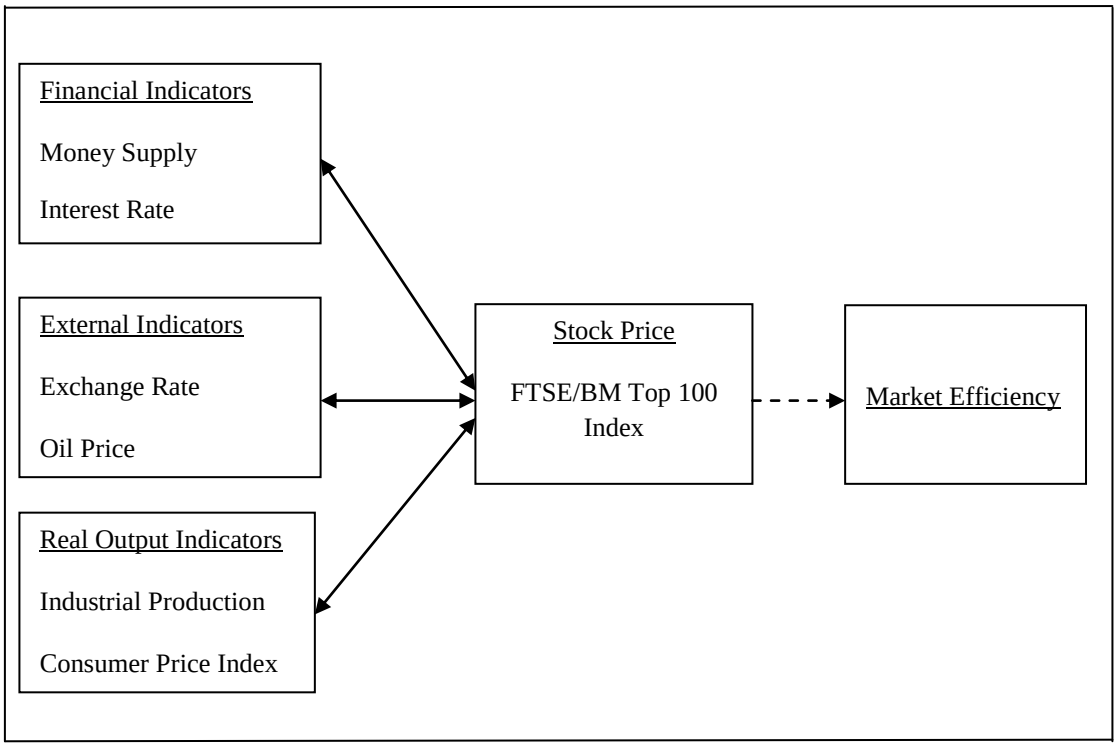

Figure 3.1
Research Framework

3.3 Data Analysis

to test the potential linkage in the long-run and short-run between the financial indicators (money supply, interest rate), external indicators (exchange rate, oil price) and the real output indicators (industrial production and consumer price index) and the FTSE Bursa Malaysia Top 100 Index as a proxy of the stock market by using monthly time series data after the ASEAN financial crisis from September 1998 until 2011 to avoid the potential influence of the financial crisis in July 1997, as well, this study will avoid the global financial crisis in 2008. This is to be able to examine the

structural changes between the variables after the crisis, which means it would show whether some policy that had been implemented had any impact on the informational efficiency of the stock price and financial, external and real output sectors. In addition all data were also transformed by taking the natural logarithms of the real data except interest rate.

The selection of this period is intended to study the effect of these indicators on the stock market. For stock prices, this study will use end of the month values of the FTSE/BM Top 100 Index as a proxy of stock market. The M1 money supply is used as the money supply variable, and is expressed in the domestic currency. The interest rate is represented by employing the base lending rate.

The exchange rate is represented by employing the nominal effective exchange rate, the bilateral exchange rate with reference to the US dollar, and finally, the average of West Texas Intermediate and Brent as a proxy to global oil price. Industrial productions were used to proxy the real output and the consumer price index was used to proxy for the inflation.

The data were obtained from the various issues of the Bank Negara Malaysia Annual Report, Bursa Malaysia website, the IMF's International Financial Statistics Database (IFS), the US Energy Information Administration (EIA) Database, and the Department of Statistics, Malaysia. The FTSE/BM Top 100 Index is used as it encompasses the largest amount of stocks traded in Malaysia.

The tool that will be used to test the potential linkage in the long-run and short-run between financial, external and real output indicators and stock market prices includes descriptive statistics, Unit Root Augmented Dickey Fuller (ADF) test proposed by Dickey and Fuller (1979, 1981), and the PP test, which was proposed by Phillips-Perron (1988). Similar procedures have been used by Asiri (2008); Dockery, Vergari & Vergari (2001); Mananyi & Struthers (1997); Payne & Sahu (2004); and Schwert (1989). Johansen's (1988, 1991) cointegration test, and the Granger-causality test proposed by Engle and Granger (1987); Granger, Huang & Yang (2000); and Granger (1986). The cointegration test is applied, which requires that the variables are to be integrated of order one *I(1)*. Majority empirical research on the time series data work on the assumption that the principal times series is stationary, and "a time series is stationary if its mean and variance does not vary systematically over time" (Gujarati, 2009). Similar types of test analysis techniques have been used by Mukherjee and Naka (1995) and Rahman et al. (2009). The E-views 5.1 statistical package was used for these analyses.

In addition, before the study employed the Granger causality to test the time series data relationship, there were a few steps that have to be tested and followed, therefore the methodology will provide the steps to do the cointegration test in order to find the dynamic linkage between the financial, external and real output variables and the stock price.

3.3.1 Descriptive Statistics

The data will be put into MS Excel, which will then be transferred to E-views 5.1 software for analysis purposes. The descriptive analyses will be conducted through E-views to ascertain the mean, median, standard deviation, skewness, kurtosis and like statistics.

3.3.2 Unit Root Test

After the descriptive statistics, this study will test the stationary status of the data using E-views 5.1 software. The integration orders of time series should be verified because the test procedure requires that the time series that will be used for causality should be stationary. That means a pretest of the variables (money supply, interest rate, exchange rate, oil price, industrial production, consumer price index, and stock price) for their order of integration by differencing each series successively until a stationary series is obtained. Briefly stated, a variable is said to be integrated of order d, written I(d), if it requires differencing d times to achieve stationary. Therfore, this study will be tested for stationarity of the variables to avoid the spurious results by employing the unit root test.

In addition, if the mean and variance of the series are constant over time, while the value of the covariance between the two periods depends only on the gap between the periods, and not on the actual time at which the covariance is considered, then the

series is stationary. But, if one or more of the above -mentioned conditions are not fulfilled, then the series is non-stationary (Paramiah & Akway, 2008). While Granger (1986) asserted that for any time series to be used in econometrics application, the time series must be stationary, whereby the notion of a spurious regression, which they argued "produces statistically significant results between series that contain a trend, and are otherwise random" was introduced. In other words, regression in which the variables are non-stationary can lead to spurious results, where variables may share the same time trend even though they are not really related.

There are several methods for testing the presence of unit roots. The most widely -used methods are the Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979) and Phillips-Perron (PP) (Philips & Perron, 1988). The unit root test that is used in this study is the Augmented Dickey-Fuller (ADF) test. This is to determine whether the sample series (or its first or second difference) is stationary. To confirm the unit root property of the sample data, the Phillips-Perron (PP) test shall also be employed to confirm the results of the ADF test. The null hypothesis of the unit root test is that the series contains a unit root. If the t-statistics is smaller than the critical value, the null hypothesis is rejected, i.e., the data has no unit root and is stationary.

ADF is applied when the error terms (u_t) are correlated. Otherwise, we can only use the Dickey-Fuller test. ADF is performed by adding the lagged values of the dependent variable ΔY_t. The null hypothesis for the ADF test for unit root test is $\alpha_1=0$. The study used the example of Gujarati (1995) for estimating ADF. The following regression is for ADF test purpose:

$$\Delta Y_1 = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon \qquad (3.2)$$

Meanwhile, another test is the Phillips-Perron (PP) test. This test controls the higher-order serial correlation. The Phillips-Perron test uses non - parametric statistical methods and avoids the use of adding lagged difference terms, as in the ADF test. The null hypothesis for the PP test is $\beta_1=0$. The PP test is relatively better (still generally poor), but has a very poor size in the presence of MA processes. This PP test is more robust because it allows for wider variety for heterogeneously distributed and weakly dependent innovations. It is also known to have the advantage of being more powerful than the ADF for small, as well as moderate, samples.

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + e_t \qquad (3.3)$$

In conclusion, to avoid spurious regressions that may arise as a result of carrying out regressions on time series data without subjecting them to testing whether they contain a unit root, therefore, the study first subjected the data to the stationarity test by using the widely- acclaimed Augmented Dickey Fuller (ADF) test by Dickey and Fuller (1979) and the Phillips-Perron (PP) test by Phillips and Perron (1988) to confirm the stationarity of the series. The tests and regressions were carried out using the econometric package E-views 5.1.

3.3.3 Cointegration Test

According to Fadhil, Azizan and Shaharuding (2007), they explained that the cointegration test explains whether there is any effect between the dependent variable and the independent variables in a short-run or long-run period. According to Gujarati (1995), cointegration means that data from a linear combination of two variables can be stationary despite those variables being individually non-stationary. Variables will be deemed to be cointegrated if they have a long-run or equilibrium relationship between them, which means the variables move together, have similar trends, and do not wander off in opposite directions for very long without coming back to a mean distance eventually. Gujarati in his book quoted Granger (1986) as saying: *"A test for cointegration can be thought as a pre-test to avoid 'spurious regression' situations".*

Then, a set of variables is considered cointegrated if they are non-stationary, integrated of the same order, and yet their linear combination is stationary. The evidence of cointegration suggests that they cannot drift farther away from each other arbitrarily. Any deviations of a variable from the long-run relationship will result in some variables adjusting to return back to the long-run path; that is, the deviations (or disequilibrium) will be corrected. Accordingly, results from cointegration tests not only provide information on the long-run relationship among the variables, but also are crucial for proper specification of their short-term dynamics.

If residuals are stationary, the two variables are said to be cointegrated, and there is a long-run relationship between the two variables. However, if residuals are random walk, the variables are not cointegrated. The notion of cointegration arose out of the concern about spurious or nonsense regressions in time series. If economic time series variables behave individually as non-stationary random walks, it often produces empirical results in which the R^2 is quite high, but the Durbin-Watson statistic is quite low. The results may be misleading, and often result in misinterpretation.

Thus, after the order of integration of each variable has been determined as to whether the time series of these variables display a stationary process in a lag linear combination. Johansen's (1988) cointegration testing framework will be used in this study to determine the absence or the presence of the cointegrating relationship among all test variables. Although there exist a number of cointegration tests, such as the Engle & Granger (1987) method and the Stock & Watson (1988) test, Johansen's test has a number of desirable properties, including the fact that all test variables are treated as endogenous variables. This test is based on the null of no cointegration between the variables. If the series are found to be cointegrated, Granger causality tests can be implemented. If there is existence of a cointegrating relationship between two variables, it means that at least one of the two variables Granger-causes the other. In conducting the cointegration test, this study used the Johansson and Juselius (1990) which proposed two tests to determine the number of cointegrating vectors. The first is the likelihood ratio test based on the maximal eigenvalue, and the second is the likelihood ratio test based on the trace test. The

power of the trace test is lower than the power of the maximal eigenvalue test. If the

null hypothesis of no cointegration vector can be rejected, it indicates that there is a long-run relationship among the variables in the model. As a result, the error correction mechanism can be presented. The aim is to test the number of r cointegrating vectors such as β1, β,… βr . The Johansen methods of cointegration can be written as the following vector autoregressive framework of order p in equation (4). The number of characteristic roots can be tested by considering the following trace statistic in equation (5) and the maximum eigenvalue test in equation (6).

$$\mathrm{X}_t = A_0 + \sum_{j=1}^{p} \beta_j \mathrm{X}_{t-j} + e_t \qquad (3.4)$$

where, Xt is an n×1 vector of non-stationary I(1) variables, A0 is an n×1 vector of constants, p is the maximum lag length, Bj is an n×n matrix of coefficient and et is a n×1 vector of white noise terms.

$$\lambda_{trace}(r) = -T \sum ln(1-\hat{\lambda}) \qquad (3.5)$$

$$\lambda \max(r, r+1) = -T \sum ln\left(1-\hat{\lambda}_{r+1}\right) \qquad (3.6)$$

Where, *r* is the number of cointegrating vectors under the null hypothesis, T is the number of usable observations and λ_j is the estimated value for the j**th** ordered characteristic roots or the eigenvalue from the Π matrix.

To perform the second step, there are five different criteria, including the sequential modified likelihood ratio (LR) test statistic, the final prediction error criteria (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SIC), and the Hannan-Quinn information criterion (HQ) that are used to determine the lag lengths used in the VAR. These criteria are widely- used in the literature (Etia, 2011; Lutkepohl, 2005; Enders, 2010). Prior to proceeding to the Johansen-Juselius (JJ) test for the number of significant cointegration vectors, Etia (2011), Rahman et al. (2009) and Ibrahim (2011) used the Akaike Information Criterion (AIC) test, which is performed in this study to determine the lag length of the vector autoregressive system and the Akaike Information Criterion (AIC) test yield lag length is of 4 for this study.

In conclusion, if there is at least one cointegration relationship among the variables, then the causal relationship among these variables can be determined by estimating the Vector Error Correction Model. This study will use the Johansson cointegration test.

3.3.4 Error Correction Model

The Error Correction Model was created by Davidson, Hendry, Srba and Yeoin (1978), and is also called the DHSY model. The definition of Error Correction Model is: An error correction model is a dynamic model in which "the movement of the variables in any period is related to the previous period's gap from long-run equilibrium". A model is a mathematical dynamic system. An error correction model is a dynamic system with the characteristic that the deviation of the current state from its long-run relationship will be fed into its short-term dynamics. An error correction model doesn't mean a model that corrects the error in another model.

This study will be investigating the influence of the variables based on the Granger causality model and the information on the cointegrating properties of the variables. In particular, according to the Granger representation theorem, the dynamic relation between cointegrated series should be modeled using an error correction model (ECM). According to Granger (1987), when two or more integrated time series that are cointegrated have an error correction, then two or more time series that are error -correcting are cointegrated. The error correction model is powerful since it allows an analyst to estimate both short-term and long-run effects of explanatory time series variables. To use the Johansen's method, equation (2) needs to be turned into a vector error correction model (VECM) which can be written as:

$$\Delta X_t = A_0 + \sum_{j=1}^{p-1} \Gamma_j \, \Delta X_{t-j} + \prod X_{t-p} + e_t \qquad (3.7)$$

Where Δ is the first difference operator, $\Gamma_j = -\sum_{i=j+1}^{p} \beta_j$ *and* $\prod = -1 + \sum_{i=j+1}^{p} \beta_j$,

and I is an n×n identity matrix.

Error correction is the error correction term obtained from cointegrating regression or the linear long-run relationship of the variables. With this specification, the changes in the stock prices will depend not only on the changes in the independent variables, but also on the long-run relationship between them. The latter allows for any previous disequilibrium, measured by the error correction term, to exert potential influences on the movement of the stock prices. According to Toda and Philips (1994), the former may be termed as short-term causality from the independent variables, while the latter may be termed as long-run causality. Thus, the error correction model conveniently combines the short-term dynamics and long-run adjustment of the stock prices, introducing two channels of causality from the independent variables to the stock prices that can be informationally inefficient in either the short-term, or the long-run, or both.

3.3.5 Granger Causality Test

A test of causality is to know whether the lags of one variable enter into the equation for another variable (Enders, 1995). There are two important steps involved with Granger's Causality test. First, stationary data is needed, rather than non-stationary data. Second, in addition to the need to test the stationary property of the data, the Granger methodology is somewhat sensitive to the lag length used. So, for selecting the appropriate lag length for our study purposes, there are various lag length criteria available. This study will use Akaike's information criteria (Granger, 1969).

This study will apply the Granger Causality test proposed by Granger (1987), which proposed that if a causal relationship exists between variables, they can be used to predict each other, as well as this concept of cointegration was introduced in the econometric literature by Granger (1981), and was further extended and formalized by Engle and Granger (1987). The economic interpretation of cointegration, according to Harris and Sollis (2003), is that if two or more series are linked to form an equilibrium relationship spanning the long-run, even though the series themselves in the short-run may deviate from the equilibrium, they will move closer together in the long-run equilibrium.

The Granger causality is defined according to E-views 5.1 Guide that the Granger approach to the questions whether (M1, IR, ER, OP, IP and CPI) causes SP, is to see how much the current SP can be explained by past values of SP, and then to see whether adding lagged values of (M1, IR, ER, OP, IP and CPI) can improve the explanation. SP is said to be Granger-caused by (M1, IR, ER, OP, IP and CPI) if (M1, IR, ER, OP, IP and CPI) helps in the prediction of SP, equivalently if the coefficients on the lagged (M1, IR, ER, OP, IP and CPI) are statistically significant. Granger proposed in 1969 that if a relationship exists between variables, they can be used to predict each other. The short-run causal relationships between the dependent variable and each of the independent variables can be tested by using Granger causality tests (Paramiah & Akway, 2008).

In other words, the variable (M1, IR, ER, OP, IP and CPI) does not 'Granger' -cause SP, if and only if, the past values of (M1, IR, ER, OP, IP and CPI) do not explain SP. In terms of the equation, in a regression of SP on other variables (including its own past values), if we include past or lagged values of (M1, IR, ER, OP, IP and CPI), and it significantly improves the prediction of SP, then we can conclude that (M1, IR, ER, OP, IP and CPI) Granger- causes SP. The same applies if SP Granger- causes (M1, IR, ER, OP, IP and CPI). The Granger causality test requires the null hypothesis of no causality being tested on a joint test that the coefficients of the lagged causal variable are significantly different from zero. The null hypothesis is that (M1, IR, ER, OP, IP and CPI) does not Granger- cause SP in the first regression, and that SP does not Granger- cause (M1, IR, ER, OP, IP and CPI) in the second regression.

3.4 Hypotheses

Hypothesis tests will explain the structure and the relationship between the six main indicators and the stock prices. This idea of hypothesis testing is to determine the significance of the model used. The hypotheses involved in this study are:

1. To test whether all the variables are cointegrated.

   H0: The variables are not cointegrated.

   H1: the variables are cointegrated.

2. To test the causal relationship between the variables.

   2. A To tests the relationship between financial variables (money supply, interest rate) and the stock price.

   A1. H0: Money supply does not Granger-cause the stock price.

   H1: Money supply does Granger-cause the stock price.

   A2. H0: Stock price does not Granger-cause the money supply.

   H1: Stock price does Granger-cause the money supply.

   A3. H0: Interest rate does not Granger-cause the stock price.

   H1: Interest rate does Granger-cause the stock price.

   A4. H0: Stock price does not Granger-cause the interest rate.

   H1: Stock price does Granger-cause the interest rate.

   2. B To test the relationship between external variables (exchange rate, oil price) and the stock price.

B1. H0: Exchange rate does not Granger-cause the stock price.

H1: Exchange rate does Granger-cause the stock price.

B2. H0: Stock price does not Granger-cause the exchange rate.

H1: Stock price does Granger-cause the exchange rate.

B3. H0: Oil price does not Granger-cause the stock price.

H1: Oil price does Granger-cause the stock price.

B4. H0: Stock price does not Granger-cause the oil price.

H1: Stock price does Granger-cause the oil price.

2. C To test the relationship between real output variables (industrial production, consumer price index) and the stock price.

C1. H0: Industrial production does not Granger-cause the stock price.

H1: Industrial production does Granger-cause the stock price.

C2. H0: Stock price does not Granger-cause the industrial production.

H1: Stock price does Granger-cause the industrial production.

C3. H0: Consumer price index does not Granger-cause the stock price.

H1: Consumer price index does Granger-cause the stock price.

C4. H0: Stock price does not Granger-cause the consumer price index.

H1: Stock price does Granger-cause the consumer price index.

3.5 Data Collection

The study will analyze the potential linkage in the long-run and short-run between the Malaysian stock market and six macroeconomic variables, including financial indicators, which consist of M1 and IR, external indicators, which include ER and OP, as well as real output indicators, which include IIP and CPI, with lagged (past) stock price. The data are monthly for the period after the ASEAN financial crisis in 1997.

The sample time series data started since the exchange rate had been pegged, from September 1998 until October 2011. This is to examine the structural relationship between the variables after the ASEAN financial crisis, which means it would show whether some policy that had been implemented had an impact on the informational efficiency of the stock price and the financial, external and real output indicators. In addition, all data are expressed in natural logarithms except the interest rate.

