THE LINKAGES BETWEEN STOCK RETURN AND MACROECONOMIC VARIABLES IN MALAYSIA

by

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Research report in partial fulfillment of the requirements
for the degree of Master of Business Administration

2006

ACKNOWLEDGEMENTS

My sincere appreciation to my supervisor, Associate Professor Dr Ruhani Hj. Ali and co-supervisor Dr Roselee Shaharudin for their constant support and guidance throughout the whole research and thesis write up. Their expertise in the field of economy, finance and econometric has been beneficial.

The support given by my wife has strengthened the determination to succeed. Her patience, understanding and love have made this research study a meaningful endeavor.

Also, special thanks to my parents, bother and sisters for their moral support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRAK

Matlamat utama kajian ini adalah menguji sama ada wujudnya perhubungan antara pulangan stok dan pembolehubah makroekonomi di Malaysia. Matlamat ini dicapai menggunakan ujian "cointegration". Selain daripada itu, ujian "Granger Causality" juga diguna untuk menguji perhubungan "causal" antara pulangan stok dan pembolehubah makroekonomi. Untuk memahami perubahan dalam perhubungan pulangan stok dan pembolehubah makroekonomi sebelum dan selepas pelaksanaan kawalan modal, data dibahagi kepada dua bahagian, iaitu sebelum kawalan modal (1990 Q1 to 1998 Q3) dan selepas kawalan modal (1998 Q4 to 2004 Q4). Keputusan daripada ujian "cointegration' menunjukkan perhubungan antara pulangan stok dan pembolehubah makroekonomi wujud sama ada sebelum atau selepas pelaksanaan kawalan modal. Keputusan daripada ujian "Granger Causality" pula menunjukkan perhubungan "causal" dua hala antara pembolehubah makroekonomi dan Indeks Komposit Bursa Malaysia sebelum pelaksanaan kawalan modal. Hasil kajian juga menunjukkan perhubungan "causal" satu hala daripada pembolehubah makroekonomi kepada Indeks Komposit Bursa Malaysia selepas pelaksanaan kawalan modal. Selain daripada itu, keputusan ujian "Granger Causality" juga menunjukkan perhubungan "causal" daripada Indeks Papan Kedua kepada pembolehubah makroekonomi sebelum dan selepas kawalan modal.

ABSTRACT

The objective of this study is to examine the relationship between stock return and macroeconomic variables in Malaysia. Cointegration test is used to examine the existence of long run relationship between stock return and macroeconomic variables. Besides, Granger causality test is also used to study the causal relationship between stock return and macroeconomic variables. In order to understand if there is any changes in the relationship on pre and post capital control period, the data is divided into pre capital control (1990 Q1 to 1998 Q3) and post capital control (1998 Q4 to 2004 Q4) period. Cointegration test suggest the existence of long run relation between stock return and all the macroeconomic variables considered in the study, for the period before and after the implementation of capital control. The Granger causality test suggests bidirectional causal relationship between Kuala Lumpur Composite Index and macroeconomic before capital control, and unidirectional causality from macroeconomic variables to Kuala Lumpur Composite Index after capital control. The Granger causality test also suggests Second Board Index Granger causes macroeconomic variables before and after capital control.

Chapter 1

INTRODUCTION

~~1.1~~1.1 Background

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Stock market is a channel for the corporate sector to raise capital for business and investment activities. One of the most important roles of stock market is to provide correct valuation of stocks and promote efficient allocation of capital. In the last two decades, the stock market of Malaysia has undergone dramatic changes. Growing rapidly before 1997, followed by the steep drop during the 1997 when financial crisis struck.

Stock market has been closely associated with the economic growth. A strong economic growth is always associated with bullish stock performance. Besides, economic indicators have been monitored closely by investors and stock analyst.

Traditionally, stock markets are viewed as a predictor of economic growth. In order to determine the stock prices, investors estimate the future earning of firms, which is closely tied to economic environment. Therefore, stock prices are closely related to economic growth.

