DETERMINANTS OF STOCK PRICE FLUCTUATIONS: EVIDENCE FROM SINGAPORE

BY

CHOI JUN HUI

CHUA PUI YI

LEE SIEW CHYN

LIM BEE GNOH

WONG YEE MUN

A research project submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF BUSINESS ADMINISTRATION (HONS) BANKING AND FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE

DEPARTMENT OF FINANCE

APRIL 2014

DECLARATION

We hereby declare that:

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

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

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

(4) The word count of this research report is 17,738 words.

Name of Student:	Student ID:	Signature:
1. CHOI JUN HUI	11ABB02331	_____
2. CHUA PUI YI	11ABB02578	_____
3. LEE SIEW CHYN	11ABB03449	_____
4. LIM BEE GNOH	11ABB02131	_____
5. WONG YEE MUN	11ABB01917	_____

Date: 10th April 2014

ACKNOWLEDGEMENT

Final Year Project is not an easy task and it would not possible to complete without support and help of numerous people. Hence, we would like to extend our sincere to all of them.

First of all, we would like to express our deepest gratitude to Universiti Tunku Abdul Rahman (UTAR) for giving us to conduct this research. UTAR has been providing us adequate information and useful resources in completing this research project.

Next, the special thank goes to our supervisor of research project, Ms Wei Chooi Yi. Her sincere supervision, guidance and direction help the progression and smoothness of our research. The patient and dedicated a great amount of time in helping is much indeed appreciated.

Greatly deals appreciated go to contribution of all group members. The teamwork and effort from every member are highly appreciated as it is the key factors to the completion of this research project.

Finally, we would like to express every special thanks for our parents, relatives and friends have been giving their love and support towards the whole period of conducting this research project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Page

LIST OF ABBREVIATIONS

ADF Unit Root Test	Augmented Dickey-Fuller Unit Root Test
AIC	Akaike Information Criterion
APT	Arbitrage Pricing Theory
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Model
ARMA	Autoregressive Moving Average Model
CAPM	Capital Assets Pricing Model
CLRM	Classical Linear Regression Model
CPI	Consumer Price Index
DOLS	Dynamic Ordinary Least Square
EMH	Efficient Market Hypothesis
ER	Exchange Rate
GDP	Gross Domestic Products
H_0	Null hypothesis
H_1	Hypothesis
IMF	International Financial Statistic
IR	Interest Rate
JB	Jarque-Bera
JSE	Jamaica Stock Exchange
KLSE	Kuala Lumpur Stock Exchange
LM Test	Breusch-Godfrey Lagrange Multiplier Test
MAS	Monetary Authority of Singapore
MS	Money Supply
NZSE index	New Zealand Stock index
OLS	Ordinary Least Square
PP Test	Philips-Perron Test
QTM	Quantity Theory of Money

REER	Real Effective Exchange Rate
RESET	Ramsey's Regression Specification Error Test
SES	Singapore Stock Exchange
SGD	Singapore Dollar
SGX	Singapore Exchange
SIC	Schwarz Information Criterion
SYM	Symmetric Matrix
UK	United Kingdom
US	United States
UTAR	Universiti Tunku Abdul Rahman
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIF	Variance Inflating Factor
WLS	Weighted Least Squares Regression

PREFACE

To examine the stock price fluctuations in Singapore is a crucial issue for investors, business firms and policy makers. By adding the specific macroeconomic variables, for example, interest rate, exchange rate, money supply, gross domestic product (GDP) and consumer price index (CPI) into the OLS Regression Model as independent variables, researchers able to identify how these macroeconomic variables lead the fluctuations of stock price. Besides, the significance and the type of relationships among these macroeconomic variables with the stock price fluctuation can also be determined.

This research is intended to establish a significant contribution to those parties who have concern on Singapore stock price fluctuations as well as financial environment of Singapore.

ABSTRACT

This study aims to examine the relationship between the Singapore Straits Times Index and selected macroeconomic variables (interest rate, exchange rate, money supply, gross domestic product and consumer price index). Ordinary Least Squares (OLS) method is employed in the study to determine the statistical relationship between the dependant variable and the five independent variables over the sample period from January 1993 to December 2012. A quarterly data set which contains a total of 80 observations has been collected from the Datastream for this study. Several tests have been run for diagnostic checking using the Eviews. The results show that there are some econometric problems in the estimated model of this study, including the multicollinearity, autocorrelation and heteroscedasticity problem. However, these problems do not affect the validity of the results in this study as a whole.

Based on the research objectives, the conclusion drawn from this study is that all the selected macroeconomic variables form significant relationships with the Singapore stock price index. Besides this, the study also found that the interest rate, money supply and gross domestic product display a positive relationship with the Singapore stock price index, while the exchange rate and consumer price index form a negative relationship with the Singapore stock price index. Lastly, policy implications, limitations of the study and recommendations for future research are also provided in the study.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

The major highlight of this chapter consists of the background, problem statement, objectives, questions, hypotheses, significance of the study and chapter layout. Lastly, conclusion is a brief outline of this chapter.

1.1 Research Background

Investments in stock exchange establish an important role of the whole country's economy due to huge amount of capital is exchanged through stock markets across the world (Ozbay, 2009; Samadi et al., 2012). Also this market provides a platform for both professional investors and public to make investment. There are several empirical studies (Donatas and Vytautas, 2009; Guo, Hu and Jiang, 2013; Nieh and Yau, 2009) in the existing literature investigating the relationship between stock prices and selected macroeconomic variables. Effects of economics variable and stock price fluctuation are highly correlated. However, neither the signs relationship nor the direction of causality is resolved in theory and empirics.

Singapore is the only developed country in Southeast Asia (International Monetary Fund Policy, 1997). Although Singapore is near to Malaysia, but the economy is more advance than Malaysia. Singapore is one of the Four Asian Tigers besides South Korea, Taiwan and Hong Kong (Barro, 1998). Stock market of Singapore plays important role in the growth of economy. The chief credit

rating agencies, Standard & Poor's, Moody's, Fitch ranked Singapore as the AAA rating. Meanwhile, Singapore is the only AAA credit rating country in Southeast Asia (Ogg, 2011). This means that Singapore is a great market to invest and able to attract foreign direct investment.

On the other hand, the monetary policy that implemented in Singapore different from the other countries. The policy implemented by controlling the exchange rate with the amount of United State Dollar holding in hand and refers to the recent inflation in the country (Parrado, 2004). This aims to stable the price and the economy. The policy also focuses on the prototype of trade in Singapore.

The Singapore stock market is known as Singapore Exchange (SGX) has continuously developed due to the economics of Singapore is the second freest and openness economic of the world (Thomas White International, 2011; Li, 2010). Singapore Exchange was established by the merge of Singapore Stock Exchange and Singapore International Monetary Exchange in year1999 (Tan, Lim & Chen, 2004). According to Singapore Exchange Annual Report 2012, Singapore Exchange has three dominant markets which are securities market, derivatives market and other services. Singapore Exchange also established clearing house in October 2011. As at year 2012, there are more than thousand companies which fulfil the listing requirement listed in Singapore Exchange. Straits Times Index and FTSE ST Index Series are the indices of Singapore Exchange.

According to Hutchinson (2012), "The Singapore stock market is the world's biggest bargain". Singapore stock market has the potential to grow rapidly and rival with U.S. stock market. Besides, investors are able to hedge their risk effectively in Singapore stock market which is a well-developed market (International Monetary Fund Policy, 1997, p. 6).

However, before the establishment of Singapore Exchange, Singapore Stock Exchange (SES) suffered in few crashes. These crashes declined the Straits Times Index rapidly and brought losses to investors. In year 1985, the Straits Times Index drops seriously due to the 1985 recession and Singapore Pan Electric crisis. Apart from that, Straits Times Index decline significantly when the worldwide market crash 1987. But after that crash, Straits Times Index climbed up successively until the event of year 1990 (International Monetary Fund Policy, 1997, p. 7). In year 1990, many Malaysian companies repealed from listing in Singapore Stock Exchange and caused the Straits Times Index drop about 25% (Yahoo Finance, n.d.).

Nevertheless, many previous researchers (Catherine, 2011; Gerlach and Gerlach-Kristen, 2006) have been investigated the relationship of macroeconomics factors and the stock price in Singapore compare with other country such as Hong Kong. Yet, there are only few previous researches that solely investigated the case in Singapore stock market. Besides, there are many researches that examined the annually data of macroeconomics factors instead of quarterly data. Thus, this study aims to test relationship between stock price and money supply, interest rate, exchange rate, gross domestic products (GDP) and consumer price index (CPI) in Singapore within year 1993 to year 2012.

1.2 Problem Statement

Previous researchers have contributed to the literature on Singapore stock price. Most studies were devoted to discuss macroeconomic determinants of stock prices as well as efficiency of the stock market in Singapore. Although there have been substantial studies, such as, Maysami, Lee and Hamzah (2004), Maysami and Koh

(2000) and Wong, Khan and Du (2006) proved macroeconomic variables changes, for example, money supply, interest rates, exchange rate, gross domestic products and consumer price index will have impacts on the stock price movements and the stock market as a whole, there are arguments proposed on how these variables behave in influencing the stock price. Besides this, empirical verifications of relationship between stock prices and its determinants started in the 1980s.

There is empirical evidence of bubbles in the Singapore stock market (Rangel & Pillay, 2007). The stock market bubbles are caused by the weak form efficiency of the Singapore stock market based on the Efficient Market Hypothesis (EMH) (Leo & Kendall, 1996). The Singapore stock market is inefficient in terms of stock pricing. The Efficient Market Hypothesis (EMH) concludes that in a stock market which is efficient, the latest related information regarding variation in macroeconomic variables are totally indicated in the recent stock prices and thus, market participants are unable to make higher than average profit through stock trading.

Money supply is also the most significant determinants of stock prices. According to Wong, Khan and Du (2006), in general, in the long-run, Singapore's stock prices exhibit an equilibrium relationship with money supply and interest rate. The growth of money supply increases the cash flow circulated in economy and this leads to growing demand for stocks and an increase in stock prices. The result is in line with Maysami, Lee and Hamzah (2004) and Maysami and Koh (2000). However, Fama's study (as cited in Maysami, Lee & Hamzah, 2004, p. 55) suggested that when money supply rises, inflation will occur, and may increase the discount rate, lower the demand for stocks and stock prices. As discussed by Mukherjee and Naka's study (as cited in Wong et al., 2006, p. 32), the negative effects will be outweighed by positive effects through the economic incentive provided by money growth may eventually increase the stock prices.

Interest rate is another important factor in determining stock prices and affected by money supply. When money demand remains unchanged, a growth of money supply increases interest rates, and this raises the opportunity cost of holding stocks. Subsequently, investors are inclined to change their stock in hand to deposits and securities to earn interest income. This leads to declining demand for stocks and lower stock prices (Wong et al., 2006). In the study of the vibrant relations between macroeconomic variables and Singapore stock market, stock market is sensitive to interest rate (Maysami et al., 2000). Wong et al. (2006) learnt that before the 1997 Asian financial crisis, Singapore's stock prices were cointegrated with interest rate. But, after the crisis, this relationship has weakened. In addition, Maysami et al. (2004) claimed that short-term interest rate is positively affecting Singapore's stock market whereas long-term interest rate is negatively affecting it.

Exchange rate plays an important position in affecting stock prices. Maysami, Lee and Hamzah (2004) stated that Singapore stock markets are directly proportional to exchange rate. It is sensitive to exchange rate resulting from huge portion of international trade in the Singapore's economy (Maysami & Koh, 2000). When the Singapore dollar depreciates, the demand for Singapore's exports that are relatively cheaper will increase and subsequently raising cash inflows to Singapore, provided that the foreign demand is highly elastic. In contrast, an appreciation in Singapore dollar will attract investments, such as stocks. The increase in demand for stocks will boost stock market level, suggesting stock market returns and exchange rates fluctuations exhibit a positive correlation (Mukherjee & Naka, as cited in Maysami et al., 2004, p. 54). However, appreciation of the Singapore dollar causes Singapore products become relatively expensive in overseas markets, results in fall in foreign demand of Singapore lead to cash inflows decline. Meanwhile, stronger SGD reduces the cost of inputs

imported from other countries for production purposes.

Gross domestic products (GDP) are also a significant determinant of stock prices. GDP is referred to real economic activity standard. Maysami and Koh (2000) pointed both index of industrial production and local exports are used as substitute for the real economic activity standard in Singapore. Both of them have a positive impact on stock prices by affecting the expected future cash flows (Maysami et al., 2000). Such impact can be explained by the fact that the rational predictions of the real sector made by the market (Fama, as cited in Maysami et al., 2004, p. 68). The positive relationship shows insuring value against real market risks of production (Chen, Roll & Ross, 1986). Production activities variation will affect stock returns through their impact on expected dividends (Maysami & Koh 2000).

Besides, consumer price index is the inflation indicator which commonly used to reflect the price level of a basket of goods and services (BLS Information, n.d.). According to Maysami and Koh (2000), relationship between consumer price index (CPI) and stock price of Singapore is insignificant. This is because most of the stocks in Singapore have been hedge against inflation. Maysami, Lee, and Hamzah (2004) argued by providing contrary result. Both studies examined the relationship with Vector Error Correction Model (VECM). When the inflation occurs, the price of stocks and assets will decrease and the demand for the stocks and assets will increase. Then, the stock price will decrease along with increment of demand for stocks (Wong, Khan & Du, 2005).

In view of the phenomena above, the researchers of this study attempt to test the relationship between interest rate, consumer price index, exchange rate, money supply, as well as gross domestic product and the Singapore stock price movements. This study aims to contribute to the literature on the determinants of stock price fluctuations in Singapore.

1.3 Research Objectives

There are general objective and several specific objectives in this study.

1.3.1 General Objective

The broad objective is to identify the relationships of interest rate, exchange rate, money supply, gross domestic product and consumer price index on Singapore's stock price fluctuation.

1.3.2 Specific Objectives

The specific objectives of the study are:

1. To determine the relationship between interest rate and stock price fluctuation.
2. To determine the relationship of exchange rate on stock price.
3. To determine the relationship between money supply and stock price fluctuation.
4. To determine the relationship between gross domestic products (GDP) and stock price fluctuation.
5. To determine the relationship between consumer price index (CPI) and stock price fluctuation.
6. To determine which independent variables will affect the most on stock price fluctuation.

1.4 Research Questions

1. Is there any significant relationship between interest rate and stock price fluctuation?
2. Is there any significant relationship between exchange rate and stock price fluctuation?
3. Is there any significant relationship between money supply and stock price fluctuation?
4. Is there any significant relationship between gross domestic products (GDP) and stock price fluctuation?
5. Is there any significant relationship between consumer price index (CPI) and stock price fluctuation?
6. Which of the independent variables will affect the most to stock price fluctuation?

1.5 Hypotheses of the study

H_0 = There is no significant relationship between interest rate and stock price fluctuation.

H_1 = There is a significant relationship between interest rate and stock price fluctuation.

H_0 = There is no significant relationship between exchange rate and stock price fluctuation.

H_1 = There is a significant relationship between exchange rate and stock price fluctuation.

H_0 = There is no significant relationship between money supply and stock price fluctuation.

H_1 = There is a significant relationship between money supply and stock price fluctuation.

H_0 = There is no significant relationship between gross domestic product (GDP) and stock price fluctuation.

H_1 = There is a significant relationship between gross domestic product (GDP) and stock price fluctuation.

H_0 = There is no significant relationship between consumer price index (CPI) and stock price fluctuation.

H_1 = There is a significant relationship between consumer price index (CPI) and stock price fluctuation.

1.6 Significance of Study

The understanding of relationship among money supply and stock price is important because money supply as a monetary policy tool that can influence government in formulating policies. Therefore, whether fluctuation in stock price change or is changed by fluctuation in money supply, this study will provide a clear guideline to assist government in implementing policy.

The relationship among the stock return and exchange rate market helped propagate the Asian Financial Crisis 1997. Hence, understanding of this relationship can help government predict a crisis as well.

Interest rates will impact a corporation's operation. Any changes in interest rate that will affect cost of capital thereby projects with lower rate of return will be rejected and thus stock price fluctuate. In this way, understanding the relationship between two variables is able to predict performance of a corporation thereby investors can make investment decision.

Gross domestic product (GDP) is a principal tool used to predict future performance in an economy. The stock price fluctuation will reflect prospect about future performance of companies and future economic growth. So, knowing of relationship between gross domestic product (GDP) and stock price will benefit investors for making decision whether invest or not and assist government to predict the future economic growth.

Consumer price index (CPI) compares prices of fixed-list of commodities or services to a base period and indicates the changes in the price level. This is important for investors as it can be one of the economic indicators which can reflect how the economy is inflated. In other words, the market operates slower when consumer price index is higher. Thus, the relationship between consumer price index (CPI) and stock prices is important to investors to know the performance of economy.

In short, understanding of the relationship among macroeconomic variables and stock price is important because stock price fluctuation can affect the stock market development where economy of a country is closely related to performance of stock market even performance of corporations. Furthermore, the understanding of causal relationship among stock prices and determinants are useful in implementing an appropriate policy. Hence, the study of the determinants on stock prices fluctuation as a guideline to investors as well as government to predict the future of performance and level of corporation even future growth of economic

activities. This is important for them in making decision and implementing monetary and fiscal policy.

In conclusion, this research tends to compile both previous results and current research to establish a new and updated research paper that clarifies the determinants of stock price fluctuation in Singapore. The determinants are money supply, interest rate, exchange rate, gross domestic product and consumer price index which will be the important tools for market participants due to the relationship with the stock prices that will be investigated in this research. Hence, this study can contribute to stock market in term of companies, investors and countries.

1.7 Chapter Layout

This study is structured as follows:

1.7.1 Chapter 1

An overview of the research is provided and the research problem explained in this chapter. Besides this, the research objectives, the research questions, and the hypotheses are set in this chapter.

1.7.2 Chapter 2

This chapter presents the review of literature on previous research works relevant to the topic of interest. In this chapter, methodologies and findings regarding the topic is provided. Then, the relevant theoretical models will also be reviewed to develop the proposed conceptual framework by identifying the relevant variables in the research. Next, the hypotheses are developed once the relationships among the variables have been identified.

1.7.3 Chapter 3

This chapter describes the data sources and the research methodology. This chapter discusses the way that the research is conducted in terms of research design, data collection method, data processing and econometric methods.

1.7.4 Chapter 4

This chapter provides the empirical results and data analysis. In this chapter, firstly, a descriptive analysis is provided. Then, the measurement of scale is discussed and the results of reliability analysis are provided. Furthermore, inferential analyses will also be presented.

1.7.5 Chapter 5

This chapter outlines the discussion, conclusion and implications of the

research paper. A summary of statistical analyses will be presented in this chapter. Furthermore, this chapter also provides the major findings of the research and provides the implications of the research. Besides this, the limitations of the study and suggestions for future study will be discussed here. Lastly, a summary of the entire research project is provided.

1.8 Conclusion

In this chapter, researchers had discussed about history and background of Singapore Exchange market (SGX) continued by problem statement regarding this market. Research objective, research question and significant of study is presented as researchers want to enhance the knowledge about the effect of independent variables on stock price fluctuations. Literature review will be discussed in chapter2.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Researchers would review plenty journals about relationship between stock price and macroeconomic variables from many countries. Previous researchers rarely investigate the linkage between stock price and interest rate, exchange rate, money supply, gross domestic product (GDP) and consumer price index (CPI). Hence, researchers try to use these variables to build the theoretical framework after reviewing the journals.

2.1 Review of the Literature

2.1.1 Stock Price in Singapore

The relationships between stock market movements and macroeconomic variables have been studied by previous researcher long time ago. In recent years, researchers were interested to examine the stock market fluctuations in ASEAN. This is due to ASEAN markets such as Singapore and Malaysia are open and welcome foreign investment. Investors are interested to invest in ASEAN markets because the markets incur low cost and provide high returns (Catherine, 2011). Nelson (1977) and Jaffe and Mandelker (1976) have investigated the stock price with Fisher effect.

Many previous researchers investigated the linkages between stock market and macroeconomic factors for different countries, long run and short run. For example, Donatas and Vytautas (2009) tested the relationship between stock price and interest rate, money supply, exchange rate and unemployment in Lithuania in short term. The effect of interest rate, house price and gold price on stock price in Iran market also has been examined (Mahmood & Ahmad, 2012). In Iran, Karimzadeh and Mostafa (2006) examined long run impact of macroeconomic variables on stock price. Peng, Cui, Qin and Nicolaas (n.d.) investigate the impact of GDP on stock price in China for long run and short run.

Singapore Exchange (SGX) is the name of stock market since 1999. Rangel and Pillay (2007) applied unit root test and cointegration test and found that there are stock price bubbles in the market. Previous researcher such as Maysami, Lee and Hamzah (2004) and Maysami and Koh (2000) also used VECM and multivariate cointegration test and they discovered long term relationship between macroeconomic factors and stock price in Singapore. Singapore stock price is sensitive to interest rate, exchange rate and inflation rate (Maysami & Koh, 2000).

Besides that, Ramin, Lee, and Mohamad (2004) studied the relationship between Singapore stock price, interest rate, price levels, money supply, industrial production and exchange rate by unit root test and cointegration test. They found that these macroeconomic variables significantly affect the Singapore stock price.

On the other hand, unit root test and cointegration test are the popular tests that previous researchers usually used to find out relationship of

macroeconomic variables and stock price all around the world. Catherine (2011) applied these two tests to find out the effect of interest rate, economic growth and exchange rate on stock price of Malaysia, Indonesia, Singapore, Thailand and Philippines. Researcher also used OLS to test the relationship. There are different results in different countries.