The secondary data was collected from different sources. The data for the index of money supply (M1), interest rate (IR), and consumer price index (CPI) were gathered from the Bank Negara Malaysia Annual Report (Central Bank of Malaysia), data for exchange rate (ER) was collected from the International Financial Statistics database, and the industrial production index (IP) was collected from the Department of Statistics, Malaysia.

In addition, crude oil commodity prices are classified under world oil prices, which is the average real oil price obtained from two main benchmark oil prices used in world trade, namely, West Texas International (WTI), and Brent of Europe. The data was taken from the US Energy Information Administration (EIA) database.

Stock prices will be measured by end of month values of the FTSE/BM Top 100 Index, which is derived from 100 companies that Bursa Malaysia has chosen from a cross- section of the total listed companies in Malaysia. This Index is taken to be representative of Malaysian stock market performance and thus provides a benchmark that reflects the growth of Malaysian economy. The data was taken from the Bursa Malaysia database.

3.6 Operational Definitions

In the context of this study, the following terms will be applied, as provided by the Department Of Statistics, the source of Malaysia's official statistics, as well as the glossary of Bank Negara Malaysia.

Kuala Lumpur Composite Index (KLCI)

Kuala Lumpur Composite Index (KLCI) is derived from 100 companies that Bursa Malaysia has chosen from a cross -section of the total listed companies in Malaysia,

which is effective from 6 July, 2009; the FTSE Bursa Malaysia KLCI replaced the KLCI. Available at

http://www.klse.com.my/website/bm/market_information/ftse_bursa_index.html

Money Supply (M1)

M1 = Currency in Circulation + Demand Deposits

Currency in Circulation refers to the notes and coins issued by BNM less the amount held by the commercial banks and Islamic banks. Meanwhile, demand deposits refer to the current accounts (includes SPI current accounts) of the non-bank private sector placed with the commercial banks and Islamic banks. M2 = M1 + Narrow Quasi-Money

Narrow Quasi-Money = Savings Deposits + Fixed Deposits + NIDs + Repos + Foreign Currency Deposits

Narrow Quasi-Money refers to the sum of deposits/ interest- bearing instruments (including SPI deposits and instruments) placed by the non-bank private sector with the commercial banks and Islamic banks (excluding inter-placements among these banking institutions). Foreign currency deposits refer to the deposits of foreign currencies held by residents (non-bank) and foreign entities with the commercial banks and Islamic banks (Bank Negara Malaysia Glossary, 2011).

M1, M2, M3 are all measures of money supply, that is the amount of money in circulation at a given time. Manipulating money supply is used in an attempt to control inflation, the idea being the more money in circulation leads to more money chasing fewer goods and hence prices increase to compensate and vice versa. M1 measure the narrowest and M3 measure the broadest. Narrow money refers to forms of money that are available immediately for use in transactions, broad those that are not immediately available. More recently, the US Federal Reserve Bank has stopped publishing information on the M3 money supply as it had been deemed no longer useful. (http://www.federalreserve.gov/)

Interest rate (IR)

The fixed charge or return, usually expressed on an annual basis, on a financial asset expressed as a percentage of the price of the asset. Interest rate is the percent charged, or paid, for the use of money. It is charged when the money is being borrowed, and paid when it is being loaned.

Exchange Rate (ER)

Most commonly, exchange rates are expressed as the number of units of domestic currency that will purchase one unit of foreign currency (e.g., units of currency per U.S. dollar). An exchange rate may also be defined as the inverse: the number of units of foreign currency that one unit of domestic currency will purchase (IMF Glossary, 2011). Available at

http://www.imf.org/external/np/exr/glossary/showTerm.asp#88

Period average exchange rates are the arithmetic average of the reported monthly exchange rate during a given period; in general, the exchange rate chosen is the US Dollar to Ringgit Malaysia because the US dollar is the main currency for trade in the world.

Oil Price (OP)

Oil prices are those normally referring to the average OECD import price of oil (cost insurance and freight) as calculated by the US International Energy Agency. Crude oil prices measure the spot price of various barrels of oil, most commonly, either the West Texas Intermediate or the Brent Blend. The OPEC basket price and the NMEX Futures price are also sometimes quoted (EIA, Annual Energy Outlook 2011).

Industrial Production (IP)

Index of Industrial production (IP) covers the mining, manufacturing and electricity sectors. The main objective of the IIP is to measure the rate of change in the production of industrial commodities in real terms over time. The index is a base year weighted arithmetic average of quantity relatives calculated by the Laspeyres formula. It was first constructed with 1968 as the base year (1968 = 100). Subsequently, the IP was rebased to 1981, 1985, 1988, 1993, 2000, and currently to 2005. The IIP refers to Malaysia except those for 1968 and 1981 base years, which refer to Peninsular Malaysia (Bank Negara Malaysia, 2007).

Consumer Price Index (CPI)

It measures the percentage change through time in the cost of purchasing a constant basket of goods and services representing the average pattern of purchases made by a particular population group in a specified time period. CPI is calculated based on the international standard and procedures, known as the Laspeyres formula. CPI expressed for the base year 1967 = 100, was the index for Peninsular Malaysia, while the index for the year 1980 onwards refers to Malaysia. Prior to 2006, the items in this basket of goods and services were classified according to the Classification of Household Goods and Services (CHGS) with nine main groups, as follows (Bank Negara Malaysia, 2007):

- Food
- Beverages and Tobacco
- Clothing and Footwear
- Gross Rent, Fuel & Power
- Furniture, Furnishing & Household Equipment and Operation
- Medical Care and Health Expenses
- Transport and Communication
- Recreation, Entertainment, Education and Cultural Services
- Miscellaneous Goods and Services

Table 3.2
Operational Definitions

Acronym	Data Source	Definitions of Variables
M1	BNM[1]	Logarithm of the month-end narrowly defined money supply in Malaysia
IR		The end of month average lending rate for loans in the money market rate (base lending rate)
ER	IMF[2]	Logarithm of the end of month real exchange rate (RM/USD)
OP	EIA[3]	Logarithm of Average of West Texas Intermediate and Brent oil price
IP	DOS[4]	Logarithm of the end of month industrial production index
CPI	BNM	Logarithm of the monthly consumer price index
FTSE/BM	BM[5]	Logarithm of the end of month FTSE/BM Top 100 closing prices.

[1]BNM: Bank Negara Malaysia, Monthly Statistical Bulletin in different issues.

[2]IMF: International Monetary Fund, which published data in the International Financial Statistics (IFS) in different issues.

[3]EIA: US Energy Information Administration.

[4]DOS: Department of Statistics, Malaysia, Monthly Industrial Production Index in different issues.

[5]BM: Bursa Malaysia.

3.7 Summary

In this chapter of study, the underpinning theory including the research framework, model specification and the description of data and the methods will be used to analyze the relationship between the financial, external and real output indicators with the stock market in the Malaysian context. The sectors of the Malaysian economy will be represented by the six macroeconomic variables under three different sectors including: the Financial Sector (money supply and interest rate); the

External Sector (foreign exchange rate and oil price); Real output Sector (index of industrial production and consumer price index), and the stock market index by applying the Unit Root Augmented Dickey Fuller (ADF) test and (PP) test, Johansen's cointegration test and Error Correction Model with the Granger-causality test. E-views 5.1 statistical package was used for the analysis. Also this chapter deals with the hypotheses and operational definitions as well.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The objective of this study was to test the potential linkage in the long-run and short-run between the financial indicators (money supply, interest rate), external indicators (exchange rate, oil price) and the real output indicators (industrial production and consumer price index) and the FTSE Bursa Malaysia Top 100 Index. This chapter starts with the descriptive statistics and then shows the findings of the study, which begins with the results of the non-stationary test to ascertain whether there is a unit root or a stationary time series by using the Augmented Dickey-Fuller (ADF) and Philips Perron test (PP), after the series were integrated at I(1), which mean the time series are non-stationary at the first level and stationary at first difference, then proceed to the analysis of the Johansen cointegration test, then the findings of the Granger-causality test.

4.2 Descriptive Statistics

Prior to deciding on the appropriate method, a preliminary examination of the nature of the data is analyzed. Primary inspection of the graphical presentation of the data in Figure 4.1 indicates possible non-stationarity of the variables, which facilitates the unit root testing. The sample data collected for the purpose of this study, which has been plotted in Figure 4.1, is from September 1998 to October 2011, for a total of 158 observations. As can be seen from the graphs, the movements of the indices are volatile.

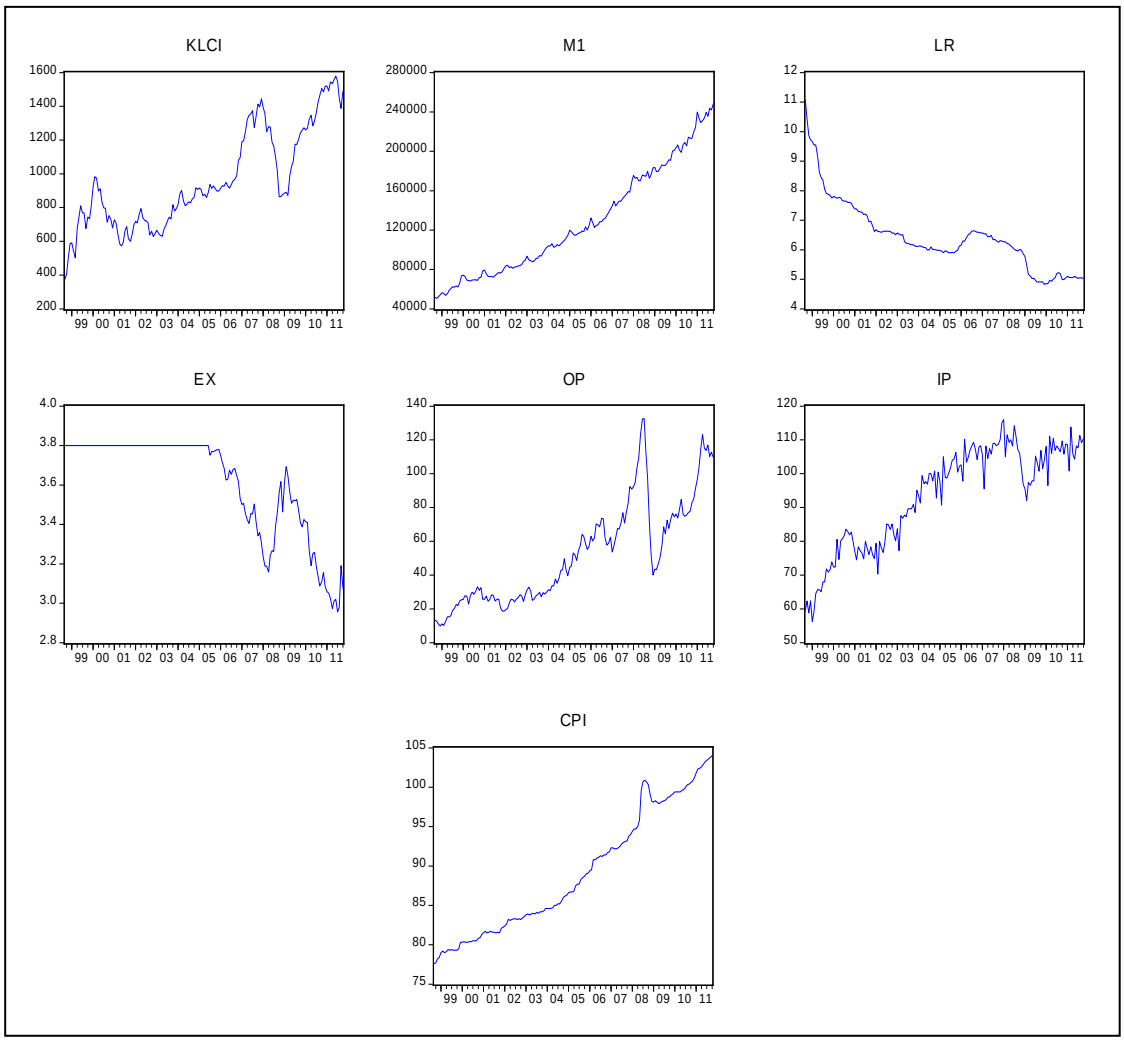

Figure 4.1
Movements of the Variables from September 1998 to October 2011

Various descriptive statistics are calculated for the variables under study in order to describe the basic characteristics of these variables. Table 4.1 presents the descriptive statistics of the data, containing sample mean, median, maximum, minimum, standard deviation, skewness, kurtosis as well as the Jarque-Bera statistics and probabilities (p-values) test for the data in their levels.

Table 4.1

Descriptive Statistics of the Data in Level from December 1998 to October2011

	KLCI	M1	IR	EX	OP	IP	CPI
Mean	961.17	127696.8	6.45	3.61	52.38	93.27	89.14
Median	897.24	116465	6.27	3.80	45.00	97.85	86.75
Maximum	1579.07	248334.6	11.08	3.80	132.72	116.00	104.00
Minimum	373.52	50593.7	4.83	2.96	9.82	56.20	77.60
Std. Dev.	293.18	54968.61	1.18	0.26	30.52	15.10	7.88
Skewness	0.49	0.52	1.22	-1.08	0.71	-0.57	0.37
Kurtosis	2.18	2.08	5.11	2.81	2.60	2.17	1.74
Jarque-Bera	10.80	12.73	68.49	31.20	14.49	13.05	14.05
Probability	0.0045*	0.0017*	0.0000*	0.0000*	0.0007*	0.0014*	0.0008*
Sum	151864.4	20176096	1019.78	570.46	8276.72	14736.30	14083.90
Sum Sq. Dev.	1349446	4.74E+11	218.44	10.36	146244.30	35781.53	9755.71
Observations	158	158	158	158	158	158	158

Note: Asterisk (*) denotes the null of normality was rejected at the 1% significance level.

This study has examined 158 monthly observations of all the variables to estimate the following statistics. The mean describes the average value in the series, and the standard deviation measures the dispersion or spread of the series. The maximum and minimum statistics measures upper and lower bounds of the variables under study during the study sample time frame. The skewness measures whether the distribution of the data is symmetrical or asymmetrical. On the other hand, kurtosis measures the peakedness and flatness of the distribution of the series. Jarque-Bera test statistics are

used for testing whether the data series is normally distributed. The small probability value estimated below failed to accept the null hypothesis that the data series is normally distributed. Table 4.1 provides self-explanatory descriptive statistics analysis done through E-views 5.1 statistical software. Money supply has a mean of 127696.8 with a standard deviation of 54968.61. Interest rate has a mean of 6.45 and the standard deviation is 1.18, meanwhile the exchange rate has a mean of 3.61 and the standard deviation is 0.26. Oil price has a mean of 52.38 with a standard deviation of 30.52. The index of industrial production has a mean and standard deviation of 93.27 and 15.10, respectively. The consumer price index has a mean of 89.14 and standard deviation of 7.88. Similarly, the FTSE/BM Top 100 Index has a mean of 961.17 and standard deviation of 293.18; therefore, these descriptive statistics provide a historical background for the behavior of the study data. For instance, the standard deviations indicate that M1 and OP are more volatile compared to the IP and CPI. Furthermore, the standard deviations indicate that the ER and IR are less volatile compared to the rest of the macroeconomic variables during the same time, which is perhaps due to the fixed exchange rate to the U.S. dollar that effectively adopted for the Malaysia since the Asian financial crisis in July 1997.

The values of median, skewness, kurtosis, Jarque-Bera and probability are also given for all seven variables in Table 4.1, and all the variables are asymmetrical. More precisely, skewness is positive for five series (KLCI, M1, IR, OP and CPI) indicating the fat tails on the right-hand side of the distribution comparable with the left-hand side. On the other hand, ER and IP have a negative skewness, which indicates the fat

tails on the left-hand side of the distribution (Stock & Watson, 2006). Kurtosis value is positive for all the series under study. The calculated Jarque-Bera statistics and corresponding p-values are used to test for the normality assumption. Based on the Jarque-Bera statistics and p-values, this assumption is rejected at the 1% level of significance for all variables. So the descriptive statistics show that the values are not normally distributed about its mean and variance, or in other words, one can say there is no randomness in the data and therefore, being sensitive to speculation, shows periodic change. This indicated that individual investors can earn a considerably higher normal rate of profit from the FTSE/BM Top 100 Index. As a result, P-values are associated with the Jarque-Bera statistics, a test for departures from normality.

