THE DETERMINANTS OF STOCK MARKET: THE CASE IN UNITED STATES

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DECLARATION

We hereby declare that:

(1) This undergraduate 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 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 23,214 words.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
APR	Annual Percentage Rate
APT	Arbitrage Pricing Theory
ARCH	Autoregression Conditional Heteroscedasticity
BRICs	Brazil, Russia, India and China
CAPM	Capital Asset Pricing Model
CPI	Consumer Price Index
DJIA	Dow Jones Industrial Average
DUMMY	Financial Crisis
EG	Engle-Granger
EIA	Energy Information Administration
ELS	Exchange Rate- Led Stock Price
EMH	Efficient Market Hypothesis
EX	Exchange Rate
EVIEWS	Econometric Views
GDP	Gross Domestic Product
INFLA	Inflation Rate
INT	Interest Rate
JB	Jarque-Bera

KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LM	Lagrange Multiplier
MPT	Modern Portfolio Theory
NASD	National Association of Securities Dealers
NYSE	New York Stock Exchange
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OP	Crude Oil Price
PP	Phillips and Perron
PPP	Purchasing Power Parity
SIC	Schwarz Information Criterion
SLE	Stock Price- Led Exchange Rate
S&P	Standard and Poor
T-bill	Treasury-bill
U.S	United State
USD	United State Dollars
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
WTI	West Texas Intermediate

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ABSTRACT

This paper investigates the relationship between Standard and Poor's 500 (S&P 500) and determinants include crude oil price, exchange rate, inflation rate, interest rate and financial crisis from January 1993 to December 2012 with 240 sample size in United States. Besides, this paper adopts Ordinary Least Square (OLS) to determine the general relationship between those determinants and Standard and Poor's 500 stock market return. In addition, the short run and long run relationship are examined in this paper by using the Granger Causality Test and Johansen Juselius Cointegration Test respectively. Furthermore, in order to examine the long run relationship in more detail, Vector Error Correction Model (VECM) has been introduced in this paper. The result shows that all determinants have significant relationship with Standard & Poor's 500 but there is only financial crisis has short run influences on stock market (S&P 500). Additionally, there has a long run positive relationship between Standard and Poor's 500, oil price, interest rate and exchange rate but long run negative relationship between Standard and Poor's 500, inflation rate and financial crisis. Besides, according to Variance Decomposition and Impulse Response Function, the result shows that all variables have an impact on the stock market (S&P 500), where there is a negative shock on stock market (S&P 500) resulting from inflation rate, exchange rate, crude oil price and financial crisis, and positive shock from interest rate.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Stock market plays an important role as one of the main indicators in the economy. It reflects the performance of growth and major sources in a country. The stock prices hardly separated with the economic factors such as inflation rate, exchange rate, interest rate, oil prices and financial crisis. Hence, it will become a crucial matter to investors, economists, and policy maker to examine the determinants that affect the stock market return. Therefore, the further understanding on the real relationship between the stock market return and its determinants are useful to enhance the forecasting skill in the stock market. For the highly developed country, United States (U.S.), the performance of its stock market has major influence and sensitive to the global economy due to the U.S. stock market is a core of international market economies. As a result, it is essentially to conduct a research on the U.S. stock market and its determinants. Accordingly, this paper aims to study and investigate the monthly movement of Standard & Poor 500's (S&P 500) stock price index which is influenced by Interest Rate (INT), Exchange Rate (EX), Inflation Rate (INF) and Crude Oil Price (OP) in U.S. including the period of financial crisis from September 2008 until June 2009.

1.1 Research Background

1.1.1 Research Background of U.S.

In 1980, Ronald Reagan won the election and became the president in United States, since then it had championed globalization of trade and finance. The U.S. economy today with just five percent of the world's population, it is responsible for twenty percent of total economic output and its gross domestic product per person was around $4,000 in year 2007, compare to an international average of $11,000 (Behr, 2009). The World Economic Forum, whose annual conferences with a gathering of those top international governments and corporate leaders, has regularly ranked the United States as the world's most competitive economy.

The American economy nowadays has achieved highly flexible economic system that arguably offers more choices and chances than any other, and one that has displayed continuously its ability and capacity to repair mistakes and adapt to recessions, financial panics and wars, which helps it to gain strength from its trails claimed by Behr (2009). Furthermore, the nation of U.S. plays an important role in shaping this flexible economic system. This is because large majority of Americans subscribes to the idea of a dynamic economy that embraces competition, invites striving and invention, heaps rewards on winners, and gives second chances to those who fail from the author, Behr (2009), Secretary of State Condoleezza Rice (2008) said that the great things about representing the United States is it continues to surprise; it continues to renews itself; it continues to beat all odds and expectations. You just know that Americans are not going to be satisfied until they really do form that perfect union. And while the perfect union may never be in sight, we just keep working at it and trying."

1.1.2 Research Background of U.S. Stock Exchange

According to Beattie (2009), after the first stock exchange was formed in Amsterdam market during 16th century, United States started to set the stock market up. In 1970, the first stock exchange in U.S. was established on Market Street, which name is Philadelphia Stock Exchange. There were some other stock exchange were formed by the following, which were National Association of Securities Dealers (NASD) and New York Stock & Exchange Board. U.S. stock market has around 220 hundred years of history and it also had undergone several financial crises such as Black Thursday, October 24, 1929, and the World War II. It crashed the U.S. stock market and led to a Great Depression in the world and caused millions of people unemployment. That situation had caused high inflation rate and high unemployment rate in United States. Today, U.S. stock market is still one of the largest stock markets in the world. The average daily trading volume is around $48 billion. It makes New York Stock Exchange (NYSE) to become the largest place to trade the stocks in United States too.

1.1.2.1 New York Stock Exchange (NYSE)

New York Stock Exchange (NYSE), also known as the "Big Board", is one of the oldest stock markets in the world since it was established in the May 17, 1792. It is located at Wall Street, New York. Its original name was New York Stock & Exchange Board. At the beginning, it only had twenty-four stockbrokers signed the Buttonwood Agreement. Nowadays, it is the world's largest stock exchange by using market capitalization. According to the month report from World Federal of Exchange, NYSE has around $16,178.588 billion market capitalization in January, 2013. In 2012, NYSE has trading around $13,000 billion volumes in all stocks and net income is $462 million. NYSE has three major stock indexes which are Dow Jones Industrial Index (DJIA), Standard & Poor's 500 index (S&P 500) and NYSE composite index (Amadeo, K., 2013).

1.1.2.1.1 Dow Jones Industrial Average (DJIA)

Dow Jones Industrial Average (DJIA) is a price-weighted index that included 30 largest and most widely traded stocks on New York Exchange and NASDAQ. These 30 stocks have significant influences to affect the index's value which are from variety sectors including financials, oil and gas, materials, technology, telecommunication services, health care, consumer goods and utilities. It is the most quoted and widely recognized stock market index around the globe (Aragon & Dieckmann, 2003).

DJIA was found from year 1882 which was created by Charles Dow, Edward Jones, and Charles Bergstresser. The first averages were published in

Customer's Afternoon Letter which was its precursor and mainly in transportation companies for example two capitalized industrial and 12 capitalized railroad companies (Kosakowski, 2009). Then, in year 1896, May 26, it separated into two different averages that were transportation and industrial and it created the Dow Jones Industrial Average. Besides, kosakowski (2009) said that it was created as a tool for assessing the overall health of the industrial sector. Therefore a lot of industrial stocks were made up but now it focuses on the rising industries index in the American economy. Today, the averages were published in Wall Street Journal and as a benchmark to track the American stocks.

The 30 companies will be replaced by other according to their performance over the time. For example, in 1999, Microsoft, Intel and SBC communications and Home Depot were added into DJIA and caused other four companies dropped. Besides, the General Motor was removed from DJIA lists during the financial recession due to its poor performance of company.

Next, the current 30 stocks need to be added up together and divided by the Dow divisor when it comes to the calculation of the DJIA index. The divisor is to adjust for company changes, stock split or other activities that changed over the time. In addition, to translate the changes of individual stock price affect the DJIA index, the stock's price change need to divide by the current divisor. The actual value of DJIA will become meaningful when it compares with the previous index value because many people will misunderstood the meaning of one point changed in this index. They thought the one point changed is equal to one U.S. dollar (USD) changed in the value of average share (Gitman, Joehnk & Smart, 2011).

On the other hand, the criticism about the DJIA is it only represents a small stocks percentage in the entire stock market. This is because it only consists of 30 stocks out of the publicly traded companies in the United States (Gitman, Joehnk & Smart, 2011). This means that DJIA cannot fully reflect the performance of the stock market since its proportion in market capitalization is not large enough.

1.1.2.1.2 Standard and Poor's 500 (S&P 500) Index

According to Chen, Kountsantony, Truong and Veeraraghavan (2013) stated that the Standard and Poor's 500 includes 500 leading companies which capture approximately 75% coverage of available market capitalization. The S&P 500 is widely regarded as the best single gauge of large cap United States' equities and it is most broadly accepted barometer of the market. There is more than USD 5.58 trillion benchmarked to the index with including approximately USD 1.31 trillion of this totals.

Besides that, Chen, Kountsantony, Truong and Veeraraghavan (2013) have also claimed the S&P 500 Index was first published in 1957 and since then, the index has been maintained by the S&P 500 Index Committee which includes economist and index analysts whose job is to ensure the index is consistently represent the U.S. equity market. To be eligible and approved by the committee, the company must have a market capitalization of at least USD 4 billion and meet the criterions of liquidity (a minimum of 250,000 traded shares per day), public float (at least 50% of the stocks) and sector classification (positive reported earnings in 4 consecutive quarters).

Most importantly, the committee has stated that the decision to include a company in the S&P 500 Index is not an opinion of that company's investment potential. Then, any decision for inclusion and exclusion is solely based upon public information. Hence, Denis, McConnell, Ovtchinnikov and Yu (2003) claimed that the fascination with the effect of S&P Index inclusion on stock prices appears to stern from the possibility that inclusion in the index is an “information-free” event. Information free means that S&P 500 makes no claim that inclusion represents an endorsement of the newly included stock’s future prospects. There is a criterion for additions and deletions in S&P 500 with a guiding principle of S&P Indices index management is the minimization of turnover among index constituents. An index addition generally will be made only if an index vacancy is created by an index deletion. Additions to the S&P 500 must meet criterias. Deletions occur when there is a merger or acquisition or when there are substantial violations of addition criteria. When necessary, changes to the quantity of the S&P 500 are made on an as-needed basis and there is no annual or semi-annual reconstitution.

Gitman, Joehnk and Smart (2011) also stated that the indices are being calculated using a market capitalization-weighted methodology; with the index levels reflect the total market value of the entire component stock relative to a particular base period.

1.1.2.1.3 New York Stock Exchange Composite Index

New York Stock Exchange Composite Index is one of the indexes under New York Stock Exchange (NYSE). According to Gitman, Joehnk and Smart (2011), it includes about 2100 or so, stock listed on the “Big Board” and the behavior of this is normally similar to the Dow Jones Industrial Average (DJIA) and the Standard and Poor’s 500 (S&P 500). Harvey (2012) said that the NYSE Composite Index was established in 1966 and measured all the stocks’ performance which has listed on the NYSE. It is a free-float market capitalization index and calculated on the basis of price return and total return. On 31st December, 1965, the base value was only 50 and it had changed into a new methodology with a base value 5,000. The advantage of this index to investors is global diversification. It includes foreign companies and their headquarters which are not inside in United States. But at the view of most researchers, they do not use it as the research variables to determine of stock market in United States due to non-United States stocks included. Hence, the result will not be much significant for their research.

1.1.3 Research Background of Financial Crisis

Basically, economic activities will affect the stock market which is not only occurred or happened in United States. If a large stock market bubble is formed and busted, it will smash the whole stock market structure and lead to stock market downturn. It definitely affects the investors' behavior, financial situation and confident. The consequences of this are the financial crisis might occur and affect the country's economy.

The financial crisis that happened between middle of 2008 to June 2009 which was triggered by the subprime mortgage crisis had caused massive consequences to the financial sectors in United States (Xu & Hamori, 2012). The stock prices dropped 48 % in Standard and Poor's 500 which were from its local peak 1300.68 on 28th August, 2008 to low point in March 2009. This United States recession caused huge falls to the stock market indices and investors turn to safer investment like gold and oil.

1.1.4 Research Background of Determinants that affect United States Stock Market

There are economic factors that can affect the United Stated stock market. They are inflation rate, exchange rate, interest rate and crude oil price. Inflation is an increase in the price of the goods and services over a time period. Inflation rate in the United States is reported by the Bureau of Labor Statistics. Inflation causes an effect on every sector in the economy, either directly or indirectly. Then, exchange rate is rate measured between two currency which the value of one currency in term of another currency. Exchange rates can be determined in the foreign exchange market. In addition, oil is a non-renewable resources, therefore it is an important resource in determined the world economy.

Furthermore, there are studies have been conducted in United States about the relationship of its stock market index and determinants. However, many scholars only focus to investigate the major determinants separately which rarely combine them together and determine the causality effect with U.S. stock market return. In order to contribute to this literature of studies, this paper combines and extends the existing studies on several determinants and they are Interest rate (INT), Exchange Rate (EX), Inflation Rate (INFLA), and Crude Oil Price (OP) in United Sates including the period of financial crisis from September 2008 until June 2009.

1.2 Problem Statement

Movement in stock market has high volatility and uncertainty which can affect the stock market performance. Thus, this paper aims to understand the stock market determinants which can be used to manage the risk that is caused by the volatility in stock market due to there are also lack of studies about testing the relationship between selected determinants and stock market. According to Geetha, Mohidin, Chandran and Chong (2011), recent studies do not precise in investigate the potential significant relationship between macroeconomic variables and stock market in United States which is one of the world's five largest equity market (United States, Japan, United Kingdom, China and Canada), it has around USD 16 trillion exchanges in United States. Jorion and Goetzmann (1999) also reported that United States stock market equity had the highest return rate to the investor among other thirty nine global stock markets which had 4.3 percent annually and other countries only have medium of 0.8 percent for the investor. Besides, period of study is from 1993 until 2012 which include the period of financial crisis 2008-2009. Previous researchers had not much focus on the studies of U.S. stock market with the period of financial crisis had risen and with the combination of the determinants that may have impact on the U.S. stock market. Mollick and Assefa (2013), collected the data from year 1999 until 2011, have only identified that the U.S. stock price and oil price did not have much associated during the financial crisis. However, there are some determinants that are found is vital in estimating the relationship between U.S. stock market return. Hence, this paper proposes the Interest Rate (Koekeamaki, 2011), Exchange Rate (Johnson & Soenen, 2004), Inflation Rate (Omran & Pointon, 2011), and Crude Oil Price (Narayan, P. & Narayan, S. 2010) in United States including the period of financial crisis 2008-2009 (Al-Rjoub & Azzam, 2012).

1.3 Research Objectives

1.3.1 General Objectives

This research's objective is to examine the effect of major determinants which are Interest Rate (INT), Exchange Rate (EX), Inflation Rate (INFLA), and Crude Oil Price (OIL) in United States stock markets from year 1993 until 2012 which includes the period of finance crisis in order to formulate a suitable policy instrument. At that moment, the progressively of doing research will increase accuracy forecasting on the market prices; it will help to minimize the potential lost in the future stock market. Besides, this paper will also help to analyze the time-series relationship between stock return and economic factors. The prevention steps and solutions can be taken to overcome the problems arise from the financial crisis period as well.

1.3.2 Specific Objectives

This study has a tendency to concentrate on:

i. To investigate the significant relationship between stock market return and monthly interest rate in United States.
ii. To investigate the movement direction among the exchange rate and the stock returns in United States.
iii. To examine the effect of inflation rate on the United States stock market return.

iv. To found out that there are any connections between the crude oil price and the stock returns in United States accompanied by other independence variables.
v. To examine the effect of financial crisis (dummy variable) on the United States Stock Market.
vi. To examine the short run and long run relationship between the stock returns and its determinants.

1.4 Research Questions

i. Does using the monthly data can fully explain the model and result significantly?
ii. How if combine all the independent variables into model would make the result significantly to stock return?
iii. Are every determinants has the significant short run and long run effect towards stock return?
iv. Did the result can fully giving an aid in stock market to investors, policy makers and researchers?

1.5 Hypotheses of the Study

1.5.1 Interest Rate

H_0: There is no relationship between the stock return (S&P 500) and interest rate (INT).

H_1: There is a relationship between the stock return (S&P 500) and interest rate (INT).

In the United States, most financial managers view that market risk is the most important risk factors in stock market, and next of it is the interest rate risk (Graham & Harvey, 2001). According to Eita (2012), other scholars as Hooker (2004), Rahman, Sidek and Tafri (2009) and Maysami and Koh (2000) had reported that when the interest rate increase, it will have a substitution effect of increase the opportunity of preserving cash and cause equity investment volume reduce. Besides that, higher interest rate will also influence firms' cash flow and lead to the stock price and stock return affected (Bernanke & Kuttner, 2005). Based on all these information, this paper will reject H_0 and conclude that there has a relationship between the stock market and interest rate.

1.5.2 Exchange Rate

H_0: There is no relationship between the stock return (S&P 500) and exchange rate (EX).

H_1: There is a relationship between stock return(S&P 500) and exchange rate (EX).

Phylaktis and Ravazzolo (2005) indicated a depreciation in the local currency and fall in their real exchange rate will cause domestic assets become less demanded, decrease in their domestic economy activities; result in a local stock market burst. Therefore, decrease in exchange rate will lower the stock market return. Volatility in exchange rate is one of the variability that influences investors. A significant association between S&P 500 and USD generate an exchange risk compounding effect to international investors in U.S stock market (Johnson & Soenen, 2004). There is a significant impact of exchange rate on stock returns. When decline in the value of local currency, foreign investors tend to recall their funds, and this cause stock market returns to fall (Khan, Ahmad & Abbas, 2011). According to Garefalakis, Dimitras, Koemtzopoulos and Spinthiropoulos (2011), reduction in the worth of currency will decrease investors' confidence, stimulate arbitrage trade which will give rise to instability in the stock market. Although there are different result obtain by different researchers, but they all show a significant relationship between these variables. In conclusion, this paper rejects H_0, which means there is a relationship between exchange rate and stock market return.

1.5.3 Inflation Rate

H_0: There is no relationship between the stock return (S&P 500) and inflation rate (INFLA).

H_1: There is a relationship between the stock return (S&P 500) and inflation rate (INFLA).

According Dural and Bhaduri (2009), Fama theory (1981) proposed that inflation is negatively related with the stock return with two propositions that link the real stock return and inflation via real output (GDP). Stock return will be affected by the inflation rate directly through the impact of changes in inflation to real output in one country. This phenomena can be explained when inflation rate in a country increase it will lead to decreasing of real output, because the investment cost will be increased subsequently. Furthermore, the cash inflow such as foreign direct investment will be lower down and cause the real output reduced. On the other hand, the reduction in real output will cause the real stock return dropped due to there are insufficient funds liquid in the stock market. In conclusion, this paper rejects H_0 and has sufficient evidence to conclude that there is a relationship between stock return and inflation.

1.5.4 Crude Oil Price

H_0: There is no relationship between the stock return (S&P 500) and crude oil price (OP).

H_1: There is a relationship between the stock return (S&P 500) and crude oil price (OP).

Regarding the impacts of crude oil prices (an input of production process) to stock market, they influence the cost of production of goods and services, and lead to a fact that affects the profit margin. A rise in the oil price causes the cost of production increased, which will affect the stock return (Narayan, P. & Narayan, S. 2010) Besides, Kumar, Managi and Matsuda (2012) claimed that the stocks are related to business cycles and oil price is an important component of business cycle. Therefore, the return of stocks should be associated with the movement of crude oil price, this paper rejects H_0.

1.5.5 Financial Crisis 2008 -2009

H_0: There is no relationship between the stock return (S&P 500) and crude financial crisis 2008-2009.

H_1: There is a relationship between the stock return (S&P 500) and financial crisis 2008-2009.

Financial crisis from year 2008 until 2009 is a global disaster that had brought impacts to the international economies. In rationale, this will easily affect the stock return, negatively (Mollick & Assefa, 2012). Then, Wen, Wei and Huang (2012) stated that financial crisis will cause asset prices to drop and create speculative runs and capital flight leading the market to become instable. Investors will lose faith and confidence on the future of investment and lead the economic growth become dampen. Then, the weak international transmission of stock prices between the U.S. and other countries might reflect a change in investors' behavior too after the financial crisis in year 2008 until 2009 (Xu & Hamori, 2012).

1.6 Significance of the Study

The primary contribution of this paper is assessing the relationship of stock market return and exchange rate, interest rate, inflation rate, crude oil price, as well as the existence of financial crisis from 1993 until 2012 in United States by using monthly data.

There is not much of studies that investigate the stock market return and its volatility during financial crisis in the past, thus, this paper provides a clear picture to practitioners and policy makers that financial crisis will give an impact on stock market (Al-Rjoub & Azzam, 2012). Valcarcel (2012) stated that the policy makers have to be awaere of the determinants effect on the stock return by making the decision in stabilizing the volatility of economy activity.

A more in-depth understanding on the connection between stock return and exchange rate helps multinational enterprise to deal with their foreign exchange risk (Phylaktis & Ravazzolo, 2005). Besides, financial manager will be more cautious and wisely in order to make better investment and financial decision, mentioned by Chen, S. & Chen, T. (2012). Stock traders also can gain benefit from this study by understanding the movement of the variables that could affect the stock return, so that they could secure and transform the risk (Kurihara, 2006). On the other hand, the relationship between stock return and exchange rate are not necessary to be linear, because there is an extending analysis include both stock price and volatility spillover effect of exchange rate will provide a comprehensive picture about the relationship between this two variables.

1.7 Chapter Layout

This paper is structured as follows; the second chapter presents an overview of the existing relevant literature, whereas in the third chapter displays methodological consideration. The following section (chapter 4) describes the data used. The last section, chapter 5 exposes the discussion, conclusion and implications deduced by this paper.

1.8 Conclusion

This aim of this paper is to identify the determinants that could influence the stock market return in United States. In chapter 1, this paper explains on the background of U.S. economy and U.S. stock market for the purpose of being more comprehensive on U.S. stock market and also shows the purpose of examine the relationship between stock return and its determinants. The determinants include interest rate, inflation rate, exchange rate, crude oil price and financial crisis.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter summarizes the literature review that applied in this study. This research has covered and reviewed several series of journal on the topic of determinants of stock price in the market of United States (U.S.). Normally most of researchers like to choose the developed countries such as United States as their research target rather than choose developing countries because of its ability influences the world's economy. Therefore, United States become the main focus on this paper since it is one of the largest developed countries in the world to explain the significant relationship from the empirical results.

2.1 Review of the Literature

From the previous studies and researches, most of the researchers had covered their studies about the stock markets in different countries due to it has more significant effect to economic development of a country. Based on the research from Eita (2012) which referred Adjasi and Biekpe (2009)'s studies and stated that every country economy can be developed through the fund which is generated from the stock market.

Despite of emerging market, some researchers will also do the analyses of impact in developed countries due to its economic growth are strong and more stable. For example, Jareno and Navarro (2010) estimated the relationship between the interest rate and inflation rate to the stock return in Spain. The reason of it is the economy of Spanish placed at fourth largest in the Euro zone. Same situation happens to Korkeamaki (2011) who had investigated the interest rate effect towards stock returns in the European countries. In this study, United States will be the main country to focus due to it is one of the four largest equity markets in the world (Dumas & Solnik, 1995). The recent U.S. Economic Growth report had reported that United States economy had already recovered and kept growing until 2013 although suffered from the financial crisis of 2008-2009. Besides, U.S. dollar (USD) is the most common currency which be used and traded in the global markets. Based on this reason, United States economy has a significant effect to impact the internationally financial markets. Therefore, most researchers are using the United States stock market as the benchmark of the research such as Johnson and Soenen (2004), Xu and Hamori (2012), Tai (2000), Zhou and Sornette (2006), and Kolari, Moorman and Sorescu (2008). Trading volume of the stock will become another reason too. New York Stock Exchange (NYSE) which is the largest stock exchange in United States, it will be a great example to prove it. It has huge of trading volume, so the effect will be more significant to the world.

Nowadays, it still does not have any researches combine all the variables which are crude oil price, interest rate, inflation rate, exchange rate and financial crisis from year 2008 until 2009 to explain the effect of them to the stock price with the sample size from 1993 to 2012. Therefore in this paper will explain all of this combination of determinants that would affect the United States stock market during that period.

2.1.1 Stock Return (Standard & Poor's 500 Index)

Standard and Poor's 500 (S&P 500) is a stock market index that used to track the performance of 500 largest listed companies in United States with a large amount of market capitalization. Besides, it is a capitalization-weighted index which means that each stock index is weighted according to its market value proportion. In addition, those 500 companies stock index chosen base on their market size and liquidity. These requirements will be verified by the Standard and Poor index committee and analysts and economists. Furthermore, it is designed to act as an indicator for overall United States stock market and also able to reflect the risk-return characteristic of the large-cap universe.