In a nut shell, researchers will further review the relationship of stock price and interest rate, exchange rate, money supply, gross domestic product and consumer price index one by one.

2.1.2 Interest Rate

An interest rate commonly refers to the rate at which an interest that borrower paid to lender who lend them money. In turn, the lender receives an interest at a predetermined rate to compensate for postponing the use of money. Interest rate is an important tool of monetary policy that deals with various economic activities and conditions such as investment, unemployment and inflation. Interest rate has been a vast literature documented on its relationship with stock price movements in developed and emerging economies.

There are many representative researches on the relationship among selected variables and stock market indices in Singapore such as Maysami, Lee and Hamzah (2004) who applied the Vector Error Correction Modelling technique to study equilibrium relationships between selected factors and Singapore Exchange Composite Index. They

found that Singapore stock market is directly proportional to short-term interest rates while inversely proportional to long-term interest rates based on the findings.

The finding is in line with Maysami and Koh (2000). This is because the long-term interest rates are more suitable to substitute the nominal risk-free element in stock valuation models and anticipated inflation of discount rate. Wong, Khan and Du (2006) conducted similar research by applying the time series analysis technique and reported Singapore stock returns show equilibrium relationship with long-term interest rates, yet this relationship weakened after the 1997 Asian financial crisis.

Meanwhile, Humpe and Macmillan (2007) investigated impact of several macroeconomic factors on stock prices in U.S. and Japan by performing a cointegration analysis. Their findings revealed that U.S. stock prices are significantly and inversely related to the long-term interest rates, which is supported by many other previous researches. However, a contrary result was demonstrated in the case of Japan. The result indicated that interest rate has insignificant influence on the stock prices in Japan. This is also supported by the study of Yusof, Majid and Razali (2006) who employed the autoregressive distributed model (ARDL) to test relationship between stock return and its determinants in Malaysia in long term. They similarly observed that the Treasury Bill Rate, which is a substitute for interest rate, found to be insignificant in the long run for the models used in their research.

Maysami and Sim (2001) studied the relationship between stock return and its determinants in Malaysia, Thailand through the employment of the Error-Correction Modelling technique. They incorporated a dummy

variable in the model to absorb the impact of 1997 Asian financial crisis. Their findings confirmed that a significant negative relation exists among interest rates and stock prices in Malaysia. They concluded similarly in the case of Thailand and explained such relationship by claiming that a rise in interest rate would lead to higher borrowing costs to the firm and subsequently deter the business investment. There will be a decrease in demand for the firm's stocks due to the expectation of lower profitability by investors, resulting in a higher required rate of return and lower valuation. In addition, Islam (2003) simulated the above studies in Malaysia and his results were similar, which revealed existence of significant short-run and long-run relationships among interest rates and KLSE stock returns. This is in line with results of Chong and Goh (2003) and Chen, Roll and Ross (1986).

Herve, Chanmalai and Yao (2011) conducted similar research in Ivory Coast. The Granger-causality test performed in their study showed a strong bi-directional relationship exists between stock price and local interest rate. Furthermore, their results also indicated that there is a strong inverse relationship. This follows theoretical financial valuation model where interest rate moves inversely with stock prices and is consistent with the findings by Trivediand Behera (2012) in India, Pirovano (2012) for the new EU member states, Kearney and Daly (1998) in Australia, and Li, Is and Xu (2010) in Canada and the United States. In addition, the fact that stock prices are negatively and significantly related to interest rates is also proven by the studies of Ioannidis and Kontonikas (2008)in 13 OECD countries, Al Sharkas (2004) in Jordan, and Yu (2013) in Japan. However, a study based on Stock Market Index in Nigeria by Osamwonyi and Evbayiro-Osagie (2012) showed contrary results to this. They reported that interest rates are negatively related to stock market index in

short run and long run but they are found to be consistently statistically insignificant.

In contrast, Guo, Hu and Jiang (2013) who investigated the impacts of monetary shocks over the period of 2005 to 2011 on China stock market using MSVAR-CEGARCH approach found that current interest rate shock significantly affect the stock markets yet asymmetric effects produced by previous shocks over time. Besides this, another study based on New Zealand stock prices by Gan, Lee, Au Yong and Zhang (2006) suggested that the shocks of long-term interest rates always exert negative impacts on the stock index as proven by a wide array of relevant studies.

2.1.3 Exchange rate

Exchange rate is another important variable that might affect stock price which will then affect the capital market performance as well as countries economic growth. Stock market is the vital investment vehicle for potential investors, including individual and corporation. Investors require stock market to accumulate wealth, manage financial plan and diversify their investment portfolios in order to lower potential risks faced in volatile stock market.

Singapore Dollar has been managed against an undisclosed basket of currencies which were weighted according to the Singapore's trade dependence on the major trading partners' currencies. Since 1975, Monetary Authority of Singapore has implemented managed exchange

rate float system for SGD where exchange rate allowed swinging within policy band. The Singapore dollar has appreciated against its trading partners and competitors' exchange rate since 1981, indicating robust economic development, rapid productivity growth and high savings rate (Gerlach & Gerlach-Kristen, 2006). Rajan and Siregar (2002) used ADF Unit Root test and Philips-Perron test to check stability of exchange rate regime in Singapore for the period of 1990-2000. The stability tests showed the misalignment of Singapore's Real Effective Exchange Rate (REER) was stable within the period.

Harjito and McGowan (2011) find out statistical relationship between stock prices and exchange rates across Indonesia, Philippines, Singapore and Thailand. Researcher applied Granger causality, Johansen cointegration test and Engel-Granger causality test with weekly data of each country. Their empirical analysis showed bi-directional causality between exchange rate and stock price is present in Singapore and Thailand. There is cointegration between stock prices and exchange rates according percentage change data.

Maysami, Lee and Hamzah (2004) have investigated the long-term equilibrium linkages between selected variables and Singapore stock market index. Monthly time-series data was used in the study. They reported the exchange rate and Singapore stock market are positively correlated by using Augmented Dickey-Fuller Unit Root Test and cointegration method. Their study uphold stronger domestic currency has added advantage to have lower cost of imported raw materials, enabling local manufactures to offer lower and competitive price of goods, increasing the firm's trading, thus stock price of the company increases due to stable growth and consistent profits generated. Furthermore, the

study of relationship among stock prices and exchange rates on selected Pacific Basin countries over the period 1980-1998 by Phylaktis and Ravazzolo (2005) also showed the similar result. The five Pacific Basin countries include Singapore, Hong Kong, Malaysia, Philippines and Thailand. The sample period used for Singapore is from January 1990 to December 1998 and the data used are monthly data. Their research further confirmed that US stock market has vital influential on the economies of these countries. Koh and Maysami (2000) have used monthly time-series data in Johansen's method by using multivariate cointegration analysis. The result stated changes in exchange rate is positively related or cointegrated with the variation in stock market. Empirical result of Kubo (2012) mentioned the exchange rate and domestic stock price in Philippines and Singapore have positive relationship. The increases of exports to United States of these two Asian countries lead to appreciation of exchange rates, putting an upward pressure on the domestic stock prices.

However, Kim (2003) stated stock price and the exchange rate are negatively related. This is due to portfolio effect which determined by investors' expectation on the U.S. stock performance has relatively minor influence on stock price fluctuations. The portfolio effect is easily overwhelmed by the price effect. Besides, Hsu, Liang and Lin (2013) have done a research on the ASEAN-5 countries where findings revealed that stock prices of each country were negatively impacted by exchange rates through panel DOLS approach. They also concluded a long-run relationship exists between two variables for the ASEAN-5. Their results supported the "stock-oriented" hypothesis which stated exchange rates affect stock prices inversely via portfolio balance. From their Grange causality test's results, indicating there was unidirectional causality from

exchange rates to stock prices across ASEAN-5 nations in short-run and long-run. Agrawal, Srivastav and Srivastava (2010) indicated there was negative correlation among daily exchange rates and daily stock prices in India to better capture relationship between exchange rates and Nifty index. They applied Granger Causality test which proved stock prices are not granger caused by exchange rates.

Md-Yusuf and Rahman (2013) have studied relationship between exchange rate and stock price in Malaysia with the Granger causality effects in a multivariate VAR framework. They used monthly data from 1990 until 2010 and the exchange rate used is RM/US$. The results stated that there was a bi-directional causality effects running in the overall market.

On the other hand, Nieh and Yau (2009) found that exchange rate movement has no effect on stock price in short run with TECM Granger-causality tests in Japan and Taiwan. But, in the long run, it was proven that there was positive causal relationship between Japan or US exchange rates and stock prices. The researchers concluded that stock prices of Taiwan were strongly impacted by exchange rates in the long run. The finding of this study is similar with the results of Lin (2012). In addition, the study of Lin (2012) proved the co-movement of exchange rates and stock prices tend to be stronger during crises. The study also stated that the co-movement among exchange rates and stock prices in Asian developing markets is commonly caused by the capital account balance rather than balance of trade. This is because foreign investors withdrew their capital during economic crisis as stock market performed badly, forcing downward pressure on the currency.

Lean, Narayan and Smyth (2011) argued that exchange rates and stock prices have long-run disequilibrium relation in Singapore, Hong Kong, Japan, Indonesia and Thailand by applying cointegration and panel cointegration model. While there was a unidirectional Granger causality from exchange rates to stock prices in Hong Kong, Malaysia and Singapore in short-run.

2.1.4 Money Supply

Money supply plays an essential role in determining stock price. Wong et al. (2005) pointed out that Singapore stock market (SGX) was co-integrated with money supply before Asian financial crisis 1997. However this equilibrium was broken and disappeared after the crisis. Brahmasrene and Jiranyakul (2007) stated that money supply has positive impact on stock price index by using unit roots test. Coinciding in time, they have found that causality between monetary variable and stock price only happen during post-financial crisis. Their findings are similar to that observed by Kumar and Puja (2012). They declare that stock market is co-integrated and positive related to money supply and real economic activity while there are no causality observed from stock price found in long run and short run. The positive relationship among money supply and stock price movement were found in the research of Khan and Yousuf (2013). Injection of money supply boost corporate earning leads to increase in company's cash flows, and hence increase in company share price in the long run.

Sellin (2001) and Maskay (2007) proved that expected changes in money supply would not influence stock prices movements; only the unexpected

component of a variation in money supply would influence the stock prices. Purchaser's response on money supply will affect changes on price in the short run. Peace and Roley (1983) carry out the same research by Ordinary Least Square method. They suggest that only unanticipated money supply will influence stock prices. The result is consistent with prediction made by efficient market hypothesis which is unanticipated of high money supply cause a rise in interest rate and lower down the stock prices. But, Corrado and Jordan (2005) disagree by arguing that all available information is not embedded in the prices, and hence, stock price would also respond to the expected announced money supply.

Broad money supply (M3) has been used as proxy variable in explaining money supply. Ray (2012) made two conclusions in the research. First, increase in money supply, investor will have more money, increase liquidity on cash for buying securities, and thus market prices will increase. Thus, stock prices are directly proportional to money supply. Second, a rise in money supply tends to raise inflation, which sequentially may cause an increment in interest rate and decreased in stock prices. By using Granger Causality test and autoregressive moving average model (ARMA), Rogalski and Vinso (1997) determined bi-directional theory of causality between stock price fluctuation and money supply. Changes of money supply will cause stock price changes while stock price changes will lead to money changes. Changes in Federal Reserve policies, (basically money supply) will have direct influence on stock return.

Highlighted from Alatiqi and Fazel (2008), there is insignificant relationship between money supply and market stock price. They employed Engle-Granger cointegration test and the Granger causality test

in their research. Absolute value from test statistic is lower than critical value. They verify that money policy have no long-run explanatory power in stock price prediction. Ozbay (2009) also suggested that monetary expansion do not granger cause bank's stock return. Hence, money supply is not an indicator to increase investments in stocks for Turkish case. Humpe and Macmillan (2007) report that Japan stock price is inversely proportional to money supply; whereas money supply did not influence the performance of stock price in US stock market. It may be because Japanese economy was facing difficulties and consequent liquidity trap since 1990.

Raymond (2009) examined the inter-relationships between stock prices and monetary indicators on Jamaica Stock Exchange (JSE). Impulse response function and Granger causality test show that the JSE index was influenced positively by M3 and negatively by M2. In similar vein, Isenmila and Erah (2012) used co-integration and error correction methodologies also indicate that only M2 is appeared to be negative and also significant on stock return.

2.1.5 Gross domestic product (GDP)

Gross domestic product is a prime macroeconomic indicator used by economists and investors to predict the future performance of a country's economy (Taulbee, n.d.). In simple term, GDP measures the total domestic income and the income earned by foreign owned factors of production (Mankiw, Romer & Weil, 1992). GDP can indicate the growth of domestic economy whether it is growing or contracting whereby strength of the country. Usually, GDP expresses as comparison to

previous quarter or year.

Peng, Cui, Groenewold and Qin (n.d.) apply tests in order to investigate for stationarity and cointegration analysis among stock prices and China economy measured by productivity level. The result pointed clearly that stock prices are directly proportional to GDP in long run. Furthermore, the research in Sudan economy states that the relationship among real GDP and prices was found have unidirectional causality relationship from real GDP to price level without any feedback (Ahmed & Suliman, 2011).

In the study of Maysami and Koh (2000), industrial production index and domestic exports as the proxy for standard of real economic activity are likely to form a positive relationship with stock prices in Singapore. Moreover, Osamwonyi and Evbayiro-Osagie (2012) state that Gross Domestic Product and growth rate of economy have positively related The higher the GDP, the more favours of the stock market (Chandra, 2004). According to Graham (2013), a big effect on investing sentiment would happen due to the significant change in GDP either increase or decrease. When GDP increase as be a boost in investor confidence, investors believe the overall stock market is improving thereby will invest more in the stock market thereby stock price will increase. However, if GDP decline, investors would buy less stock, leading downward pressure to the stock market thereby stock price decrease.

Ikoku (n.d.) concluded the causal relationship between stock market prices, real GDP and index of industrial production in Nigeria. The research shows bidirectional causality relationship between stock prices and GDP by Granger causality tests. Johansen cointegration tests are found long run relationship among stock prices and GDP in Nigeria

(Ikoku, n.d.).

Duca (2007) employs Granger causality test to examine direction of causality among stock prices and GDP in developed market economies. Nevertheless, result points out unidirectional relationship in the causality run from stock prices to GDP and there is no causality found in reverse direction in developed economies market. All of the developed market economies like United States, Japan, Australia, United Kingdom and others has been determined that stock prices Granger cause GDP except Germany due to its market capitalisation (Duca, 2007).

According to Shiblee (2009), one of the key factors that affect stock price behaviour is gross domestic product (GDP). Stock exchange price and price index positively co related with gross domestic product (Bashiri, n.d.). The changes in gross domestic product would expect to have positive influence on stock and real estate prices in Singapore economy (Liow, 2004). According to Sugimoto (2012), there was a positive correlation between gross domestic product and stock price in Singapore. In other words, Atje and Jovanovic (1993) found strong evidence to support the view that economic growth measured by gross domestic product as a result of stock market development. Stock market performance may affect gross domestic product was proven by Modigliani (1971).

In short, there have two explanations about the relationship among stock prices and gross domestic product. Thus, to expand investigation, this research will examine whether the stock prices affect gross domestic product or gross domestic product triggers fluctuation in stock price.

2.1.6 Consumer Price Index (CPI)

Consumer Price Index is an index used to measure price level of commodities and services consumed by citizens, complimentary with social security benefits and inflation is tied to this index as well (Zhang, 2013). Zhang (2013) found there is a concrete relationship. The relationship is varying according the range of inflation. The result showed inflation exceeded 10 percent is a good to the stock market while other values will detriment the stock returns.

Li, Narayan and Zheng (2010) found expected inflation rate has effect on stock returns but unexpected inflation rate is significantly influencing the stock returns for overall UK stock market. Their study suggested stock market performance is negatively affected by inflation. They also pointed the relationship between the inflation and stock returns maybe dissimilar in diverse inflationary conditions. In addition, Boucher (2006) expressed the stock return predictability can be caused by time-varying expected risk premium and irrational behaviour of investors.

However, Kim and In (2005) have presented the opposite result which is nominal and real stock returns are directly proportional to inflation in US market based on wavelet multi-scaling method. They used monthly data in the study.

Besides, Bekaert and Engstrom (2010) analysed US based data by using quarterly data (1968: Q4 – 2007: Q4) for standard equity data which obtained from S&P 500 Index. They suggested positive correlations between equity and bond yield and inflation. This is because expected inflation tend be high in recessions, bond yields rise along with the

expected inflation. To prove this statement, Bekaert and Engstrom (2010) used VAR methodology to measure inflation expectations and two proxies (economic uncertainty and habit model) for rational variation in risk premium.

Moreover, for case in Singapore, Maysami and Koh (2000) determine the relationship between stock market price and CPI is cointegrating relationship by vector error correction approach. However, CPI is not significant to cointegrating relationship. On contrary, Maysami, Lee and Hamzah (2004) found that there is a positive and significant relationship among inflation and Singapore stock market.

2.2 Review of Relevant Theoretical Models

2.2.1 Stock price

2.2.1.1 Capital Assets Pricing Model (CAPM) (1964)

According to Holton (n.d.), Capital Assets Pricing Model (CAPM) was first established by William F. Sharpe in 1964. He established this model because at earlier decade, there was no theory to describe the relationship between stock return and risk (Sharpe, 1964). This model further extended by John Lintner (Fama & French, 2004). Capital Assets Pricing Model (CAPM) is to illustrate stock return with risks. It use to determine the return rate that required by investors.

There are four assumptions need to be conformed before applying the Capital Assets Pricing Model (CAPM) (Perold, 2004).Firstly, the market should be efficient. This means that there is no transaction costs, taxes, restriction in the market. The information can be transferred to all people costless so that they can borrow and lend with same risk free rate. Secondly, investors in the market are risk averse and have unanimous period of investment. Thirdly, investors enjoy same investment opportunities. Lastly, the investments' expected return, standard deviation and correlation of investors should be same.

The formula of Capital Assets Pricing Model (CAPM) is below:

$k_i = k_{rf} + \beta_i(k_m - k_{rf})$

where:

k_i =required return on security*i*

k_{rf} =risk-free rate of interest

β_i =beta of security*i*

k_m =return on the market index

$(k_m - k_{rf})$ =market risk premium

$\beta_i(k_m - k_{rf})$=asset *i*'s risk premium

Womack and Zhang (2003) state that in this model, the return earn from the stock will equal to the return from market. The return an investor earn from a stock equal to the combination of risk free rate and risk premium. Normally, risks are market risk and company risk, but the model already diversified the company risk. Hence, the beta, β_i will capture the market risk, this risk will take into account in this model.

With this model, Friend and Blume (1970) found that when the beta is high, the cost of equity will be high. In contrast, the cost of equity is low if the beta is low.

2.2.1.2 Efficient Market Hypothesis (1960)

Efficient Market Hypothesis state that in an efficient market, the information can be reflected by the stock price rapidly (Fama, 1965); (Fama, 1970); (Maysami, Lee, & Hamzah, 2004).This theory was established by Eugene Fama in early 1960. Investors refer to the information to make decision in the stock market (Jonathan, Tomas, & Gershon, n.d.).

According to Malik, Qureshi, and Azeem (2012); Jonathan, Tomas, and Gershon, (n.d.), Efficient Markets Hypothesis is divided into strong form, semi-strong form and weak form. Strong form efficiency is that the information entirely affects the stock price. The information includes the public information and insider information. Investors can use the costless information to predict the future stock price (Timmermann & Granger, 2004). No one can earn excessive profit in this form of efficient market. Even a manager knows the private information, that manager cannot gain excessive profits.

In semi-strong form efficient market, all investors can know only the public information but not private information (Wong & Kwong, 1984). Investors can know the historical stock price, the figure of company financial reports, dividend given and company expectations to several macroeconomic variables. They can earn a few profits only because all

investors know the information available.

The last form of Efficient Market Hypothesis is weak form efficient market. The flow of information not affluently like the other two forms (Gimba, n.d). Investors only can know the past stock price in the market (Palan, 2004). Thus, investors who know the information can gain more profit than those who did not get the information. This form is the weakest form because historical stock price unable fully reflect the current stock price.

Some researchers argue that there is no efficient market exists in real world. Grossman and Stiglitz (1980) argue that there is no costless information in the market. Arbitragers use costly information to make gain in the market and make the market achieve equilibrium level. They suggest that investors should interest on what the degree of efficiency rather than the market is efficient or not.

2.2.1.3 Arbitrage Pricing Theory (APT) (1976)

Arbitrage Pricing Theory (APT) which established by Stephen A. Ross is an alternative model to the Capital Assets Pricing Model (CAPM) (Maysami, Lee, & Hamzah, 2004; Maysami & Koh, 2000). It is a multi factor model which shows linear relationship between stock price and macroeconomic factors, for instance, inflations and exchange rate. It mainly measures the sensitivity of stock price to those variables and show in beta (Roll & Ross, 1980)

There are several parts of Arbitrage Pricing Theory (APT) that prior to

Capital Assets Pricing Model. First, the Arbitrage Pricing Theory does not assume market must be efficient. Second, Arbitrage Pricing Theory (APT) can consider multiple variables instead of one at the same time (Franke, 1984). For Capital Assets Pricing Model (CAPM), it can only consider one variable that affect stock price. Thirdly, the covariance of Arbitrage Pricing Theory (APT) is the market risk measurement in which cannot be diversified by investors while covariance of Arbitrage Pricing Theory (APT) is the market return (Huberman & Wang, 2005). But the Arbitrage Pricing Theory (APT) does not limit to market risks (Sabetfar, Cheng, Mohamad, & Noordin, 2011).