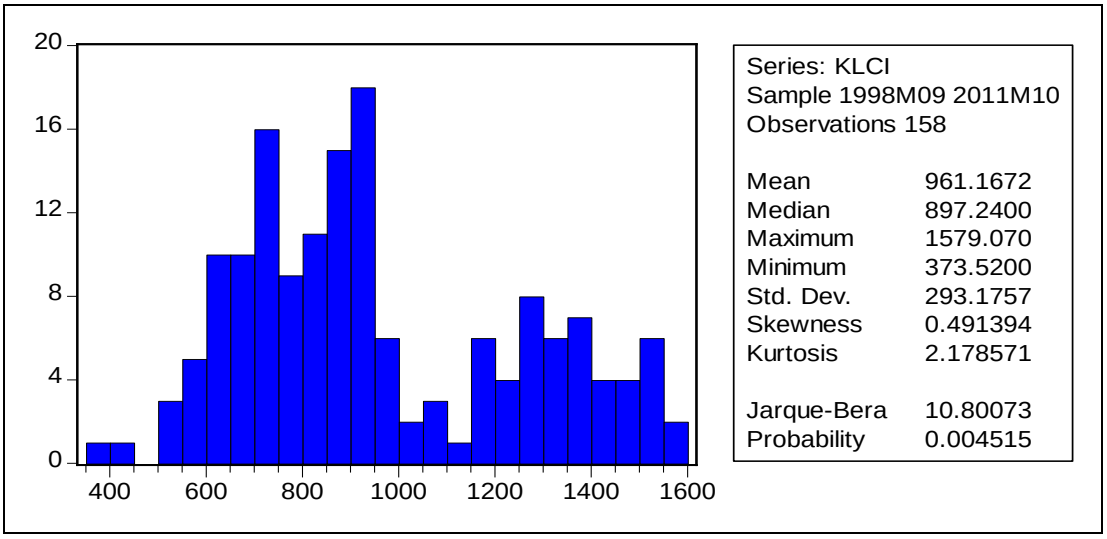

Figure 4.2
Descriptive Statistics for KLCI

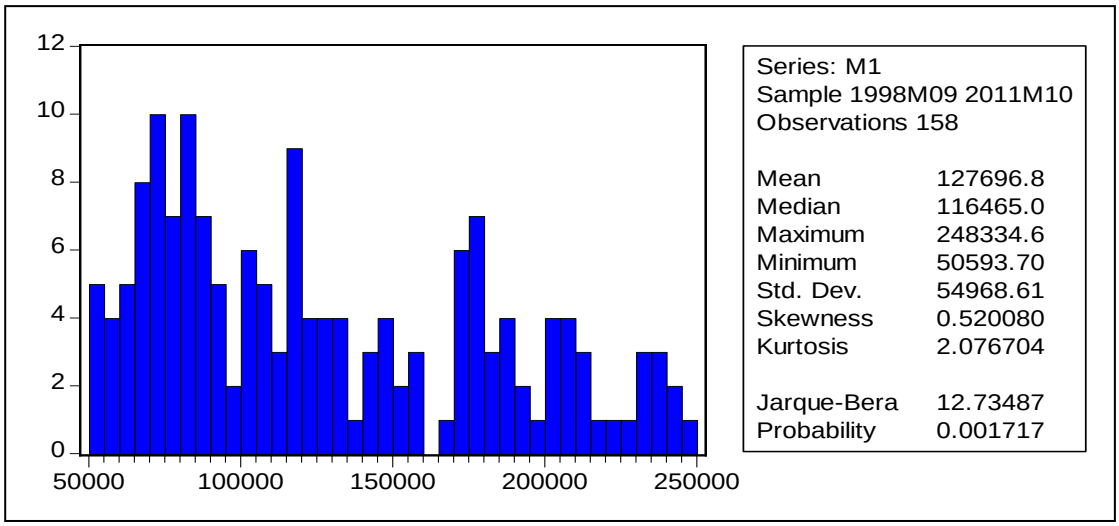

Figure 4.3
Descriptive Statistics for M1

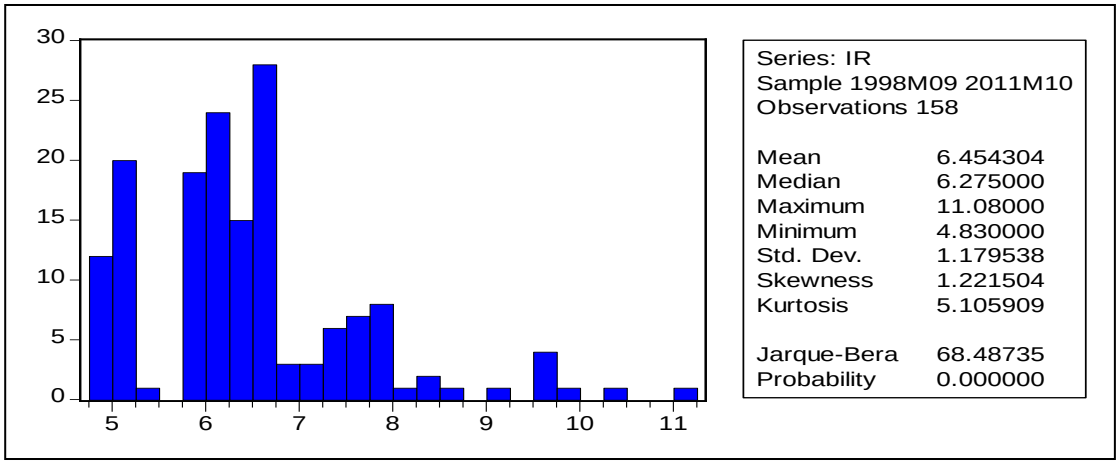

Figure 4.4
Descriptive Statistics for IR

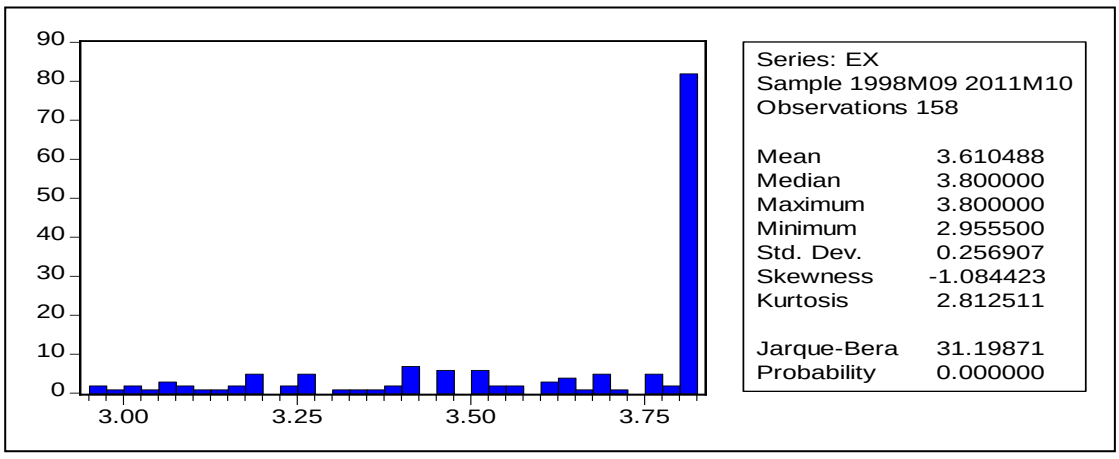

Figure 4.5
Descriptive Statistics for ER

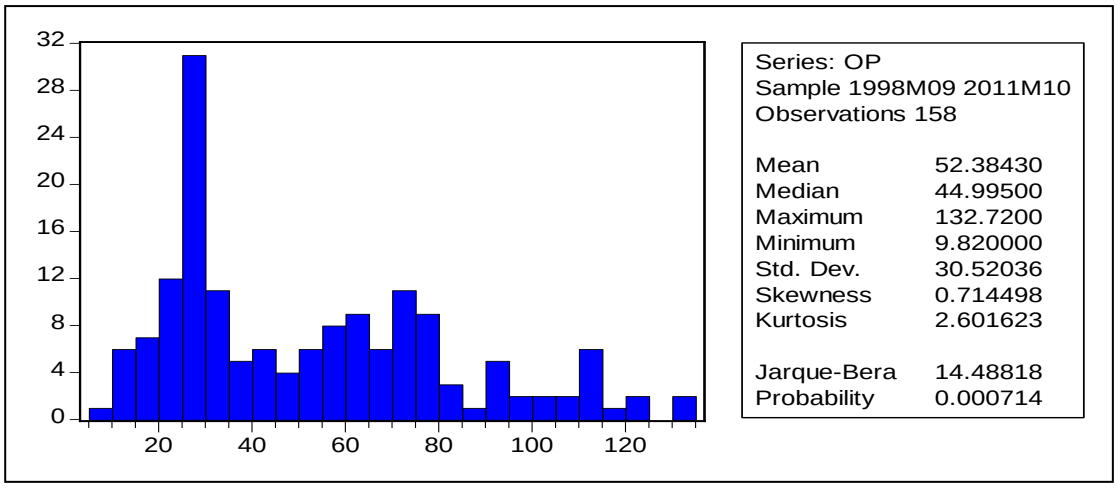

Figure 4.6
Descriptive Statistics for OP

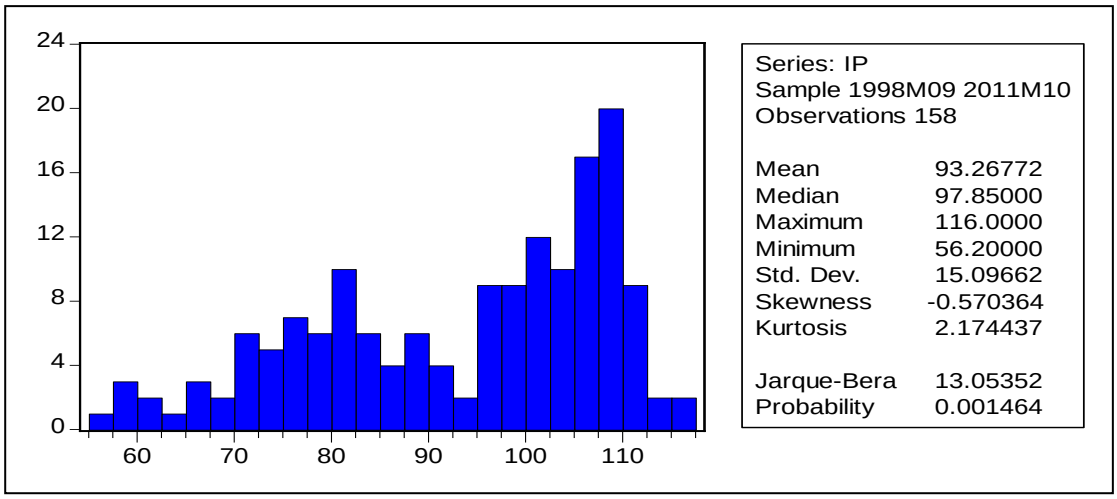

Figure 4.7
Descriptive Statistics for IP

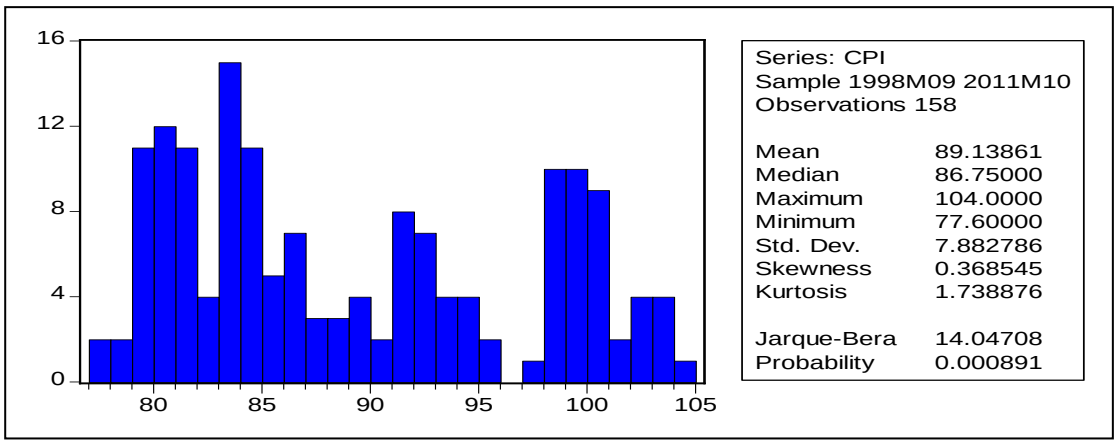

Figure 4.8
Descriptive Statistics for CPI

The results reported in Table 4.2 reveals information on the strength of the relationships connecting the six macroeconomic variables. In particular, this table shows a strong positive correlation between the FTSE/BM Top 100 Index and OP, IP and CPI. On the other hand, a negative correlation exists between the FTSE/BM Top 100 Index and M1, IR and ER. These results support the inclusion of these macroeconomic variables in this analysis.

Table 4.2
Pairwise Correlation Matrix of the Variables

Variables	KLCI	M1	IR	ER	OP	IP	CPI
KLCI	1	-0.89450	-0.67506	-0.91647	0.88110	0.79387	0.85980
M1	-0.89450	1	-0.80279	-0.90751	0.88359	0.81754	0.98760
IR	-0.67506	-0.80279	1	0.57924	-0.65903	-0.80735	-0.79303
EX	-0.91647	-0.90751	0.57924	1	-0.88921	-0.68099	-0.88004
OP	0.88110	0.88359	-0.65903	-0.88921	1	0.84787	0.89208
IP	0.79387	0.81754	-0.80735	-0.68099	0.84787	1	0.83222
CPI	0.85980	0.98760	-0.79303	-0.88004	0.89208	0.83222	1

4.3 Unit Root Test

Most macroeconomic time series data are often assumed to be non-stationary, and thus it is necessary to perform a pretest to ensure there is a stationary cointegrating relationship among variables to avoid the problem of spurious regression. Before proceeding with the OLS estimations, it is necessary to investigate the time series properties of the variables by utilizing unit root tests. The Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979; 1981) and Phillips-Perron (PP) (Phillips & Perron, 1988) unit root tests have been performed in this study in order to check whether the time series are stationary (Asaolu & Ogunmuyiwa, 2011; Eita, 2011; Kumar, 2011). The ADF at level and first difference form are presented in Table 4.3 and Table 4.4, respectively, also the PP unit root tests results at level and first difference form are presented in Table 4.5 and 4.6, respectively. The ADF and PP show that all variables are non-stationary in levels, but stationary if in first-difference form; which means that they are I(1). Both the ADF and PP tests fail to reject the null hypothesis of the existence of a unit root in time series used in current study, which are integrated of order 1 or I(1).

The conclusion from the estimated results for the unit-root test indicate that, both ADF and PP tests agree in classifying all variables; M1, IR, ER, OP, IP, CPI and KLCI as I(1) variables at the 5% level of significance, i.e. they are non-stationary in level, but become stationary after first differencing. Therefore, this study cannot reject the null hypothesis of non-stationary at level form, but can reject the null hypothesis of non-stationary at first difference.

Table 4.3

Results of the Augmented Dickey-Fuller (ADF) Unit Root Tests at Level Form

Variables	Augmented Dickey-Fuller (ADF) at Level		
	Constant	Constant & Trend	None
LogKLCI	-1.317147	-2.830509	1.975584
LogM1	-0.864954	-4.586233	3.781283
IR	-3.808062	-3.219181	-1.419630
LogER	-2.543047	-4.035659	-1.454434
LogOp	-0.964960	-3.025690	1.152676
LogIP	-3.292231	-3.040600	1.907614
LogCPI	-0.162242	-2.484193	3.789881

1. ADF is the Augmented Dickey-Fuller test.

2. Asterisk (*) indicates rejection of the null hypothesis of non-stationarity at the 5% level.

3. The optimum lag length of the (ADF) test is automatically determined based on the Akaike Information Criterion (AIC) methods.

4. Values based on MacKinnon (1996) one-sided p-values.

Table 4.4

Results of the Augmented Dickey-Fuller (ADF) Unit Root Tests at First Difference Form

Variables	Augmented Dickey-Fuller (ADF) at First Difference			Conclusion
	Constant	Constant & Trend	None	
LogKLCI	-10.76285*	-10.74341*	-10.77106*	I(1)
LogM1	-12.00025*	-11.97468*	-10.98494*	I(1)
IR	-9.442214*	-9.718703*	-9.368121*	I(1)
LogER	-9.224815*	-11.02907*	-9.126589*	I(1)
LogOp	-10.73782*	-10.70522*	-10.61590*	I(1)
LogIP	-15.34056*	-15.168345*	-2.900070*	I(1)
LogCPI	-9.511725*	-9.499422*	-8.392276*	I(1)

1. ADF is the Augmented Dickey-Fuller test.

2. Asterisk (*) indicates rejection of the null hypothesis of non-stationarity at the 5% level.

3. The optimum lag length of the (ADF) test is automatically determined based on the Akaike Information Criterion (AIC) methods.

4. Values based on MacKinnon (1996) one-sided p-values

Table 4.5

Results of the Phillips-Perron (PP) Unit Root Tests at Level Form

Variables	Phillips-Perron (PP) at Level		
	Constant	Constant & Trend	None
LogKLCI	-1.544055	-1.544055	0.900420
LogM1	-0.663935	-6.718024	3.758726
IR	-3.011951	-2.457780	-1.196388
LogER	-2.600634	-4.295256	-2.002271
LogOp	-1.137092	-3.084654	1.133495
LogIP	-1.628784	-3.785859	2.014518
LogCPI	-0.208300	-2.247749	4.895277

1. PP is the Phillips-Perron test.

2. Asterisk (*) indicates rejection of the null hypothesis of non-stationarity at the 5% level.

3. The optimum bandwidth for the (PP) test is automatically determined based on the Newey-West by Bartlett Kernel methods

4. Values based on MacKinnon (1996) one-sided p-values.

Table 4.6

Results of the Phillips-Perron (PP) Unit Root Tests at First Difference Form

Variables	Phillips-Perron (PP) at First Difference			Conclusion
	Constant	Constant & Trend	None	
LogKLCI	-10.84769*	-10.82659*	-10.85612*	I(1)
LogM1	-14.96150*	-14.71639*	-10.95989*	I(1)
IR	-9.478079*	-9.718703*	-9.461011*	I(1)
LogER	-17.72508*	-18.10095*	-17.62854*	I(1)
LogOp	-10.73722*	-10.70419*	-10.67499*	I(1)
LogIP	-24.03764*	-27.28956*	-25.64835*	I(1)
LogCPI	-9.516234*	-9.498259*	-8.485287*	I(1)

1. PP is the Phillips-Perron test.

2. Asterisk (*) indicates rejection of the null hypothesis of non-stationarity at the 5% level.

3. The optimum bandwidth for the (PP) test is automatically determined based on the Newey-West by Bartlett Kernel methods

4. Values based on MacKinnon (1996) one-sided p-values.

4.4 Cointegration Test

The second step after the unit root test for establishing the presence of a long-run relationship among the variables is to determine the optimal lag length for the VAR model to verify that the estimated residuals are not autocorrelated. Lag-length misspecification for the VAR model often generates autocorrelated errors (Lutkepohl, 2005).

After concluding that each of the series is stationary, this study proceeded to examine whether there exists a long-run equilibrium between the FTSE/BM Top 100 Index and the macroeconomic variables selected. Table 4.7 provides the Johansen-Juselius cointegration test results based on trace test and Table 4.8 provides the Johansen-Juselius cointegration test results based on maximum eigenvalue Test. This sets the lag order of first differenced right-hand-side variables to 4, using the Akaike Information Criterion (AIC), which this study finds sufficient to render the error term serially uncorrelated in conducting the test. Furthermore, following Reinsel and Ahn (1992), this study adjusted the trace and maximal eigenvalue statistics by a factor (T-np)/T, where T is the effective number of observations, n is the number of variables, and p is the lag order. This is to correct bias towards finding evidence for cointegration in finite or small samples. As may be noted from the table, both the maximum eigenvalue and the trace statistics suggests the presence of a unique cointegrating vector at the 5% significant level for the period under study.

Table 4.7

Results of the Johansen Cointegration based on Trace Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	**0.284797**	**145.8631**	**125.6154**	**0.0016**
At most 1	0.191997	94.57907	95.75366	0.0601
At most 2	0.171407	61.96104	69.81889	0.1801
At most 3	0.087129	33.19301	47.85613	0.5462
At most 4	0.075458	19.24546	29.79707	0.4754
At most 5	0.040557	7.241648	15.49471	0.5497
At most 6	0.005911	0.907024	3.841466	0.3409

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

The lag order specified for test is 4, which was found sufficient to render the error term serially uncorrelated. The 5% critical values are based on Osterwald-Lenum (1992)

Table 4.8

Results of the Johansen Cointegration based on Maximum Eigenvalue Test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	**0.284797**	**51.28399**	**46.23142**	**0.0133**
At most 1	0.191997	32.61803	40.07757	0.2703
At most 2	0.171407	28.76803	33.87687	0.1803
At most 3	0.087129	13.94754	27.58434	0.8262
At most 4	0.075458	12.00382	21.13162	0.5473
At most 5	0.040557	6.334624	14.26460	0.5707
At most 6	0.005911	0.907024	3.841466	0.3409

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

The lag order specified for test is 4, which was found sufficient to render the error term serially uncorrelated. The 5% critical values are based on Osterwald-Lenum (1992)

The presence of a cointegration equation provides indication that the variables are tied together in the long-run, and any deviations from the long-run equilibrium path will be corrected. The presence of cointegration also implies the presence of causality relationships between the variables, whereby there must be at least a unidirectional causality from one variable to the others. With this evidence, the study of financial, external and real output indicators (M1, IR, ER, OP, IP and CPI) on KLCI is further extended into the causality test. The results of exist long-run relationship between KLCI and the underlying macroeconomic variables in the Malaysia economy is consistent with the empirical studies including Gan et al.

(2006), Gunasekarage et al. (2004), Hasan and Javed (2009), Humpe and Ibrahim (1999); Macmillan (2009), Maysami et al. (2004), Mukherjee and Naka (1995) and Patra et al. (2006); but contradicts the results of Muradoglu and Argac (2001) for the Turkish stock market, and Keung et al. (2006) for the U.S. stock market.

Based on Johansen and Juselius Cointegration test, the first normalized cointegrated vector towards KLCI variable using lag period proposed by AIC indicate long-run relationship between macroeconomic and expected price of FTSEBM Top 100 Index. The results of the cointegration relationship can be summarized in Table 4.7 and 4.8. Thus, the cointegration relationship can be expressed as below in equation 1.1 which base on the Table 4.9.

Table 4.9
Cointegration Relationship

Dependent Variable (KLCI)	Independent Variable					
	LogM1	IR	LogER	LogOP	LogIP	LogCPI
Coefficient	- 0.9830*	- 0.3693	- 2.5652*	0.0456*	2.6384*	4.0729*
t Value	- 0.45689	- 0.20582	-0.67729	0.15722	0.55603	1.91499
C	7.0925					
Denote significance at 1% level						

$$LogKLCI = 7.0925 - 0.9830\ LogM1 - 0.3693\ IR - 2.5652\ LogER + 0.0456\ LogOP + 2.6384\ LogIP + 4.0729\ LogCPI + \varepsilon_t \quad (4.1)$$

The relationship between financial indicators (M1, IR) and KLCI in long-run:

The previous researchers like Mukherjee and Naka (1995), Maysami and Koh (2000) Maysami et.al (2004), and Ratanapakorn and Sharma, (2007), documented a positive relationship based on the money supply expansionary effect and this phenomenon would increase the actual economic activities and affect the share price through the profit gained by the corporate firms and in turn will increase the future cash flow and share prices. A striking finding in current study points towards a negative relationship which is significant between the KLCI and the M1, the findings which reported a negative relationship are in line with the findings stated by previous researchers like Fama (1981) in the United States context, Ibrahim and yusoff (2001) and Ibrahim and Aziz (2003) for Malaysia context. This negative type relationship is based on the direct relationship as regards to excessive money supply in the market which would cause inflation problems as well as affecting the increase of discount rate and later on, causing a fall in share prices. (Gan et al, 2006).

According to the Stock Valuation Model and Monetary Portfolio Hypothesis, the increase in money supply leads to a reduction in interest rate, which in turn will increase the stock prices. Nevertheless, based on several studies such as Mukhrejeee and Naka, (1995) and Dasgupta and Sensarma, (2002), money supply has an immediate positive response on stock prices, but that effect is dissolved and the long-run association becomes negative. This can be caused by the inflationary expectations that future real dividends will be lower, hence decreases the attractiveness of stocks, and stock prices in turn will fall. Nevertheless, the positive

coefficient for CPI annuls this justification (Ratanapakorn & Sharma, 2007). Therefore, the negative relationship between M1 and KLCI must be explained using a different framework, which probably an increase in money supply resulted in inflation uncertainty, leading to depreciation expectation and anticipation of future contractions (Ibrahim & Yusoff, 2001).