Chen, Roll and Ross (1986) identified four macroeconomic variables which systematically affect the stock return. Those variables included the spread between long term and short term interest rates, expected and unexpected inflation, industrial production and the spread between high and low grade bonds.

On the other hand, there are theories which argue that development of stock market affect economic growth. For example, Levine and Zervos (1996) argue that a functioning stock market affects liquidity, risk diversification, acquisition of

information about firms, corporate control and saving mobilizations. By altering the quality of these services, stock market is able to affect economic growth.

Economic growth is affected by stock market's liquidity (Levine & Zervos, 1996). Many high return projects require long-term commitment of capital. However, most of the investors are reluctant to have their funds tied up to a project for long period, therefore, less investment goes to the high return project which require long-term commitment. Through a well functioning stock market, investors can sell their stake of a company confidently and without high transaction cost any time they want, thus enable more high return and long term project to happen.

Stock markets also provide risk diversification and shift investment to higher return and higher risk project, thus, enhance economic growth. Stock markets may also promote the acquisition of information about firms. Investors who have gotten information about firms maybe able to make high profit through information asymmetry. Besides, investors also like to know more about the companies they invest in to safeguard their investment.

Finally, stock markets can facilitate saving mobilization. High return projects, which require large capital is made possible with stock market. Large projects are able to exploit economies of scale and improve economic efficiency.

~~1.2~~1.2 Problem Statement

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The linkages between stock market and economic growth are important to both investors and policy makers in decision-making. The linkages of macroeconomic variables and stock markets of developed economy like United State are well documented, however, literatures that focus on developing economy particularly Malaysia is very limited. A list of literatures that performed study in Malaysian

context includes Ibrahim (1999 & 2000), Ibrahim and Aziz (2003), Ismail and Ooh (2001) and Yu (2005).

There are some macroeconomic variables which are identified to have positive linkages with stock prices, this includes consumer price index (Ibrahim, 1999) and gross domestic product (Ismail & Ooh 2001). On the other hand, some variables had been identified to have no linkages with stock price, for example exchange rate (Ibrahim, 1999 & 2000). However, there are some variables which show inconsistent linkages with stock prices, for example money supply. Study of Ibrahim (1999) shows no linkage between money supply and stock price while the study of Ismail and Ooh (2001) shows the opposite. The limited literature do not provide clear evidence about the linkages between macroeconomic variables and stock market, thus more studies are needed in order to help investors and policy makers in decision making, especially after Asia financial crisis and after capital control implementation in Malaysia.

Malaysia implemented capital control in September 1998 when Asian financial crisis deepening. With the implementation of capital control, Malaysia produced faster recovery compare to Thailand and Korea (Kaplan & Rodrik, 2001). Study of Chatterjee, Ayadi and Maniam (2003) indicates the relationship between Malaysia stock market and other stock markets in Asian countries including Thailand, Indonesia, Korea, Singapore and Hong Kong. However, study focuses on the changes of the stock and macroeconomic relationship in Malaysia is still lacking.

~~1.3~~1.3 Research Objectives

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The first and main objective of this research is to study the linkages between stock return in Malaysia and macroeconomic variables by testing the

cointegration of these variables. Cointegration test is used to determine if there is a long run relationship between stock return and macroeconomic variables concerned.

The second objective of this study is to establish a causal relationship of stock return and macroeconomic variables using the Granger Causality Test. Granger Causality test is used to identify the direction of causal relationship of stock return and macroeconomic variables.

The final objective of this study is find out if there is any changes in the long run and causality relationship between stock return and macroeconomic variables. The study is conducted by dividing the period of study into pre capital control (1990 Q1 to 1998 Q3) and post capital control (1998 Q4 to 2004 Q4).

~~1.4~~1.4 Research Questions

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The 3 questions that intended to answer by this study are:

i) Does stock return cointegrate with Malaysia macroeconomic variables?

ii) Is there a Granger causal relationship between KLCI and macroeconomic variables? If there is, which variables Granger cause the others?

iii) Is there any change on the relationship of Malaysia stock return and macroeconomic variables after the implementation of capital control?