The formula of Arbitrage Pricing Theory (APT) is below:

$R_j = a + b_{1j}F_1 + b_{2j}F_2 + \ldots + b_{mj}F_m + e_j$

where:

R_j= the stock price of security j

a = the risk-free rate

b=the beta, the degree of sensitivity of stock price of security j to the factors

F= the factors that affect the stock price of security j

e_j= the error term

According to Kothari, (n.d.), the Arbitrage Pricing Theory (APT) assumes that the market is in equilibrium with no riskless profit. This is due to the arbitragers will compensate all the riskless profit until zero when they realize that there is an arbitrage profits. Then, the market will turn back to equilibrium. Thus, no investors can earn extra profit in this case.

2.2.2 Interest Rate

2.2.2.1 Dividend-Discount Valuation Model (1956)

The simple dividend-discount valuation model is used to value stock prices based on the net present value of the future dividends. This model can also explain the effect of interest rate on stock prices. The most widely used equation is called the Gordon growth model, which was established by Myron J. Gordon in 1956.

$$P=D_1/ (k-g)$$

where:

P = stock price,

D_1= dividends after first period,

g= constant growth rate of the dividends, and

k= required rate of return on the stock.

Based on this model, stock price is inversely proportional to interest rate for two factors. Firstly, interest rates can affect the corporate profitability level which subsequently influences the price that market participants wish to pay the stock by expecting higher future payment of dividends. Declined in interest rates will decrease the costs of borrowing for those companies that primarily funding their capital and inventories through borrowings. The costs saved hence serve as an incentive for the growth of business. This will exert a positive impact on the firm's future expected returns. Secondly, if investors purchase a considerable amount of stocks with loan, a rise in interest rates would increase the cost of stock transactions. Hence, it is reasonable that market participants will require a

higher rate of return before making investments. Eventually, this will result in a fall in demand for stocks and lead to stock price depreciation (Maysami, Lee & Hamzah, 2004).

2.2.3 Exchange Rate

2.2.3.1 Classical Economic Theory (1776)

Classical economy theory emerged from the foundation introduced by Adam Smith ("Classical Economics", 2013). Classical economic theory proposes intermediate variables, for instance, prosperity, desired of money and interest rates act as catalyst in creating the link between exchange rate behaviour and stock market performance (Md-Yusuf & Rahman, 2013).

According to Richards, Simpson and Evans (2009), classical economic theory hypothesises there is an interaction between stock prices and exchange rates. Two approaches of economic theory can be used to explain the relationship between exchange rates and stock prices. The first approach suggested by economic theory is flow-oriented model (Dornbusch & Fisher, as cited in Richards, Simpson & Evans, 2009, p.2). This model predicts exchange rate movements cause stock price movements. Currency movements influence international competitiveness and trade position balance. When the domestic currency depreciates, leading the domestic firms to have higher volume of exports due to cheaper price of domestic goods in international trade. Then, the

real income of country may increase as well as the domestic firms' profits. As a consequence, firms' stock prices will rise and perform well.

In contrary, the second approach is stock-oriented model or portfolio balance approach which exerts the opposite statement. Stock-oriented model (Branson, 1981) postulates stock prices Granger-cause movements in exchange rate by dealing of capital account. This model is based on the allocation of investors' wealth on the domestic and foreign assets. Stock-oriented model explains the link between real world stock and currency market is broadly depends on the matters, like stock market liquidity and market segmentation (Richards, Simpson & Evans, 2009).

2.2.4 Money Supply

2.2.4.1 Quantity Theory of Money (1600-an)

Quantity theory of money was established to explain the relationship between money supply and stock price. Changes in money supply would influence the public's desire to substitute money for other financial assets, including stocks. A growth in money supply results in a devaluation of currency since an increase in money supply causes inflation to rise. When inflation occurred, people tend to save more than expend. It therefore will spend more money to purchase the same volume of goods or services. Such situation also happens in stock market. When economy is in bad situation, household will save more of their money in bank or financial institution for emergency usage rather than invest in market.

Besides, he observed that changes in both money supply and stock prices led to business cycle turning points. Hence, money supply changes appeared to lead stock price changes. However, there are major problem with this theory as it is unable to provide us whether it is changes from money supply or stock price first.

The theory can be expressed as:

MV = PT

where:

M = Money Supply

V = Velocity of Circulation (the number of times money changes hands)

P = Average Price Level

T = Volume of Transactions of Goods and Services

2.2.5 Gross domestic product (GDP)

2.2.5.1 Wealth Effect (1957)

There is a theory usually called "wealth effect" which says that stock market exerts a reverse effect on economic activity (Graham, 2013). A fall in stock market will decrease an individual's personal wealth or income and individual will consequently spend less makes stock market fall. Since any change in consumption also gives significant effect on GDP, therefore, wealth effect makes stock market fall and thereby GDP also will decline. For instance, fall in stock price will affect the cost of borrowing of firms. Thus, the firms invest less due to the fall in stock

market so the real GDP growth will decline (Carlstrom, Fuerst & Ioannidou, 2002). In other words, if consumers have more purchasing power and willing to devote more income towards stock market investing, hence, the level of stock market increase and GDP increase (Taulbee, n.d.).

2.2.6 Consumer price index (CPI)

2.2.6.1 Fisher Effect Theory (1930)

Fisher Effect Theory describes when inflation occurred, interest rate will increase at the same time. According to Abdulnasser (2009), relationship between inflation and nominal interest rates shows its importunacy in financial market. Both of them are significant positively related in US and Latin American countries market (Cooray, n.d.) When investors assume there will be inflation in future, they tended to save more rather than spend it. Thus, purchasing power will decline. Since positive relationship between stock price and inflation is found, they will invest more in stocks market now in order to generate more money.

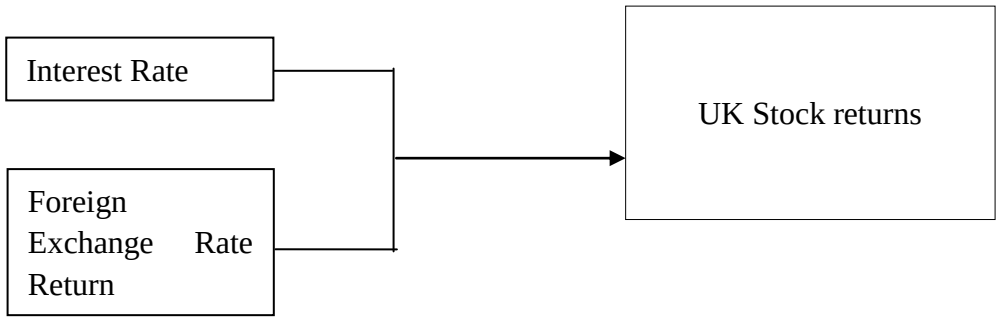
2.2.7 Review of Theoretical Model

Nathan (2002) finds out influence of interest rate and exchange rate to stock return of UK. There are 106 different industry UK firms' stock returns being examined in the study. There are several tests being applied

in this study. Augmented Dickey-Fuller (ADF) used to test for stationarity. Autocorrelation and Autoregressive Conditional Heteroscedastic (ARCH) used to test the heteroscedasticity problem of the model and Newey-West applied to solve the problem. This paper also applied cointegration test to test on whether interest rate and exchange rate affect on stock return.

At last, Nathan (2002) found that the both of the interest rate and exchange rate are significant negatively affect stock return of UK firms. Besides, the changes of interest rate are more negatively affect the stock return than changes of exchange rate.

Figure 2.1: ModellingThe Impacts of Interest Rate and Exchange Rate Changes on UK Stock Returns



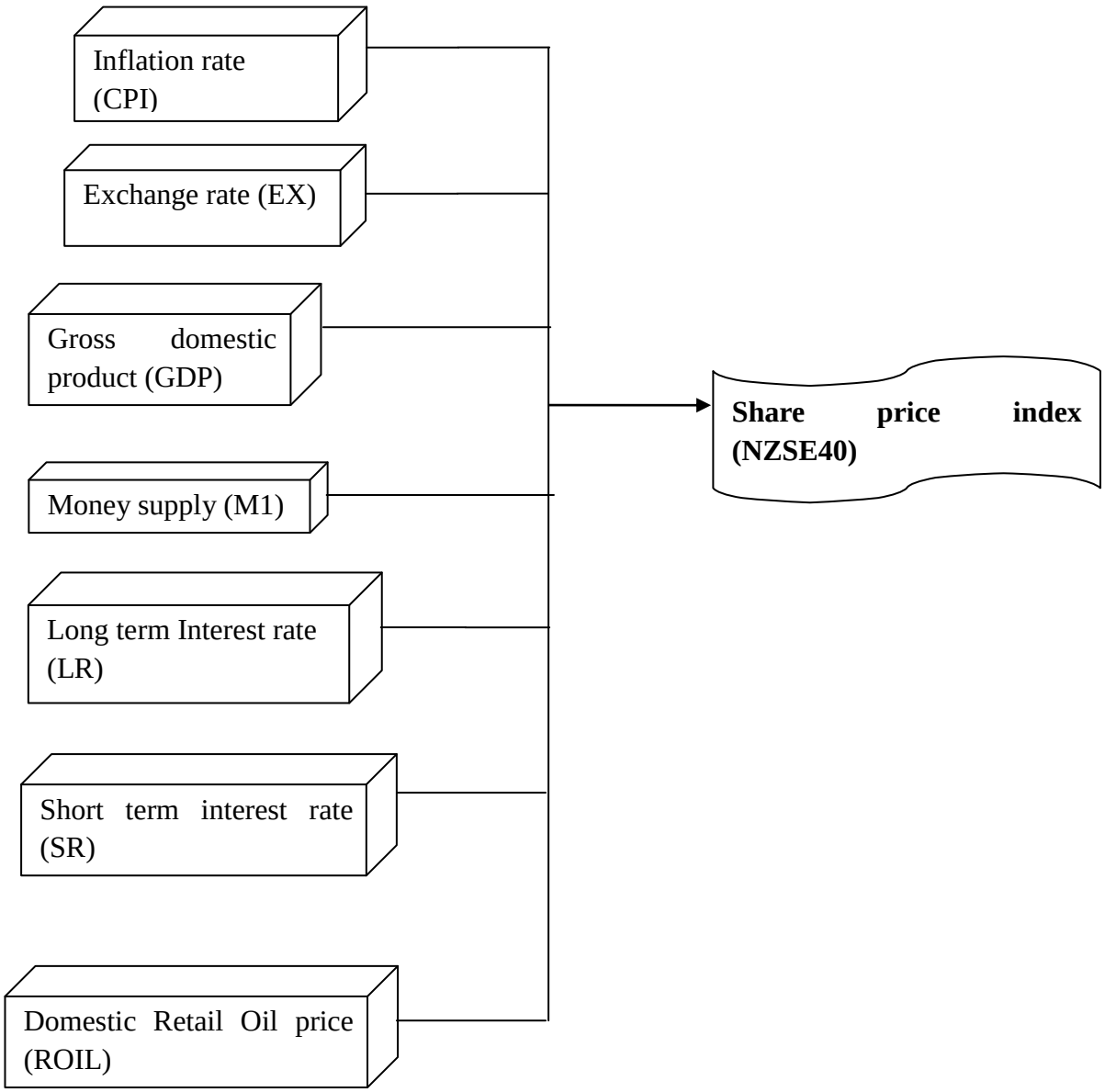
On the other hand, Gan, Lee, Au Yong, and Zhang, J. (2006) investigated relationship between New Zealand stock index (NZSE index) and few macroeconomic variables from 1990 to 2003 with monthly data. There are total of seven macroeconomic variables included in the research paper like, exchange rate, inflation rate (CPI), gross domestic product (GDP), long term and short term interest rate, domestic retail oil price and money

supply (M1). Johansen Maximum Likelihood and Granger-causality tests were employed by researchers.

Before May 2003, five main stock index were published in New Zealand Stock Exchange. One of the New Zealand Stock Exchange, NZSE40 is the main public market index used as it covers up to top 40 largest companies and it is the most frequent traded stock listed on New Zealand stock index. Researchers tried to involve this stock index in their research by examine short run linkages between NZSE40 and selected variables.

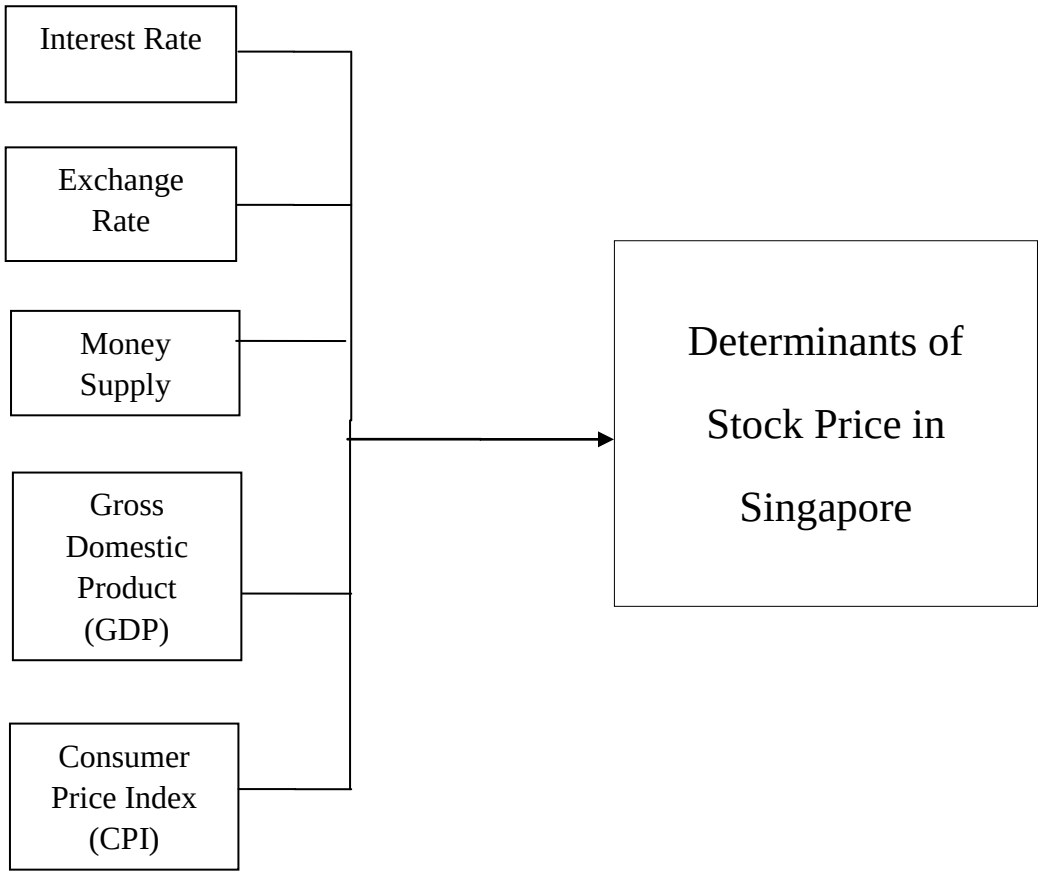
They found that CPI has negative impact on NZSE40 throughout the period. This result is similar with previous researcher. It might be due to New Zealand stock market is comparatively small compare to other developed nations and basically more sensitive to global macroeconomic factors. In general, exchange rate, CPI, money supply, long term and short term interest rate show negative impact on New Zealand stock price while GDP and retail oil price show positive sign.

Figure 2.2: Macroeconomic Variables and Stock Market Interactions: New Zealand Evidence



2.3 Proposed Conceptual Framework

Figure 2.3: Framework of Determinants of Stock Prices in Singapore



Adapted from:Nathan, L. J. (2002).Modelling the impacts of interest rate and exchange rate changes on UK stock returns. *Derivatives Use, Trading & Regulation*, *7*(4), 306-323.
Gan, C., Lee, M., Au Yong, H. H., & Zhang, J. (2006).Macroeconomic variables and stock market interactions: New Zealand evidence. *Investment Management and Financial Innovations*, *3*(4), 89-101.

The conceptual framework show that the regressand is affecting by the independent variables. The regressand as shown above is the stock price in Singapore while the independent variables are interest rate, exchange rate, money supply, gross domestic product (GDP) and consumer price index (CPI).

2.4 Hypotheses Development

H_0 = There is no significant relationship between interest rate and stock price fluctuation.

H_1 = There is a significant relationship between interest rate and stock price fluctuation.

H_0 = There is no significant relationship between exchange rate and stock price fluctuation.

H_1 = There is a significant relationship between exchange rate and stock price fluctuation.

H_0 = There is no significant relationship between money supply and stock price fluctuation.

H_1 = There is a significant relationship between money supply and stock price fluctuation.

H_0 = There is no significant relationship between gross domestic product (GDP) and stock price fluctuation.

H_1 = There is a significant relationship between gross domestic product (GDP) and stock price fluctuation.

H_0 = There is no significant relationship between consumer price index (CPI) and stock price fluctuation.

H_1 = There is a significant relationship between consumer price index (CPI) and stock price fluctuation.

2.5 Conclusion

In short, researchers have been reviewed the previous researchers' findings about the explanatory power of each independent variables to stock prices. In order to make readers clear about the findings, researchers constructed the theoretical framework and hypothesis development. In next chapter, researchers will use the tests that were reviewed to identify the relationship between stock price and regressors in Singapore.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Chapter 3 exhibits the introductory outline of research methodology applied by the researchers in a more organized and detailed manner. Necessary information has been collected to develop a valid and critical analysis as well as to address the hypothesis and research questions which were presented in previous chapters. Chapter three consists of five elements which are research design, method data collection, data processing and econometric methods.

3.1 Research Design

This quantitative research includes empirical techniques and methods to investigate the research. A total of five macroeconomics variables and stock price of Singapore market are used in this research. The macroeconomic variables which are money supply, exchange rate, interest rate, gross domestic product and consumer price index are quarterly frequency from quarter 1 of year 1993 to quarter 4 of year 2012. There are 80 observations collected from same source which is Datastream database subscribed by UTAR. In order to investigate the relationship among the stock price and its determinants, the empirical method has been used in this research is EViews 6 software.

3.2 Data Collection Method

In this study, researchers decide to use secondary data to complete the methodology. This is due to the secondary data can be obtained from Datastream database in which consist of data from many sources. It is time saving and the data are reliable. Besides, the data use in this study is time-series data. So, researchers can compare the data from time to time.

3.2.1 Secondary Data

Researchers collect time-series data from the Datastream database subscribed by UTAR consist of dependent variable which is the stock price and all of the independent variables which are interest rate, exchange rate, money supply, gross domestic product (GDP) as well as consumer price index (CPI). The data covered from quarter 1 of year 1993 to quarter 4 of year 2012.

Table 3.1: Data Sources

Variable	Proxy	Unit Measurement	Description	Data Sources
Stock price	STI	Index	Straits Times stock price index in Singapore	National sources
Interest rate	IR	Percentage (%)	Interest rate of treasury bills which is Singapore government securities	International Financial Statistic (IMF)
Exchange rate	ER	SGD(millions)	Exchange rate of Singapore Dollar per USD	International Financial

				Statistic (IMF)
Money supply	MS	SGD(millions)	Money circulation in Singapore's market of Category 2 (M2)	International Financial Statistic (IMF)
Gross domestic product (GDP)	GDP	SGD(millions)	Gross domestic product of Singapore	Statistics Singapore
Consumer price index (CPI)	CPI	Index	Consumer price index of Singapore which the base year is 2009	Statistics Singapore

3.3 Data Processing

Figure 3.1: Flow Chart of Data Processing

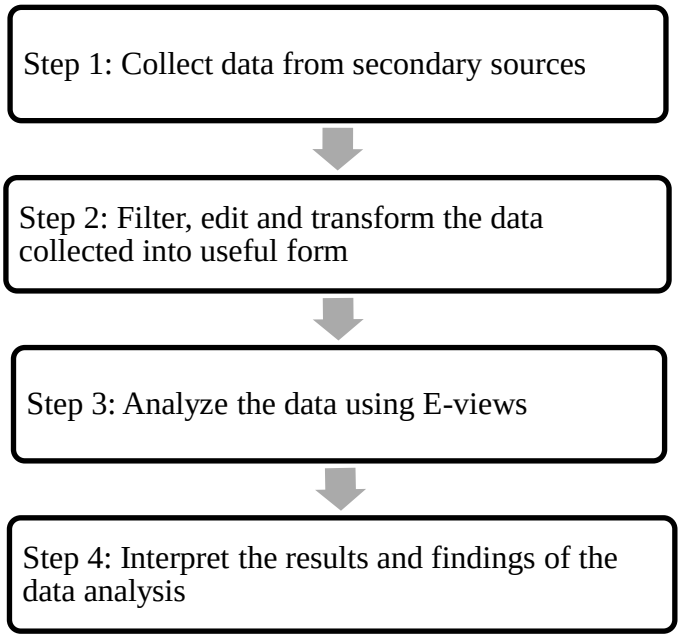


Figure 3.1 shows the four steps of data processing in this study. Step 1 involves the collection of data from an electronic database, which is the Datastream subscribed by UTAR.

In Step 2, the data gathered from the Datastream will be filtered, edited and transformed into useful form. In this study, the data for stock prices collected (Straits Times stock price index in Singapore) are converted from monthly basis to quarterly basis in order to make the stock prices consistent with other data that is also in quarterly basis. Before moving on to the next step, the data to be used in the data analysis will be double checked to ensure that the data is free from errors and mistakes.