In United States, Standard and Poor's 500 index is not a only one stock index to measure the stock performance, there still have another stock index to compare such as Dow Jones Industrial Average (DJIA). However, Standard and Poor's 500 index is chosen as the dependence variable in this paper. The reason of it is Standard and Poor's 500 Index occupied around 75 percent of market capitalization in United States stock market. Therefore, Standard and Poor's 500 Index will be a better measurement to represent the United States stock market performance (Chen, 2009). Besides, Kathman (1998) also stated that Standard and Poor's 500 will be more accurate and less volatile due to Dow Jones Industrial Average is more heavily weighted in industrial since it is only consists of 30 companies. Additionally, the researcher also said that S&P 500 measures total return including reinvested dividends while Dow Jones Industrial Average is based solely on price. When market falls and dividend yield rises, it will benefit Standard and Poor's 500. As a conclusion, Standard and Poor's 500 will be a better indicator for the United States stock market if compared with Dow Jones Industrial Average.

2.1.2 Interest rate (INT)

Interest rate is a very important macroeconomic factor to determine the stock market performance. According to the Federal Reserve Bank of New York (n.d.), it reported that the interest rate is fund connection or transaction between the suppliers and demanders. Besides, it also stated that interest rate is charged by the leaders and paid by the borrowers. Normally, it can be divided into two types which are fixed or variable. One of the researchers who is Tucker (2000), he said that interest rate often represent as an annual percentage of principal and also known as annual percentage rate (APR). Commonly, it will affect the inflation rate and the Federal Reserve Board policies. From the investors' view, interest rate increased will be good news for them due to they can gain better returns on bank deposit or bonds.

There are lots of researchers had done their research about the interest rate like Graham and Harvey (2001), they had done a survey and found that most of the financial managers believe and consider the changing of interest rate as one of the key factors to affect the market performance. Besides, Alam and Uddin (2009) had stated that interest rate is one of the important macroeconomic variables due to it will directly affect the economy growth. They also refer Zhou (1996) studies and found that interest rate have a significant effect to the stock return in the long-term period. Based on these reasons, this paper included interest rate as one of the independence variables.

Previous researchers such as Alam and Uddin (2009) had found that the interest rate will have an inverse direction to stock return. At the same situation, Korkeamaki (2008) also found the same result in the European stock market. Besides European countries, Namibia where is located at Africa, had found the same outcome which was negative relationship with stock return

(Eita, 2012). Other than these research, most recent empirical studies (Jareno and Navarro, 2010; Lettau and Wachter, 2011; Hsing, Budden and Philips, 2012; Rahman, Sidek, and Tafri, 2009; Hooker, 2004) explained that the movement of the interest rate will be opposite towards stock return.

Hsing, Budden and Philips (2012) had found that the Gross Domestic Product (GDP) will cause a crowding-out effect to interest rate and stock price when that country have the huge government debts or deficit. Besides, as a good investor will always seek for the efficient market to invest. If the interest rate increased, people will tend to switch their fund from stock market to bank and lead to demand of shares decreased (Alam & Uddin, 2009). Therefore, this paper will forecast that there has a significant negative relationship between the interest rate and stock returns in United States stock market.

2.1.3 Exchange Rate (EX)

According to the Cambridge Advanced Learner's Dictionary & Thesaurus, exchange rate can be view as the value of a country’s currency that can be exchanged and traded for other country’s currency. Besides, exchange rate is a significant macroeconomic determinant that influences investors in an open economy (Johnson & Soenen, 2004). Through the international diversification, the volatility in exchanges rates increase the risk of investment and in the end will affect the stock return.

Exchange rate will have an indirect effect to stock market (Zhao, 2010). Furthermore, there is also consisting bidirectional relationship among foreign exchange market and stock market in China by using monthly data. Nowadays, China has become one of the main export oriented countries. Its competition power of products in international markets will indirectly affect by the changes of exchange rate and the quantities of exports products. If the export rate decreased, the profit of firm will reduce and in the end will affect the stock price. It can be consider as an indirect effect to stock market. Besides, this huge international market has attracted several foreign investors invest. These inflow and outflow of foreign capitals will influence the value of currency. This can be considered as another indirect effect. This statement is agreed by Nandhaa and Hammoudeh (2007) which found that the stock market return will be affected by the changes of exchange rate in some of the country in the Asia-Pacific region.

A significant association between return of United States equity investments and value of U.S. dollar generates an effect of exchange risk to international investors in United States stock market. Johnson and Soenen (2004) have stated that if the dollar value appreciates which means the exchange rate decreases, it will affect the stock index will increase. When depreciation in the value of local currency, foreign investors tend to recall their funds, and this cause stock market returns to fall (Khan, Ahmad, & Abbas, 2011). Besides, Tsai (2012) who also agrees that exchange rate has a negative impact on stock market return in Singapore, Thailand, Malaysia, the Philippines, South Korea, and Taiwan. The result holds the portfolio balance effect, in which decreased of the exchange rate will increase the stock market returns, appreciate in the value of the domestic currency. Garefalakis, Dimitras, Koemtzopoulos and Spinthiropoulos (2011) have also found that the fallen of the value of Yen currency will lead to decrease in investor’s confidence and cause instability in Hong Kong stock market.

But not all the results are agreed by some researchers such as Hsing, Budden and Philips (2012). They found that depreciation of the Argentine peso has positive effect on stock price and this result is consistent with the exchange rate policy that implemented by government. Besides Argentine, Pacific Basin Countries stock market also had been done by Phylaktis and Ravazzolo (2005). They examined the long-run and short-run relationship between stock price and exchange rate and the outcome was positive relationship. Richards, Simpson and Evans (2009) found that there was a same direction movement among the stock market return and Australian dollar exchange rate. In their study, they stated that if the stock market return increase around 66 percent, then the dollar exchange rate will appreciate around 33 percent.

Since most of the paper and researches' result are negative relationship between stock return and exchange, this paper will also forecast it as this result as well. Besides, this paper will also examine how the exchange rate movements affect the Standard and Poor's 500 Index. One of the reasons that this paper forecast the result will be negative is the exchange rate channel of monetary policy. From exchange rate channel of monetary policy view, if the value of currency appreciated, it will decrease the exchange rate and lead to the cost of export lower. In the end, the volume of import demand and the flow of capital investment will raised and cause the stock return increased. Next reason is portfolio-balance models. This model assume that the stock price increase will cause investors to purchase more stocks and will increase the demand of money due to the investors need more money to buy stock. Hence, appreciation in the value of currency and decrease exchange rate.

2.1.4 Crude Oil Price (OP)

Normally, crude oil price measures the spot price of various barrels of oil and most commonly crude oil refers to West Texas Intermediate (WTI) crude oil (Amadeo, 2013). The reason of why West Texas Intermediate crude oil is the major benchmark of crude oil in the United States is its properties. West Texas Intermediate crude oil is light-weight and has low sulphur content. Therefore, West Texas Intermediate crude oil can consider as very high quality crude oil and excellent for making gasoline.

Normally, if the oil price got any changes, it will directly affect the cost of production such as cost of gasoline, home heating oil, manufacturing and electric power generation. This statement agreed by Garefalakis, Dimitras, Koemtzopoulos and Spinthiropoulos (2011), they found that oil prices will influence the cost of production of goods and services in Hong Kong. Then, it will indirectly affect the profit margin and future of industries. How much cost will be influenced? EIA which is the "Oil and Energy Watchdog Agency" of the OECD group of countries had done the research and came up a result. It will be 96% of transportation relies on oil, 43% of industrial product, 21% of residential and commercial, and (only) 3% of electric power. Therefore, if crude oil prices change, so does the stock price which is connected to the profit margin.

Kumar, Managi and Matsuda (2012) did a study and found that rising oil prices increase the production costs of goods and services dampen cash flow, and reduce stock prices. There are several studies also find a inverse and statistically significant relationship between the movement of oil price and stock price (Cong, Wei, Jiao & Fan 2008; Driesprong, Jacobsen & Maat, 2008; Henriques & Sadorsky, 2008; Park & Ratti, 2008). Cifarelli and Paladino (2010) have strong evidence that WTI crude oil price changes are negatively with the United States DJIA stock price index from 1992 to 2008.

Most of the studies had come up an outcome was negative relationship between stock return and oil price, but some of researchers did not agreed with it. For instance, El-Sharif, Brown, Burton, Nixon and Russell (2005) investigate and found that a rise in oil prices would raises the returns in the oil and gas markets in United Kingdom. Their study was also agreed by Arouri and Rault (2012). Their research stated that there was positive relationship between oil price movement and stock prices, except in Saudi Arabia. This positive result also could apply in Vietnam market (Narayan, P. & Narayan, S. 2010)

Some researchers like Huang, Masulis and Stoll (1996) disagree with those both type outcomes. Their study showed that if the oil price got any changes, it would not influence the Standard and Poor’s 500. Another research done by Maghyereh (2004) had supported their study’s result. He found that there was no relationship between oil price movements with the stock returns in 22 emerging markets. Hence, to expand these studies, this paper will examine how the oil price movements affect the Standard and Poor’s 500 stock index in United States.

Then, this paper also hypothesizes that crude oil price should associate with stock market return and with then negative relationship. That is because has two approaches show that oil price can affect the stock price negatively (Narayan, P. & Narayan, S. 2010). The first approach is if the oil price increase so as the cost of production and which will depress aggregate stock price. Next approach is which if oil price increase, in contrast, stock price decreased via discount rate. In the case of net importer of oil, if oil price increased, the foreign exchange rate would decrease and that could influence the domestic inflation rate increase. Discount rate includes inflation rate and real interest rate, which mean that the decrease of inflation rate would increase the discount rate and at the end the stock price is being pull down. So once again, this paper investigates the result will be inverse movement.

2.1.5 Inflation Rate (INFLA)

The definition of inflation is a sustained or continuous rise in the general price level or the depreciation of money value and it will lead to decreasing of purchasing power (Makinen, 2003). Besides, inflation should refer to the movement in the general level of price instead of the changes in one price relative to other price. Moreover, the rise in the price level should be over a long or continuous period.

From previous studies, the movement direction among inflation rate and stock return are always to be opposite direction assuming that stocks are deal with the unexpected inflation. For example, referring to Fama's theory, Dural and Bhaduri (2009) found that inflation and stock return were negatively related with two propositions that link real stock return and inflation via real output. Next, Chatrath (1996) found that the unexpected inflation is inverse movement towards the stock return and agree with the Fama's two propositions that link the relationship through real output by holding this unexpected component. In addition, this result is similar with Alagidede and

Panagiotidis (2012) they show that common stock return and inflation is negatively related especially in post-war period for the United States and developed economies.

In contrast, Fisher Effect show that stock returns should be positively related to expected inflation rate. This result is under the condition while real stock returns are independent of inflationary expectation. For example, Li and Narayan and Zheng (2010) found that the stock return and inflation will move in same direction since the equities is hedges against inflation and represent claims on real assets. Similar with the result above, Hondroyiannis and Papapetrou (2006) also found a positive relationship between expected stock returns and expected inflation for the United States and Denmark. Accordingly, in this paper will examine how the inflation rate affects the Standard and Poor's 500 stock market return.

In conclusion, this paper also hypothesizes that inflation should associate with stock market return and with negative relationship. First, this paper investigated the impact of inflation to the stock market return and there are two categories of inflation which is expected and unexpected inflation. From previous studies, the relationship between unexpected inflation and stock market return can be known as negative. However, this relationship can be reversed when inflation rate is expected. By the ways, investors are difficult to hedges against the inflation rate since the future inflation is an uncertain variable and hard to be forecasted. Therefore, theoretically inflation should negatively relate with the stock market return.

2.1.6 Financial Crisis (DUMMY)

A financial crisis is a disturbance to financial markets, associated typically with falling asset prices and insolvency among debtors and intermediaries, which spreads through the financial system, disrupting the market's capacity to allocate capital (Eichengreen & Portes, 1987). This also is a global economy issue which will affect most of the economics in this world. Therefore, it is important to investigate the uncertainties that causes the happened of recession and to prevent another strike of financial crisis in the future.

According to Caballero and Kurlat (2009), financial crisis has caused a serious wealth loss, the demise of elite financial institution and global recession. Many professional economist and policymakers are investigating into this issue. Hence, financial crisis becomes a very important factor for them to deeply investigate to avoid from falling into this chaos. There are three keys reason for research on this factor. The first reason is financial crisis will bring a significant negative surprise to the market. Next, the excessive concentration of aggregate risk in highly leveraged financial institutions. Lastly, a slow policy response is to catch up with the financial crisis.

During the financial crisis period, the stock return will be decreased. Therefore, it is inverse direction between them. This statement agreed by Xu and Hamori (2012). Their research found that the international transmission of stock prices between Brazil, Russia, India and China (BRICs) and the United States weakened in both the mean and variance during the financial crisis. Besides, other researchers who are Nikkinen, Piljak and Aijo (2012), they also found that a negative relationship between stocks prices and economic recession. Moreover, a significantly increasing dependence between crude oil and stock markets was found by Wen, Wei and Huang (2012).

As a conclusion, the uncertainty causes by the financial crisis will seriously impact the normal operation in the stock market. Hence a negative impact will be brought by this financial recession on the stock market returns. This paper will examine the effect of financial crisis on stock return of United States.

2.2 Review of Relevant Theoretical Models

2.2.1 Stock Return

2.2.1.1 Efficient Market Hypothesis (EMH)

Efficient Markets Hypothesis (EMH) asserts that financial asset prices rapidly and completely integrated with new information, which is defined by Smart and Graham (2012). New information is information that investors did not previously have and could not anticipate (Gitman, Joehnk & Smart, 2011). The EMH also says that it is almost impossible to do a precise prediction on when stocks will do better relative to other security like bonds or when the occurrence of the opposite outcome. Smart and Graham (2012) explained that the random changes take place in stock prices because the prices react only to up-to-date information and this up-to-date information is almost unpredictable.

Gitman, Joehnk and Smart (2011) claimed that the more information that is incorporated into stock prices, the more efficient the market becomes. Then, the way to recognize the extent to which markets are efficient is to define different levels of efficiency corresponding to types of information that prices may reflect. These levels of market efficiency are identified as the weak form, the semi-strong form, and the strong form. The weak form holds stock prices fully embody any related information that can be acquiring from an analysis of past price movements. Then, the semi-strong form claim that stock prices fully embodies all related information that investors can get from public sources. However, the strong form would hold that there is no information, private or public, that allows investors to consistently earn abnormal returns.

Next, according to Timmermann and Granger (2004) claim that from the researcher Malkiel (1992), a capital market is efficient if it completely and correctly reflect all related information in decide the security prices which emphasized the significant of the information employ in the prediction, the capability to use the information in a strategy of trade (i.e. buying companies with the highest market share in a certain industry); and lastly the criterion for detect as the EMH holds is in economic measurement profits.

Hence, this theory is trying to predict the future direction of a stock price based on how the stock has performed in the past is ineffective.

2.2.1.2 Capital Asset Pricing Model (CAPM)

According Khan (2012), Capital Asset Pricing Model (CAPM) is developed by Sharp (1965), Linter (1965) and Black (1972) according to the assumptions and concepts on portfolio theory to describes the relationship between risk and expected return of asset. The concept of high risk-high return is proposed in this model. The CAPM express the concept that securities pricing will provide an expected return in order to compensate investors due to the expected risks. The relationship between expected stock return and beta risk can be conveying through capital market line and security market line. The capital market line shows the return that expected by the investor to get in the portfolio, while security market line shows the return that expected to obtain by the investor with respect to the risk free rate and also the relative security's risk in a portfolio (Khan, 2012).

Broadstock, Cao and Zhang (2012) show that energy related stock return in China can be affected by international oil price shocks since it is a systematic risk. Authors created a model that shows the relationship of the percentage change in oil price with the energy related stock returns and the changes in the oil price act as one of the systematic risk in the model is manipulated by the beta coefficient of CAPM. Oil price changes with larger beta will cause higher expected return of stocks; hence, increase in oil prices risk will increase the return of energy related stock.

Apergis, Artikis and Sorros (2011) conclude that the smaller firms and the value of stocks that have high book-to-market equity ratios are more sensitive to volatility of foreign exchange rate. The result show foreign exchange risk is one of the asset pricing elements in the asset pricing model that influence stock market returns. Apergis, Artikis and Sorros (2011) also show difference in risk premium in the model is based on the degree of the riskiness in the returns of assets. Good and services in different countries will be varying in the market price due to different in value of currency. In asset pricing model, it consists of risk premium that comprise of the co-variances of the asset return with exchange rates risk.

2.2.1.3 Random Walk Theory

According to Chaudhuri and Wu (2003), random walk theory stated that future stock returns cannot be predictable according to historical observation since stock price fluctuation is independent with each other and there is no probable change for stock to get back to it trend path with the passage of time. For example, Koustas, Lamarche and Serletis (2008) had tested this theory on the DJIA by adopting unit root test and found statistical evidence to support the theory.

However, this theory is controversy because according to Chavarnakul and Enke (2008), the future stock return can be forecasted by market analyst through two methods which are Technical analysis and Fundamental analysis. First, technical analysis also called as “charting” analysis and it investigate the historical price and volume movement of the stock by using chart as primary instrument to estimate the movement of future price (Murphy, 1999). For example, previous trading volume of stock is been consider in order to assess the future stock price since it is a standard measurement that can provide significant information to the interpretation for the price movement (Chavarnakul & Enke, 2008). Second, fundamental analysis depend on the intrinsic value of the company through the studies on economic, industry and also company situation to forecast the movement of stock price (Cutler, Poterba & Summers, 1989).

2.2.1.4 Modern Portfolio Theory (MPT)

Modern portfolio theory (MPT) is also known as Markowitz portfolio theory which is developed by Harry Markowitz in 1952 and this theory generally called mean-variance framework. It is a comprehensive theoretical framework for investment analysis and guidelines for most portfolio structure. This theory still widely used even after 60 years for private and professional investors (Schulmerich, 2012). In addition, MPT is generally suitable to use on common stock (Muller, n.d.). Besides that, it provides a framework according to the expected investment performance and also the investor's behavior of the risk taking preference for portfolio construction and selection (Fabozzi, Gupta & Markowitz, 2002).

Generally, this model assumes investors make decision based on expected return and risk, by using the measurement of mean and variance on the returns of assets (West, 2006). Investors are risk averse, meaning they prefer a less risky investment that will offer equivalent expected return. Therefore, investors will only take a high risk investment if the return is in high rate (Omisore, Yusuf & Christoper, 2012). Then, investors have similar time horizon which means they only care about their wealth and not the situation of their portfolio, besides all investors will have the same terminal time. Furthermore, investors have the same freely and simultaneously information to take part in the decision making. Moreover, financial assets are randomly substitutability. In other words, it is replaceable (West, 2006). According to Omisore, Yusuf and Christoper (2012), MPT is a diversification. It shows the investors the best way to find the optimal diversification strategy on investment under the assumptions and a particular amount of definition for risk and return. In addition, MPT allow investors make a choice for the desired combination of assets to incorporate in their portfolio (Brown, 2010). According to Gavdon, Meinke, Rodriguez and McGrath (2012), MPT is a useful instrument when there are some degrees of risk-aversion. It can help to provide an assessment on the best combination of alternatives for returns maximization at whichever desired level of risk.

2.2.2 Interest Rate

2.2.2.1 "Substitution Effect" Hypothesis

"Substitution Effect" Hypothesis is one of the effect of the consumer behaviors. Normally, it refers that the demand of the commodity falls down as the price of it increases, so consumers will more likely to buy other substitute commodity. Therefore, this theory also can be applied in the stock market. In the Rahman, Sidek and Tafri (2009) studies, they stated that the increase of the interest rate will raise the opportunity of preserving cash. This situation will cause substitution effect to the investors and the demand of the stock market other securities that are interest bearing such as bond will decrease. Besides, Alam and Uddin (2009) also reported that if the interest rate increased, investors will more likely to move their money from stock market to bank and his will cause the decreases in the demand of shares. This is because all investors are seeking to an effective market to invest. Based on these, substitution effect hypothesis suggest that is a negative correlation between the interest rate and stock market.

2.2.2.2 Restrictive Policy

Rahman, Sidek and Tafri (2009) reported that beside macroeconomic variables can affect the stock return; the changes in the monetary policy also have this effect in the stock market. For example, restrictive policies through increasing interest rate and discount rate would cause the cash flow become lesser. So this situation will have an effect to the stock market indirectly. Besides, Roley and Sellon (1995) also agreed that monetary policy will affect the economy through their effect on the interest rates. They also stated that monetary policy that restricted by the Federal Reserve with increasing the long-term and short-term interest rate and lead to a decrease in the spending in the interest-sensitive sectors like housing and investment. As a summary, restrictive policy will have an effect to the stock market through the interest rate.

2.2.2.3 Arbitrage Pricing Theory (APT)

Arbitrage Pricing Theory (APT) is a model for pricing assets. In the studies of Ramadan (2012), he stated that APT is same like the capital assets pricing model (CAPM), but APT reflects a linear multi-factor relationship and non-diversifiable risk factors that affect all stock returns. Besides, the strength point of APT is allowing research to choose the best available factors and explain without any restrictions. In his research, the researcher used interest rate as one of the variables to test the effect in Jordanian stock market and he found that is negative relationship between them.

2.2.3 Exchange Rate (EX)

2.2.3.1 Flow Oriented Model

Phylaktis and Ravazzolo (2005) claimed that Flow Oriented Model that developed by Dombusch and Fisher (1980) in which illustrate the volatility in exchange rate affect stock prices. This model is derived from the macroeconomic view that stock prices considered as the present value of future cash flows of firms. Thus, any factors that cause an effect to a firm's cash flow will be shown in the form's stock price. The Flow Oriented Model demonstrate the movement in exchange rate will cause an impact on international competitiveness, the trade's balance and also the real output of the country, in which will influence the cash flows of companies and also their stock return. Depreciation in the value of currency improved competitiveness of domestic forms since their exports are cheaper compared to foreign forms. Hence, Flow Oriented Model showed a positive relationship among stock prices and exchange rate (Tsuji, 2011).

According to flow approach, Phylaktis and Ravazzolo (2005) also report that an appreciation in the value of a country's currency and increase in the real exchange rate will lead to the local stock market to rise via its effect on domestic economic activities. As from the flow approach's point of view, changes in exchange rates are expected to affect stock prices. So, Chen, S. and Chen, T. (2012) illustrated flow approach to the Exchange Rate-led Stock Prices (ELS) hypothesis that shows a unidirectional effect from exchange rate to stock price, in which increase in exchange rate will increase the stock price.

2.2.3.2 Portfolio-balance Model

Portfolio-Balance Model which was developed by Branson (1983) and Frankel (1983) had shown the volatility in stock prices can cause changes in exchange rates (Tsuji, 2011). The transaction of foreign currency in dealing with domestic securities in domestic stock market will have a flow through effect in the currency market. The Portfolio-balance Model assumes that when the stock price increase will raise the wealth of the domestic investors and cause them to purchase more stocks. Hence, the demand of money will increase result to rise of interest rate. Then, the chain effect will happen by showing the increase of capital inflow, the value of currency and decrease of exchange rate. Thus, Portfolio-balance Model shows a negative relationship among stock prices and exchange rates (Tsuji, 2011).

According to Portfolio-balance Model, wealth is based on alternative assets such as domestic money, bonds and equities, and foreign securities, while exchange rate is used to balance the demands and supplies of asset. Therefore, exchange rate will be affected by the changes of asset supply and demands. Growth in the stock market will add to wealth and the asset demand (wealth effect). Then, rise in asset demand cause demand for money to increase, bring to an increase in interest rates and also substitution from foreign securities to domestic assets. As a result, value of the domestic currency move upwards and give rise in the exchange rate (Phylaktis & Ravazzolo, 2005). As from the portfolio-balance approach's point of view, stock prices are expected to affect the changes in exchange rates, so, Chen, S. and Chen, T. (2012) showed portfolio-balance approach to the stock price-led exchange rate (SLE) hypothesis.

Moreover, Richards, Simpson and Evans (2009) showed increase in exchange rate is expected to cause decrease in stock prices which consistent with portfolio-balance model. An appreciation in the value of the currency in export-leading economies will cause a negative effect on the domestic stock markets of that economy. Tsai (2012) also expressed the stock return as the explanatory variable and the dependent variable is exchange rate in order to investigate the portfolio balance effect between stock return and exchange rate. The result supports the portfolio-balance effect that shows a significantly negative relationship between them, which means the increase in the stock return, will reduce the exchange rate.

2.2.3.3 Monetarist Model

An earliest approach for exchange rate determinants is Monetarist Model. Sercu and Uppal (2000) analyzed the Monetarist Model from the scholars, Mussa (1967), Frenkel (1976) and Bilson (1978, 1979) who are the developers for monetary approach. This approach indicates the exchange rate as discounted value of future money and the level of output in local and foreign. Hence, any related information will cause changes to exchange rate since this approach views it as other asset price. The monetary model holds the assumption of purchasing power parity. In Purchasing Power Parity (PPP), exchange rates between two countries are in equilibrium when both of their purchasing power is the same. This means an identical product in two countries has the same price level when currencies are in equilibrium. The country's exchange rate must be reduced if the country's domestic price level increasing in accordance with PPP. The "law of one price" is the basic for PPP. In the case of no transportation and transaction costs, the price of same types of product in two countries will be the same. However, in reality, the transportation costs cannot be avoided which is proven by Eita (2012) who implied that from the Monetarist Model's point of view, cut down in the costs of exports lead to a rise in import demand and flow of capital investment as the exchange rate decrease. Hence, the stock market return will move upward.