~~1.5~~1.5 Significance of Study

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From investors' point of view, investors would like to understand a firm's future earning capability to better safeguard investment. A well established stock prices and economic growth relationship can serve as an analysis method. Investors can gain better understanding of the company future performance, and thus, determine the stock price more accurately.

From policy makers' point of view, a well-established stock markets and economic growth relationship can serve as indicator of economic growth. This will help policy makers in formulating policy which stabilizes the economy.

~~1.6~~1.6 Organization of Thesis

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Chapter 1 provides an introduction on the problem of research. Chapter 2 reviews the relevant literatures. Literatures related to stock market and macroeconomic linkages will be reviewed. This is followed by a proposal of the theoretical framework and development of research hypotheses. Chapter 3 discusses the methodology of study and also the sources of data. Subsequently, Chapter 4 analyzes the research hypotheses and presents the findings of the study. Finally, the managerial implications and the conclusion of the research will be discussed in Chapter 5.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews all the literatures related to the relationship between stock prices and macroeconomic variables. Section 2.1.1 reviews literatures focusing on stock market development and economic growth. Section 2.1.2 reviews literatures which focuses on stock markets and macroeconomic linkages in developing countries. Finally, section 2.1.3 reviews literatures which study the linkages of stock market and macroeconomic in Malaysia context.

2.1.1 Stock Markets Development and Economic Growth

There are a lot of theories argue that stock markets affect economic growth. For example Bencivenga, Smith and Starr (1996) argue that stock market liquidity is important for economic growth, and stock market liquidity is inversely related to level of transaction cost. While Kyle (1984) and Holmstrom and Tirole (1993) argue that liquid stock markets can increase incentive for investors to acquire information about firms and improve corporate governance.

On the other hand, there are also theories argue that stock markets have no effect on economic growth. For example, Mayer (1988) argues that large stock markets are not important sources of capital for corporate.

Stock market development is a complex and multifaceted concept which can not be measured using a single indicator (Dermirguc-Kunt & Levine 1996). Therefore, Dermirguc-Kunt and Levine (1996) developed a set of stock market

indicators with the purpose to facilitate and stimulate research into relationship among stock markets, economic development and corporate financing development.

Dermirguc-Kunt and Levine (1996) constructed the aggregate indexes by combining a set of stock market indicators to facilitate assessment to overall stock market development. The indicators developed by Dermirguc-Kunt and Levine (1996) included the following stock market indicators:

a) *Market size which measured* using market capitalization ratio which equals to the value of listed share divided by Gross Domestic Product (GDP) and number of listed companies.

b) *Market liquidity which measured* using total value traded divided by GDP and total shares traded divided by market capitalization.

c) *Market concentration* which measured the shares of market capitalization accounted for by the ten largest stocks.

d) *Market volatility which measured using* twelve-months rolling, standard deviation estimate based on market return.

e) *Asset pricing efficiency is measured using estimates of asset pricing error.*

f) *Regulatory and institutional development* which is measured using information provided by IFC and also seven other indicators constructed by Dermirguc-Kunt and Levine (1996).

The aggregate indexes have been used by several authors in their investigation of the relationship between stock market development, financial intermediaries and economic growth.

Using the aggregate indexes developed by Dermirguc-Kunt and Levine (1996), Levine and Zervos (1996) examine the relationship between stock market development and economic growth. By examining the data from 41 countries over period from 1976 to 1993, the results show a strong and positive correlation between stock market development and long run economic growth (measured by growth rate of gross domestic product per capita).

However, cross country growth regression usually suffer from measurement, statistical and conceptual problem. Furthermore, cross-country regressions do not provide insight of causality. Therefore, Levine and Zervos (1996) recommended extending the research by examining the time series relationship between stock market development and economic growth

Equity and debt are main sources of finance for firms. An empirical study by Demirguc-Kunt and Maksimovic (1996) indicates a negative correlation between stock market development and debt to equity ratio. A well functioning stock market provides easy access to equity market thus increase the equity financing compare to debt financing.

