THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND STOCK PRICES

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DECLARATION

We hereby declare that:

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

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

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

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LIST OF ABBREVIATIONS

CPI	Consumer Price Index
FTSE	Financial Times Stock Exchange
DSE	Dhaka Stock Exchange
FBM KLCI	FTSE Bursa Malaysia Kuala Lumpur Composite Index
EMH	Efficient Market Hypothesis
APT	Arbitrage Pricing Theory
PVM	Present Value Model
KLCI	Kuala Lumpur Composite index
DW	Durbin-Watson
ARCH	Autoregressive Conditional Heteroscedasticity
ADF	Augmented Dickey Fuller
VIF	Variance Inflation Factor
OLS	Ordinary Least Square
SSRN	Social Science Research Network
DV	Dependent Variable
IV	Independent Variables
ARDL	Autoregressive Distributed Lag Model

ABSTRACT

This paper examines the significant relationship among the macroeconomic variables on stock prices in Bursa Malaysia. The macroeconomic variables which are selected are inflation, interest rate, exchange rate, money supply and reserves. The data employed are in monthly basis which range from January 2002 to December 2011. OLS (Ordinary Least Square) method is employed to estimate the regression. In order to counter the four econometric problems which are multicollinearity, autocorrelation, heteroscedasticity and model specification error, various diagnostic testing are employed such as VIF (Variance inflation factor), LM (Breusch-Godfrey serial correlation Lagrange multiplier test), ARCH (Autoregressive conditional heteroscedasticity), ARDL (Autoregressive distributed lag model), Ramsey's RESET test, and normality test. The results showed that the interest rate and money supply have significant positive relationship with the stock prices while inflation, exchange rate, and reserves have significant negative relationship with the stock prices.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

This chapter is an introductory chapter which provides an overview of this research topic of relationship between macroeconomic variables and stock prices in Bursa Malaysia and explains the research problem statements leading to the research objectives and research questions of this study.The objective of this research is to investigate the relationship between the macroeconomic variables such as inflation, interest rate, exchange rate, money supply and reserves on stock prices in Bursa Malaysia. However, this chapter will cover seven parts which included research background, problem statement, research objectives, research questions, hypotheses of the study, significance of the study and chapter layout.

1.1 Research Background

Share market is a channel for the corporate businessman to raise their capital for business and investment activities. According to the main economic theory, it suggested that exchange rate is determining by the macroeconomic variables such as inflation rate and interest rate differential but it also suggested that there also have a relationship between the stock price and economic variables (NurulHaida Johan, ZuraidahSipon, Nor' AzurahBteMdKamdari, 2012). Therefore, the interaction between stock market and economic variables has been widely researched in the financial economic literature. The researchers applied different economic instruments to find out the relationship between the stock market and the economic variables. For example, the arbitrage pricing theory has been investigated by Schwert(1990); the vector error correction model has been employed by Engle, Granger(1987); the Granger causality tests have been applied by Hassan(2003).

"Share prices on Bursa Malaysia closed lower today tracking the lower regional markets on worries of slower economic activities globally, dealers said. 'The Malaysian market is not an exception. Fund managers worldwide are holding on their investments as the markets are too volatile,' a dealer said. …"

Excerpt from: "Bursa finishes lower tracking regional market"
Source: Malaysia Insider, Fri. Oct. 24, 2008

From the quote above, it resulted that how stock market volatility has implications on financial and economic activities in Malaysia and the major stock market around the world will be consequence by the Malaysia stock market.

In financial theory, inflation happens either when prices of goods and services go up or when it needs more money to buy the same items. So, it will be reflected by consumer price index (CPI) which represents an overall upward price movement of goods and services. The researchers believed that the inflation rate will affect the stock market volatility and risk. Most of the stock market in Asia country have been experienced sell-downs with foreign funds transferring their money to a more matured market even though the inflation in the region has becomes more of a concern.

In Malaysia, according to the data compiled by Maybank Research, foreign funds had been turned sellers, it selling off RM1.18 billion worth of shares on 2011. While OSK research report claimed that funds were taking profit gained on 2010 were made by the most emerging markets. So, in the case of Malaysian market, it yield a 31 percent return in US dollar term. On year 2011, the Bursa Malaysia data also revealed that foreign investors that participate in the local stock market are dropped as early as last month as foreign buyers net purchases took a dip. The net purchase of local stocks are dropped to RM100million in January time, a steeply fall from RM2.6 billion in December. Therefore, it is confirmed that shifting the funds can be affected by the economic growth of the nation where inflation plays an important role.

Besides that, in Malaysia, the improved performance for the economy and stronger economic fundamentals in year 2000 further increased the confidence of investors. The composite index of Financial Times Stock Exchange (FTSE KLCI) improved to 1,009.53 points on 24 February 2000, an increase of 284 percent compared to the year of 1998, on 1st of September. Therefore, performance of Financial Times Stock Exchange (FTSE KLCI) should be investigated by using the development in the domestic economy and the performance of the companies that listed on the FTSE KLCI.

In additional, Federal Reserve is the financial market that gets the most benefit, it is because of Federal Reserve does more on quantitative easing. An increasing in stock market, it won't cause the overall economy to improve rapidly. It is because of the Federal Reserve has an inflation to other false stock market bubble which it with a lot of money, but it not means that the U.S economy is in great shaped situation.

Moreover, an increase of the money supply growth rate, it will affect the stock price and cause an increase over the stock prices. While f the money supply is fall, it will cause the stock prices to decrease. According to stock market analysis, the movement of money supply is now been treated as an indicator, which trends with the central bank monetary policy and it able to provide information on movements of future stock prices.

Furthermore, exchange rate changes will directly affect the international competitive of firms, giving their impact on input and output price. Usually, foreign exchange rate volatility influencing the value of the company since the future cash flows of the company change together with the fluctuations in the exchange rate. The exchange rate appreciate will bring either negative or positive effect on the stock market for the export and import of the country. Exchange rate can influence the stock market not only on multinational or export-oriented company but also on domestic companies.

However, the empirical evidence on the influence of economic variable on the stock market is showed there is an inconsistent. Although, economic or financial

theory had suggested that the economic variables are playing an important role on the stock market by influencing the money supply, interest rate, exchange rate, inflation rate and reserves. Therefore, there has no consistent about the relationship between stock market and economic variables and the empirical studies for the relationship are always inconclusive.

1.2 Problem Statement

Many economies have undergone a high instability during the Asian financial crisis. According to the general mood of the market and several factors influencing individual stocks, the stock prices traded in the stock market tend to fluctuate. The factor influences market situation may result in stock prices to fluctuate at any time. As a result, many Asian exchange rates were pegged to the US dollar which consists of Malaysian Ringgit owing to the crisis.

Ross (1976) and Fama (1981) indicated that stock prices may have been influenced by several factors for instance interest rate, exchange rate and money supply. However, the aspect of the impact of macroeconomic variables on the stock price movement has not been completely examined. On the other hand, the analyses on the relationship between macroeconomic variables and stock prices also have not been well discussed especially in Malaysia.

Stock prices movement serves as a channel of monetary transmission mechanisms and may affect the variability of economic activities. An increase in domestic stock prices indicates that domestic financial assets are become more attractive. Hence, firms or individual investors would regulate their domestic and foreign portfolios by requiring more domestic assets. The regulations of portfolio of individuals and firms will result in a domestic currency's appreciation. Owing to these regulations, interest rate and money supply may also be impacted.

Since the stock market performance had influenced from the economy downturn in year 2008 as the macroeconomic variables are sensitive towards the movement

of the Malaysian economy. Thus, this study will extend the research about investigate the relationship between macroeconomic variables and stock performance in Malaysia.

1.3 Research Objective

The research objectives are mostly based on the problem statement that we had found on the above. It illustrates both of general and specific objectives of this study.

1.3.1 General Objective

This research is aims to examine the effect of selected macroeconomic variables on stock prices and analyze stock market performance in Bursa Malaysia. This study applies a selected set of macroeconomic variables which included inflation, interest rates, exchange rate, money supply and reserves by using the monthly data series for the period start from year 2002 to 2011.

1.3.2 Specific Objective

The objectives of this paper are:

i. To identify whether there is significant relationship between the stock prices and inflation.

ii. To identify whether there is significant relationship between the stock prices and interest rate.

iii. To identify whether there is significant relationship between the stock prices and exchange rate.

iv. To identify whether there is significant relationship between the stock prices and money supply.

v. To identify whether there is significant relationship between the stock prices and reserves.

1.4 Research Question

In line with the research objectives above, the followings are the research questions of this study:

i. Is stock price has a significant relationship with inflation?
ii. Is stock price has a significant relationship with interest rate?
iii. Is stock price has a significant relationship with exchange rate?
iv. Is stock price has a significant relationship with money supply?
v. Is stock price has a significant relationship with reserves?

1.5 Hypotheses of the Study

i. H_0: There is no significant relationship between stock prices and inflation.
H_1: There is significant relationship between stock prices and inflation.

ii. H_0: There is no significant relationship between stock prices and interest rate.
H_1: There is significant relationship between stock prices and interest rate.

iii. H_0: There is no significant relationship between stock prices and exchange rate.
H_1: There is significant relationship between stock prices and exchange rate.

iv. H_0: There is no significant relationship between stock prices and money supply.
H_1: There is significant relationship between stock prices and money supply.

v H_0: There is no significant relationship between stock prices and reserves.
H_1: There is significant relationship between stock prices and reserves.

There are five hypotheses to examine whether the existence of significant relationship between macroeconomic variables and the stock performances in Bursa Malaysia. The first variable is to examine whether inflation has significant relationship with stock prices in Malaysia. Next hypothesis is to investigate significant relationship between interest rate and stock prices in Malaysia. Third, exchange rate will also be explored whether it has significant relationship with stock prices in Malaysia. Forth, this study will test whether the existences of significant relationship between the variables of money supply and stock prices in Malaysia. Lastly, reserves will also be investigated whether it has significant relationship with stock prices in Malaysia. H_0 is indicating that there is no significant relationship between stock prices and macroeconomic variables. H_1 is representing that there is significant relationship between stock prices and macroeconomic variables. Whenever the final results show more than significance level of 0.01, H_0 will be accepted. On the other hand, whenever the final results indicate less than significance level of 0.01, H_0 will be rejected.

1.6 Significance of the Study

The significant study for this research is to help both local and foreign investors to have a better understanding on the economic variables that will bring different influence to the stock market, so that the investors could make out an effective investment decision in different economy environment. It could lead the investor to reduce their exposure to risk during the investment decision making process. At the same time, it will also provide a guideline for the risk management purpose and investment strategy for the asset allocation.

Besides that, this research also will provide more information to the policy maker, and help the policy maker understand the full effect of economic variables toward the stock market. So, the policy makers could make a precise prediction which may help the government agencies in planning new policies to encourage more capital inflows into their capital market.

Furthermore, for the academic field, this research results could strengthen the theoretical framework of the factors of stock market movement from the perspective of developing economies like our country, Malaysia. So that the students can have better understanding on how the relevant variable will influence the Malaysia's stock market movement.

Other than that, the significant study for this research is to help the public to know more about which force leads the other can help in reducing the stock factor. It is due to the public will be wish to know what might happen in the economy or the financial market. Thus, the public will be able to take advance protective measures, for example, the public might choose to hold more save less or hold less save more during different economic environment or financial market.

Lastly, this study also will benefit to the traders as well. If the stock market have good response toward the economic variables, so it will attract more investors choose to invest on the firm or country, it will help to increase the firm value of traders, and this will bring a lot of income to traders.

1.7 Chapter Layout

This research involves five chapters as follows:

Chapter 1: Introduction / Research Overview

This chapter will provide an overview of this research topic of relationship between macroeconomic variables and stock prices in Bursa Malaysia and present

the research background, explain the research problem statements leading to the research objectives and research questions of this study. In this chapter has nine parts which consist of introduction, research background, problem statement, research objectives which included general and specific objectives, research questions, hypotheses of the study, significance of the study, chapter layout and conclusion.

