DOES MACROECONOMIC AND POLITICAL ISSUE AFFECT EXCHANGE RATE IN MALAYSIA?

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DECLARATION

We hereby declare that:

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

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

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

(4) The word count of this research report is 17528 words.

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THB  Thai Baht
TOL  Tolerance
TOT  Terms of trade
UMVU Uniformly Minimum Variance of All Unbiased Estimators
USD  United States Dollar
VAR  Vector Autoregressive Model
VECM Vector Error Correction Model
VIF  Variance Inflation Factor
WDI  World Development Indicators
WLS  Weighted Least Squares
PREFACE

Nowadays, the study about exchange rate is becoming very popular in developing country and it is an interesting topic for many researchers. The effects of macroeconomic variables and political issues can be examined by using Ordinary Least Square (OLS).

This research could offer useful guidelines and information to numerous parties such as investors, researchers, policymakers and governments who want to get a better understanding about the Malaysian exchange rate.
ABSTRACT

This research attempts to investigate does macroeconomic and political issue affect the exchange rate in Malaysia. Ranging from the year 1980 to 2014, the annual data which consists of 35 sample size includes two macroeconomic variables and 1 political variable. The macroeconomic variable consists of inflation rate and terms of trade while general election was chosen as the variable to represent political issue. The data was obtained from World Development Indicator (WDI). To test the relationship between the exchange rate and the independent variables, Ordinary Least Square (OLS) was used. The result indicated a positive and significant relationship between terms of trade and exchange rate, while the other two variables have an insignificant relationship. Besides that, this research also used Unit Root Test to measure if a time series variable is non-stationary and the results obtained was stationary at first difference. Besides that, causal relationship between exchange rate and independent and variable and if there is a causal relationship between them is tested using Granger Causality Test. The end result is there is no granger cause between the independent and dependent variables. Johansen Co-integration Test was used to see if there is a long-run relationship between the variables and the result obtained was there is long run relationship between the variables. This research would be beneficial for a number of parties which includes policy maker, central bank and investor. There were certainly limitations faces during the research and recommendations have been made for further betterment in future research.
CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

This chapter begins with research background which addresses the importance of proposed work followed by problem statement which is the brief description of issues brought forward by research team and followed by research questions that indicates the purpose of the research team to carry out this study and contribution to the field. Next part is the hypotheses of the study. Hypotheses are the prediction that can be tested based on evidence. Last part of this chapter is the significance of study which explains potential value of the study and identifies target audience of the study and how the results will benefit them. The layouts for the following chapters are included at the end of this chapter.

1.1 Background of Research

1.1.1 The Malaysian History

Malaysia is one of South East Asia’s rapidly developing country with a population of more than 31 million (Department of Statistics, 2016). Malaysia started off as a commodity based country rich in tin and rubber (Ariff, 1998). During the 1970s-1980, manufacturing became an important sector shifting from mining and agriculture (Ang, 2007). In 1997, Malaysia suffered economically during the Asian Financial crisis. What began in the fall of the Thai baht, soon spread to countries like Philippines, South Korea, Hong Kong and which was also referred to as the contagion effect (Lauridsen, 1998). Chowdhry and Goyal (2000) stated that the financial crisis occurred was unexpected and caused a decrease in currency as well as asset price in a few countries in East Asia simultaneously. At those crucial times, under the leadership of Tun Dr Mahathir Mohamad, the government
had to take several corrective measures to ensure that the economy is brought back to the normal level which included external and internal sources (Zakaria et al., 2010). Having recovered from that major crisis, in 2008 Malaysia had to face another setback in the global financial crisis which according to Bekhet and Yasmin (2014) caused a major decline in GDP in the 4th quarter of 2008.

After being colonized by the Japanese, Dutch Portuguese and Britain for the span of more than 400 years, Malaysia finally gained its independence in 1957 (Yaakop, 2014). Since then Malaysia practices Parliamentary Democracy where the citizen has the right to choose their ruling government. The General Election in Malaysia is held every 5 years with the next one due in 2018. The party that rules the government today is Barisan National was registered on 1st June 1974 about 80 days prior to the 5th General Election (Hai, 2002). It was a coalition of 9 other parties in forming Barisan National as a replacement of Parti Perikatan. Parti Perikatan is where all 3 major races reunited to achieve the country’s independence under the leadership of Tunku Abdul Rahman who is well known as Malaysia’s 1st Prime Minister.

The Malaysian Electoral System mimics the one of British Parliamentary. Every citizen of Malaysia above the age of 21 has the right to vote (Brown, 2005). Malaysia is divided into constituencies and each cast vote for their member of Parliament. For Malaysia context, member of Parliament represents only Dewan Rakyat in which Prime Minister should considered as member of Parliament. The leader of party, in Malaysia’s case is either Barisan National or Pakatan Rakyat that has majority of members as member of Parliament, makes up the ruling government. The exact steps applied at state level where the representative is called State Legislative Assembly (Hai, 2002).

At present, the government which is led by Barisan National has dominated the General Election since the country’s independence for over 59 years. However the previous two elections which were in 2008 lead by Malaysia’s 4th Prime Minister and 2013 lead by Malaysia’s 5th and current Prime
1.1.2 **Foreign Exchange Rate**

Exchange rates have two quotation terms in which a currency pair can be quoted as the relative value of a domestic currency unit against the foreign currency unit and vice versa (Krugman, Obstfeld & Melitz, 2015). The foreign exchange rate has several regimes that varies according to country and financial market conditions. Bhalla (2008) listed the many nature of exchange rate such as fixed, floating, pegged, managed, dirty float and dirty managed as the reason why the exchange rate is such a controversial subject.

The Malaysian dollar replaced the Malaya and British Borneo dollar at par through first issuance on 12th June 1967. It was quoted as 8.57 dollars against one unit of British Pound Sterling and then later switched to US dollar. During the 1973 oil crisis caused the USD to be unstable. Malaysia adopted a managed floating exchange rate system on June 21, 1973 (Saleh, 1991).

During the Asian financial crisis from March to July 1997, Ringgit Malaysia (RM) experienced a drastic drop in its exchange rate from RM2.48 per US$1 to RM2.57 per US$1 which was then depreciate further until the rate of RM3.77 per US$1 at the end of 1997 (International Monetary Fund, 2016). The exchange rate had been most severe by RM4.88 per US$1 during the beginning of 1998. At that time, Prime Minister cum Finance Minister, Tun Dr Mahathir Mohamed decided to peg the RM to USD at RM 3.80 from 1998-2005.

After the RM was done being pegged to USD according to Ahmad, Yusop and Masron (2010), Malaysian foreign exchange rate is under ‘managed’ float. Under this system, the exchange rate is determined based on the demand-supply framework of currency without the intervention of government. Even though it has been almost a decade since the RM was
removed from being pegged to USD, yet Malaysian foreign exchange rate has been unstable in recent times.

According to Lim (2015), the reason for the weakening RM is due to strengthening US Dollar as well as weak commodity price especially crude oil price. Malaysia being a country which is heavily reliant on commodity export has certainly effect the RM. As cited by Tuah (2013) in Malaysia, the commodity market plays a crucial role in the context of economy development in the country hence this explains why the exchange rate has been having a depreciating trend in recent times.

In September 2015, the exchange rate was at all-time low at RM 4.45 per USD, after a depreciating trend since 2014 (International Monetary Fund, 2016). This was far worst then the time of financial crisis in 1997-1998 where the RM was pegged towards the 1 USD at RM 3.80.

1.2 Problem Statement

According to Chan, Lye and Hooy (2013), the predictability and stability of exchange rate towards a small and open economy country like Malaysia is very important. In recent times, the exchange rate of Malaysia has become a widely discussed topic throughout the world and as the currency was depreciating, the country was hit with multiple political issues. Although the RM is one of the best performing currency in Asia, but the success might be short-lived due to political related risk and the political related risk causes the market to price in (Tang, 2016). This was also supported by Yeo (2015) who listed one of the reasons that the weakening of RM against US Dollar is due to political turmoil.

There has been a vast comparison of the RM currency with 1997-1998 financial crises which began with the attack on the Thai Baht, followed by other South-East Asian country to follow suit. During the financial crisis, the RM fluctuated to 4.80 at its worst, before being pegged to the USD at 3.80 in September 1998 (Jomo, 1998). However, the recent trend of RM against US Dollar has been suffering a similar state. According to Sidhu (2015), the reason for the depreciation in currency
is totally different between those periods as the reason for depreciating in 1997/1998 is the spread of effect from the Thai Baht. Hence, this study is crucial in determining if variables that in the study which are inflation rate, terms of trade and general election might be factors that determine the depreciation of exchange rate.

Another significant role of an exchange rate is it is critical in supporting imports and exports activities of a country. This is the primary reason why the terms of trade variable is crucial in studying the exchange rate. Malaysia is the second largest Liquified Natural Gas exporter in the world according to Stuards (2015). Thus, the currency of Malaysia would be highly reliable on oil price supported by Tang (2016) and also Yeo (2015) who stated that the reason of declining oil price is a result of the increase in oil supply from the United States and the declining of supply of oil from around the world. Thus, it is interesting to see how the export and import plays a role in the changes of Malaysian exchange rate.