Using time series regression, Arestis and Demetriades (1997) performed empirical study on linkages between financial market development and economic growth (measured by real GDP per capita). The study shows a positive relationship between financial market development and economic growth. On top of that, the study also indicates there is difference between these linkages in Germany and United State. Thus, Arestis and Demetriades (1997) suggested long run relationship between financial development and economic growth varies across countries.

Filer, Hanousek and Campos (1999) performed study on linkage between stock market and economic growth using cross-country of 66 countries. Different

from previous studies, these 66 countries were divided into 3 groups based on level of financial freedom and income. These results can be summarized as follow:

i) There is a strong relationship between stock market activity and future economic growth for lower income countries, but not in higher income countries.

ii) Stock market in more developed economies incorporated future growth in to current prices, this is consistent with efficient market hypotheses.

iii) Increased equity market activity has no impact on economic growth in developing countries;

The results from this study further support Arestis and Demetriades' (1997) argument about variation of stock market and economic growth relationship across countries.

Shan and Morris (2002) studied the linkage between financial development and economic growth on 19 countries using Granger causality test. The results support the conclusion of Arestis and Demetriades (1997) and Filer, Hanousek and Campos (1999) that the linkage between financial development and economic growth may be countries specific. Shan and Morris (2002) suggest the linkages maybe influenced by differences in industrial structures and cultures.

Ewing (1998) examined whether or not budget deficits impact the movement of stock market in Australia and France. The results suggest that past deficits contain information about future movement in the stock market of both Australia and France. This implies that deficits have impact on stock market movement in Australia and France.

The relationship between budget deficit and stock prices in United States, France, Germany and Japan were studied by Adrangi and Allender (1998). Data included in this study covered the period from 1974 to 1998. The study shows a mix results where budget deficit affects stock prices in US, but not in France, Germany and Japan. This result implies that as deficits fall, interest rates, and the dollar's value fall, leading to an increase in corporate profits in the U.S. because of strong domestic as well as export revenues. The stronger sales are likely to lead to higher net earnings, thus, rising stock prices.

Darrat and Brocato's (1994) study of stock return and budget deficit relationship shows budget deficit influences stock market. Similarly, Ewing's (1998) study also indicates that budget deficit exert a significant influence to the movement of stock in Australia and France.

2.1.2 Linkages of Stock Market and Economic Growth in Developing Countries

Comment [A1]: 2.1.2 is newly added.

Chung and Shin (1999) performed study on linkages of stock market and macroeconomic variables of Korea, with the objective to find out how does a less developed stock market in Korea respond to economic variables, compared with well-developed, well-organized and more efficient markets such as United State stock market. Cointegration test and Granger causality test were used in this study. Macroeconomic variables included in this study are production index, exchange rate, trade balance and money supply.

The results of the study illustrates that stock price is cointegrated with the all macroeconomics variables included in the study. This cointegration relationship indicates direct long-run and equilibrium relations with those variables. The results also indicate the change in stock price lag behind those economic activities. This is

inconsistent with the findings that the stock market rationally signals change in real activities (Fama, 1991).

A similar study to examine the relationship between stock market and macroeconomic was also performed by Garcia and Liu (1999). Macroeconomic determinants of stock market development in Latin America and East Asia were examined by Garcia and Liu (1999) with the objective to explain the differences between these 2 developing economies. The effect of real income, saving rate, financial intermediary development, stock market liquidity, and macroeconomic stability on stock market capitalization were examined in this study. The results indicate East Asia has a more developed stock market than Latin America. The results also suggest that this is due to the sustained economic growth, the higher saving rate, the more liquid stock market and the more developed banking sector in East Asia.

To add to the line of study of emerging economies, El-Wassal (2005) examined the relationship between stock market growth and economic growth, privatization on 12 emerging economies. Johansen Cointegration and Granger Causality tests are employed in this study. In this study, market capitalization and market liquidity were employed as stock market growth indicators. Besides, IFCG total return index introduced by Emerging Market Data Base was also included. The IFCG total return index is total returns including dividend in US dollars. On the other hand, industrial production index is used as an indicator of the real economic growth, while number of listed companies is used a proxy of financial liberalization.