Furthermore, according to Monetarist Model which was developed by Gavin (1989) showed the equities will influence exchange rates as the result of the changes in demand for money. A fall down of stock prices will decrease the money demands due to decrease in the wealth of local investors and lastly will give an impact to currency depreciation (Adjasi, Biekpe & Osei, 2011).

Besides, exchange rate is claims as relative price of currencies by this model, and this relative price is based in the demands and supplies of money. An increase in the demand of money in economy due to the rise in demand for goods and services will increase the domestic price. Change in exchange rates will always accompany with the change in domestic price level. Reduce in the exchange rate is proportional to the rise in the domestic price level (Chinn, 2011).

2.2.4 Crude Oil Price (OP)

2.2.4.1 Markov-switching Model

Miao, Wu and Su (2013) said that the classical Markov-switching approach proposed by Hamilton (1989, 1990) was developed to explain the uncertain regime shifts in the data generating process about economic and financial variables. The foregoing studies presented that considering the Markov-switching method in model specification for stock market data can capture the richer dynamics volatility process and obtain accurately in data fitting and forecasts. Therefore, it is natural to introduce the framework of the Markov-switching to discuss the impact of unusual events such as oil price shock on the patterns of volatility and correlation processes. Hence, it can examine the different measure of oil price movement.

In addition, Guo, Chen and Huang (2011) investigated the contagion effects among the stock market, real estate, credit default swap and energy market covering the most recent financial crisis period when markets experience regime shifts. Using Markov regime-switching framework, they found that the energy market also appears to be more responsive to the stock market movement than the shocks originating from housing and credit market. For instance, oil price change in response to shock from exogenous geopolitical events or supply interruptions and financial markets can shift unexpectedly in response to financial crises. Consequently, stock returns could change due to the change of the crude oil price in the market. Chen (2010) who used Markov-switching Model and determined the monthly stock returns on the Standard and Poor’s 500 Index suggests that an increase in crude oil price pushes the stock market into territory with higher probability.

2.2.4.2 Discounted Cash Flow Model

There are many scholars (Adam & Tweneboah, 2008; Rault & Arouri, 2009; Mohanty, Nandha, Turkistani & Alaitani, 2011) used this model as a framework to understand the relationship between crude oil prices and stock return.

From Mohanty, Nandha, Turkistani and Alaitani (2011), stock returns are affected by systematic movements in expected cash flow as well as by discount rates. Therefore, a decrease in oil price can have a negative or positive effect on a form's cash flow which is depending on whether the firm uses oil as an input (consumer) or output (producer). Similarly, it goes to the changes in oil price can also affect discount rates, which can lead to an increase in the hurdle rate on corporate investment. A higher hurdle rate can have a negative effect on a firm's stock price. Thus, the true relation between changes in oil prices and stock returns of a firm is actually depends on the net effects that are due to the changes in expected cash flow and expected discounted rates. Their research result also shows the stock markets have significant positive exposure to oil price shocks except for Kuwait.

2.2.5 Inflation Rate (INF)

2.2.5.1 Fama Proxy Hypothesis

According to Balduzzi (1994), the negative relationship between inflation and stock return can be explained by the Fama proxy hypothesis and the theory state that real output growth can be used as a proxy to induce the negative relationship between inflation and stock return. In case of high inflation, the growth rate of real output will be slow down and cause the demand of money decrease. Furthermore, the economy downturn will lead to the declining of stock return. Therefore, it can be concluded that the negative relationship between inflation and stock return is result from the growth of real output.

Besides, the negative relationship between inflation and stock return that driven from the real output growth is explained by Alagitidede and Panagiotis (2012) through the combination of money demand and money quantity theory. The results show that, inflation that arises from excessive money supply will lead to the decreasing of real output and cause the stock return declining at the end.

2.2.5.2 Fisher Effect Theory

Fisher Effect theory stated that inflation rate and nominal rate should be move in the same direction in response to the change in money supply. Besides, the inflation rate can be determined by the money supply in long run, moreover it will affect the nominal interest rate as well (Beggs, n.d.). Therefore, government plays an important role on the adjustment of inflation rate through the monetary policies. Furthermore, peoples are concern with the government control on the money supply because it will have significant impact on stock market.

According to Ali and Anwar (2013), high inflation may lead to high interest rate policy implementation form government in order to meet the targeted inflation rate since money supply will be decreased due to the high borrowing cost. Finally, stock price will be affected as well since it moves in the inverse direction with the interest rate.

2.2.6 Financial Crisis (DUMMY)

2.2.6.1 Minsky's Theory

Minsky's theory focuses on the understanding and elucidation of financial crisis. In this theory, it states when the cash flows in a corporation rises beyond what is needed to pay off debt in prosperous time, the development of speculative euphoria will happen. Then, investor will borrow more for investment until their income revenue unable to pay off the debt hence creates a financial crisis or speculative borrowing bubbles (Tan, 2008). There are two general assumptions. The first is total nominal wealth in the system is macro-economically determined and with the value of firms' asset responding to the state of confidence as reflected by discounted quasi rent on capital. Next, the second assumption is there is a high substitutability between the firm' liabilities and money in public's portfolio. Which means public will shift portfolio preferences to money when the decreases in profit. When financial crisis occurred, there is a possibility that panic happen, interest rate rise, investment amount drop and profit rate go down (Taylor & O'Connell, 1985).

According to Wray and Tymoigne (2008), they cited from Whalen (2008)'s Theory, the crisis that happened in United States Financial sectors will spread around the world and affect the stock return. A lot of commentators refer to 'Minsky Moment' to question whether they have become a 'Ponzination'.

2.3 Summary of Tests

There are tests were used by previous researches and they are Ordinary Least Squares (OLS), Unit Root Test, Johansen Juselius Cointegration Test, Vector Error Correction Model (VECM), Granger Causality Test, Variance Decompostion and Impulse Response Function.

Ordinary Least Squares (OLS) is one of the regression models to study the relationship between the independent variables (predictor variables) and dependent variable (outcome variable) (Uekawa, 2006). This model can build a single response variable by recording it on at least an internal scale. This technique is suitable to apply on single or multiple explanatory variables. Next, according to Hutcheson (2011), it also can classify the explanatory variables after coded correctly. It helps to check the assumptions of the model too, for example, the linearity, constant variance and also the effect of outliers by using the graphical methods. There is an example that is explained by Bekaert and Engstorm (2010) who identify the yield of stock-bond is moving same direction as the inflation-recession, and it also shows the country specific time-series correlation between the dividend yield and the long term nominal bond yield by using this OLS regression.

Unit Root Test on every variable needs to be run and conducted before the model estimation with the purpose to investigate all the variables are chosen are either stationary or non-stationary in the levels of time-series data (Eita, 2012). Besides that, Ray (2012) recommended that this Unit Root Test should be carried out since most of the time series data are non-stationary and this will cause econometric problems which can lead the test to be invalid. Hence, in the studies of Ray (2012), all the variable that were chose to be used in determining the relationship with the stock prices are non-stationary in level form but stationary in first difference. Stationary defined as there is no trend in the variables which means there is no autocorrelation problem. Its result indicated that the cointergration relationship between variables exist and have a stable long run relationship.

Johansen Juselius Cointegration Test is used to determine whether the linear combination of the data series owns a long equilibrium relationship or not (Johansen & Juselius, 1990). Besides, it is very important for researches to evaluate the cointegration properties of the data series, because the result can be used to support the hypothesis of significant connection between determinants and dependent variables, if there is cointegration existed between the combinations of the series. For example, Hendry and Juselius (2000) investigated the properties of economic time series that were integrated processes such as random walk and the variables can be defined as cointegration, when they are individually non-stationary and integrated at the same order. Next, Zhu, Li and Yu (2011) had provided the evidence to support about the cointegration of stock prices with the determinants (crude oil prices and nominal exchange rate) and found that the oil prices have a significant positive impact on Vietnam's stock prices. In addition, Mukherjee and Naka (1995) also employed this test and found that Tokyo stock exchange index movement is negatively cointegrated with its nation inflation changes.

Vector Error Correction Model (VECM) is used to determine the existence of long-run relationship between dependent variable and its determinants when there is a cointergration relationship occurs between the dependent and independent variables (Asari, Baharuddin, Jusoh, Mohamad, & Jusoff, 2011). Narayan, P. and Narayan, S. (2010) used this model and computed there are long-run relationship can be found on both crude oil price and exchange rate which have a statistically significant positive effect on the Vietnam's stock return. Besides, Omran and Pointon (2001) also found the relationship between inflation rate and Egypt stock price could be in positive for long run. In addition, Geetha, Mohidin, Chandran and Chong (2011), had found the long run relationship exists between stock return and the independent variables (interest rate, inflation rate, exchange rate and GDP) in Malaysia, United States and China.

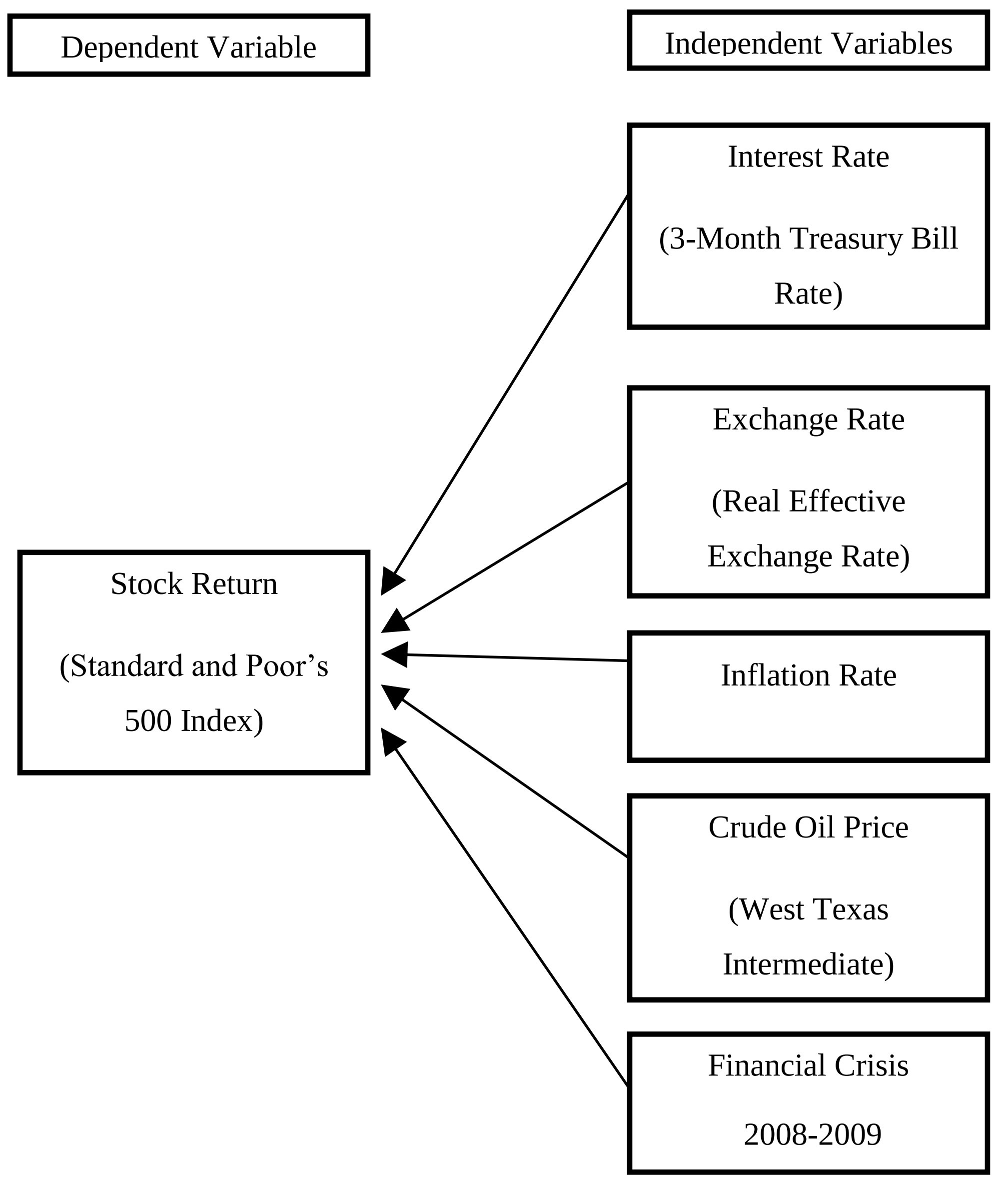
Granger Causality Test is well-known in the researches. It helps in determining the direction of causal relationship that might exist between the variables. Richards, Simpson and Evans (2009), studied the interaction between exchange rates and stock prices. Then it found that there is an uni-directional causal relationship exists between the variables during the sample period. It also be used to demonstrates a relationship between the variables, whether it is consistent with the analysis and theoretical framework or not which was used by Arouri (2011) who study the exchange rates and the stock price movement, then Chen, S. and Chen, T. (2011) also studied the crude oil price and the stock return movement in Europe.

Variance Decomposition shows the changes in dependent variable that is caused by its own shock and the transmission to other variables stated by Brooks, 2008. Imarhiagbe (2010) suggested that the selected major oil producing and consuming countries (Mexico, Russia, Saudi Arabia, India, China, and the U.S.), the variance decomposition confirms the existence of crude oil prices and exchange rates influences the stock prices.

Impulse Response Function traces the effect of a one-time shock to one of the values of the endogenous variables, (Imarhiagbe, 2010; Kurihara, 2006). According to Eita (2011) it is able to show the response of stock market prices to its determinants. Imarhiagbe (2010) stated that there are six countries (Mexico, Russia, Saudi Arabia, India, China, and the U.S) are confirmed there is an existence of exchange rates and crude oil prices influences the stock return. Besides, Kurihara (2006) implied this test and indicated that the shock of quantitative easing policy exists for one or two days in Japan’s stock market, it took eight days for the response mostly disappearing.

2.4 Proposed Theoretical / Conceptual Framework

Figure 1: Structure of macroeconomic factors affecting stock prices in United States Stock Market from 1993 - 2012



2.5 Conclusion

In conclusion, this paper investigates the combination of independent variables that studied by previous researchers independently. The determinants are supported by those former researchers' finding. This paper will also determine the result at developed country, United States which has the most impact to the world economy. These independent variables are support by former researchers' finding too. In addition, this paper examines the theoretical framework from former researches. Hence, in order to provide a clearer picture, this paper also inserts a diagram of theoretical framework in the last section.

CHAPTER 3: METHODOLOGY

3.0 Introduction

In this paper has five variables which are crude oil price (OP), interest rate (INT), inflation rate (INFLA), exchange rate (EX) and financial crisis (DUMMY) as a dummy variable, they are being used as determinants of Standard and Poor's 500 (S&P 500) in United States (U.S.). The period of this research is from January 1993 to December 2012 and all the data are used as monthly data. Therefore, it has 240 observations for each of the variables. Some previous researchers such as Geetha, Mohidin, Chandran, and Chong (2011), Apergis and Miller (2009), Basher, Haug and Sadorsky (2012), and Chen, S. and Chen, T. (2012), they also used monthly data for their research and found the relationship between stock return and economic factors. All the data are extracted from two sources which are internet source and journals.

3.1 Data Collection Methods

This paper is used and focused on the secondary data and all of these data are collected from same data base which is www.economy.com. Besides, the data of this paper are considered as time-series data and monthly data which are covered from January, 1993 to December, 2012. Previous researcher like Reilly (2013) has stated that one of the advantages by using monthly data in the research is it can be easily modeled and identified the trend or movement changes of the variables in the model. Besides, using monthly data also is a better way to forecast the directions of long-run

(Reilly, 2013). Based on these two advantages, this research is using monthly data rather than using quarterly or annually data. Therefore, there have total 240 observations of each variable in this paper.

3.1.2 Secondary Data

There have two advantages by using the secondary data which are economics and the quality of the data. The reason of it is the data had already collected by other users, therefore the future researchers who want to use secondary data will save some time and cost in the process of data collections (Baslaugh, 2007). Besides, the process of data collections are usually guided and performed by professionalism who have experience in certain fields (Baslaugh, 2007). In this paper, there are various types of the secondary data are used, which are internet sources, journals, report and books. They provide a lot of information for the research and improve the result that becomes more accurate for this paper. The secondary data covered in this paper are stock index, interest rate, inflation rate, exchange rate, crude oil price and financial crisis.

Table 3.1 Source of Secondary Data

Variables	Proxy	Units	Source of data
Stock index	S&P 500	Index	Internet Source
Interest rate	INT	Percentage	Internet Source
Inflation rate	INFLA	Percentage	Internet Source
Exchange rate	EX	Index	Internet Source
Crude oil price	OP	USD per Barrel	Internet Source
Dummy (Financial Crisis)	DUMMY	-	Journals

3.1.2.1 Stock Index (S&P 500)

Stock index normally is mean that how the weighted market value of nowadays. Most of the investors will use this measurement to predict the future trend of the stock market. Therefore, they will refer it to help them to make a decision to buy in or sell out. This paper chooses Standard and Poor's 500 index as the dependant variable due to it is a better representation of the U.S. market (Chen, 2009). Furthermore, most of the previous researchers such as Johnson and Soenen (2004), Doman M. and Doman R. (2012) and Mollick and Assefa (2013), they used Standard and Poor's 500 index as variable in their research. Therefore, Standard and Poor's 500 index is measured in this paper.

3.1.2.2 Interest Rate (INT)

In stock market, interest rate will be the one of the most common factors that will affect the value of stock price. Therefore, most of the financial managers also view this factor as a main risk or a consideration for them when making decision (Graham & Harvey, 2001). In this paper, 3-month Treasury bill rates are used as interest rate. It is because it is usually used as the benchmark for money markets rate (Slovenska, 2002). Beside, money market has high liquidly and the most developed in the country. Kumar, Managi and Matsuda (2012) had used Treasury bill rate for their research as well. At last, Treasury bill rate is used as measurement in this paper.

3.1.2.3 Inflation Rate (INFLA)

In this paper, inflation rate is measured by the Consumer Price Index (CPI) and used to analysis the relationship with stock return. CPI is a weighted average of indexes referred to several groups of consumer goods. Some of the previous researcher had determined the relationship between stock returns and inflation. For example, Diaz and Jareno (2009) had used CPI as price level to test the impact of inflation rate to the stock returns in United States. Besides, Hondroyiannis and Papapetrou (2006) and Du (2006) also used the CPI as the price level to found out the relationship between inflation rate and stock returns.

3.1.2.4 Exchange Rate (EX)

The measurement of exchange rate of this paper will be the Real Effective Exchange Rate (REER). REER is adjusted by different level which is a level of the double-sided real exchange rate between countries and their trading partners will be weighted by trade shares of each partner. Besides, it also can consider as short run volatility that replies to news. Therefore, REER is important factor due to it signal large exchange rate overvaluation in the run up to financial crisis (Catao, n.d.).

Real Effective Exchange Rate has two main advantages which are already stated out by Bagella, Becchetti and Hasan (2006). The first advantage is REER includes trade partners' externalities to evaluate the effect of exchange rate volatility on growth. Second advantage is it can dampen the negative effects of individual bilateral exchange rate volatility on growth since different trade partners with favorable and unfavorable exchange rate movements may reimburse each other. Moreover, it is more related with bilateral exchange rate with dollar than exchange rate regimes. It gives the chance to test the pros of flexibility and the cost of volatility arguments. Zhao (2010) had using REER measurement to test the relationship between exchange rate and stock price.

3.1.2.5 Crude Oil Price (OP)

West Texas Intermediate (WTI) crude oil price is used as measurement in this paper. The reason of it is WTI crude oil is the benchmark of crude oil in United States and it is light-weight and has low sulphur content (Amadeo, 2012). U.S. dollars per barrel will be its unit in this paper too. Mollick and Assefa (2013), they referred Cifarelli and Paladino (2010) research and found that they have significant effect of the WTI crude oil price had the impact to the U.S stock index from 1992 to 2008. Besides, Imarhiagbe (2010) also used WTI crude oil price as variable and determine the relationship with stock market return.

3.1.2.6 Financial Crisis (DUMMY)

According to Wen, Wei and Huang (2012) studies, the financial crisis will have a strong impact to stock returns and bring negative effect to stock market. The actual period of the financial crisis is hard to determine. Samarakoon (2011) stated that the period of the financial crisis 2008-2009 last for seven months that was from September 2008 to March 2009. But this statement doesn't agree with Mollick and Assefa (2013). They said that the financial crisis officially ended in June 2009. Therefore, this paper will set the dummy variable as one (1) from September 2008 to June 2009 which is the period that financial crisis occurred and zero (0) as there is no financial crisis occurred. Since the financial crisis had already gripped the stock markets and world economy (Samarakoon, 2011), Mollick and Assefa (2013) stated that this period of financial crisis are provided a great opportunity for economic researchers to reinvestigate the macroeconomic factors on United States stock markets. Therefore, this paper includes this financial crisis as dummy variable in the model.

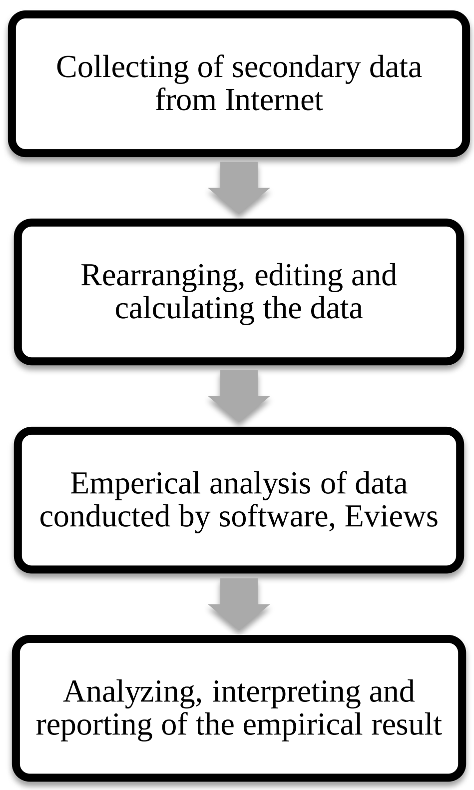
3.2 Sampling Design

3.2.1Target Population – United States

This paper targets on U.S. stock market which is New York Stock Exchange (NYSE) and tends to analyze the relationship between the determinants and stock return in U.S. which is known as a core economy that could reflect the global economy in the world. Besides, under NYSE it can be categorized into a few types of financial market indicator such as S&P 500 and DJIA. Therefore, this paper focuses on the performance of S&P 500 and analyzes how its performance can be used as an indicator of U.S. economy. As mentioned before, S&P 500 is a stock market index which comprises 500 largest listed companies from different industries in U.S. with large amount of market capitalization that account around seventy five percent of U.S. stock market. In addition, S&P 500 is a capitalization-weighted index, hence, it is able to track the performance of each listed companies in U.S. market more accurately according to their weighted proportion. Therefore, S&P 500 can be treated as a precise measurement for tracking the performance of stock market and act as an indicator for U.S. overall economy as well as the world economy (Kathman, 1998).

3.3 Data Processing

Figure 3.2: Diagram of Data Processing



This data processing (Figure 3.2) involves 4 steps. The data is used as a secondary data is collected from Internet. Then, the data will be organized and empirical analyzed by using the software, Econometric Views (Eviews). Finally, the empirical results that are obtained from Eviews will be analyzed and reported.

3.4 Multiple Regression Model

According to Cohen J., Cohen P., West and Aiken (2003), multiple regression model is used to investigate the effect of the determinants on the dependent variable. In this paper's retrogression model, it consists of 5 determinants (interest rate, inflation rate, exchange rate, crude oil price and financial crisis) that will influence the dependent variable, S&P 500 stock return. Next, error term, is call as disturbance term too which is included in the model to overcome the effect that cause by the variables which do not incorporate in the model, it eventually will impact the dependent variable, since the independent variables in the model cannot be completely taken into account of all the divergence of the dependent variable. Gujarati and Porter (2009) showed there are few assumptions that the model needs to follow in order to get an unbiased estimation. The assumptions are normal distribution of error term, homoscedasticity, error term is independent as well as independent variables uncorrelated with error term. The scholars also reveal that the smaller the sum of the square residuals, the model will be the best fit to the data.

In this study, some of the variables will be transformed into logarithm form. Wooldridge (2005) shows independent variable in logarithm is approximately to the assumptions of classical linear regression model. Imarhiagbe (2010) also stated that the transformation of variables into log form can aim to decrease the variation of the data.