Chapter 2: Literature Review

This chapter will be discussed and elaborated further on the relationship between stock prices and other macroeconomic variables in Malaysia based on previous studies and past literature review. This chapter presents the part of introduction, review of the literature, review of relevant theoretical models, proposed theoretical or conceptual framework, hypotheses development and conclusion.

Chapter 3: Methodology

This chapter describes how the research to be done by using the data collection method and data analysis method. In this chapter will list down all the data collection method and sampling design on how the research is carried out. This chapter consists of introduction, research design, data collection methods which included primary data and secondary data, sampling design which contained target population, sampling frame and sampling location, sampling elements, sampling techniques and sampling size, research instrument, constructs measurement, data processing, data analysis and conclusion part.

Chapter 4: Data Analysis

This chapter briefly discusses and elaborates the patterns of the results and analyses of the results which are pertaining to the research questions and hypotheses. Part of introduction, descriptive analysis which included respondent demographic profile and central tendencies measurement of constructs, scale measurement, inferential analysis and conclusion are included in this chapter.

Chapter 5: Discussion, Conclusion and Implications

This chapter concludes the research area by providing discussion on the research findings, conclusions, limitations and implications of the study and recommendations for the future research.

1.8 Conclusion

As the research background of the study, problem statement, research objective and research question are included in this chapter which help other researcher to understand and aware of the purposes and objectives of conducting this research. Moreover, hypotheses of the study and significance of the study which has also been covered in this chapter on how the research study gives the contribution to the public. Chapter layout is also involved in this chapter which provides us the understanding of the outline of each chapter of research report. In chapter 2, we will discuss about literature review, further research of theoretical models and theoretical framework based on the previous studies on the relationship between stock prices and other macroeconomic variables in Malaysia.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter consists of the literature review which is based on review of the published and unpublished information from previous researchers that is related to the topic of this research paper. It will divide into 4 sections which is review of the literature, review of relevant theoretical models, proposed theoretical or conceptual framework and hypotheses development.

In this chapter will discuss the relationship between the dependent variable (stock prices) and independent variables (inflation, interest rate, exchange rate, money supply, and reserves) by establish several hypothesis and linkage based on the previous research to explain and examine the relationship between them. In other words, this paper is going to analyze the previous works between the relationship of stock prices and its variables that mentioned as above.

2.1 Review of the Literature

As mentioned in the previous part, this review of the literature section will comprising of the research papers conducted by the other previous authors and researchers.

2.1.1 Stock Price & Inflation

The empirical evidence could be categorized into three parts. Firstly, research finding that provided support in favor of a positive relationship between inflation and stock market. A study concluded that there is a relationship between nominal stock market returns and inflation in United

Kingdom is positively related, a finding which consistent with the generalized Fisher hypothesis. By using data sets from 1802 to 1990 for the U.S and from 1820 to 1988 for Britain, the results supported that there is positive relationship between inflation and nominal stock market returns over long horizons (Boudhouch and Richarson, 1993). A study also found that there is an evidence of positive correlation between inflation and stock market in Greece between 1985 and 2003 (Ioannidis *et al*., 2004). A result also examined that unexpected inflation will raise the firm's equity values if the firm is a net debtor.

In contrast, Schwert (1990) conducted a research by using the data from UK and US markets. To investigate the relationship between stock market and inflation, the author examined 1-year stock market and 1-year inflation rate, and 5 years stock market returns and 5 years inflation rate. At the end, the research showed there is negatively related between the stock market and inflation in short term, but there is positive relationship in long term.

Consumer price index (CPI) and nominal wage index are generally used to measure inflation. In addition, Asprem (1989) also examined the inflation was inversely related to stock prices. The results of studies by Fama and Schwert (1977), Chen, Roll and Ross (1986) found that there is negatively correlated between inflation and stock prices. Moreover, Chen et al. (1986) pointed to a negative relation between inflation and stock prices.

Furthermore, an author investigated the relation between unexpected inflation and stock market returns. The result showed that there is a correlation between unexpected inflation and nominal equity return of Fama French book to market and size portfolios across the business cycle (Wei, 2009). There has four main finding in the research, firstly, there was strong evidence that equity returns respond more negatively to the unexpected inflation. Secondly, the equity returns with lower book to market ration and medium size were more negatively related to unexpected inflation. Third, the excess return was the only one factor responded to the changes in expected and unexpected inflation. Lastly, the cyclical patterns

of inflation beta would not explain based solely on how the bond prices are reacting to unexpected inflation (Wei, 2009).

Other than that, a study examines the negative relationship between stock market returns and inflation rate of industrialized economies for Brazil. In the study, the result showed that there was negative relationship between inflation and real stock returns, the finding support Fama's proxy hypothesis framework. The negatively related between the real stock returns and inflation rate for Brazil persists even after the inverse relationship between inflation and real activity is eliminated (Adrangi, Chatrath, and Sanvicente, 2000). So, the real stock returns might be adversely affected by inflation because inflationary pressure may threaten the firm's future profits. This result supported the interesting nation that the proxy effecting in the long run rather than short run.

Lastly, some of studies provided a mixed result. A study found that there is mixed empirical evidence between the stock market and inflation (Pearce and Roley, 1988). A report also suggested that there is negatively correlated between stock market prices and inflation in the short run but it also positively correlated in the long run (Anari and Kolari, 2001).

2.1.2 Stock Price &Interest Rate

Interest rate is deemed as one of macroeconomic variables to influence stock market performance in literatures and most of the studies recorded that there was a negative relationship between interest rate and stock prices. Those studies which is consistent with the theory in finance. Asprem (1989) had found that the interest rates influenced stock prices negatively. Economic theory anticipated that short term and long term interest rates have a negative influence on stock market returns. Humpe and Macmillan (2007) stated that the stock prices in United States and Japan is negatively related to long term interest rates.

Mysami, Howe and Hamzah (2004) argued that the relationship between short run and long run interest rate is found to be positive and negative respectively. This is owing to long run interest rate acts as a better proxy for nominal risk free component. It is applied in the discount rate for stock valuation models and might also act as a proxy for predicted inflation in the discount rate. Nevertheless, French et al., (1987) recorded that the relationship between both short term and long term interest rate and stock returns was negative.

Other than that, Uddin and Alam (2007) examined the linear relationship between interest rates and share prices, interest rates and changes of share prices, changes of interest rate and share prices, and changes of interest rates and changes of shares prices on Dhaka Stock Exchange (DSE). They found that both interest rates and changes of interest rates have significant negative relationship with share prices and changes of shares prices respectively. According to Asprem (1989) and Fama (1990), they illustrated that there was a negative relationship between interest rates and stock market returns in Korea.

On top of that, Alam and Uddin (2009) showed that there was an empirical relationship between interest rates and stock market index for fifteen developed and developing countries which comprise of Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain and Venezuela. For six countries, it was found that changes of interest rates have significant negative relationship with changes of stock prices. However, for all of the countries, it had found that interest rates have significant negative relationship with stock prices. Consequently, there would be great advantages of these countries' stock exchange by way of demand pull of more investors in share market and supply push way of more extensional investment of companies if interest rate is controlled for these countries.

Based on Suliaman et al., (2009), they indicated that interest rates in Pakistan are significantly influencing the stock prices. Fama (1990) and Chen et al., (1986) identified that the effect of nominal interest rates on stock prices was negative on future cash flows and thus will cause a decrease on stock prices. An increase in interest rates might increase financing costs and required rate of return while decrease future corporate profitability and stock market returns. Restrictive policies by mean of higher interest rates or discount rates would make cash flows worth less after being discounted. This would reduce investment's attractiveness and hence it might lower down the stock market return's value. From the "substitution effect" hypothesis, an increase in the interest rate would raise the opportunity costs of holding cash which lead to a substitution effect between stocks and other interest bearing securities for instance bonds and thus would lead to share price to be decreasing.

Interest rate is not only deemed as an indicator to carry out loose or tight policies for the monetary authority but also the execution of monetary policy affects stock prices via the credit channel. It had been found that there was an inversely relationship on stock prices (Bernanke and Gertler, 1995; Kiyotaki and Moore, 1997).

2.1.3 Stock Price & Exchange Rate

Most of the empirical literature that has determined the relationship of stock market and exchange rate has focused on developed countries but with a little attention on the developing countries, but these results of the studies are inconclusive. A study determined that fluctuation in exchange rate can significantly affect the values of the firms, by the changes in the terms of competition, the changes of input prices and the changes in the value of foreign currency denominated assets (Bodnar and Wong, 2002). Therefore, the firm's stock price and its stock market will both react to changes in the exchange rate. Griffin (2004) conducted a study in Thailand,

India, Korea and Taiwan, the result showed that the foreign flows have significant to the predictor of returns.

In contrast, Subair and Salihu carried a study on investigates the influence of exchange rate on Nigeria stock market. Through GARCH process the resulted showed that the exchange rate volatility is strong negatively related on the Nigeria stock market. While another study about the effect of daily currency depreciation on Korean stock market during the Korea financial turn oil of 1997 to 2000. These study concluded that the level of exchange rate depreciation is negatively affected the stock market (Fang and Miller, 2002). Moreover, by using several cointegration testing, the results suggested that the exchange rate have a negative influences on the Malaysia's stock market index in long run and short run as well (Foo, 2009).

In additional, Nieh and Lee (2001) found that there had bidirectional causality between exchange rates and stock prices in the short run but not in the long run. Besides, Malarvizhi and Jaya (2012) conducted a study on analysis the dynamic relationship between exchange rate and stock prices. US Dollar is a remarkable currency in foreign trade, therefore the authors used exchange rate of Rupee and US Dollar to conduct the research. The results explained that there is a bidirectional casual relationship between the exchange rate and stock market. Moreover, before the crisis exists, Brazil shows bidirectional relationship but Russia and India showed unidirectional relationship between stock market prices and exchange rate. While for the China, it shows no connection between these two variables (Ali, Anwar, Ziaei, 2013).

Furthermore, Hatemi-J and Roca (2005) examined the relationship between exchange rates and stock prices in Malaysia, Thailand, the Philippines and Indonesia in the periods immediately before and during the Asian financial crisis by using bootstrap causality tests with leveraged adjustments. They found that before the crisis, exchange rates Granger caused stock prices in Indonesia and Thailand, while the reverse in

Malaysia, but during the crisis, there was no significant relationship between the variables.

Lastly, some studies suggested that there is unidirectional causality between stock market and exchange rate. Stavrek (2005) carried a research by using monthly data to investigate the stock prices and exchange rate. The results showed there is causation between developed countries and exchange rate. This causation is can be seem to be a unidirectional relationship between the stock prices and exchange rates. The research for relationship between stock price and exchange rate is conducted by using the data from 2002 to 2010. In short run, India and Korea have unidirectional granger causality between stock price and exchange rate (Ray, 2012).

2.1.4 Stock Price & Money Supply

Money supply is the other macroeconomic variable that might influence on stock market returns or stock prices. The relationship between money supply and stock prices had found controversial in different markets. According to Palmer (1970) and Homa and Jaffee (1971), they illustrated that money supply is positively correlated with stock prices in United States.

According to Fama (1981), there was a positive relationship between money supply and stock prices. Those studies conducted by Rozeff (1984), Campbell (1987) and Kaul (1987) stated that the money supply influenced stock prices positively. Besides that, Jiranyakul and Brahmasrene (2007) studied that money supply had a positive impact on the Thailand stock market index. On the contrary, Sulaiman et al., (2009) argued that there was a significant negative relationship between money supply (M2) and stock prices. Nevertheless, Azzez and Yonezawa (2006) concluded that money supply had significant impact on expected stock prices.