The cointegration test indicates that interest rate is insignificant in determining the KLCI although the sign of the coefficient IR are negative. The basis for this type of relationship refers to the rise in interest rates which would cause the share prices to decline via the decrease in future corporate profit due to the increasing borrowing and production costs. This result between the two variables is as expected whereby the finding is in line with the findings of Chen et.al (1986) regarding the stock market in the United States, Maysami and Koh (2000) for the stock market in Singapore, Wongbangpo and Sharma (2002) for the stock market in the Phillipines', Singapore and Thailand and Yusof (2003) for the stock market in Malaysia, Hammoudeh and Choi (2006) for the GCC markets, Gan et al. (2006), Gjerde and Saettem (1999), Gunasekarage et al. (2004), Hondroyiannis and Papapetrou (2001), Ratanapakorn and Sharma (2007), Sadorsky (1999), Humpe and Macmillan (2009) for the U.S. stock market. However, the long-run relationship between the IR and KLCI is not significant.

The current study answered the first question is there any potential linkage in the long-run between the financial indicators (money supply, interest rate) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the results found the long-

run relationship between the significant negative M1 and insignificant negative IR with KLCI.

The relationship between international indicators (ER, OP) and KLCI in long-run:

As for exchange rate, the study showed that the ER and KLCI share a long-run relationship which is negative and significant. That indicates the opposite, meaning that currency appreciation leads to a decrease in stock prices. In fact, the currency effect may have a positive or negative association with stock prices depending on the nature of the economy. For net-exporting economies, currency depreciation leads to an increase in net exports as domestic products become cheaper in the world market. Hence, the increase in firms' profitability will be reflected in the value of the stocks. However, for economies that depend heavily on imports, currency depreciation may lead to higher import prices, causing a fall in firms' profit and in turn the price of stocks. The net effect of currency depreciation will depend on which of these factors is more dominant. In addition, currency depreciation may also create expectations in future increase in the exchange rate, which consequently leads to a fall in the investment flows to the country (Ibrahim and Yusoff 2001). The results show that negative net effects are more dominant, hence creating downward pressure on stock prices.

The basis for the long-run negative relationship between the two variables can be attributed to the negative value of the ER coefficient. Ibrahim and Wan (2001) stated that this negative relationship could be caused by a few factors, firstly, the status of the nation which depends on export value (international trade). The declining value of the currency would encourage more exports. However, the declining currency

value would the production costs due to the increase in domestic prices as regards to capital goods and imported mediators. This would in turn decrease the profit margin for that particular firm and the firm's share prices would decrease. Secondly, this negative relationship can also be seen from the investors' point of view as regards to the currency value of a particular country (Ibrahim and Aziz, 2003), if there is a decrease in currency value, the common presumption is that the country is in the throes of economic recession. This would probably lead investors to withdraw their capital out of the country and affect the firm's profits due to the loss of capit al from foreign investors. This in turn would decrease the returns and share prices. These findings indeed support the findings of studies conducted by Kwon and Shin (1999) for the South Korean stock market, Maysami and Koh (2000) for the stock market in Singapore, Wongbangpo and Sharma (2002) for the stock market in Thailand and Singapore, and Ibrahim and Yusoff (2001) and Ibrahim and Aziz (2003) for the Malaysian stock market, while a study by Yusoff (2003) on Malaysian stock market finds that positive net effects are more dominant.

Based on the results obtained, the analyses have documented a positive long-run relationship between oil price and KLCI. The oil price coefficients appear to be significant. The positive relationship between OP and KLCI is consistent with the hypothesis that considers Malaysia as an oil-exporting country; where an increase in oil prices implies an increase in country's oil revenue and income. This hypothesis supported when the Bank Negara Malaysia mention that the rise in oil prices contributed significantly to the increase in Malaysian government revenue. The oil revenue increased from RM13.6 billion in 2000 to RM51.2 billion in 2007. In tandem with the sharp increase in oil prices in 2008, the oil revenue amounted to

RM63.7 billion in 2008 to account for 39.9% of the overall government revenue. This higher oil-based revenue has, over the years, allowed the government to undertake development spending on infrastructure, education and healthcare, thus contributing further to enhancing the country's long-run productive capacity. However, the large contribution of oil revenues has also increased sensitivity of fiscal revenue to movements in oil prices (Bank Negara Malaysia Report, 2009).

This finding also appears to be consistent with results of the Park and Ratti (2008), who claimed that the event of oil price shocks had adversely affected the growth rates and trade balances of the Asian economies, except oil-exporting countries; like Indonesia, Malaysia, and Brunei, Gjerde and Saettem (1999) for the stock market in Norway, which is strongly dependent on oil, similar to the Malaysian economy. In contrast, Hondroyiannis and Papapetrou (2001), and Sadorsky (1999) found that a positive the price of oil shock depresses real stock market returns in Greece and the U.S., which are both net oil importing countries. According to the Cunado and Garcia (2005) the mixed results support the notion that oil price shocks have a different impact on stock prices depending on whether the economy is a net importer or net exporter of oil, the institutional structure of the economy within these groups, and the stage of economic development of the country.

The current study answered the second question is there any potential linkage in the long-run between the external indicators (exchange rate, oil price) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the results indicate that

exchange rate and oil price are significant in determining the KLCI although the sign of the coefficient for ER and OP are negative and positive respectively.

The relationship between real output indicators (IP, CPI) and KLCI in long-run:

The result shows a significant positive long-run relationship between industrial production and KLCI. This is in line with the share analysis theory based on the discounted cash flow model which states that IP shares a positive correlation with particular firm's expected future cash flow, which mean that the higher the IP, the higher the expected share price. This finding is consistent with past studies done by Fama (1990) ,Chen et al (1986) for the United States, Mukherjee and Naka (1995) for Japan, Kwon and Shin (1999) for South Korea, Maysami and Koh (2000) and Maysami et.al (2004) for Singapore, Wongbangpo and Sharma (2002), Ibrahim (2003) and Rahman et al. (2009) for Malaysia. The positive relationship indicates that increase in industrial production index increase the corporate earning which enhances the present value of the firm and hence the stock prices increase. It may also increase the national disposable income and therefore more retail investment in the stock market.

From the long-run equation of the period under study, there seems to be a positive relationship between inflation rate and the stock prices and this is a significant relationship. This result seems to be consistent with Ibrahim and Yusoff (2001), Ibrahim and Aziz (2003) and Islam (2003) for the case of Malaysia, Abd.Majid et al. (2001) for Malaysia and Indonesia context, and Ratanapakorn and Sharma, (2007) for the U.S. stock market, these findings supports the view that stock prices in

Malaysia are a good hedge against inflation. In contrary, Fama (1981) explained the negative relationship between inflation and stock price, that higher inflation raises the production cost which adversely affects the profitability and the level of real economic activity; since the real activity is positively associated with stock price, an increase in inflation reduces the stock price.

The current study answered the third question is there any potential linkage in the long-run between the real output indicators (industrial production, inflation) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the cointegration results reveal that stock price are positively and significantly related to the level of real output indicators as proxy by the index of industrial production and consumer price index.

Empirical results obtained have various implications on the issues of Malaysian stock market efficiency, monetary transmission mechanisms, and temporal stability of dynamic linkages between macroeconomic variables and stock prices. The presence of cointegration between stock prices and macroeconomic variables indicate long-run predictability of the Malaysian stock prices. In other words, at least in the long run, movements in the Malaysian stock market are tied to its economic fundamentals. This study can reject the null hypothesis of no cointegration between the macroeconomic variables and the FTSE/BM Top 100 Index from the results of Johanson cointegration test which shown in Table 4.7 and Table 4.8.

After supporting the existence of a long-run relationship among these variables in the model, the short-run error correction estimates are illustrated in Table 4.10. Bannerjee et al. (1998) holds that a significant error correction term is further proof of the existence of a stable long-run relationship; also the expected negative sign of the error correction model is significant in the model. This confirms once again the existence of the cointegration relationship among the variables of this model. The estimated coefficient for error correction is 21.6%, and is found significant at the 5% significance level, suggesting that the last period (month) disequilibrium in stock prices is corrected in the next month only by 21.6%. The value seems to adjust slowly towards the long-run equilibrium. This implies that any shock that forces stock prices from their long-run value will take a long time for prices to return to its equilibrium, unless there are other shocks that counter the initial one. This result is in line with the empirical evidence for Ibrahim (1999), Mohamed et al. (2009) and Rahman et al. (2009) for the Malaysian stock market.

The error correction model term passes the examination of the 5% critical level, and the sign of the variable is the same as in the long-run equilibrium correlation. The coefficient of error correction model is negative, which agreed with the reverse correlation mechanism. The error correction model reflects the regular pattern of short-run fluctuations of variables. In the short-run, macroeconomic variables' departure from the long-run equilibrium with the FTSE/BM Top 100 Index; at last, it can go back to this equilibrium through an adjustment.

In addition, the robustness of the model has been confirmed by diagnostic tests for normality, serial correlation, heteroskedasticity and structural stability of the model, which generally passed all diagnostic tests. Table 4.11 shows that there is no evidence of autocorrelation in the disturbance of the error term. The models pass the Jarque-Bera normality test, suggesting that the errors are normally distributed as shown in Figure 4.9.

Table 4.10
Error Correction Model of KLCI

Parameter estimate	-0.216439
Standard Error	-4.39863
T-Statistics	0.05692**
** represent 5% significant levels.	

In the diagnostic tests, Figure 4.9 shows that cannot reject the null hypothesis of normal distribution because Jarque-Bera is 3.112316 with non-significant p-value of 0.210945; also cannot reject the null hypothesis that there is no serial correlation in the residuals, based on the Chi-Square being 0.901380 with a non-significant p-value of 0.906702 in the Breusch-Godfrey Serial Correlation LM Test as shown in Table 4.12, which is in line with results shown in Table 4.11; also, the White Heteroskedasticity test suggests the errors are homoskedastic in Table 4.13, which means this study cannot reject the null hypothesis of homoscedasticity of residual based on the non-significant p-value of 0.297531, with a Chi square of 0.292181, and this is confirmed by the ARCH test in Table 4.14. The Ramsey RESET test is a general test for the following types of specification errors, such as omitted variables;

X does not include all relevant variables, incorrect functional form; some or all of the variables in Y and X should be transformed to logs, powers, reciprocals, or in some other way the correlation between X and ε, which may be caused by measurement errors in X, simultaneous equation considerations, combination of lagged Y values and serially correlated disturbances. The results of this test are shown in Table 4.15, with a non-significant Chi-Square value of 0.594538.

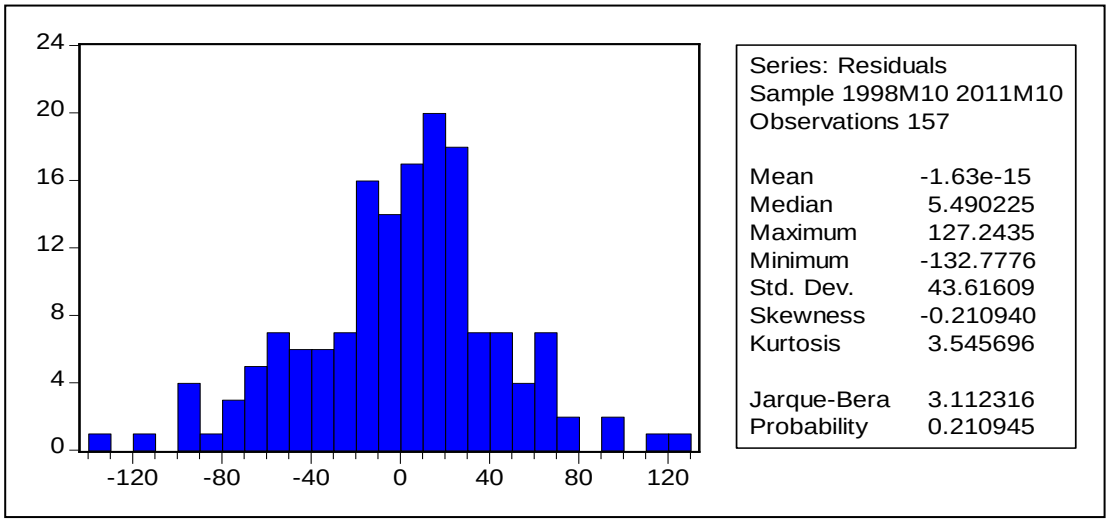

Figure 4.9
Normality (Jarque-Bera) for Series Residuals

Table 4.11
Serial Correlation

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	0.030	0.030	0.1397	0.709
.|. |	.|. |	2	0.020	0.019	0.2056	0.902
.|. |	.|. |	3	-0.018	-0.019	0.2572	0.968
*|. |	*|. |	4	-0.099	-0.099	1.8720	0.759
.|. |	.|* |	5	0.062	0.069	2.5040	0.776
.|. |	.|. |	6	0.036	0.037	2.7228	0.843

Table 4.11 (Continued)

.|.	|	.|.	|	8	0.012	0.002	2.7661	0.948
.|*	|	.|*	|	9	0.092	0.107	4.1896	0.898
*|.	|	*|.	|	10	-0.067	-0.073	4.9560	0.894
*|.	|	*|.	|	11	-0.063	-0.069	5.6408	0.896
.|.	|	.|.	|	12	-0.049	-0.039	6.0467	0.914

Table 4.12
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.098006	Prob. F(2,148)	0.906702
Obs*R-squared	0.207657	Prob. Chi-Square(2)	0.901380

Table 4.13
White Heteroskedasticity Test

F-statistic	1.187259	Prob. F(12,144)	0.297531
Obs*R-squared	14.13483	Prob. Chi-Square(12)	0.292181

Table 4.14
ARCH Test

F-statistic	0.654808	Prob. F(2,152)	0.521001
Obs*R-squared	1.324055	Prob. Chi-Square(2)	0.515804

Table 4.15
Ramsey RESET Test

F-statistic	0.491790	Prob. F(2,148)	0.612526
Log likelihood ratio	1.039941	Prob. Chi-Square(2)	0.594538

4.5 Causality Test

The documented cointegration results in the analyses only suggest the presence of a long-run association between variables and imply a causality relationship. However, it does not reveal the directions of causation among them. Thus, in order to differentiate the causal nexus between the concerned variables, the Granger causality test is performed. The Granger causality test in vector error correction form allows the examination of the dynamic causal interaction amongst the intended variables. The short-run causality is based on the F-statistics of lagged first-differenced terms, whilst the long-run term error correction term is based on the t-test. Significant error correction term in Table 4.10 reinforces the presence of cointegration in the long-run and variables adjust towards long-run equilibrium, therefore the Granger causality test is carried out to find the causal direction between M1, IR, ER, OP, IP, CPI and KLCI.

After estimating the long-run equilibrium for the macroeconomic variables and stock prices, this study intends to investigate the relationship short-run between these variables. This section presents the results of the pairwise Granger causality with a uniform lag of 2 for the period under study, which is sufficient to whiten the noise process.

From Table 4.16, some general findings can be concluded; the money supply does Granger-caused the KLCI, but the KLCI does not Granger-caused any movement in the money supply. Therefore, there is unidirectional causality from money supply to KLCI, which means the money supply leads stock prices, but not the other way

around. The results that found that money supply leads stock prices is in line with earlier studies conducted on the Malaysian equity market by Ibrahim and Yusoff (2001), Wongbangpo and Sharma, (2002) and Yusoff (2003). The interest rate does not Granger-caused the KLCI, and the KLCI also does not Granger-caused any movement in the interest rate, which is consistent with the earlier studies (Ali et al. 2010).

For the period under study, can see that the exchange rate does not Granger-cause stock prices, but a stock price does Granger-cause the exchange rate. However, based on these findings, this study can conclude that for the period under study, the exchange rate cannot lead stock prices, but is unidirectional from stock price to exchange rate (Wongbangpo & Sharma, 2002).

The results also reveal that the oil price movement does Granger-caused the KLCI, but the KLCI does not Granger-caused any movement in the oil prices. Therefore, it can be said that there is unidirectional causality from oil prices to KLCI in the Main Board of Bursa Malaysia.

The finding shows that the industrial production change does not Granger-cause the KLCI, but the KLCI does Granger-cause movement in the industrial production change. Therefore, it can be said that there is unidirectional causality from KLCI change to industrial production. It seems to be that only the consumer price index affects stock prices with bidirectional causality between both variables. However, based on these findings, this study can conclude that for the period under study, the consumer price index leads stock prices, and *vice versa*.

The variables, such as M1, OP, and CPI, were found to reject the null hypothesis that the variable does not Granger-cause the KLCI. For M1, the null hypothesis that M1 does not Granger-cause of KLCI can be rejected by 5%, and the OP and CPI are rejected by 10%, however, this study rejects the null hypothesis for the relationship between CPI with KLCI, and *vice versa*, at 10%. Meanwhile, ER doesn't have short-run interaction with the KLCI, therefore the null hypothesis that ER does not Granger-cause KLCI cannot be rejected, and can be rejected that KLCI does not Granger-cause ER at 5%. In conclusion, the results show that M1, OP, and CPI tend to have an impact on the KLCI in the short-run; also, the information that CPI and KLCI tend to influence each other in the short-run as well. The past information about IR found to have no influence on the KLCI in the short-run and *vice versa*, it is shown that this study failed to reject both null hypotheses for the IR and KLCI.

Based on the p-values in Table 4.16 indicates that the Malaysian stock market is a leading indicator for three macroeconomic variables (ER, IP and CPI). On the other hand, the Malaysia stock market is not a leading indicator for the other macroeconomic variables in the system, i.e., M1, IR and OP. In the literature, there is no consensus about how real economic activity reacts to stock market shocks. These findings are in line, one way or another, with Ratanapakorn and Sharma (2007) for the U.S. stock market, Patra et al. (2006) for U.S., and Gan et al. (2006) in New Zealand, Gjerde and Saettem (1999) in Norway, Gunasekarage et al. (2004) in Sri Lanka, Lim et al. (2009) for China, Bashir et al. (2011) for Pakistan, which found empirical evidence that the stock market is not a leading indicator of real economic activities.

Table 4.16
Pairwise Granger Causality Tests

Null Hypothesis:	F-Statistic	Probability	Null Hypothesis
M1 does not Granger-Cause KLCI	2.16651	0.04092**	Support
KLCI does not Granger-Cause M1	1.51701	0.16647	Not Support
IR does not Granger-Cause KLCI	1.25421	0.27781	Not Support
KLCI does not Granger-Cause IR	1.05921	0.39329	Not Support
ER does not Granger-Cause KLCI	0.45221	0.86725	Not Support
KLCI does Granger-Cause ER	2.13403	0.04404**	Support
OP does not Granger-Cause KLCI	1.84660	0.08324***	Support
KLCI does not Granger-Cause OP	4.96120	5.13105	Not Support
IP does not Granger-Cause KLCI	0.85982	0.54014	Not Support
KLCI does not Granger-Cause IP	2.59963	0.01506***	Support
CPI does not Granger-Cause KLCI	3.92824	0.00062***	Support
KLCI does not Granger-Cause CPI	3.60871	0.00135***	Support

(*)(**) (***) indicates significance at 1%, 5%, and 10%, respectively.

The conclusion from this result is that the Malaysian stock market is inefficient stock market with respect to M1, OP, and the CPI, since market prices can be predicted using available information about these three variables in the short-run during this time period. These results are to some extent consistent with the empirical evidence revealed by the studies of Ahmed (2008), Hasan and Javed (2009), Ibrahim (1999), and Keung et al. (2006). Additionally, KLCI was found to have an influence on EX, IP and CPI, which implied a short-run relationship between the macroeconomic variables and the Malaysian stock market.

The macroeconomic variables like IR, ER and IP appear to not have a significant relationship with the Malaysian stock market prices in the short-run. In other words, all information available on changes of IR, ER and IP is already incorporated in the Malaysian stock market prices. This result may be seen as empirical evidence that this market meets the efficient-market hypothesis with respect to this macroeconomic variable in the short-run. Also, the findings indicate that the past values of macroeconomic variables such as M1, OP, and CPI in the Malaysian context are able to predict the past changes in the KLCI/BM Top 100 Index, which shows the Malaysian stock market inefficient, that's mean in overall the market was found not to be an efficient market, and this result is in line with past studies done by Ibrahim (1999), Ibrahim and Aziz (2003), Habibullah and Baharumshah (1996) in the Malaysian context. Therefore, this study answered the last question is that Malaysian stock market partially an efficient but overall it is inefficient.