In Step 3, software named EViews will be employed to run a number of econometric tests to analyze the data.

Lastly, Step 4 involves the interpretation of the outcomes and findings of the data analysis obtained from the EViews.

3.4 Econometric Method

3.4.1 EViews 6

EViews 6 Student Version is applied in the areas of econometric analysis, forecasting, and statistics for instructional use. It allows researchers to conduct a series of statistical and graphical techniques, without having to learn any complicated steps. EViews 6 chosen as the main software to run for

the tests in the following chapter.

3.4.2 P- value

Significance of results can be determined by p-value through hypothesis test in statistics. Null hypothesis should be rejected when p-value is small. Assume significance level is 5%

- A low p-value specified strong evidence against the null hypothesis, in this case, null hypothesis should be rejected.

- A high p-value specified weak evidence against the null hypothesis, do not reject or failed to reject null hypothesis.

3.4.3 T-test

T-statistics helps researchers to determine whether two sets of data are significantly different from others. Basically, it performed on a small set of data which make decision by comparing means and standard deviation of two samples. Null hypothesis (H_0) is opposed to alternative hypothesis (H_1). The null hypothesis represent "no difference" while the alternative hypothesis represent "a difference" in the population. Reject $H_0$when test statistic is greater than critical value at significance level of 1%, 5% and 10%. Otherwise, do not reject.

Null Hypothesis $\mathbf{H_0: \mu = \mu_0}$

Alternate Hypothesis $H_1: \mu > \mu_0$

3.4.4 F-test

F-test is employed to test whether the variances of two populations are equal (Snedecor & Cochran, 1983).It is formed by the ratio of two independent chi-square variables divided by their respective degrees of freedom (k-1). F-test can be conducted in terms of two-tailed test or one-tailed test. The two-tailed test examines against the alternative that the variances are not equal while one-tailed test examine in one direction only. Since chi-square form F-value, therefore, F-value has many characteristics of chi-square. For example,

- F-values are all non-negative
- Distribution is non-symmetric
- Mean is approximately one
- There are two independent degrees of freedom which are numerator, and denominator.

Some important assumptions or notes to be taken when run for F-test. First, smaller variance should always be placed in denominator. Second, alpha must be divided by 2 for two-tailed test, follow by finding the right critical value. Third, populations ought to be normally distributed. Fourth, the samples required to be independent.

The F hypothesis test is defined as:

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

H_1: At least one of the $\beta_i \neq 0$, where $i = 2, 3, 4, 5$

Reject the null hypothesis when the F test is less than lower bound of critical value or more than upper bound critical value at significance level of 1%, 5% or 10%.

3.5 Diagnostic checking

3.5.1 Jarque-Bera (JB) Test for Normality

Normality can be the most common assumption in applying statistical procedures in linear regression model (Thadewald and Buning, 2004). Therefore, a test on normality in any regression analysis is needed. The well-known test for normality of regression residuals is Jarque-Bera Test (1980).

The Jarque-Bera (JB) Test is a test of goodness of fits to determine whether sample data have matched with normal distribution. The JB test calculated skewness and kurtosis of the distribution to measure the OLS residual by using the test statistic:

$$JB = \frac{n}{6}\left(S^2 + \frac{(K-3)^2}{4}\right)$$

Where:

n = number of observations

S = skewness of the observations

K = kurtosis of the observations

The null hypothesis is stated that the error term is normally distributed while the alternative hypothesis is stated that the error term is not normally distributed as following:

H_0: The error term is normally distributed.

H_1: The error term is not normally distributed.

By referring p-value of JB statistic, if p-value of JB statistic is lower than significance level, hence there is sufficient evidence to reject H_0 and conclude that error term is not normally distributed. Inversely, there is no sufficient evidence to reject the H_0 if the p-value of JB statistic is larger than significance level which means that the error term is normally distributed.

3.5.2 Ramsey's Regression Specification Error Test (RESET)

Ramsey's RESET test is applied to test model specification of linear regression model (Ramsey, 1969). It was established by Ramsey J. B. in 1969 (Long & Pravin, 1992). In this test, researchers need to use estimated restricted model with the R^2 to get the estimated unrestricted model with the new R^2. Both $R^2$are used to compute the test statistic value (Linda & David, 1996).

Estimated restricted model:

$$Y= \beta_0 + \beta_1 X_1 + \varepsilon$$

Estimated unrestricted model:

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 Y^2 + \beta_3 Y^3 + \varepsilon$$

To compute the test statistic value:

$$F=\frac{(R^2_{\text{unresticted}} - R^2_{\text{restricted}})/(k_{\text{unresticted}} - k_{\text{restricted}})}{(1 - R^2_{\text{unresticted}})/(n - k_{\text{unresticted}})}$$

It is complicated to use the test statistic value. So, researchers decide to use the p- value.

The hypothesis of this test:

H_0: Model specification is correct.

H_1: Model specification is incorrect.

Researchers must make sure that there is no sufficient evidence to reject H_0 which means the model specification is correct. Hence, the p-value of Ramsey's RESET test should be larger than 0.01 to make sure there is no model specification error.

3.5.3 Multicollinearity

Multicollinearity is an econometric problem that occurs when there is a perfect or exact linear relationship between some or all independent variables of a regression model (Gujarati & Porter, 2009).

According to Montgomery, Peck and Vining (2012), multicollinearity may be caused by several factors. These include the data collection method, constraints on the model, model specification and an over determined model. In time series data, multicollinearity happen due to independent variables of the model show a common trend, all of them change together over the period.

There are a number of consequences of multicollinearity. First, the OLS estimators will have high variances and covariances, resulting in estimations become not precise. Second, although the *t* ratio of one or more coefficients is likely to be statistically insignificant, R^2, the overall measure of goodness of fit, can be very high. Third, the OLS estimators and their standard errors are sensitive to small changes in the data.

Variance-inflating factor (VIF) is employed to check multicollinearity. VIF is calculated as

$$\text{VIF} = \frac{1}{1 - R^2}$$

VIF shows the degree of multicollinearity by presenting the number from 1 until infinity. When the VIF is equal to 1, it shows that there is no multicollinearity in the model. On the other hand, when the VIF is infinite or undefined, it indicates perfect multicollinearity. Meanwhile, if the VIF is between 1 and 10, it shows low multicollinearity, whereas if the VIF is equal to or greater than 10, it indicates high multicollinearity occurs in the model.

3.5.4 Autocorrelation

Autocorrelation exists when there is correlation between participants of observations ordered in time. More specifically, autocorrelation carries the meaning that the error term of individual observation and error term of other observations are related (Gujarati & Porter, 2009). This econometric problem is most probably exists in time series data.

Basically, there are three factors that cause autocorrelation to occur in the model. The first factor is the omission of relevant independent variables. The effect of the exclusion of the important independent variables will be captured by error terms. The second factor is the incorrect functional form used by researchers to relate the independent variables and dependent variable. The third factor is the data problem, for example, changing the high frequency data (weekly data) to low frequency data (yearly data) may lose certain relevant information that cannot be explained by low frequency data (yearly data). Then, error terms will capture the lost information, autocorrelation occurs in the model.

As the consequences of autocorrelation, OLS estimators will be inefficient and thus no longer as best linear unbiased efficient (BLUE) estimator. At the same time, autocorrelation violates one of the Classical Linear Regression Model assumptions that stated no relationship between error terms. When the estimated parameters become inefficient, t statistic value, F statistic value and confidence interval will be invalid. Hence, directly cause the p-value of hypothesis test results become biased and wrong. Wrong inference may be made on the significance of the parameters based on the inefficient parameters.

In order to detect autocorrelation, researchers used Breusch-Godfrey Lagrange Multiplier (LM) Test in this study. This LM test was developed by Breusch and Godfrey at 1978. Optimal lag-length is chosen based on smallest value of Akaike Information Criterion to conduct Bruesch-Godfrey LM Test. Null hypothesis will be rejected if p-value obtained is less than 5% significance level in this study.

3.5.5 Heteroscedasticity

Heteroscedasticity occurs when the variance of the disturbance different across observations and is a problem often encountered in cross-sectional data. In the present of heteroscedasticity, OLS estimates are no longer blue as model failed to provide smallest estimated variance, var $(\beta_2^*) \leq$ var (β_2). Thus, the results given by t and F test will be inaccurate as a result of the overly large var (β_2) and appears to be statistically insignificant. In short, if researchers keep on in using the usual testing procedures despite heteroscedasticity, whatever conclusions researchers draw or inferences which are made may be very misleading.

Heteroscedasticity might occur because of several reasons. First, error tends to increase when included too many independent variable. Second, "outliers" found in the observation as it leads to extrapolation. Third, measurement error as some of the data provided by respondent is not accurate. Fourth, there is extreme value in either direction (extremely negative to extremely positive) of independent value. Fifth, results from improper model specification, included wrong functional form.

In order to detect whether there is heteroscedasticity problem occur, Autoregressive Conditional Heteroscedasticity (ARCH) should be employed. This test can only be applied to detect problem in time series data. In ARCH test, researchers set null hypothesis as there is no heteroscedasticity problem in the model; whereas for alternative hypothesis as there is heteroscedasticity problem. By comparing p-value and significance level, null hypothesis will be rejected if p-value smaller than 1%, 5% or 10% significance level and vice versa. In case of researchers failed to reject null hypothesis, it can be concluded that the model is free from heteroscedasticity and error variance is constant.

In case heteroscedasticity found in the model, researchers should transform the variables or re-specify the model. Sometimes taking logs of the dependent or explanatory variable can reduce the problem. Drop out the "outlier" but often these observations may be important or significant to the model.

3.6 Conclusion

Overall, chapter three has explained all methodologies or statistical tests that will be implemented by researchers in this study. Several diagnostic checking will be conducted systematically to obtain robust results that can provide solid proof on the inference made by researchers in previous chapter. Further discussion and detailed evaluation on the data analysis will be presented in Chapter Four.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, the relationship between interest rate, exchange rate, money supply, gross domestic product (GDP), consumer price index (CPI) and stock price are tested and presented. In this research paper, Ordinary Least Square (OLS) method was employed. T-test is applied to test significant of parameters while F-test is applied to examine the model fit. Ramsey Reset Test and Jarque-Bera Test are used to determine whether the specification of model is correct and the distribution of error term is normal. Besides, Breusch-Godfrey Lagrange Multiplier (LM) Test, Variance-Inflating Factor (VIF) and Autoregressive Conditional Heteroscedasticity (ARCH) also been tested to determine whether the model has the problem of autocorrelation, multicollinearity and heteroscedasticity. For the former case, all the testing that researchers mentioned above with p-value approach and may reject null hypothesis since p-value is less than significance level of 0.05.

4.1 Diagnostic checking

4.1.1 Jarque-Bera (JB) Test for Normality

Hypothesis

H_0: The error term is normally distributed.

H_1: The error term is not normally distributed.

Decision Rule

Reject H_0 if the p-value of JB statistic is smaller than significance level($\alpha = 0.05$), otherwise do not rejectH_0.

Table 4.1: Jarque-Bera Normality Test

Std. Dev.	**Jarque-Bera**	**Probability**
265.3990	1.5908	0.4514

Decision

Do not reject H_0 since the p- value of JB statistic (0.4514) more than significance level (0.05).

Conclusion

There is not sufficient evidence to conclude that the error term is not normally distributed at the significance level of 0.05. Hence, the model is free from normality problem.

4.1.2 Ramsey's Regression Specification Error Test (RESET)

To test the model specification of linear regression model, researchers applied the Ramsey's RESET test.

Table 4.2: Ramsey's RESET test

P-value of F test(1,73)	P-value of Chi-Square(1)
0.3072	0.2834

Hypothesis

H_0: Model specification is correct.

H_1: Model specification is incorrect.

Decision Rule

Reject H_0 if the p-value is less than significance level (α=0.05). Otherwise, do not rejectH_0.

Decision

Do not reject H_0 since the p- value is 0.3072 which larger than significance level.

Conclusion

There is sufficient evidence to conclude that the model specification is correct at 5% significance level.

4.1.3 Multicollinearity

Multicollinearity is an econometric problem when there is a linear relationship or correlation between the regressors in estimated regression model. There are several ways of detecting the multicollinearity problem in the estimated model. In this study, the researchers employed two ways to

detect the multicollinearity in the model. The first way is to observe the R^2 and the number of significant t-ratios of the estimated model. Multicollinearity problem exists when there is a high R^2 but only a few significant t-ratios are found in the estimated model. The second way is to conduct the Variance Inflation Factor (VIF) analysis. If multicollinearity problem is found in the model, the estimated parameters can be considered as bias, inefficient and inconsistent.

Table 4.3: Correlation Analysis

	STI	**IR**	**ER**	**MS**	**GDP**	**CPI**
STI	1.0000	-0.1236	-0.6422	0.7449	0.79029	0.6833
IR	-0.1236	1.0000	0.3533	-0.4384	-0.3373	-0.4617
ER	-0.6422	0.3533	1.0000	-0.5766	-0.5512	-0.6331
MS	0.7449	-0.4384	-0.5766	1.0000	0.9818	0.9787
GDP	0.7903	-0.3373	-0.5512	0.9818	1.0000	0.9504
CPI	0.6833	-0.4617	-0.6331	0.9787	0.9504	1.0000

From the Table 4.3, it shows that there are three pairs of independent variables that are highly correlated with each other, which are GDP and MS (0.9818), CPI and MS (0.9787), as well as GDP and CPI (0.9504).

Next, regression analyses were carried out to obtain R^2 and calculate Variance

Inflation Factor.

Hypothesis

H_0: There is no multicollinearity problem.

H_1: There is a multicollinearity problem.

Decision Rule

Reject H_0 if the VIF is greater than 10, otherwise do not reject H_0.

Decision

Table 4.4: Variance Inflation Factor (VIF)

Dependent variable	**Independent variable**	**R^2 of auxiliary model**	**Variance inflation factor**	**Degree of multicollinearity**
STI	IR	0.01528	1.0155	Low multicollinearity
STI	ER	0.4125	1.7021	Low multicollinearity
STI	MS	0.5549	2.2467	Low multicollinearity
STI	GDP	0.6246	2.6635	Low multicollinearity
STI	CPI	0.4669	1.8757	Low multicollinearity
IR	STI	0.01528	1.0155	Low multicollinearity
IR	ER	0.1248	1.1427	Low multicollinearity
IR	MS	0.1922	1.238	Low multicollinearity
IR	GDP	0.1137	1.1283	Low multicollinearity
IR	CPI	0.2132	1.271	Low multicollinearity
ER	STI	0.4125	1.7021	Low multicollinearity
ER	IR	0.1248	1.1427	Low multicollinearity
ER	MS	0.3324	1.4979	Low multicollinearity

ER	GDP	0.3038	1.4363	Low multicollinearity
ER	CPI	0.4008	1.6690	Low multicollinearity
MS	STI	0.5549	2.2467	Low multicollinearity
MS	IR	0.1922	1.238	Low multicollinearity
MS	ER	0.3324	1.4979	Low multicollinearity
MS	GDP	0.9639	27.6993	High multicollinearity
MS	CPI	0.9579	23.7609	High multicollinearity
GDP	STI	0.62456	2.6635	Low multicollinearity
GDP	IR	0.1137	1.1283	Low multicollinearity
GDP	ER	0.3038	1.4363	Low multicollinearity
GDP	MS	0.9639	27.6993	High multicollinearity
GDP	CPI	0.9033	10.3394	High multicollinearity
CPI	STI	0.4669	1.8757	Low multicollinearity
CPI	IR	0.2132	1.271	Low multicollinearity
CPI	ER	0.4008	1.669	Low multicollinearity
CPI	MS	0.9579	23.7609	High multicollinearity
CPI	GDP	0.9033	10.3394	High multicollinearity

$R_{Xi,Xj}$	**R-Square**	**VIF**	**Degree of multicollinearity**
$R_{STI,IR, ER, MS, GDP\& CPI}$	0.8278	5.8058	Low multicollinearity
$R_{IR, STI, ER, MS, GDP\& CPI}$	0.4687	1.882	Low multicollinearity
$R_{ER, STI, IR, MS, GDP\& CPI}$	0.7076	3.4201	Low multicollinearity
$R_{MS, STI, IR, ER, GDP\& CPI}$	0.9891	91.8442	High multicollinearity
$R_{GDP, STI, IR, ER, MS\& CPI}$	0.9791	47.8149	High multicollinearity
$R_{CPI, STI, IR, ER, MS \& GDP}$	0.9778	45.0999	High multicollinearity

Conclusion

From the Table 4.4, it shows that when money supply, gross domestic product and consumer price index become dependent variable in the auxiliary models respectively, R-Squared in the models are very high. It leads to serious multicollinearity problem in the auxiliary models since the Variance Inflation Factor (VIF) is greater than 10. Therefore, it indicates linear relationship between money supply, gross domestic product and consumer price index in the estimated model. This leads to the estimated parameters to be unbiased, inefficient but consistent. Overall, it can be concluded that there is a serious multicollinearity problem.

4.1.4 Autocorrelation

To examine whether autocorrelation occurs in the model, researchers carried out Breusch-Godfrey Serial Correlation LM Test.

Table 4.5: Breusch-Godfrey Serial Correlation LM Test

P-value of F test (1,73)	**P-value of Chi-Square (1)**
0.0000	0.0000

Lag length	**Probability**	**AIC**	**Conclusion**
1	0.0000	13.6311	Reject Ho at α =0.05
2	0.0000	13.6417	Reject Ho at α =0.05
3	0.0000	13.6614	Reject Ho at α =0.05
4	0.0000	13.6766	Reject Ho at α =0.05
5	0.0000	13.694	Reject Ho at α =0.05

Optimal lag-length is chosen based on the smallest value of Akaike Information Criterion to conduct Bruesch-Godfrey LM Test. Therefore, researchers conduct the Breusch-Godfrey Serial Correlation LM Test with the optimal lag-length which is lag length 1.

Hypothesis

H_0: There is no autocorrelation in the model.

H_1: There is an autocorrelation in the model.

Decision Rule

Reject H_0 if the p-value of F-Statistic is less than significance level (α =0.05). Otherwise, do not reject H_0.

Decision

Since the p-value of F-statistic = 0.0000 <α =0.05, researchers reject H_0.

Conclusion

Therefore, there is sufficient evidence to conclude that there is autocorrelation problem in the model at 5% significance level.

4.1.5 Heteroscedasticity

Arch test had been carried out in this time series data to determine Heteroscedasticity problem and the lag-length have been chosen is 1 by referring to lowest Schwarz Criterion (SIC) value which is 26.0732.

Table 4.6: ARCH Test

P-value of F test (1,73)	P-value of Chi-Square (1)
0.0006	0.0008

Lag length	Probability	SIC	Conclusion
1	0.0006	26.0732	Reject Ho at α =0.05
2	0.0018	26.128	Reject Ho at α =0.05
3	0.0065	26.1950	Reject Ho at α =0.05
4	0.0090	26.2128	Reject Ho at α =0.05
5	0.0001	26.1023	Reject Ho at α =0.05

Hypothesis

$H_{0:}$ There is no heteroscedasticity problem in the model.

$H_{1:}$ There is heteroscedasticity problem in the model.

Decision Rule

Reject H_0 if the P-value is smaller than $\alpha=0.05$. Otherwise, do not reject H_0.

Decision

Reject H_0 since the p-value (0.0006) is smaller than $\alpha=0.05$.

Conclusion

There is sufficient evidence to conclude that there is heteroscedasticity problem in the model at 5% significance level.

4.2 Ordinary Least Square (OLS)

Table 4.7: EViews result

Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**P-value**
Intercept	12443.87	1760.022	7.0703	0.0000
Interest Rate	95.4506	46.694	2.0442	0.0445
Exchange Rate	-1970.138	244.0427	-8.0729	0.0000
Money Supply	0.005708	0.0025	2.2818	0.0254
Gross Domestic Product	0.04358	0.0129	3.3792	0.0012
Consumer Price Index	-117.2088	19.7304	-5.9405	0.0000
R-squared		0.8278		
Adjusted R-squared		0.8161		
F-statistic		71.1253		
P-value of F-test		0.0000		

4.2.1 Economic Function

Stock price = *f* (Interest rate, Exchange rate, Money supply, Gross domestic product, Consumer Price Index)

4.2.2 Economic Model

$\hat{Y} = \widehat{\beta_1} + \widehat{\beta_2}x_2 + \widehat{\beta_3}x_3 + \widehat{\beta_4}x_4 + \widehat{\beta_5}x_5 + \widehat{\beta_6}x_6$

$\widehat{Y}$= 12443.87+ 95.4506IR -1970.138ER +0.005708MS +0.04358GDP -117.2088 CPI

Dependent variable, $\hat{Y}$	:	Stock price
Independent variables, X_i	:	Interest rate
		Exchange rate
		Money supply
		Gross domestic product
		Consumer Price Index

4.3 Hypothesis for Model Fit (F-test)

In order to test the estimated regression model is significant, researchers decided to use F-test with p-value approach at significance level of 0.05.

Hypothesis

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

H_1: At least one of the $\beta_i \neq 0$, where $i = 2, 3, 4, 5$

Decision rule

1. Reject H_0 if the p-value of F-test is less than significance level of 0.05, and conclude that at least one independent variable is important in explaining the dependent variable.
2. Do not reject H_0 if the p-value of F-test is more than significance level of 0.05, and conclude that there is no linear relationship in model.

Decision

Table 4.1 shows that the p-value of F-test is 0.0000 which is less than significance level of 0.05, hence reject H_0.