Most of the literatures had found that it was a positive co-integration between changes in money supply and stock prices. Habidullah (1998) recorded that there was a strong positive correlation and the existence of long run co-integration between money supply (M1 or M2) and stock prices in Malaysian stock market. According to Fama (1981), an increase in money supply would lead to discount rates to be increasing and lower down the stock prices and therefore result in a negative effect on stock prices.

On top of that, a study conducted by Gazi and Hisham (2010) argued that the money supply is the critical macroeconomic variable. It had long run effects on the Jordanian stock market. Another study conducted by Yusoff (2003), he indicated that the money supply and stock prices is negatively related and had co-integration between monetary policy and stock prices in the Malaysian stock market.

Habibullah (1998) explored the relationship between money supply and stock prices using the vector error correction model and co-integration in order to examine the informational efficiency's market level in the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBM KLCI). He stated that money supply and stock prices were non-stationary in their level form. However, they were co-integrated in the long run by the mean of error correction representation and money supply Granger cause stock prices in unidirectional. The findings of the study were found to be not in line with the efficient market hypothesis as an investor would forecast stock prices by way of adopting information of money supply.

Furthermore, the findings of the Granger causality test identified that money supply was the only variable influencing the stock prices positively. However, Ghazali and Yakob (1997) explored the relationship between money supply and stock prices in Malaysian context. The results of the Granger causality test indicated that there had a significant unidirectional relationship from money supply to stock prices. This function illustrated

that stock prices would respond positively after money expansion.

2.1.5 Stock Price & Reserves

A case study has been conducted by Bhattacharya and Mukherjee (2001) to analyze the "Causal Relationship between Stock Market and Exchange Rate, Foreign Exchange Reserves and Value of Trade Balance". In the context of the Indian stock market with respect to exchange rate, foreign exchange reserves and trade balance, the results suggest that there is no causal linkage between stock prices and the three variables under consideration.

According to Hussain et al. (2009) who has analyzed the" Impact of Macroeconomics Variables on Stock Prices: Empirical Evidence in Case of KSE", the quarterly data from year 1986 to year 2008 of several economic variables has been obtained such as foreign exchange rate, foreign exchange reserve, industrial production index, wholesale price index, gross fixed capital formation, and broad money M2. The results shows that after the reforms in year 1991 the influences of foreign exchange rate and reserve effects significantly to stock market while other variables like industrial production index and gross fixed capital formation are not significantly to stock prices. Besides this, the results also shows that internal factors of firms such as increase production and capital formation not effects significantly while external factors of firms like exchange rate and reserves effects significantly the stock prices.

According to the study conducted by Sarbapriya Ray (2012) is to assess the impact of foreign exchange reserve on stock market capitalization of India covering a period of 1990 to 1991 and 2010 to 2011. The results show that there exist significant positive impact of foreign exchange reserve on stock market capitalization and the Granger Causality Tests suggests that causality is unidirectional and it turns from foreign exchange

reserve to stock market capitalization but not vice versa. The stock market capitalization does not granger cause foreign exchange reserve at all.

2.2 Review of Relevant Theoretical Models

In this part of chapter 2 will consist of two theoretical models based on past literature review which are Efficient Market Hypothesis (EMH) and Arbitrage Pricing Theory (APT).

2.2.1 Efficient Market Hypothesis (EMH)

According to Fama (1970), the efficient market hypothesis (EMH) is a concept that current stock prices fully reflect available information about the firm value thus there is no way to earn excess profit or eliminating profit opportunities as investors react instantaneously to any informational advantages they have.

Market efficiency has been classified by Fama into three categories namely, weak form, semi-strong form and strong form. A market is considered in its weak form when the stock returns are serially uncorrelated and have a constant mean. In other words, a market is weak form efficient if current prices just fully reflect all information in historical prices that implies no investor can create a trading rule based solely on past patterns to earn abnormal returns. A market is in semi strong efficient condition if stock prices instantaneously reflect any new publicly available information and a market is considered as strong form efficient if prices reflect all types of information whether available publicly or privately.

De Bondt and Thaler (1985) found out that stock prices will overreact by argue that investors are subject to waves of optimism and pessimism that lead prices to diverge systematically from their fundamental values and

later to exhibit mean reversion. The other studies is one of the most lasting anomalies documented in the finance literature according to Dreman and Lufkin (2000) which is the empirical observation that stock prices appear to respond to earnings for about a year they are announced. Prices of firms experiencing positive earnings surprises tend to drift upwards while prices of stocks experiencing negative earnings surprises tend to drift downward. This "post-earnings-announcement drift" was first noted by Ball and Brown (1968) and has been replicated by many studies over different time periods and in different countries.

2.2.2 Arbitrage Pricing Theory (APT)

Stock prices are generally believed to be determined by some macroeconomic variables such as interest rate, exchange rate, inflation rates and so on. Most of the empirical studies based on the Arbitrage Pricing Theory (APT) which is developed by Ross (1976), Chen and Roll (1986). The APT is one period model, it can be used to measure the risk attached to various macroeconomic variables that would affect the returns on assets, whether they are significant or “priced” into the stock market returns.

There are two approaches that are relevant to the APT. The first approach is the trend stationarity. Fama (1990), Fama and French (1989), Schwert (1990), Ferson and Harvey (1991). Another approach is the discounted cash flow or present value model (PVM). The PVM model relates the stock price to the future expected cash flows and the future discount rate of these cash flows. This model can also be used to focus on the long run relationship between the stock market and macroeconomic variables. According to Campbell and Shiller (1998), they find that the stock prices are too volatile to accord with a simple present value model.

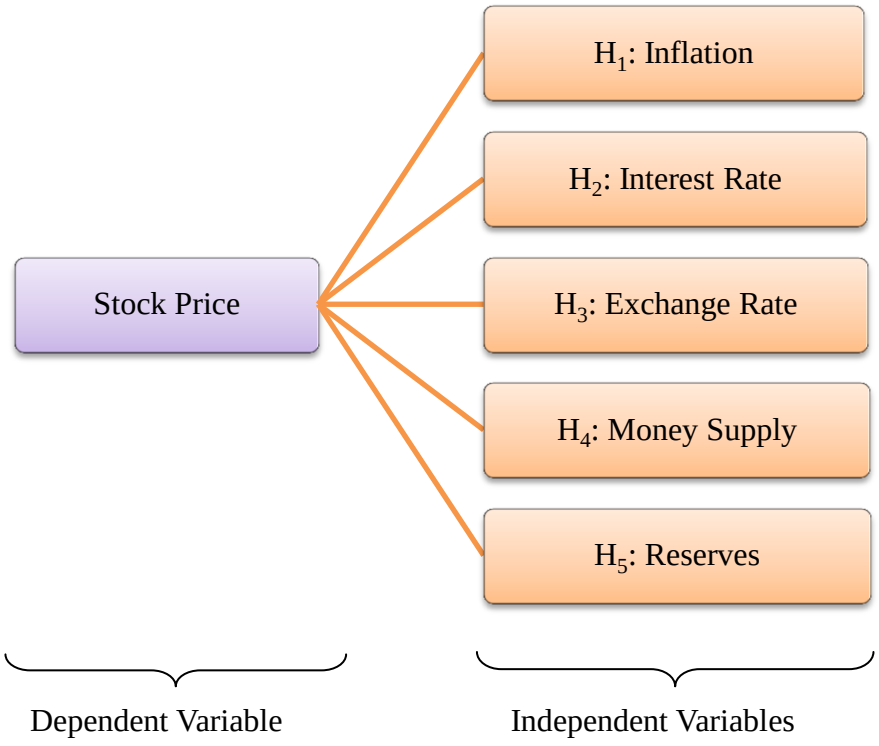
The APT is an alternative approach to CAPM. The APT states that the

expected return on the asset at the beginning of the time period and the unexpected realization of risk factors during the time period plus firm specific risk constitute the realized return on asset. The APT assumes that the return on asset is a linear function of various macroeconomic factors. The factor-specific beta coefficient means the sensitivity to the changes in each factor.

According to Chen, Roll and Ross (1986), they believe that there is long term equilibrium between stock prices and macroeconomic variables due to the impact of economic forces on the discount rates, the ability of firms to generate cash flows and future dividend payouts. Ross argues that the expected returns on the assets are approximately linear related to the betas. This is because there is no arbitrage opportunity within the equilibrium prices over the portfolios of the assets.

2.3 Proposed Theoretical/ Conceptual Framework

Figure 2.1: Conceptual Framework



2.4 Hypotheses Development

There are 5 hypotheses will be developed in order to conduct the relationship between the stock price and the macroeconomic variables. Asprem (1989) stated that stock price have a complicated relate with macroeconomic variables of portfolios or other assets.

The results of studies by Flannery and Protopapadakis (2002), Marquering and Verbeek (2004), Avramov and Chordia (2006) found that macroeconomic variables can predict the conditional variance of stock prices. Besides that, the empirical result of Schwert's (1989) shows that the effects of macroeconomic variables on market volatility are also sensitive to the length of the sample period.

A study conducted by Chong and Goh (2003) have find that competition among the profit-maximizing investors in an efficient market will ensure that all the relevant information currently known about changes in macroeconomic variables are fully reflected in current stock prices, so that investors will not be able to earn abnormal profit through prediction of the future stock market movement.

2.4.1 Inflation

H_0: There is no significant relationship between stock prices and inflation.
H_1: There is significant relationship between stock prices and inflation.

According to the Asprem (1989), Fama and Schwert (1997), Chen, Roll and Ross (1986), Chen et al. (1986), Wei (2007), Adrangi, Chatrath, and Sanvicente (2000), they found that inflation was inversely related to stock prices. The report on Schwert (1990), Anari and Kolari (2001) also suggested that there is negatively correlated between stock prices and inflation in the short run but it also positively correlated in the long run. But in contrast, Boudhouch and Richarson (1993) and Ioannidis *et al*., (2004) stated that there is positive relationship between nominal stock

market returns and inflation over long horizons. Pearce and Roley (1988) indicated that there is mixed empirical evidence between the inflation and stock price.

2.4.2 Interest Rate

H_0: There is no significant relationship between stock prices and interest rate.
H_1: There is significant relationship between stock prices and interest rate.

The results of studies by Asprem (1989), Uddin and Alam (2007), Fama (1990), Alam and Uddin (2009), Chen et al., (1986), Bernanke and Gertler (1995) and Kiyotaki and Moore (1997) found that the interest rate is negatively related to the stock prices. Besides that, Suliaman et al., (2009) found that interest rates are significantly influencing the stock prices in Pakistan. In addition, Mysami, Howe and Hamzah (2004) stated that the relationship between short run and long run interest rate is found to be positive and negative respectively. However, French et al., (1987) recorded negative relationship between both short term and long term interest rate and stock returns. Humpe and Macmillan (2007) observed that the price is only negatively related to long term interest rate.

2.4.3 Exchange Rate

H_0: There is no significant relationship between stock prices and exchange rate.
H_1: There is significant relationship between stock prices and exchange rate.

The study has examined by Subair and Salihu, Fang and Miller (2002), Foo (2009) showed that there is a significantly negative relationship

between stock market and exchange rate. Bodnar and Wong (2002) explained that the fluctuation in exchange rate can significantly affect the values of the firms. Moreover, Griffin (2004) found that exchange rate is significantly influencing the stock prices. Hatemi-J and Roca (2005) stated that exchange rate does not Granger caused stock prices in Malaysia before the Asian financial crisis.Besides that,Nieh and Lee (2001) found that there had bidirectional causality between exchange rates and stock prices in the short run but not in the long run. Malarvizhi and Jaya (2012) showed that there is a bidirectional casual relationship between the exchange rate and stock price. However, Ali, Anwar, Ziaei (2013), Stavrek (2005), and Ray (2012), they indicated that unidirectional relationship between exchange rate and stock price.