The results of cointegration analysis indicate existence of long run relationship between stock market growth, and real economic activity, privatization, and stock return in India, Malaysia, Philippines and Zimbabwe. On the other hand, the results

also indicate that such relationship absent in Chile, Colombia, Greece, Pakistan and Venezuela.

The results of the Granger Causality test indicate that economic growth leads and finance follows in Korea, while a two way causality relationship exists in Malaysia, Philippines and Zimbabwe. These results further show that the privatization programs have a significant impact on stock market activities.

2.1.3 Linkage of stock market and economic growth in Malaysia

Even though much attention has been given to this topic recently, however the empirical study in this topic is relatively limited in Malaysian context. Evident has been found by Habibullah (1998) to support the positive correlation between money supply and stock prices in Malaysia. Habibullah's (1998) study indicates there is a long run relationship between the stock prices at Bursa Malaysia and domestic macroeconomic variables, which includes M1, M2 and national output.

Ibrahim (1999) investigated the relationship between Bursa Malaysia stock prices and 7 macroeconomic variables using cointegration and Granger Causality Test. The study suggests cointegration between stock prices and consumer prices, credit aggregates and official reserves. The cointegration of stock price and consumer price, credit aggregates and official reserves suggests the existence of long run relationship between these variables.

However there is no clear evidence of cointegration between stock prices and industrial production, M1, M2 and the exchange rate, and this suggests there is not long run relationship between stock prices and industrial production, M1, M2 and exchange rate. Besides, the results also suggest that the stock prices are Granger caused by changes in the official reserves and exchange rate.

From bivariate error correction models, the study shows the reactions of stock prices to deviations from the long run equilibriums.

In another study, Ibrahim (2000) extended his investigation in the relationship between stock market and exchange rate. Unlike the previous study, 3 alternative measures of exchange rate were used; these measures included real effective exchange rate, nominal effective exchange rate and bilateral RM/USD rate. In addition, money supply (M2) and reserve also be examined.

Consistent with the previous study, the results indicate no long run relationship between stock market index and any of the 3 exchange rates. However, there is some evidence of cointegration between stock market index and money supply and reserves.

On the other hand, results from causality tests show there is a unidirectional causality from stock market to exchange rate. Besides, the results also show stock index is Granger caused by money supply and reserves.

Ibrahim and Aziz (2003) investigate the relationship between Kuala Lumpur Composite Index (KLCI) and 4 macroeconomic variables (industrial production index, consumer price index, M2 and exchange rate). The data coverage for this study has been extended to 1998 compare previous study (Ibrahim, 1999) which only covered until 1996.

The cointegration test results indicate a long run positive relationship between stock prices and consumer product index. This is consistent with the finding of Ibrahim (1999). However, the results indicate a positive relationship between stock price and industrial production index, this is contracting with the finding of Ibrahim

(1999). On the other hand, the results indicate and negative relationship between stock prices with M2 and exchange rate.

Besides cointegration test, Ibrahim and Aziz (2003) also specify a dynamic model using VAR framework, and the authors also generate variance decompositions and impulse response functions to examine the short-run dynamic interaction among the variables. The results indicate the stock prices respond to innovations in the macroeconomic variables.

The result shows one standard deviation shock in money supply results in positive equity price response. This means money supply has immediate positive liquidity effects and possible long run negative effect. The results also indicate positive lagged response of the stock prices to the industrial production innovation, however, the stock prices respond negatively to Ringgit depreciation shock. The negative response to Ringgit depreciation shock may due to the Malaysian economy's high dependence to imported capitals.

In the same study, the authors implement rolling regressions of VAR model to see if there is an evolving pattern in dynamic linkages among the stock prices and the macroeconomic variables. Window size of 13 years was used in this study. Observations from year 1998 were removed as it caused irregularity at the result due to financial crisis. The results from rolling regression is in line with those from the whole sample.