4.6 Summary

After the descriptive statistics of the time series of FTSE/BM Top 100 Index and the macroeconomic variables of money supply, interest rate, exchange rate, oil price, industrial production and consumer price index in, this chapter presents the results of the empirical analysis. In the first step, determined the order of integration of these variables using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test, which indicated that all the time series were non -stationary at level form, but stationary at the first difference form, Furthermore, in this stage this study can find whether the same order exists between the variables.

After the unit root test the study found a long-run equilibrium relationship between the variables by applying the Johanson cointegration test technique, which was proposed by Johanson and Juselius in 1990. The existence of cointegration between the variables indicates that the long-run stable relation is kept by the short-run dynamic adjustment of variables. Then the error correction model was built up, and shows the error correction coefficients, which determined the speed of adjustment, or to bring the short-run fluctuations and the long-run equilibrium together. The results indicated that deviations from the long-run in the FTSE/BM Top 100 Index were corrected by approximately 0.216% over the following months. Finally, the results show the outcomes of both unidirectional and bidirectional Granger causality from money supply, interest rate, exchange rate, oil price, industrial production, and consumer price index to the FTSE/BM Top 100 Index.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The objective of this study was to test the potential linkage between the financial indicators (money supply, interest rate), external indicators (exchange rate, oil price) and the real output indicators (industrial production and consumer price index) and the FTSE Bursa Malaysia Top 100 Index as proxy of the Malaysian stock market, as one of nine advanced emerging countries (see Appendix D). In particular, this study examined the long-run and short-run dynamic relationships between the FTSE/BM Top 100 Index and the six macroeconomic variables over the period from September 1998 to October 2011.

This study was based on the Arbitrage Pricing Theory (APA), which was proposed by Ross (1976), and the Economic Theory to determine the appropriate required rate of an asset return. The APT, as an alternative to the CAPM, is one of two influential theories on asset pricing and differs with the CAPM by being less restrictive in its assumptions and allowing for an explanatory (as opposed to statistical) model for asset returns, therefore, the APT implies a relationship between the stock market and economic activity.

5.2 Conclusions and Implications

This study was attempted to serve as a primer in exploring the relationship between stock market prices and macroeconomic variables for advanced emerging financial markets. The research into these relationships has been limited when it comes to the Malaysian context, collectively known as the Malaysia, even though foreign investment flowing into this country has expanded within the last decade, especially after the ASEAN financial crisis in July 1997. Using stock market prices FTSE/BM Top 100 Index and the respective macroeconomic variables of money supply, interest rate, exchange rate, oil price, industrial production and consumer price index, the goal of this study was to determine the reaction of stock market prices to shocks emanating from their economies. In general, the hypothesized relationships between stock market prices and each macroeconomic variable did hold. The existence of differences between the hypothesized and observed relationships between stock market prices and macroeconomic variables was due to the unique economic situation of this country in terms of the Malaysian economy becoming one of the faster emerging countries, growing more than 4.6% on average in the last three years, with GDP growth forecast at 5% in 2012 (Malaysian Economic Outlook, 2011).

Although the linkages between the macroeconomic variables and the movement of the stock prices have been well- researched in the developed countries, there are still avenues for research in this area for emerging economies. As in the case of Malaysia, further research could be conducted to examine the relationship between the

macroeconomic variables and the various sectors in the stock market. This study intends to be a primer into further research of relationships between stock market prices and other domestic and international factors to Malaysia, and for the emerging financial markets to enhance investor portfolio understanding and evaluation in terms of the sensitivity of stock market prices to the effect of the financial indicators of money supply and interest rate, external indicators such as exchange rate and oil prices, with the industrial production index and the consumer price index as the proxy of the real output factors.

The current study used unit root test by ADF and PP test, the Johansen cointegration test proposed by Johansen and Juselius (1990), and error correction model and Granger causality tests were used to examine the long-run and short-run relationships between the macroeconomic variables and the Malaysian stock market.

For the long-run analysis, the presence of the Johansen cointegration equation provides an indication that the variables are tied together in the long-run and any deviations from the long-run equilibrium path would be corrected. The presence of cointegration also implies the presence of causality relationships between the variables, whereby there must be at least a unidirectional causality from one variable to another. Normalizing the cointegrating vector on the Malaysian stock market index suggested the following results.

The findings indicate that these variables share a long-run relationship in the period under study, indicating that deviations in the short-run stock prices will be adjusted towards the long-run value. However, from the value of the error correction model (21.6%), it can be said that this adjustment is slow unless there are other shocks that occur at the same time and counter the initial shock. This result signals the importance of these variables as government targets to emphasize policy effects on the stock market.

The previous researchers like Mukherjee and Naka (1995), Maysami and Koh (2000) Maysami et.al (2004), and Ratanapakorn and Sharma, (2007), documented a positive relationship based on the money supply expansionary effect and this phenomenon would increase the actual economic activities and affect the share price through the profit gained by the corporate firms and in turn will increase the future cash flow and share prices. A striking finding in current study points towards a negative relationship which is significant between the KLCI and the M1, the findings which reported a negative relationship are in line with the findings stated by previous researchers like Fama (1981) in the United States context, Ibrahim and yusoff (2001) and Ibrahim and Aziz (2003) for Malaysia context. This negative type relationship is based on the direct relationship as regards to excessive money supply in the market which would cause inflation problems as well as affecting the increase of discount rate and later on, causing a fall in share prices. (Gan et al, 2006).

According to the Stock Valuation Model and Monetary Portfolio Hypothesis, the increase in money supply leads to a reduction in interest rate, which in turn will increase the stock prices. Nevertheless, based on several studies such as Mukhrejeee and Naka, (1995) and Dasgupta and Sensarma, (2002), money supply has an immediate positive response on stock prices, but that effect is dissolved and the long-run association becomes negative. This can be caused by the inflationary expectations that future real dividends will be lower, hence decreases the attractiveness of stocks, and stock prices in turn will fall. Nevertheless, the positive coefficient for CPI annuls this justification (Ratanapakorn & Sharma, 2007). Therefore, the negative relationship between M1 and KLCI must be explained using a different framework, which probably an increase in money supply resulted in inflation uncertainty, leading to depreciation expectation and anticipation of future contractions (Ibrahim & Yusoff, 2001).

The cointegration test indicates that interest rate is insignificant in determining the KLCI although the sign of the coefficient IR are negative. The basis for this type of relationship refers to the rise in interest rates which would cause the share prices to decline via the decrease in future corporate profit due to the increasing borrowing and production costs. This result between the two variables is as expected whereby the finding is in line with the findings of Chen et.al (1986) regarding the stock market in the United States, Maysami and Koh (2000) for the stock market in Singapore, Wongbangpo and Sharma (2002) for the stock market in the Phillipines', Singapore and Thailand and Yusof (2003) for the stock market in Malaysia, Hammoudeh and Choi (2006) for the GCC markets, Gan et al. (2006), Gjerde and Saettem (1999), Gunasekarage et al. (2004), Hondroyiannis and Papapetrou (2001),

Ratanapakorn and Sharma (2007), Sadorsky (1999), Humpe and Macmillan (2009) for the U.S. stock market. However, the long-run relationship between the IR and KLCI is not significant.

The current study answered the first question is there any potential linkage in the long-run between the financial indicators (money supply, interest rate) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the results found the long-run relationship between the significant negative M1 and insignificant negative IR with KLCI.

As for exchange rate, the study showed that the ER and KLCI share a long-run relationship which is negative and significant. That indicates the opposite, meaning that currency appreciation leads to a decrease in stock prices. In fact, the currency effect may have a positive or negative association with stock prices depending on the nature of the economy. For net-exporting economies, currency depreciation leads to an increase in net exports as domestic products become cheaper in the world market. Hence, the increase in firms' profitability will be reflected in the value of the stocks. However, for economies that depend heavily on imports, currency depreciation may lead to higher import prices, causing a fall in firms' profit and in turn the price of stocks. The net effect of currency depreciation will depend on which of these factors is more dominant. In addition, currency depreciation may also create expectations in future increase in the exchange rate, which consequently leads to a fall in the investment flows to the country (Ibrahim and Yusoff 2001). The results show that

negative net effects are more dominant, hence creating downward pressure on stock prices.

The basis for the long-run negative relationship between the two variables can be attributed to the negative value of the ER coefficient. Ibrahim and Wan (2001) stated that this negative relationship could be caused by a few factors, firstly, the status of the nation which depends on export value (international trade). The declining value of the currency would encourage more exports. However, the declining currency value would the production costs due to the increase in domestic prices as regards to capital goods and imported mediators. This would in turn decrease the profit margin for that particular firm and the firm's share prices would decrease. Secondly, this negative relationship can also be seen from the investors' point of view as regards to the currency value of a particular country (Ibrahim and Aziz, 2003), if there is a decrease in currency value, the common presumption is that the country is in the throes of economic recession. This would probably lead investors to withdraw their capital out of the country and affect the firm's profits due to the loss of capit al from foreign investors. This in turn would decrease the returns and share prices. These findings indeed support the findings of studies conducted by Kwon and Shin (1999) for the South Korean stock market, Maysami and Koh (2000) for the stock market in Singapore, Wongbangpo and Sharma (2002) for the stock market in Thailand and Singapore, and Ibrahim and Yusoff (2001) and Ibrahim and Aziz (2003) for the Malaysian stock market, while a study by Yusoff (2003) on Malaysian stock market finds that positive net effects are more dominant.

Based on the results obtained, the analyses have documented a positive long-run relationship between oil price and KLCI. The oil price coefficients appear to be significant. The positive relationship between OP and KLCI is consistent with the hypothesis that considers Malaysia as an oil-exporting country; where an increase in oil prices implies an increase in country's oil revenue and income. This hypothesis supported when the Bank Negara Malaysia mention that the rise in oil prices contributed significantly to the increase in Malaysian government revenue. The oil revenue increased from RM13.6 billion in 2000 to RM51.2 billion in 2007. In tandem with the sharp increase in oil prices in 2008, the oil revenue amounted to RM63.7 billion in 2008 to account for 39.9% of the overall government revenue. This higher oil-based revenue has, over the years, allowed the government to undertake development spending on infrastructure, education and healthcare, thus contributing further to enhancing the country's long-run productive capacity. However, the large contribution of oil revenues has also increased sensitivity of fiscal revenue to movements in oil prices (Bank Negara Malaysia Report, 2009).

This finding also appears to be consistent with results of the Park and Ratti (2008), who claimed that the event of oil price shocks had adversely affected the growth rates and trade balances of the Asian economies, except oil-exporting countries; like Indonesia, Malaysia, and Brunei, Gjerde and Saettem (1999) for the stock market in Norway, which is strongly dependent on oil, similar to the Malaysian economy. In contrast, Hondroyiannis and Papapetrou (2001), and Sadorsky (1999) found that a positive the price of oil shock depresses real stock market returns in Greece and the U.S., which are both net oil importing countries. According to the Cunado and Garcia (2005) the mixed results support the notion that oil price shocks have a

different impact on stock prices depending on whether the economy is a net importer or net exporter of oil, the institutional structure of the economy within these groups, and the stage of economic development of the country.

The current study answered the second question is there any potential linkage in the long-run between the external indicators (exchange rate, oil price) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the results indicate that exchange rate and oil price are significant in determining the KLCI although the sign of the coefficient for ER and OP are negative and positive respectively.

The result shows a significant positive long-run relationship between industrial production and KLCI. This is in line with the share analysis theory based on the discounted cash flow model which states that IP shares a positive correlation with particular firm's expected future cash flow, which mean that the higher the IP, the higher the expected share price. This finding is consistent with past studies done by Fama (1990) ,Chen et al (1986) for the United States, Mukherjee and Naka (1995) for Japan, Kwon and Shin (1999) for South Korea, Maysami and Koh (2000) and Maysami et.al (2004) for Singapore, Wongbangpo and Sharma (2002), Ibrahim (2003) and Rahman et al. (2009) for Malaysia. The positive relationship indicates that increase in industrial production index increase the corporate earning which enhances the present value of the firm and hence the stock prices increase. It may also increase the national disposable income and therefore more retail investment in the stock market.

From the long-run equation of the period under study, there seems to be a positive relationship between inflation rate and the stock prices and this is a significant relationship. This result seems to be consistent with Ibrahim and Yusoff (2001), Ibrahim and Aziz (2003) and Islam (2003) for the case of Malaysia, Abd.Majid et al. (2001) for Malaysia and Indonesia context, and Ratanapakorn and Sharma, (2007) for the U.S. stock market, these findings supports the view that stock prices in Malaysia are a good hedge against inflation. In contrary, Fama (1981) explained the negative relationship between inflation and stock price, that higher inflation raises the production cost which adversely affects the profitability and the level of real economic activity; since the real activity is positively associated with stock price, an increase in inflation reduces the stock price.

The current study answered the third question is there any potential linkage in the long-run between the real output indicators (industrial production, inflation) and the FTSE Bursa Malaysia Top 100 Index from September 1998 until October 2011 through testing the first hypothesis by Johansen cointegration test, the cointegration results reveal that stock price are positively and significantly related to the level of real output indicators as proxy by the index of industrial production and consumer price index.

Empirical results obtained bear various implications on the issues of Malaysian stock market efficiency, monetary transmission mechanisms, and temporal stability of dynamic linkages between macroeconomic variables and stock prices. The presence of cointegration between stock prices and macroeconomic variables indicate long-run

predictability of the Malaysian stock prices. In other words, at least in the long-run, movements in the Malaysian stock market are tied to its economic fundamentals. Moreover, the dynamic responses of the stock prices to changes in the macroeconomic variables, especially its lagged responses to real economic activity, spell inefficiency in the Malaysian stock market. The inefficiency of the market seems to persist over time. Accordingly, investors may gain by exploiting information contained in any macroeconomic variables for investment decisions.

Granger causality tests and error correction model were used for the short-run analysis; this method was used to ascertain the causal relationships among the cointegrated variables, i.e., FTSE/BM Top 100 Index, money supply, interest rate, exchange rate, oil price, industrial production, and consumer price index.

Some general findings can be concluded; the money supply does Granger-cause the stock prices, but the stock prices do not Granger-cause any movement in the money supply. Therefore, there is unidirectional causality from money supply to stock prices, which means the money supply leads stock prices, but not the other way around. The results that found that money supply leads stock prices is in line with earlier studies conducted on the Malaysian equity market by Ibrahim and Yusoff (2001), Wongbangpo, Sharma 2002 and Yusoff (2003). The interest rate does not Granger-cause the stock prices, but the stock prices do not Granger-cause any movement in the interest rate, which is consistent with the earlier studies by Ali et al. (2010) and Joseph (2002), where the exchange rate does not Granger-cause stock prices, but stock prices Granger-cause the exchange rate. However, based on these

findings, this study can conclude that for the period under study, exchange rate cannot lead stock prices, but is unidirectional from stock price to exchange rate (Wongbangpo, Sharma, 2002).

Oil price movement does Granger-cause the stock prices, but stock prices do not Granger-cause any movement in the oil prices. Therefore, there is unidirectional causality from oil prices to stock prices in the Main Board of Bursa Malaysia, which in line with Cunado and Garcia (2005), Park (2007), and Sadoresky (2008). The finding shows that the industrial production change does Granger-cause the stock prices, but the stock prices do not Granger-cause any movement in the industrial production changes. Therefore, it can be said that there is unidirectional causality from industrial production changes to stock prices.

It seems to be that only the relationship of consumer price index with stock prices has bidirectional causality between both variables. However, based on these findings this study can conclude that for the period under study, the consumer price index leads stock prices, and *vice versa*. In conclusion, the results show that money supply, oil price, and consumer price index tend to have an influence on stock prices in the short-run, as well as the information of consumer price index and stock prices tend to influence each other in the short-run as well. The past information about interest rate was found to have no influence on the stock prices in the short-run; it was revealed that this study failed to reject both null hypotheses of the interest rate and stock prices.

Table 4.16 reported the p-values that indicate that the Bursa Malaysia is a leading indicator for three macroeconomic variables (exchange rate, industrial production

and consumer price index). On the other hand, the Malaysia stock market is not a leading indicator for the others macroeconomic variables in the system, i.e., money supply, interest rate and oil price. In the literature there is no consensus about how real economic activity reacts to stock market shocks. These findings are in line, one way or another, with Ratanapakorn and Sharma (2007) for the U.S. stock market, Patra et al. (2006), and Gan et al. (2006) in Sri Lanka, Gjerde and Saettem (1999) in New Zealand, Gunasekarage et al. (2004) in Norway, Lim et al. (2009) for China, Bashir et al. (2011) for Pakistan, where all these studies found empirical evidence that the stock market is not a leading indicator of real economic activities.

These results suggest that the Malaysian stock market violated the efficient market hypothesis with respect to money supply, oil price, and the consumer price index, since the Malaysian stock market prices can be predicted using available information about these three variables in the short-run, but showed evidence for the efficient market hypothesis with respect to the other macroeconomic variables of the interest rate, exchange rate and the industrial production. On the other hand, the error correction model supported the previous results obtained from the Johansen-Juselius cointegration test. The error correction model found a significant long-run causal effect, based on t-statistics associated with the coefficient of the lagged error-correction term, and with the expected negative sign. Furthermore, the Malaysian stock market converged on its equilibrium in almost five months, within a year after being shocked.

5.3 RECOMMENDATIONS

This study recommended further research into the determination of stock market prices for the Malaysian context by including such microeconomic variables as dividend yield, dividend announcement, initial public offering (IPO), earnings per share (EPS), accounting profit, term structure, and risk premium to further the understanding of the determination of stock market prices within the emerging financial markets, and make comparisons between microeconomic and macroeconomic influences on the Malaysian stock market.

There are other factors that can attribute to the volatility of the stock market; such factors include political risk and non-macroeconomic events such as elections, natural disease, infectious diseases, and sports events (Cheng et al., 2011). Malaysia experienced political turmoil in the years from 2003 to 2008 where there was a change of prime ministers and the Cabinet line-up in October 2003. The twelfth general election was held in March 2008, and the ruling party had lost many parliamentary seats as well as control over several states. This could also be one of the reasons that impeded investors' confidence.

One of the future research topics would be to conduct the same study for the Southeast Asia countries that are consider as world energy suppliers. Such a study could compare the behavior of the Malaysian stock market against the rest of the

Southeast Asia countries in responding to shocks to real economic activity. This comparison is of great interest for policymakers, since these countries are state members of ASEAN and are working forward into unifying their economies and harmonizing their financial markets. This study is also interesting, since ASEAN stock markets are very promising markets for international portfolio diversification. This study also suggests some further research to enhance the understanding about the dynamic relationship between real economic activity and the behavior of the stock market in oil-exporting countries through including the other oil exporting countries in region like Indonesia and Brunei.

This study was conducted by including the FTSE/BM Top 100 Index and represents the stock market in Malaysia; the same study can be extended to study the influence of macroeconomic variables on the different sectors listed in the market, or on the individual companies listed on the stock market based on the company size as large, medium or small companies as they are listed in the market, in addition to using the different stock market indices as a proxy of Bursa Malaysia, such as the tradable index that comprises the 30 largest companies in the FTSE Bursa Malaysia EMAS index by market capitalization, or the tradable index that comprises the next 70 companies in the FTSE Bursa Malaysia EMAS index by full market capitalization, or even using the FTSE Bursa Malaysia EMAS Syariah index as the proxy for Islamic stock market in Malaysia.

Understanding how international financial markets affect each other became critical for portfolio managers, therefore this study recommends for future research to include in this model some foreign index to examine whether the international market contributed to movements of the Bursa Malaysia for instance, the Standard and Poor's (S&P 500) price index as a proxy for international stock market effects, the S&P 500 being one of the most popular benchmark indexes used to capture the overall U.S. stock market.

This study can to be a primer into further research of the relationships between stock market prices and other domestic and international factors for Malaysia, and for the emerging financial markets to enhance investor portfolio understanding and evaluation in terms of the sensitivity of stock market prices from the effect of macroeconomic variables. This study can be extended to consider the impact of other macroeconomic variables such as palm oil, gold price, foreign direct investment, and gross national product, because inclusion of these variables would be a significant addition to account for the influence of real activity and the effect of the public sector, given that the Malaysian government owns all of the oil revenues, on Malaysian stock market behavior.