2.4.4 Money Supply

H_0: There is no significant relationship between stock prices and money supply.
H_1: There is significant relationship between stock prices and money supply.

According to Palmer (1970), Homa and Jaffee (1971), Fama (1981), Kaul (1987),Jiranyakul and Brahmasrene (2007), Habidullah (1998), they found that there is a positive relationship between money supply and stock prices. On the contrary, Suliaman et al., (2009), Fama (1981), Yusoff (2003) argued that money supply is significantly and negatively related to stock prices. Besides that, Azzez and Yonezawa (2006) stated that money supply is significantly impact on expected stock prices. However, Gazi and Hisham (2010) indicated that money supply only had long run effects on the Jordanian stock market. Habibullah (1998) stated that money supply and stock prices were non-stationary in their level form but they were co-integrated in the long run with the presence of error correction representation and money supply Granger cause stock prices in

unidirectional. Moreover, Ghazali and Yakob (1997) explored the relationship between money supply and stock prices in Malaysian context. The results of the Granger causality test indicated that a significant unidirectional relationship from money supply to stock prices.

2.4.5 Reserves

H_0: There is no significant relationship between stock prices and reserves.
H_1: There is significant relationship between stock prices and reserves.

According to the study conducted by Sarbapriya Ray (2012) shows that there exists significant positive impact of foreign exchange reserve on stock market capitalization. The results shows by Hussain et al. (2009) indicated that after the reforms in year 1991 the influences of foreign exchange rate and reserve effects significantly to stock market while other variables like industrial production index and gross fixed capital formation are not significantly to stock prices. However, a case study has been conducted by Bhattarcharya et.al. (2001), the results suggest that there is no causal linkage between stock prices and the exchange rate, foreign exchange reserves and trade balance under consideration.

2.5 Conclusion

The objective of this chapter is to establish a theoretical foundation for the research to determine the topics of interest by reviewing relevant articles and journals. Therefore, literature review provides the foundation for establishing a proposed theoretical or conceptual framework to conduct with further research and hypotheses testing.

In addition, the formation of actual framework and hypothesis is based on the previous research to examine the relationship between economic variables and

stock prices. There are many facts that have been proved by the previous authors and researchers. For this, it will discuss the detailed information in the next chapter by using several research methodologies.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In this chapter, research methodologies have been developed and discussed. It is very important to have a well-designed research methodology as it helps to improve the degree of accuracy and significant contribution of the research. Secondary data is used in this research.

This chapter consists of research design, data collection methods, sampling design, research instrument, data processing, and data analysis. The sampling design include sampling frame, sampling technique, and sample size. There are four stages in data processing. In data analysis, the diagnostic testing of the data will be determined.

3.1 Research Design

Research design is a basic and systematic plan which is used for collecting and utilizing data in order to obtain the desired information so that the hypothesis can be tested properly. Before examining the types of research designs, it must be clearly defined the role and purpose of the research design. The purpose of the research design is to provide a plan of study which allows accurate assessment of cause and effect relationships between the dependent variable which is share price while the independent variables are inflation, interest rate, exchange rate, money supply and reserves, ensuring that the research design fix into the whole research process.

There are different types of research design such as qualitative research and quantitative research, it is not limited to a particular type of research. In this research paper, it used quantitative research as it present the numerical data to do the hypothesis testing. Quantitative research gathers all the data in numerical form

which can be put into categories or measured in units of measurement.

According to Cohen (1980), quantitative research is defined as the social research which employs empirical statements. The reason is empirical statements are generally expressed in numerical terms. Besides that, quantitative research also applied empirical evaluation. Empirical evaluation is a form which is used to determine whether the degree to which a specific program fulfills the particular standard or not.

Quantitative methods of research are frequently described as deductive in nature, in the sense that inferences about characteristics of a population.

3.2 Data Collection Methods

Data is important for analyzing or examining something that someone wishes to know. It helps to perform the analysis which is showed the pattern of the stock prices over particular period happens in Malaysia. For this research, the data will be collected from the Data Stream Navigator in the Library of University of Tunku Abdul Rahman, campus of Perak (2012). All of these data could be collected on daily, monthly, and annual basis.

3.2.1 Secondary Data

Secondary data is collected by someone else for some other purpose (Boslaugh, 2007). The secondary data is cheaper and economical which saves efforts and expenses. It is time saving due to it can be more quickly obtained than the primary data. In additional, the secondary data may also be available when primary data cannot be obtained at all. With the help of secondary data, it makes primary data collection more specific.

In this study, a literature was undertaken. Specific areas that focus on the literature review including some variables which are stock price, exchange rate, inflation, interest rate, reserve and money supply. The main sources of secondary data for our research would be some articles, journals, books and online information which is related to the variables affecting the stock price.

3.3 Sampling Design

Sampling design can be defined as how the samples are selected and specified. There are different types of sampling designs. In this study, the sampling design is focused on sampling frame, sampling technique and sampling size.

3.3.1 Sampling Frame

The data that have been collected for this research is from year 2002 until 2011. That has some crisis happen during the ten years which would impact on the stock price in Malaysia. The methodology that can be used to analysis the stock price is Kuala Lumpur Composite Index (KLCI). It is a capitalization-weighted stock market index and introduced in 1986.

Now, the KLCI is known as the FTSE Bursa Malaysia (FBM) KLCI which is implemented on July 6, 2009. FBM comprises the largest 30 eligible companies by market capitalization instead of the current 100 stocks in the KLCI. FBM meet the two main eligibility requirements of the FBM index Ground Rules which are free float and liquidity.

The index will be computed based on free float adjusted market capitalization. Companies must have at least 15% of free float. This means that a stock with higher free float will gain greater weight age in the index. The basket of stocks for the FBM KLCI will also be screened for liquidity.

A liquidity screen can be used to ensure the stocks of companies are liquid enough to be traded. Each stock must maintain a minimum turnover of 10% of its free float shares in the 12 months prior to an annual review in December.

3.3.2 Sampling Technique

There are two major types of sampling methods which are probability sampling method and non-probability sampling method. Probability sampling is a portion or sample of the population. There is an equal probability of being selected in every element of the population being sampled. While non-probability does not involve random selection, it comes in various shapes and sizes. Selections of non-probability are generally according to the researcher personal judgment. In this research paper, the sampling technique that is used to run the regression analysis is Electronic Views, also called Eviews.

3.3.3 Sampling Size

Sampling size means the number of observations in a population to be studied. Generally the sample size should be big enough to have a high likelihood of detecting a true difference between two groups. It is very important to determine the sample size because samples that are too large may waste time, money and resources, while the samples that are too small may cause the results to be inaccurate. In this research paper, the sample size of 120 is chosen to measure on how the share price influenced by the various macroeconomic variables.

3.4 Research Instrument

This research project are conducting the secondary data research by employed Eview 6.0 to collect and analyze the data extracted from Data Stream Navigator, International Monetary Fund, bank's annual reports, and online search which is based on the previous research papers conducted by the other authors and researchers. Various types of tests can be fully utilized by EViews 6.0 such as T-test, F-test, Jarque-Bera test, Durbin-Watson (DW) statistic test, Breusch-Godfrey serial correlation LM test, Granger Causality test, Cointegration test, White test, Autoregressive Conditional Heteroscedasticity (ARCH) test, Ramsey RESET test and Augmented Dickey Fuller (ADF) Unit Root test.

By using EView 6.0, different problems can be identified which included normality test, multicollinearity, heteroscedasticity, autocorrelation, this software provide the method to solve these problems to helps to ensure the data collected to be process is valid and reliable thus increase the validity and reliability of the results get. The Jarque-Bera test is normally used to determine the normality of the variable chosen in a regression which is conduct the research. However, multicollinearity can be determined by Variance inflation factor (VIF) to define whether the variables in the regression have linear relationship. As well as the White test, Autoregressive Conditional Heteroscedasticity (ARCH) test are usually used to identify the problem of the heteroscedasticity. Besides that, autocorrelation is determined by Durbin-Watson (DW) statistic test and Breusch-Godfrey Serial Correlation LM test.

Moreover, EViews 6.0 also provide the information regarding the causal effect of the variables in the regression and whether those variables are in long run or short run relationship. In fact, there are various others software can be used to conduct the tests, but EViews 6.0 is chosen which is recognized to be more accurate, reliability, validity and the most important is simple to use by many scholars and researchers compare to others software. Other than that, this study also done by using the Microsoft Office Word and Microsoft Office Excel to conduct the research.

In this study, secondary data analysis instrument is relatively preferable to be used. Ordinary Least Square (OLS) Regression will be applied as research instrument rather than using the questionnaire for this paper due to its wide usage and coverage in analyzing the economic data. According to the Greene (1990) found that OLS is a simply way of technique which is usually used to determine the relationship between the dependent variable and independent variables.

OLS method can be applied to analyze the relationship between the dependent variable (stock prices) and independent variables (inflation, interest rate, exchange rate, money supply, and reserves) for this study. Moreover, OLS can be used to determine the hypothesis testing and linkage based on the previous research to explain and examine the relationship between them. It is important to assume that the data must be random sample of the population and the variables are linear in parameters. Besides that, the expected value of the errors must equal to zero and are normally distributed.

The regression was created based on the OLS method showed as below:

Stock Price = Inflation + Interest Rate + Exchange Rate + Money Supply + Reserves + e

(Model 3.1)

Furthermore, by running the data that have obtained from the Data Stream Navigator, the estimation of the model can be calculated through the assumption above. In addition, verified the significant of the model coefficient and regression, the interpreting of the coefficient, all of these will be discuss in the following chapter for detail information.

3.5 Data Processing

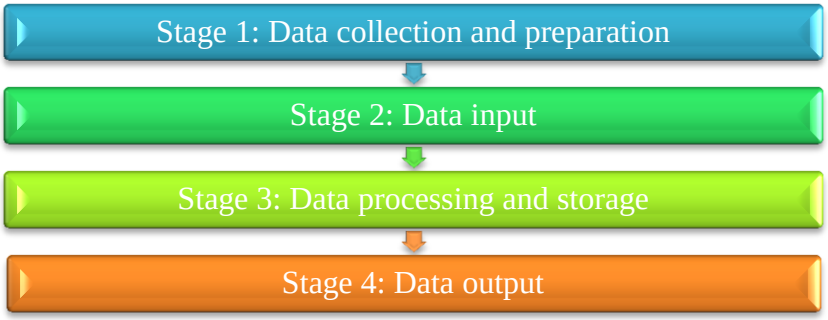
The meaning of the data processing is refer to the processes of a description of data preparation by develop the raw data mainly included of huge amount of numeric data into useful information. There are few steps consists in data processing, which is data checking, data editing, data coding and data transcribing, as well as specifying any special or unusual treatments of data before analyzed.

This study using data checking to ensure the data are accurate and consistent by preventing from human error and calculation error. If the errors occur in the process of data checking, the data editing is being using to amend and correct these errors to ensure the data is accurate and free from errors. Data coding is where we assign a code with a specific numeric value to represent different meaning of the data.

As mentioned in the previous part, this section will discuss the data processing to measure the dependent variable (stock prices) and independent variables (inflation, interest rate, exchange rate, money supply, and reserves) by using several measurements based on the previous research papers conducted by the other authors and researchers in order to provide detailed information of the data we had been selected.

Data processing cycle consists of 4 stages which are data collection and preparation, data input, data processing and storage, and data output.

Figure 3.1: Data processing cycle



Stage 1: Data collection and preparation. Collect data from Data Stream Navigator, International Monetary Fund, bank's annual reports, and online search which are based on the previous research papers conducted by the other authors and researchers. Find relevant Journals from Google Scholar, Social Science Research Network (SSRN), EBSCO and Scopus.