The regression model is express as follows:

$$LOGS\&P\ 500_t = \beta_0 + \beta_1 INT_t + \beta_2 LOGEX_t + \beta_3 LOGOP_t + \beta_4 INFLA_t + \beta_5 DUMMY_i + \varepsilon_t \qquad (1)$$

Where,

LOGS&P 500 = Natural logarithm of U.S. S&P 500 stock return at t month

INT = U.S. Treasury Bill rate at t month

LOGEX = Natural logarithm of U.S. real effective exchange rate at t month

LOGOP = Natural logarithm of U.S. West Texas Intermediate (WTI) crude oil price at t month

INFLA = U.S. inflation rate at t month

DUMMY = 1 if there is a financial crisis in year 2008 until 2009

0 if there is no financial crisis in year 2008 until 2009

3.5 Data Analysis

There are tests will be carried out to investigate the relationship between the dependent variables and independent variables and fulfill the objective of this paper. Those tests are Ordinary Least Square (OLS), Unit Root Test, Johansen Juselius Cointegration Test, Granger Causality Test, Vector Error Correction Model (VECM), Variance decomposition and Impulse Response Function.

3.5.1 Ordinary Least Square (OLS)

Ordinary Least Square (OLS) is one of the regression models to study the relationship between a dependent variable which is outcome variable and independent variables that are predictor variables. OLS is for detection of the economic problems (Hutcheson, 2011). Then OLS can only be used after fulfilled the following conditions. First, the available of linearity between dependent variable (Y) and independent variables (X). Next, X is error-free or error less than 10 percent in Y. Third, the errors associated with different observations are independent (Nascimento et al., 2010).

According to Gujarati and Porter (2009) there are seven assumptions for OLS estimation. First, the regression model is linear in the parameter. Next, X value independent of the error term, means X variables and the error term are independent. Third, zero mean value of disturbance, means the expected value of residuals is zero. Besides, the assumption of homoscedasticity which means the variance of the error is same regardless of the value of X. Moreover, no autocorrelation between the disturbances, which means no correlation between two X values. Next, the observation number must more than the number of parameter to be estimated. Then the last assumption is the nature of X variable, means the positive number in variance (X) and no outlier in the values of the X variables.

3.5.2 Unit Root Test

Unit root test is carried out to test the non-stationary and stationary trend for data. A stationary time series have a constant mean and variance across time period, while time series which are non-stationary will have mean that change over time. If most of the economic variables are non-stationary and will cause some econometric problems, so this test should be carried out in order to prevent the spurious results. A non-stationary model will cause the normal assumptions of the analysis to be invalid, which mean t-ratio do not comply with t-distribution as well as other (Brooks, 2008). This paper used Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) test to test for unit root as study by Ray (2012) in his research of testing the relationship of the macroeconomic variable and stock prices in India.

Augmented Dickey-Fuller test (ADF) is a parametric test, it assumes a normal distribution. ADF expands the lag length to remove the impact of serial correlation. While Phillips-Perron test (PP) is non-parametric test; it does not assume a normal distribution. However, it can also account as semi-parametric as it is parametrically dealing with regression coefficient, yet non-parametrically in stationary residual. PP test consists of non-parametric adjustments that take into consideration of serial correlation; it does not need to expand lag length when there is serial correlation (Phillips & Xiao, 1998). A few different unit root tests should be conducted in order to see whether these tests provide a similar result (Mahadeva & Robinson, 2004).

In more detail, ADF is a frequently used parametric test for stationary. ADF test the occurrence of stationary with intercept (whether it is with trend or not). In this test, the null hypothesis (H_0) is there is a unit root and the alternative hypothesis (H_1) is there is no unit root. The decision rule is to reject H_0 if test statistic is more than it critical value, otherwise do not reject $H_{0.}$ Rejection of H_0 show there is a stationary (Ray, 2012). To conduct the test, first, set an appropriate lag length, and then estimate the test with the chosen lag length. There are two ways in selecting an optimal lag length which is based on data's frequency or information criterion. If serial correlation exists in the model, the test need to expand the p lagged of dependent variable. However, there is a difficulty in choosing the optimal lag length. This is because lag length that is too small will not eliminate the autocorrelation while if too large, it will decrease the power of test (brooks, 2008). To examine the unit root, different authors use different information criterion. Apergis and Miller (2009) used Akaike Information Criteria (AIC), while Chen, S. and Chen, T. (2012) used Schwarz Information Criterion (SIC) to pick an appropriate lag length. Acquah (2009) reveals that AIC determine the model that is optimally approximated while SIC is for real model, hence AIC will not as consistent as SIC. Although there are some difference, but both are better in determine a best model.

Next, PP test is also one of the tests that used in testing unit root, but it is a nonparametric test that have being modifies in the t-ration in order to prevent serial correlations that cause effect on the asymptotic distribution (Ray, 2012). Ray (2012) also shows that PP test is based on Dickey-Fuller test (DF), however, it comprise of non-parametric automatic correction that for autocorrelated residuals. The null hypothesis, alternative hypothesis and decision rule are same as the ADF, which H_0 is there is a unit root and H_1 is there is no unit root. The decision rule is to reject H_0 if test statistic is more than critical value, otherwise do not reject $H_{0.}$ This test is significant to test serial correlation as well as heteroscedasticity (Zhao, 2010).

However, both of the tests (ADF and PP) are not perfect with the limitation of their low power, which mean there are difficulty in differentiate the stationary process that are extremely consistent from non-stationary process. Hence, these tests show a lack of powerful in making decision, particularly deal with finite sample size (Brooks, 2008).

As a conclusion, an optimal lag length must be selected initially; then carry out the parametric test, ADF test and also non-parametric test, PP test by including the chosen lag length, in order to determine the stationary of the variables.

3.5.3 Johansen Juselius Cointegration Test

According to Gujarati and Porter (2009), two variables can be stated as cointegrated if they are individually non-stationary and integrated at the same order but it can be reversed back to stationary through linear combination. Besides, according to Johansen and Juselius (1990) cointegration test is used to determine whether the linear combination of data series hold a long run equilibrium relationship. In addition, the purpose of carry out this test is to analyze whether two time series are likely to move closely and it is time invariant (Chu, 2011).

On the other hand, it is vital to make sure the cointegration of the data series in order to avoid spurious regression that may result to the imprecise and inconsistent outcome for forecasting purpose (Gujarati & Porter, 2009). Once again, under the cointegration assumption of the data series the causal relationship is existed between these variables; moreover this can be determined by using Vector Error Correction Model (VECM). For instance, VECM allows the estimation of the behavior of current stock return by using past stock return from vary stock market over time as the stock return is cointegrated (Menezes, Dionisio & Hassani, 2012).

3.5.4 Granger Causality Test

In year 1969, Clive Granger developed this test in order to help in determination and identification of the causality among two time series and whether one time series is significantly to predict another (Harasheh & Abu-Libdeh, 2011). Granger Causality usually will be misinterpreted as the change in a variable cause changes in another but actually; Granger Causality only shows the correlation between the current value of a variable and the past values of others (Brooks, 2008). For example, the variable X is granger caused the variable Y since variable X can help in forecasting the variable Y. Hence, the lagged values of variable X should be statistically considerable in interpreting the variable Y. The null hypothesis (H_0) that can be tested is that the variable X does not Granger cause variable Y and variable Y does not Granger cause variable X. Accordingly, in case Y at t year can be predicted by the lagged values of X at t year and vise-versa, then variable Y at t year is granger cause by one variable X at t year (Ray, 2012).

The test result can be carried out by running the VAR Granger Causality or Block Exogeneity Wald Tests. The result would indicate the presence of causality relationship among the variables. The direction of causality also can be show by this test whether the variables are having unidirectional causality, bi-directional causality or independent (Brooks, 2012). This method is famous to be applied by those previous researchers in determining the causal relationship between the stock return and determinants in different countries (Richards, Simpson & Evans, 2009; Plylaktis& Ravazzolo, 2005; Valcarcel, 2012; Ray, 2012).

3.5.5 Vector Error Correction Model (VECM)

Vector Error Correction Model (VECM) determines the long-run relationship between dependent variable and the determinants when there is a co-integration relationship between dependent variable and its determinants (Asari, Baharuddin, Jusoh, Mohamad, &Jusoff, 2011). According to Wong, Chan, and Chiang (2007), the vector error correction framework is developed by Johansen and improved by Johansen and Juselius. Then, VECM is developed for the purposes of forecasting and is verified against various diagnostic statistical criteria. Besides that, Wong, Chan, and Chiang (2007) also suggestes Engle and Granger (1987)'s research about the vector error correction (VEC) framework provides a multivariate maximum likelihood approach which states VEC does not rely on arbitrary normalization rules but allow the determination of the number of co-integration vector. The following is the VECM regression equation form according to Asari, Baharuddin, Jusoh, Mohamad and Jusoff (2011).

Previous researcher Gunes (2007) uses VEC framework to test on the period of functional income distribution. Then, Asari, Baharuddin, Jusoh, Mohamad and Jusoff (2011) used VECM to analyze the long-run relationship between exchange rate and interest rate with inflation.

3.5.6 Variance Decomposition

Variance decomposition shows the changes in dependent variable that caused by its own shock and also the transmission to other variables in the model by means of the dynamic nature of Vector Autoregression (VAR) (Brooks, 2008). Then, according to Campbell (1991), a robust change to VAR lag length and data frequency have been shown in the variance decomposition for stock returns. He claims that, the variance decomposition also sensitive to the changes of macroeconomic variables that are used to forecast.

Moreover, variance decomposition is extended from VAR with orthogonal residual. Besides, it allows forecasting the variance of stock price by directly applied to the contribution of macroeconomic variables (Kazi, 2008). Previous researcher Rey (2004) examines the stock market returns by moving the total future cash flow up or down in this variance decomposition methodology. Furthermore, Hollifield, Koop and Li (2003), use the variance decomposition to examine the relative importance of excess stock return for reflecting future real interest rate and dividend.

3.5.7 Impulse Response Function (IRF)

Impulse response Function (IRF) was introduced by Sims in 1980 to show the response of stock market prices to their determinants (Eita, 2011). Eita (2011) also indicated that according to Sims (1980), if there is a shock happened to the variable, the variable itself will get affected and it will pass on to all other endogenous variables either though the lag or dynamic structure of the VAR. In addition, according to Stock and Watson (2001), the response of current or future value of each of the determinants will be traced out to a one-unit rise in the current value of one of the VAR errors.

Furthermore, Elder (2003) says the trustworthy impulse response functions come with a stationary time series data which is turned into stationary after the second difference. The short-run impact can be detected when IRF receives impulses which have been caused by the VAR model.

Here, for example, the previous researcher Eita (2011) used the impulse response function to investigate the macroeconomic variables of stock market prices in Namibia. Then, Philinkus and Boguslauskas (2009) also used the IRF to check on the existence of relationship between stock market prices and macroeconomic determinants.

3.6 Conclusion

In a nutshell, five macroeconomic variables which include interest rate, inflation rate, crude oil price, exchange rate and financial crisis are used to test on the relationship with stock return in United States by using Standard and Poor's 500 Index. Total 240 observations for each of the variable are taken from January 1993 to December 2012. All these five determinants and stock returns are collected from the source (internet sources) except for the dummy variables (financial crisis) is obtained from reading materials. It consists of a number of tests to be carried out as Ordinary Least Square, Unit Root Test, Johansen Juselius Cointegration Test, Granger Causality Test, Vector Error Correction Model, Variance Decomposition and Impulse Response have different purposes and assumptions in order to generate unbiased results. All these tests would be also used to examine and determine the relationship between these five determinants and the United States stock returns. The empirical result would be discussed in the coming chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter performs the result and interpretation of the study from the methodology of previous chapter. Then, it presents the descriptive analysis for the stock returns of Standard and Poor's 500 with variables included the financial crisis. The empirical results are Ordinary Least Square, Unit Root Test, Vector Error Correction Model, Johansen Juselius Cointegration, Granger Causality, Variance Decomposition and Impulse Response Function is shown in this chapter. A further explanation will be discussed after each of the test's results.

4.1 Ordinary Least Square (OLS)

Table 4.1: LOG(SP 500) is explained by LOG(OP), INT, INFLA, LOG(EX), and DUMMY with actual sign from Ordinary Least Square

Variable	**P-value**	**Expected**	**Actual**
LOG(OP) - Crude Oil Price	0.000	Negative	Positive
INT - Interest Rate	0.000	Negative	Positive
INFLA - Inflation Rate	0.000	Negative	Negative
LOG(EX) - Exchange Rate	0.000	Negative	Positive
DUMMY - Financial Crisis	0.000	Negative	Negative

From the table above, it shows all the macroeconomic variables in this model is significant to the Standard and Poor's 500 (S&P 500) stock returns since the p-value for all variables are 0.0000 that are smaller than the significant level 0.01. These result are consistent with the results from Eita (2012) and Hsing, Budden, and Phillips (2011) which the interest rates, inflation and exchange rates are significant to influence the stock return. Moreover, according to Akoum, Graham, Kivihaho, Nikkinen and Omran (2012), the crude oil price is also significant variable that affect the stock returns. Then, Mollick and Assefa (2013) have proven the stock returns are significantly influenced by financial crisis.

The result from the Ordinary Least Square shows the inflation rate and the dummy variable (financial crisis) have negative relationship which is consistent with this paper estimation. Dural and Bhaduri (2009), Chatrath (1996) and Alagidede and Panagiotidis (2012) found the same sign of relationship (negative) in their studies between inflation rate and stock return. Then, Xu and Hamori (2012), Nikkinen, Piljak and Aijo (2012) and Wen, Wei and Huang (2012) also agree with this paper findings which the relationship between stock return and financial crisis is negative. Below is the actual formula that derived from the result from Ordinary Least Square.

$$LOG\ (SP\ 500_t) = -\ 6.268530 + 0.585530LOG\ (OP_t) + 0.056396\ INT_t - 0.060635INFLA_t + 2.431019LOG\ (EX_t) - 0.307753DUMMY \quad (2)$$

Where,

LOG (SP 500) = Natural logarithm of U.S. S&P 500 stock return at t month

INT = U.S. Treasury Bill rate at t month

LOG (EX) = Natural logarithm of U.S. real effective exchange rate at t month

LOG (OP) = Natural logarithm of U.S. West Texas Intermediate (WTI) crude oil price at t month

INFLA = U.S. inflation rate at t month

DUMMY = 1 if there is a financial crisis in year 2008 until 2009

0 if there is no financial crisis in year 2008 until 2009

However, the exchange rate, interest rate and crude oil price show positive relationship with stock returns which are not consistent with this studies estimation. The exchange rate in this paper shows a positive relationship with stock returns, this could happen because according to Hsing, Budden, and Phillips (2011), there are a condition when home currency appreciate and stock price would increase too. It said that the home currency depreciation may raise the import costs, raise the domestic prices, incur higher inflation, and reduce the international capital flows then cause the stock prices drop. Hsing, Budden, and Phillips (2011) showed the same positive sign of exchange rate with stock returns.

Moreover, the result of positive relationship of crude oil price with stock returns in this paper is supported by Mohanty, Nandha, Turkistani, and Alaitani (2011). Its study explained that the relationship can be mixed, it is due to it depends on whether the country is a net producer (output) or net consumer (input) of oil resources. If the country acts as producer, then there will a positive relationship between stock returns and crude oil price. If the country acts as consumer, negative relation will happen. Therefore, a positive relation appears as United States is an oil producer country (Malaysiandigest, 2012).

On the other hand, the interest rate in this paper shows positive sign which is also contrasted with the estimation. This can be explained by Maysami and Koh (2000), the positive and negative relationships between interest rate and stock returns have been determined. The stock market’s relationship with short term interest rate is positive while with long term interest rate is negative. Therefore, the 3-month Treasury bill rate which is a short term interest rate shows a positive relation with stock returns.

Finally, the R-squared value in this model is 0.707179 which means there are 70.71% of the variation of the S&P 500 index can be explained by the five independent variables which are inflation, exchange rate, interest rate, oil price and financial crisis. R-square value in this paper is considered as high.

4.2 Unit Root Test

The stationary of series is important since it can avoid the spurious result moreover it can strongly influence its behavior and properties while the unexpected change will slowly eliminated (Brooks, 2008). According to Cheung and Lai (1995), if series is stationary the effect of lag order on critical value should reduce to zero as sample size goes to infinity. In this paper, the stationary properties of each variable are examined by using the Unit Root Test in two methods which is Augmented Dickey Fuller and Phillips Perron Test.

Table 4.2: Summary of Unit Root Test

Unit Root test				
	Augmented Dickey Fuller (ADF)		Phillips Perron (PP)	
	Level			
Variables	Constant without Trend	Constant with Trend	Constant without Trend	Constant with Trend
S&P 500	-2.039381 (1)	-1.841314 (1)	-2.065364 [7]	-1.856869 [7]
Crude Oil Price	-1.017470 (1)	-3.428866 (1)	-1.011679 [4]	-3.226861 [4] *
Interest Rate	-1.335770 (3)	-2.790720 (3)	-1.036244 [9]	-2.291635 [9]
Inflation Rate	-2.440695 (12)	-2.466868 (12)	-3.741495 [3] ***	-3.764939 [3] ***
Exchange Rate	-0.959542 (2)	-1.271944 (2)	-0.952190 [3]	-1.218265 [2]
Dummy	-2.868093 (10) *	-2.985353 (10)	-3.886235 [4] ***	-3.971296 [4] **
	1st different			
S&P 500	-11.88791 (0) ***	-11.93390 (0) ***	-12.02274 [5] ***	-12.05252 [5] ***
Crude Oil Price	-12.04653 (0) ***	-12.02718 (0) ***	-12.02687 [1] ***	-12.00742 [1] ***
Interest Rate	-5.255378 (2) ***	-5.315444 (2) ***	-9.875721 [7] ***	-9.929604 [7] ***
Inflation Rate	-9.256233 (11) ***	-9.234288 (11) ***	-9.828357 [5] ***	-9.804644 [5] ***
Exchange Rate	-10.18732 (1) ***	10.29457 (1) ***	-10.38055 [7] ***	-10.39744 [7] ***
Dummy	-8.087027 (9) ***	-8.071079 (9) ***	-15.36229 [0] ***	-15.33039 [0] ***
Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively. The figure in parenthesis (…) represent optimum lag length selected based on Schwarz Info Criterion. The figure in bracket […] represents the Bandwidth used in the KPSS test selected based on Newey- West Bandwidth criterion.				

Hypothesis:

H_0: S&P 500/ Crude Oil Price/ Interest Rate/ Inflation Rate/ Exchange Rate/ Financial Crisis are not stationary and have a unit root.

H_1: S&P 500/ Crude Oil Price/ Interest Rate/ Inflation Rate/ Exchange Rate/ Financial Crisis are stationary and do not have a unit root.

From the table above, all variables in ADF and PP test are not significant at 1% in level phase, so do not reject the null hypothesis. Proceed to first different, the p-value of each variable is less than 0.01 which means that all variable is significant at 1% (Brooks, 2008). Therefore, the null hypothesis is rejected and concludes that all variables are stationary and do not contain of unit root.

4.3 Johansen Juselius Cointegration Test

Before conducting the cointegration test in this paper, the initial step is to determine the cointegration order of each variable. Next, Johansen Juselius Cointegration Test has been conducted in order to obtain the cointegration properties of the data series. According to Johansen and Juselius (1990) Cointegration Test is used to evaluate whether the linear combination of data series hold a long run equilibrium relationship.

Table 4.3: Summary of Johansen Juselius Cointegration Test

Hypothesized	Trace	Max-Eigen	Critical Values (1%)	
No. of CE(s)	Statistic	Statistic	Trace	Max-Eigen
r = 0	120.9026***	56.78804***	104.9615	45.86900
r ≤ 1	64.11453	26.45675	77.81884	39.37013
r ≤ 2	37.65778	21.42080	54.68150	32.71527
r ≤ 3	16.23698	10.35342	35.45817	25.86121
r ≤ 4	5.883557	5.467941	19.93711	18.52001
r ≤ 5	0.415615	0.415615	6.634897	6.634897

Note: *** denote significant at 1% significance levels.

Hypothesis:

H_0: Long-run equilibrium relationship does not exist between variables.

H_1: Long-run equilibrium relationship exists between variables.

From table 4.3, the result shows that both Trace and Max-Eigen Test are cointegrated in r=0 at 1% significant level. According to Grewal et al (2001), each individual variable integrated at the same order if there involve stationary linear combination of two or more variable. Besides, Trace and Maximum Eigenvalue test statistic is greater than the critical value at 1% significant level. Therefore null hypothesis is rejected and conclude that long run equilibrium relationship exist between variables.

4.4 Vector Error Correction Model (VECM)

Once the cointegration relationship between dependent variable and its determinants has been existed in the model, the Vector Error Correction Model (VECM) should be applied to determine the long-run relationship (Asari, Baharuddin, Jusoh, Mohamad, & Jusoff, 2011). Therefore, the VECM will be proceeding in this paper. Below is the estimated VEC Model.

$$LOG\ (SP\ 500_{t-1}) = -\ 4.780238 + 1.341098\ LOG\ (OP_{t-1}) + 0.409234\ INT_{t-1} -\ 1.533208\ INFLA_{t-1} + 0.020392\ LOG\ (EX_{t-1}) -\ 4.633996\ DUMMY \quad (3)$$

Where,

$LOG\ (SP\ 500_{t-1})$	=	Natural logarithm of U.S. S&P 500 stock return at t-1 month
$LOG\ (OP_{t-1})$	=	Natural logarithm of U.S. West Texas Intermediate (WTI) crude oil price at t-1 month
INT_{t-1}	=	U.S. Treasury Bill rate at t-1 month
$INFLA_{t-1}$	=	U.S. Inflation rate at t-1 month
$LOG\ (EX_{t-1})$	=	Natural logarithm of U.S. real effective exchange rate at t-1 month
DUMMY	=	1 if there is a financial crisis in year 2008 until 2009
		0 if there is no financial crisis in year 2008 until 2009

Based on the result, there has positive long-run relationship between Standard and Poor's 500 stock return (S&P 500) and crude oil price, interest rate and exchange rate. This paper also found that there have inverse movements between S&P 500 and inflation rate and financial crisis in long run.

According to Arouri and Rault (2011) and Alshogeathri (2011), they proved that the stock price will be moving in same direction with crude oil price in long run which is consistent with this study that has determined the positive relationship in long run too.

Next, the relationship between S&P 500 and inflation rate is negative in long run which is agreed by Alshogeathri (2011). This statement is also supported by Yeh and Chi (2009) who also proved the long run relationship between inflation and stock return will be negative relationship within 12 OECD countries such as United States.

The long run relationship between interest rate and S&P 500 is positive. Majid and Yusof (2009) stated that it also exists in Islamic capital market. Maysami and Koh (2000) found that this relationship can be applied in Singapore and United States too. Furthermore, they found that the positive long run relationship between stock return and exchange rate which is constant with this paper. When the banking crisis occurred, the investment will be affected and reduced in the long run (Rioja, Rios-Avila, & Valev, 2011). Once again, this paper output of VECM is same as their studies.

4.5 Granger Causality Test

Harasheh and Abu-Libdeh (2011) mentioned Granger Causality Test is used to identify and determine the causality between two time series data and whether one time series data is significantly in order to predict another. Hence, if the causal relationship exists between the variables, then they can be used to forecast each other. The results from Granger Causality Test are computed in Table 4.4, Table 4.4.1, and Table 4.5 as shown as below.