Exchange rate is widely studied in finance area however researchers managed to find only a few studies that examine exchange rate specifically in Malaysia. For instance, Asari et al. (2011) studied the Malaysian exchange rate by exploring its relationship with the inflation rate and interest rate. Besides, the link between general election and exchange rate also studied by Ong et al. (2015) in Malaysia. Whereas many research have been carried out the study of the topic based on other countries like Nigeria studied by Nwude (2012), Oriavwote and Oyovwi (2012) and also Orji (2015). Other than that, there are few researchers studied the exchange rate in Pakistan which are Bashir and Luqman (2014), Khan (2014), Razi et al. (2012) and ul Islam and Raza (2014). Few researches also have been done in Maldives, Bangladesh and India by Hassan and Gharleghi, (2015), Chowdhury and Hossain (2014) and Mirchandani (2013) respectively. Besides that in Venezuela, study done by Hsing (2006) and in Tanzania by Proti (2013) that studies the relationship between exchange rate and macroeconomic factors whereas in United States, research is done by Grier and Hernández-Trillo (2004) to study the effect of general election to exchange rate. In other words, the researchers intended to contribute on having more resources to be used as the references by the other researchers to study the Malaysian exchange rate.
1.3 Research Questions

I. Does inflation rate have a relationship with exchange rate in Malaysia?

II. Does political factor which is general election have a relationship with exchange rate in Malaysia?

III. Is terms of trade having a relationship with exchange rate in Malaysia?

IV. Are the variables stationary?

V. Is there a long run relationship exists between dependent variable and the selected independent variables?

VI. Is the granger causality relationship in short run possessed by independent variables and dependent variable?

1.4 Research Objective

1.4.1 General Objective

The general objective of this research is to explore the trend of exchange rate in Malaysia which has changed over the period of 1980 to year 2014 and to study whether macroeconomic factors and political event which is general election are significant to affect the exchange rate in Malaysia or otherwise.
1.4.2 Specific Objectives

I. To determine the effect of inflation rate on exchange rate in Malaysia.

II. To identify the influence of political factor, which is general election towards the exchange rate in Malaysia.

III. To study on how terms of trade affects the exchange rate in Malaysia.

IV. To determine the stationary of the variables.

V. To observe whether a long run relationship exist between dependent and independent variables.

VI. To examine granger causality existence among the variables.

1.5 Hypotheses of the Study

Inflation rate and terms of trade are the independent variable cum macroeconomic variables that are studied in this research. The other independent variable is general election and since if differs from the other two variable as it is qualitative variable, general election will serve as a dummy variable to represent the existence of political event in that particular year.

1.5.1 Inflation Rate (Consumer Price Index)

H_{0a}: Inflation rate does not influence exchange rate.

H_{1a}: Inflation rate does influence exchange rate.
Khan (2014) found that the inflation rate (CPI) has a positively significant impact on exchange rate. Furthermore, same kind of relationship is proved in Nigeria both in the short and long run (Thaddeus & Nneka, 2014). This result was also supported by Namjour, Gholizadeh and Haghighi (2014) in study of exchange rate and inflation rate in Iran. Chowdhury and Hossain (2014) results demonstrated a significant positive effect of inflation rate on the exchange rate.

According to Hsing (2006), a negative and significant influence on exchange rate proved to be induced by inflation rate. In Nigeria, the researchers conducted the test to conclude that both of the variables existed in the long run (Oriavwote & Oyovwi, 2012). There seem to be a negative effect of inflation rate on exchange rate (Asari et al., 2011). Mirchandani (2013) results suggest that in developed countries, the inflation rate has a significant impact on the exchange rate. In India, exchange rate seemed to have a significant yet statistically negative relationship with the inflation rate.

Opposing stated results, Nwude (2012) based on studies in Nigeria concluded that the impact of inflation rate on exchange rate is negative but an insignificant relationship is detected. On a more general note, the research done by Proti (2013) found that the exchange rate is affected by the inflation rate in a positive and insignificant way.

The expected sign of inflation rate to exchange rate is predicted be positive supported by the research done by Namjour, Gholizadeh and Haghighi (2014) in Iran explained high inflation rate causes depreciation in exchange rate which is why The expected sign of inflation rate to exchange rate is predicted be positive. In line with Malaysia, Iran is an oil exported country (Mohammadi & Parvaresh, 2014). According to research by Cunado and De Gracia (2005), oil price and inflation rate have an asymmetry relationship which explained that a world increase in oil price leads to the higher inflation rate and all the domestic goods become expensive in Malaysia. The Malaysian consumers tend to import more products from United States which cause the value of RM depreciate against USD.
1.5.2 Terms of Trade

H₀ₑ: Terms of trade does not influence exchange rate.

H₁ₑ: Terms of trade does influence exchange rate.

Terms of trade is defined as the relative value of exportable commodity in term of the value of importable commodity. It can also be interpreted in the price index form. A better terms of trade can be obtained when the exportable commodity has a higher price index than importable commodity. According to Bashir and Luqman (2014), terms of trade has significantly positive impact toward exchange rate. This also means that the relationship is significant due to an increase in price of exportable goods, thus the export will decline and depreciate of real exchange rate in Pakistan. Furthermore, Malik and Asghar (2013) and Camarero, Cuestas and Ordóñez (2008) stated that the terms of trade and real exchange rate is positively and statistically related with each other. Moreover, the results remarked that the exchange rate has positive and significant relationship with the terms of trade (Raja & Naeem-Ullah, 2014).

Cermeño, Grier and Grier (2010) indicated that the terms of trade gives negative impacts towards the real exchange rate in Latin America in a weak yet significant way. The researchers provided the explanation that the real exchange rate depreciation could be related with an increment in the terms of trade. In another study, the researcher stated that the terms of trade will significantly affect real exchange rate and their correlation is negative (Bouraoui & Phisuthtiwatcharavog, 2015).

The researcher implied that terms of trade had an insignificant relation impact toward real exchange rate (Oriavwote & Oyovwi, 2012). Saradhi and Goel (2014) also proved the insignificance between terms of trade and exchange rate in India.

Terms of trade is said to have a positive relationship with exchange rate supported by Bashir and Luqman (2014). Research done by Coudert.
Couharde and Mignon (2015) found out that commodity exporter countries such as Malaysia has its exchange rate positive related with the terms of trade.

### 1.5.3 General Election (Dummy)

H₀°C: General election does not influence exchange rate.

H₁°C: General election does influence exchange rate.

There are two possible results between the study of exchange rate and general election, either there is a significant or not significant relationship. As studied by Gámez (2013) in Mexico, there is a mixture of positive and negative but significant relationship 18 months prior and 18 months after election, including the election month. Similar study also studied in the same country of Mexico by Grier and Hernández-Trillo (2004), concluded that the electoral cycle does have positive influence the exchange rate significantly.

In contradictory, Ashour and Sarkar (2014) found that there is an insignificant relationship between presidential terms and foreign exchange rate which is also supported by Grier and Hernández-Trillo (2004) taking place in United States. General Election was negatively but insignificant related with exchange rate. The result is similar to of which research by Hasenzagl (2013) on the effect of left and right wing party win towards the exchange rate. It highlighted that the winning party does not significantly influence the exchange rate regardless of which party wins.

The expected result on general election is predicted to be negative. This is supported by Malik and Asghar (2013) who found that there is an increase in depreciation in exchange rate after the election. Since Malaysia encountered with multiple political issue recently, thus we expect that the election will cause depreciation.
1.6 Significance of Study

The connection of the macroeconomic variables (inflation rate, terms of trade) to the exchange rate are always a great concern to a country as these variables affect the exchange rate movements and thus can bring significant impact to the economy. Hence, the reason behind the volatility in the exchange rates is important to be discussed in great detail. The study is viewed from the perspective of Malaysia in order to provide a rule of thumb for managing the exchange rate. Meanwhile, the research has made additional contribution by adding the general election factor as one of the determinants to affect the exchange rate in Malaysia.

1.6.1 Policy Makers

Standing from the view of the policy makers, this research would benefit them in terms of formulating the foreign exchange rate policy by including the macroeconomic and general election factors. From long-term perspective, they would have better insights into exchange rate movements by monitoring these monetary policy variables. According to Chiu (2008), adjustment in the implementation of monetary policies hornets the efforts of policy makers in providing the optimum economic welfare to the society. At the same time, the study is significant for policy makers to minimize the consequences of unexpected economic shocks and emergencies from studying the exchange rate movement. Besides, the policy makers will benefit from the study in terms of initiating the policies that will diversify the income stream of Malaysian economy.

1.6.2 Investors

This research is useful for investor who are involved in foreign investment to make their investment decision. Through studying the effect of factors that mainly contributes to exchange rate volatility, they can make wiser choices in investing decision. Meanwhile, the parties involved in the
international trade such as the multinational firms and portfolio traders would help them to have a better planning on the hedging period to deal with the exchange rate risks. Moreover, the firms tend to switch to domestic activities if they intended to reduce the overall exchange rate risk exposed to their companies (Mirchandani, 2013). In common, the multinational firms which involved in the foreign direct investments would require considering the financial stability of the foreign country before they decided to invest in it. On the other hand, Goodell and Vähämäa (2013) revealed that the occurrence of presidential election may beget the market anxiety. From here, the researchers perceived that the investors would have better predictions and expectations regarding the future macroeconomic policies and the current performance of the foreign exchange market.

1.6.3 Central Bank

The goals of central bank in enhancing the efficiency of monetary policies can be referred to this study (Bouraoui & Phisuttiwatcharavong, 2015). It also aids the central bank to determine the factors that contribute to the appreciation and depreciation effect of the currency value of Ringgit Malaysia in common way. The central bank will benefit from knowing the impact of each macroeconomic variable in restraining the exchange rate volatility.
1.7 Chapter Layout

This research is arranged according to the following sequences:

Chapter 1 will cover the introduction of the research and the overview of the research topic. It will then followed by the related research background, general and specific objectives of the research, questions that are research related, hypothesis and significance of this study, a chapter layout and last but not least, the overall conclusion regarding Chapter 1.