While Ibrahim (1999 & 2000) used KLCI as a measure of Bursa Malaysia stock prices, Ismail and Ooh (2001) investigate the relationship between stock market and economic growth using Industrial Stock Index as a measure of stock market. Industrial Stock Index was used instead of Composite Index (KLCI) due to the increasing proportion of industrial stocks in Bursa Malaysia compare to other sectors

under the New Economic Plan. The importance of industrial sector has been increased compare to other sector in term of GDP contribution and in term of jobs creation. Macroeconomic variables included in this study include gross domestic product (GDP), base lending rate, total money supply, investment ratio and export ratio.

The study found that Industrial Index show significant correlation with GDP, M1, M3 and export ratio, while Industrial Index show insignificant correlation with capital investment ratio. Through Granger Causality test, the results indicate that Industrial Index lead Malaysia economic growth by 2 quarters.

Using Granger causality test, Yu (2005) conducted a study on dynamic interaction between KLCI and macroeconomic fundamental in Malaysia. Monthly data of Industrial Production Index, Consumer Price Index, M1, Three Month Fix Deposit Rate, Treasury Bill Rate and Foreign Exchange Rate were used in his study. The results of the study partially supported the efficient market hypothesis. Market usually is not efficient during the crisis years, for example year 1985 to 1987 and year 1997 to 1999. Market inefficient happened in this period due to government intervention.

2.2 Theoretical Framework

Macroeconomy is the environment where the firms operate. Macroeconomic variables are the indicators of macroeconomic situation which affect firms' opportunity to increase sale or to make investment. According to the stock valuation model, stock price represents the discounted present value of the firms' expected cash flow. This implies that any economy factor which influences the firms' future cash flow will affect stock price. The objective of the study is to find out if Bursa Malaysia stock prices cointegrate with macroeconomic variables.

Chen, Roll and Ross (1986) argue that macroeconomy systematically affect stock return. On the other hand, Levine and Zervos (1996) argue the level of development of stock market affect economic growth. However, the relationship of stock markets and economic growth varies from country to country. Therefore, the second part of the study is to establish a causal relationship between Bursa Malaysia stock prices and economic growth using Granger Causality Test.

With the restriction of capital flow and fixed exchange rate after the implementation control, macroeconomic environment and financial market will be changed. This will eventually lead to changes on the long run and causal relationship between stock return and macroeconomic.

2.3 Hypothesis

The following hypotheses are formulated to address the research questions of section 1.4. The first hypothesis is used to investigate the relationship between stock prices of Bursa Malaysia and macroeconomic variables in Malaysia.

Hypothesis 1: Stock return in Bursa Malaysia cointegrate with macroeconomic variables in Malaysia.

The second and third hypotheses are used to investigate the causal relationship between Bursa Malaysia stock prices and macroeconomic variables.

Hypothesis 2: Bursa Malaysia stock return Granger cause macroeconomic variables.

Hypothesis 3: Macroeconomic variables Granger cause Bursa Malaysia stock return.

The final hypothesis is used to study if there is any change on the relationship between stock return and macroeconomic variables after the implementation of capital control.

Hypothesis 4: There is no change on the relationship between stock return and macroeconomic variables after implementation of capital control.

Chapter 3

METHODOLOGY

3.1 Data Collection

All series of data used in this analysis are quarterly, covering the period from 1991 Q1 to 2004 Q4. Stock market data was obtained from Bank Negara Malaysia Official Website, Bursa Malaysia and various issues of Investor Digest. Macroeconomic variables data was obtained from IFS database, various issues of Bank Negara Monthly Statistic Bulletin and Bank Negara Economy Report.

3.2 Research Variables

Kuala Lumpur Composite Index (KLCI) is used as stock indicator in this analysis. KLCI is constructed based on 100 "heavy weight" stocks in Bursa Malaysia. This index is weighted by market capitalization. The base year (the year when KLCI equal to 100) of the index is 1977. Most of the analysis performed in Malaysia context, which include Ibrahim (2000), Ibrahim and Aziz (2003), used end of quarter value of KLCI as the indicator of Malaysia stock market. However, to avoid the effect of "window dressing" during every end of quarter, the KLCI quarterly average value is used in this analysis.