Conclusion

There is sufficient evidence to conclude that at least one of the β_i is not equal to 0, where i= 2, 3, 4, 5 at significance level of 0.05. This shows that the model is significant in explaining the stock price at significance level of 0.05.

4.4 Hypothesis Testing (t-test)

Researchers decided to use t-test with p-value approach (shown in Table 4.7) at significance level of 0.05.

Hypothesis

H_0**:** $\beta_i = 0$

H_1**:** $\beta_i \neq 0$

Decision rules

Reject H_0 if the p-value is less than the significance level, otherwise do not reject H_o.

4.4.1 Interest Rate

Hypothesis

H_0 = There is no significant relationship between interest rate and stock price fluctuation.

H_1 = There is a significant relationship between interest rate and stock price fluctuation.

Decision

Reject H_0 since p-value is 0.0445 which is less than the significance level.

Conclusion

There is sufficient evidence to conclude that the relationship between interest rate and stock price fluctuation is significant.

4.4.2 Exchange Rate

Hypothesis

H_0 = There is no significant relationship between exchange rate and stock price fluctuation.

H_1 = There is a significant relationship between exchange rate and stock price fluctuation.

Decision

Reject H_0 since p-value is 0.0000 which is less than the significance level.

Conclusion

There is sufficient evidence to conclude that the relationship between exchange rate and stock price fluctuation is significant.

4.4.3 Money Supply

Hypothesis

H_0 = There is no significant relationship between money supply and stock price fluctuation.

H_1 = There is a significant relationship between money supply and stock price fluctuation.

Decision

Reject H_0 since p-value is 0.0254 which is less than the significance level.

Conclusion

There is sufficient evidence to conclude that the relationship between money supply and stock price fluctuation is significant.

4.4.4 Gross Domestic Product

Hypothesis

H_0= There is no significant relationship between gross domestic product (GDP) and stock price fluctuation.

H_1 = There is a significant relationship between gross domestic product (GDP) and stock price fluctuation.

Decision

Reject H_0 since p-value is 0.0012 which is less than the significance level.

Conclusion

There is sufficient evidence to conclude that the relationship between gross domestic product (GDP) and stock price fluctuation is significant.

4.4.5 Consumer Price Index

Hypothesis

H_0 = There is no significant relationship between consumer price index (CPI) and stock price fluctuation.

H_1 = There is a significant relationship between consumer price index (CPI) and stock price fluctuation.

Decision

Reject H_0 since p-value is 0.0000 which is less than the significance level.

Conclusion

There is sufficient evidence to conclude that the relationship between consumer price index (CPI) and stock price fluctuation is significant.

4.4.6 Interpretation

β_1=95.4506

When the Interest Rate (IR) increased by one percentage point, on average, the stock price index in Singapore will be increased by 95.4506 basis points, holding other variables constant.

β_2= -1970.138

When the Exchange Rate (ER) increases by SGD 1 million, on average, the stock price index in Singapore will be decreased by 1970.138 basis points, holding other variables constant.

β_3= 0.005708

When the Money Supply (MS) increases by SGD 1 million, on average, the stock price index in Singapore will be increased by 0.005708 basis points, holding other variables constant.

β_4= 0.04358

When the Gross Domestic Product (GDP) increases by SGD 1 million, on average, the stock price index in Singapore will be increased by 0.04358 basis points, holding other variables constant.

β_5= -117.2088

When the Consumer Price Index (CPI) increases by one index, on average, the stock price index in Singapore will be decreased by 117.2088 basis points, holding other variables constant.

4.4.7 Goodness of Fit

R-squared = 0.8278

Interpretation: There are 82.78% of the total variation in the Stock Price index in Singapore can be explained by the total variation in Interest Rate, Exchange Rate, Money Supply, Gross Domestic Product and Consumer Price Index.

Adjusted R-squared = 0.8161

Interpretation: There are 81.61% of the total variation in the Stock Price index in Singapore can be explained by the total variation in Interest Rate, Exchange Rate, Money Supply, Gross Domestic Product and Consumer Price Index after taking into account of the sample size and the degree of freedom.

4.5 Problem Solving

4.5.1 Multicollinearity Problem

Although the VIF analysis reveals that there is a serious multicollinearity problem in the estimated model, however, the R^2 in the model is high and all the independent variables are significant. From the E-view output, the R^2 in the estimated model is 0.8278 which is considered high. It shows that 82.78% of the total variation of the dependent variable (stock price volatility) can be explained by the total variation of independent variables (interest rate, exchange rate, money supply, gross domestic product and consumer price index). Using the significance level of α=0.05, all the independent variables have p-value smaller than α=0.05. It means that all the independent variables are significant at the significance level. In conclusion, the multicollinearity issue in the estimated model can still be accepted.

4.5.2 Autocorrelation Problem

As autocorrelation exits in the model, researchers further conducted a Newey-West Standard Error test to tolerate with the problem, perhaps to solve autocorrelation in the model.

Table 4.8: Result of First Breusch-Godfrey Serial Correlation LM Test (Lag Length 1)

Variable	Coefficient	Std. Error	t-Statistic	P-value
IR	-19.9102	36.1448	-0.5508	0.5834
ER	-55.0037	188.5045	-0.2918	0.7713
MS	0.002696	0.001967	1.3708	0.1746
GDP	-0.009222	0.01004	-0.9189	0.3612
CPI	-19.9771	15.4812	-1.2904	0.2010
C	1794.598	1381.298	1.2992	0.1980

Table 4.9: Result of Newey-West Standard Error Test

Variable	Coefficient	Std. Error	t-Statistic	P-value
IR	95.4506	71.0548	1.3433	0.1833
ER	-1970.138	254.5172	-7.7407	0.0000
MS	0.005708	0.003493	1.6343	0.1064
GDP	0.04358	0.02109	2.0661	0.0423
CPI	-117.2088	28.6038	-4.0977	0.0001
C	12443.87	2348.361	5.299	0.0000

By referring the original model with Newey-WestHAC Standard Errors & Covariance model, there are changes in the coefficient values, standard error, t-statistic values and p-values for each individual parameters value. Due to this, it is essential to perform Serial Correlation LM test for the second time to examine whether autocorrelation problem has been solved.

Table 4.10: Result of Second Breusch-Godfrey Serial Correlation LM Test

P-value of F test (1,73)	**P-value of Chi-Square (1)**
0.0000	0.0000

From the second LM test's results above, the p-value of F-statistics (0.0000) is less than significance level of 5%. Hence, autocorrelation problem still exist in the model.

4.5.3 Heteroscedasticity Problem

The alternatives to solve heteroscedasticity problem is to increase sample size. This will be useful if the model is correctly specified. According to Central Limit Theorem, the distribution of dependent and independent variables will be approximately normal as sample size increase. Consequences, the error term will also approximately normal. Besides, researchers suggested transforming the model into logarithmic form. However, in the research, researchers fail to transform as it causes the model to be not normally distributed. Unlike linear and nonlinear least squares regression, weighted least squares regression (WLS) is able to deal with both linear and non-linear regression parameters. Weighted Least Square regression is also efficient for small data set and it used to describe relationship among variables (Engineering Statistic Handbook, 2012). It implements by including an additional non-negative constants, or weights, related to each data point, into the fitting criterion.

4.6 Conclusion

All the analysis of data has been completed under Ordinary Least Square (OLS) test. The empirical results of the study are shown clearly in this chapter through the tables as well as figures. The interpretations and explanations of several testing have been written in this chapter. In Chapter 5, constraints of this research as well as recommendations for future research will be presented

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

Chapter 5 provides a review of the descriptive and inferential analyses discussed in Chapter 4. Besides this, the major findings of the research are also discussed here. This is followed by the practical implications of the study for policy makers and practitioners. The remaining part of the chapter presents the limitations of the research and the recommendations for future research. Then, an overall conclusion is drawn in this research.

5.1 Summary of Statistical Analyses

Table 5.1: Result of OLS Regression

Variable	**P-value**	**Result**
Interest Rate	0.0445	Significant
Exchange Rate	0.0000	Significant
Money Supply	0.0254	Significant
Gross Domestic Product	0.0012	Significant
Consumer Price Index	0.0000	Significant
Diagnostic Checking		
Jarque-Bera (JB) Test	0.4514	Error term is normally distributed.
Ramsey's RESET Test	0.3072	Model specification is correct.
Variance Inflation Factor (VIF)	-	Serious multicollinearity problem.
Breusch-Godfrey Serial Correlation LM Test	0.0000	Autocorrelation problem in the model.
ARCH test	0.0006	Heteroscedasticity problem in the model.

This study is to find out relationship between interest rate, exchange rate, money supply, gross domestic product, consumer price index and stock price of Singapore. Researchers conducted several tests at 5% significance level in Chapter 4 to test the relationship. Based on the result of OLS Regression as recorded in Table 5.1, the error term of the model is normally distributed and the model is correctly specified. In the meanwhile, the model has multicollinearity problem, autocorrelation problem, as well as heteroscedasticity problem.

Besides, all independent variables in the model are significantly affecting the stock price in Singapore which is the Straits Time Index. The interest rate, money supply, and gross domestic product (GDP) are positively affecting the stock price.

In contrast, exchange rate and consumer price index (CPI) are negatively affecting the stock price.

5.2 Discussions of Major Findings

5.2.1 Interest Rate

The interest rate used in this study is the interest rate of Treasury bill which issued by Singapore government. The reason of choosing the interest rate of Treasury bill as one of the independent variables is the risk of treasury bill is low or almost zero. This can avoid the result of the model influenced by the risks.

Based on the result of statistical test, the relationship between interest rate and stock price is significant positive. This result is consistent with Maysami, Lee and Hamzah (2004) who applied the VECM technique and found that short term interest rate is significant positively affects the Singapore Exchange Composite Index. The result also supported by Maysami and Koh (2000) and Wong, Khan and Du (2006).

In contrast, some previous researchers found that the interest rate is having significant negative relationship with stock price. By applied cointegration analysis, Humpe and Macmillan (2007) argued that the interest rate is significant inversely affect the stock price in U.S. stock market. Besides, Maysami and Sim (2001) obtain the same result for the Malaysia and Thailand stock price with Error-Correction Modelling technique with a

dummy variable that take into account the shock of the 1997 Asian financial crisis. This is because higher interest rate will caused higher borrowing cost.

Yet, Yusof, Majid and Razali (2006) proved that interest rate is insignificant with stock price in Malaysia market by applying autoregressive distributed model (ARDL).

5.2.2 Exchange Rate

In this model, exchange rate which is the exchange rate of Singapore Dollar per USD has significant negative relationship with the stock price. It can explain as when the exchange rate increase, the stock price in Singapore will decrease, vice versa.

This result is consistent with many results of findings in Asia stock market such as Hsu, Liang and Lin (2013) and Agrawal, Srivastav and Srivastava, (2010). Kim (2003) who investigated relationship between exchange rate and stock price of U.S showed that the negative relationship is due to the portfolio effect. The result is supported by Hsu, Liang and Lin (2013) who investigate relationship between exchange rate and stock price of ASEAN-5 which include Malaysia, Thailand, Vietnam, Indonesia and Philippines through panel DOLS approach. Even in India, exchange rate is significant negatively affect the stock price (Agrawal, Srivastav & Srivastava, 2010).

However, the result of findings by Maysami, Lee and Hamzah (2004) is the exchange rate has significant positive relationship with the stock price of Singapore. They concluded that this is due to stronger domestic currency lead to lower imported raw materials cost as well as lower sales price and higher

sales result. This able to increase the stock price of company which has constant profit from sales. This is supported by Kubo (2012) who investigate the relationship between exchange rate and stock price in Philippines and Singapore. Furthermore, according to Harjito and McGowan (2011), by running the Granger causality, Johansen co-integration test and Engel-Granger causality test in Philippines, Indonesia, Thailand and Singapore, the relationship also significantly and positively.

Apart from that, Nieh and Yau (2009) argued that relationship among exchange rate and stock price in Taiwan and Japan is insignificant by applying TECM Granger-Causality tests. By implementing co-integration and panel co-integration model, relationship between exchange rate and stock price of Singapore, Indonesia, Japan, Hong Kong as well as Thailand also insignificant (Lean, Narayan & Smyth, 2011).

5.2.3 Money Supply

Researchers have included money supply, M2 in this study. M2 is broader money classification than M1, because it includes assets which are highly liquid but not cash. M2 is defined as M1 plus saving deposits, money market deposits and time deposits.

Significant positive relationship between money supply and stock price has been found in the statistic test. It can be explained that when injection in money supply occurred, it will boost up company earning and thus increase company's cash flows and its share price. This result is in line with the result from Wong et al. (2005) who examined Singapore stock market (SGX) before Asian financial crisis 1997.The result also supported by Brahmasrene

and Jiranyakul (2007), Kumar and Puja (2012) and Khan and Yousuf (2013).

However, Sellin (2001), Maskay (2007) and Peace and Roley (1983) found that only unanticipated change in money supply will influence stock price movement. By referring to Efficient Market Hypothesis, unanticipated high money supply leads to increase interest rate, households and investors will tend to save more than spend, causing stock price to drop. Ray (2012) agreed the statement by coming out another conclusion which is increase in money supply, increase cash on hand, increase liquidity on buying securities and thus increase in stock price. There are two scenarios might happen by depending on which country.

Rogalski and Vinso (1997) pointed bi-directional relationship between stock price fluctuation and money supply by using Granger Causality test and Autoregressive moving average model (ARMA). Changes of stock price will leads to changes in money supply, or vice versa.

5.2.4 Gross Domestic Product (GDP)

Gross Domestic Product is a measurement of total domestic income and the income earned by foreign owned factors of production. It is important as a tool for future and health of country's economy prediction, so GDP has included in this study.

The result shows significant positive relationship between gross domestic product and stock price. Increase in GDP will increase the stock price, it found to be consistent with result from Peng, Cui, Groenewold and Qin (n.d) who investigated for China stock market. Researchers found strong causality

from GDP to stock market and positive long run relationship. Ahmed and Suliman (2011) also support the result by examined Sudan economy. Moreover, for case in Singapore, Maysami and Koh (2000) also concluded that positive relationship among stock price and Gross Domestic Product by applied both industrial production index and domestic exports as proxy. When GDP increase, it gave a good signal that country is earning money and thus boost up investor confidence, increase purchase of stock, and then causing stock price to increase.

By using Granger Causality test, Ikoku (n.d) who investigated on Nigeria stock market found bidirectional causality relationship between stock price and GDP. However, Duca (2007) presented the opposite result which is unidirectional relationship occurred between stock price and GDP in developed economies market. All the developed market such as United States, Japan, Australia has been determined that stock price to increase except for Germany due to its market capitalisation.

5.2.5 Consumer Price Index (CPI)

Inflation can be measured by using CPI which threatens the stability of economy. Therefore, it is one of the indicators used by the Federal government in determining appropriate economics policies. Zhang (2013) found there is complex relationship between inflation and stock market, as it depends on range of inflation.

There is significantly inverse relationship between CPI and stock price movements showed in this research paper. This result is consistent with Li, Narayan and Zheng (2010) who examined on US market. They suggested that

relationship between inflation and stock market may be different in different political power. Meanwhile, Boucher (2006) also agreed by pointed out that expected stock return is based on own perspective and behaviours.

In contrast, Kim & In (2005) indicated that there is positive relationship between nominal stock returns and inflation by using monthly nominal and real stock returns and inflation rates. Bekaert and Engstrom (2010) agreed by suggested that expected inflation would be lower if economy is booming.

However, result in this paper is not consistent with Maysami and Koh (2000) who also examined case in Singapore by using vector error correction approach.

5.3 Implications of the Study

A great deal of useful information has been supplied to a number of parties, such as the Singapore Government or policy makers, economists or researchers, local and foreign stock market investors, as well as corporate management teams. The findings of the research give the parties concerned a better insight into the Singapore economic conditions and the stock market trend. The parties concerned also manage to get a better idea on how the Singapore stock market works with the selected macroeconomic variables.

5.3.1 Implications to Singapore Government

The study on the relationship between the stock price movements and its

determinants in Singapore shows significant implications for the Singapore Government. The policy makers could introduce and implement appropriate sets of national economic policies which suit to the current financial economic environment in Singapore. For example, the Ministry of Trade and Industry of Singapore can boost the gross domestic product growth which could directly affect the stock market performance. Having a better understanding on influence of money supply and interest rate on stock price enables the Monetary Authority of Singapore to use the stock market levels as an indicator to control the monetary policy accordingly.

Since the Consumer Price Index is a pointer of the inflation rate and it shows an inverse relationship with the stock price, the government needs to control the inflation rate at the optimal level to optimize the stock market performance. Otherwise, excessive high rate of inflation could impact the stock market adversely.

5.3.2 Implications to Policy Makers

Policy makers have to be prudent when making an attempt to control the economy through adjustments in macroeconomic variables. For instance, when they try to resolve unfavourable macroeconomic conditions like unemployment and inflation, they might unintentionally hold down the stock market and reduce capital formation which would result in further economic downturn (Maysami, Lee & Hamzah, 2004). Hence, a good supervision and manipulation on the macroeconomic variables is necessary to allow policy makers to maintain a financially sound and stable economy of the country.

5.3.3 Implications to Economists and Researchers

In addition, this study also adds to the literature of the determinants of stock price volatility. It may be useful and provides ground for future research. Economists and researchers can take this study as a reference for their further studies. Researchers can refer to the recommendations suggested in this study when conducting their research in order to avoid the limitations encountered in this study, thereby more accurate results might be obtained. Moreover, economists can also study this research to develop new economic theory and policies that could be beneficial to not only the country but the entire world.

5.3.4 Implications to Market Investors

Furthermore, this study is also dedicated to the stock market investors, both local and foreign. Stock market investors can be broadly divided into speculators and hedgers. A speculator is one who takes higher-than-average risk and anticipates future price movements in return for higher-than-average profits. On the other hand, a hedger is one who aims to reduce the risk of an investment by making an offsetting investment. They should possess specific knowledge of the stock market before going for speculation, hedging and investment. This study may be useful for the investors in making investment decisions and achieving their investment objectives. For instance, investors can arrange and amend their stock portfolios based on the changes of macroeconomic variables which could influence the stock market performance. Thus, investors may alter their trading strategies where necessary.

Overall, this study shows important information about how the macroeconomic variables affect stock market to investors, hedgers and speculators, allowing them to examine the related variables in the market before making any trading decisions. However, the Efficient Market Hypothesis suggests that all the related information regarding varies in macroeconomic variables is totally indicated in the stock prices in an efficient market due to the competition among investors. Therefore, investors will not be able to make higher than average profit through anticipation of future stock price movements. But the fact that no stock market in the real world is perfectly efficient enables the investors to gain abnormal profit by predicting future stock price movements.

5.3.5 Implications to Corporate Management Teams

This study also has implication for corporate management teams. Management can use this study as a reference to predict their companies' stock price movements. This is supported by the view that stock prices should be a sign of expectation of company performance in future and the level of economic activities (Maysami, Lee & Hamzah, 2004). If stock prices accurately reflect the changes in macroeconomic variables, then stock prices should become an important indicator of future economic activities. Through the expectation of future company performance and prediction of future economic activities, the management team of corporate is able to develop appropriate business strategies that can adapt to the economic environment. Besides this, the management will also be able to get the company well prepared to face unfavourable market conditions such as inflation and recession.

5.4 Limitations of Study

The constraint that encountered in this research is insufficient of sample size. According to the data that collected from data stream is available from quarter 1 for year 1993 until quarter 4 for year 2012. The data set or sample size consists of 80 observations. Although quarterly data had been used in this study but there is still not enough sample size and might create limitation on the data period in this study.

Besides, time series data is used in this research. The data set in investigating on the relationship between determinants and stock price fluctuation. Time series data is each observation dependent upon the previous observation and often influenced by each other. Thus, time series data is correlated. In short, autocorrelation problem may occur. According to Dimitrova (2005), time series data always fail to meet the classical assumptions of OLS estimation. Hence, time series data may cause less accurate result.

Ordinary Least Square (OLS) method has been conducted in this study however there are some disadvantages to OLS method. According to Burke and Term (2010), if any one of the assumptions is not met, the OLS estimation procedure breaks down and the result will become inconsistent and bias. Although the assumptions of OLS estimation have been hold in this study but still has risk to get less accurate result. Hence, future researchers are encouraged not to conduct OLS method.

Furthermore, this research only investigated the changes of stock price in one country, Singapore. Hence, the result of this research only useful for Singapore policy makers, economists and investors. Other countries such as Europe, United

State, New Zealand and other western countries are not encouraged to refer this study's result in implementing their countries' policy due to their different culture and political factors. Singapore is developed country so the result of this study becomes less accurate to the developing countries such as Vietnam and Thailand. The result of this study cannot represent other countries would have same effect in their stock market.

5.5 Recommendations for Future Research

High frequency data such as monthly data or daily data are suggested to be used in future researches. According to Liu (n.d.), high frequency data are more useful in estimation time series data. Therefore, high frequency data can obtain the more reliable result of the research.

This research is using time series data set and this type of data set has always been used by many previous researches. However, time series data has some disadvantages that may make the result becomes bias. Other type of data such as panel data are encouraged to be employed in future researches instead of using time series data as time series data may cause inconsistent result.

Regarding the disadvantage of Ordinary Least Square (OLS) method, future researchers are suggested to conduct Vector Error Correction Model (VECM) approach in testing relationship among macroeconomic variable and stock price. The advantage of using VECM approach over OLS method is the result of VECM approach has more efficient coefficient estimates in multivariate cointegrated time series. VECM approach becomes a popular tool and has been used by previous researchers to conduct their studies.