Chapter 2 comprised of the literature review of the past researches that related to the research topic. The theoretical models that had been applied in the past studies are also being reviewed in this chapter in order to develop the proposed theoretical or contractual framework to adopt in this research paper. It will then followed by the conclusion for this chapter.

Chapter 3 outlines the methodology to be applied in this study and the description of data collection done by the researchers. The methodology will be further discussed in term of the research design, data analysis techniques, sources of data and also the conclusion.

Chapter 4 discusses the empirical result of this research and it also will present the inferential analysis from the result obtained.

Chapter 5 will have an overall conclusion throughout these chapters. The major findings of the research will be covered in details which was then followed by the implication of the study. Besides, this chapter remarked the extent of future research as well. It also outline the limitation of this study that faced by the researchers while doing this research.
1.8 Conclusion

This chapter had carried out an overview of Malaysia’s background and to justify on the related variables to study its impact on exchange rate. Research question and research objectives also had been developed for this research. Besides that, significance and contribution of this research has been discussed in this chapter. Literature review of past studies related to exchange rate and relationship with variables such as general election, inflation rate and terms of trade will be discussed in the following chapter.
CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The research of background, problem statement, research questions, research objectives, hypotheses and significance of the study were discussed in the prior chapter. In this chapter, the review of literature, theoretical models and conceptual framework will be discussed. Reviewing literature is a compilation of previous study on subject matter to further deepen the knowledge on current research. Besides that, literature review could give a strong suggestion to determine the independent variables which will significantly affects the dependent variable by implementing several methodologies for the purpose of examining what are the outcomes of the studies variables.

2.1 Review of the Literature

Critical analysis of past studies relating to this research can be said as literature review. It gives a thorough and detailed explanation about the results obtained by previous researchers regarding the topic of study. A literature review gives a better understanding of the theoretical framework on the area of interest.

2.1.1 Exchange Rate

Exchange rate is a widely studied subject as it is crucial in predicting the behavior of the economy. It is of top priority of countries as exchange rate is the main instrument to the stability of an economy. Investigating the behavior of exchange rate is utmost important as it is vital to predict them in order to design foreign exchange policy.
The exchange rate can be said as the relative price of one national currency in term of other monies (Frenkel & Johnson 2013). It is measured in two ways either direct or indirect quotation by switching the denominator of home currency with foreign currency. It is one of the most crucial tools to reflect the performances of other macroeconomic variables in the economy. Ozturk (2006) discussed about exchange rate volatility which is caused by a sudden move in the exchange rate and stated that interest rate and inflation rate as some of the contributing factors. Using the co-integration test, Chiu (2008) proposed Purchasing Power Parity preposition to declare that some economic factors do maintain a long run relationship with the exchange rate. The exchange rate movement should be monitored and frequently addressed in studies as many parties especially policy makers are responsible for formulating policies regarding exchange rate.

The exchange rates also act as an indicator of the economic health of the country (ul Islam & Raza, 2014). When the demand of the home currency is higher than its supply, it is known as the appreciation of exchange rate which showed that the strength of the home currency is stronger against the foreign currency and vice versa. Malaysia has adopted various exchange rate systems over the past 40 years which includes the Bretton Wood system. Once it collapsed, the managed floating system was used. Malaysia then practiced the free floating system and currency floating approach (Chan, Lye & Hooy, 2013). As of the year of 2015, Malaysia has been practicing managed floating system in which the value of RM is found to be suffering from its worst hit with RM3.60 per US Dollar (Jacob, 2015). Since the depreciation of the exchange rate is predicted to dim the outlook of economic performances of Malaysia, but the situation could be an advantage to the country in different ways. Depreciation of currency indicates that the RM is cheaper to the foreigners and they tend to have more borrowing in RM which incurred lower interest rates. Meanwhile, the international trade activity in Malaysia is probably to increase in the volume of transaction as the foreigners rely on the weakening of RM to import more goods from Malaysia. As a result, the foreigners contribute more of their own currency
to exchange with RM and it leads to the demand of RM increase and RM will be strengthening back against the foreign currency.

### 2.1.2 Inflation Rate (Consumer Price Index, CPI)

Umaru and Zubairu (2012) explains the concept of inflation rate in a long period of time, the continuous increase in price level in general of goods and services of a country. Out of the available disposable income, how much consumer spends on goods and services is the given definition of Consumer Price Index (Boskin et al., 1998). Achsani, Fauzi and Abdullah (2010) have done research in various locations such as the Asian countries, North America as well as the European Union in the effort to investigate the relationship between exchange rate and inflation rate. In comparing how sensitive is the inflation rate and exchange rate between Asian and non-Asian countries, there is a strong significant relationship between those two variables tested using granger causality test in Asian countries. However, there is no significant result obtained between exchange rate and inflation rate in the non-Asian countries which are EU and North America.

The results in studying the relationship between exchange rate and inflation rate can be divided into three outcomes which are positive significant impact, negative significant impact, and no significant impact. For researchers that obtained a positive and significant effect are many. For instance the papers studied by Khan (2014), Thaddeus and Nnneka (2014), Namjour, Gholizadeh and Haghighi (2014) and Chowdhury and Hossain (2014) respectively. Taken place in Bangladesh from the period of 1990 to 2011, Chowdhury and Hossain (2014) manage to obtain positive and significant results in studying exchange rate and inflation rate which also supported by Khan (2014). Thaddeus and Nnneka (2014) explained that inflation rate increases, the money supply increases and local currency depreciate due to the exchange rate changes. In addition, the researcher examine that inflation rate possessed a positive impact on exchange rate based on their study in Nigeria. The results obtained slightly differ where there are both long run
and short run relationship between exchange rate and inflation rate in Nigeria. Besides, in Iran similar results of positive and significant results was obtained by Namjou, Gholizadeh and Haghighi (2014).

In contrast to the results obtained above, other authors also studied the relationship between exchange rate and inflation rate yet obtained a different result which is a negative relationship (Hsing, 2006; Oriavwote & Oyovwi, 2012; Asari et al., 2011; & Mirchandani, 2013). According to Mirchandani (2013) and Oriavwote and Oyovwi (2012), the researchers stated that the studies have discovered the inflation rate are negatively influence the exchange rate. Hsing (2006) conducted study in Venezuela to identify the behavior of short term real exchange rates where the results indicated that there is a negative and significant results obtained on real exchange rate due to the uncertainty in the inflation rate. Similar result was studied in Malaysia by Asari et al. (2011) between the years 1999 to 2009 between exchange rate and inflation rate.

According to Proti (2013), the researchers indicated that there was no significant relationship between inflation rate and the movement of exchange rate in Tanzania and they implied that the government or central bank interventions could be the cause of the insignificant relationship. Other researches who obtained similar results are Vikram and Vikram (2016) who studied in India of the relationship between inflation rate and exchange rate and found an insignificant relationship. Nwude (2012) also obtained similar results in Nigeria. The exchange rate of strong economy countries which are AUD/USD, Euro/USD and AUD/Euro also being tested for the significance of inflation rate towards the exchange rates movements and the results turned out to be insignificant (Ramasamy & Abar, 2015).
2.1.3 Terms of trade

The terms of trade take into account the export value of the country in relation to the import value of the country. If there is an increase in the country’s terms of trade, it means that the country could purchase more units of imported goods for every unit of exports sold. Meanwhile, Cermeño, Grier and Grier (2010) explained the effect of terms of trade on exchange rate in alternative way. Increase in terms of trade leads to either depreciation or appreciation of the exchange rate by depending on the strength of substitution and income effect. This concept is also adopted by Cakrani (2013) to explain the effect of terms of trade. Income effect refers to the higher income cause the demand of tradable and non-tradable goods increase. This leads to the price on non-tradable goods to increase and its demand decline which known as overvaluation of real exchange rate. Subsequently, customers can choose to replace those non-tradable products with cheaper products that are imported. This will also cause an undervaluation of currency due to the decrease in price on the non-tradable goods, which is also known as the substitution effect. There is not a certain fixed way to identify the effect of terms of trade, but according to Cakrani (2013), if the income effect is stronger than substitution effect, there is said to be an overvaluation of exchange rate as the terms of trade improves. As for when substitution effect is stronger, then the relationship is opposite where an improvement in terms of trade will cause an undervaluation of the exchange rate.

Raja and Naeem-Ullah (2014) analysed the determinants of exchange rate in 43 developing countries from 1970 to 2012 and had conducted a panel data analysis. Results show trade had a positive significant impact on exchange rate of home country and the researchers suggested that more accepting towards trade policy enhance the appreciation of exchange rate. Camarero, Cuestas and Ordóñez (2008) also stated that the terms of trade is linked with the exchange rate in a positive and significant relationship as the improvement of terms of trade causes appreciation of exchange rate in Mediterranean countries except Morocco. This relationship is further
supported by Naseem, Tan and Hamizah (2009), Malik and Asghar (2013) and Bashir and Luqman (2014). However, their results showed different inferences with Raja and Naeem-Ullah (2014) as the improvement of terms of trade will lead to the depreciation of exchange rate. A study done by Dauvin (2014) results depict that there is a positive relationship between terms of trade and real exchange rate in countries that export energy.