In addition to KLCI, Second Board Index (SBI) are also used as an indicator of stock market. The return is calculated using the following equation as recommended by Chatterjee, Ayadi and Maniam (2003).

$$\mathbf{R}_t = \ln(I_t) - \ln(I_{(t-1)}) \qquad (3.1)$$

Where I_t and $I_{(t-1)}$ are the respective average stock index at time *t* and *t-1*. R_t is the corresponding rate of return on the stock index. The logarithmic forms are used as most economic and financial time series follow curvilinear trends.

In line with Ibrahim and Aziz (2003), macroeconomic variables included in this study are real output (measured by GDP), price level (measured by CPI), money supply (M1 & M2). In addition, new variables industrial production index (IPI) and government budget deficit are also included in this study. Data coverage is from 1991 to year 2004. The data are divided into pre and post capital control period with the purpose to examine if there is any difference on the linkage after implementation of capital control in September 1998.

Gross Domestic Product (GDP) is defined as the market value of all final goods and services produced within a country in a given period of time. GDP is divided into four components: private consumption, investment, government purchase of goods and services and net export. Growing GDP indicates an expanding economy which provides opportunities for firms to increase sales and improve profitability, thus boost up the stock prices.

Similarly, Industrial Production Index (IPI) is another popular measure of economy's output. In Malaysia, IPI is the measure of the rate of change in the production of industrial commodities in real terms over time. The commodities comprise product of manufacturing, mining, and electricity commodities. IPI are obtained from Department of Statistics Malaysia. Theoretically, High IPI indicates high capacity utilization in industry sector which lead to high profitability of firms. This will eventually leads to higher stock prices.

Consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer. CPI is calculated based on a fix basket of

goods and services which a typical consumer will purchase. Rate of change of CPI is one of the key measures of inflation or deflation. Rising CPI indicates high inflation rate, which is associated with high demand for goods and services and eventually lead to increase on prices level and reduce on purchasing power, thus hinder sales growth and profitability of firms and eventual reduce stock prices.

Money aggregate (M1 & M2) is the measure of total money flow in an economy. Money supply is measured using M1 and M2. M1 is a narrow measure of money's function as a medium of exchange. M1 includes currency, traveler's check and checkable deposit. M2 is a broader measure that also reflects money's function as a store of value; M2 includes everything in M1 plus saving, money market mutual fund and some other minor categories. In general M2 has broader classification of money than M1, therefore, M2 is better indicator for money supply

Money aggregate has powerful influence to a lot of economic variables because money is used in virtually all economic transactions. Mukherjee and Naka, (1995) argue that expansionary effect of money supply on economic activity suggests a positive relation with stock prices. Increase in money aggregate puts more money in the hands of consumers, making them feel wealthier and cause them to increase spending. This leads to sales increase in business firms and business firms will respond by increasing production. Thus, stock prices will rise. On the other hand, if money aggregate continue to increase, prices of goods and services begin to rise, eventually inflation will follow, and stock prices will fall. Bulmash and Trivoli (1991) argue that continued increase in money supply may exert a negative effect on the stock prices due to rising of inflationary pressure. In general, the relationship between money supply and stock price can be positive or negative (Ibrahim & Aziz, 2003).

Budget deficit occurs when government's spending is higher than income. The difference between income and spending is call deficit. On the other hand, when government's spending is lower that income, budget surplus occur. Budget deficit increases demand on loan, place upward pressure on the interest rate lower stock prices. Darrat and Brocato (1994) argue that knowledge of increasing budget deficit might lead to following expectation:

1. Increase in future taxes to cover government spending
2. Increase in interest rate as expected increase in government borrowing
3. Increase in risk premium associated with deficit induced financial market uncertainty

Those expectations will eventually affect stock price.

3.3 Data Analysis

In this analysis, all data series are divided into 2 sub-period: pre capital control (1991 Q1 to 1998 Q3) and post capital control (1998 Q4 to 2004 Q2). Capital control was implemented in Malaysia at September 1998. The two groups of data will be analyzed separately to examine if there is any difference on the relationship between the stock return and macroeconomic variables.