This research is mainly on Singapore's stock market and only useful for Singaporean. Therefore, this study may not suitable for future researcher to apply in other countries. Future researchers are suggested to collect extra information in examining the relationship among macroeconomic variable and stock price when refer to this research. They may have to do comparison among their counties and Singapore in order to get more accurate result.

5.6 Conclusion

This study examines the relationship between the selected variables (interest rate, exchange rate, money supply, gross domestic product and consumer price index) and the stock price volatility in Singapore by means of Ordinary Least Squares method for the period from January 1993 to December 2012. The conclusion drawn from this study is that a significant relationship is formed between the Singapore stock price index and all the selected macroeconomic variables. The study also found that the interest rate, money supply and gross domestic product display positive relationship with the Singapore stock price index, while the exchange rate and consumer price index form negative relationship with the Singapore stock price index.

Several tests have been carried out to detect the existence of econometric problems in the estimated model of this study. This study has discussed the constraints of study and provided some suggestions for further research. For instance, in order to address the problem of less accurate results, the study shall be extended by employing other methodology such as the Vector Error Correction Model approach. Future researchers are also recommended to include other economic variables that might influence the stock price significantly. Overall, this study has achieved its main objectives and provided grounds for further research.

REFERENCES

About us.(n.d.). Retrieved June 23, 2013, from Stock Exchange website: http://www.sgx.com/wps/portal/sgxweb/home/about_us/!ut/p/c5/DcrbDoIgAADQL2ogltijiqGWhWXLeGneYiRCZSvz62vn9QAO_nT5lqJ8SaNLBQrAnQvyvHkEA7h0LYphfEQx8_OMHrANEsCFMtV_nkjdjcR4goRkP0w-VFGFkl1MZZgcjBemkZr1Gn-Z38E6s8_CkF7ncvEsJpYprGBMtXWS7Xxzo3BYB-hcaKvhXxdRPo0WG-RqeDTukQRM7R1xxamxV2Abmb4F9676_AB4AThP/dl3/d3/L2dBISEvZ0FBIS9nQSEh/

Agrawal, G., Srivastav, A. K., &Srivastava, A. (2010). A study of exchange rates movement and stock market volatility. *International Journal of Business and Management*, *5*(12), 62-73.

Ahmed, A. E., & Suliman, S. Z. (2011). The Long–Run Relationship Between Money Supply, Real GDP, and Price Level: Empirical Evidence From Sudan. *Journal of Business Studies Quarterly* , 68-79.

Al Sharkas, A.A. (2004). The dynamic relationship between macroeconomic factors and the Jordanian stock market.*International Journal of Applied Econometrics and Quantitative Studies, 1*(1), 97- 114. Retrieved from http://www.usc.es/economet/reviews/ijaeqs115.pdf

Alatiqi, S., & Fazel, S. (2008). Can money supply predict stock prices? *Journal for economic educators*, 8(2), 54-59.

Anna J. Schwartz. "Money Supply."*The Concise Encyclopedia of Economics.* 2008. Library of Economics and Liberty. Retrieved July 20, 2013 from the World Wide Web: http://www.econlib.org/library/Enc/MoneySupply.html

Atje, R., & Jovanovic, B. (1993) . Stocks markets and development, *European Economic Review,* 634-640.

Barro, R. J. (1998, April 27). The East Asian Tigers have plenty to roar about. *Business Week,* 24.

Bashiri, N. (n.d.). The Study of Relationship between Stock Exchange Index and Gross Domestic Production in Developed and Emerging Countries.

Branson, W. H. (1981). *Macroeconomic Determinants of Real Exchange Rates* (No.0801).National Bureau of Economic Research, Inc.

Bekaert, G., & Engstrom, E. (2010). Inflation and the stock market: Understanding the "Fed Model". *Journal of Monetary Economics, 57*(3), 278-294. http://dx.doi.org.libezp.utar.edu.my/10.1016/j.jmoneco.2010.02.004

BLS Information. (n.d.). Retrieved January 25, 2014, from Bureau of Labor Statistic website: http://www.bls.gov/dolfaq/bls_ques6.htm

Boucher, C. (2006). Stock prices–inflation puzzle and the predictability of stock market returns. *Economics Letters, 90*(2), 205-212. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.econlet.2005.08.001

Brahmasrene, T., &Jiranyakul, K. (2007).Cointegration and causality between stock index and macroeconomic variables in an emerging market.*Academy of Accounting and Financial Studies Journal*, 11(3).

Burke, O., & Term, M. (2010). More Notes for Least Squares. 1-15.

Carlstrom, C. T., Fuerst, T. S., & Ioannidou, V. P. (2002, August 15). *Stock Prices and Output Growth: An Examination of the Credit Channel.* Retrieved August 7, 2013, from http://www.clevelandfed.org/research/commentary/2002/0815.pdf

Catherine, H. S.F. (2011).Domestic macroeconomic fundamentals and world stock market effects on ASEAN emerging markets.*International Journal of Economics and Management, 5*(1), 1-8.

Chandra, P. (2004). *Investment Analysis and Portfolio Management*. New Delhi: McGraw-Hill.

Chen, N. F., Roll, R., & Ross, S. A. (1986).Economic forces and the stock market.*The Journal of Business, 59*(3), 383-403. Retrieved from http://www-personal.umich.edu/~jizhu/jizhu/Empirical%20Finance/Papers/Cross%20Sectional%20Predictability/ChenRollRoss86.pdf

Chong, C. S., &Goh, K. L. (2003). Linkages of economic activity, stock prices and monetary policy: The case of Malaysia. Faculty of Economics & Administration, University of Malaya, Kuala Lumpur, Malaysia. Retrieved from http://fep.um.edu.my/images/fep/doc/2004%20Pdf/FEA-WP-2004-004.pdf

Classical economics. (2013, August 19). AmosWEBEncyclonomicWEBpedia. Retrieved from http://www.AmosWEB.com

Corrado, C. J., & Jordan, B. D. (2005). Fundamentals of Investments: Valuation and Management. *New York*, New York: McGraw-Hill Irwin.

Dimitrova, D. (2005). The Relationship between Exchange Rates and Stock Prices: Studied in a Multivariate Model. *Political Economy, 14*, 1-25.

Donatas, P., &Vytautas, B. (2009). The short-run relationship between stock market prices and macroeconomic variables in Lithuania: An application of the impulse response function. *InzinerineEkonomika-Engineering Economics, 5*.

Duca, G. (2007). The relationship between the stock market and the economy : experience from international financial market . *Bank of Valletta Review* (36).

Fama, E. F. (1965). The behavior of stock-market prices.*The Journal of Business, 38*(1), 34-105. Retrieved from http://links.jstor.org/sici?sici=0021-9398%28196501%2938%3A1%3C34%3ATBOSP%3E2.0.CO%3B2-6

Fama, E.F. (1970). Efficient Capital Market: A review of Theory and Empirical Work. *Journal of Finance* 25(2):382-417

Fama, E.F. (1990). Stock returns, expected returns and real activity. *The Journal Finance,45*(4), 1089–1108. Retrieved from http://didattica.unibocconi.it/mypage/upload/FAMA20081107164805.PDF

Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and evidence. *Journal of Economic Perspectives, 18*(3), 25-46.

Fama, E.F., & Schwert, G.W. (1977). Asset returns and inflation. *Journal of Financial Economics, 5*(1977), 115-146. Retrieved from http://schwert.ssb.rochester.edu/ari_jfe77.pdf

Franke, G. (1984). On tests of the arbitrage pricing theory. *Operations-Research-Spektrum, 6(2),* 109-117. doi: 10.1007/BF01721086.

Friend, I., & Blume, M. (1970). Measurement of portfolio performance under uncertainty.*American Economic Review*, *60*(4), 607-636.

Gan, C., Lee, M., Au Yong, H.H., & Zhang, J. (2006). Macroeconomic variables and stock market interactions: New Zealand evidence. *Investment Management and Financial Innovations, 3*(4), 89- 101. Retrieved from http://www.businessperspectives.org/journals_free/imfi/2006/imfi_en_2006_04_Gan.pdf

Gerlach, S., &Gerlach-Kristen, P. (2006). Monetary policy regimes and macroeconomic outcomes: Hong Kong and Singapore

Geske, R., &Roll, R. (1983).The fiscal and monetary linkage between stock returns and inflation.*The Journal of Finance, 38*(1), 1–33. DOI: 10.1111/j.1540-6261.1983.tb03623.x

Gimba, V. K. (n.d.). Testing the Weak-form Efficiency Market Hypothesis: Evidence from Nigerian Stock Market.*Journal of Applied Statistics, 3*(1), 117-135.

Graham, J. (n.d.). *The Big Three Economic Indicators.* Retrieved August 7, 2013, from discover options: http://www.discoveroptions.com/mixed/content/education/articles/bigthreeeconomicindicators.html

Grossman, S., &Stiglitz, J. (1980).On the impossibility of informationally efficient markets.*American Economic Review*, *70*, 393-408.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). Boston: McGraw-Hill.

Guo, F., Hu, J., & Jiang, M. (2013). Monetary shocks and asymmetric effects in an emerging stock market: The case of China. *Economic Modelling, 32*, 532–538. http://dx.doi.org/10.1016/j.econmod.2013.02.032

Harjito, A. D., & McGowan, C. B. (2011). Stock price and exchange rate causality: The case of four asean countries. *Southwestern Economic Review*, *34*, 103-114.

Herve, D. B. G., Chanmalai, B., & Yao, S. (2011). The study of causal relationship between stock market indices and macroeconomic variables in Cote d'Ivoire: Evidence from Error-Correction models and Granger Causality Test. *International Journal of Business and Management, 6*(12), 146- 169. doi:10.5539/ijbm.v6n12p146

Holton, G. A. (n.d.). Capital Asset Pricing Model. Retrieved August 7, 2013, from Risk Encyclopedia website: http://riskencyclopedia.com/articles/capital_asset_pricing_model/

Huberman, G., & Wang, Z. Y. (2005). *Arbitrage Pricing Theory.* New York: Federal Reserve Bank.

Humpe, A., & Macmillan, P. (2007). Can macroeconomic variables explain long term stock market movements? A comparison of the US and Japan.*School of Economics and Finance, University of St Andrews.*

Hutchinson, M. (2012, March 6). The Singapore stock market is the world's biggest bargain. *Money Morning*. Retrieved from http://moneymorning.com/2012/03/06/the-singapore-stock-market-is-the-worlds-biggest-bargain/

Hsu, H.-C., Liang, C.-C., & Lin, J.-B. (2013). Reexamining the relationships between stock prices and exchange rates in ASEAN-5 using panel Granger causality approach. Economic Modelling, 32(0), 560-563. doi:http://dx.doi.org.libezp.utar.edu.my/10.1016/j.econmod.2013.03.001

Ikoku, A. E. (n.d.). Is the Stock Market a Leading Indicator of Economic Activity in Nigeria? *Journal of Applied Statistics* , 17-38.

International Monetary Fund Policy Development and Review Department.(1997, January).*IMF working paper: Stock market equilibrium and macroeconomic fundamentals* (L. Leigh, Author).

Ioannidis, C., & Kontonikas, A. (2008).The impact of monetary policy on stock prices.*Journal of Policy Modeling, 30*(1), 33–53. doi:10.1016/j.jpolmod.2007.06.015

Isenmila, P. A., & Erah, D. O. (2012). Share prices and macroeconomic factors: A test of the arbitrage pricing theory (APT) in the Nigerian stock market. *European Journal of Business and Management*, 4(15), 2222-2839.

Islam, M. M. (2003). The Kuala Lumpur stock market and economic factors: a general-to-specific error correction modeling test. *Journal of Academy of Business and Economics, 1*(1). Retrieved from http://www.freepatentsonline.com/article/Journal-Academy-Business-Economics/113563578.html

Jaffe, J. & Mandelkar, G.(1976). The Fisher effect for risky assets: An empirical investigation. *The Journal of Finance, 31*(2), 447-456. Retrievedfromwww.jstor.org/discover/10.2307/2326616?uid=3738672&uid=2129&uid=2134&uid=2&uid=70&uid=4&sid=21102527999697

Jarque, C., & Bera, A. K. (1980). Efficient Tests For Normality, Homoscedasticity and Serial Independence of Regression Residuals. *Economics Letters* (6), 255-259.

Jonathan, C., Tomas, J., & Gershon, M. (n.d.).*The Efficient Markets Hypothesis*. Retrieved from http://comp.uark.edu/~tjandik/papers/emh.pdf

Karimzadeh. & Mostafa. (2006). Examining long-term relationship between Stock price index and Money Macro Economic Variables using Cointegration method in Iran Economy, The Quarterly Economic Researches, 8(26): 41-54.

Kearney, C. & Daly, K. (1998). The causes of stock market volatility in Australia. *Applied Financial Economics, 8,* 597-605. Retrieved from http://web.ebscohost.com.libezp.utar.edu.my/ehost/pdfviewer/pdfviewer?sid=237f82ba-de61-4955-96d4-377950343419%40sessionmgr4&vid=8&hid=108

Khan, M. M., & Yousuf, A. S. (2013). Macroeconomic forces and stock prices: Evidence from the Bangladesh stock market. *MRPA paper*, 46538(25).

Kim, K.-h. (2003). Dollar exchange rate and stock price: evidence from multivariate cointegration and error correction model. Review of Financial Economics, 12(3), 301-313.doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/S1058-3300(03)00026-0

Kim, S., & In, F. (2005). The relationship between stock returns and inflation: new evidence from wavelet analysis. *Journal of Empirical Finance, 12*(3), 435-444. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.jempfin.2004.04.008

Koh, T. S., & Maysami, R. M. (n.d). A Cointegration Analysis of the Impact of Economic Forces and Global Market Integration on the Singapore Stock Market.*Nanyang Business School.*

Kothari, V. (n.d.). *Capital asset pricing model, arbitrage pricing theory and portfolio management.* Retrieved August 16, 2013, from http://vinodkothari.com/tutorials/The%20capital%20asset%20pricing%20model.pdf

Kubo, A. (2012). The US tech pulse, stock prices, and exchange rate dynamics: Evidence from Asian developing countries. Journal of Asian Economics, 23(6), 680-687.doi:http://dx.doi.org.libezp.utar.edu.my/10.1016/j.asieco.2012.06.007

Kumar, N. P., & Puja, P. (2012). The impact of macroeconomic fundamentals on stock prices revisited: An envidence from Indian Data. *MPRA paper*, 38980(23).

Lean, H. H., Narayan, P., & Smyth, R. (2011). Exchange Rate and Stock Price Interaction in Major Asian Markets: Evidence for Individual Countries and Panels Allowing for Structural Breaks. *The Singapore Economic Review*, *56*(02), 255-277.

Lee, B. S. (2010). Stock returns and inflation revisited: An evaluation of the inflation illusion hypothesis. *Journal of Banking & Finance, 34*(6), 1257-1273. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.jbankfin.2009.11.023

Leo, K.C., & Kendall, J.D. (1996).An empirical analysis of stock indices in three Southeast Asian countries. In Chew, B. S. & Kendall, J. D. (Eds.), *Regiona Issues in Economics, Vol.II. Nanyang Technical University, Singapore.*

Li, D. (2010, February 1). Singapore is most open economy: Report. *The Straits Times*, Business.

Li, L., Narayan, P. K., & Zheng, X. (2010). An analysis of inflation and stock returns for the UK. *Journal of International Financial Markets, Institutions and Money, 20*(5), 519-532. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.intfin.2010.07.002

Li, Y. D., Is çan, T. B., & Xu, K. (2010). The impact of monetary policy shocks on stock prices: Evidence from Canada and the United States. *Journal of International Money and Finance, 29*(5), 876-896. doi:10.1016/j.jimonfin.2010.03.008

Lin, C. H. (2012). The comovement between exchange rates and stock prices in the Asian emerging markets. International Review of Economics & Finance, 22(1), 161-172. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.iref.2011.09.006

Linda, F. D., & David, E. A. G. (1998). Diagnostic Testing in Econometrics: Variable Addition, RESET, and Fourier Approximations. In A. Ullah, & D.E.A. Giles, *Handbook of Applied Economic Statistics* (pp. 383-417). New York: Marcel Dekker.

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

Liow, K. H. (2004). Dynamic Relationship Between Stock And Property Markets.

Liu, Q. (n.d.). On Portfolio Optimization: How Do We Benefit From High-Frequency Data ? 1-37.

Long, J.S., & Pravin, T., 1992, Some Specification Tests for the Linear Regression Model. *Sociological Methods and Research,* (21), 161-204. Reprinted in Bollen and Long, 1993.

Mahmood, Y., & Ahmad, B. (2012). Macroeconomic variables and stock price: New evidence from Iran. *Middle-East Journal of Scientific Research, 11*(4), 408-415.

Malik, M. F., Qureshi, M. U., &Azeem, M. (2012). Determination of share price: Evidence from Karachi Stock Exchange. *The Romanian Economic Journal*, *43*.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics* , 407-437.

Maskay, B. (2007). Analyzing the effect of change in Money Supply on Stock Market.*The Park Place Economist, Illinois Wesleyan University*.

Maskay, B., & Chapman, M. (2007).Analyzing the Relationship between Change in Money Supply and Stock Market Prices.*Department of Economics, Illinois Wesleyan University.*

Maysami, R. C., &Koh, T. S. (2000). A vector error correction model of the Singapore stock market.*International Review of Economics and Finance, 9*(2000), 79–96. Retrieved from http://web.ebscohost.com.libezp.utar.edu.my/ehost/pdfviewer/pdfviewer?sid=dcb6871c-53f1-4a5b-8d2a-512de28b78c0%40sessionmgr111&vid=5&hid=119

Maysami, R. C., Lee, C. H., &Hamzah, M. A. (2004).Relationship between macroeconomic variables and stock market indices: Cointegration evidence from stock exchange of Singapore's all-S sector indices. *JurnalPengurusan, 24(2004)*, 47-77.Retrieved from http://journalarticle.ukm.my/1762/1/Jp24-03.pdf

Maysami, R. C., &Sim, H. H. (2001).An empirical investigation of the dynamic relations between macroeconomic factors and the stock markets of Malaysia and Thailand.*JurnalPengurusan, 20*, 3-26. Retrieved from 202.185.40.102/ojs/pengurusan/article/download/1468/

Md-Yusuf, M., &Rahman, H. A. (2013).Granger Causality Relationship between Malaysia Equity Market and Exchange Rate Volatility.*International Journal of Trade,* 4(1), 19-24

Modigliani, F. (1971). Consumer Spending and Monetary Policy: the Linkages. *Federal Reserve Bank of Boston Conference Series: Paper* No. 5.

Montgomery, D. C., Peck, E.A. & Vining, G. G. (2012). Introduction to linear regression analysis (5th ed.). Hoboken, NJ: John Wiley & Sons.

Nathan, L. J. (2002). Modelling the impacts of interest rate and exchange rate changes on UK stock returns.*Derivatives Use, Trading & Regulation*, *7*(4), 306-323.

Nelson, C. R. (1976). Inflation and rates of return on common stocks.*Journal of Finance,31*(2), 471-483. Retrieved from http://www.jstor.org/discover/10.2307/2326618?uid=3738672&uid=2129&uid=2&uid=70&uid=4&sid=21102528831543

Nieh, C. C., &Yau, H.-Y.(2009). Testing for cointegration with threshold effect between stock prices and exchange rates in Japan and Taiwan. Japan and the World Economy, 21(3), 292-300. doi:http://dx.doi.org.libezp.utar.edu.my/10.1016/j.japwor.2008.09.001

Ogg, J. C. (2011, August 8). Remaining countries with AAA credit ratings [Newsgroup post]. Retrieved from NBCNEWS.com website: http://www.nbcnews.com/id/44020687/ns/business-world_business/t/remaining-countries-aaa-credit-ratings/

Osamwonyi, I. O., &Evbayiro-Osagie, E. I. (2012).The relationship between macroeconomic variables and stock market index in Nigeria.*J Economics*, *3*(1), 55-63.Retrieved from http://www.krepublishers.com/02-Journals/JE/JE-03-0-000-12-Web/JE-03-1-000-12-Abst-PDF/JE-03-1-055-12-052-Osamwonyi-I-O/JE-03-1-055-12-052-Osamwonyi-I-O-Tt.pdf

Ozbay, B. (2009). The relationship between stock returns and macroeconomic factors: Evidence from turkey. *Financial analysis and fund management*. Retrieved from http://www.cmb.gov.tr/displayfile.aspx?action=displayfile&pageid=61&fn=61.pdf

Palan, S. (2004, August).*The Efficient Market Hypothesis and its validity in today's markets*. Retrieved from http://www.palan.biz/academic/documents/palan_2004-08_thesis-efficient_markets.pdf

Parrado, E. (2004). *Singapore's unique monetary policy: How does it work?* Unpublished working paper.

Pearce, D. K., &Roley, V. V. (1983). The reaction of stock prices to unanticipated changes in money: A Note. *The Journal of Finance*, 38(4), 1323-1333.

Peng, J., Cui, J., Qin, F., &Nicolaas, G. (n.d.).*Stock prices and the macro economy in China*. Unpublished working paper, The University of Western Australia, Crawley, Australia.

Perold, A. F. (2004). The Capital Assets Pricing Model.*Journal of Economic Perspectives*, *18*(3), 3-24.

Phylaktis, K., &Ravazzolo, F. (2005).Stock prices and exchange rate dynamics.Journal of International Money and Finance, 24(7), 1031-1053. doi: http://dx.doi.org.libezp.utar.edu.my/10.1016/j.jimonfin.2005.08.001

Pirovano, M. (2012). Monetary policy and stock prices in small open economies: Empirical evidence for the new EU member states. *Economic Systems, 36*(3), 372-390. http://dx.doi.org/10.1016/j.ecosys.2012.06.001

Rajan, R. D., &Siregar, R. Y. (2002). Choice of exchange rate regime: Currency Board (Hong Kong) or monitoring band (Singapore)?.*Australian Economic Papers*, *41*(4), 538-556.