The study conducted by Bouraoui and Phisuthitiwatcharavong (2015) was on the determinants of the Thai Baht (THB) against the US Dollar (USD) from 2004 to 2013 in which the terms of trade variable is included because Thailand is known to be export-oriented. Terms of trade is adopted as the percentage ratio of export price and import price of the commodity traded in Thailand and the result indicates that terms of trade has a negative significant impact on the THB/USD. It means the improvement of terms of trade indicates the faster rate of increasing export prices rather than import prices and this leads to the increasing demand of Thai Baht which brings to the lower THB/USD rate. Cermeño, Grier and Grier (2010) also linked terms of trade as well as real exchange rate in Latin America from 1980 to 2000 by using the terms of trade index as the measurement form of terms of trade. The result showed negative and weakly significant relationship existed between the variables via ordinary least square method. The researchers implied that the income effect is more than the substitution effect in Latin America as the improvement in terms of trade can bring to the depreciation of real exchange rate.

For the insignificant relationship between terms of trade and exchange rate, it is supported by Oriavwote and Oyovwi (2012) who investigated the determinants of the real exchange rate in Nigeria from 1970-2010 by using the parsimonious ECM. The researcher obtained the result which showed that the terms of trade has an insignificant impact on the exchange rate and it implied that terms of trade is not essential in enhancing the international competitiveness of Nigeria. This result is further supported by Saradhi and Goel (2014) who stated that terms of trade is statistically insignificant to exchange rate in India.
2.1.4 General Election

In Malaysia, the General Election is a widely awaited event which occurs once every 5 years. Once the parliament is dissolved, it will remain dissolved throughout the election period and the new parliament should be formed no longer than 120 days of dissolution. The election process comprises of many steps as well as tedious regulation and has to be completed in 60 days.

Blomberg, Frieden and Stein (2005) said that there is an impact of political factor towards the sustainability of fixed exchange rate. Ong et al. (2015) also found a mediating effect between the investors decision during election period as they are highly concern about the political condition. Results obtained by Grier and Hernández-Trillo (2004) mentioned a significant and positive relationship between the exchange rate and general election in Mexico. Meanwhile, Gámez (2013) found a mixture of positive and negative but significant results political cycles which includes the political month.

There are researches that show general election was negatively but insignificant related with exchange rate by Hasenzagl (2013), where he conducted a research on the effect of left and right wing party win towards the exchange rate winning. Ashour and Sarkar (2014) also found similar results to Hasenzgal (2013), where there is insignificant relationship between presidential terms and foreign exchange rate. Grier and Hernández-Trillo (2004) who compared the effect of general election on exchange rate in Mexico and United States and found out there was an insignificant and negative effect in United States.
2.2 Review of Relevant Theories

2.2.1 International Fisher Effect

The International Fisher Effect (IFE) is proposed by economist Irving Fisher in the 1930s. It is crucial to illustrate the close relation among the exchange rate, inflation rate and interest rate. According to Shalishali (2012), this exchange rate theory is the duality of Purchasing Power Parity (PPP) and Fisher Effect (FE) as both of the interest rate and inflation rate is known to be highly correlated. Besides, efficient market hypothesis is said to be attached with IFE in which the new and recent information of changes in interest and inflation rate contribute to the exchange rate movements (Ortiz & Monge, 2015). Thus, it implied the efficiency of foreign exchange rate in responding to the differential in interest rates and also inflation rate to avoid the possible arbitrage opportunities. The calculation of International Fisher Effect (IFE) is described as the following equation:

\[
\frac{i^a - i^b}{1 + i^b} = \frac{S_{t+1} - S_t}{S_t}
\]

Where,

\( S_t \) = Spot exchange rate in period t

\( S_{t+1} \) = Forward exchange rate in period t + 1

\( i^a \) = Interest rate of Country A

\( i^b \) = Interest rate of Country B

Formally, IFE theory is adopted to examine the connection between the percentage change in the spot exchange rate over time and the differences
between the comparable interest rates in different capital markets (El Khawaga, Esam & Hammam, 2013). Madura (2011) has stated that high nominal interest rates which indicate high expected inflation rate will tend to make a drop in the value of the currencies against the foreign currencies. It referred to the forecasted changes in the exchange rates of two currencies indicates an opposite direction of the difference in the interest rates between these two countries. Likewise, Country A with higher interest rates will tend to have lower value in currency and the appreciation of currency for Country B supposed to be in lower interest rates. In line with this, high inflation rate also leads to more imports to the country and depreciation of currency value occurs. It is justified that IFE causes the investors to be either penalized or rewarded for the predicted changes in exchange rates between two countries to equalize their total returns (Ortiz & Monge, 2015). However, Cumby and Obstfeld (1981) stated that IFE does not hold in forecasting the changes in spot exchange rates in the short run. It is because the changes in spot exchange rates is subjected to diverse factors such as the national debt level, monetary base, international reserves and terms of trade over time (Bouraoui & Phisuthtiwatcharavong, 2015). Meanwhile, the application of IFE proved that it does not generalize throughout the world as the adjustment in exchange rates is subjected to the impediments in the foreign trade of the countries (Shalishali, 2012). According to Asari et al. (2011), the information of interest rates revealed the movement of inflation rate in future. This explains that the variation in interest rate proceed from the changes in inflation rate and further influence the future exchange rate.

2.2.2 Purchasing Power Parity Theory

Purchasing power is the value of currency expressed in term of the number of goods or services that purchased with one unit of currency. As inflation rate decreases, purchasing power has financial ability to acquire the amount of goods or services. Purchasing Power Parity (PPP) is a theory of exchange
rate determination and a way to compare the average costs of goods and services between countries.

Jiang et al. (2016) indicate how PPP in the past ten year has been a highly disputable topic regarding economic internationally. This is said to happen due to the importance for important decision making within exchange rate market players from the verdict of the Purchasing Power Parity (PPP). Domestic currency per unit of foreign currency should be equal to the ratio of domestic to the foreign price level (Baharumshah & Ariff, 1997). Moreover, Purchasing Power Parity (PPP) is said to be the fundamental towards comprehending the open economy behavior. Hsing (2008) mentioned that an exchange rate of a country would rise if there was a higher expected domestic inflation rate relative to the expected foreign inflation rate.

According Thaddeus and Nnneka (2014), this theory is offered during the international policy contest, after the World War I happened which study about the suitability of foreign exchange rates between the industrialized nations after the inflation rate happened during and after the war. According to the Patel, Patel and Patel (2014), purchasing power parity is the price levels after adjustment of exchange rate between two countries should be equal to one another. The main idea of this theory is the one price rule, where the cost of similar goods should be the same around the world. If the price’s difference after the changes of exchange rate is very large for the same product between two countries, an arbitrage opportunity is formed, because from the country that sells for the lowest price, the product can be attained.

When inflation rate of one country increases relative to that of another country, decline export and rises imports will lower the country’s currency. In other words, the exchange rate between two countries is determined by their relative price levels. The theory tries to measure inflation rate and exchange rate relationship by insisting that changes in exchange rate are caused by the inflation rate differentials according to Oleka, Sabina and Mgbodile (2014) and Obaseki (1998). In addition, Kamin and Khan (2003) stated that the expected inflation rate differential equivalents to the current...
spot rate and the expected spot rate difference. The PPP in its simplest form asserts that when relative price level changes will be reflected by the changes in exchange rate among countries in the long run. The theoretical foundation and explanation of PPP seems to be sensible and tolerable but its practical application in real condition may be a misapprehension, particularly in the long run.

Formula for Purchasing Power Parity is as below:

\[ e = \frac{\pi_1 - \pi_2}{1 + \pi_2} \]  

(1)

Where:

\( e \) = the rate at for exchange rate change,

\( \pi_1 \) = first country’s inflation rate (in %)

\( \pi_2 \) = second country’s inflation rate (in %)

For example, there are two countries which are C1 and C2.

Country C1 has inflation rate= 10% and country C2 has inflation rate=5%.

So, Expected Currency Appreciation (ECA) is

\[ \text{ECA} = \frac{C_1 - C_2}{1 + C_2} \]  

(2)

Here country C1’s currency should realize 4.76% in opposition to C2’s currency.
2.2.3 Efficient Market Hypothesis (EMH)

According to Fama (1984), efficient market hypothesis (EMH) asserts that the prices will fully adjust to any new or latest information available in the market. EMH also known as informational efficiency and it depends on the efficient manipulation of information by economic players in the foreign exchange market (Lee & Sodoikhuu, 2012). Efficient market hypothesis perceived that there is no arbitrage opportunity when the exchange rates always reflect to the up-to-date information. It means that the chance for an individual to outperform the market and earn arbitrage profit is very rare.

Foreign exchange market efficiency plays a vital role for all currency market players. The market assumed to be efficient when the exchange rates integrated all the information of the history rates and relevant information. This indicates that the exchange rates change only when there is new information and it is impossible to predict the future rates. Lee and Sodoikhuu (2012) emphasized that there is no serial correlation exist between the market efficiency and changes in the exchange rates. It means that EMH implied the situation of the exchange rates in incorporating the relevant information instead of affecting the exchange rate movements. EMH can be distinguished into three forms which are weak, semi-strong and strong forms in terms of the efficiency of market in reflecting the degree of information available.