Table 4.4: Short-term Granger Causality Tests E-views Output

VEC Granger Causality/Block Exogeneity Wald Tests

Sample: 1993M01 2012M12

Included observations: 238

Dependent variable: D(L_SP 500)

Excluded	Chi-sq	df	Prob.
D(L_OP)	0.001687	1	0.9672
D(INT)	1.286660	1	0.2567
D(INFLA)	0.074665	1	0.7847
D(L_EX)	0.210962	1	0.6460
D(DUMMY)	14.57125	1	0.0001
All	16.37553	5	0.0058

Note: *** Significant at 1% significance level

** Significant at 5% significance level

* Significant at 10% significance level

Table 4.4.1: Short-term Granger Causality Test Result

Dependent Variable: D(L_SP 500)		
Independent Variable	**P-Value**	**Result**
D(L_OP) – Crude Oil Price	0.9672	Insignificant
D(INT) – Interest Rate	0.2567	Insignificant
D(INFLA) – Inflation Rate	0.7847	Insignificant
D(L_EX) – Exchange Rate	0.6460	Insignificant
D(DUMMY) – Financial Crisis	0.0001***	Significant

Note: *** Significant at 1% significance level

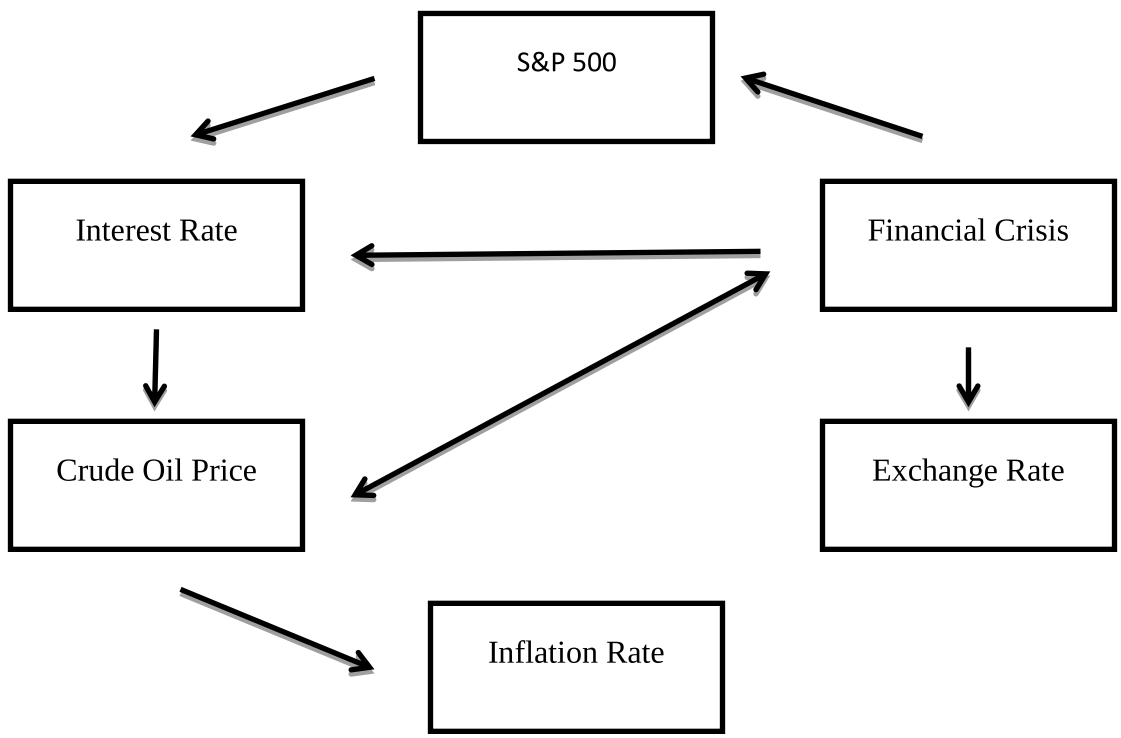
** Significant at 5% significance level

* Significant at 10% significance level

Table 4.5: Summary of Short-term Granger Causality Test Results between All Variables

Variables	L_SP 500	L_OP	INT	INFLA	L_EX	DUMMY
L_SP 500		-	-	-	-	1%
L_OP	-		10%	-	-	5%
INT	5%	-		-	-	10%
INFLA	-	10%	-		-	-
L_EX	-	-	-	-		5%
DUMMY	-	5%	-	-	-	

Figure 4.5.1: The Relationship between Each Variable for Granger Causality Test



4.5.1 Interest Rate (INT)

Hypothesis:

H_0: There is no Granger cause relationship between S&P 500 and interest rate in short run.

H_1: There is a Granger cause relationship between S&P 500 and interest rate short run.

According to the Table 4.4.1, the result shows that S&P 500 is not affected by interest rate in short run. This is because the p-value of interest rate (0.2567) is not significant at any level and it is meant that the interest rate has no Granger cause effect on S&P 500. Hence, this study does not reject H_0 and there is no Granger cause relationship between S&P 500 and interest rate for the research period. This result is consistent with the research that was done by Geetha, Mohidin, Chandran and Chong (2011) saying that there is no short run relationship between stock market in United State and interest rate. Ray (2012) also reported there is no causality relationship exists between stock price and interest rate from the evidence at India. So, this study can say that interest rate does not influence S&P 500 stock price and past values of interest rate cannot be used to enhance the prediction of future S&P 500 stock price.

4.5.2 Inflation Rate (INFLA)

Hypothesis:

H_0: There is no Granger cause relationship between S&P 500 and inflation rate short run.

H_1: There is a Granger cause relationship between S&P 500 and inflation rate short run.

Giving from the result of Table 4.4.1, it shows that S&P 500 is not affected by inflation rate in short run. This is because the p-value of inflation rate (0.7847) is not significant at any level and it is meant that the inflation rate has no Granger cause effect on S&P 500. Hence, this study does not reject H_0 and there is no Granger cause relationship between S&P500 and inflation rate for the research period. This result is agreed by Geetha, Mohidin, Chandran and Chong (2011) saying that there is no short run relationship between stock market in United State and inflation rate. Besides, Ray (2012) also reported that inflation does not Granger cause stock price in India. Then, this study can say that inflation rate does not influence S&P 500 stock price and past values of inflation rate cannot be used to enhance the prediction of future S&P 500 stock price.

4.5.3 Exchange Rate (EX)

Hypothesis:

H_0: There is no Granger cause relationship between S&P 500 and exchange rate short run.

H_1: There is a Granger cause relationship between S&P 500 and exchange rate short run.

The Table 4.4.1 shows that S&P 500 is not affected by exchange rate in short run. This is because the p-value of exchange rate (0.6460) is not significant at any level and it is meant that the exchange rate has no Granger cause effect on S&P 500. Hence, this study does not reject H_0 and there is no Granger cause relationship between S&P500 and exchange rate for the research period. This result is consistent with the previous research that there is no short run relationship between stock market in United State and exchange rate (Geetha, Mohidin, Chandran & Chong, 2011). Rahman and Uddin (2009), also agreed that exchange rate does not Granger cause S&P 500. Thus, this paper can say that the exchange rate does not influence S&P 500 stock price and past values of exchange rate cannot be used to enhance the prediction of future S&P 500 stock price.

4.5.4 Crude Oil price (OP)

Hypothesis:

H_0: There is no Granger cause relationship between S&P 500 and crude oil price in short run.

H_1: There is a Granger cause relationship between S&P 500 and crude oil price in short run.

The p-value for crude oil price is 0.9672 in the test that is not significant at 1% significant level. The result does not reject H_0, so there is no Granger cause relationship between S&P 500 and crude oil price in short run.

According to Akoum, Graham, Kivihaho, Nikkinen and Omran (2012), the research result has shown no ganger cause relationship between crude oil price and stock returns. This shows consistency with the result as in Table 4.4.1. Therefore, this paper can say that the crude oil price does not influence S&P 500 stock price and past values of crude oil price cannot be used to enhance the prediction of future S&P 500 stock price.

4.5.5 Financial Crisis (DUMMY)

Hypothesis:

H_0: There is no Granger cause relationship between S&P 500 and financial crisis in short run.

H_1: There is a Granger cause relationship between S&P 500 and financial crisis in short run.

The result (Table 4.1.1) has shown the p-value of dummy variable which is financial crisis from year 2008 until 2009 is 0.0001 which is significant at 1% significant level. Thus, this paper rejects H_0 and it represents there is a strong Granger cause relationship between S&P 500 and financial crisis in the short run periods. These results are supported by Nikkinen, Piljak and Aijo (2011) research by saying the financial crisis influences S&P 500 stock price.

4.6 Variance Decomposition

Table 4.6: Variance Decomposition of L_SP 500 towards L_OP, INT, INFLA, L_EX and DUMMY

Period	S.E.	L_SP 500	L_OP	INT	INFLA	L_EX	DUMMY
1	0.034402	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.054674	94.38407	0.033980	**0.008200**	0.907499	0.091972	4.574276
3	0.070558	89.29422	0.028058	0.054363	3.056647	0.229583	7.337129
4	0.084567	84.25755	0.053060	0.079976	5.953520	0.317032	9.338862
5	0.097519	79.64226	0.117132	0.090138	9.017635	0.352900	10.77993
6	0.109688	75.63594	0.210205	0.093396	11.88162	0.358050	11.82080
7	0.121169	72.26891	0.316259	0.094215	14.39257	0.348786	12.57926
8	0.132011	69.48303	0.422935	0.094363	16.52480	0.334125	13.14075
9	0.142264	67.18946	0.523078	0.094438	18.30989	0.318385	13.56475
10	0.151977	65.29855	0.613472	0.094597	**19.79812**	0.303422	13.89184

The impact on variables on stock return	
Small impact on short run	Interest Rate (INT)
Large impact on long run	Inflation Rate (INFLA)

Hypothesis:

H_0: LOP/ INT/ INFLA/ LEX/ DUMMY do not have an impact on S&P 500 stock return.

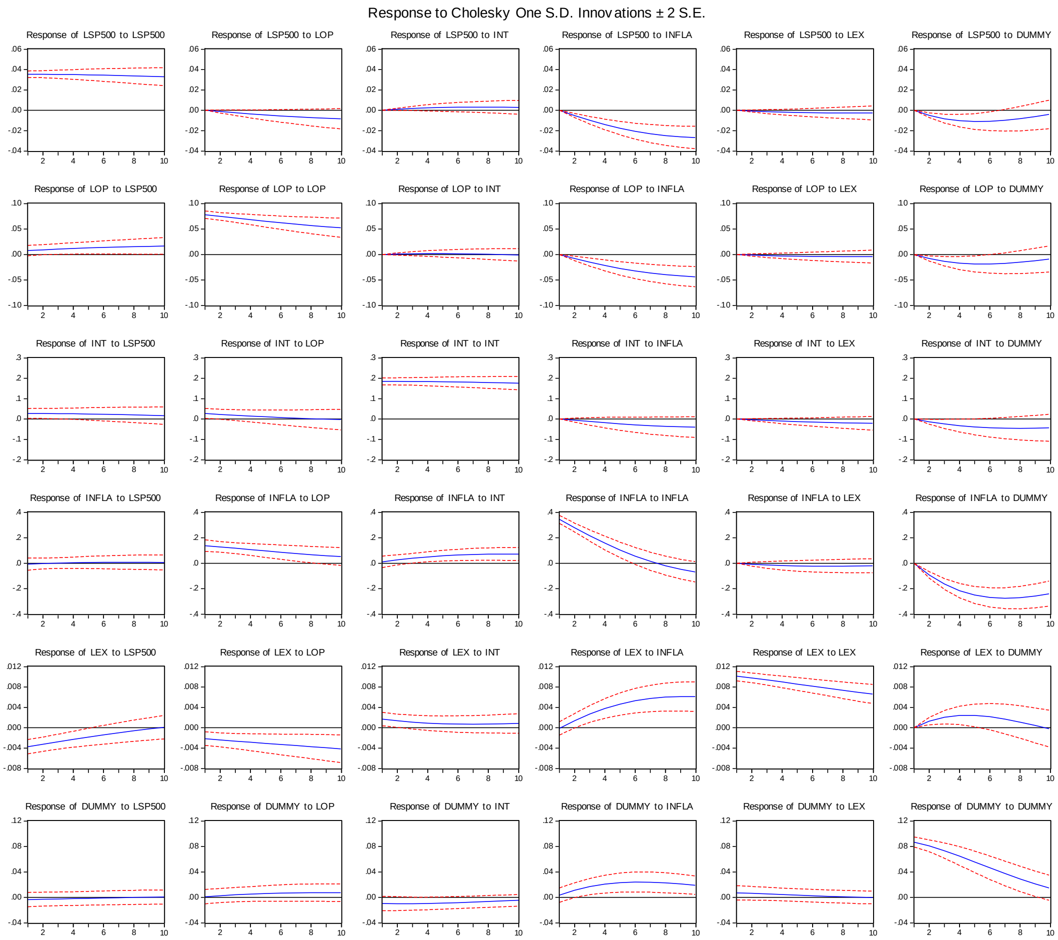
H_1: LOP/ INT/ INFLA/ LEX/ DUMMY have an impact on S&P 500 stock return.

Variance Decomposition shows the variations in dependent variable that cause by its own shock and also the transmission to other variables in the model by means of the dynamic nature of VAR (Brooks, 2008). As shown in the data above, interest rate has small effect to S&P 500 in period 2, which is 0.0082 percent; while inflation rate is 19.79812 percent in period 10 that show to have the larger effect to S&P 500.

Based on the table above, it shows the crude oil price, interest rate, inflation rate and financial crisis are increasing from period to period. Hence, it indicates that these variables are having less effect to S&P 500 in the short run. While, the exchange rate is also increasing at early stage but it have been started to decrease in period 7. This paper shows that the interest rate have short run relationship with SP 500, the result is consistent with Khan, Ahmad and Abbas (2011) whose indicate the short term T-bill rate is significantly affected the stock return. Whereas, inflation rate is having both short run and long run relationship with S&P 500. This result is also in line with Khan, Ahmad and Abbas (2011), they show both relationships are exist between stock return and inflation rate. Based on the result above, this paper rejects the H_0; therefore, all the variables are having an impact on stock return (S&P 500).

4.7 Impulse Response Function

Figure 4.7: Impulse Response Function of L_SP 500 to L_OP, INT, INFLA, L_EX and DUMMY



According to Eita (2012), Impulse Response is established by Sims (1980) and it reveals the response between dependent variable with each of the determining variables. Impulse Response seek for the effect of shock to dependent variable from each of the variables in the VAR, hence, it shows the effect of a shock that carry out on the error of each equation in the VAR (Brooks, 2008).

From the figure above, “the response of LSP 500 to LSP 500” shows the decreasing line with the passage of time. Furthermore, inflation rate and exchange rate are decreasing over time; it shows that these variables shocks affect negatively to S&P 500. This result is corresponding to Eita (2012). For the result of crude oil price shock that also has negative effect on S&P 500 which is proven by Imarhiagbe (2010) and Basher, Huag and Sadorsky (2012). Imarhiagbe (2010) reveals that U.S. stock price will react to the reaction of oil price since oil is quoted on U.S. dollar. Basher, Huag and Sadorsky (2012) indicates this result is complying with theory, as the crude oil price shock will negatively influence the stock prices. Financial crisis shock response negatively to SP 500 and it has been proven by Wikanti (2011) and also Ali and Afzal (2012). Ali and Afzal (2012) shows financial crisis causes negative effect to stock return and stimulated the volatility of Indian and Pakistan stock market. However, interest rate is shown to have positive shock on S&P 500. The result is consensus with Mun (2012) and Viceira (2012). Mun (2012) reveals U.S. stock market can be stimulated by a positive shock of interest rate since it can cause increases in the value of dollar.

4.8 Conclusion

In summary, all the empirical results have been presented well in table form and figure form. Then, the clear and accurate explanation and analysis have been written in this chapter. The summary for the whole research will be carried on in next chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

This paper studies about the determinants (interest rate, inflation rate, exchange rate, crude oil prices and financial crisis) that affect the stock market return, Standard and Poor's 500 (S&P 500) in U.S. using monthly data from 1993 to 2012. Previously, this paper has carried out various tests and provides evidences to show these variables are significant and have relationship with S&P 500 stock return. In this chapter, this paper will provide an explicit explanation on the finding of the previous chapter and also display the result in a table form in order to make it more easily to read through, as well as for easier understanding. The major finding will be discussed to meet with the research objective. Then, followed by implication and limitation of this study, recommendation for future research and lastly is the conclusion.

5.1 Summary of Statistical Analyses

Table 5.1: Summary of Major Findings

Dependent Variable	Independent Variable	Ordinary Least Square	Unit Root Test	Granger Causality test	Impulse Response
LSP500	LOP	Significant at 1% (Positive)	Stationary (first different)	Insignificant	Negative shock
LSP500	INT	Significant at 1% (Positive)	Stationary (first different)	Insignificant	Positive shock
LSP500	INFLA	Significant at 1% (Negative)	Stationary (first different)	Insignificant	Negative shock
LSP500	LREER	Significant at 1% (Positive)	Stationary (first different)	Insignificant	Negative shock
LSP500	DUMMY	Significant at 1% (Negative)	Stationary (first different)	Significant at 1%	Negative shock

The table above shows the relationship between S&P 500 with the interest rate, inflation rate, exchange rate, crude oil price and financial crisis. Based on ordinary least square, all the variables are significant at 1%. Crude oil price, interest rate and exchange rate are show positive relationship with S&P 500, these result are consistent with Mohanty, Nandha, Turkistani and Alaitani (2011), Veceira (2012) and Hsing, Budden and Phillips (2011) respectively. The result of inflation rate that shows negative relationship with S&P 500 is backed by Dural and Bhaduri (2009). Financial crisis is negatively correlated with S&P 500; this is shows by Xu and Hamori (2012).

According to unit root test, all the variables are stationary and do not contain unit root. Besides, from the Granger Causality Test, crude oil price, interest rate, inflation rate and exchange rate are not having short run relationship with S&P 500. Ray (2012) agreed that there is no causality relationship between S&P 500 with interest rate and inflation rate. The result of exchange rate is consistent with Geetha, Mohidin, Chandran and Chong (2011). Akoum, Graham, Kivihaho, Nikkinen and Omran (2012) shown crude oil price do not granger cause S&P 500. While, financial crisis shows a relationship with S&P 500 in short run (Nikkinen, Piljak & Aijo, 2011). Lastly, from the impulse response function, the inflation rate and exchange rate shocks affect negatively to S&P 500 (Eita, 2012). For the result of crude oil price and financial crisis shock that has negative effect on S&P 500 is agreed by Imarhiagbe (2010) and Wikanti (2011) respectively. Whereas, interest rate is the only variable that show a positive shock on S&P 500. This outcome is supported by Viceira (2012).

5.2 Summary of long run relationship

Johansen Juselius Cointegration Test		
Trace Test		Max Eigenvalue Test
Cointegrated at r=0		Cointegrated at r=0
VECM		
Dependent variable	Independent variable	Relationship
LSP500	LOP	Positive
LSP500	INT	Positive
LSP500	INFLA	Negative
LSP500	LREER	Positive
LSP500	DUMMY	Negative

According to Johansen Cointegration Test, both trace and Max Eigenvalue test show there is a long run relationship in the model since both tests are cointegrated at r equals to zero. For Vector Error Correction Model (VECM), it indicates the existence of positive long run relationship between interest rate and S&P 500 (Majid & Yusof, 2009). Exchange rate and S&P 500 also found to have positive long run relationship among them (Maysami & Koh, 2000). Alshogeathri (2011) shows stock return is positively correlated with crude oil price and negatively correlated with inflation rate in long run, which is in line with the result above. Yet, financial crisis is found to have long run relationship but in negative form with S&P 500, this result is consistent with Rioja, Rios-Avila and Valev (2011).

5.2 Discussion on Major Findings

According to the major findings are shown above (Table 5.1), all the determinants are significant and well explained. However, there are only two determinants' (inflation rate and financial crisis) actual sign are same as what the paper estimated. The others as crude oil price, interest rate and exchange rate are contrast with the expected sign.

The sign is different for crude oil price is because it is depends on the role that a country plays which is whether it is a net producer or a net consumer (Mohanty, Nandha, Turkistani, and Alaitani, 2011). Thus, United States is an oil producer country, the relationship between stock returns and oil price would be positive which is consistent with the actual sign.

Next, according to Mayasami and Koh (2000), the relationship between stock return and interest rate could be in mix result; hence, it has to depend on the data that is collected. This paper used 3-month Treasury Bill interest rate (short-term), which generated the positive actual sign that is same as the previous research where the stock return is moving positively with the short-term interest rate.

Then, there are also researches that could explain the relationship between exchange rate and stock return with the actual sign of positive. Hsing, Budden and Philips (2011), stated that there could be a situation which create the positive relationship is if the home currency depreciated, it could raise the import costs, domestic prices, incur higher inflation, and decrease the international capital flows and at the end it leads to the stock prices drop.

Afterward, this paper is continued with higher level tests in order to fulfill the research objectives by determining the short run and long run relationship between the variables. The higher level tests are Unit Root Test, Johansen Juselius Cointegration Test, Vector Error Correction Model (VECM), Granger Causality Test, Variance Decomposition and Impulse Response Function.

In order to determine the long run relationship, Johansen Juselius Cointegration Test is carried out and it proves that there is a long run equilibrium relationship exists between variables. Then, VEC model was being constructed and the actual sign of the independent variables were identify as well.

For determining the short run relationship, Granger Causality Test is ran and only financial crisis can affect S&P 500 stock price since it is the only one significant variable. Figure 4.5.1 shows a clearer picture of the relationship between each variable for Granger Causality Test too. Next, Variance Decomposition also shows that all the variables are having an impact on S&P500 stock return. Impulse Response Function is also shown in Figure 4.7.

The main purpose of this study is to determine and investigate the short run and long run relationship between determinants in United States. Hence, the research objectives are all be fulfilled and achieved. All of these findings are informative and powerful tools for the stock market participants which will be discussed in detail at the following section. Then, all of the determinants that have been chosen are considered important variables in order to help the stock market participants in determining and forecasting the trend of the stock market.

5.3 Implications of the Study

5.3.1 Managerial Implications

In this paper, the result shows vital and useful information to public and economy especially to the stock market participants. Besides that, the trend and situation in United States stock market can be understood more by policy makers, practitioners and stock market participants. Then, and the probability and accuracy in forecasting the significant relationship between stock market return (S&P 500), inflation rate, interest rate (three-month treasury bill), exchange rate (real effective exchange rate), crude oil price (World Texas Intermediate) and financial crisis 2008-2009 will be increased.

From the Original Least Squares (OLS) result of this paper, it shows that all the variables in the model are significant to the dependent variable which is Standard and Poor’s 500 (S&P 500). In this model, the crude oil price, interest rate and real effective exchange rate have shown positive relationship with

Standard and Poor's 500. However, the inflation rate and financial crisis which is a dummy variable in the model shows an inverse relationship to dependent variable.

The interest rate has shown a positive relationship with stock return in this paper. According to the theory of substitute effect, the interest rate has any changes will affect the investors to hold the money and increase or decrease the opportunity cost to invest into stock market. But this paper disagrees with this theory. This is because the long-term interest rate can consider as a substitution of inflation rate but short-term interest rate cannot. Besides, short-term interest rate is also not a better way to replace the nominal interest rate in the stock valuation model. This case had occurred in Singapore, Japan and United States. Therefore, this paper cannot apply theory of substitute effect.

In addition, the crude oil price is another vital variable that policy makers and investors need to put more attention in it. There was an incident happened in year 2007 which is oil price crisis. Due to the low supply volume of crude oil and high volume of demand (Hamilton, 2009), the oil shock has occurred and the oil price was hitting the peak (Whipple, 2007).This increased the cost of production in the manufacturing sector. Hence, the raise of the costs will initiate the inflation due to the costs are transposed to customers. Government will try to solve this problem by lower down the discount rate for a purpose to trim down the burden of the company. Company could make more loans to establish more projects, hence it leads to the unemployment rate reduced as well as improve economic growth and also the stock market. Other than that, as an oil producer country, the oil exports will get foreign earnings and increase the governments' spending and revenues. The strong influence of oil will bring an increase of the stock returns (Mohanty, Nandha, Turkistani, & Alaitani 2011). From the findings, crude oil price has significant positive relationship with stock market. In short, the raising of oil price will bring an upward trend to stock market.

In this paper, the result proves that the movement between inflation rate and stock return is opposite direction. When the inflation rate increase which means the commodity prices also increase, so it will affect the cost of living increased. If the cost of production increased and it affects the company to loss some portion of the profit. As investors' point of view, they will try to hold their money or reduce some amount to invest into the market due to the living cost is higher and the company performance reports are unsatisfied to them to invest. Because of these reason, the stock market performance will be going to downturn during the inflation rate is increased.

The relationship between exchange rate and stock return is supported by "Intuitive Financial Theory", which means positive relationship. It is because when the United States Dollars (USD) appreciated, the export volume of the United States will be lower. Therefore, the cash inflow will decrease. Simultaneously, the cost of production will be reduced and company performance will be increased. In the end, investors will tend to invest more into market. As conclusion, exchange rate will directly affect the stock return.

From the result in Table 4.1 that is extracted from Original Least Squares, the financial crisis 2008-2009 (DUMMY) and stock returns (S&P500) have significant negative relationship. Policy makers and stock market participants should concern more about financial crisis in the market. When there is a financial crisis happens, the stock price will dramatically decline. Economy will face a grim situation by getting a huge impact from the downward of economy. Most of the industries will be affected by this wave of crisis so that budget of company needs to be trimmed in order to avoid from bankruptcy. Then, banks as one of the market participants will tighten the rules in borrowing the loans to prevent from the happening of the bad debt in this critical moment. Therefore, policy makers need to implement appropriate monetary policy by injecting more money supply into the market to prevent a worse downturn of economy.

In conclusion, the five variables in this paper should be taken into the consideration by government, policy makers and other participants in order to predict the stock market performance to be more preciseness and able to formulate appropriate policy to deal with the corresponding problems.

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5.4 Limitations of the Study

Due to the ideal or perfect condition is not always existed for every research in reality, therefore there are some limitations and difficulties have been overcome in this paper. The main limitation in this paper is data constraint. First of all, in order to study the long term relationship between those determinants, those data that collected in this paper must cover a large period of time for example the data this paper collected is from 1993:01 to 2012:12. However, some variables such as inflation rate are not available from data stream within this period. Besides, there are some limitations on monthly data because exchange rate and crude oil price are volatile and normally in daily basis.

On the other hand, this research paper is only focus on the U.S. stock market. Therefore, the result or finding from this research is only applicable by the local investors and policy makers. Besides, the market response differ because the market condition is not alike from different country according to the country background, culture, government regulation and other factors especially from developing country. Thus, the result from this paper only can be treated as a reference by other researcher who is outside from U.S.