Analysis for the relationship between the stock return and macroeconomic variables can be done in 4 stages.

The very first stage in this analysis is the correlation test on the independent variables. The correlation test results indicate how closely the relative positions of two or more variables agree with one another. Or stated another way, the correlation indicates the correspondence, or lack of correspondence between the relative positions of two or more variables.

The second stage of analysis involves verifying order of integration of variables used. Augmented Dickey and Fuller (1981) and Phillips and Perron (1988) tests are the two popular tests used to test the order of integration.

The third stage involves investigating the cointegration relation. For this purpose, the Johansen and Juselius (1990) maximum likelihood approach is used. Cointegration test is used to determine if there is any long-run equilibrium relationship between stock return and the variables concerned. Multiple regression test also added as robustness test.

If two variables are cointegrated, Granger causality relationship must exist at least in one direction. Finally, when cointegration is established, the third step involves testing of the direction of causality.

3.3.1 Correlation Test

The correlation coefficient indicates how closely the relative positions of two or more variables agree with one another. Correlation test is conducted on independent variables to better understand the relationship between independent variables.

The correlation test is conducted by calculating the Pearson Product Moment Correlation Coefficient, *r* or in short correlation coefficient. The correlation coefficient is a number that can range from -1 to +1. -1 indicates perfect negative correlation, 0 indicates no correlation while +1 indicates perfect positive correlation.

3.3.2 Basic Unit Root Theory

As a pre-requisite for cointegration analysis, the integration properties of the variables need to be evaluated. A variable which is integrated of order *d*, need to be differenced for *d* times to become stationary. Long run relation exists between the variables only if all the variables have the integration order of 1 (All variables are I(1)).

Consider the following stochastic process

$$Y_t = \rho Y_{t-1} + \varepsilon_t \qquad -1 \leq \rho \leq 1 \qquad (3.2)$$

Where ε_t is white noise error term. If $\rho = 1$, the process becomes a random walk model without drift which known as non-stationary stochastic process. Therefore, by regressing Y_t on its lagged value Y_{t-1} and find out if the estimated ρ is statistically equal to one, the stationarity of the series can be determined.

Equation (1) also can be written as

$$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + \varepsilon_t$$

$$\Delta Y_t = (\rho - 1) Y_{t-1} + \varepsilon_t$$

which also can be written as

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t \qquad (3.3)$$

where $\delta = (\rho - 1)$ and Δ is the first difference operator.

Null hypothesis $\delta = 0$ will be tested. If $\delta = 0$, that means the time series under consideration is non-stationary and unit root exist.

In order to determine δ, we can take the first difference of Y_t and regress them on Y_{t-1} and find out the estimated slope coefficient. However, the normal t test cannot

be used to test the estimated coefficient of Y_{t-1}. This is because under the null hypothesis $\delta = 0$, the t value of the estimated coefficient of Y_{t-1} does not follow the t distribution.

Two frequently used methods to test unit root are Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. These two tests are used to determine the order of integration of all variables under consideration in the study.

Augmented Dickey-Fuller (ADF) Test

The standard Dickey and Fuller test is carried using the following equation.

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t$$

Value of δ will be estimated and test against following hypothesis:

H_0: $\delta = 0$

H_1: $\delta < 0$

However, Dickey and Fuller (1979) show that under the null hypothesis of a unit root, δ statistic does not follow the conventional Student's t-distribution. Dickey and Fuller (1979) then derive asymptotic results and simulate critical values for various test and sample sizes. More recently, MacKinnon (1991 & 1996) implements a much larger set of simulations than those tabulated by Dickey and Fuller. Therefore, the more recent MacKinnon critical value calculations are used by EViews in constructing test output.

The standard Dickey and Fuller test is only valid for AR(1) process. Therefore, if the series is correlated at higher order lags, the assumption of ε_t is a white noise will be violated. The Augmented Dickey-Fuller (ADF) test adding *p* lagged terms of the dependent variable Y on the right hand side of the equation.