Stage 2: Data input. Review all the data and journals have collected. Summarize the types of data and methodologies used by the previous researchers. Decide the types of data and methodologies this study are going to use and then run the data by using the EViews 6.0 to get the results.

Stage 3: Data processing and storage. Run various tests which includes T-test, F-test, Jarque-Bera test, Breusch-Godfrey serial correlation LM test, White test, Autoregressive Conditional Heteroscedasticity (ARCH) test, Ramsey RESET test and by using EViews 6.0 software. Store the result for further interpretation.

Stage 4: Data output. Did different variety of analysis on the test which has used to judge the model .It will become useful information for the research being conducted. Verified the significant of the model coefficient and regression, and interpreting of the coefficient.

3.6 Data Analysis

Data analysis can defined as the process of evaluating the data by using different types of analytical method to make sure the whole model are significant. Furthermore, data analysis is carried out to detect the problem that might occur during the test.

3.6.1 EViews

EViews will be used to analyze the data collected from the datastream and website. EViews stands for Econometric Views which is a new version of a statistical package or a set of tools for manipulating time series data. In general, EViews can perform data analysis and evaluation, regression, forecasting, and simulation. Hypothesis testing can be conducted by using EViews to determine the significant relationship between the dependent and independent variables. Besides that, E-views can also run diagnostic testing such as Breusch-Godfrey LM test, ARCH test, White test and so on. Ordinary Least Square (OLS) is obtained from the EViews to carry out all the hypothesis testing and diagnostic checking.

3.6.2 Normality Test

The Jarque-Bera test is used to determine whether the sample of random variable of the data set collected from the population with unknown mean and dispersion is normally distributed or not. As a rule, normality distribution is an underlying assumption for statistical tests when carry out parametric testing. This test is based on the fact that skewness and kurtosis of normal distribution are equal to zero. Hence, the absolute value of these parameters will be a measure of deviation of the distribution from normal. There are two ways to access to the normality test which is by numerically and graphically. Numerical or statistical tests help in making objective judgment for normality while graphical methods help in making good subjective judgment from the graphs. When sample size is too small or too big, the result will under or over sensitive in statistical test and will lack of objectivity in graphical method.

3.6.3 Model Specification Test

Model specification test is applied to make sure whether the regression created or designed is correctly specified and is one of the first steps in regression analysis. If an estimated model is incorrect specified, it will lead to biased and inconsistent results. In other words, it could mean that there are irrelevant independent variables are included in the model or the model is in incorrect functional form. To learn more about model specification test, Ramsey RESET Test is applied.

3.6.4 Multicollinearity

When two or more independent or explanatory variables in a regression have a linear relationship this is called multicollinearity. Collinearity between variables is always present. However, if the degree of collinearity is too high it will bias the estimates. Correlation is a statistical technique used to measure the degree of relationships between two random variables and ranges from -1 to +1. If correlation is equal to +1 implies it has a perfect positive correlation between X and Y and will move in same direction. If correlation is equal to -1 implies the perfect negative correlation and these two variables will move in opposite direction. Variance inflation factor (VIF) is used to determine the severity of multincollinearity. If the VIF value is equal or more than 10 that means the model has serious multicollinearity. There are some consequences if there is serious multicollinearity problem. For example, the estimated regression coefficients and T-statistics may not be able to properly isolate the unique effect of each variable and the standard errors are very sensitive to small changes in the data.

3.6.5 Heteroscedasticity

Heteroscedasticity means that the variances of the residuals are not constant but they are different for different observations. Based on a basic assumption of the classical model, normality of error terms is required for the statistical tests to be valid. As a result, heteroscedasticity leads to inefficient estimators and biased standard errors, rendering the t-tests and confidence intervals unreliable. Thus, hypothesis testing will lead to incorrect conclusions too. White's test and ARCH test is normally used as a test for heteroscedasticity. In White's test, a regression of the squares of the residuals is run on the variables suspected of causing the heteroscedasticity, their squares and cross products. ARCH models are used to characterize and model observed time series.

3.6.6 Autocorrelation

The autocorrelation problem will happen when the model has relationship or correlation between the error terms. Autocorrelation make t-statistics insignificant by underestimating the standard errors of the coefficients. Estimators no longer have minimum variance but they still remain unbiased. Autocorrelation problem can be estimated by Durbin-Watson (DW) statistic and Breusch-Godfrey Serial Correlation LM test. The DW statistic test is for the autocorrelation of the first order and is not valid in dynamic models. The LM test is a general test of serial correlation.

3.7 Conclusion

In this chapter, relevant measurements and statistical tests have been determined. Data will be collected based on the discussions of the data collection methods, sampling design, and research instrument. Sample size of data is determined and data are collected from datastream and website.

In the data processing, the raw data will be transformed into useful information. For the following part, data analysis, the diagnostic checking of data is determined to check for any econometric problems exist. Data will be run and analysed by the EViews. The results will be shown in next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In previous chapter, it had mentioned about that Ordinary Least Square (OLS) Regression has been chosen as the main method to analysis the stock market prices which happened in Malaysia from January 2002 to December 2011. The analysis of this research is based on monthly performance, and the sampling size is at 120 units.

Besides that, it also had discussed about that the diagnostic checking such as normality test, multicollinearity, heteroscedasticity, autocorrelation and model specification test will be carried on and tested. These five diagnostic checking will be only conducted when there has doubt, whether the initial estimated regression model has any econometric problem, which the model is showed in previous chapter and as below:

Stock Price = Inflation + Interest Rate + Exchange Rate + Money Supply + Reserves+ e

(Model 4.1)

Where the S*tock Price* represents the stock price of Malaysia measured in index points (FBM KLCI) and it is also the dependent variable (DV) in this regression model. At the same time, the *Inflation, Interest Rate, Exchange Rate, Money Supply and Reserves* are the independent variables (IV) in the model where *Inflation* is measured in index points, *Money Supply and Reserves* are measured in Ringgit Malaysia, *Interest Rate* is measure in Percentage, and *Exchange Rate* is measured in currency of Ringgit Malaysia based.

The analysis on the estimated regression showed as above by using OLS method will be explaining in the following part of this chapter. As mentioned, hypotheses testing will need to be done, and diagnostic checking tested if any problem exists.

Also, further solutions will be conducted to solve if there shows any econometric problem is happened.

4.1 Description of the Empirical Models

In this part, a few econometric models will be applied to explain and evaluate the relationship between stock prices with inflation, interest rate, exchange rate, money supply and reserves in Malaysia. The empirical model had been used to estimate this relationship is shows as below:

$$lnShare\ Prices = \alpha_0 + \alpha_1\ ln\ INFLATION + \alpha_2\ INTRATE + \alpha_3\ ln\ EXRATE + \alpha_4\ ln\ MS + \alpha_5\ ln\ RESERVE + e$$

(Model 4.2)

The *Model 4.2* is the basic model where share price is estimated by using the other five independent variables, which are inflation, interest rate, exchange rate, money supply and reserves, where inflation is measured in index point, money supply and reserves are measured in Ringgit Malaysia, interest rate is measured in percentage and exchange rate is measured in Ringgit Malaysia based, while *e*is the random error of testing, At the same time, *Model 4.2* also can be and evolved to another better OLS regression model, where commonly seen:

$$lnShare\ Price = \beta_0 + \beta_1\ ln\ INFLATION + \beta_2\ INTRATE + \beta_3\ ln\ EXRATE + \beta_4\ ln\ MS + \beta_5\ ln\ RESERVE + e$$

(Model 4.3)

The *Model 4.3* is shows and explains the same as *Model 4.2*. The only different between these models is that the symbol of α and β, either one can be used and would fit for the model. As a result, the expanded model is more precisely in interpreting the relationship between stock price movement and economic variables, which are inflation, interest rate, exchange rate, money supply and reserves, with a sample size of 120 units which started from January 2002 to

December 2011, by using the monthly performances. If the studies carry on, there might has few econometric problems exist in the OLS regression model. Thus, to overcome the problem, solutions such like autoregressive distributed lag model is needed and applicable to avoid classification of the variables, and it will be explained more details in the next part.

4.2 Model Estimation and Interpretation

In this following part, the model which has been formed in previous part is now be brought forward to this part and using the OLS regression method to test this model through EViews 6.0. As previous part mentioned, either *Model 4.2* or *Model 4.3*can be used for the following of studies. In this part, *Model 4.3* is used and applied for further hypotheses testing and diagnostic checking, because *Model 4.3* is more commonly to be seen. The next step, an equation will be tested by running the data obtained early with EViews 6.0 software.

Table 4.1 Initial Regression Output

Dependent Variable: LPRICE

Method: Least Square

Sample: 2002M01 2011M12

Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINFLATION	-1.659526	0.308073	-5.386800	0.0000
INTRATE	0.095004	0.021188	4.483932	0.0000
LEXRATE	-2.734996	0.278108	-9.834284	0.0000
LMS	0.334840	0.060562	5.528863	0.0000
LRESERVE	-0.406304	0.100761	-4.032369	0.0001
C	17.64959	2.427090	7.271913	0.0000

R-squared	0.903521	Mean dependent var	6.927525
Adjusted R-squared	0.899290	S.D. dependent var	0.268436
S.E. of regression	0.085188	Akaike info criterion	-2.039206
Sum squared resid	0.827297	Schwarz criterion	-1.899832
Log likelihood	128.3524	Hannan-Quinn criter	-1.982606
F-statistic	213.5213	Durbin-Watson stat	0.280426
Prob(F-statistic)	0.000000		

Source: Developed for the research via EViews 6.0

Table 4.1 showed as above is the initial regression output conducted by EViews 6.0. Then, data and information obtained from *Table 4.1* at above can be used to define *Model 4.3* in econometrics way, which shows as below:

$$ln\ Share\ Price = \beta_0 + \beta_1\ ln\ INFLATION + \beta_2\ INTRATE + \beta_3\ ln\ EXRATE + \beta_4\ ln\ MS + \beta_5\ ln\ RESERVE + e$$

$$\ln \text{Share Price} = 17.64959 - 1.659526 \ln INFLATION + 0.095004 INTRATE - 2.734996 \ln EXRATE + 0.334840 \ln MS - 0.406304 \ln RESERVE$$

(Model 4.4)

As the econometrics model showed above, parameters estimates can be performed by interpreting the model. Assuming that all independent variables (IV) are equal to 0, on average, the stock price of Malaysia will increase at 17.64959 units. Meanwhile, the same thing is applied on the independent variables. If inflation increases by RM1, on average, the stock price will decreases by 1.659526 units, holding other variables constant. Besides that, if interest rate increases by 1%, on average, the stock price will increases by 0.095004 units, holding other variables constant. Moreover, if exchange rate is rises by RM1, on average, the stock price will depreciates by 2.734996 units, holding other variables constant. In addition, when there is an increase of RM1 on money supply, on average, the stock price of Malaysia will increases by 0.3348430 units, holding other variables constant. Same thing used on reserves, when there is increases of RM1 on reserves, on average, the stock price of Malaysia will decrease by 0.406304 units, holding other variables constant.

4.3 Hypotheses Testing

The purpose of conducting hypotheses testing is to detect whether there is any econometric problems exist in the estimated regression model. This research needs to run five diagnostic checking which is multicollinearity, autocorrelation, heteroscedasticity, model specification and normality of error term test in order to treat the problems if the estimated regression model had been found out that there have any problems, Therefore, a solution need to be developed against the problems by this study if there has still an existence of any problems in diagnostic checking. Hypotheses testing that should be conducted are showed in the following:

4.3.1 T-test

In this research will test the significant relationship between stock prices and each explanatory variable by using the p-value of t-test approach at the significance level of 0.01.