Ramsey, J.B. (1969). Tests for specification errors in Classical Linear Least-squares Regression Analysis.*Journal of the Royal Statistical Society*, Series B, 31(2), 350-371.

Rangel, G.,&Pillay, S.S.(2007).Evidence of bubbles in the Singaporean stock market.

In Kim, S.J., & McKenzie, M.D. (Eds.),*ProceedingsofSingaporeEconomi Review Conference held in Meritus Mandarin Hotel Singapore,Singapore,2-4 August 2007*. Singapore: World Scientific Publishing. Retrieved from http://viessmanncentre.ca/wp-content/uploads/2011/06/Pillay.pdf

Raymond, K. (2009). Is There a Long Run Relationship Between Stock Prices and MonetaryVariables? Evidence from Jamaica.*Financial Stability Department, Bank of Jamaica.*

Richards, N. D., Simpson, J., & Evans, J. (2009). The interaction between exchange rates and stock prices: An Australian context. *International Journal of Economics and Finance*, *1*(1), P3.

Rogalski, R. J., &Vinso, J. D. (1997). Stock returns, money supply and the direction of causality. *The Journal of Finance*, 32(4), 1017-1030.

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

Sabetfar, P., Cheng, F. F., Mohamad, S., & Noordin, B. A. (2011). Test of Arbitrage Pricing Theory on the Tehran Stock Exchange: The case of a Shariah-compliant close economy. *International Journal of Economics and Finance* , 3(3), 109-118. doi:10.5539/ijef.v3n3p109.

Schwartz, A.J. (2008). The Concise Encyclopedia of Economics Money Supply.*Economist at the National Bureau of Economic Research*. Retrieved 22 July, 2013, from http://www.econlib.org/library/Enc/MoneySupply.html

Sellin, P. (2001). Monetary Policy and the Stock Market: Theory and Empirical Evidence. *Journal of Economic Surveys*, 2001, 15 (4), pp. 491-541.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under condition of risk. *The Journal of Finance*, *19*(3), 425-442.

Shiblee, L. S. (2009). *The Impact of Inflation, GDP, Unemployment, and Money Supply On Stock Prices.* Retrieved August 7, 2013, from http://ssrn.com/abstract=1529254 or http://dx.doi.org/10.2139/ssrn.1529254

Singh, T., Mehta, S., & Varsha, M. S. (2011). Macroeconomic factors and stock returns: Evidence from Taiwan. *Journal of Economics and International Finance* , *2*(4), 217-227.

Snedecor, G. W. & Cochran, W. G. (1989), *Statistical Methods*, Eighth Edition, Iowa State University Press.

Sugimoto, I. (2012). Exploration of Economic Growth Analysis of Singapore :Construction of Historical GDP Estimates (1900-39 and 1950-60) and Empirical Investigations . 47-67.

Tan, C. H., Lim, J., & Chen, W. (2004, November).*Competing international financial centers: A comparative study between Hong Kong and Singapore*. Unpublished working paper, Saw Centre for Financial Studies.

Taulbee, N. (n.d.). Influences on the Stock Market: An Examination of the Effect of Economic Variables on the S&P 500. *The Park Place Economist* .

Thadewald, T., & Büning, H. (2004). Jarque-Bera Test and its Competitors for Testing Normality - A Power Comparison. *School of Business & Economics Discussion Paper: Economics* .

Thomas White International . (2011). *Country profile: Singapore.* Chicago: Thomas White International Ltd.

Timmermann, A., & Granger, C. W.J. (2004).Efficient market hypothesis and forecasting. *International Journal of Forecasting*, *20*, 15-27. doi:10.1016/S0169-2070(03)00012-8

Trivedi, P. & Behera, S. R. (2012). Macroeconomic fundamentals as determinants of equity prices: An empirical analysis for India. *The IUP Journal of Applied Finance*, *18*(3), 5-30. Retrieved from http://web.ebscohost.com.libezp.utar.edu.my/ehost/pdfviewer/pdfviewer?sid=237f82ba-de61-4955-96d4-377950343419%40sessionmgr4&vid=6&hid=108

Womack, K.L., & Zhang, Y. (2003).Understanding risk and return, the CAPM, and the Fama-French three-factor model. Retrieved from http://www.portfoliosolutions.com/pdfs/FF_3_Factor_Tucks.pdf

Wong, K. A., & Kwong, K. S. (1984).The Behaviour of Hong Kong Stock Prices. *Applied Economics* 16:905-917.

Wong, W. K., Khan, H., & Du, J. (2005). Money, Interest Rate, and Stock Prices: New Evidence from Singapore and the United States. Retrieved July 20, 2013, from http://www.u21global.edu.sg/PartnerAdmin/ViewContent?module=DOCUMENTLIBRARY&oid=14100

Wong, W. K., Khan, H., & Du, J. (2006). Do money and interest rates matter for stock prices? An econometric study of Singapore and USA.*The Singapore EconomicReview, 51*(1), 31–51. Retrieved from http://repository.hkbu.edu.hk/cgi/viewcontent.cgi?article=1043&context=econ_ja&sei-redir=1&referer=

Yahoo Finance.(n.d.). Retrieved August 23, 2013, from Yahoo website: http://finance.yahoo.com/q/hp?s=^STI&a=11&b=28&c=1990&d=07&e=23&f=2013&g=m

Yu, H. (2013). The stock market and macroeconomic factors in Japan and policy implications.*International SAMANM Journal of Accounting and Finance, 1*(1), 32- 43. Retrieved from http://www.samanmjournals.org/wp-content/uploads/The-Stock-Market-and-Macroeconomic-Factors-in-Japan-and-Policy-Implications1.pdf

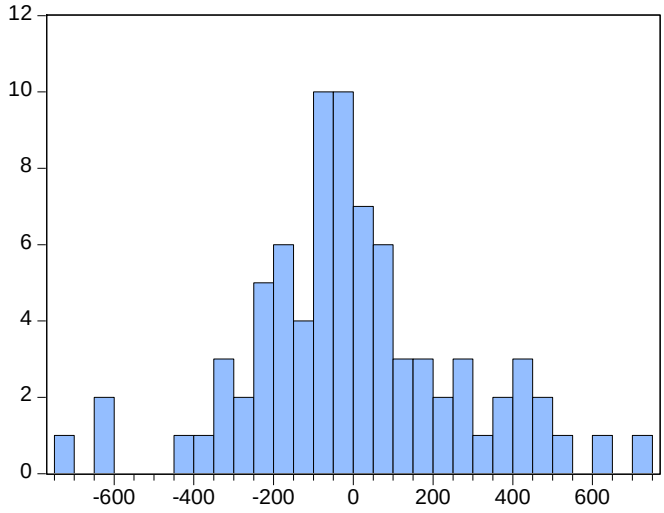
Yusof, R. M., Majid, M. S. A., & Razali, A.N. (2006). Macroeconomic variables and stock returns in the post 1997 financial crisis: An application of the ARDL model. *6th global conference on business & economics held in USA, 15-17 October 2006* (pp.1-10). Gutman Conference Center. Retrieved from http://www.gcbe.us/6th_GCBE/data/Macroeconomic%20Variables%20&%20Stock%20Returns.pdf

Zhang, W. (2013).Analysis of the Influences of Inflation, Measured by Percentage Change in CPI, and Other Economic Variables on Stock Performance. *The Park Place Economist, 21*. Retrieved from http://digitalcommons.iwu.edu/parkplace/vol21/iss1/20

APPENDIX

Appendix 1.1: Straits Time Index from year 1987 to year 2012

Appendix 4.1: Jarque-Bera Normality Test



Series: Residuals
Sample 1993Q1 2012Q4
Observations 80

Mean	4.15e-13
Median	-25.71049
Maximum	717.1155
Minimum	-721.8978
Std. Dev.	265.3990
Skewness	0.140912
Kurtosis	3.630731
Jarque-Bera	1.590822
Probability	0.451396

Appendix 4.2: Ramsey RESET Test

F-statistic	1.057556	Prob. F(1,73)	0.3072
Log likelihood ratio	1.150650	Prob. Chi-Square(1)	0.2834

Test Equation:
Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	34.16534	75.69751	0.451340	0.6531
ER	-729.6245	1230.704	-0.592851	0.5551
MS	0.001346	0.004923	0.273481	0.7853
GDP	0.016916	0.028953	0.584263	0.5608
CPI	-35.52470	81.84228	-0.434063	0.6655
C	4681.519	7750.495	0.604028	0.5477
FITTED^2	0.000140	0.000136	1.028375	0.3072

R-squared	0.830217	Mean dependent var	2153.337
Adjusted R-squared	0.816262	S.D. dependent var	639.4830
S.E. of regression	274.1120	Akaike info criterion	14.14838
Sum squared resid	5485031.	Schwarz criterion	14.35681
Log likelihood	-558.9354	Hannan-Quinn criter.	14.23195
F-statistic	59.49347	Durbin-Watson stat	0.736110
Prob(F-statistic)	0.000000		

Appendix 4.3: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test (lag length 1):

F-statistic	51.23449	Prob. F(1,73)	0.0000
Obs*R-squared	32.99212	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-19.91016	36.14479	-0.550844	0.5834
ER	-55.00373	188.5045	-0.291790	0.7713
MS	0.002696	0.001967	1.370800	0.1746
GDP	-0.009222	0.010036	-0.918885	0.3612
CPI	-19.97707	15.48122	-1.290407	0.2010
C	1794.598	1381.298	1.299211	0.1980
RESID(-1)	0.680107	0.095016	7.157827	0.0000

R-squared	0.412401	Mean dependent var	8.70E-13
Adjusted R-squared	0.364106	S.D. dependent var	265.3990
S.E. of regression	211.6371	Akaike info criterion	13.63106
Sum squared resid	3269688.	Schwarz criterion	13.83948
Log likelihood	-538.2422	Hannan-Quinn criter.	13.71462
F-statistic	8.539081	Durbin-Watson stat	1.805634
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test (lag length 2):

F-statistic	26.15524	Prob. F(2,72)	0.0000
Obs*R-squared	33.66441	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-15.48168	36.39258	-0.425408	0.6718
ER	-43.53610	188.7806	-0.230617	0.8183
MS	0.002349	0.001996	1.176877	0.2431
GDP	-0.008464	0.010060	-0.841394	0.4029
CPI	-16.64835	15.81545	-1.052663	0.2960
C	1505.460	1409.555	1.068039	0.2891
RESID(-1)	0.747558	0.115662	6.463314	0.0000
RESID(-2)	-0.124743	0.122048	-1.022084	0.3102

R-squared	0.420805	Mean dependent var	8.70E-13
Adjusted R-squared	0.364494	S.D. dependent var	265.3990
S.E. of regression	211.5724	Akaike info criterion	13.64165
Sum squared resid	3222926.	Schwarz criterion	13.87985
Log likelihood	-537.6660	Hannan-Quinn criter.	13.73715
F-statistic	7.472926	Durbin-Watson stat	1.977068
Prob(F-statistic)	0.000001		

Breusch-Godfrey Serial Correlation LM Test (lag length 3):

F-statistic	17.41146	Prob. F(3,71)	0.0000
Obs*R-squared	33.90896	Prob. Chi-Square(3)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-12.14587	36.95299	-0.328684	0.7434
ER	-27.62895	191.3661	-0.144377	0.8856
MS	0.002207	0.002018	1.093678	0.2778
GDP	-0.008513	0.010104	-0.842571	0.4023
CPI	-14.52702	16.25601	-0.893640	0.3745
C	1315.284	1449.206	0.907589	0.3672
RESID(-1)	0.734622	0.118062	6.222357	0.0000
RESID(-2)	-0.076885	0.145277	-0.529232	0.5983

RESID(-3)	-0.076439	0.124539	-0.613777	0.5413

R-squared	0.423862	Mean dependent var	8.70E-13
Adjusted R-squared	0.358945	S.D. dependent var	265.3990
S.E. of regression	212.4941	Akaike info criterion	13.66136
Sum squared resid	3205916.	Schwarz criterion	13.92934
Log likelihood	-537.4544	Hannan-Quinn criter.	13.76880
F-statistic	6.529297	Durbin-Watson stat	1.975965
Prob(F-statistic)	0.000002		

Breusch-Godfrey Serial Correlation LM Test (lag length 4):

F-statistic	13.17227	Prob. F(4,70)	0.0000
Obs*R-squared	34.35616	Prob. Chi-Square(4)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-10.03055	37.12300	-0.270198	0.7878
ER	-4.341478	193.8414	-0.022397	0.9822
MS	0.002018	0.002035	0.991700	0.3248
GDP	-0.008509	0.010126	-0.840236	0.4036
CPI	-11.97348	16.58131	-0.722107	0.4726
C	1083.079	1479.241	0.732186	0.4665
RESID(-1)	0.721929	0.119312	6.050744	0.0000
RESID(-2)	-0.087717	0.146186	-0.600038	0.5504
RESID(-3)	-0.013228	0.146305	-0.090414	0.9282
RESID(-4)	-0.103063	0.124451	-0.828146	0.4104

R-squared	0.429452	Mean dependent var	8.70E-13
Adjusted R-squared	0.356096	S.D. dependent var	265.3990
S.E. of regression	212.9658	Akaike info criterion	13.67661
Sum squared resid	3174811.	Schwarz criterion	13.97436
Log likelihood	-537.0644	Hannan-Quinn criter.	13.79599
F-statistic	5.854340	Durbin-Watson stat	1.979935
Prob(F-statistic)	0.000005		

Breusch-Godfrey Serial Correlation LM Test (lag length 5):

F-statistic	10.57259	Prob. F(5,69)	0.0000
Obs*R-squared	34.70322	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-7.921729	37.36136	-0.212030	0.8327
ER	22.80673	198.0487	0.115157	0.9087
MS	0.002028	0.002042	0.993053	0.3242
GDP	-0.009461	0.010245	-0.923502	0.3590
CPI	-10.25100	16.80523	-0.609988	0.5439
C	923.7441	1500.336	0.615692	0.5401
RESID(-1)	0.711962	0.120498	5.908474	0.0000
RESID(-2)	-0.089837	0.146709	-0.612344	0.5423
RESID(-3)	-0.024989	0.147688	-0.169199	0.8661
RESID(-4)	-0.045862	0.147587	-0.310742	0.7569
RESID(-5)	-0.092520	0.127244	-0.727102	0.4696

R-squared	0.433790	Mean dependent var	8.70E-13
Adjusted R-squared	0.351731	S.D. dependent var	265.3990
S.E. of regression	213.6864	Akaike info criterion	13.69398
Sum squared resid	3150670.	Schwarz criterion	14.02150
Log likelihood	-536.7590	Hannan-Quinn criter.	13.82529
F-statistic	5.286297	Durbin-Watson stat	1.969542
Prob(F-statistic)	0.000010		

Appendix 4.4: Newey-West Test

Dependent Variable: STI

Method: Least Squares

Sample: 1993Q1 2012Q4

Included observations: 80

Newey-West HAC Standard Errors & Covariance (lag truncation=3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	95.45061	71.05475	1.343339	0.1833
ER	-1970.138	254.5172	-7.740685	0.0000
MS	0.005708	0.003493	1.634302	0.1064
GDP	0.043577	0.021092	2.066070	0.0423
CPI	-117.2088	28.60379	-4.097669	0.0001
C	12443.87	2348.361	5.298961	0.0000

R-squared	0.827757	Mean dependent var	2153.337
Adjusted R-squared	0.816119	S.D. dependent var	639.4830
S.E. of regression	274.2186	Akaike info criterion	14.13777
Sum squared resid	5564493.	Schwarz criterion	14.31642
Log likelihood	-559.5107	Hannan-Quinn criter.	14.20939
F-statistic	71.12533	Durbin-Watson stat	0.733886
Prob(F-statistic)	0.000000		

Appendix 4.5: Second LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	51.23449	Prob. F(1,73)	0.0000
Obs*R-squared	32.99212	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-19.91016	36.14479	-0.550844	0.5834
ER	-55.00373	188.5045	-0.291790	0.7713
MS	0.002696	0.001967	1.370800	0.1746
GDP	-0.009222	0.010036	-0.918885	0.3612
CPI	-19.97707	15.48122	-1.290407	0.2010
C	1794.598	1381.298	1.299211	0.1980
RESID(-1)	0.680107	0.095016	7.157827	0.0000

R-squared	0.412401	Mean dependent var	8.70E-13
Adjusted R-squared	0.364106	S.D. dependent var	265.3990
S.E. of regression	211.6371	Akaike info criterion	13.63106
Sum squared resid	3269688.	Schwarz criterion	13.83948
Log likelihood	-538.2422	Hannan-Quinn criter.	13.71462
F-statistic	8.539081	Durbin-Watson stat	1.805634
Prob(F-statistic)	0.000000		

Appendix 4.6: Multicollinearity (VIF)

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-89.63320	81.47636	-1.100113	0.2747
C	2272.694	129.8828	17.49804	0.0000

R-squared	0.015279	Mean dependent var	2153.337
Adjusted R-squared	0.002654	S.D. dependent var	639.4830
S.E. of regression	638.6337	Akaike info criterion	15.78122
Sum squared resid	31812539	Schwarz criterion	15.84077
Log likelihood	-629.2489	Hannan-Quinn criter.	15.80510
F-statistic	1.210248	Durbin-Watson stat	0.150243
Prob(F-statistic)	0.274667		

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	-2409.093	325.5528	-7.400005	0.0000
C	5891.649	508.1787	11.59366	0.0000

R-squared	0.412474	Mean dependent var	2153.337
Adjusted R-squared	0.404942	S.D. dependent var	639.4830
S.E. of regression	493.2974	Akaike info criterion	15.26478
Sum squared resid	18980699	Schwarz criterion	15.32433
Log likelihood	-608.5913	Hannan-Quinn criter.	15.28866
F-statistic	54.76008	Durbin-Watson stat	0.229755
Prob(F-statistic)	0.000000		

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	0.004170	0.000423	9.861051	0.0000
C	1230.534	105.1748	11.69990	0.0000

R-squared	0.554897	Mean dependent var	2153.337
Adjusted R-squared	0.549191	S.D. dependent var	639.4830
S.E. of regression	429.3639	Akaike info criterion	14.98717
Sum squared resid	14379562	Schwarz criterion	15.04672
Log likelihood	-597.4868	Hannan-Quinn criter.	15.01104
F-statistic	97.24032	Durbin-Watson stat	0.330780
Prob(F-statistic)	0.000000		

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.032821	0.002881	11.39097	0.0000
C	565.5780	146.1939	3.868684	0.0002

R-squared	0.624556	Mean dependent var	2153.337
Adjusted R-squared	0.619743	S.D. dependent var	639.4830
S.E. of regression	394.3372	Akaike info criterion	14.81697
Sum squared resid	12129142	Schwarz criterion	14.87652
Log likelihood	-590.6789	Hannan-Quinn criter.	14.84085
F-statistic	129.7541	Durbin-Watson stat	0.382578
Prob(F-statistic)	0.000000		

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	50.56540	6.118441	8.264426	0.0000
C	-2476.515	562.6726	-4.401342	0.0000

R-squared	0.466852	Mean dependent var	2153.337
Adjusted R-squared	0.460016	S.D. dependent var	639.4830
S.E. of regression	469.9150	Akaike info criterion	15.16766
Sum squared resid	17223967	Schwarz criterion	15.22721
Log likelihood	-604.7065	Hannan-Quinn criter.	15.19154
F-statistic	68.30074	Durbin-Watson stat	0.307564
Prob(F-statistic)	0.000000		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	-0.000170	0.000155	-1.100113	0.2747
C	1.698684	0.347882	4.882934	0.0000

R-squared	0.015279	Mean dependent var	1.331625
Adjusted R-squared	0.002654	S.D. dependent var	0.881874
S.E. of regression	0.880703	Akaike info criterion	2.608490
Sum squared resid	60.49977	Schwarz criterion	2.668041
Log likelihood	-102.3396	Hannan-Quinn criter.	2.632366
F-statistic	1.210248	Durbin-Watson stat	0.441976
Prob(F-statistic)	0.274667		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	1.827771	0.547933	3.335754	0.0013
C	-1.504620	0.855308	-1.759155	0.0825

R-squared	0.124847	Mean dependent var	1.331625
Adjusted R-squared	0.113627	S.D. dependent var	0.881874
S.E. of regression	0.830262	Akaike info criterion	2.490531
Sum squared resid	53.76809	Schwarz criterion	2.550081
Log likelihood	-97.62122	Hannan-Quinn criter.	2.514406
F-statistic	11.12725	Durbin-Watson stat	0.510544
Prob(F-statistic)	0.001305		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	-3.38E-06	7.86E-07	-4.308330	0.0000
C	2.080634	0.195391	10.64858	0.0000

R-squared	0.192226	Mean dependent var	1.331625
Adjusted R-squared	0.181870	S.D. dependent var	0.881874
S.E. of regression	0.797660	Akaike info criterion	2.410414
Sum squared resid	49.62839	Schwarz criterion	2.469964
Log likelihood	-94.41654	Hannan-Quinn criter.	2.434289
F-statistic	18.56171	Durbin-Watson stat	0.537162
Prob(F-statistic)	0.000047		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-1.93E-05	6.10E-06	-3.163903	0.0022
C	2.266025	0.309753	7.315595	0.0000