In addition, the scope of independent variables that are used to investigate the long term and short term relationship with the U.S. stock market return is small and there is only five determinants is being taken as the independent variables in this research paper which include crude oil price, inflation rate, interest rate, exchange rate and financial crisis. However, all of these variables may not fully reflect the actual performance of U.S. stock market because other significant factors are possible to be missed out or out of the consideration in this research. Therefore, the final result will become bias and inaccurate in case of the omission of significant variables.

Furthermore, the intention of analyze the properties of time series data that used to investigate the causal effect of each independent variable against the stock market return will be very important in this research because it will lead to a serious problem if certain properties do not compliance such as stationary and cointegration properties. Therefore, the properties of time series data should be analyzed carefully in order to fulfill the OLS assumption and ensure that the OLS estimator can be classified as “BLUE” estimator, which represent the best, linear, unbiased and efficient.

Last but not least, in order to achieve certain research objective, some tests should be carried out even though the process is complicated such as VECM, Johansen Juselius cointegration test and so on. Therefore, the knowledge which is required to apply in corresponding test and the ways to interpret the result has become the limitation in this paper. Furthermore, it is time consuming when conducting each type of test and eventually will lead the work become ineffective and inefficiency.

5.5 Recommendations for Future Research

Firstly, due to the limitation of data collection, future researchers are encouraged to collect data that is outside from their institution database, for example they are able to obtain the data from World Bank database, Yahoo Finance and other econometric website. Besides, even though time series data is more popular and frequently used by the past researchers but there are some shortages by using time series data. Therefore, other data category is recommended to the future researcher such as panel data in order to avoid the problem that is caused by time series data.

In addition, future researcher is suggested to change the data frequency such as annually, weekly and daily because the performance of each data will be different base on its attribute such as exchange rate is more sensitive compare with other independent variables since it is fluctuated in every single moment. Besides, future researcher is encouraged to apply some additional approaches in order to improve the reliability and the accuracy of the tests.

On the other hand, the result or finding in this paper is only focus on the U.S. stock market. Thus, other researchers especially who are intent to study the stock market performance in developing country should consider more other aspect from their own country such as Islamic country the trading in stock market is different from the conventional stock market because there are consist of some prohibition and regulation in the trading process. Besides, future researcher should take consideration on other factors that is relevant with the performance of stock market in order to improve the accuracy of the result.

5.6 Conclusion

In conclusion, this paper shows that all the variables are significantly affected the stock return in United States. Crude oil price, interest rate and exchange rate have positive relationship with S&P 500, whereas, inflation rate and financial crisis are having negative relationship with S&P 500. A few tests such as ordinary least square, Unit Root Test, Granger Causality Test, Johansen Juselius Cointegration Test, Vector Error Correction Model, Variance Decomposition and Impulse Response Function have been conducted to check for significant and stationary, long run and short run relationship of the employed variables. Hence, this paper has accomplished the research objectives. In addition, this chapter presents the weakness of this study and also provides recommendation to prospective researchers for improvement on further studies.

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APPENDICES

Appendix 4.0 Econometric Views (Eviews) Result

Appendix 4.1 Original Least Squares

Dependent Variable: LOG(SP500)
Method: Least Squares
Date: 07/09/13 Time: 14:28
Sample: 1993M01 2012M12
Included observations: 240

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.268530	0.775211	-8.086221	0.0000
LOG(OP)	0.585530	0.028309	20.68376	0.0000
INT	0.056396	0.009063	6.222917	0.0000
INFLA	-0.060635	0.014178	-4.276595	0.0000
LOG(EX)	2.432019	0.161884	15.02322	0.0000
DUMMY	-0.307753	0.070037	-4.394134	0.0000

R-squared	0.707179	Mean dependent var	6.902312
Adjusted R-squared	0.700922	S.D. dependent var	0.363157
S.E. of regression	0.198603	Akaike info criterion	-0.370332
Sum squared resid	9.229728	Schwarz criterion	-0.283316
Log likelihood	50.43987	Hannan-Quinn criter.	-0.335271
F-statistic	113.0246	Durbin-Watson stat	0.125940
Prob(F-statistic)	0.000000		

Appendix 4.2 Unit Root Test

Appendix 4.2.1 Standard and Poor's 500 (SP500)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: LSP500 has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.039381	0.2699
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LSP500)
Method: Least Squares
Date: 07/09/13 Time: 14:36
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSP500(-1)	-0.013625	0.006681	-2.039381	0.0425
D(LSP500(-1))	0.246485	0.062644	3.934702	0.0001
C	0.097775	0.046199	2.116385	0.0354

R-squared	0.079148	Mean dependent var	0.004913
Adjusted R-squared	0.071311	S.D. dependent var	0.038395
S.E. of regression	0.037001	Akaike info criterion	-3.743234
Sum squared resid	0.321728	Schwarz criterion	-3.699466
Log likelihood	448.4448	Hannan-Quinn criter.	-3.725594
F-statistic	10.09927	Durbin-Watson stat	1.973619
Prob(F-statistic)	0.000062		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: LSP500 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.841314	0.6815
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LSP500)
Method: Least Squares
Date: 07/09/13 Time: 14:37
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSP500(-1)	-0.017374	0.009436	-1.841314	0.0668
D(LSP500(-1))	0.249948	0.063035	3.965209	0.0001
C	0.120285	0.061123	1.967927	0.0503
@TREND(1993M01)	2.79E-05	4.95E-05	0.563558	0.5736

R-squared	0.080396	Mean dependent var	0.004913
Adjusted R-squared	0.068607	S.D. dependent var	0.038395
S.E. of regression	0.037055	Akaike info criterion	-3.736187
Sum squared resid	0.321291	Schwarz criterion	-3.677829
Log likelihood	448.6062	Hannan-Quinn criter.	-3.712668
F-statistic	6.819158	Durbin-Watson stat	1.975377
Prob(F-statistic)	0.000200		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: LSP500 has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.065364	0.2591
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001435
HAC corrected variance (Bartlett kernel)	0.002427

Phillips-Perron Test Equation
Dependent Variable: D(LSP500)
Method: Least Squares
Date: 07/09/13 Time: 14:37
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSP500(-1)	-0.014444	0.006789	-2.127494	0.0344
C	0.104630	0.046916	2.230172	0.0267

R-squared	0.018740	Mean dependent var	0.004955
Adjusted R-squared	0.014600	S.D. dependent var	0.038320
S.E. of regression	0.038039	Akaike info criterion	-3.692086
Sum squared resid	0.342928	Schwarz criterion	-3.662994
Log likelihood	443.2043	Hannan-Quinn criter.	-3.680363
F-statistic	4.526231	Durbin-Watson stat	1.504704
Prob(F-statistic)	0.034412		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: LSP500 has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.856869	0.6736
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001435
HAC corrected variance (Bartlett kernel)	0.002436

Phillips-Perron Test Equation
Dependent Variable: D(LSP500)
Method: Least Squares
Date: 07/09/13 Time: 14:37
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSP500(-1)	-0.015631	0.009650	-1.619783	0.1066
C	0.111769	0.062477	1.788965	0.0749
@TREND(1993M01)	8.79E-06	5.07E-05	0.173485	0.8624

R-squared	0.018865	Mean dependent var	0.004955
Adjusted R-squared	0.010551	S.D. dependent var	0.038320
S.E. of regression	0.038117	Akaike info criterion	-3.683845
Sum squared resid	0.342884	Schwarz criterion	-3.640208
Log likelihood	443.2195	Hannan-Quinn criter.	-3.666260
F-statistic	2.268902	Durbin-Watson stat	1.503119
Prob(F-statistic)	0.105677		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(LSP500) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.88791	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LSP500,2)
Method: Least Squares
Date: 07/09/13 Time: 14:38
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSP500(-1))	-0.749255	0.063027	-11.88791	0.0000
C	0.003687	0.002434	1.514627	0.1312

R-squared	0.374540	Mean dependent var	2.09E-05
Adjusted R-squared	0.371890	S.D. dependent var	0.046998
S.E. of regression	0.037248	Akaike info criterion	-3.734094
Sum squared resid	0.327422	Schwarz criterion	-3.704915
Log likelihood	446.3572	Hannan-Quinn criter.	-3.722334
F-statistic	141.3223	Durbin-Watson stat	1.974277
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(LSP500) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.93390	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LSP500,2)
Method: Least Squares
Date: 07/09/13 Time: 14:38
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSP500(-1))	-0.755300	0.063290	-11.93390	0.0000
C	0.008101	0.004924	1.645096	0.1013
@TREND(1993M01)	-3.64E-05	3.53E-05	-1.031185	0.3035

R-squared	0.377357	Mean dependent var	2.09E-05
Adjusted R-squared	0.372058	S.D. dependent var	0.046998
S.E. of regression	0.037243	Akaike info criterion	-3.730205
Sum squared resid	0.325947	Schwarz criterion	-3.686437
Log likelihood	446.8944	Hannan-Quinn criter.	-3.712566
F-statistic	71.21178	Durbin-Watson stat	1.971758
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(LSP500) has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.02274	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001376
HAC corrected variance (Bartlett kernel)	0.001493

Phillips-Perron Test Equation
Dependent Variable: D(LSP500,2)
Method: Least Squares
Date: 07/09/13 Time: 14:38
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSP500(-1))	-0.749255	0.063027	-11.88791	0.0000
C	0.003687	0.002434	1.514627	0.1312

R-squared	0.374540	Mean dependent var	2.09E-05
Adjusted R-squared	0.371890	S.D. dependent var	0.046998
S.E. of regression	0.037248	Akaike info criterion	-3.734094
Sum squared resid	0.327422	Schwarz criterion	-3.704915
Log likelihood	446.3572	Hannan-Quinn criter.	-3.722334
F-statistic	141.3223	Durbin-Watson stat	1.974277
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(LSP500) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.05252	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001370
HAC corrected variance (Bartlett kernel)	0.001473

Phillips-Perron Test Equation
Dependent Variable: D(LSP500,2)
Method: Least Squares
Date: 07/09/13 Time: 14:38
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LSP500(-1))	-0.755300	0.063290	-11.93390	0.0000
C	0.008101	0.004924	1.645096	0.1013
@TREND(1993M01)	-3.64E-05	3.53E-05	-1.031185	0.3035

R-squared	0.377357	Mean dependent var	2.09E-05
Adjusted R-squared	0.372058	S.D. dependent var	0.046998
S.E. of regression	0.037243	Akaike info criterion	-3.730205
Sum squared resid	0.325947	Schwarz criterion	-3.686437
Log likelihood	446.8944	Hannan-Quinn criter.	-3.712566
F-statistic	71.21178	Durbin-Watson stat	1.971758
Prob(F-statistic)	0.000000		

Appendix 4.2.2 Oil Price (OP)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: LOP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.017470	0.7474
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOP)
Method: Least Squares
Date: 07/09/13 Time: 14:44
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOP(-1)	-0.007995	0.007857	-1.017470	0.3100
D(LOP(-1))	0.243838	0.063343	3.849485	0.0002
C	0.033458	0.028728	1.164655	0.2453

R-squared	0.061328	Mean dependent var	0.006226
Adjusted R-squared	0.053339	S.D. dependent var	0.081761
S.E. of regression	0.079550	Akaike info criterion	-2.212328
Sum squared resid	1.487141	Schwarz criterion	-2.168560
Log likelihood	266.2670	Hannan-Quinn criter.	-2.194688
F-statistic	7.676828	Durbin-Watson stat	2.029928
Prob(F-statistic)	0.000589		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: LOP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.428866	0.0500
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOP)
Method: Least Squares
Date: 07/09/13 Time: 14:44
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOP(-1)	-0.068024	0.019839	-3.428866	0.0007
D(LOP(-1))	0.269953	0.062573	4.314240	0.0000
C	0.174431	0.051342	3.397448	0.0008
@TREND(1993M01)	0.000622	0.000190	3.283188	0.0012

R-squared	0.102664	Mean dependent var	0.006226
Adjusted R-squared	0.091160	S.D. dependent var	0.081761
S.E. of regression	0.077945	Akaike info criterion	-2.248960
Sum squared resid	1.421652	Schwarz criterion	-2.190603
Log likelihood	271.6263	Hannan-Quinn criter.	-2.225441
F-statistic	8.923970	Durbin-Watson stat	2.058445
Prob(F-statistic)	0.000013		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: LOP has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.011679	0.7495
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006621
HAC corrected variance (Bartlett kernel)	0.010130

Phillips-Perron Test Equation
Dependent Variable: D(LOP)
Method: Least Squares
Date: 07/09/13 Time: 14:44
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOP(-1)	-0.005983	0.008032	-0.744873	0.4571
C	0.027933	0.029375	0.950901	0.3426

R-squared	0.002336	Mean dependent var	0.006409
Adjusted R-squared	-0.001874	S.D. dependent var	0.081638
S.E. of regression	0.081714	Akaike info criterion	-2.162840
Sum squared resid	1.582507	Schwarz criterion	-2.133748
Log likelihood	260.4594	Hannan-Quinn criter.	-2.151117
F-statistic	0.554836	Durbin-Watson stat	1.515189
Prob(F-statistic)	0.457086		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: LOP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.226861	0.0817
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006441
HAC corrected variance (Bartlett kernel)	0.010196

Phillips-Perron Test Equation
Dependent Variable: D(LOP)
Method: Least Squares
Date: 07/09/13 Time: 14:44
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOP(-1)	-0.053809	0.020235	-2.659234	0.0084
C	0.140477	0.052548	2.673311	0.0080
@TREND(1993M01)	0.000496	0.000193	2.569580	0.0108

R-squared	0.029488	Mean dependent var	0.006409
Adjusted R-squared	0.021264	S.D. dependent var	0.081638
S.E. of regression	0.080765	Akaike info criterion	-2.182065
Sum squared resid	1.539437	Schwarz criterion	-2.138428
Log likelihood	263.7568	Hannan-Quinn criter.	-2.164481
F-statistic	3.585347	Durbin-Watson stat	1.485543
Prob(F-statistic)	0.029248		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(LOP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.04653	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOP,2)
Method: Least Squares
Date: 07/09/13 Time: 14:45
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOP(-1))	-0.760983	0.063170	-12.04653	0.0000
C	0.004706	0.005172	0.909803	0.3639

R-squared	0.380771	Mean dependent var	-0.000134
Adjusted R-squared	0.378147	S.D. dependent var	0.100886
S.E. of regression	0.079556	Akaike info criterion	-2.216336
Sum squared resid	1.493693	Schwarz criterion	-2.187157
Log likelihood	265.7439	Hannan-Quinn criter.	-2.204576
F-statistic	145.1189	Durbin-Watson stat	2.026781
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(LOP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.02718	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOP,2)
Method: Least Squares
Date: 07/09/13 Time: 14:45
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOP(-1))	-0.761362	0.063303	-12.02718	0.0000
C	0.001898	0.010434	0.181926	0.8558
@TREND(1993M01)	2.33E-05	7.52E-05	0.310045	0.7568

R-squared	0.381024	Mean dependent var	-0.000134
Adjusted R-squared	0.375756	S.D. dependent var	0.100886
S.E. of regression	0.079709	Akaike info criterion	-2.208341
Sum squared resid	1.493082	Schwarz criterion	-2.164573
Log likelihood	265.7926	Hannan-Quinn criter.	-2.190702
F-statistic	72.32963	Durbin-Watson stat	2.026810
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(LOP) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.02687	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006276
HAC corrected variance (Bartlett kernel)	0.006191

Phillips-Perron Test Equation
Dependent Variable: D(LOP,2)
Method: Least Squares
Date: 07/09/13 Time: 14:45
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOP(-1))	-0.760983	0.063170	-12.04653	0.0000
C	0.004706	0.005172	0.909803	0.3639

R-squared	0.380771	Mean dependent var	-0.000134
Adjusted R-squared	0.378147	S.D. dependent var	0.100886
S.E. of regression	0.079556	Akaike info criterion	-2.216336
Sum squared resid	1.493693	Schwarz criterion	-2.187157
Log likelihood	265.7439	Hannan-Quinn criter.	-2.204576
F-statistic	145.1189	Durbin-Watson stat	2.026781
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(LOP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.00742	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006273
HAC corrected variance (Bartlett kernel)	0.006189

Phillips-Perron Test Equation
Dependent Variable: D(LOP,2)
Method: Least Squares
Date: 07/09/13 Time: 14:45
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOP(-1))	-0.761362	0.063303	-12.02718	0.0000
C	0.001898	0.010434	0.181926	0.8558
@TREND(1993M01)	2.33E-05	7.52E-05	0.310045	0.7568

R-squared	0.381024	Mean dependent var	-0.000134
Adjusted R-squared	0.375756	S.D. dependent var	0.100886
S.E. of regression	0.079709	Akaike info criterion	-2.208341
Sum squared resid	1.493082	Schwarz criterion	-2.164573
Log likelihood	265.7926	Hannan-Quinn criter.	-2.190702
F-statistic	72.32963	Durbin-Watson stat	2.026810
Prob(F-statistic)	0.000000		

Appendix 4.2.3 Interest Rate (INT)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: INT has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.335770	0.6131
Test critical values:	1% level	-3.457984	
	5% level	-2.873596	
	10% level	-2.573270	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT)
Method: Least Squares
Date: 07/09/13 Time: 14:39
Sample (adjusted): 1993M05 2012M12
Included observations: 236 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT(-1)	-0.007209	0.005397	-1.335770	0.1829
D(INT(-1))	0.390903	0.064428	6.067286	0.0000
D(INT(-2))	0.052114	0.069259	0.752454	0.4525
D(INT(-3))	0.192498	0.064740	2.973386	0.0033
C	0.017529	0.019673	0.890996	0.3739

R-squared	0.263171	Mean dependent var	-0.011941
Adjusted R-squared	0.250412	S.D. dependent var	0.193237
S.E. of regression	0.167302	Akaike info criterion	-0.717073
Sum squared resid	6.465684	Schwarz criterion	-0.643687
Log likelihood	89.61462	Hannan-Quinn criter.	-0.687490
F-statistic	20.62639	Durbin-Watson stat	1.983943
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: INT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.790720	0.2022
Test critical values:	1% level	-3.997418	
	5% level	-3.428981	
	10% level	-3.137946	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT)
Method: Least Squares
Date: 07/09/13 Time: 14:39
Sample (adjusted): 1993M05 2012M12
Included observations: 236 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT(-1)	-0.021302	0.007633	-2.790720	0.0057
D(INT(-1))	0.379894	0.063796	5.954835	0.0000
D(INT(-2))	0.051212	0.068427	0.748409	0.4550
D(INT(-3))	0.198631	0.064006	3.103314	0.0022
C	0.131385	0.048218	2.724827	0.0069
@TREND(1993M01)	-0.000589	0.000228	-2.580211	0.0105

R-squared	0.283899	Mean dependent var	-0.011941
Adjusted R-squared	0.268332	S.D. dependent var	0.193237
S.E. of regression	0.165290	Akaike info criterion	-0.737133
Sum squared resid	6.283796	Schwarz criterion	-0.649070
Log likelihood	92.98170	Hannan-Quinn criter.	-0.701634
F-statistic	18.23674	Durbin-Watson stat	1.990179
Prob(F-statistic)	0.000000		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: INT has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.036244	0.7405
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.036807
HAC corrected variance (Bartlett kernel)	0.136683

Phillips-Perron Test Equation
Dependent Variable: D(INT)
Method: Least Squares
Date: 07/09/13 Time: 14:39
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT(-1)	-0.000140	0.006113	-0.022846	0.9818
C	-0.012192	0.022187	-0.549491	0.5832

R-squared	0.000002	Mean dependent var	-0.012611
Adjusted R-squared	-0.004217	S.D. dependent var	0.192255
S.E. of regression	0.192660	Akaike info criterion	-0.447451
Sum squared resid	8.796901	Schwarz criterion	-0.418359
Log likelihood	55.47034	Hannan-Quinn criter.	-0.435727
F-statistic	0.000522	Durbin-Watson stat	1.063207
Prob(F-statistic)	0.981792		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: INT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 9 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.291635	0.4364
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.035951
HAC corrected variance (Bartlett kernel)	0.130534

Phillips-Perron Test Equation
Dependent Variable: D(INT)
Method: Least Squares
Date: 07/09/13 Time: 14:39
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT(-1)	-0.014486	0.008562	-1.691942	0.0920
C	0.102828	0.053275	1.930145	0.0548
@TREND(1993M01)	-0.000600	0.000253	-2.369981	0.0186

R-squared	0.023249	Mean dependent var	-0.012611
Adjusted R-squared	0.014971	S.D. dependent var	0.192255
S.E. of regression	0.190810	Akaike info criterion	-0.462604
Sum squared resid	8.592402	Schwarz criterion	-0.418966
Log likelihood	58.28113	Hannan-Quinn criter.	-0.445019
F-statistic	2.808670	Durbin-Watson stat	1.073097
Prob(F-statistic)	0.062302		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(INT) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.255378	0.0000
Test critical values:	1% level	-3.457984	
	5% level	-2.873596	
	10% level	-2.573270	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT,2)
Method: Least Squares
Date: 07/09/13 Time: 14:39
Sample (adjusted): 1993M05 2012M12
Included observations: 236 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT(-1))	-0.381041	0.072505	-5.255378	0.0000
D(INT(-1),2)	-0.229610	0.074451	-3.084028	0.0023
D(INT(-2),2)	-0.182619	0.064425	-2.834591	0.0050
C	-0.004324	0.010945	-0.395053	0.6932

R-squared	0.300720	Mean dependent var	0.000231
Adjusted R-squared	0.291677	S.D. dependent var	0.199122
S.E. of regression	0.167585	Akaike info criterion	-0.717853
Sum squared resid	6.515626	Schwarz criterion	-0.659144
Log likelihood	88.70667	Hannan-Quinn criter.	-0.694187
F-statistic	33.25656	Durbin-Watson stat	1.980658
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(INT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.315444	0.0001
Test critical values:	1% level	-3.997418	
	5% level	-3.428981	
	10% level	-3.137946	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT,2)
Method: Least Squares
Date: 07/09/13 Time: 14:40
Sample (adjusted): 1993M05 2012M12
Included observations: 236 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT(-1))	-0.389664	0.073308	-5.315444	0.0000
D(INT(-1),2)	-0.224163	0.074797	-2.996960	0.0030
D(INT(-2),2)	-0.179639	0.064571	-2.782022	0.0058
C	0.011760	0.022402	0.524968	0.6001
@TREND(1993M01)	-0.000133	0.000162	-0.823071	0.4113

R-squared	0.302764	Mean dependent var	0.000231
Adjusted R-squared	0.290691	S.D. dependent var	0.199122
S.E. of regression	0.167701	Akaike info criterion	-0.712307
Sum squared resid	6.496574	Schwarz criterion	-0.638921
Log likelihood	89.05222	Hannan-Quinn criter.	-0.682724
F-statistic	25.07711	Durbin-Watson stat	1.980352
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(INT) has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.875721	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.028819
HAC corrected variance (Bartlett kernel)	0.036887

Phillips-Perron Test Equation
Dependent Variable: D(INT,2)
Method: Least Squares
Date: 07/09/13 Time: 14:40
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT(-1))	-0.532600	0.057479	-9.266030	0.0000
C	-0.006204	0.011074	-0.560199	0.5759

R-squared	0.266760	Mean dependent var	0.000487
Adjusted R-squared	0.263653	S.D. dependent var	0.198668
S.E. of regression	0.170479	Akaike info criterion	-0.692046
Sum squared resid	6.858856	Schwarz criterion	-0.662867
Log likelihood	84.35350	Hannan-Quinn criter.	-0.680287
F-statistic	85.85931	Durbin-Watson stat	2.111378
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(INT) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.929604	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.028674
HAC corrected variance (Bartlett kernel)	0.036557

Phillips-Perron Test Equation
Dependent Variable: D(INT,2)
Method: Least Squares
Date: 07/09/13 Time: 14:40
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT(-1))	-0.539342	0.057788	-9.333150	0.0000
C	0.014953	0.022343	0.669241	0.5040
@TREND(1993M01)	-0.000176	0.000162	-1.090094	0.2768

R-squared	0.270449	Mean dependent var	0.000487
Adjusted R-squared	0.264240	S.D. dependent var	0.198668
S.E. of regression	0.170411	Akaike info criterion	-0.688687
Sum squared resid	6.824348	Schwarz criterion	-0.644919
Log likelihood	84.95372	Hannan-Quinn criter.	-0.671047
F-statistic	43.55806	Durbin-Watson stat	2.106901
Prob(F-statistic)	0.000000		