4.3.1.1 Inflation (β1):

Hypothesis:

H_0: There is no significant relationship between stock prices and inflation. ($\beta_1 = 0$)

H_1: There is significant relationship between stock prices and inflation. ($\beta_1 \neq 0$)

Decision Rule:

Reject H_0 if p-value of T-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of T-Test which is 0.0000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is significant relationship between stock prices and inflation at the significance level of 0.01 or inflation is statistically significant in explaining the stock prices.

4.3.1.2 Interest Rate (β2):

Hypothesis:

H_0: There is no significant relationship between stock prices and interest rate. ($\beta_2 = 0$)

H_1: There is significant relationship between stock prices and interest rate. ($\beta_2 \neq 0$)

Decision Rule:

Reject H_0 if p-value of T-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of T-Test which is 0.0000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is significant relationship between stock prices and interest rate at the significance level of 0.01 or interest rate is statistically significant in explaining the stock prices.

4.3.1.3 Exchange Rate (β3):

Hypothesis:

H_0: There is no significant relationship between stock prices and exchange rate. ($\beta_3 = 0$)

H_1: There is significant relationship between stock prices and exchange rate. ($\beta_3 \neq 0$)

Decision Rule:

Reject H_0 if p-value of T-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of T-Test which is 0.0000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is significant relationship between stock prices and exchange rate at the significance level of 0.01 or exchange rate is statistically significant in explaining the stock prices.

4.3.1.4 Money Supply (β4):

Hypothesis:

H_0: There is no significant relationship between stock prices and money supply. ($\beta_4 = 0$)

H_1: There is significant relationship between stock prices and money supply. ($\beta_4 \neq 0$)

Decision Rule:

Reject H_0 if p-value of T-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of T-Test which is 0.0000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is significant relationship between stock prices and money supply at the significance level of 0.01 or money supply is statistically significant in explaining the stock prices.

4.3.1.5 Reserves (β5):

Hypothesis:

H_0: There is no significant relationship between stock prices and reserves. ($\beta_5 = 0$)

H_1: There is significant relationship between stock prices and reserves. ($\beta_5 \neq 0$)

Decision Rule:

Reject H_0 if p-value of T-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of T-Test which is 0.0001 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is significant relationship between stock prices and reserves at the significance level of 0.01 or reserves is statistically significant in explaining the stock prices.

4.3.2 F-test

F-test is conducted by this study in order to test overall significant of the whole model by including all the explanatory variables which are inflation, interest rate, exchange rate, money supply and reserves. The result is showed in the following:

Hypothesis:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

H_1: At least one of the β_i is different from zero, i=1,2,3,4,5

Decision Rule:

Reject H_0 if p-value of F-Test is smaller than 0.01. Otherwise, do not reject H_0.

Decision Making:

Reject H_0 since the p-value of F-Test which is 0.000000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is at least one of the β_i is different from zero at the significance level of 0.01. In other words, there is at least one independent variable is significantly in explaining the stock prices.

4.3.3 R^2 (Goodness of Fit)

R^2 is found to be 0.903521 based on the *Table 4.1*. This indicates that 90.35% of the total variation in the stock prices can be explained by the total variation in the inflation, interest rate, exchange rate, money supply and reserves.

Adjusted R^2 is equals to 0.899290 which showed that 89.93% of the total variation in the stock prices can be explained by the total variation in the inflation, interest rate, exchange rate, money supply and reserves after taking into account of number of independent variables and degree of freedom. As a result, this model is considered as a good fit model since the R^2 and Adjusted R^2 are considered as large enough.

4.3.4 Standard Errors

Standard error for the model is found to be 0.085188 as shown in *Table 4.1*. The sample size for this research is at 120 whereas the standard error is shown as 0.085188. It illustrated that the sample size is large enough while the standard error of this model is small. From the econometric views, it had been found that the sample size larger than thirty is considered as big sample size. Moreover, this study conducts the standard error-to-mean ratio which is shown as a result of 1.23% (0.085188/6.927525 x 100). It is known that the lower the standard error-to-mean ratio, the better the model.

4.4 Diagnostic Checking

As mentioned earlier, five diagnostic checking will be conducted by this study is wanted to test whether this model is facing the problem of multicollinearity, autocorrelation, heteroscedasticity, model specification and normality of the error term. These five tests are performed in order to examine whether this model is best linear unbiased estimators (BLUE) or not. The results of these tests are showed as below:

4.4.1 Multicollinearity

The correlation is a statistical technique that is used to measure the degree of relationships between two independent variables. Correlation is range from -1 to +1. Correlation is equal to +1 implies that it has a perfect positive correlation between one independent and another independent variable (X1 and X2). However, correlation is equal to -1 indicates that the perfect negative correlation between X1 and X2. If the correlation is equal to zero, it means that X1 and X2 are uncorrelated. High correlation between two independent variables in the model will result in multicollinearity problem.

Hypothesis:

H_0: There is no multicollinearity problem.

H_1: There is a multicollinearity problem.

Table 4.2 Correlation Analysis

	LPRICE	LINFLATION	INTRATE	LEXRATE	LMS	LRESERVE
LPRICE	1.000000	0.091629	0.142146	-0.903462	0.893417	0.788941
LINFLATION	0.091629	1.000000	0.167171	-0.347769	0.016390	0.006626
INTRATE	0.142146	0.167171	1.000000	-0.127897	0.004771	0.302255
LEXRATE	-0.903462	-0.347769	-0.127897	1.000000	-0.861703	-0.801855
LMS	0.893417	0.016390	0.004771	-0.861703	1.000000	0.858350
LRESERVE	0.788941	0.006626	0.302255	-0.801855	0.858350	1.000000

Source: Developed for research via EViews 6.0

As shown in data above, the highest pair-wide correlation between independent variables of money supply and exchange rate is recorded as -0.861703. The second higher pair-wide correlation between independent variables of money supply and reserve is showed as 0.858350. In addition, the correlation between independent variables of exchange rate and reserve is also highly correlated at -0.801855. Thus, this study will conduct the regression analysis for the high pair-wide correlation between those independent variables in order to get R^2 and detect the multicollinearity problems. The results of calculation of Variance Inflation Factor (VIF) are showed as below:

Table 4.3 Regression Analysis

Dependent Variable: LEXRATE

Method: Least Square

Sample: 2002M01 2011M12

Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMS	-0.179264	0.009718	-18.44748	0.0000
C	3.668384	0.130491	28.11209	0.0000
R-squared	0.742532	Mean dependent var	1.262075	

Source: Developed for research via EViews 6.0

VIF =1 / (1-R^2) = 1 / (1- 0.742532) = 3.8840

(Model 4.5)

Table 4.4 Regression Analysis

Dependent Variable: LMS

Method: Least Square

Sample: 2002M01 2011M12

Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRESERVE	1.643967	0.090461	18.17325	0.0000
C	-4.530648	0.988089	-4.585262	0.0000
R-squared	0.736764	Mean dependent var	13.42329	

Source: Developed for research via EViews 6.0

VIF =1 / (1-R^2) = 1 / (1- 0.736764) = 3.7989

(Model 4.6)

Table 4.5 Regression Analysis

Dependent Variable: LEXRATE

Method: Least Square

Sample: 2002M01 2011M12

Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRESERVE	-0.319492	0.021917	-14.57759	0.0000
C	4.751278	0.239392	19.84728	0.0000
R-squared	0.642972	Mean dependent var	1.262075	

Source: Developed for research via EViews 6.0

$VIF = 1 / (1-R^2) = 1 / (1- 0.642972) = 2.8010$

(Model 4.7)

Based on the results showed as above, this model has no serious multicollinearity problem since the degree of VIF of three pairs independent variables is fall between 1 and 10 which is 3.8840, 3.7989 and 2.8010 respectively. The estimated parameters are become unbiased, efficient and consistent. Therefore, any further actions need not to be performed hereafter.

4.4.2 Autocorrelation

The autocorrelation problem will happen when the model has relationship or correlation between the error terms, it will cause the Ordinary Least Square (OLS) estimators no longer BLUE and the OLS procedure will also become inappropriate. This research usesBreusch-Godfrey Serial Correlation LM Test in order to testwhether autocorrelationproblems exist in this model.

Hypothesis:

H_0: There is no autocorrelation problem.

H_1: There is an autocorrelation problem.

Decision Rule:

Reject H_0 if P-value is smaller than 0.01. Otherwise, do not reject H_0.

Table 4.6 Breusch-Godfrey Serial Correlation LM Test

F-statistic	332.4163	Prob. F (1,113)	0.0000
Obs*R-squared	89.55657	Prob. Chi-Squared (1)	0.0000

Source: Developed for research via EViews 6.0

Decision Making:

Reject H_0 since the P-value of Chi-Squared which is 0.0000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is an autocorrelation problem in the model at the significance level of 0.01.

Since there is an autocorrelation problem exists in this model, a Newey-West Test should be conducted by this study in order to treat the autocorrelation problems. The testing and results are showed as follow:

Table 4.7 Newey-West HAC Standard Errors & Covariance Test

Dependent Variable: LPRICE

Method: Least Square

Sample: 2002M01 2011M12

Included observations: 120

Newey-West HAC Standard Errors & Covariance Test (lag truncation=4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINFLATION	-1.659526	0.646563	-2.566690	0.0116
INTRATE	0.095004	0.042733	2.223202	0.0282
LEXRATE	-2.734996	0.603087	-4.534993	0.0000
LMS	0.334840	0.094906	3.528139	0.0006
LRESERVE	-0.406304	0.152727	-2.660328	0.0089
C	17.64959	5.405106	3.265354	0.0014

R-squared	0.903521	Mean dependent var	6.927525
Adjusted R-squared	0.899290	S.D. dependent var	0.268436
S.E. of regression	0.085188	Akaike info criterion	-2.039206
Sum squared resid	0.827297	Schwarz criterion	-1.899832
Log likelihood	128.3524	Hannan-Quinn criter	-1.982606
F-statistic	213.5213	Durbin-Watson stat	0.280426
Prob(F-statistic)	0.000000		

Source: Developed for the research via EViews 6.0

Decision Making:

Reject H_0 since the P-value of F statistic which is 0.000000 is smaller than 0.01.

Conclusion:

There is sufficient evidence to conclude that there is an autocorrelation problem in the model at the significance level of 0.01. In other words, Newey-West Test is unable to solve the autocorrelation problem in this model.

Consequently, it is advisable to increase the sample size to change low frequency data to become high frequency data. This can be done if the model specification is correct and has pure autocorrelation problem. The large number of observations in the time series data can able to decrease the series correlation. On the other hand, another suggested solution is applying the Autoregressive Distributed Lag Model (ARDL) in order to solve the autocorrelation problems. Furthermore, this solution will be explored further hereafter by this study to address the autocorrelation problem.

4.4.3 Heteroscedasticity

Hypothesis:
H_0: There is no heteroscedasticity problem.
H_1: There is heteroscedasticity problem.

Decision rule:
Reject H_0 if the p-value of Chi-square is smaller than level of significance, α=0.01. Otherwise, do not reject H_0.

The heteroscedasticity problem will happen when the variances of error term in the model are not constant, normally it happens in cross-sectional data and it also happens in time series data as well. It also will cause the OLS estimators no longer BLUE and the OLS procedure will also become inappropriate. The Autoregressive Conditional Heteroscedasticity (ARCH) Test is used to test whether the heteroscedasticity problem of the model will exist. If there is heteroscedasticity problem presence, White Test will also be introduced to detect whether there is the heteroscedasticity problem.

Table 4.8: Autoregressive Conditional Heteroscedasticity (ARCH) Test

F-stastistic	15.66409	Prob. F (6,107)	0.0000
Obs*R-squared	53.30877	Prob. Chi-Square (6)	0.0000

Source: Developed for research via EViews 6.0

Decision:

Reject H_0 since the p-value of Chi-square=0.0000 is smaller than level of significance, α=0.01.