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APPENDICES

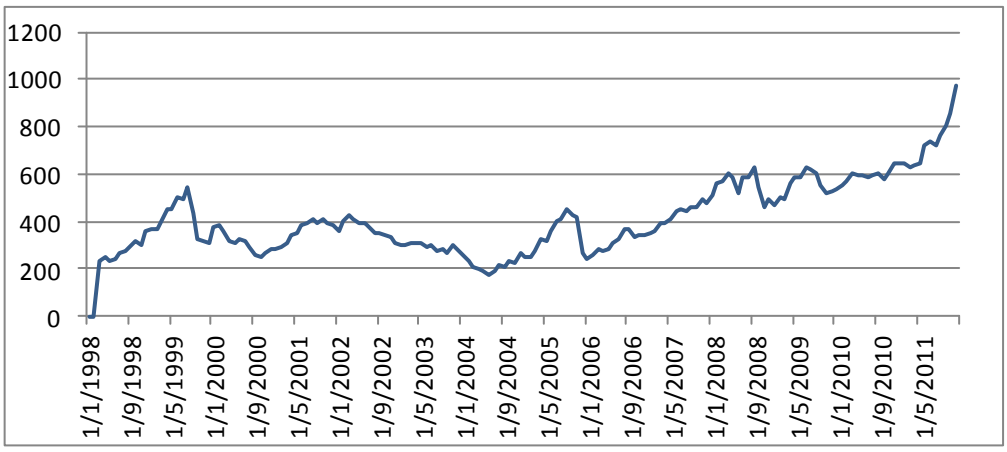
APPENDIX A

BURSA MALAYSIA INDEX SERIES FIGURES

FTSE Bursa Malaysia Top 100 Index-Price Close (KLCI) from January 1980 to November 2011

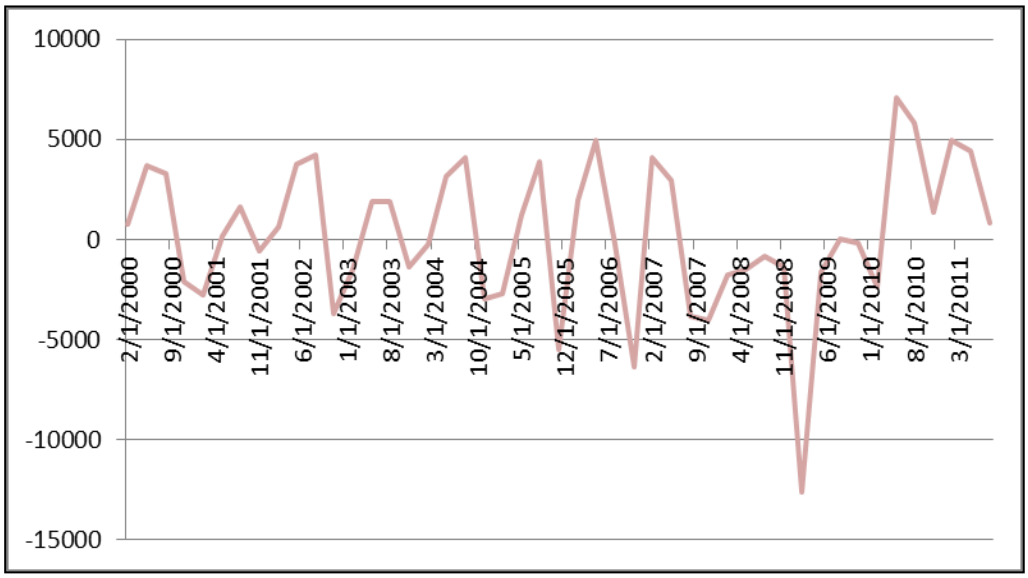
Source: DataStream

FTSE Bursa Malaysia Top 100 Index-Price Close (KLCI) from January 1980 to November 2011



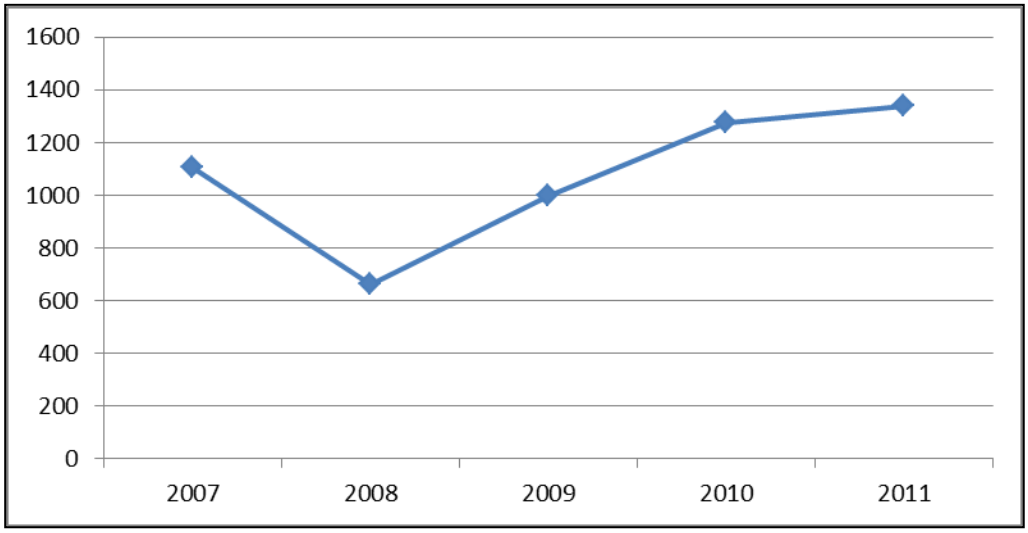
Source: DataStream

Change in FTSE Bursa Malaysia Top 100 Index-Price Close (KLCI) from 2000 to 2011



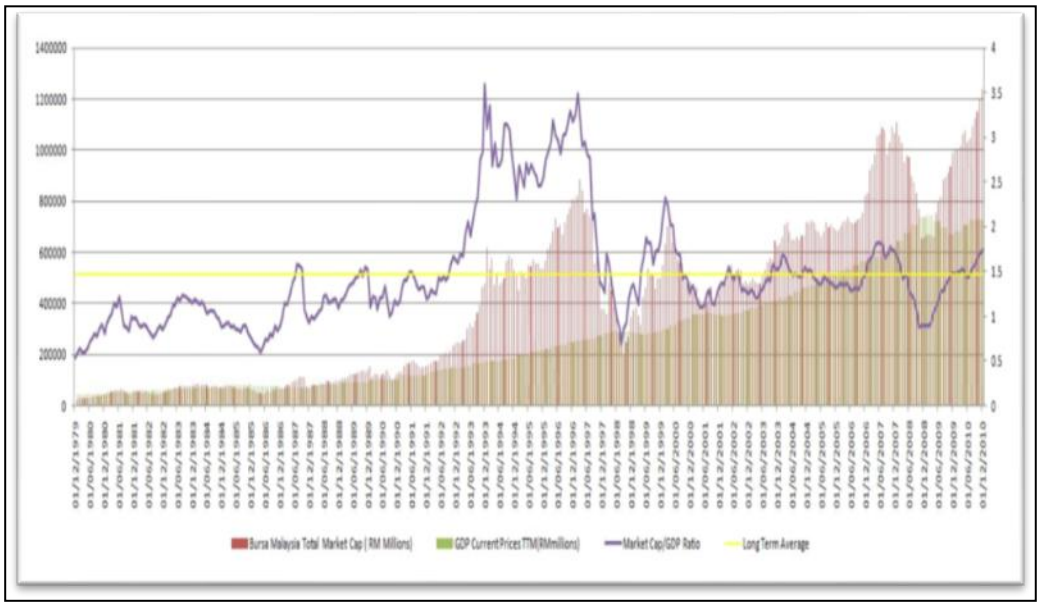
Source: DataStream

Market Capitalization End-Period (RM Billion) from 2007 to 2011



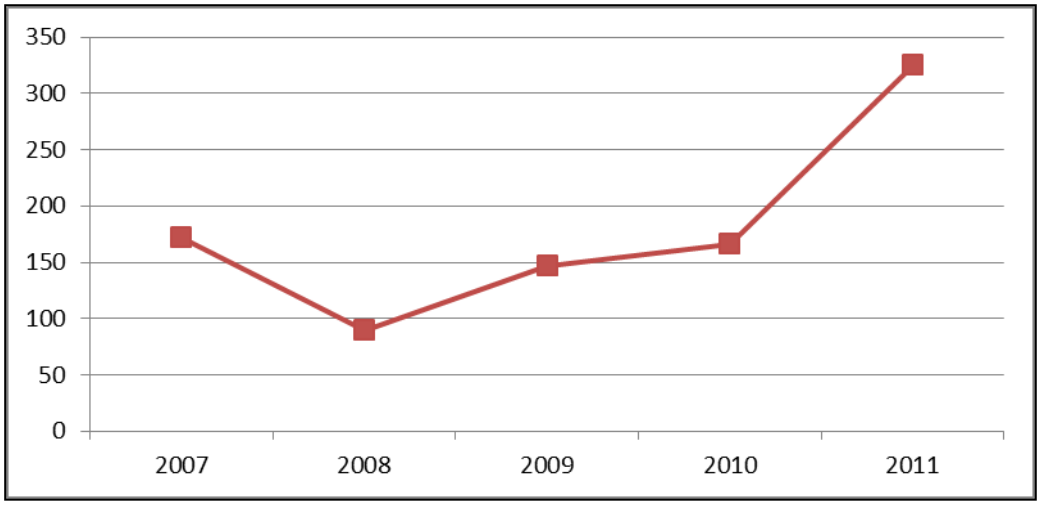
Source: Economic Report 2011-2012, Ministry of Finance Malaysia.

FTSE Bursa Malaysia Market Capitalization / GDP Ratio from December 1979 to December 2010



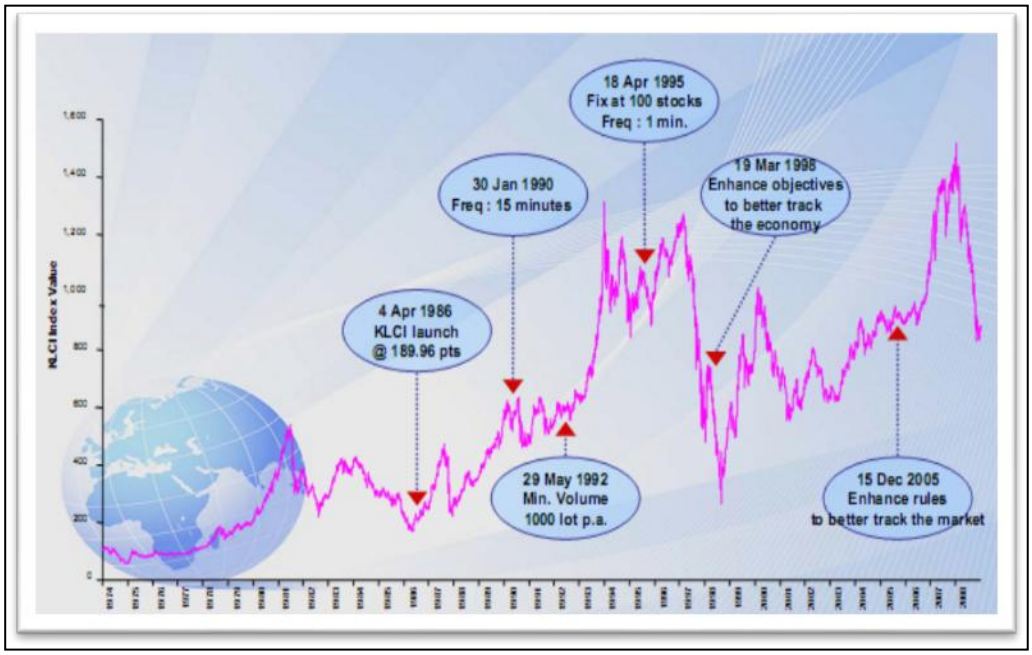
Source: CEIC, Department of Statistics, Malaysia

FTSE Bursa Malaysia Market Capitalization / GDP Ratio from 2007 to 2011



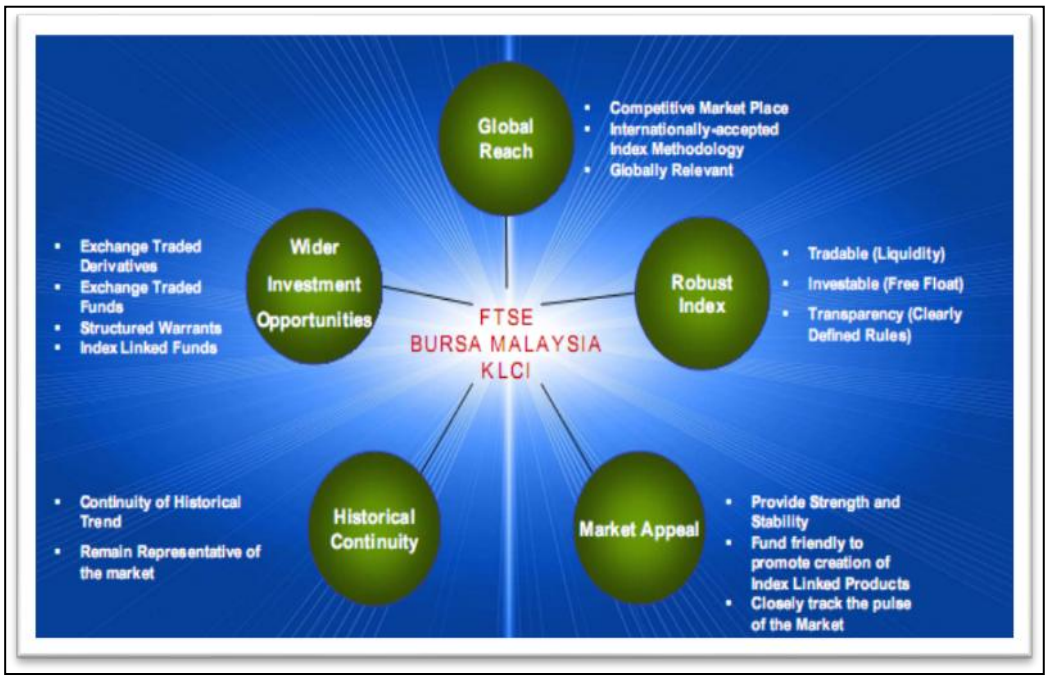
Source: Economic Report 2011-2012, Ministry of Finance Malaysia.

Changes in Malaysian Stock Market- Kuala Lumpur Composite Index (KLCI)



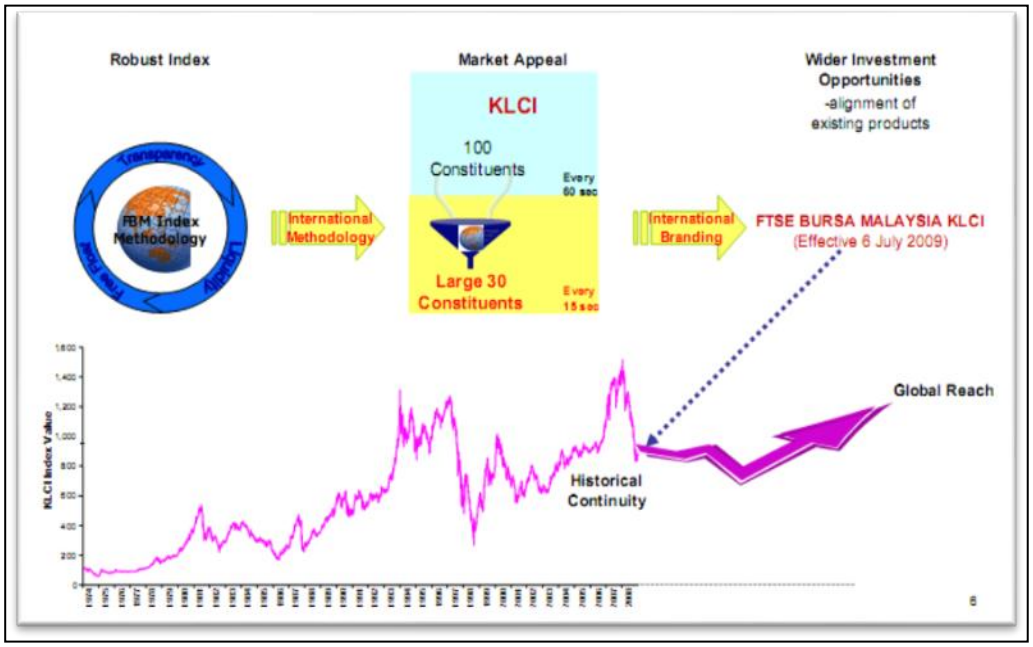
Source:Bursa Malaysia. (2009). FTSE Bursa Malaysia KLCI, Elevating Malaysia's Benchmark Index to Global Standards.

FTSE Bursa Malaysia Index Strategic Objectives (Market Driven Index)



Source:Bursa Malaysia. (2009). FTSE Bursa Malaysia KLCI, Elevating Malaysia's Benchmark Index to Global Standards.

FTSE Bursa Malaysia KLCI A market driven Robust Index



Source:Bursa Malaysia. (2009). FTSE Bursa Malaysia KLCI, Elevating Malaysia's Benchmark Index to Global Standards.

FTSE Bursa Malaysia Indices Movement from 2009 to 2010 (%)

	As at 31 Dec 2009	As at 31 Dec 2010	Movement (%)
FTSE Bursa Malaysia KLCI	1,272.78	1,518.91	19
FTSE Bursa Malaysia Top 100	8,308.89	10,116.56	22
FTSE Bursa Malaysia Small Cap	10,165.81	12,625.36	24
FTSE Bursa Malaysia EMAS	8,507.61	10,374.98	22
FTSE Bursa Malaysia ACE	4,299.58	4,347.56	1
FTSE Bursa Malaysia Palm Oil Plantation	11,615.60	15,481.09	33
FTSE Bursa Malaysia Asian Palm Oil Plantation (USD)	16,931.27	21,587.57	28
FTSE Bursa Malaysia Asian Palm Oil Plantation (MYR)	20,141.01	23,128.52	15
FTSE Bursa Malaysia Hijrah Shariah	9,312.02	10,456.86	12
FTSE Bursa Malaysia EMAS Shariah	8,509.52	10,058.15	18

Source:Bursa Malaysia Berhad. Annual Report 2010. (2010). Strength + Foresight = Growing Value. Kuala Lumpur, Malaysia.

KLCI and FTSE Bursa Malaysia KLCI

	KLCI	FTSE Bursa Malaysia KLCI
Number of Constituents	100	30
Market Capitalisation Representation to Main Board	74%	64%
Correlation to FTSE Bursa Malaysia EMAS (5Years)	99.4%	99.1%
Volatility (3 yrs)	16.5%	17.0%
Volatility (5 yrs)	14.2%	15.0%

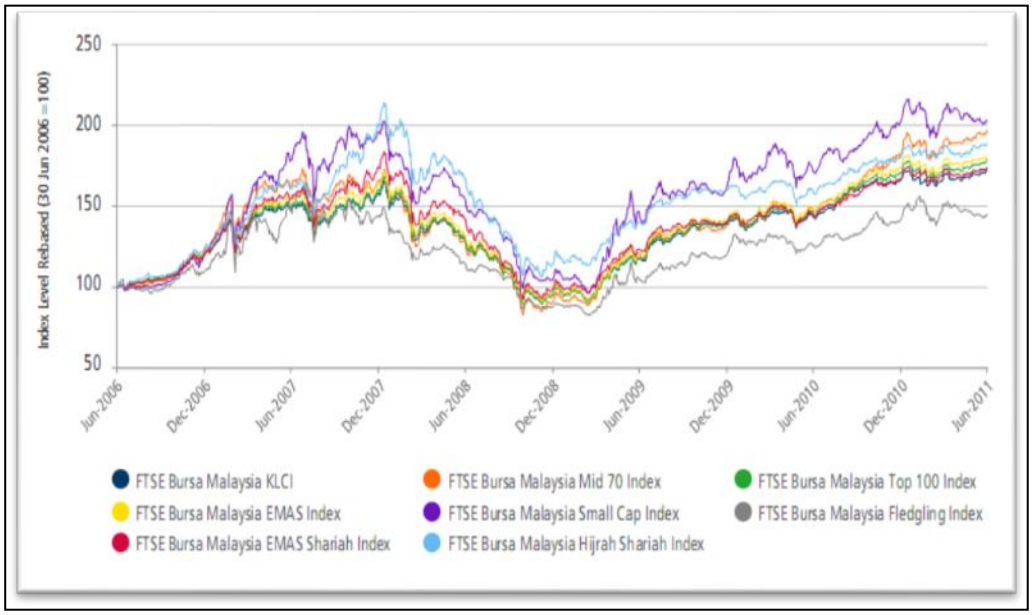
Source:Bursa Malaysia. (2009). FTSE Bursa Malaysia KLCI, Elevating Malaysia's Benchmark Index to Global Standards.