Weak form of market efficiency indicates that the historical price reflected on the current price only. Jensen (1978) proved that the weak market efficiency does not profitable when the marginal benefit of information is less than the marginal cost of accumulating it. For semi-strong form, it showed that the price incorporated the historical and publicly available information. For market participants who carried the insider information in weak or semi-strong form of market efficiency stand a chance to earn the extraordinary returns. However, strong form of market efficiency indicates the current price integrated all the historical, publicly available or even the insider information and no arbitrage opportunity for the market participants to outperform the market.
Few researches have been done to study the foreign exchange market efficiency by exploring the degree of information that incorporated into the changes in the exchange rates. Lee and Sodoikhuu (2012) used several strategies of filter rules to prove that the foreign exchange market is efficient for the exchange rates. The theory of EMH in foreign exchange market is further supported by Wu and Chen (1998) who carried out their research in nine OECD countries. Mehrara and Oryoie (2012) also implied that the EMH do not supported during the post crisis period because of the government interventions and reduction in speculative activities in foreign exchange market. In other words, the information that subjected to manipulation leads to the possibilities of the arbitrage opportunity when the market is inefficient.
2.3 Proposed Theoretical Framework

The model below depicts the framework model that represents the relationship between exchange rate and selected variable. Exchange rate (MYR/USD) has a relationship with inflation rate (CPI), terms of trade and general election (dummy). There has been lack of study involving exchange rate and general election in particular thus this model is created to have a clearer view of the dependent and independent variables. This study focuses on the time period 1980-2014 on a yearly basis.

Dependent Variable: Independent Variables:

\[
\text{Exchange Rate (Y)} = \beta_0 + \beta_1 \text{Inflation Rate (X}_1) + \beta_2 \text{Terms of Trade (X}_2) + \text{D}_i \text{General Election (dummy)}
\]

Source: Developed for Research
2.4 Conclusion

The review of literature is done in this chapter that is related to the field of study. The analyzing and summarization of empirical results and findings has been shown in the relationship between exchange rate and chosen variables. This will help in further understanding of this research. Several theoretical model have been identified in regards with the topic of interest as well a theoretical framework is proposed for this research.
CHAPTER 3: METHODOLOGY

3.0 Introduction

Research methodology is clearly described in this chapter. First section consists of data collection method and target population. Second section is description of data preparation processes. The following section is data analysis, which is the discussion about the methods would be conducted in the following chapter.

3.1 Research Design

This research uses quantitative and qualitative data. Empirical technique and sample data are applied to measure effect of macroeconomic variables and general election against exchange rate. This research consists of one dependent variable which is exchange rate and three independent variables which are inflation rate, terms of trade and general election. A total of 35 observations have been used in this research which is from year 1980 to 2014. A highly accurate software mechanism which is E-Views 9.0 is used as an instrument to compute data of variables to further study the linkage between independent variables and exchange rate. World Development Indicators (WDI) is the source of which the data was collected from.

3.2 Data Collection Method

The data are quantitative and time series data. All the variables are using secondary data derived from the World Development Indicators (WDI) except dummy variable in this research. For the dummy variable in this research, “0” indicates that there is no election in the particular period while “1” indicates that there is election in the particular period. There are a total of 8 general elections within the period 1980 to 2014 in Malaysia.
3.2.1 Secondary data

This research uses time series data which consists of 35 observations on yearly basis from 1980 to 2014. The details of the data stated in the table below:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Proxy</th>
<th>Units</th>
<th>Explanation</th>
<th>Data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Rate</td>
<td>EXC</td>
<td>RM/USD</td>
<td>Direct quote of Ringgit Malaysia per US Dollar</td>
<td>The World Development Indicators (WDI)</td>
</tr>
<tr>
<td>Inflation Rate</td>
<td>INF</td>
<td>Percentage (%)</td>
<td>Annual percentage change in consumer price index by taking the year 2010 as the base year (Base rate 2010 = 100)</td>
<td>The World Development Indicators (WDI)</td>
</tr>
<tr>
<td>Terms of Trade</td>
<td>TOT</td>
<td>Percentage (%)</td>
<td>The percentage ratio of export unit value index to the import unit value index by taking the year 2000 as base year (Base rate 2000=100)</td>
<td>The World Development Indicators (WDI)</td>
</tr>
<tr>
<td>General Election</td>
<td>GE</td>
<td>Election year</td>
<td>General Election in Malaysia</td>
<td>Journals, news and official website</td>
</tr>
</tbody>
</table>
3.3 Sampling Design

3.3.1 Target Population

Target population is particular group of people identified as intended group. This research targets on Malaysian foreign exchange in examining relationship of the dependent variable which is exchange rate and selected independent variables which are inflation rate, terms of trade and general election on yearly basis in the period from 1980 to 2014. Malaysia is a democratic country consists of few races that are dominated by three main races which are the Malay, Chinese, Indian and others. Malaysian has a population of approximately 31 million (Department of Statistics, 2016). Malaysia practices a floating exchange rate system where the value of currency determined by demand and supply of currency on foreign exchange market (Ahmad, Yusop & Masron, 2010).

3.4 Data Processing

In this research, more than 30 journals have been reviewed related to other research title “Determinants of Exchange Rate”. Summary is conducted to analyze and study the methods and results. Secondly, secondary data for all independent variables except dummy variable in this research obtained from the World Development Indicators (WDI) while the data of dummy variable which is general election collected from journals, news and official website named Suruhanjaya Pilihan Raya (SPR). The data is extracted from variety of sources and rearranged in Microsoft Excel for E-view analysis. Statistical tests will be carry out in E-views software and interpret the results and major findings. Finally, the predicted and actual results are compared to come up with a conclusion.
Figure 3.4: Diagram of Data Processing

1. Journal relating to research being analyzed
2. Collection of secondary data from World Development Indicator (WDI)
3. Filter and rearrange data for E-view analysis
4. Running on E-view tests
5. Interpretation of outcomes
3.5 Data Analysis

3.5.1 Multiple Linear Regression Model

Multiple Linear Regression Model has a correlation between their variables which are independent. There are two types of multicollinearity which are perfect and imperfect correlation. To attain a regression model of Best Linear Unbiased Estimator (BLUE), there are some expectations that needed to be met. The model is said to be BLUE when there is minimum error of estimation, estimators need to be in linear form, and the average sample value of coefficients is equal or near to the true population value of coefficients and the model comprises variance of minimum value (Gujarati & Porter, 2009).

Economic Function:

\[ \text{InEXC}_t = f [\text{Inflation Rate (INF}_t), \text{Terms of Trade (TOT}_t), \text{General Election (GE}_t)] \]

Economic Model in Logarithm Form:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon_t \]

\[ \text{InEXC}_t = \beta_0 + \beta_1 \text{INF}_t + \beta_2 \text{TOT}_t + \beta_3 \text{GE}_t + \epsilon_t \]

Where,

\[ \text{InEXC}_t = \text{the natural logarithm form of exchange rate (MYR/USD Dollar)} \]

at year \( t \)
$INF_t = $ the inflation rate measured by percentage change in consumer price index at year $t$

$TOT_t = $ the percentage ratio of terms of trade index at year $t$

$GE_t = $ Election at year $t$ where 0 indicate no election in the specific year and 1 indicate election occur in the specific year

$\varepsilon_t = $ Error term

### 3.5.1.1 Ordinary Least Squares

In 1795, Carl Friedrich Gauss had founded the Ordinary Least squares (OLS) method. According to Hutcheson (2011), one of the main techniques used was the OLS regression where it analyzes data and forms the base of many other techniques, for example Generalized Linear Models and Analysis of Variance (ANOVA). OLS regression is mainly influential as it quite easy to check the model assumption such as constant variance, linearity and the outcome of outliers using simple graphical methods. However, the seven assumptions of Classical Linear Regression Model (CLRM) must be fulfilled in order to realize the method of Least Squares (Gujarati & Porter, 2009).

1) Linear in parameter but not necessary linear in variable.

2) X values are fixed in repeated sampling.

3) There must be variation and no outlier in the values of X variables.

4) Zero mean value of error terms.

5) No autocorrelation between error terms.

6) Homoscedasticity or constant variance of error term.
7) The number of observation must be greater than the number of parameter to be estimated, \( n > k \).

If all assumptions above are fulfilled, the OLS estimators will possess the Uniformly Minimum Variance of all unbiased estimators (UMVU).

### 3.5.1.2 T-Test

The t-test is proposed by William Sealy Gosset to overcome the deficiency of traditional z-test as it provide high rates of false positive especially in small sample sizes (De Winter, 2013). The t-tests are conducted for each of the independent variables (inflation rate, terms of trade and general election) to test for their significance towards the dependent variable (exchange rate). The key assumption is the normality assumption need to be satisfied before proceed to this test to produce the exact and trustable result (Gujarati & Porter, 2009). However, this test is only available for determining the individual effect of each independent variable and the researchers could not draw the conclusion for multiple regression analysis that all these explanatory variables is sufficient to explain the exchange rates based on the t-test. For the hypothesis testing, it is known that the researchers will be using E-view 9.0 to get the estimation output and extracting the t-test statistics of each independent variable to study their significance to the explained variable.

The hypothesis for the test is conducted as follows:

\[ H_0 : \beta_i = 0 \]

\[ H_1 : \beta_i \neq 0 \text{, where } i = 1, 2, 3. \]
The null hypothesis represents the relationship between dependent and independent variables are not significant, where the alternative hypothesis means that the relationship between dependent and independent variables are significant.