Conclusion:

There is enough evidence to conclude that there is heteroscedasticity problem in the model at 1% level of significance.

Therefore, White Test will be carried to check whether there is the heteroscedasticity problem since there is heteroscedasticity problem presence by using ARCH Test.

Table 4.9: White Test

Dependent Variable: LPRICE

Method: Least Squares

Sample: 2002M01 2011M12

Included observations: 120

White Heteroscedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINFLATION	-1.659526	0.363490	-4.565533	0.0000
INTRATE	0.095004	0.022906	4.147504	0.0001
LEXRATE	-2.734996	0.337774	-8.097108	0.0000
LMS	0.334840	0.054228	6.174707	0.0000
LRESERVE	-0.406304	0.097293	-4.176077	0.0001
C	17.64959	3.038520	5.808613	0.0000

R-squared	0.903521	Mean dependent var	6.927525
Adjusted R-squared	0.899290	S.D. dependent var	0.268436
S.E. of regression	0.085188	Akaike info criterion	-2.039206
Sum squared resid	0.827297	Schwarz criterion	-1.899832
Log likelihood	128.3524	Hannan-Quinn criter	-1.982606
F-statistic	213.5213	Durbin-Watson stat	0.280426
Prob (F-statistic)	0.000000		

Source: Developed for research via EViews 6.0

Decision:

Reject H_0 since the p-value of F-test=0.0000 is smaller than level of significance, α=0.01.

Conclusion:

There is enough evidence to conclude that there is heteroscedasticity problem in the model at 1% level of significance.

Since the heteroscedasticity problem still exists, another recommended method ARDL is to be used in order to solve the problem. It will discuss the detailed information in the chapter 4.5 to explain the solution of the heteroscedasticity problem.

4.4.4 Model Specification Test

The Ramsey RESET Test is to be used to estimate the model specification of the model in order to make sure the model is "correct or good" model.

Hypothesis:

H_0: Model specification is correct.

H_1: Model specification is incorrect.

Decision rule:

Reject H_0 if the p-value of F-test is smaller than level of significance, α=0.01. Otherwise, do not reject H_0.

Table 4.10: Ramsey RESET Test

F-stastistic	3.328389	Prob. F (1,113)	0.0707
Log likelihood ratio	3.483517	Prob. Chi-Square (1)	0.0620

Source: Developed for research via EViews 6.0

Decision:

Do not reject H_0 since the p-value of F-test=0.0707 is greater than level of significance, α=0.01.

Conclusion:

There is insufficient evidence to conclude that there is model specification problem in the model, thus it can be conclude that model is correctly

specified at 1% level of significance.

4.4.5 Normality Test

Normality distribution of error term is important for the regression analysis model because the estimated β is the linear function of the error term. If the error terms are normally distributed, then the β and independent variables will also normally distributed as well. If error term is normally distributed, the specification model is correct and ceteris paribus. The Jarque-Bera Test will be used to check the error term is whether normally distributed or not based on the estimated model.

Hypothesis:

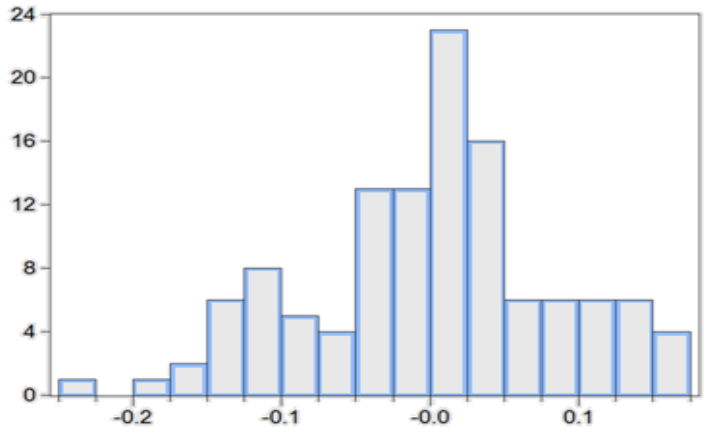
H_0: Error terms are normally distributed.

H_1: Error terms are not normally distributed.

Decision rule:

Reject H_0 if the p-value of JB test is smaller than level of significance, α=0.01.Otherwise, do not reject H_0.

Table 4.11: Jarque-Bera Test



Series: Residuals	
Sample 2002M01 2011M12	
Observations 120	
Mean	2.66e-15
Median	0.005678
Maximum	0.173034
Minimum	-0.226113
Std. Dev.	0.083379
Skewness	-0.187805
Kurtosis	2.786412
Jarque-Bera	0.933513
Probability	0.627033

Source: Developed for research via EViews 6.0

Decision:

Do not reject H_0 since the p-value of JB test=0.627033 is greater than level of significance, α=0.01.

Conclusion:

There is not enough evidence to conclude that the error terms are not normally distributed. Therefore, it can conclude that the model meets the normality assumption of error term at 1% level of significance.

4.5 Autoregressive Distributed Lag Model

In previous part, the sources developed from EViews 6.0, it showed that there have econometric problems at the diagnostic checking part, which is autocorrelation and heteroscedasticity problems. As mentioned in previous part, there has few ways of solutions to overcome the econometric problems. In this studies, autoregressive distributed lag model, which known as ARDL, is chosen as the solving matter for econometric problems.

An autoregressive distributed lag model is a model that providing a general distributed lag structure without clearly assigning a dynamic optimization. Tsay (2009) used autoregressive distributed lag model which highly recommended by Deboef and Kellstedt, it is because of it can be used to calculate the short run, long run effect and other important quantities of interest to political scientists. Besides that, autoregressive distributed lag model can be flexible in connecting the short run and long run effect on regressors on dependent variable.

There has few difficulties are needed to be noted in this model. When there has several of independent variables in the model, it will cause the degree of freedom to be lesser. If degree of freedom lower, it will affects the statistical significant of the predicted parameters. In addition, the model wills also auto-regress the error term its own, thus the technical problem will exists.

Autoregressive distributed lag model is chooses to reform a better research's model, this is because of it can be one of the ways to remove the econometric problems and the relationship between dependent variable and independent variables are rarely immediate. An improved regressive model showed as below:

$$
\begin{aligned}
ln\text{Share Price}_{t-1} = {} & \beta_0 + \beta_1 ln \text{ Inflation} + \beta_2 \, ln \text{ Inflation}_{t-1} + \beta_3 \text{Interest Rate} \\
& + \beta_4 \text{Interest Rate}_{t-1} + \beta_5 \, ln \text{ Exchange Rate} + \\
& \beta_6 \, ln \text{ Exchange Rate}_{t-1} + \beta_7 ln \text{ Money Supply} + \\
& \beta_8 \, ln \text{ Money Supply}_{t-1} + \beta_9 \, ln \text{ Reserves} + \\
& \beta_{10} \, ln \text{ Reserves}_{t-1} + e
\end{aligned}
$$

(Model 4.8)

By using this *Model 4.8* as above, firstly, to overcome the autocorrelation problem, LM test is applied to detect whether the autocorrelation problem still existing or not. Secondly, using the same model, *Model 4.8*, ARCH test is applied to detect against the heteroscedasticity problem, whether it still existing or not.

Table 4.12:Breusch-Godfrey Serial Correlation LM Test

F-stastistic	0.087454	Prob. F (1,107)	0.8245
Obs*R-squared	0.176738	Prob. Chi-Squared (1)	0.8028

Source: Developed for research via EViews 6.0

Through the results showed as *Table 4.12*, the autocorrelation problems is now been eliminated. As the result showed as above, the P-value of Chi-Squared in LM test is bigger than 0.01, which is 0.8028. Therefore, the autocorrelation problem does not longer exist anymore.

Table 4.13: ARCH test

F-stastistic	0.074385	Prob. F (6,101)	0.6588
Obs*R-squared	0.189027	Prob. Chi-Squared (6)	0.5832

Source: Developed for research via EViews 6.0

Through the results showed as *Table 4.13*, the heteroscedasticity problem is solved. As the result showed, the P-value of Chi-Squared in ARCH test is larger than 0.01, which is 0.5832. Therefore, the heteroscedasticity problem does not exist anymore. Meanwhile, the diagnostic checking for multicollinearity, model specification test and normality test that had been done previously showed there has no serious problem in this model. Thus, further checking is not needed to be performing again.

4.6 Conclusion

The objective of this chapter is to test whether the model is BLUE by using the data collected from the Data Stream Navigator and International Monetary Fund. This research project found out that all the variables' p-value smaller than the level of significance, α (0.01), so it can conclude that there is significant relationship between the dependent variable and independent variables. Stock prices with inflation, stock prices and interest rate, stock prices and exchange rate, stock prices and money supply, stock prices and reserves.

Besides that, this chapter is conducting to check the problem of multicollinearity, autocorrelation, heteroscedasticity, normality of error term, and model specification by employed EView 6.0 system. The results of these tests showed that the model specification is correct, error terms are normally distributed, there is no serious multicollinearity problem, but exists of autocorrelation problem and heteroscedasticity problem.

In addition, the statistical results, major findings, policy implications, limitations of the study, and recommendation for future study will be discuss further in the detailed information in the next chapter.

CHAPTER 5: DISCUSSIONS, CONCLUSIONS, AND IMPLICATIONS

5.0 Introduction

This chapter consists of the overall summary on the main points and outcomes in previous chapters and mostly based on outcomes obtained from chapter 4 where chapter 4 is to prove the objectives of the research and linked back to the purpose of the study. First is the summary of statistical analysis and major findings that was showed and discussed in chapter 4. Next, the implications of policies will be suggested in the research. Other than that, limitations and problems appeared in the study will also be discussed. Lastly, recommendations will be suggested for future researchers of the relevant topics.

5.1 Summary of Statistical Analysis

The objective set previously for this research is to identify the significant relationship between stock prices and macroeconomic variables. The *stock price* is the dependent variable whereas *inflation, interest rate, exchange rate, money supply and reserves* are independent variables. Data are collected from data stream and website of Bank Negara Malaysia from January 2002 to December 2011 based on monthly performance and has the sample size of 120 units. An empirical model was developed and then improved to OLS regression model from *Model 5.1* to *Model 5.2* as showed at below:

Stock Price = Inflation + Interest Rate + Exchange Rate + Money Supply + Reserves + e

(Model 5.1)

$$ln\ Share\ Price = \beta_0 + \beta_1\ ln\ INFLATION + \beta_2\ INTRATE + \beta_3\ ln\ EXRATE + \beta_4\ ln\ MS + \beta_5\ ln\ RESERVE + e$$

(Model 5.2)

From *Model 5.2*, the share price is explained by the other five independent variables, which are inflation, interest rate, exchange rate, money supply and reserves, where inflation is measured in index point, money supply and reserves are measured in Ringgit Malaysia, interest rate is measured in percentage and exchange rate is measured based in currency of Ringgit Malaysia, while*e*is the random error terms.

Next, EViews6.0 is used to perform the data to obtain OLS result. The *Model 5.3* as showed below is improved from the initial output of regression, *Model 5.2*.

$$ln\ Share\ Price = 17.64959 - 1.659526\ ln\ INFLATION + 0.095004\ INTRATE - 2.734996\ ln\ EXRATE + 0.334840\ ln\ MS - 0.406304\ ln\ RESERVE$$

(Model 5.3)

From *Model 5.3*, on average, assuming that all independent variables are equal to 0, the stock price of Malaysia will constant at 17.64959 units. Holding other variables constant, if inflation, exchange rate and reserve increase by RM1, on average, the stock price will decrease by 1.659526 units, 2.734996 units and 0.406304 units, respectively. However, if interest rate increases by 1%, on average, the stock price will increase by 0.095004 units, holding other variables constant. Moreover, if there is an increase of RM1 on money supply, on average, the stock price of Malaysia will increase by 0.3348430 units, holding other variables constant.