FTSE Bursa Malaysia Index Series Correlation

	FTSE Bursa Malaysia KLCI	FTSE Bursa Malaysia Mid 70 Index	FTSE Bursa Malaysia Top 100 Index	FTSE Bursa Malaysia EMAS Index	FTSE Bursa Malaysia Small Cap Index	FTSE Bursa Malaysia Fledgling Index	FTSE Bursa Malaysia EMAS Shariah Index	FTSE Bursa Malaysia Hijrah Shariah Index
FTSE Bursa Malaysia KLCI	1.000	0.922	0.996	0.991	0.803	0.702	0.969	0.948
FTSE Bursa Malaysia Mid 70 Index		1.000	0.937	0.951	0.888	0.778	0.946	0.891
FTSE Bursa Malaysia Top 100 Index			1.000	0.997	0.817	0.717	0.975	0.949
FTSE Bursa Malaysia EMAS Index				1.000	0.858	0.759	0.978	0.941
FTSE Bursa Malaysia Small Cap Index					1.000	0.922	0.839	0.735
FTSE Bursa Malaysia Fledgling Index						1.000	0.731	0.627
FTSE Bursa Malaysia EMAS Shariah Index							1.000	0.976
FTSE Bursa Malaysia Hijrah Shariah Index								1.000

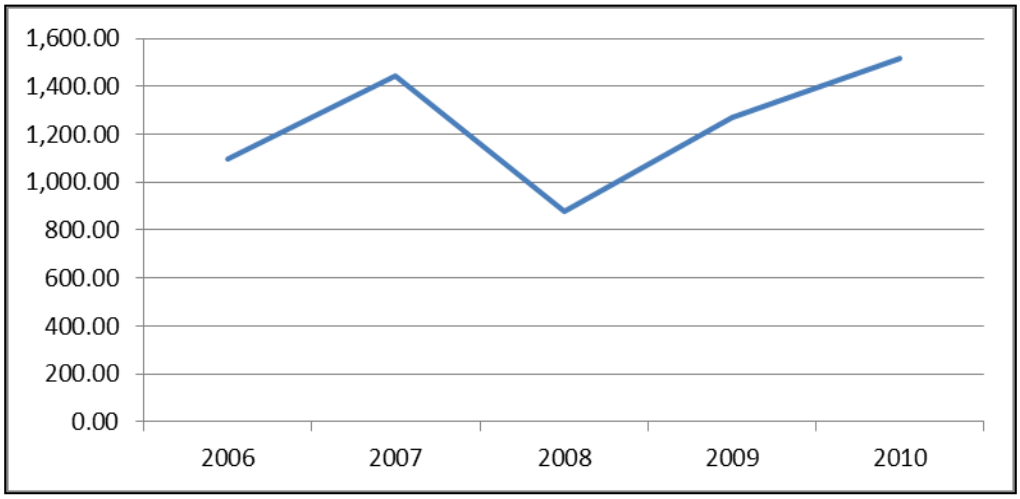
Source: FTSE Group, data as at 30 June 2011.

FTSE Bursa Malaysia Index Series five years Performance (MR, Price Index)



Source: FTSE Group, data as at 30 June 2011.

FTSE/BM KLCI from 2006 to 2010

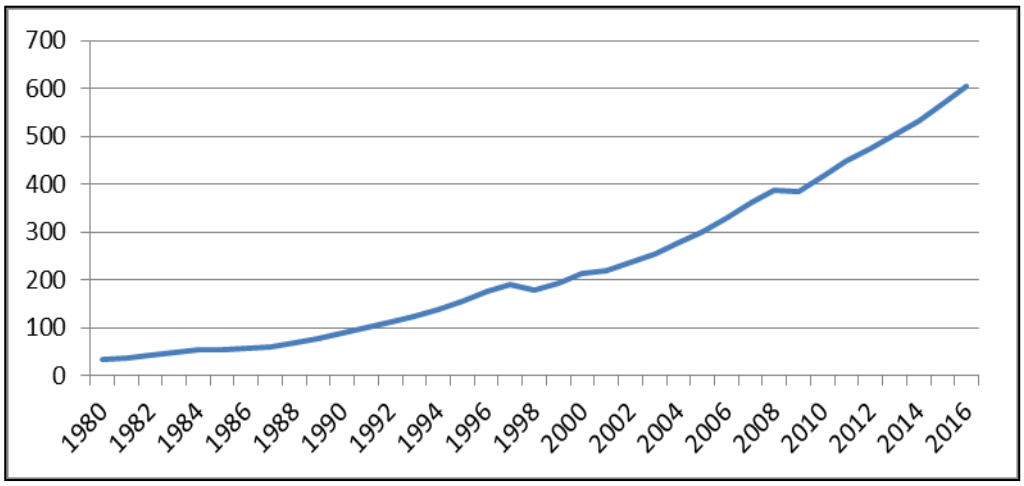


Source:Bursa Malaysia Berhad. Annual Report 2010. (2010). Strength + Foresight = Growing Value. Kuala Lumpur, Malaysia.

APPENDIX B

MALAYSIAN MACROECONOMIC SERIES FIGURES

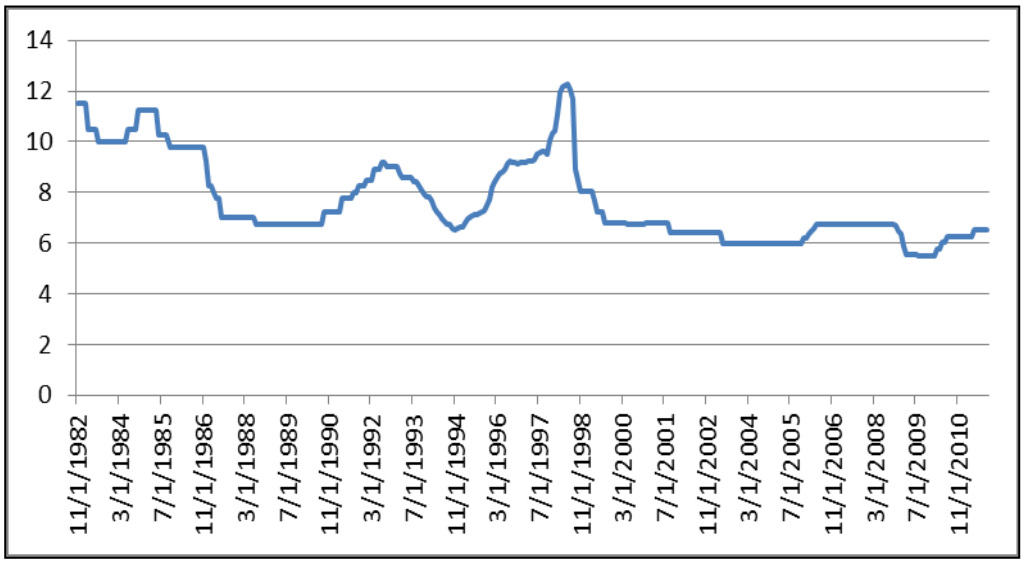
Malaysia Gross Domestic Product (GDP) based on (PPP) (1980 - 2016)



Source: Department of Statistics, Malaysia. (2011).

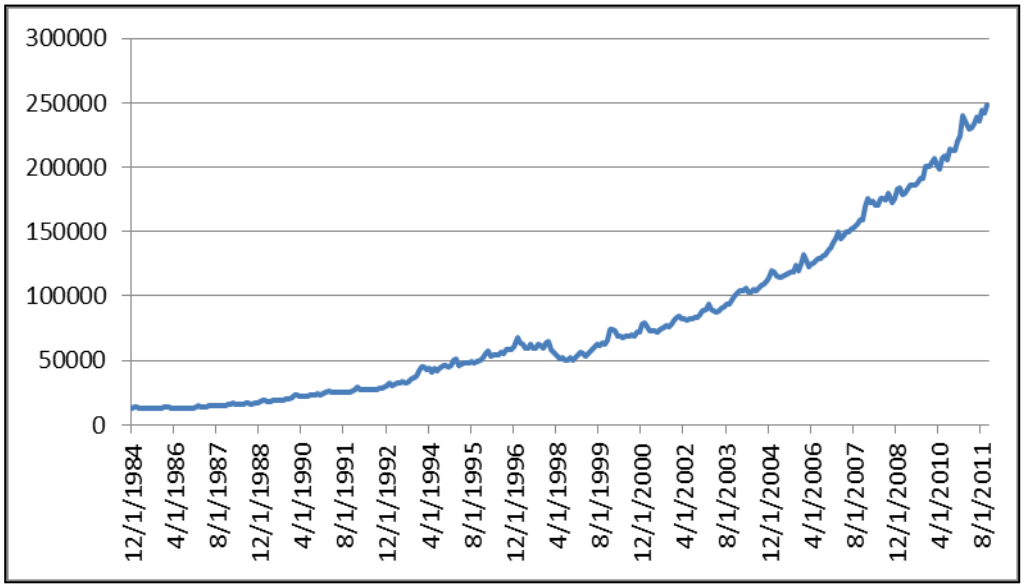
Note: The data estimated based on 2010 by EIA for period after 2010.

Malaysia Interest Rate from November 1982 to November 2010



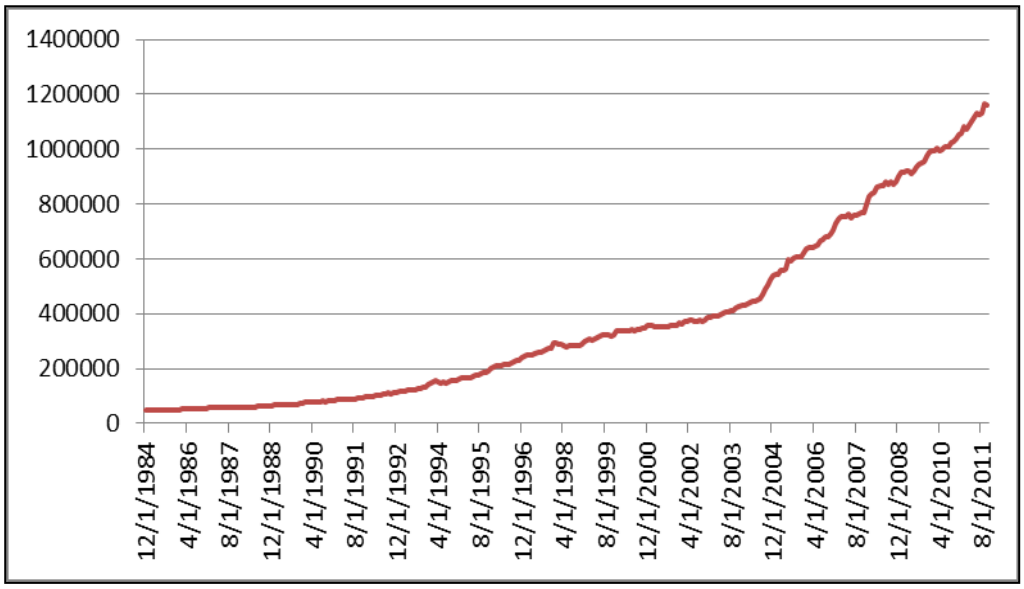
Source: Bank Negara Malaysia, Monthly Statistical Bulletin in different issues.

Malaysia Money Supply (M1) from December 1984 to October 2011



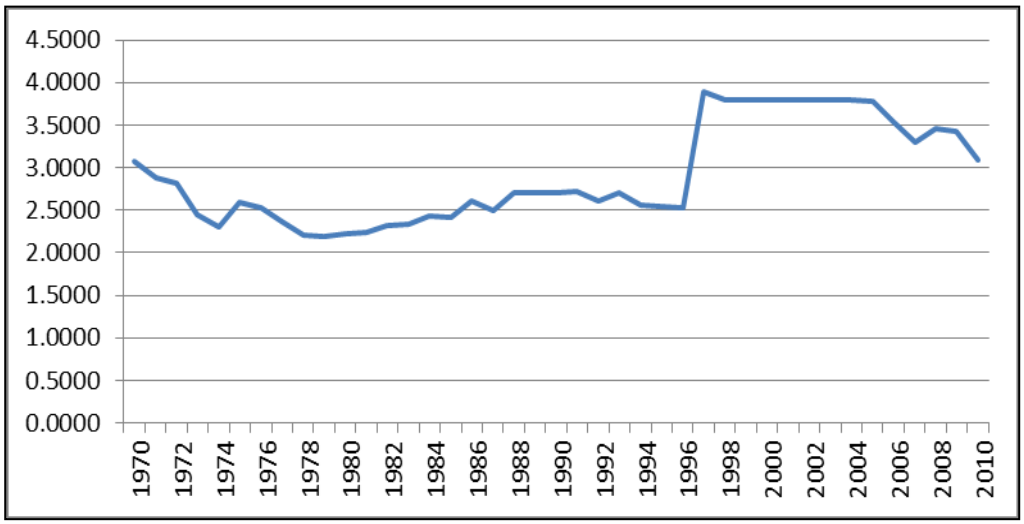
Source: Bank Negara Malaysia, Monthly Statistical Bulletin in different issues.

Malaysia Money Supply (M2) from December 1984 to October 2011



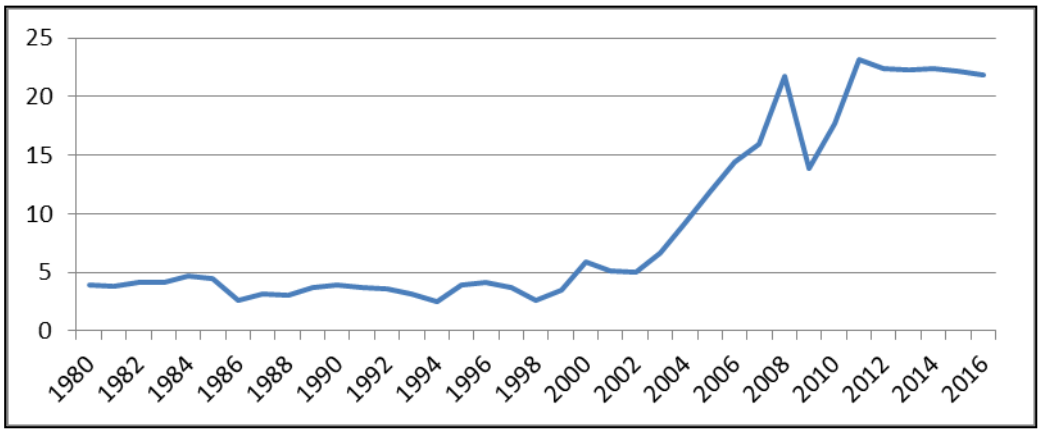
Source: Bank Negara Malaysia, Monthly Statistical Bulletin in different issues.

Malaysia Foreign Exchange Rate (ER) from 1970 to 2010



Source: International Monetary Fund, International Financial Statistics in different issues.

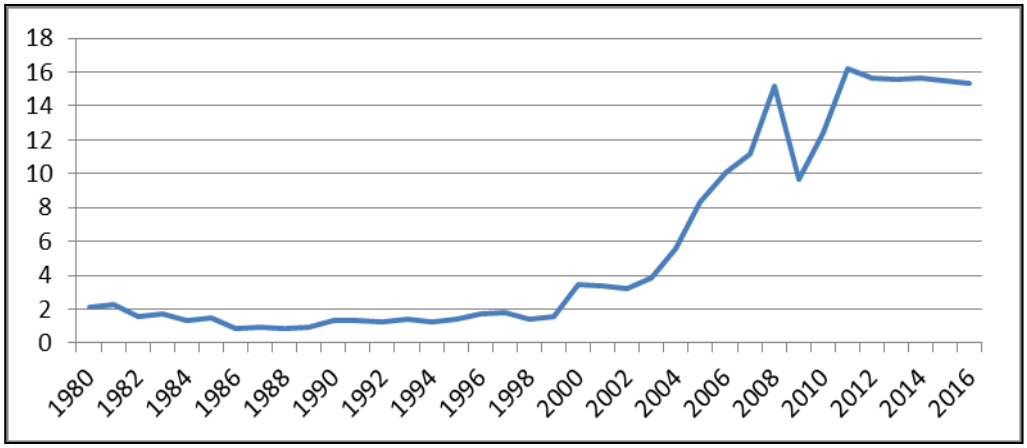
Malaysia Oil Export from 1980 to 2016



Source: US Energy Information Administration database.

Note: The data estimated based on 2010 by EIA for period after 2010.

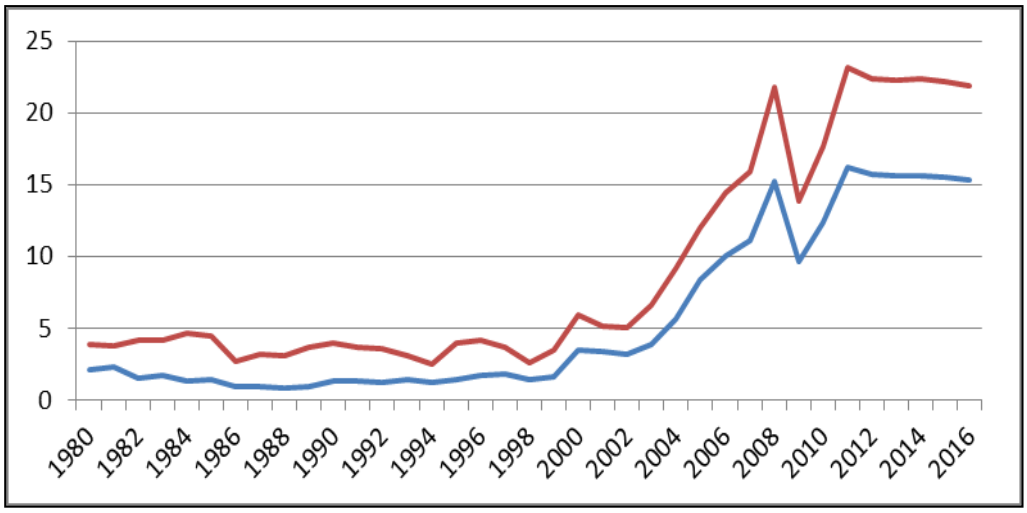
Malaysia Oil Import from 1980 to 2016



Source: US Energy Information Administration database.

Note: The data estimated based on 2010 by EIA for period after 2010.

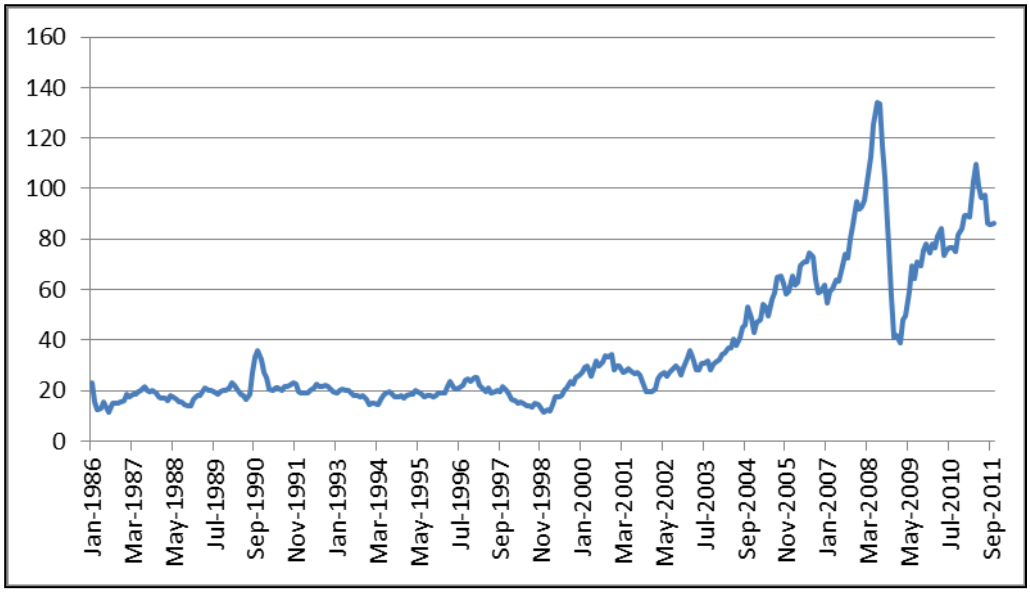
Malaysia Oil Export and Import from 1980 to 2016



Source: US Energy Information Administration database.