**Significant level, \( \alpha = 0.05 \)**

**Decision rule**

If the t-statistic is greater than the upper critical value or lesser than the lower critical value, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

\[
t = \frac{\hat{\beta}_i - \beta_i}{se(\hat{\beta}_i)}
\]

Where,

\( \hat{\beta}_i \) = Estimates of independent variable

\( \beta_i \) = Actual independent variable

\( se(\hat{\beta}_i) \) = Standard error of the estimates of independent variable

**3.5.1.3 F-Test**

The purpose for conducting the F-test is the researchers intend to test for the overall significance of the model which explicitly identifying the explanatory power of the model to the dependent variable. The testing is proposed by Ronald Aylmer Fisher (1924) to overcome the deficiency of t-test in more complicated hypothesis. According to Blackwell (2008), F-test is capable of identifying the jointly significance of these independent variables in a broad way and it do not specified in the way that which variable is more important to the
explained variable. Same goes to the t-test, E-view 9.0 is required for extracting the F-test statistic to analyze the strength of the explanatory power of the whole model.

The hypothesis for the test is conducted as follows:

\[ H_0 : \beta_1 = \beta_2 = \beta_3 = 0 \]

\[ H_1 : \text{At least one of } \beta_i \text{ is different from zero, where } i = 1, 2, 3. \]

The null hypothesis represents the overall model is not significant, where the alternative hypothesis represents the overall model is significant.

**Significant level:** \( \alpha=0.05 \)

**Decision rule**

If F-test statistic is greater than the upper critical value, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

\[
F = \frac{R^2/k}{(1 - R^2)/(n - k - 1)}
\]

Where,

- \( R^2 \) = the coefficient of determination
- \( n \) = number of sample size
- \( k \) = number of independent variables
3.5.2 Diagnostic Checking

3.5.2.1 Multicollinearity

According to Kumari (2008), multicollinearity is a high degree of correlation among several independent variables. A multicollinearity problem is said to exist when there is an amount of substantially large correlation between 2 or more variables (Morrow-Howell, 1994).

Symptoms of multicollinearity could be detected in situations when there is minor change in the data produce extensive swings in the parameter estimates. Besides that, the coefficients may have standard errors that are very high and significance levels that are low although they are equally significant and the $R^2$ is quite high for the regression. Moreover, the coefficients could have the “wrong” sign or improbable magnitude.

There are several ways to detect multicollinearity. Correlation coefficients of independent variable could be calculated. However, a high correlation coefficients not necessarily indicate multicollinearity. A judgment could be made by checking associated statistics such as variance inflation factor (VIF) or tolerance value (TOL) which according to Yoo et al. (2014) is one of the rules which is widely used. Although there is no any formal rule, a VIF more than 10 is considered harmful.

Formula:

\[
VIF = \frac{1}{(1 - Rij^2)}
\]

\[
TOL = \frac{1}{VIF}
\]
3.5.2.2 Heteroscedasticity

Testing for heteroscedasticity is to check on the regression model’s fitting through the outcome of standard deviation and sample variance. Heteroscedasticity caused by model misspecification, outlier, skewness in the regressors and changes in data collection. According to Gujarati and Porter (2009), three effects of heteroscedasticity on OLS estimators are coefficients of OLS are consistent and unbiased, OLS estimators tend to be inefficient resulting from higher variance and heteroscedasticity will cause the underestimation of standard errors and variances. This caused hypothesis testing neither t statistics nor F statistics is reliable.

There are several tests can be applied in order to detect whether there is heteroscedasticity problem exists. Formal and informal methods are two distinct methods in detecting this problem. First, informal method is defined as graphical method, which uses hypothetical patterns graph of estimated squared residuals to detect heteroscedasticity. Second, the formal way is conducted through hypothesis testing. Park test, Glejser test, White test, Breusch-Pagan test and Autoregressive Conditional Heteroscedasticity (ARCH) tests are the hypothesis testing to detect this problem (Gujarati & Porter, 2009).

This study employed the Autoregressive Conditional Heteroscedasticity (ARCH) because this study is based on time series data.

The hypothesis for the test is conducted as follows:

\( H_0: \text{The model is homoscedasticity.} \)

\( H_1: \text{The model is heteroscedasticity.} \)
Significant level: $\alpha=0.05$

Decision rule

If the p-value is less than significant level, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Remedial measures can be applied to solve this heteroscedasticity which are Weighted Least Squares (WLS) and Generalized Least Squares (GLS). Besides that, this problem could be solved by increase sample size. Larger sample size would reduce impact of missing value and outlier.

3.5.2.3 Autocorrelation

Autocorrelation involves the wrong estimation of the standard error where there is a technical violation of one of the OLS assumption (Babatunde et al., 2014). There are also different views on the definition of autocorrelation where it is said to be a problem due to non-proper theoretical specification instead of technical violation (Hendry & Mizon, 1978 and Mizon, 1995). In other word, the current error term is correlated with the past error term. The assumption of Classical Linear Regression Model (CLRM) must fully fulfilled by the regressions. Under the assumptions of CLRM, one of the most important criteria is serial correlation between disturbances. Autocorrelation can be divided into two, which are pure serial correlation and impure serial correlation. Pure autocorrelation is an internal that caused by the underlying distribution of the error term of the true specification of an equation.

In contrast, impure autocorrelation is an external that caused by a specification bias that often can be corrected such as omitted important variable, wrong functional form and model wrongly
specified (Gujarati & Porter, 2009). The consequences of autocorrelation will happened in the OLS estimators when there is an autocorrelation problem in the error terms. The OLS estimators are still unbiased and consistent as do not depend on the assumption of no autocorrelation. However, when the OLS estimator becomes inefficient, there is no longer BLUE due to the variances of the estimator is no longer minimal. As the variance of OLS estimators are underestimated, smaller estimated standard error produces a larger t statistic. This may cause all the hypothesis testing is no longer valid due to the OLS method underestimate or overestimate the variance (Gujarati & Porter, 2009).

As mentioned by Gujarati and Porter (2009), the types of autocorrelation must be identify before overcome the autocorrelation problem. In order to confirm whether there is pure or impure autocorrelation, it must make sure there is specification bias or no specification bias in the model. For the pure autocorrelation problem, there are two methods can be used to overcome it which are Cochrane-Orcutt procedure or Newey-West by adjusting the standard errors. If the sample size is larger, it can use Newey-West method to adjust standard error of OLS estimators that are correlated from autocorrelation.

Detection of autocorrelation can be classified into two ways which are Durbin-Watson d test and Breusch-Godfrey LM test for research by applying the time series data. Durbin Watson d test is a first order of series correlation that do not include lagged dependent variable AR (1) schemes. There are many authors depict that the Durbin Watson d test can fall to 0 when the coefficient in AR(1) process is nearing 1 which what makes it the most common test for first order auto correlated errors (Wan, Zou & Banerjee, 2007). Breusch-Godfrey LM test is a higher order of series correlation that involved lagged AR (2) schemes (Gujarati & Porter, 2009).
The hypothesis for the test is conducted as follows:

\[ H_0 : \text{The model has no autocorrelation problem.} \]
\[ H_1 : \text{The model has autocorrelation problem.} \]

Formula for Breusch-Godfrey LM Test:

\[(n - p)R^2\]

**Significant level:** \( \alpha = 0.05 \)

**Decision rule**

If the test statistics is greater than the critical value or the p-value is less than significant level, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

### 3.5.2.4 Model Specification

Regression model that is used, need to abide with one of the assumptions of Classical Linear Regression Model (CLRM) which is it has to be correctly specified. If this is failed to be met, the econometrics model is said to have the problem of model specification error or model specification bias (Gujarati & Porter, 2009). Where there is one or a mixture of more than one of the following issues, an econometric problem arises which is the model specification.

i. Omitting the relevant variables

ii. Including irrelevant variables

iii. Application of the wrong functional form
Besides Gujarati and Porter (2009), Andrikopoulos and Gkountanis (2011) in their research of studying issues and models in econometrics stated that, misspecification of the model that is to be researched is due to the violation of Gauss-Markov assumptions and similar to the factors brought forward by Gujarati and Porter (2009) with two additional causes which are:

i. Wrong specification of the error terms

ii. Measurement error in both dependent and independent variables in the model.

The reason model specification brings such importance eventually to the outcome of the research is because a misspecification could cause the conclusion to be invalid about the theoretical relationship amongst the variables that is taken from the research (Jarvis, MacKenzie & Podsakoff, 2003).

The hypotheses of the test are stated below:

\[ H_0 : \text{The model specification is correct.} \]

\[ H_1 : \text{The model specification is incorrect.} \]

Significant level: \( \alpha = 0.05 \)

Decision rule

If the p-value is less than significant level, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Before the test statistic is computed using the Ramsey RESET test to be compared with the critical value from F table \( (F_{\alpha,2,n-3}) \), two model need to be developed from the original model with is the
unrestricted and restricted model. This is important as the test statistic require the $R^2$ for both the restricted and unrestricted models.

The formula below depicts the Ramsey RESET test that is carried out to know the stability of the specification error which is important in determining if the model suffers from model specification error.