Appendix 4.2.4 Inflation Rate (INFLA)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: INFLA has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.440695	0.1318
Test critical values:	1% level	-3.459101	
	5% level	-2.874086	
	10% level	-2.573533	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLA)
Method: Least Squares
Date: 07/09/13 Time: 14:40
Sample (adjusted): 1994M02 2012M12
Included observations: 227 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLA(-1)	-0.073633	0.030169	-2.440695	0.0155
D(INFLA(-1))	0.453840	0.056496	8.033108	0.0000
D(INFLA(-2))	-0.119072	0.064104	-1.857475	0.0646
D(INFLA(-3))	0.026132	0.064399	0.405779	0.6853
D(INFLA(-4))	0.076631	0.064336	1.191109	0.2349
D(INFLA(-5))	-0.086690	0.064365	-1.346849	0.1795
D(INFLA(-6))	0.087782	0.064483	1.361332	0.1748
D(INFLA(-7))	-0.013045	0.064859	-0.201129	0.8408
D(INFLA(-8))	-0.011626	0.064228	-0.181008	0.8565
D(INFLA(-9))	0.034766	0.064229	0.541282	0.5889
D(INFLA(-10))	-0.007583	0.064210	-0.118090	0.9061
D(INFLA(-11))	0.190774	0.062658	3.044659	0.0026
D(INFLA(-12))	-0.541046	0.058301	-9.280254	0.0000
C	0.180573	0.078279	2.306770	0.0220

R-squared	0.500083	Mean dependent var	-0.003436
Adjusted R-squared	0.469572	S.D. dependent var	0.436161
S.E. of regression	0.317659	Akaike info criterion	0.604011
Sum squared resid	21.49319	Schwarz criterion	0.815242
Log likelihood	-54.55526	Hannan-Quinn criter.	0.689246

F-statistic	16.39006	Durbin-Watson stat	1.877891
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: INFLA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 12 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.466868	0.3444
Test critical values:	1% level	-3.998997	
	5% level	-3.429745	
	10% level	-3.138397	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLA)
Method: Least Squares
Date: 07/09/13 Time: 14:41
Sample (adjusted): 1994M02 2012M12
Included observations: 227 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLA(-1)	-0.075464	0.030591	-2.466868	0.0144
D(INFLA(-1))	0.454457	0.056631	8.024873	0.0000
D(INFLA(-2))	-0.117914	0.064301	-1.833787	0.0681
D(INFLA(-3))	0.027149	0.064580	0.420395	0.6746
D(INFLA(-4))	0.077538	0.064506	1.202027	0.2307
D(INFLA(-5))	-0.085876	0.064527	-1.330843	0.1847
D(INFLA(-6))	0.088636	0.064648	1.371043	0.1718
D(INFLA(-7))	-0.012229	0.065022	-0.188080	0.8510
D(INFLA(-8))	-0.010636	0.064406	-0.165143	0.8690
D(INFLA(-9))	0.035760	0.064408	0.555219	0.5793
D(INFLA(-10))	-0.006624	0.064385	-0.102877	0.9182
D(INFLA(-11))	0.191673	0.062826	3.050870	0.0026
D(INFLA(-12))	-0.539674	0.058523	-9.221605	0.0000
C	0.201200	0.094583	2.127227	0.0346
@TREND(1993M01)	-0.000127	0.000326	-0.390252	0.6967

R-squared	0.500442	Mean dependent var	-0.003436
Adjusted R-squared	0.467452	S.D. dependent var	0.436161

S.E. of regression	0.318293	Akaike info criterion	0.612104
Sum squared resid	21.47776	Schwarz criterion	0.838422
Log likelihood	-54.47376	Hannan-Quinn criter.	0.703426
F-statistic	15.16965	Durbin-Watson stat	1.877112
Prob(F-statistic)	0.000000		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: INFLA has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.741495	0.0041
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.174187
HAC corrected variance (Bartlett kernel)	0.279426

Phillips-Perron Test Equation
Dependent Variable: D(INFLA)
Method: Least Squares
Date: 07/09/13 Time: 14:41
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLA(-1)	-0.072720	0.024317	-2.990546	0.0031
C	0.175574	0.066604	2.636110	0.0089

R-squared	0.036364	Mean dependent var	-0.006360
Adjusted R-squared	0.032298	S.D. dependent var	0.426051
S.E. of regression	0.419114	Akaike info criterion	1.106985
Sum squared resid	41.63057	Schwarz criterion	1.136077
Log likelihood	-130.2847	Hannan-Quinn criter.	1.118708
F-statistic	8.943362	Durbin-Watson stat	1.177764
Prob(F-statistic)	0.003079		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: INFLA has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.764939	0.0201
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.174092
HAC corrected variance (Bartlett kernel)	0.279479

Phillips-Perron Test Equation
Dependent Variable: D(INFLA)
Method: Least Squares
Date: 07/09/13 Time: 14:41
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLA(-1)	-0.073769	0.024537	-3.006452	0.0029
C	0.195241	0.086414	2.259375	0.0248
@TREND(1993M01)	-0.000142	0.000397	-0.358169	0.7205

R-squared	0.036887	Mean dependent var	-0.006360
Adjusted R-squared	0.028725	S.D. dependent var	0.426051
S.E. of regression	0.419887	Akaike info criterion	1.114810
Sum squared resid	41.60796	Schwarz criterion	1.158447
Log likelihood	-130.2197	Hannan-Quinn criter.	1.132394
F-statistic	4.519377	Durbin-Watson stat	1.177236
Prob(F-statistic)	0.011855		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(INFLA) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.256233	0.0000
Test critical values:	1% level	-3.459101	
	5% level	-2.874086	
	10% level	-2.573533	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLA,2)
Method: Least Squares
Date: 07/09/13 Time: 14:42
Sample (adjusted): 1994M02 2012M12
Included observations: 227 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLA(-1))	-1.351662	0.146027	-9.256233	0.0000
D(INFLA(-1),2)	0.774733	0.138377	5.598729	0.0000
D(INFLA(-2),2)	0.609075	0.133643	4.557470	0.0000
D(INFLA(-3),2)	0.594136	0.125790	4.723247	0.0000
D(INFLA(-4),2)	0.630086	0.117225	5.375004	0.0000
D(INFLA(-5),2)	0.502840	0.110723	4.541401	0.0000
D(INFLA(-6),2)	0.555139	0.102293	5.426951	0.0000
D(INFLA(-7),2)	0.503752	0.092657	5.436758	0.0000
D(INFLA(-8),2)	0.458818	0.085409	5.372003	0.0000
D(INFLA(-9),2)	0.460679	0.074730	6.164605	0.0000
D(INFLA(-10),2)	0.420157	0.062533	6.718976	0.0000
D(INFLA(-11),2)	0.584001	0.056221	10.38762	0.0000
C	-0.003418	0.021334	-0.160225	0.8729

R-squared	0.577186	Mean dependent var	0.000925
Adjusted R-squared	0.553476	S.D. dependent var	0.480852
S.E. of regression	0.321317	Akaike info criterion	0.622784
Sum squared resid	22.09429	Schwarz criterion	0.818926
Log likelihood	-57.68595	Hannan-Quinn criter.	0.701930
F-statistic	24.34436	Durbin-Watson stat	1.903057
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(INFLA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 11 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.234288	0.0000
Test critical values:	1% level	-3.998997	
	5% level	-3.429745	
	10% level	-3.138397	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLA,2)
Method: Least Squares
Date: 07/09/13 Time: 14:42
Sample (adjusted): 1994M02 2012M12
Included observations: 227 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLA(-1))	-1.351651	0.146373	-9.234288	0.0000
D(INFLA(-1),2)	0.774717	0.138708	5.585241	0.0000
D(INFLA(-2),2)	0.609058	0.133964	4.546447	0.0000
D(INFLA(-3),2)	0.594119	0.126092	4.711782	0.0000
D(INFLA(-4),2)	0.630066	0.117512	5.361730	0.0000
D(INFLA(-5),2)	0.502814	0.111004	4.529693	0.0000
D(INFLA(-6),2)	0.555112	0.102557	5.412717	0.0000
D(INFLA(-7),2)	0.503722	0.092910	5.421610	0.0000
D(INFLA(-8),2)	0.458792	0.085637	5.357412	0.0000
D(INFLA(-9),2)	0.460658	0.074925	6.148288	0.0000
D(INFLA(-10),2)	0.420141	0.062694	6.701412	0.0000
D(INFLA(-11),2)	0.583992	0.056358	10.36218	0.0000
C	-0.002933	0.046352	-0.063280	0.9496
@TREND(1993M01)	-3.85E-06	0.000326	-0.011794	0.9906

R-squared	0.577186	Mean dependent var	0.000925
Adjusted R-squared	0.551380	S.D. dependent var	0.480852
S.E. of regression	0.322070	Akaike info criterion	0.631594
Sum squared resid	22.09428	Schwarz criterion	0.842824
Log likelihood	-57.68588	Hannan-Quinn criter.	0.716828
F-statistic	22.36674	Durbin-Watson stat	1.903050
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(INFLA) has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.828357	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.153785
HAC corrected variance (Bartlett kernel)	0.127171

Phillips-Perron Test Equation
Dependent Variable: D(INFLA,2)
Method: Least Squares
Date: 07/09/13 Time: 14:42
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLA(-1))	-0.609119	0.059916	-10.16626	0.0000
C	-0.003881	0.025530	-0.152018	0.8793

R-squared	0.304559	Mean dependent var	-4.20E-05
Adjusted R-squared	0.301612	S.D. dependent var	0.471239
S.E. of regression	0.393813	Akaike info criterion	0.982485
Sum squared resid	36.60088	Schwarz criterion	1.011664
Log likelihood	-114.9157	Hannan-Quinn criter.	0.994245
F-statistic	103.3528	Durbin-Watson stat	1.835821
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(INFLA) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.804644	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.153785
HAC corrected variance (Bartlett kernel)	0.127171

Phillips-Perron Test Equation
Dependent Variable: D(INFLA,2)
Method: Least Squares
Date: 07/09/13 Time: 14:42
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLA(-1))	-0.609119	0.060043	-10.14469	0.0000
C	-0.003787	0.051649	-0.073320	0.9416
@TREND(1993M01)	-7.81E-07	0.000372	-0.002097	0.9983

R-squared	0.304559	Mean dependent var	-4.20E-05
Adjusted R-squared	0.298640	S.D. dependent var	0.471239
S.E. of regression	0.394650	Akaike info criterion	0.990889
Sum squared resid	36.60088	Schwarz criterion	1.034657
Log likelihood	-114.9157	Hannan-Quinn criter.	1.008528
F-statistic	51.45743	Durbin-Watson stat	1.835821
Prob(F-statistic)	0.000000		

Appendix 4.2.5 Exchange Rate (EX)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: LEX has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.959542	0.7676
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 07/09/13 Time: 14:46
Sample (adjusted): 1993M04 2012M12
Included observations: 237 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.008091	0.008433	-0.959542	0.3383
D(LEX(-1))	0.410122	0.064682	6.340633	0.0000
D(LEX(-2))	-0.148656	0.065081	-2.284190	0.0233
C	0.036550	0.038359	0.952858	0.3416

R-squared	0.148669	Mean dependent var	-0.000330
Adjusted R-squared	0.137707	S.D. dependent var	0.012002
S.E. of regression	0.011145	Akaike info criterion	-6.138934
Sum squared resid	0.028941	Schwarz criterion	-6.080401
Log likelihood	731.4637	Hannan-Quinn criter.	-6.115342
F-statistic	13.56301	Durbin-Watson stat	1.981273
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: LEX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.271944	0.8921
Test critical values:	1% level	-3.997250	
	5% level	-3.428900	
	10% level	-3.137898	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 07/09/13 Time: 14:46
Sample (adjusted): 1993M04 2012M12
Included observations: 237 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.010928	0.008591	-1.271944	0.2047
D(LEX(-1))	0.404214	0.064576	6.259533	0.0000
D(LEX(-2))	-0.153398	0.064935	-2.362322	0.0190
C	0.051538	0.039373	1.308972	0.1918
@TREND(1993M01)	-1.73E-05	1.09E-05	-1.593093	0.1125

R-squared	0.157881	Mean dependent var	-0.000330
Adjusted R-squared	0.143362	S.D. dependent var	0.012002
S.E. of regression	0.011108	Akaike info criterion	-6.141375
Sum squared resid	0.028628	Schwarz criterion	-6.068209
Log likelihood	732.7530	Hannan-Quinn criter.	-6.111885
F-statistic	10.87388	Durbin-Watson stat	1.984917
Prob(F-statistic)	0.000000		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: LEX has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.952190	0.7701
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000142
HAC corrected variance (Bartlett kernel)	0.000215

Phillips-Perron Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 07/09/13 Time: 14:47
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.005607	0.008949	-0.626524	0.5316
C	0.025142	0.040700	0.617725	0.5374

R-squared	0.001654	Mean dependent var	-0.000354
Adjusted R-squared	-0.002559	S.D. dependent var	0.011960
S.E. of regression	0.011975	Akaike info criterion	-6.003668
Sum squared resid	0.033986	Schwarz criterion	-5.974576
Log likelihood	719.4383	Hannan-Quinn criter.	-5.991945
F-statistic	0.392533	Durbin-Watson stat	1.290494
Prob(F-statistic)	0.531574		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: LEX has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.218265	0.9039
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000140
HAC corrected variance (Bartlett kernel)	0.000204

Phillips-Perron Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 07/09/13 Time: 14:47
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.008922	0.009117	-0.978667	0.3287
C	0.042586	0.041776	1.019391	0.3091
@TREND(1993M01)	-1.97E-05	1.14E-05	-1.723978	0.0860

R-squared	0.014070	Mean dependent var	-0.000354
Adjusted R-squared	0.005715	S.D. dependent var	0.011960
S.E. of regression	0.011925	Akaike info criterion	-6.007814
Sum squared resid	0.033563	Schwarz criterion	-5.964177
Log likelihood	720.9338	Hannan-Quinn criter.	-5.990230
F-statistic	1.683949	Durbin-Watson stat	1.302435
Prob(F-statistic)	0.187862		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.18732	0.0000
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 07/09/13 Time: 14:47
Sample (adjusted): 1993M04 2012M12
Included observations: 237 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.748832	0.073506	-10.18732	0.0000
D(LEX(-1),2)	0.156072	0.064609	2.415624	0.0165
C	-0.000250	0.000724	-0.344913	0.7305

R-squared	0.340252	Mean dependent var	-4.04E-06
Adjusted R-squared	0.334613	S.D. dependent var	0.013660
S.E. of regression	0.011143	Akaike info criterion	-6.143429
Sum squared resid	0.029055	Schwarz criterion	-6.099530
Log likelihood	730.9964	Hannan-Quinn criter.	-6.125735
F-statistic	60.34047	Durbin-Watson stat	1.983232
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.29457	0.0000
Test critical values:	1% level	-3.997250	
	5% level	-3.428900	
	10% level	-3.137898	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 07/09/13 Time: 14:47
Sample (adjusted): 1993M04 2012M12
Included observations: 237 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.760732	0.073896	-10.29457	0.0000
D(LEX(-1),2)	0.162198	0.064651	2.508816	0.0128
C	0.001493	0.001474	1.013138	0.3120
@TREND(1993M01)	-1.44E-05	1.06E-05	-1.357209	0.1760

R-squared	0.345427	Mean dependent var	-4.04E-06
Adjusted R-squared	0.336999	S.D. dependent var	0.013660
S.E. of regression	0.011123	Akaike info criterion	-6.142865
Sum squared resid	0.028827	Schwarz criterion	-6.084332
Log likelihood	731.9295	Hannan-Quinn criter.	-6.119273
F-statistic	40.98574	Durbin-Watson stat	1.986848
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.38055	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000125
HAC corrected variance (Bartlett kernel)	0.000109

Phillips-Perron Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 07/09/13 Time: 14:48
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.648069	0.060989	-10.62594	0.0000
C	-0.000246	0.000729	-0.337282	0.7362

R-squared	0.323609	Mean dependent var	-3.77E-05
Adjusted R-squared	0.320743	S.D. dependent var	0.013642
S.E. of regression	0.011243	Akaike info criterion	-6.129781
Sum squared resid	0.029831	Schwarz criterion	-6.100603
Log likelihood	731.4440	Hannan-Quinn criter.	-6.118022
F-statistic	112.9106	Durbin-Watson stat	1.885574
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.39744	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000125
HAC corrected variance (Bartlett kernel)	0.000105

Phillips-Perron Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 07/09/13 Time: 14:48
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.654524	0.061249	-10.68629	0.0000
C	0.001156	0.001474	0.784074	0.4338
@TREND(1993M01)	-1.17E-05	1.07E-05	-1.093782	0.2752

R-squared	0.327035	Mean dependent var	-3.77E-05
Adjusted R-squared	0.321308	S.D. dependent var	0.013642
S.E. of regression	0.011238	Akaike info criterion	-6.126456
Sum squared resid	0.029680	Schwarz criterion	-6.082688
Log likelihood	732.0483	Hannan-Quinn criter.	-6.108817
F-statistic	57.10044	Durbin-Watson stat	1.884323
Prob(F-statistic)	0.000000		

Appendix 4.2.6 Financial Crisis (DUMMY)

Augmented Dickey-Fuller Test at level (constants without trend)

Null Hypothesis: DUMMY has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.868093	0.0507
Test critical values:	1% level	-3.458845	
	5% level	-2.873974	
	10% level	-2.573472	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DUMMY)
Method: Least Squares
Date: 07/09/13 Time: 14:49
Sample (adjusted): 1993M12 2012M12
Included observations: 229 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DUMMY(-1)	-0.109569	0.038203	-2.868093	0.0045
D(DUMMY(-1))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-2))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-3))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-4))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-5))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-6))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-7))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-8))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-9))	0.054785	0.060785	0.901282	0.3684
D(DUMMY(-10))	-0.445215	0.060785	-7.324390	0.0000
C	0.004785	0.005645	0.847599	0.3976

R-squared	0.277392	Mean dependent var	0.000000
Adjusted R-squared	0.240762	S.D. dependent var	0.093659
S.E. of regression	0.081609	Akaike info criterion	-2.122783
Sum squared resid	1.445215	Schwarz criterion	-1.942850
Log likelihood	255.0587	Hannan-Quinn criter.	-2.050194
F-statistic	7.572843	Durbin-Watson stat	1.966246
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at level (constants with trend)

Null Hypothesis: DUMMY has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 10 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.985353	0.1386
Test critical values:	1% level	-3.998635	
	5% level	-3.429570	
	10% level	-3.138293	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DUMMY)
Method: Least Squares
Date: 07/09/13 Time: 14:50
Sample (adjusted): 1993M12 2012M12
Included observations: 229 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DUMMY(-1)	-0.121539	0.040712	-2.985353	0.0032
D(DUMMY(-1))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-2))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-3))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-4))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-5))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-6))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-7))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-8))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-9))	0.061141	0.061276	0.997794	0.3195
D(DUMMY(-10))	-0.438859	0.061276	-7.161981	0.0000
C	-0.003982	0.011710	-0.340027	0.7342
@TREND(1993M01)	7.43E-05	8.70E-05	0.854595	0.3937

R-squared	0.279827	Mean dependent var	0.000000
Adjusted R-squared	0.239818	S.D. dependent var	0.093659
S.E. of regression	0.081659	Akaike info criterion	-2.117425
Sum squared resid	1.440345	Schwarz criterion	-1.922498
Log likelihood	255.4452	Hannan-Quinn criter.	-2.038786
F-statistic	6.994007	Durbin-Watson stat	1.962164
Prob(F-statistic)	0.000000		

Phillips-Perron Test at level (constants without trend)

Null Hypothesis: DUMMY has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.886235	0.0025
Test critical values:	1% level	-3.457630	
	5% level	-2.873440	
	10% level	-2.573187	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.007932
HAC corrected variance (Bartlett kernel)	0.009313

Phillips-Perron Test Equation
Dependent Variable: D(DUMMY)
Method: Least Squares
Date: 07/09/13 Time: 14:50
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DUMMY(-1)	-0.104367	0.028892	-3.612254	0.0004
C	0.004367	0.005910	0.738889	0.4607

R-squared	0.052183	Mean dependent var	0.000000
Adjusted R-squared	0.048184	S.D. dependent var	0.091670
S.E. of regression	0.089434	Akaike info criterion	-1.982297
Sum squared resid	1.895633	Schwarz criterion	-1.953205
Log likelihood	238.8845	Hannan-Quinn criter.	-1.970574
F-statistic	13.04838	Durbin-Watson stat	1.901379
Prob(F-statistic)	0.000371		

Phillips-Perron Test at level (constants with trend)

Null Hypothesis: DUMMY has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.971296	0.0108
Test critical values:	1% level	-3.996918	
	5% level	-3.428739	
	10% level	-3.137804	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.007914
HAC corrected variance (Bartlett kernel)	0.009350

Phillips-Perron Test Equation
Dependent Variable: D(DUMMY)
Method: Least Squares
Date: 07/09/13 Time: 14:50
Sample (adjusted): 1993M02 2012M12
Included observations: 239 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DUMMY(-1)	-0.109100	0.029667	-3.677517	0.0003
C	-0.002839	0.011666	-0.243322	0.8080
@TREND(1993M01)	6.17E-05	8.61E-05	0.716596	0.4743

R-squared	0.054241	Mean dependent var	0.000000
Adjusted R-squared	0.046226	S.D. dependent var	0.091670
S.E. of regression	0.089526	Akaike info criterion	-1.976102
Sum squared resid	1.891517	Schwarz criterion	-1.932465
Log likelihood	239.1442	Hannan-Quinn criter.	-1.958518
F-statistic	6.767551	Durbin-Watson stat	1.896577
Prob(F-statistic)	0.001387		

Augmented Dickey-Fuller Test at 1st difference (constants without trend)

Null Hypothesis: D(DUMMY) has a unit root
Exogenous: Constant
Lag Length: 9 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.087027	0.0000
Test critical values:	1% level	-3.458845	
	5% level	-2.873974	
	10% level	-2.573472	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DUMMY,2)
Method: Least Squares
Date: 07/09/13 Time: 14:50
Sample (adjusted): 1993M12 2012M12
Included observations: 229 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DUMMY(-1))	-1.500000	0.185482	-8.087027	0.0000
D(DUMMY(-1),2)	0.500000	0.175964	2.841492	0.0049
D(DUMMY(-2),2)	0.500000	0.165900	3.013857	0.0029
D(DUMMY(-3),2)	0.500000	0.155186	3.221949	0.0015
D(DUMMY(-4),2)	0.500000	0.143674	3.480102	0.0006
D(DUMMY(-5),2)	0.500000	0.131156	3.812261	0.0002
D(DUMMY(-6),2)	0.500000	0.117309	4.262237	0.0000
D(DUMMY(-7),2)	0.500000	0.101593	4.921608	0.0000
D(DUMMY(-8),2)	0.500000	0.082950	6.027714	0.0000
D(DUMMY(-9),2)	0.500000	0.058655	8.524475	0.0000
C	0.000000	0.005482	0.000000	1.0000

R-squared	0.625000	Mean dependent var	0.000000
Adjusted R-squared	0.607798	S.D. dependent var	0.132453
S.E. of regression	0.082950	Akaike info criterion	-2.094310
Sum squared resid	1.500000	Schwarz criterion	-1.929371
Log likelihood	250.7985	Hannan-Quinn criter.	-2.027770
F-statistic	36.33333	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller Test at 1st difference (constants with trend)

Null Hypothesis: D(DUMMY) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic based on SIC, MAXLAG=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.071079	0.0000
Test critical values:	1% level	-3.998635	
	5% level	-3.429570	
	10% level	-3.138293	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DUMMY,2)
Method: Least Squares
Date: 07/09/13 Time: 14:50
Sample (adjusted): 1993M12 2012M12
Included observations: 229 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DUMMY(-1))	-1.500750	0.185942	-8.071079	0.0000
D(DUMMY(-1),2)	0.500675	0.176395	2.838368	0.0050
D(DUMMY(-2),2)	0.500600	0.166303	3.010168	0.0029
D(DUMMY(-3),2)	0.500525	0.155558	3.217603	0.0015
D(DUMMY(-4),2)	0.500450	0.144015	3.474975	0.0006
D(DUMMY(-5),2)	0.500375	0.131464	3.806169	0.0002
D(DUMMY(-6),2)	0.500300	0.117582	4.254895	0.0000
D(DUMMY(-7),2)	0.500225	0.101827	4.912516	0.0000
D(DUMMY(-8),2)	0.500150	0.083139	6.015827	0.0000
D(DUMMY(-9),2)	0.500075	0.058787	8.506601	0.0000
C	0.001875	0.011754	0.159489	0.8734
@TREND(1993M01)	-1.50E-05	8.31E-05	-0.180409	0.8570

R-squared	0.625056	Mean dependent var	0.000000
Adjusted R-squared	0.606050	S.D. dependent var	0.132453
S.E. of regression	0.083135	Akaike info criterion	-2.085726
Sum squared resid	1.499775	Schwarz criterion	-1.905793
Log likelihood	250.8157	Hannan-Quinn criter.	-2.013137
F-statistic	32.88668	Durbin-Watson stat	2.000150
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants without trend)

Null Hypothesis: D(DUMMY) has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-15.36229	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.008403
HAC corrected variance (Bartlett kernel)	0.008403

Phillips-Perron Test Equation
Dependent Variable: D(DUMMY,2)
Method: Least Squares
Date: 07/09/13 Time: 14:51
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DUMMY(-1))	-1.000000	0.065094	-15.36229	0.0000
C	0.000000	0.005967	0.000000	1.0000