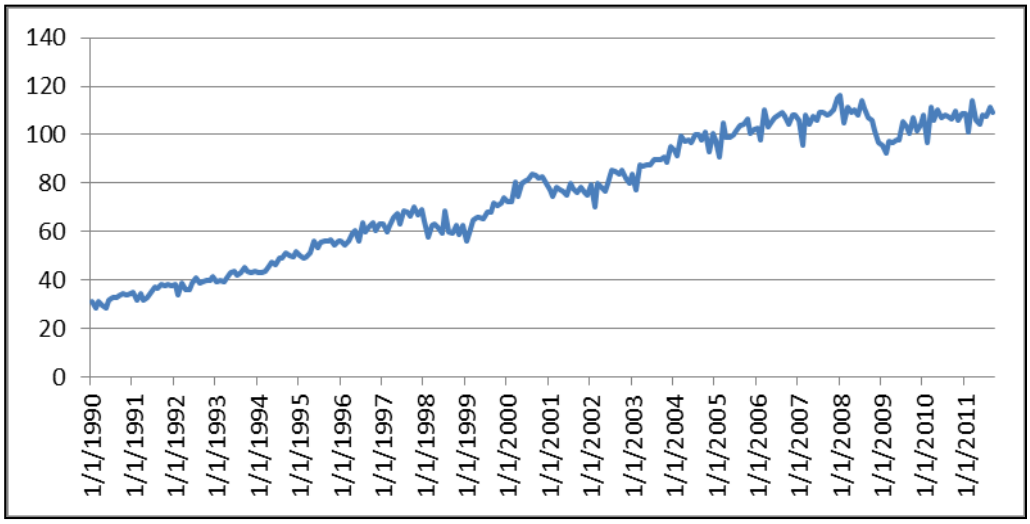
Note: The data estimated based on 2010 by EIA for period after 2010.

Global Oil Price (OP) based on WTI and Brent Spot Price from January 1986 to September 2011



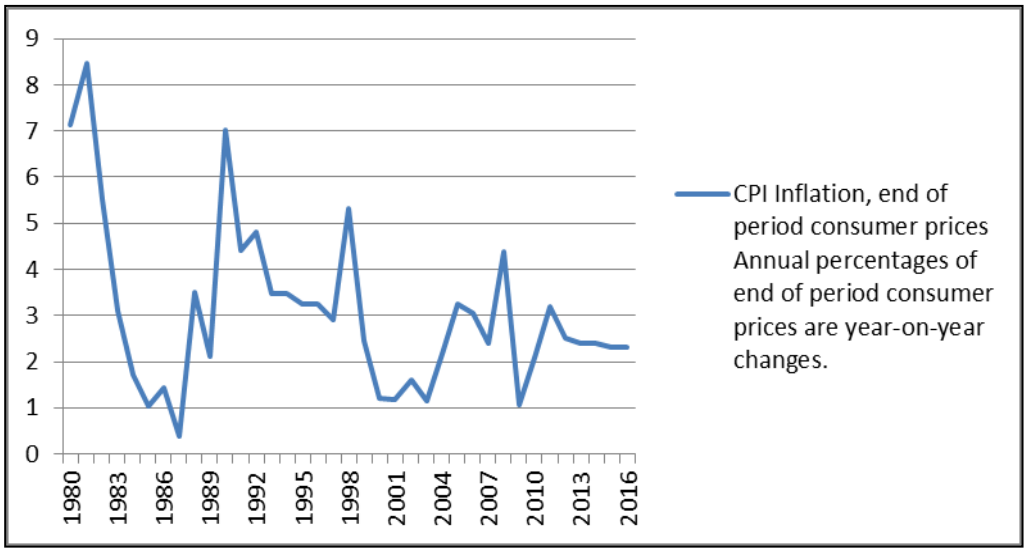
Source: US Energy Information Administration database.

Malaysia Industrial Production (IP) from January 1980 to January 2011



Source: Department of Statistics, Malaysia. (2011).

Malaysia Consumer Price index (CPI) inflation from 1980 to 2016



Source: Department of Statistics, Malaysia. (2011).

Note: The data estimated based on 2010 by EIA for period after 2010.

APPENDIX C

BURSA MALAYSIA INDEX SERIES

The Kuala Lumpur Composite Index (KLCI) is now known as the FTSE Bursa Malaysia KLCI and adopts the FTSE global index standard from 6 July 2009 onwards.

Bursa Malaysia and FTSE Group will be introduced enhancements to the Kuala Lumpur Composite Index (KLCI) effective on 6th July, 2009. The KLCI will adopt FTSE's global index standards and will be known as the FTSE Bursa Malaysia KLCI.

The FTSE Bursa Malaysia KLCI will adopt an internationally accepted index calculation methodology to provide a more investable, tradable and transparently managed index. The enhanced KLCI will provide a platform for a wider range of investable and appealing opportunities. The constituents will be free float adjusted with only the investable portion included in the index calculation.

The constituents of FTSE Bursa Malaysia KLCI will change from 100 to 30 companies to enhance the tradability of the index, whilst remaining representative of the Malaysian stock market. The 30 largest companies by market size will transform the FTSE Bursa Malaysia KLCI to a large cap index. Existing users of the KLCI that would prefer a broader coverage of companies can use the FTSE Bursa Malaysia Top 100 Index or FTSE Bursa Malaysia EMAS Index. To preserve the continuity of the KLCI, the historical index values of the KLCI will be retained for the new FTSE Bursa Malaysia KLCI up to 3rd July, 2009. The closing value of the KLCI on 3rd July, 2009 will be the opening value of the FTSE Bursa Malaysia KLCI on 6th July, 2009.

FTSE Bursa Malaysia KLCI

Bursa Malaysia's Strategic Objectives

Bursa Malaysia is committed towards extending the Malaysian capital market's global reach by offering competitive services and infrastructure through adoption of internationally accepted standards which are globally relevant.

As part of Bursa Malaysia's strategic initiative, the Kuala Lumpur Composite Index (KLCI) was enhanced to ensure that it remains robust in measuring the national economy with growing linkage to the global economy. Bursa Malaysia together with FTSE, its index partner, have integrated the KLCI with internationally accepted index calculation methodology to provide a more investable, tradable and transparently managed index.

The enhanced KLCI, whilst remaining representative of the Malaysian stock market, provides a platform for a wider range of investable and appealing opportunities.

The KLCI is now known as the FTSE Bursa Malaysia KLCI and the enhancements were implemented on Monday, 6 July 2009.

Strengths of the FTSE Bursa Malaysia KLCI

1. The KLCI is known as FTSE Bursa Malaysia KLCI to provide global relevance, recognition and reach.
2. A market barometer made up of primary market movers will more aptly define market activities while remaining representative of the Malaysian stock market.
3. The FTSE Bursa Malaysia index calculation methodology emphasizes free float and liquidity screens for a clearer representation of the market.

4. A smaller basket of 30 stocks makes it easier to manage and more appealing for the creation of Index Linked products to promote market liquidity.
5. Increasing the frequency of index calculation from every 60 seconds to every 15 seconds tracks the market pulse closely and more efficiently.
6. The continuity of the KLCI index value preserves the historical movements of the Malaysian stock market.

Selection of FTSE Bursa Malaysia KLCI Constituents

The FTSE Bursa Malaysia KLCI comprises the largest 30 companies listed on the Main Board by full market capitalisation that meet the eligibility requirements of the FTSE Bursa Malaysia Ground Rules.

The two main eligibility requirements stated in the FTSE Bursa Malaysia Ground Rules are the free float and liquidity requirements as indicated below :

- **Free Float**

  Each company is required to have a minimum free float of 15%. The free float excludes restricted shareholding like cross holdings, significant long term holdings by founders, their families and/or directors, restricted employee share schemes, government holdings and portfolio investments subject to a lock in clause, for the duration of that clause. A free float factor is applied to the market capitalisation of each company in accordance with the banding specified in the FTSE Bursa Malaysia Ground Rules. The factor is used to determine the attribution of the company's market activities in the index.

- **Liquidity**

  A liquidity screen is applied to ensure the company's stocks are liquid enough to be traded. The method is based on the calculation of the stock's median daily trading per month.

Calculation and Review of the FTSE Bursa Malaysia KLCI

FTSE uses the real time and closing prices sourced from Bursa Malaysia to calculate the FTSE Bursa Malaysia KLCI. Calculation is based on a value weighted formula and adjusted by a free float factor. The FTSE Bursa Malaysia KLCI values are calculated and disseminated on a real time basis every 15 seconds.

The FTSE Bursa Malaysia KLCI is reviewed by the FTSE Bursa Malaysia Index Advisory Committee on a semi-annual basis in June and December.

Full market capitalization data as at the last trading day of May and November is used for the review. Any constituent changes will be implemented after close of business on the 3rd Friday in June and December.

Variation to the Kuala Lumpur Composite Index Future (FKLI) and Kuala Lumpur Composite Index Options (OKLI) Contract Specification

Arising from the transition of KLCI to FTSE Bursa Malaysia KLCI on the Implementation Date, kindly take notice that the contract specifications for FKLI and OKLI contracts (which are currently stipulated in Schedule 6 and 7 respectively of the

Rules of Bursa Malaysia Derivatives Berhad ("Rules of Bursa Derivatives") that are created in the trading months as stated in the table below will be varied with effect from 1 February 2009 in the manner set out in paragraphs (i) and (ii) below

Trading Month	**Contract Type**	**Contract Month**	**Underlying Index**
Feb 2009 - Apr 2009	2nd Quarter	Sep 09	The trading of the contracts will be based on KLCI from 1 Feb 2009 until 3 Jul 2009, and subsequently based on FTSE Bursa Malaysia KLCI till expiry.
May 2009	1st Quarter 2nd Quarter	Sep 09 Dec 09	The trading of the contracts will be based on KLCI until 3 Jul 2009, and subsequently based on FTSE Bursa Malaysia KLCI till expiry.
Jun 2009	Next Month 1st Quarter 2nd Quarter	Jul 09 Sep 09 Dec 09	The trading of the contracts will be based on KLCI until 3 Jul 2009, and subsequently based on FTSE Bursa Malaysia KLCI till expiry.
Jul 2009	Spot Month Next Month 1st Quarter 2nd Quarter	Jul 09 Aug 09 Sep 09 Dec 09	The trading of the contracts will be based on KLCI until 3 Jul 2009, and subsequently based on FTSE Bursa Malaysia KLCI till expiry.

i. The 'UNDERLYING STOCK INDEX' as stipulated in Schedule 6 for FKLI and as stipulated in Schedule 7 for OKLI is changed to read as follows.
'Kuala Lumpur Composite Index (from 1 February 2009 until 3 July 2009) FTSE Bursa Malaysia KLCI (from 6 July 2009 onwards)'

ii. To add 'ATTRIBUTION CLAUSE' as follows.
'The FTSE Bursa Malaysia KLCI Index is calculated by FTSE International Limited ("FTSE").

All intellectual property rights in the FTSE Bursa Malaysia KLCI vests in FTSE and Bursa Malaysia Berhad (“BURSA MALAYSIA”). “FTSE®”, “FT-SE®” and “Footsie®” are trademarks of the London Stock Exchange Plc (the "LSE") and The Financial Times Limited ("FT") and are used by FTSE under licence. “BURSA Malaysia”, “Kuala Lumpur Composite Index” and “KLCI” are trademarks of Bursa Malaysia.

FTSE nor Bursa Malaysia nor LSE nor FT makes any warranty or representation whatsoever, expressly or impliedly, either as to the results to be obtained from the use of the FTSE Bursa Malaysia KLCI and/or the figure at which the FTSE Bursa Malaysia KLCI stands at any particular time on any particular day or otherwise.'

This Attribution Clause is added for the use of FTSE Bursa Malaysia KLCI as the underlying index for FKLI and OKLI by FTSE and its partners.

KLCI Milestones

The barometer of the Malaysian stock market was the Industrial Index which was launched on 2 January 1970. Its constituents comprised of 30 industrial stocks and the base year was 1970. By 1985, the Industrial Index was considered to be no longer reflective of the stock market. The Exchange and industry representatives agreed that the stock market needed an index that was reflective of the market performance, sensitive to investors’ expectations, indicative of Government policy changes and responsive to structural changes in the economy. This index is what we now know as the KLSE Composite Index or KLCI.

4 April 1986	The KLCI was launched as an open ended index with a total of 83 companies and calculated three times a day. Trading volume criteria was 250 lots per annum.
30 January 1990	Calculation frequency was increased to every 15 minutes.
29 May 1992	Trading volume criteria was increased to 1,000 lots per annum.
18 April 1995	Number of constituents was increased to and fixed at 100 to accommodate the listing of stock index futures. Computation frequency was increased to every 60 seconds
19 March 1998	Enhancement to the objectives to better track the economy
25 May 2005	Discontinued the practice of adjusting index base for dividends
6 July 2009	Now known as FTSE Bursa Malaysia KLCI and adopts the FTSE Bursa Malaysia Index calculation methodology
9 Jun 2011	Enhancement to the liquidity screening rule to further align the index to global standards.

The Bursa Malaysia Index Series Comprises of the following Indices

Indices	Base Year	Companies No.
FTSE Bursa Malaysia KLCI (formerly known as KLCI)	1977	…..
-Industrial Index	1970	……
-Sectoral Indices		…….
- Construction	1992	42
- Consumer Product	1992	86
- Finance	1970	40
- Industrial Product	1992	26
- Mining	1970	40
- Plantation	1970	152
- Property	1970	87
- Technology	1999	144
- Trading/Services	1992	22

All the indices are derived from the companies listed in the Main Market.

Index Methodology

All Bursa Malaysia Indices are weighted by market capitalization.

The index computation is as follows:

$$\frac{\text{Current aggregate Market Capitalization}}{\text{Base Aggregate Market Capitalization}} \times 100$$

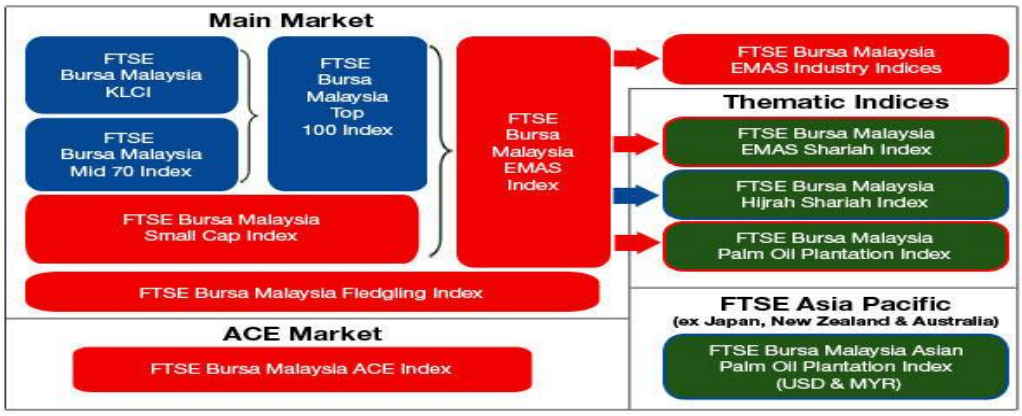
FTSE/BM INDICES

Bursa Malaysia and FTSE Group joined forces on 26 June 2006 to launch the market data.

The market data is designed to represent the performance of companies, providing investors with a comprehensive and complementary set of indices, which measure the performance of the major capital and industry segments of the Malaysian and regional market.

All Malaysian companies listed on the Bursa Malaysia Main Market and ACE Market is eligible for inclusion, subject to meeting FTSE's international standards of free float, liquidity and investability. The FTSE Bursa Malaysia index methodology allows investors to do cross border analysis and comparison while a set of Ground Rules provides transparency to the management of the index series.

The index series covers all stock sizes within the market and provides the investors with a better tool to benchmark their investments. The indices are also suitable for the creation of investment products such as ETFs, derivatives, structured products and index tracking funds.



TRADABLE INDICES

FTSE Bursa Malaysia KLCI Index

Bursa Malaysia and FTSE Group introduced enhancements to the Kuala Lumpur Composite Index (KLCI) on 6 July 2009.

This tradable index comprises the 30 largest companies in the FTSE Bursa Malaysia EMAS index by market capitalization.

FTSE Bursa Malaysia Mid 70 Index

Comprises the next 70 companies in the FTSE Bursa Malaysia EMAS Index by full market capitalization.

FTSE Bursa Malaysia Top 100 Index

Comprises the constituents of the FTSE Bursa Malaysia KLCI and the FTSE Bursa Malaysia Mid 70 Index.

FTSE Bursa Malaysia Hijrah Shariah Index

The FTSE Bursa Malaysia Hijrah Shariah Index is a tradable index which comprises the 30 largest companies in the FBM EMAS Index that meets the following triple screening process:

a. FTSE's global standards of free float, liquidity and investability.
b. Yasaar's international Shariah screening methodology.
c. Malaysian Securities Commission's Shariah Advisory Council (SAC) screening methodology.

FTSE Bursa Malaysia Asian Palm Oil Plantation Index (USD and MYR)

This index comprises the companies from the universes of developed, advanced emerging and secondary emerging countries as classified by FTSE in the Asia Pacific region excluding Japan, Australia and New Zealand that derive substantial revenue from palm oil activities.

Benchmark Indices

FTSE Bursa Malaysia EMAS Index

Comprises the constituents of the FTSE Bursa Malaysia Top 100 Index and FTSE Bursa Malaysia Small Cap Index.

FTSE Bursa Malaysia Small Cap Index

Comprises those eligible companies within the top 98% of the Bursa Malaysia Main Market excluding constituents of the FTSE Bursa Malaysia Top 100 Index.

FTSE Bursa Malaysia Fledgling Index

This index comprises the Main Market companies which meet stated eligibility requirements, but are not in the top 98% by full market capitalisation and are not constituents of the FTSE Bursa Malaysia EMAS Index. No liquidity screening is applied.

FTSE Bursa Malaysia EMAS Shariah Index

The FTSE Bursa Malaysia EMAS Shariah Index comprises constituents of the FTSE Bursa Malaysia EMAS index that are Shariah-compliant according to the Securities Commission's SAC screening methodology and FTSE's screens of free float, liquidity and investability.

The index has been designed to provide investors with a broad benchmark for Shariah-compliant investment.

FTSE Bursa Malaysia ACE Index

The FTSE Bursa Malaysia ACE Index comprises all eligible companies listed on the ACE Market. No liquidity screening is applied.

FTSE Bursa Malaysia Palm Oil Plantation Index

This index comprises the constituents of the FTSE Bursa Malaysia EMAS Index that derive substantial revenue from palm oil activities that meet the stated eligibility requirements.

FTSE Bursa Malaysia EMAS Industry Indices

The indices comprise the constituents of the FTSE Bursa Malaysia EMAS Indies and are categorized into 10 industry, 19 super sector, and 39 sector indices.

Summary of Bursa Malaysia's 2009 Initiatives/ Events Highlights:

Improved Accessibility

- Launch of DMA for the securities market
- Introduction of SBL-Negotiated trades
- Introduction of Market Making for Structured Warrants and Exchange Traded Funds

Enhanced Efficiency

- New fund raising framework and board structure
- Restructuring of minimum tick size
- Shortening of trading halt

Developed New Products and Services

- Launch of FTSE Bursa Malaysia Palm Oil Plantation Index Series
- Listing of foreign IPOs
- Listing of sukuk and bonds

Internationalized Markets

- KLCI enhancement to FBM KLCI
- Strategic partnership with CME
- Launch of Bursa Su Al-Sila'

Source: Bursa Malaysia Annual Report. (2009). Data updated as at 31 December 2009.

APPENDIX D

EMERGING MARKETS CLASSIFICATION

The FTSE Group distinguishes between advanced and secondary emerging markets on the basis of their national income and the development of their market infrastructure. The Advanced Emerging markets are classified as such because they are upper or lower middle income GNI countries with advanced market infrastructures or high income GNI countries with lesser developed market infrastructures. Meanwhile, the secondary emerging markets include some low income, lower middle, upper middle and high income GNI countries with reasonable market infrastructures and significant size and some upper middle income GNI countries with lesser developed market infrastructures. The secondary emerging markets are:

Emerging Markets Classification

	FTSE GROUP		MSCI BARRA	MSCI ASIA
	Advanced Emerging Markets	Secondary Emerging markets	21 Countries	12 Countries
1	Brazil	Chile	Brazil	Malaysia
2	Czech Republic	China	Czech Republic	Taiwan
3	Hungary	Colombia	Hungary	China
4	Malaysia	Egypt	Malaysia	Bangladesh
5	Mexico	India	Mexico	India
6	Poland	Indonesia	Poland	Indonesia
7	Taiwan	Morocco	Taiwan	Pakistan
8	Turkey	Pakistan	Turkey	South Korea
9	South Africa	Peru	South Africa	Sri Lanka
10		Philippines	Chile	Philippines
11		Russia	China	Vietnam
12		Thailand	Colombia	Thailand
13		UAE	Egypt	
14			India	
15			Indonesia	
16			Morocco	
17			South Korea	
18			Peru	
19			Philippines	
20			Russia	
21			Thailand	