**Formula:**

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

### 3.5.3 Normality Test

The test of normality is to determine if the regression model satisfied the normality assumption or not. The basic assumption of the regression model according to Ul-Islam (2011) is the normality of error term. The importance to employ the normality assumption is dependable on the error term in the model. The error term is known as the number of independent variables which are not explicitly included in the model. The researchers are required to determine the normal distribution of the error term in the model to ensure that probability distributions of OLS estimators can be easily derived as it is verified that the variable is itself normally distributed with the regard of any linear function of normally distributed variables (Gujarati & Porter, 2009). Since the estimators act as the linear function of error term, the estimators will be normally distributed if the error term is normally distributed. To study the normality assumption, Jarque-Bera Test is originated from Jarque and Bera (1980) to investigate the differences of kurtosis and asymmetry measures diverged from the value characteristics of the normal distribution.
The hypothesis for the test is conducted as follows:

\[ H_0 : \text{The error term is normally distributed.} \]

\[ H_1 : \text{The error term is not normally distributed.} \]

**Significant level:** \( \alpha=0.05 \)

**Decision rule**

If the p-value is less than significant level, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

**Formula for Jarque-Bera (JB) Test:**

\[
JB = n\left[\frac{S^2}{6} + \frac{(K - 3)^2}{24}\right]
\]

Where,

\( n = \) sample size

\( S = \) skewness coefficient

\( K = \) Kurtosis coefficient
3.5.4 Unit Root Test

The main reason for the unit root test is to test for the stationary of the series variable that used in the research. The function of the test included for detecting any possible structural break in the time series since the test is frequently used in the time series analysis. Chandran and Munusamy (2009) added that the stationary of the series variables are essential to obtain a valid, meaningful and non-spurious regression to ensure that the estimated result is reliable. Based on Diebold and Kilian (2000), unit root test is beneficial in diagnosing the suitability of using the forecasting model in levels or differences for the superior effects in predicting. In other words, Elder and Kennedy (2001) also proved that unit root test is closely linked with the time series data to justify that the stationary time series analysis would have independent mean and variance which remained constant throughout the time. The characteristics as mentioned above can be described in the equation terms as follows:

\[
\text{Constant mean:} \quad \mathbb{E}(y_t) = \mu
\]

\[
\text{Constant Variance:} \quad \text{var}(y_t) = \sigma^2
\]

Augmented Dickey Fuller (ADF) Test is known as the most recommended test procedure for unit root test (Elder & Kennedy, 2001). As what had mentioned by Cheung and Lai (1995), the researchers who applying ADF test usually tend to rely on the effect of the lag orders and this will affect the behavior of the test together with the finite sample size.
The hypothesis for the test is conducted as follows:

**H₀**: All variables have a unit root and non-stationary.

**H₁**: All variables do not have a unit root and stationary.

**Significant level**: \( \alpha = 0.05 \)

**Decision rule**

If the p-value of ADF test is less than significant level, then the **null hypothesis** will be rejected. Otherwise, do not reject **null hypothesis**.

Phillips Perron unit root test is a non-parametric test based on the estimates of the long-run variance instead of Augmented Dicker-Fuller test (ADF) which detecting the serial correlation through parametric autoregressive structure (Brooks, 2008). According to Chandran and Munusamy (2009), the test result which showed that all the variables are non-stationary in level while their first difference is stationary implies that the variables are all integrated of order one, I(1). Based on Fahami (2011), the Phillips Perron test correct for any “nuisance” serial correlation as it is robust against the variety form of the serial correlation and it is not compulsory to be conditionally homoscedasticity. Phillips Perron test is applicable on the situation of a relax assumption on the distribution of the error (Chandran & Munusamy, 2009). On contrary, the criticism of adopting the unit root test into the literature is where the power of the test is poor as the process is stationary but with a root close to non-stationary boundary and there is a severe size distortion (Kwiatkowski et al., 1992).
3.5.5 Granger Causality Test

Granger Causality initially brought forward by Wiener (1956) proposed that the prediction of one time series could be improved by including the knowledge on the second time series which then has a casual effect on the first time series. The idea was later developed in the context of regression models by Granger (1969) who examined in forecasting and determining if future values of a time series by adopting past value of another time series and if time series regression is handy in predicting this. This method can also be referred to as Wiener-Granger causality and there has been study not only in the economic field but also in the neuroscience regarding this method (Bressler & Seth, 2011).

Gujarati and Porter (2009) said that the idea of causality is highly controversial and deeply philosophical because there are two extreme views which are contradicting. One says that “everything causes everything” while there are also those who rule out the idea of causality. This test is important in studying the causal relationship between dependent and independent variables individually as well as determining the unidirectional or bidirectional direction between the variable.

The hypotheses of this test are stated as below:

**H₀:** Variable X does not granger causes the variable Y.

**H₁:** Variable X does granger causes the variable Y.

**Significant level:** $\alpha=0.05$

**Decision rule**

If the test statistics is greater than the critical value or the p-value is less than significant level, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.
Formula for Wald F test:

\[
F = \frac{(SSE_{\text{reduced}} - SSE_{\text{full}}) / (k_{\text{full}} - k_{\text{reduced}})}{SSE_{\text{full}} / (n - k_{\text{full}} - 1)}
\]

3.5.6 Johansen Co-integration test

The definition of Co-integration is about two variables that are not moving in same direction but they are co-integrated. It indicated that the selected variables have the long-term equilibrium relationship (Granger & Newbold, 1974). When two or more time series variables are integrated and non-stationary in the same order, co-integrated occur (Gujarati & Porter, 2009). Besides that, the Johansen Co-integrating test aims to determine the number of co-integration that allows for more than one co-integration relationship. Another function of the test is to check whether the co-integration vectors hold the long-term equilibrium relationship. There are two types of Johansen test used to estimate the co-integration ranking, which are “Trace Test” and “Maximum Eigenvalue Test”. At first, Johansen Co-integration test take its starting point in Vector Autoregressive Model (VAR). When the error correction term was included in the model, it will be converting into Vector Error Correction Model (VECM) (Hjalmarsson & Österholm, 2010). If the selected variables are co-integrated, VECM will be applied in this research.

The hypotheses of this test are stated as below:

\( H_0 \): There is no long run relationship between the variables.

\( H_1 \): There is long run relationship between the variables.
Significant level: $\alpha=0.05$

**Decision rule**

If the p-value is less than significant level, then the **null hypothesis** will be rejected. Otherwise, do not reject **null hypothesis**.

### 3.6 Conclusion

In the nutshell, this chapter has provided clear explanation on research design, data collection method and data processing steps. To perform evaluation quantitative analysis is being used. With a sampling size of 35, this research uses secondary data. Statistical tests as well as econometrics method is the main content of this chapter. The following chapter discusses about the empirical test that is resulted from running the tests.
Chapter 4: DATA ANALYSIS

4.0 Introduction

Representation of the inferential analysis using the methodology applicable in this research is being discussed. The Ordinary Least Square (OLS) method is used to justify the model and the test used in the analysis included T-test, F-test, Normality test, Unit root test, Granger causality test and Johansen Co-integration Test. Diagnostic checking also proceeds in this chapter to examine for the presence of the multicollinearity, heteroscedasticity, autocorrelation and model specification problem in the model. All the empirical result is illustrated in the table form to explain the analysis in a better understanding way.

4.1 Multiple Regression Model

\[
\ln EXC_t = \beta_0 + \beta_1 INF_t + \beta_2 TOT_t + \beta_3 GE_t + \varepsilon_t \tag{1}
\]

\[
\ln EXC_t = 0.592165 - 0.027065 INF_t + 0.005994 TOT_t + 0.010153 GE_t \tag{2}
\]

Where,

\(\ln EXC_t\) = the natural logarithm form of exchange rate (MYR/USD Dollar) at year t

\(INF_t\) = the inflation rate measured by percentage change in consumer price index at year t

\(TOT_t\) = the percentage ratio of terms of trade index at year t
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

$GE_t$ = Election at year $t$ where 0 indicate no election in the specific year and 1 indicate election occur in the specific year

Table 4.1 (a): Output of time-series data from year 1980 to 2014

<table>
<thead>
<tr>
<th>Component</th>
<th>Intercept</th>
<th>Inflation Rate</th>
<th>Terms of Trade</th>
<th>General Election</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>0.592165</td>
<td>-0.027065</td>
<td>0.005994</td>
<td>0.010153</td>
</tr>
<tr>
<td>T-test statistic</td>
<td>1.860686</td>
<td>-1.541116</td>
<td>1.960394</td>
<td>0.305735</td>
</tr>
<tr>
<td>Standard error</td>
<td>0.318251</td>
<td>0.017562</td>
<td>0.003058</td>
<td>0.033208</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0723</td>
<td>0.1334</td>
<td>0.0590</td>
<td>0.7619</td>
</tr>
<tr>
<td>Expected Sign</td>
<td>-</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Actual Sign</td>
<td>-</td>
<td>Negative</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.330014</td>
<td></td>
<td></td>
<td>Adjusted R-squared = 0.265177</td>
</tr>
</tbody>
</table>

Significance level: 10%

Sources: Developed from Eviews 9.0

By referring to Table 4.1(a), R-squared for the model is 0.330014 which means that about 33% of the changes in exchange rates is explained by the total variation in the inflation rate, terms of trade and general election. Meanwhile, the adjusted R-squared is 0.265177 and it implied that only 26.52% of the changes in the exchange rates is explained by the total variation in inflation rate, terms of trade and general election after taken into account the degree of freedom. On the other hand, both of the result of terms of trade and general election are parallel to their prior expectation as mentioned in Chapter 1. For inflation rate, the actual sign produced from the Eviews output is negative which in contrast with the expected sign stated in Chapter 1. However, terms of trade is the only variable that found to be significant with
exchange rate yet the others showed an insignificant relationship. Thus, the positive relationship between terms of trade and exchange rate should be discussed in detail.

4.1.1 T-test

This test is conducted to examine the individual effect of independent variables to the dependent variable in this research. The researchers used the p-value approach to identify the result outcomes for the t-test. The independent variables mentioned in the hypothesis testing below refers to the inflation rate, terms of trade and general election while the independent variable refers to the exchange rate.

For inflation rate ($INF_t$):

$H_0 : \beta_1 = 0$

$H_1 : \beta_1 \neq 0$

**Decision Rule:**

If the p-value is less than the significant level of 0.10, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

**Result:**

Do not reject null hypothesis since the p-value of 0.1334 is greater than the significant level of 0.10. Therefore, this research does not have sufficient evidence to conclude that the relationship between inflation rate and the exchange rate is significant at the significant level of 0.10.