R-squared	0.500000	Mean dependent var	0.000000
Adjusted R-squared	0.497881	S.D. dependent var	0.129914
S.E. of regression	0.092057	Akaike info criterion	-1.924440
Sum squared resid	2.000000	Schwarz criterion	-1.895261
Log likelihood	231.0083	Hannan-Quinn criter.	-1.912680
F-statistic	236.0000	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Phillips-Perron Test at 1st difference (constants with trend)

Null Hypothesis: D(DUMMY) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-15.33039	0.0000
Test critical values:	1% level	-3.997083	
	5% level	-3.428819	
	10% level	-3.137851	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.008403
HAC corrected variance (Bartlett kernel)	0.008403

Phillips-Perron Test Equation
Dependent Variable: D(DUMMY,2)
Method: Least Squares
Date: 07/09/13 Time: 14:51
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DUMMY(-1))	-1.000045	0.065233	-15.33039	0.0000
C	0.001073	0.012073	0.088848	0.9293
@TREND(1993M01)	-8.90E-06	8.70E-05	-0.102274	0.9186

R-squared	0.500022	Mean dependent var	0.000000
Adjusted R-squared	0.495767	S.D. dependent var	0.129914
S.E. of regression	0.092251	Akaike info criterion	-1.916081
Sum squared resid	1.999911	Schwarz criterion	-1.872313
Log likelihood	231.0136	Hannan-Quinn criter.	-1.898442
F-statistic	117.5105	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Appendix 4.3 Residual Checking

Date: 07/09/13 Time: 15:01
Sample: 1993M01 2012M12
Included observations: 238

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	0.016	0.016	0.0597	0.807
.|. |	.|. |	2	-0.053	-0.053	0.7347	0.693
.|. |	.|. |	3	0.034	0.036	1.0231	0.796
.|. |	.|. |	4	-0.056	-0.060	1.7826	0.776
.|* |	.|* |	5	0.133	0.140	6.0995	0.297
.|. |	.|. |	6	-0.036	-0.051	6.4125	0.379
.|. |	.|. |	7	-0.031	-0.008	6.6468	0.467
.|* |	.|* |	8	0.106	0.090	9.4431	0.306
.|* |	.|* |	9	0.091	0.106	11.527	0.241
.|. |	.|. |	10	0.060	0.046	12.436	0.257
.|. |	.|. |	11	0.022	0.034	12.561	0.323
.|* |	.|* |	12	0.077	0.095	14.040	0.298
.|. |	.|. |	13	0.025	0.006	14.198	0.360
.|. |	.|. |	14	-0.028	-0.032	14.392	0.421
.|. |	.|. |	15	-0.030	-0.033	14.625	0.479
.|. |	.|. |	16	0.027	0.029	14.818	0.538
.|. |	.|. |	17	0.034	-0.005	15.119	0.587
.|. |	.|. |	18	0.053	0.039	15.841	0.604
.|* |	.|* |	19	0.092	0.089	18.060	0.518
.|. |	.|. |	20	-0.008	-0.022	18.079	0.582
.|. |	.|. |	21	-0.031	-0.058	18.337	0.628
.|. |	.|. |	22	0.005	-0.006	18.343	0.685
.|. |	.|. |	23	0.029	0.037	18.568	0.726
.|. |	.|. |	24	0.060	0.038	19.545	0.722
.|. |	.|. |	25	0.017	0.023	19.624	0.766
*|. |	*|. |	26	-0.089	-0.083	21.742	0.703
*|. |	*|. |	27	-0.080	-0.110	23.473	0.659
*|. |	*|. |	28	-0.078	-0.130	25.119	0.621
.|. |	.|. |	29	0.027	0.008	25.313	0.662
.|. |	.|. |	30	0.054	0.043	26.128	0.669
*|. |	*|. |	31	-0.075	-0.072	27.671	0.638
.|. |	.|. |	32	-0.037	-0.044	28.059	0.666
.|. |	.|. |	33	0.028	0.032	28.274	0.702
.|. |	.|. |	34	-0.011	-0.017	28.309	0.742
.|. |	.|. |	35	0.005	-0.003	28.316	0.781
*|. |	.|. |	36	-0.080	-0.037	30.109	0.744

Appendix 4.4 Johansen Juselius Cointegration Test

Date: 07/09/13 Time: 14:55
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments
Trend assumption: Linear deterministic trend
Series: LSP500 LOP INT INFLA LEX DUMMY
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.01 Critical Value	Prob.**
None *	0.212274	120.9026	104.9615	0.0003
At most 1	0.105207	64.11453	77.81884	0.1311
At most 2	0.086072	37.65778	54.68150	0.3172
At most 3	0.042569	16.23698	35.45817	0.6955
At most 4	0.022713	5.883557	19.93711	0.7092
At most 5	0.001745	0.415615	6.634897	0.5191

Trace test indicates 1 cointegrating eqn(s) at the 0.01 level
* denotes rejection of the hypothesis at the 0.01 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.01 Critical Value	Prob.**
None *	0.212274	56.78804	45.86900	0.0003
At most 1	0.105207	26.45675	39.37013	0.2936
At most 2	0.086072	21.42080	32.71527	0.2516
At most 3	0.042569	10.35342	25.86121	0.7109
At most 4	0.022713	5.467941	18.52001	0.6820
At most 5	0.001745	0.415615	6.634897	0.5191

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.01 level
* denotes rejection of the hypothesis at the 0.01 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LSP500	LOP	INT	INFLA	LEX	DUMMY
0.853273	-1.144323	-0.349188	1.308245	-0.017400	3.954063
-1.007353	0.768940	-0.041536	0.151702	1.567886	-5.258420
4.369295	-3.120225	-0.115581	0.278951	-15.50224	0.547790
-2.373514	-0.146604	-0.019843	0.047566	-3.705555	0.038585
1.187874	-1.919203	-0.679869	0.117299	-1.338933	-0.949789
-0.940080	-0.181942	0.123127	0.087003	9.289378	-0.501208

Unrestricted Adjustment Coefficients (alpha):

D(LSP500)	-0.006782	0.001091	0.001662	0.004877	-0.000403	0.000797
D(LOP)	-0.009960	-0.002623	0.007457	-0.006716	0.007089	0.001505
D(INT)	0.008248	-0.000692	0.003056	0.020491	0.018568	-0.001900
D(INFLA)	-0.137829	0.044209	0.009045	-0.020216	0.012174	-0.003855
D(LEX)	0.001431	-0.000229	0.002412	-3.15E-05	-0.000280	-0.000245
D(DUMMY)	0.013615	0.026151	0.003768	-0.003504	8.31E-05	0.000612

1 Cointegrating Equation(s): Log likelihood 1778.999

Normalized cointegrating coefficients (standard error in parentheses)

LSP500	LOP	INT	INFLA	LEX	DUMMY
1.000000	-1.341098	-0.409234	1.533208	-0.020392	4.633996
	(0.33797)	(0.10751)	(0.19287)	(1.94115)	(0.95366)

Adjustment coefficients (standard error in parentheses)

D(LSP500)	-0.005786
	(0.00190)
D(LOP)	-0.008499
	(0.00423)
D(INT)	0.007038
	(0.00933)
D(INFLA)	-0.117606
	(0.01905)
D(LEX)	0.001221
	(0.00060)
D(DUMMY)	0.011617
	(0.00499)

2 Cointegrating Equation(s): Log likelihood 1792.227

Normalized cointegrating coefficients (standard error in parentheses)

LSP500	LOP	INT	INFLA	LEX	DUMMY
1.000000	0.000000	0.636371	-2.375163	-3.585802	5.994286
		(0.27110)	(0.57046)	(6.03698)	(3.06927)
0.000000	1.000000	0.779662	-2.914305	-2.658574	1.014311
		(0.23430)	(0.49303)	(5.21758)	(2.65268)

Adjustment coefficients (standard error in parentheses)

D(LSP500)	-0.006885	0.008599
	(0.00294)	(0.00307)
D(LOP)	-0.005856	0.009380
	(0.00654)	(0.00683)
D(INT)	0.007735	-0.009971
	(0.01443)	(0.01507)
D(INFLA)	-0.162139	0.191715
	(0.02922)	(0.03052)
D(LEX)	0.001452	-0.001813
	(0.00093)	(0.00097)
D(DUMMY)	-0.014726	0.004529
	(0.00737)	(0.00770)

3 Cointegrating Equation(s): Log likelihood 1802.938

Normalized cointegrating coefficients (standard error in parentheses)

LSP500	LOP	INT	INFLA	LEX	DUMMY
1.000000	0.000000	0.000000	-0.227898	-14.75188	-24.87751
			(0.96713)	(10.2990)	(5.41875)
0.000000	1.000000	0.000000	-0.283540	-16.33892	-36.80891
			(1.41166)	(15.0329)	(7.90944)
0.000000	0.000000	1.000000	-3.374237	17.54650	48.51230
			(2.25872)	(24.0532)	(12.6554)

Adjustment coefficients (standard error in parentheses)

D(LSP500)	0.000377	0.003413	0.002131
	(0.01016)	(0.00759)	(0.00082)
D(LOP)	0.026725	-0.013886	0.002725
	(0.02250)	(0.01681)	(0.00182)
D(INT)	0.021088	-0.019506	-0.003205
	(0.04988)	(0.03728)	(0.00405)
D(INFLA)	-0.122619	0.163492	0.045246
	(0.10101)	(0.07549)	(0.00819)
D(LEX)	0.011992	-0.009340	-0.000769
	(0.00312)	(0.00233)	(0.00025)
D(DUMMY)	0.001736	-0.007227	-0.006276
	(0.02546)	(0.01903)	(0.00207)

4 Cointegrating Equation(s): Log likelihood 1808.114

Normalized cointegrating coefficients (standard error in parentheses)

LSP500	LOP	INT	INFLA	LEX	DUMMY
1.000000	0.000000	0.000000	0.000000	0.684235	-0.855305
				(1.44292)	(0.68147)
0.000000	1.000000	0.000000	0.000000	2.865949	-6.921633
				(3.25849)	(1.53893)
0.000000	0.000000	1.000000	0.000000	246.0921	404.1828
				(168.592)	(79.6230)

0.000000	0.000000	0.000000	1.000000	67.73254	105.4077
				(43.1828)	(20.3945)

Adjustment coefficients (standard error in parentheses)

D(LSP500)	-0.011199	0.002698	0.002034	-0.008011
	(0.01133)	(0.00752)	(0.00082)	(0.00297)
D(LOP)	0.042666	-0.012902	0.002858	-0.011667
	(0.02525)	(0.01676)	(0.00182)	(0.00661)
D(INT)	-0.027547	-0.022510	-0.003611	0.012513
	(0.05579)	(0.03703)	(0.00402)	(0.01461)
D(INFLA)	-0.074636	0.166456	0.045648	-0.172046
	(0.11364)	(0.07542)	(0.00819)	(0.02976)
D(LEX)	0.012066	-0.009336	-0.000768	0.002509
	(0.00352)	(0.00234)	(0.00025)	(0.00092)
D(DUMMY)	0.010053	-0.006713	-0.006206	0.022663
	(0.02868)	(0.01903)	(0.00207)	(0.00751)

5 Cointegrating Equation(s): Log likelihood 1810.848

Normalized cointegrating coefficients (standard error in parentheses)

LSP500	LOP	INT	INFLA	LEX	DUMMY
1.000000	0.000000	0.000000	0.000000	0.000000	-1.903265
					(0.73510)
0.000000	1.000000	0.000000	0.000000	0.000000	-11.31106
					(2.24972)
0.000000	0.000000	1.000000	0.000000	0.000000	27.27345
					(6.05270)
0.000000	0.000000	0.000000	1.000000	0.000000	1.670003
					(1.18392)
0.000000	0.000000	0.000000	0.000000	1.000000	1.531578
					(0.30490)

Adjustment coefficients (standard error in parentheses)

D(LSP500)	-0.011678	0.003471	0.002308	-0.008058	-0.041471
	(0.01163)	(0.00863)	(0.00171)	(0.00298)	(0.03540)
D(LOP)	0.051087	-0.026507	-0.001961	-0.010836	-0.104140
	(0.02580)	(0.01914)	(0.00378)	(0.00661)	(0.07854)
D(INT)	-0.005490	-0.058146	-0.016235	0.014691	-0.149395
	(0.05689)	(0.04220)	(0.00834)	(0.01457)	(0.17317)
D(INFLA)	-0.060175	0.143092	0.037371	-0.170618	-0.009896
	(0.11655)	(0.08646)	(0.01709)	(0.02985)	(0.35477)
D(LEX)	0.011734	-0.008799	-0.000578	0.002476	-0.037289
	(0.00361)	(0.00268)	(0.00053)	(0.00093)	(0.01100)
D(DUMMY)	0.010152	-0.006873	-0.006263	0.022673	-0.004770
	(0.02943)	(0.02183)	(0.00432)	(0.00754)	(0.08958)

Appendix 4.5 Vector Error Correction Model (VECM)

Vector Error Correction Estimates
Date: 07/09/13 Time: 14:53
Sample (adjusted): 1993M03 2012M12
Included observations: 238 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LSP500(-1)	1.000000
LOP(-1)	-1.341098 (0.33797) [-3.96812]
INT(-1)	-0.409234 (0.10751) [-3.80648]
INFLA(-1)	1.533208 (0.19287) [7.94943]
LEX(-1)	-0.020392 (1.94115) [-0.01051]
DUMMY(-1)	4.633996 (0.95366) [4.85917]
C	-4.780238

Error Correction:	D(LSP500)	D(LOP)	D(INT)	D(INFLA)	D(LEX)	D(DUMMY)
CointEq1	-0.005786 (0.00190) [-3.04108]	-0.008499 (0.00423) [-2.00956]	0.007038 (0.00933) [0.75464]	-0.117606 (0.01905) [-6.17282]	0.001221 (0.00060) [2.03588]	0.011617 (0.00499) [2.32948]
D(LSP500(-1))	0.166343 (0.06723) [2.47439]	0.059280 (0.14941) [0.39675]	0.825032 (0.32950) [2.50392]	-0.155849 (0.67312) [-0.23153]	0.025830 (0.02119) [1.21906]	0.210514 (0.17619) [1.19480]
D(LOP(-1))	0.001305 (0.03177) [0.04108]	0.159802 (0.07061) [2.26320]	0.112181 (0.15571) [0.72044]	0.549564 (0.31810) [1.72766]	-0.016276 (0.01001) [-1.62550]	-0.190849 (0.08326) [-2.29211]
D(INT(-1))	-0.013923 (0.01227) [-1.13431]	0.046942 (0.02728) [1.72065]	0.420290 (0.06016) [6.98587]	0.145970 (0.12291) [1.18766]	0.001893 (0.00387) [0.48938]	0.024200 (0.03217) [0.75223]

D(INFLA(-1))	-0.001617	0.003285	0.004485	0.315942	0.002962	0.012782
	(0.00592)	(0.01315)	(0.02900)	(0.05924)	(0.00186)	(0.01551)
	[-0.27325]	[0.24984]	[0.15468]	[5.33347]	[1.58857]	[0.82434]
D(LEX(-1))	-0.097076	-0.499179	0.148809	-2.796969	0.320403	0.633441
	(0.21135)	(0.46975)	(1.03592)	(2.11626)	(0.06661)	(0.55394)
	[-0.45931]	[-1.06264]	[0.14365]	[-1.32166]	[4.80977]	[1.14352]
D(DUMMY(-1))	-0.105948	-0.121321	-0.238948	-0.069660	0.020626	-0.087194
	(0.02776)	(0.06169)	(0.13604)	(0.27791)	(0.00875)	(0.07274)
	[-3.81723]	[-1.96669]	[-1.75649]	[-0.25066]	[2.35782]	[-1.19866]
C	0.003875	0.005370	-0.011469	-0.006150	-0.000236	0.000772
	(0.00227)	(0.00505)	(0.01114)	(0.02275)	(0.00072)	(0.00596)
	[1.70522]	[1.06320]	[-1.02976]	[-0.27031]	[-0.33010]	[0.12959]
R-squared	0.220880	0.151250	0.255252	0.368290	0.205618	0.065080
Adj. R-squared	0.197168	0.125418	0.232586	0.349064	0.181441	0.036626
Sum sq. resids	0.272209	1.344678	6.539351	27.29085	0.027041	1.869840
S.E. equation	0.034402	0.076462	0.168618	0.344465	0.010843	0.090165
F-statistic	9.314974	5.855242	11.26134	19.15585	8.504739	2.287192
Log likelihood	468.3337	278.2505	90.03012	-79.98677	743.1306	239.0163
Akaike AIC	-3.868351	-2.271012	-0.689329	0.739385	-6.177568	-1.941314
Schwarz SC	-3.751636	-2.154297	-0.572614	0.856100	-6.060853	-1.824599
Mean dependent	0.004913	0.006226	-0.012076	-0.006345	-0.000359	0.000000
S.D. dependent	0.038395	0.081761	0.192481	0.426948	0.011985	0.091863

Determinant resid covariance (dof adj.)	1.59E-14
Determinant resid covariance	1.30E-14
Log likelihood	1778.999
Akaike information criterion	-14.49579
Schwarz criterion	-13.70796

Appendix 4.6 Granger Causality Test

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 07/09/13 Time: 14:56
Sample: 1993M01 2012M12
Included observations: 238

Dependent variable: D(LSP500)

Excluded	Chi-sq	df	Prob.
D(LOP)	0.001687	1	0.9672
D(INT)	1.286660	1	0.2567
D(INFLA)	0.074665	1	0.7847
D(LEX)	0.210962	1	0.6460
D(DUMMY)	14.57125	1	0.0001
All	16.37553	5	0.0058

Dependent variable: D(LOP)

Excluded	Chi-sq	df	Prob.
D(LSP500)	0.157408	1	0.6916
D(INT)	2.960626	1	0.0853
D(INFLA)	0.062420	1	0.8027
D(LEX)	1.129209	1	0.2879
D(DUMMY)	3.867869	1	0.0492
All	8.946161	5	0.1112

Dependent variable: D(INT)

Excluded	Chi-sq	df	Prob.
D(LSP500)	6.269592	1	0.0123
D(LOP)	0.519039	1	0.4713
D(INFLA)	0.023926	1	0.8771
D(LEX)	0.020635	1	0.8858
D(DUMMY)	3.085245	1	0.0790
All	10.33330	5	0.0663

Dependent variable: D(INFLA)

Excluded	Chi-sq	df	Prob.
D(LSP500)	0.053607	1	0.8169
D(LOP)	2.984807	1	0.0840
D(INT)	1.410543	1	0.2350
D(LEX)	1.746779	1	0.1863
D(DUMMY)	0.062831	1	0.8021
All	7.426406	5	0.1908

Dependent variable: D(LEX)

Excluded	Chi-sq	df	Prob.
D(LSP500)	1.486101	1	0.2228
D(LOP)	2.642250	1	0.1041
D(INT)	0.239496	1	0.6246
D(INFLA)	2.523546	1	0.1122
D(DUMMY)	5.559327	1	0.0184
All	11.90768	5	0.0361

Dependent variable: D(DUMMY)

Excluded	Chi-sq	df	Prob.
D(LSP500)	1.427546	1	0.2322
D(LOP)	5.253763	1	0.0219
D(INT)	0.565843	1	0.4519
D(INFLA)	0.679543	1	0.4097
D(LEX)	1.307638	1	0.2528
All	8.975191	5	0.1101

Appendix 4.7 Variance Decomposition

Variance Decomposition of LSP500: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.034402	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.054674	94.38407	0.033980	0.008200	0.907499	0.091972	4.574276
3	0.070558	89.29422	0.028058	0.054363	3.056647	0.229583	7.337129
4	0.084567	84.25755	0.053060	0.079976	5.953520	0.317032	9.338862
5	0.097519	79.64226	0.117132	0.090138	9.017635	0.352900	10.77993
6	0.109688	75.63594	0.210205	0.093396	11.88162	0.358050	11.82080
7	0.121169	72.26891	0.316259	0.094215	14.39257	0.348786	12.57926
8	0.132011	69.48303	0.422935	0.094363	16.52480	0.334125	13.14075
9	0.142264	67.18946	0.523078	0.094438	18.30989	0.318385	13.56475
10	0.151977	65.29855	0.613472	0.094597	19.79812	0.303422	13.89184

Variance Decomposition of LOP: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.076462	0.392725	99.60727	0.000000	0.000000	0.000000	0.000000
2	0.119290	1.019679	96.50300	0.625701	0.200833	0.242863	1.407925
3	0.155007	1.396616	93.10775	1.241466	0.936404	0.521936	2.795830
4	0.186057	1.616288	89.68557	1.725391	2.172072	0.721332	4.079345
5	0.213794	1.735641	86.45530	2.077105	3.703449	0.842975	5.185532
6	0.239025	1.795430	83.52821	2.327441	5.328899	0.910294	6.109727
7	0.262269	1.821261	80.94960	2.505780	6.908849	0.943928	6.870576
8	0.283883	1.828456	78.71840	2.634470	8.366493	0.957959	7.494218
9	0.304129	1.825892	76.80727	2.729176	9.670182	0.961110	8.006366
10	0.323209	1.818590	75.17750	2.800510	10.81554	0.958535	8.429325

Variance Decomposition of INT: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.168618	3.150161	0.376109	96.47373	0.000000	0.000000	0.000000
2	0.301263	6.659045	0.710306	92.26138	0.005128	0.000233	0.363906
3	0.415778	8.592940	1.014157	89.52838	0.003268	0.003554	0.857698
4	0.514378	9.651598	1.245354	87.79792	0.006347	0.014356	1.284425
5	0.600732	10.25603	1.395162	86.66162	0.027651	0.027373	1.632169
6	0.677821	10.61879	1.481798	85.87720	0.069797	0.038718	1.913701
7	0.747783	10.84724	1.526411	85.30883	0.127697	0.047262	2.142557
8	0.812125	10.99762	1.545383	84.88001	0.194039	0.053260	2.329685
9	0.871928	11.10077	1.549633	84.54604	0.262530	0.057340	2.483684
10	0.927983	11.17430	1.545922	84.27948	0.328889	0.060088	2.611319

Variance Decomposition of INFLA: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.344465	0.027857	11.10605	0.018523	88.84757	0.000000	0.000000
2	0.537408	0.017346	16.84623	0.306180	81.47248	0.342980	1.014791
3	0.662104	0.062409	21.26753	1.190749	72.34973	0.926102	4.203482
4	0.749899	0.123347	24.15499	2.430948	62.40405	1.525511	9.361153
5	0.822330	0.170755	25.39777	3.744510	53.01689	2.000351	15.66972
6	0.890666	0.195012	25.27430	4.911942	45.20084	2.300691	22.11721
7	0.959168	0.199855	24.27332	5.833948	39.28353	2.445386	27.96396
8	1.028479	0.192968	22.85294	6.510118	35.07219	2.481268	32.89052
9	1.097898	0.180720	21.32565	6.986899	32.16861	2.453271	36.88485
10	1.166515	0.166973	19.86144	7.318730	30.18223	2.393466	40.07716

Variance Decomposition of LEX: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.010843	8.066842	2.166303	2.229441	1.56E-06	87.53741	0.000000
2	0.018237	6.134400	3.122664	2.043840	1.113903	85.97377	1.611421
3	0.024440	5.017210	3.566743	1.965359	2.797255	84.11810	2.535336
4	0.029746	4.380142	3.602334	1.890247	4.500417	82.45967	3.167188
5	0.034395	3.981384	3.491460	1.833299	6.020538	81.05683	3.616486
6	0.038553	3.710685	3.343487	1.793844	7.306448	79.89896	3.946577
7	0.042336	3.515300	3.198864	1.767376	8.369364	78.95415	4.194948
8	0.045823	3.367922	3.070256	1.749619	9.241222	78.18506	4.385917
9	0.049071	3.253130	2.959900	1.737478	9.956810	77.55693	4.535754
10	0.052121	3.161506	2.866408	1.728926	10.54719	77.04041	4.655556

Variance Decomposition of DUMMY: Period	S.E.	LSP500	LOP	INT	INFLA	LEX	DUMMY
1	0.090165	0.166359	0.196660	1.626123	2.268770	0.317471	95.42462
2	0.127180	0.098542	0.620454	1.121297	4.428079	0.953846	92.77778
3	0.159859	0.082915	0.696751	0.960483	6.699982	1.309610	90.25026
4	0.189356	0.078994	0.659413	0.890183	8.840795	1.472852	88.05776
5	0.216469	0.078758	0.587908	0.850992	10.71756	1.533241	86.23154
6	0.241584	0.080359	0.516069	0.823734	12.30500	1.544689	84.73015
7	0.264984	0.082862	0.453596	0.802326	13.62524	1.534405	83.50157
8	0.286892	0.085707	0.401788	0.784622	14.71664	1.515557	82.49568
9	0.307500	0.088569	0.359386	0.769698	15.61911	1.494346	81.66889
10	0.326972	0.091271	0.324639	0.757024	16.36833	1.473580	80.98515

Cholesky Ordering: LSP500 LOP INT INFLA LEX DUMMY

Appendix 4.8 Impulse Response