Hypothesis testing such as t-test, F-test are carried out and R^2, and standard errors are obtained from EViews 6.0 using the same regression output. For the t-test, at the significance level of 0.01, all the independent variables are significantly related to the stock prices. For the F-test, at the significance level of 0.01, at least one of the independent variables is significantly in explaining the stock prices.

$R^2$is found to be 0.903521 and indicates that 90.35% of the total variation in the stock prices can be explained by the variation in the independent variables. The standard error for the model is found to be 0.085188.

Five diagnostic checking are performed in this study to test whether the model is facing any econometric problems. Examples for the checking are multicollinearity, autocorrelation, heteroscedasticity, model specification tests, and normality test. There is autocorrelation and heteroscedasticity problems exist. To solve these econometric problems, autoregressive distributed lag model is applied to eliminate it. A new regression model, *Model 5.4*, is developed based on the autoregressive distributed lag model as showed below:

$$\begin{aligned} ln\text{Share Price}_{t-1} = {} & \beta_0 + \beta_1 ln \text{ Inflation} + \beta_2 ln \text{ Inflation}_{t-1} + \beta_3 \text{ Interest Rate} \\ & + \beta_4 \text{Interest Rate}_{t-1} + \beta_5 ln \text{ Exchange Rate} + \\ & \beta_6 \, ln \text{ Exchange Rate}_{t-1} + \beta_7 \, ln \text{ Money Supply} + \\ & \beta_8 \, ln \text{ Money Supply}_{t-1} + \beta_9 ln \text{ Reserves} + \\ & \beta_{10} ln \text{ Reserves}_{t-1} + e \end{aligned}$$

(Model 5.4)

Again using of the EViews software, both the autocorrelation and heteroscedasticity problems solved. No further testing is needed to perform since there is no other econometric problem exists.

5.2 Discussions of Major Findings

In this research, the first chapter had discussed about the objectives of the research topic. Generally, this research is intended to examine how the macroeconomic variables such as inflation, interest rate, exchange rate, money supply and reserve affect the stock prices in Bursa Malaysia. Specifically, this study conducts an in-depth analysis of these macroeconomic variables in order to analyze whether these macroeconomic variables have the causal relationship with the Bursa Malaysia stock prices by applying recent monthly available data. These monthly data series

are originated from Data Stream Navigator which covers in the period start from January 2002 to December 2011.

There are several hypotheses testing have been developed in order to test the correlation between the dependent variable and independent variables which was mentioned several times in the previous part and thus achieve the objectives set. Noted that, there are various diagnostic checking like normality test, multicollinearity, heteroscedasticity, autocorrelation and model specification test would be carried on in Chapter 4. These diagnostic checking will be performed only when there was doubt, whether there has any econometric problems occur in the initial estimated regression model. It can be used to solve the econometric problems that are consisting in the hypotheses testing. In other words, there is actually no need to conduct this further diagnostic checking if the hypothesis testing do not appear any econometric problems. Lastly, this section will only focus on the hypothesis part that have been done before, and relate back to the hypotheses that were initially performed in Chapter 1.

In the initial developed hypotheses, it was hypothesized that the stock market volatility and risk will be affected by the inflation rate. In the Asia country, there has more concern on the inflation, however, most of the stock markets still transferring their money to more matured market by experienced sell-downs with foreign funds. Besides that, there has a steeply fallen in the net purchase of local stocks on year 2011. This caused the foreign investors who participate in the local stock markets dropped as early as last month. The economic growth of the nation is affected by shifting the funds where inflation plays an important role. Hence, it can be estimated that the inflation and stock prices have the significantly relationship.

Furthermore, the long run interest rate serves as a better proxy for nominal risk free component and might also serves as a proxy for expected inflation in the discount rate. The nominal risk free component can be used in the stock valuation models' discount rate. Thus, there has a significantly relationship between short run and long run interest rate with stock prices.

Meanwhile for exchange rates, the input and output prices of international competitive will be directly affected by the changes in exchange rate. Not only multinational companies, domestic companies also will be influenced by the exchange rate changes. The companies' future cash flow change together with the exchange rate fluctuations and caused the value of the company influenced by the foreign exchange rates. As a result, there is a significantly relationship between the exchange rates and stock prices.

For money supply, the discount rates will be increased result in the money supply increasing. It would lead the stock prices to turn over. Besides that, the presence of error correction representation made the money supply and stock prices co-integrated although they were non-stationary in the level form. Money supply would Granger cause stock prices in unidirectional. The result shows that the money supply was a significant factor in explaining stock prices.

Lastly, the reserve is significantly impact on stock prices. The overall economy would not improve rapidly even though there is an increasing in stock market. This is because the Federal Reserve has inflation to other false stock market bubble. Although it holds a lot of money, but it does not mean that the economy is in great shaped situation. Eventually, it can be ensured that all these macroeconomic variables are appropriated to predict the stock prices based on the variables change due to all these variables has significant relationship with stock prices.

This research has conducted the t-test, F-test, $R^2$and standard errors in the early hypotheses testing. The result shows that all the independent variables like inflation, interest rate, exchange rate, money supply and reserve are significant to the stock prices. In addition on that, the F-test result shows that at least one of the β_is different from zero at the significance level of 0.01. In other words, there is at least one independent variable is significantly in explaining the stock prices.

Other than that, autocorrelation problem and heteroscedasticity problem were found out in the OLS model. The Autoregressive Distributed Lag Model (ARDL)

model was applied against the autocorrelation problem. However, regarding to the heteroscadasticity problem, White test was hired in order to solve the problem but the problem cannot fully solve at last. Hence, the ARDL model is introduced to solve the heteroscedasticity problem. At the end, the regression is finally free from normality test, multicollinearity, heteroscedasticity, autocorrelation and model specification test.

5.3 Implications of the Study

Implication can be defined as what the research has indicated or implied as well as future research avenues are discussed.

5.3.1 Managerial Implications

There is a numerous number of recently research examine that the macroeconomic variables are correlated with the stock prices. However, there are few practical implications for policy makers or practitioners in order to achieve a better stock performance.

The causal relations and dynamic interactions between macroeconomic variables and stock prices are important in the macroeconomic policies formulation. Policy makers should implement the macroeconomic policies although those policies may influence the formation of capital and stock trade process.

The policy makers can clearly aware of the foundation or knowledge regarding to the effects of macroeconomic variables like inflation, interest rate, exchange rate, money supply and reserve on the stock price through the findings and result of this study. Stock prices can become an indicator for the future economic activities if it reflects the underlying fundamentals accurately.

The governments need to maintain low and stable inflation rate, low interest rate, adequate reserve, strong money supply, and adjusted exchange rate. Governments may use this as benchmark or guidelines in order to achieve better stock performance.

The first factor is to maintain low and stable inflation rate. Governments or policy makers want to keep the inflation rate down due to high volatility in relative prices may be induced in a high inflation and which will make the investment decision risky. Low inflation means that the prices would not be higher, it would increase the consumption and can stimulate the economic growth.

Low interest rate is part of deliberate policies that are implemented by the central bank in order to encourage the customers borrowing and discourage people saving. In additional on that, households and businesses can finance their new spending if the interest rate is low. This can help to support many other assets' price, such as stocks and houses.

When the adverse external shocks happen, companies can no need to borrow funds with others, they can use the Federal Reserve to self-insure against those shocks. The cost of external borrowing can also be reduced. Investors would improve the economy confidence by holding the reserves and it would lead to lower risk premium. Adequate reserves may mitigate the negative impact on the domestic economy.

The policy makers can use a strong money supply to stabilize the economy when the economy is during recession, for example, customers may stop their spending as much as they used to, investors or companies stop investing in a new capacity, the workers or labors laid off by the firms, business production declines and so on. Stronger money supply can be said is a countercyclical policy which would expand desirable output and employment.

Policy makers can adjust the exchange rate either in fixed exchange rate or floating exchange rate. If the exchange rate becomes volatile, it will create an uncertainty. Policy makers can lower the exchange rate risk and transaction costs by fixing the exchange rate. On the other hand, floating exchange rate also has the benefits that allow the government to pursue its own independent monetary policy. For example, the competitiveness of tradable goods sector might be affected if the policy makers adjust the nominal exchange rate.

5.4 Limitations of Study

There are a few limitations problems encountered in the progress of the research. The first limitation of the study is the autocorrelation problem exists in the model after using OLS, Ordinary Least Square. This means that the model has relationship between the error terms and autocorrelation make t-statistics insignificant by underestimating the standard errors of the coefficients. Once there is relationship between the error terms, the independent variables tend to correlated with each other. If one of the independent variables decreases, other independent variables which are correlated would tend to be decreased too. In the fact that, the independent variables should correlated with dependent variable only which is the share price and not correlated with other independent variables. This would lead to misinterpretation of the results regarding about the relationship between the share price and macroeconomic variables. This is because some of the macroeconomic variables explained about the relationships between each other instead of share price.

The second limitation of the study is the heteroscedasticity problem also appeared in the model. Heteroscedasticity appeared when the error terms do not have constant variance. As the value of independent variables increases, the errors may increase. Heteroscedasticity is likely to happen when a high value for independent variables is a necessary but not sufficient condition to have a high value on dependent variables. As the values of independent variables become more extreme

in either direction range from extremely negative to extremely positive, the errors may also increase. Although heteroscedasticity does not result in biased parameter estimates, OLS does not provide the estimate with the smallest variance, and lead to significance tests either can be too high or too low. Furthermore, when heteroscedasticity problem is present, the standard errors are biased and cause the bias in test statistics and confidence intervals too.

The third limitation of the study is the unavailability of the data. At first, there is one more independent variable which is GDP. Gross Domestic Product is included in the model. The study tends to employ data from Jan 2002 to Dec 2011 based on monthly performance. However, the availability of data sources is limited and unable to achieve the standardization of monthly data among dependent and independent variables as the GDP data only can found in quarterly basis but not monthly basis. In order to achieve the standardization of monthly data among dependent and independent variables, the GDP is taken out from the model and no longer acts as independent variable anymore as GDP also is not a very significant independent variables in explaining the relationship with the stock price.

In order to solve autocorrelation and heteroscedasticity problems, ARDL, Autoregressive Distributed Lag model is implemented by introducing all lagged value to each of the variables and run it by using OLS again. The results showed that the autocorrelation and heteroscedasticity problems are being solved.

5.5 Recommendations for Future Research

The data sets of this study are monthly data, which is high quality and frequency data. Future researchers can use the various frequencies data like daily and weekly data to investigate the relationship between macroeconomic variables and stock prices, whether the result is sensitive to the frequency of data.

Future researchers can present the bull and bear phases to examine the effect of macroeconomic variables such as inflation, interest rate, exchange rate, money

supply and reserve on stock prices. Future researchers want to know whether it is different and will directly achieve desirable outcome on the stock prices while using the macroeconomic variables to apply in bull and bear phases.

Other than that, future researchers may employ various sectors like Vector Error Correction or Co-integration analysis instead of using stock market index to investigate both of the short run and long run relationship between macroeconomic variables with stock prices. Different sector is believed that has different effects of macroeconomic variables on stock prices.

5.6 Conclusion

In this chapter, there is summarization of previous chapters and emphasized more on the data and results obtained in Chapter 4. Next, there is a discussion on major findings about the outcomes or results obtained in chapter 4.

In the following section, few policies are suggested in the study for the uses of the policy makers in the relevant fields. The findings of this research paper provide a foundation to the policy makers regarding the impact of macroeconomic variables such as inflation, interest rate, exchange rate, money supply and reserves on stock prices in Malaysia.

Some limitations are encountered throughout this research paper. Autocorrelation and heteroscedasticity problems occurred in this study. Besides, the limited source of data is also one of the limitations. Furthermore, few recommendations are suggested for researchers that are doing the relevant topic in future.

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