R-squared	0.113740	Mean dependent var	1.331625
Adjusted R-squared	0.102378	S.D. dependent var	0.881874
S.E. of regression	0.835514	Akaike info criterion	2.503142
Sum squared resid	54.45048	Schwarz criterion	2.562693
Log likelihood	-98.12568	Hannan-Quinn criter.	2.527018
F-statistic	10.01028	Durbin-Watson stat	0.506806
Prob(F-statistic)	0.002220		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-0.047124	0.010250	-4.597496	0.0000
C	5.646407	0.942625	5.990088	0.0000

R-squared	0.213210	Mean dependent var	1.331625
Adjusted R-squared	0.203123	S.D. dependent var	0.881874
S.E. of regression	0.787231	Akaike info criterion	2.384093
Sum squared resid	48.33920	Schwarz criterion	2.443644
Log likelihood	-93.36373	Hannan-Quinn criter.	2.407969
F-statistic	21.13697	Durbin-Watson stat	0.569322
Prob(F-statistic)	0.000016		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	-0.000171	2.31E-05	-7.400005	0.0000
C	1.920436	0.051946	36.96954	0.0000

R-squared	0.412474	Mean dependent var	1.551751
Adjusted R-squared	0.404942	S.D. dependent var	0.170480
S.E. of regression	0.131508	Akaike info criterion	-1.194810
Sum squared resid	1.348968	Schwarz criterion	-1.135259
Log likelihood	49.79238	Hannan-Quinn criter.	-1.170934
F-statistic	54.76008	Durbin-Watson stat	0.143937
Prob(F-statistic)	0.000000		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	0.068306	0.020477	3.335754	0.0013
C	1.460794	0.032642	44.75146	0.0000

R-squared	0.124847	Mean dependent var	1.551751
Adjusted R-squared	0.113627	S.D. dependent var	0.170480
S.E. of regression	0.160503	Akaike info criterion	-0.796331
Sum squared resid	2.009364	Schwarz criterion	-0.736780
Log likelihood	33.85325	Hannan-Quinn criter.	-0.772456
F-statistic	11.12725	Durbin-Watson stat	0.132994
Prob(F-statistic)	0.001305		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	-8.60E-07	1.38E-07	-6.232027	0.0000
C	1.742159	0.034338	50.73489	0.0000

R-squared	0.332410	Mean dependent var	1.551751
Adjusted R-squared	0.323851	S.D. dependent var	0.170480
S.E. of regression	0.140183	Akaike info criterion	-1.067056
Sum squared resid	1.532796	Schwarz criterion	-1.007505
Log likelihood	44.68223	Hannan-Quinn criter.	-1.043180
F-statistic	38.83816	Durbin-Watson stat	0.099315
Prob(F-statistic)	0.000000		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-6.10E-06	1.05E-06	-5.833850	0.0000
C	1.846957	0.053073	34.80026	0.0000

R-squared	0.303782	Mean dependent var	1.551751
Adjusted R-squared	0.294856	S.D. dependent var	0.170480
S.E. of regression	0.143157	Akaike info criterion	-1.025067
Sum squared resid	1.598528	Schwarz criterion	-0.965516
Log likelihood	43.00267	Hannan-Quinn criter.	-1.001191
F-statistic	34.03380	Durbin-Watson stat	0.094976
Prob(F-statistic)	0.000000		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-0.012491	0.001729	-7.223757	0.0000
C	2.695443	0.159018	16.95051	0.0000

R-squared	0.400842	Mean dependent var	1.551751
Adjusted R-squared	0.393160	S.D. dependent var	0.170480
S.E. of regression	0.132804	Akaike info criterion	-1.175205
Sum squared resid	1.375676	Schwarz criterion	-1.115654
Log likelihood	49.00818	Hannan-Quinn criter.	-1.151329
F-statistic	52.18267	Durbin-Watson stat	0.112189
Prob(F-statistic)	0.000000		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	133.0810	13.49562	9.861051	0.0000
C	-65252.36	30299.66	-2.153568	0.0344

R-squared	0.554897	Mean dependent var	221315.9
Adjusted R-squared	0.549191	S.D. dependent var	114245.5
S.E. of regression	76707.09	Akaike info criterion	25.35806
Sum squared resid	4.59E+11	Schwarz criterion	25.41761
Log likelihood	-1012.322	Hannan-Quinn criter.	25.38193
F-statistic	97.24032	Durbin-Watson stat	0.181283
Prob(F-statistic)	0.000000		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-56798.75	13183.47	-4.308330	0.0000
C	296950.5	21015.99	14.12974	0.0000

R-squared	0.192226	Mean dependent var	221315.9
Adjusted R-squared	0.181870	S.D. dependent var	114245.5
S.E. of regression	103335.6	Akaike info criterion	25.95403
Sum squared resid	8.33E+11	Schwarz criterion	26.01358
Log likelihood	-1036.161	Hannan-Quinn criter.	25.97791
F-statistic	18.56171	Durbin-Watson stat	0.095933
Prob(F-statistic)	0.000047		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	-386368.9	61997.32	-6.232027	0.0000
C	820864.4	96776.04	8.482103	0.0000

R-squared	0.332410	Mean dependent var	221315.9
Adjusted R-squared	0.323851	S.D. dependent var	114245.5
S.E. of regression	93942.08	Akaike info criterion	25.76343
Sum squared resid	6.88E+11	Schwarz criterion	25.82298
Log likelihood	-1028.537	Hannan-Quinn criter.	25.78730
F-statistic	38.83816	Durbin-Watson stat	0.035636
Prob(F-statistic)	0.000000		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	7.284318	0.159621	45.63500	0.0000
C	-131074.7	8099.003	-16.18405	0.0000

R-squared	0.963898	Mean dependent var	221315.9
Adjusted R-squared	0.963435	S.D. dependent var	114245.5
S.E. of regression	21845.91	Akaike info criterion	22.84610
Sum squared resid	3.72E+10	Schwarz criterion	22.90565
Log likelihood	-911.8439	Hannan-Quinn criter.	22.86997
F-statistic	2082.553	Durbin-Watson stat	0.221814
Prob(F-statistic)	0.000000		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	12940.09	307.1115	42.13482	0.0000
C	-963499.8	28243.02	-34.11462	0.0000

R-squared	0.957914	Mean dependent var	221315.9
Adjusted R-squared	0.957374	S.D. dependent var	114245.5
S.E. of regression	23587.10	Akaike info criterion	22.99947
Sum squared resid	4.34E+10	Schwarz criterion	23.05902
Log likelihood	-917.9788	Hannan-Quinn criter.	23.02335
F-statistic	1775.343	Durbin-Watson stat	0.174660
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	19.02928	1.670559	11.39097	0.0000
C	7400.155	3750.651	1.973032	0.0520

R-squared	0.624556	Mean dependent var	48376.60
Adjusted R-squared	0.619743	S.D. dependent var	15398.05
S.E. of regression	9495.207	Akaike info criterion	21.17964
Sum squared resid	7.03E+09	Schwarz criterion	21.23919
Log likelihood	-845.1858	Hannan-Quinn criter.	21.20352
F-statistic	129.7541	Durbin-Watson stat	0.236765
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-5888.645	1861.197	-3.163903	0.0022
C	56218.07	2966.964	18.94802	0.0000

R-squared	0.113740	Mean dependent var	48376.60
Adjusted R-squared	0.102378	S.D. dependent var	15398.05
S.E. of regression	14588.56	Akaike info criterion	22.03855
Sum squared resid	1.66E+10	Schwarz criterion	22.09810
Log likelihood	-879.5418	Hannan-Quinn criter.	22.06242
F-statistic	10.01028	Durbin-Watson stat	0.069260
Prob(F-statistic)	0.002220		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	-49782.03	8533.307	-5.833850	0.0000
C	125625.9	13320.25	9.431200	0.0000

R-squared	0.303782	Mean dependent var	48376.60
Adjusted R-squared	0.294856	S.D. dependent var	15398.05
S.E. of regression	12930.18	Akaike info criterion	21.79720
Sum squared resid	1.30E+10	Schwarz criterion	21.85675
Log likelihood	-869.8879	Hannan-Quinn criter.	21.82107
F-statistic	34.03380	Durbin-Watson stat	0.034980
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	0.132325	0.002900	45.63500	0.0000
C	19090.96	721.2451	26.46944	0.0000

R-squared	0.963898	Mean dependent var	48376.60
Adjusted R-squared	0.963435	S.D. dependent var	15398.05
S.E. of regression	2944.400	Akaike info criterion	18.83788
Sum squared resid	6.76E+08	Schwarz criterion	18.89743
Log likelihood	-751.5152	Hannan-Quinn criter.	18.86176
F-statistic	2082.553	Durbin-Watson stat	0.225497
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	1693.607	62.74885	26.99024	0.0000
C	-106692.8	5770.597	-18.48904	0.0000

R-squared	0.903283	Mean dependent var	48376.60
Adjusted R-squared	0.902043	S.D. dependent var	15398.05
S.E. of regression	4819.303	Akaike info criterion	19.82333
Sum squared resid	1.81E+09	Schwarz criterion	19.88288
Log likelihood	-790.9331	Hannan-Quinn criter.	19.84720
F-statistic	728.4732	Durbin-Watson stat	0.102254
Prob(F-statistic)	0.000000		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	0.009233	0.001117	8.264426	0.0000
C	71.68068	2.508173	28.57884	0.0000

R-squared	0.466852	Mean dependent var	91.56164
Adjusted R-squared	0.460016	S.D. dependent var	8.641019
S.E. of regression	6.349730	Akaike info criterion	6.559384
Sum squared resid	3144.887	Schwarz criterion	6.618934
Log likelihood	-260.3754	Hannan-Quinn criter.	6.583259
F-statistic	68.30074	Durbin-Watson stat	0.161903
Prob(F-statistic)	0.000000		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-4.524408	0.984103	-4.597496	0.0000
C	97.58645	1.568774	62.20555	0.0000

R-squared	0.213210	Mean dependent var	91.56164
Adjusted R-squared	0.203123	S.D. dependent var	8.641019
S.E. of regression	7.713664	Akaike info criterion	6.948546
Sum squared resid	4641.047	Schwarz criterion	7.008096
Log likelihood	-275.9418	Hannan-Quinn criter.	6.972421
F-statistic	21.13697	Durbin-Watson stat	0.131928
Prob(F-statistic)	0.000016		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	-32.09060	4.442369	-7.223757	0.0000
C	141.3583	6.934412	20.38504	0.0000

R-squared	0.400842	Mean dependent var	91.56164
Adjusted R-squared	0.393160	S.D. dependent var	8.641019
S.E. of regression	6.731346	Akaike info criterion	6.676110
Sum squared resid	3534.260	Schwarz criterion	6.735660
Log likelihood	-265.0444	Hannan-Quinn criter.	6.699985
F-statistic	52.18267	Durbin-Watson stat	0.052345
Prob(F-statistic)	0.000000		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	7.40E-05	1.76E-06	42.13482	0.0000
C	75.17832	0.437005	172.0307	0.0000

R-squared	0.957914	Mean dependent var	91.56164
Adjusted R-squared	0.957374	S.D. dependent var	8.641019
S.E. of regression	1.784024	Akaike info criterion	4.020302
Sum squared resid	248.2537	Schwarz criterion	4.079852
Log likelihood	-158.8121	Hannan-Quinn criter.	4.044177
F-statistic	1775.343	Durbin-Watson stat	0.178495
Prob(F-statistic)	0.000000		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.000533	1.98E-05	26.99024	0.0000
C	65.76005	1.002640	65.58689	0.0000

R-squared	0.903283	Mean dependent var	91.56164
Adjusted R-squared	0.902043	S.D. dependent var	8.641019
S.E. of regression	2.704479	Akaike info criterion	4.852378
Sum squared resid	570.5080	Schwarz criterion	4.911928
Log likelihood	-192.0951	Hannan-Quinn criter.	4.876253
F-statistic	728.4732	Durbin-Watson stat	0.102405
Prob(F-statistic)	0.000000		

Dependent Variable: STI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	95.45061	46.69400	2.044173	0.0445
ER	-1970.138	244.0427	-8.072922	0.0000
MS	0.005708	0.002501	2.281841	0.0254
GDP	0.043577	0.012896	3.379215	0.0012
CPI	-117.2088	19.73039	-5.940522	0.0000
C	12443.87	1760.022	7.070293	0.0000

R-squared	0.827757	Mean dependent var	2153.337
Adjusted R-squared	0.816119	S.D. dependent var	639.4830
S.E. of regression	274.2186	Akaike info criterion	14.13777
Sum squared resid	5564493.	Schwarz criterion	14.31642
Log likelihood	-559.5107	Hannan-Quinn criter.	14.20939
F-statistic	71.12533	Durbin-Watson stat	0.733886
Prob(F-statistic)	0.000000		

Dependent Variable: IR
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	0.000560	0.000274	2.044173	0.0445
ER	1.570519	0.789800	1.988502	0.0505
MS	-2.44E-05	5.59E-06	-4.359443	0.0000
GDP	0.000114	3.08E-05	3.684226	0.0004
CPI	0.067118	0.057551	1.166239	0.2473
C	-8.560020	5.427627	-1.577120	0.1190

R-squared	0.468657	Mean dependent var	1.331625
Adjusted R-squared	0.432756	S.D. dependent var	0.881874
S.E. of regression	0.664189	Akaike info criterion	2.091539
Sum squared resid	32.64490	Schwarz criterion	2.270191
Log likelihood	-77.66156	Hannan-Quinn criter.	2.163166
F-statistic	13.05396	Durbin-Watson stat	0.834470
Prob(F-statistic)	0.000000		

Dependent Variable: ER
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	-0.000238	2.94E-05	-8.072922	0.0000
IR	0.032298	0.016242	1.988502	0.0505
MS	2.44E-06	8.53E-07	2.863856	0.0054
GDP	8.56E-06	4.71E-06	1.818094	0.0731
CPI	-0.045055	0.006476	-6.957654	0.0000
C	5.191160	0.511882	10.14132	0.0000

R-squared	0.707607	Mean dependent var	1.551751
Adjusted R-squared	0.687850	S.D. dependent var	0.170480
S.E. of regression	0.095248	Akaike info criterion	-1.792630
Sum squared resid	0.671339	Schwarz criterion	-1.613978
Log likelihood	77.70522	Hannan-Quinn criter.	-1.721004
F-statistic	35.81676	Durbin-Watson stat	0.439048
Prob(F-statistic)	0.000000		

Dependent Variable: MS
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	11.51667	5.047093	2.281841	0.0254
IR	-8383.130	1922.982	-4.359443	0.0000
ER	40848.41	14263.43	2.863856	0.0054
GDP	3.528404	0.468038	7.538706	0.0000
CPI	6497.202	767.8301	8.461770	0.0000
C	-621293.4	72496.83	-8.569939	0.0000

R-squared	0.989112	Mean dependent var	221315.9
Adjusted R-squared	0.988376	S.D. dependent var	114245.5
S.E. of regression	12317.41	Akaike info criterion	21.74745
Sum squared resid	1.12E+10	Schwarz criterion	21.92611
Log likelihood	-863.8982	Hannan-Quinn criter.	21.81908
F-statistic	1344.440	Durbin-Watson stat	0.478503
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	3.067767	0.907834	3.379215	0.0012
IR	1363.795	370.1713	3.684226	0.0004
ER	4995.019	2747.392	1.818094	0.0731
MS	0.123112	0.016331	7.538706	0.0000
CPI	72.06135	201.0097	0.358497	0.7210
C	-1641.158	19114.21	-0.085861	0.9318

R-squared	0.979086	Mean dependent var	48376.60
Adjusted R-squared	0.977673	S.D. dependent var	15398.05
S.E. of regression	2300.811	Akaike info criterion	18.39195
Sum squared resid	3.92E+08	Schwarz criterion	18.57060
Log likelihood	-729.6780	Hannan-Quinn criter.	18.46358
F-statistic	692.8632	Durbin-Watson stat	0.392044
Prob(F-statistic)	0.000000		

Dependent Variable: CPI
Method: Least Squares
Sample: 1993Q1 2012Q4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STI	-0.002755	0.000464	-5.940522	0.0000
IR	0.268903	0.230573	1.166239	0.2473
ER	-8.777533	1.261565	-6.957654	0.0000
MS	7.57E-05	8.94E-06	8.461770	0.0000
GDP	2.41E-05	6.71E-05	0.358497	0.7210
C	92.84140	2.348068	39.53948	0.0000

R-squared	0.977827	Mean dependent var	91.56164
Adjusted R-squared	0.976329	S.D. dependent var	8.641019
S.E. of regression	1.329448	Akaike info criterion	3.479443
Sum squared resid	130.7900	Schwarz criterion	3.658095
Log likelihood	-133.1777	Hannan-Quinn criter.	3.551070
F-statistic	652.6893	Durbin-Watson stat	0.395090
Prob(F-statistic)	0.000000		

Appendix 4.7: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH (lag length 1):

F-statistic	12.86081	Prob. F(1,77)	0.0006
Obs*R-squared	11.30642	Prob. Chi-Square(1)	0.0008

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1993Q2 2012Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43963.63	13978.07	3.145185	0.0024
RESID^2(-1)	0.384427	0.107196	3.586198	0.0006

R-squared	0.143119	Mean dependent var	69829.82
Adjusted R-squared	0.131991	S.D. dependent var	114227.5
S.E. of regression	106422.3	Akaike info criterion	26.01321
Sum squared resid	8.72E+11	Schwarz criterion	26.07319
Log likelihood	-1025.522	Hannan-Quinn criter.	26.03724
F-statistic	12.86081	Durbin-Watson stat	1.889012
Prob(F-statistic)	0.000587		

Heteroskedasticity Test: ARCH(lag length 2)

F-statistic	6.856245	Prob. F(2,75)	0.0018
Obs*R-squared	12.05664	Prob. Chi-Square(2)	0.0024

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1993Q3 2012Q4
Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	49297.63	14934.93	3.300829	0.0015
RESID^2(-1)	0.427417	0.115975	3.685429	0.0004

RESID^2(-2)	-0.119000	0.116547	-1.021044	0.3105

R-squared	0.154572	Mean dependent var	70307.36
Adjusted R-squared	0.132028	S.D. dependent var	114887.4
S.E. of regression	107034.9	Akaike info criterion	26.03740
Sum squared resid	8.59E+11	Schwarz criterion	26.12804
Log likelihood	-1012.459	Hannan-Quinn criter.	26.07369
F-statistic	6.856245	Durbin-Watson stat	1.976180
Prob(F-statistic)	0.001842		

Heteroskedasticity Test: ARCH (lag length 3)

F-statistic	4.424578	Prob. F(3,73)	0.0065
Obs*R-squared	11.84691	Prob. Chi-Square(3)	0.0079

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1993Q4 2012Q4
Included observations: 77 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	49566.45	16168.37	3.065643	0.0030
RESID^2(-1)	0.426965	0.118080	3.615888	0.0005
RESID^2(-2)	-0.124919	0.127661	-0.978521	0.3310
RESID^2(-3)	0.013489	0.118828	0.113521	0.9099

R-squared	0.153856	Mean dependent var	71213.13
Adjusted R-squared	0.119083	S.D. dependent var	115360.1
S.E. of regression	108273.8	Akaike info criterion	26.07326
Sum squared resid	8.56E+11	Schwarz criterion	26.19502
Log likelihood	-999.8206	Hannan-Quinn criter.	26.12196
F-statistic	4.424578	Durbin-Watson stat	1.902241
Prob(F-statistic)	0.006490		

Heteroskedasticity Test: ARCH (lag length 4)

F-statistic	3.666069	Prob. F(4,71)	0.0090
Obs*R-squared	13.00991	Prob. Chi-Square(4)	0.0112

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1994Q1 2012Q4
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43512.85	16951.49	2.566904	0.0124
RESID^2(-1)	0.440125	0.116747	3.769911	0.0003
RESID^2(-2)	-0.118727	0.126657	-0.937391	0.3517
RESID^2(-3)	-0.002480	0.126845	-0.019555	0.9845
RESID^2(-4)	0.045974	0.117306	0.391913	0.6963

R-squared	0.171183	Mean dependent var	68815.00
Adjusted R-squared	0.124489	S.D. dependent var	114178.2
S.E. of regression	106835.1	Akaike info criterion	26.05949
Sum squared resid	8.10E+11	Schwarz criterion	26.21282
Log likelihood	-985.2605	Hannan-Quinn criter.	26.12077
F-statistic	3.666069	Durbin-Watson stat	1.899706
Prob(F-statistic)	0.009018		

Heteroskedasticity Test: ARC H(lag length 5)

F-statistic	6.123011	Prob. F(5,69)	0.0001
Obs*R-squared	23.05002	Prob. Chi-Square(5)	0.0003

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1994Q2 2012Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	28730.59	16399.65	1.751903	0.0842
RESID^2(-1)	0.462623	0.111111	4.163607	0.0001

RESID^2(-2)	-0.146205	0.118416	-1.234671	0.2211
RESID^2(-3)	0.040971	0.117955	0.347341	0.7294
RESID^2(-4)	-0.106963	0.117353	-0.911468	0.3652
RESID^2(-5)	0.364905	0.108717	3.356481	0.0013

R-squared	0.307334	Mean dependent var	69724.99
Adjusted R-squared	0.257140	S.D. dependent var	114669.3
S.E. of regression	98832.70	Akaike info criterion	25.91686
Sum squared resid	6.74E+11	Schwarz criterion	26.10226
Log likelihood	-965.8824	Hannan-Quinn criter.	25.99089
F-statistic	6.123011	Durbin-Watson stat	1.875781
Prob(F-statistic)	0.000095		