For terms of trade ($TOT_t$):

$H_0 : \beta_2 = 0$

$H_1 : \beta_2 \neq 0$
Decision Rule:

If the p-value is less than the significant level of 0.10, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

Result:

Reject *null hypothesis* since the p-value of 0.0590 is lesser than the significant level of 0.10. Therefore, this research has sufficient evidence to conclude that relationship between terms of trade and the exchange rate is significant at the significant level of 0.10.

For general election ($GE_t$):

$H_0 : \beta_3 = 0$

$H_1 : \beta_3 \neq 0$

Decision Rule:

If the p-value is less than the significant level of 0.10, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

Result:

Do not reject *null hypothesis* since the p-value of 0.7619 is greater than the significant level of 0.10. Therefore, this research does not have sufficient evidence to conclude that relationship between general election and the exchange rate is significant at the significant level of 0.10.

Based on the Table 4.1(a), the researchers can draw the conclusion for t-test is that only the terms of trade does significantly affect the exchange rate. On the other hand, both of the inflation rate and general election are insignificant to influence the exchange rate.
4.1.2 F-test

F-test is conducted to examine the overall significance of the model to explain the dependent variable. For this test, the research also used the p-value approach to identify the significance of the model to explain the exchange rate.

Table 4.1 (b): Result of F-test

<table>
<thead>
<tr>
<th>F-Test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>p-value = 0.005570</td>
<td>$\alpha$ = 0.05</td>
</tr>
</tbody>
</table>

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

$H_1 : \text{At least one of } \beta_i \text{ is different from zero, where } i = 1, 2, 3.$

Decision Rule:

If the p-value is less than the significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Result:

Reject null hypothesis since the p-value of 0.005570 is less than significant level of 0.05. Therefore, this research has sufficient evidence to conclude that the whole model is significant at the significant level of 0.05.

By referring to the Table 4.1(b), the hypothesis testing of F-test proved that the model proposed by the researcher is important in explaining the exchange rate in Malaysia.
4.2 Diagnostic Checking

4.2.1 Multicollinearity

The existence of multicollinearity can bring to the impact that the researchers could not identify the individual effect of independent variables to the independent variable. The multicollinearity is examined through informal and formal testing included high pair-wise correlation coefficient, high $R^2$ but few insignificant t-ratios and Variance Inflation Factor (VIF) or Tolerance (TOL).

4.2.1.1 High Pair-wise Correlation Coefficient

Table 4.2 (a): Pair-wise Correlation Coefficient between Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF</td>
<td>1.000000</td>
<td>-0.266366</td>
<td>-0.000239</td>
</tr>
<tr>
<td>TOT</td>
<td>-0.266366</td>
<td>1.000000</td>
<td>-0.029154</td>
</tr>
<tr>
<td>GE</td>
<td>0.000239</td>
<td>-0.029154</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

Based on the table of 4.2 (a), it is clearly showed that INF and TOT are weakly correlated in a negative way as the correlation coefficient is in the range of 0.2 to 0.4. Meanwhile, the correlation of GE between INF and TOT showed very weak or no relationship between them as the correlation coefficient is within the range of 0.0 to 0.2. Thus, the researcher perceived that there is no multicollinearity problem present in the model.
4.2.1.2 High $R^2$ but few insignificant t-ratios

Table 4.2 (b): Estimation of T-test results and Coefficient of determination ($R^2$)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-ratios</td>
<td>-1.541116 (0.017562)</td>
<td>1.960394 (0.003058)*</td>
<td>0.305735 (0.033208)</td>
</tr>
</tbody>
</table>

R-squared = 0.330014

Notes: Standard error in parenthesis, (*, **, *** indicates significance level at 10%, 5% and 1%.

By referring to Table 4.2(b), the coefficient of determination is 0.330014 indicates that about 33% of variation in the exchange rate is explained by the variation in the independent variables. Since the $R^2$ result is considered moderately low which matched with the insignificance of t-ratios as INF and GE are found to be insignificant to explain the lnEXC. Thus, it is possible that no multicollinearity problem exist in the model.

4.2.1.3 Variance Inflation Factor / Tolerance (TOL)

Table 4.2 (c): VIF / TOL Results

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>VIF</th>
<th>TOL</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF</td>
<td>0.071007</td>
<td>1.0764</td>
<td>0.9290</td>
<td>No serious multicollinearity</td>
</tr>
<tr>
<td>TOT</td>
<td>0.071797</td>
<td>1.0774</td>
<td>0.9282</td>
<td>No serious multicollinearity</td>
</tr>
</tbody>
</table>
With informal testing, the prediction of multicollinearity is subjected to the wrong outcomes. Thus, formal testing such as VIF and TOL is used to further justify the occurrence of multicollinearity problem. In the Table 4.2(c), all the VIF results are found to be less than 10 and the TOL results are far more than 0. This indicates that the model is free from the influence of multicollinearity problem.

### 4.2.2 Heteroscedasticity

Heteroscedasticity is recognized as the violation of the assumption of Classical Linear Regression Model. It is known as the non-constant variance of the error term. In this research, Autoregressive Conditional Heteroskedasticity (ARCH) test is used to examine the presence of heteroscedasticity in the model.

#### 4.2.2.1 Autoregressive Conditional Heteroscedasticity (ARCH) Test

<table>
<thead>
<tr>
<th>Autoregressive Conditional Heteroscedasticity (ARCH) Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-value = 0.0031</td>
</tr>
</tbody>
</table>

$H_0$ : The model is homoscedasticity.

$H_1$ : The model is heteroscedasticity.
Decision Rule:

If the p-value is less than significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Result:

Reject null hypothesis since the p-value of 0.0031 is less than significant level of 0.05. Therefore, this research has sufficient evidence to conclude that the model has heteroscedasticity problem at the significant level of 0.05.

Since the diagnostic checking revealed that the heteroscedasticity problem present in the model, it is then overcome by using the White test.

4.2.3 Autocorrelation

Autocorrelation is defined as the situation where the current error terms is correlated with other error terms and it is subjected to the violation of the assumption of Classical Linear Regression Model. This problem is more likely to be encountered by the time-series data. Autocorrelation also can be classified as impure serial correlation and pure serial correlation. This problem is tested using Breusch-Godfrey LM Test in this research.

4.2.3.1 Breusch-Godfrey LM Test

Table 4.2 (e): Breusch-Godfrey LM Test Result

| Breusch-Godfrey LM Test |  
|------------------------|--------|
| p-value = 0.0000       | $\alpha = 0.05$ }
\( H_0 \): The model has no autocorrelation problem.

\( H_1 \): The model has autocorrelation problem.

**Decision Rule:**

If the p-value is less than significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

**Result:**

Reject null hypothesis since the p-value of 0.0000 is less than significant level of 0.05. Therefore, this research has sufficient evidence to conclude that the model has autocorrelation problem at the significant level of 0.05.

Autocorrelation problem in the model is proved by Breusch-Godfrey LM test as the probability value of 0.0000 is less than the significance level of 0.05. Thus, Newey-west test is adopted to solve the autocorrelation problem.

### 4.2.4 Model Specification

In Classical Linear Regression Model, it is assumed that the model used in the analysis is correctly specified. It indicates that the model is free from equation and model specification errors. Ramsey RESET test is used to detect the model specification error in the model.
4.2.4.1 Ramsey RESET Test

Table 4.2 (f): Ramsey RESET Test Result

| Ramsey RESET Test | p-value = 0.2677 | α = 0.05 |

H₀ : The model specification is correct.

H₁ : The model specification is incorrect.

Decision Rule:

If the p-value is less than significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Result:

Do not reject null hypothesis since the p-value of 0.2677 is greater than the significant level of 0.05. Therefore, this research does not have sufficient evidence to conclude that the model specification is incorrect at the significant level of 0.05.
4.3 Normality Test

In this research, Jarque-Bera test is used to determine the normality of error term in the model.

Table 4.3: Jarque-Bera Test

<table>
<thead>
<tr>
<th>Series: Residuals</th>
<th>Sample 1980-2014</th>
<th>Observations 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-2.80e-18</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>0.0168300</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>0.278291</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.248878</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.104030</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>0.020300</td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.649135</td>
<td></td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>2.663635</td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>0.283997</td>
<td></td>
</tr>
</tbody>
</table>

\[ H_0 : \text{The error term is normally distributed.} \]

\[ H_1 : \text{The error term is not normally distributed.} \]

**Decision Rule:**

If the p-value is less than significant level of 0.05, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

**Result:**

Do not reject *null hypothesis* since the p-value of 0.263997 is greater than the significant level of 0.05. Therefore, this research does not have sufficient evidence to conclude that error term is not normally distributed at the significant level of 0.05.
4.4 Unit Root Test

Unit root test is used by the researcher in testing the stationary of the variables as the time-series data is closely linked with the unit root. In this research, two types of unit root test which are Augmented Dickey-Fuller and Phillips Perron test has been conducted to test for the stationary properties of the variables.

H₀ : lnEXC/ INF/ TOT have a unit root and non-stationary.

H₁ : lnEXC/ INF/ TOT do not have a unit root and stationary.

Decision Rule:

If the p-value is less than significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

4.4.1 Augmented Dickey-Fuller (ADF) Test

Table 4.4(a): Results of ADF test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>First difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Intercept</td>
</tr>
<tr>
<td>InEXC</td>
<td>-1.684853 (0)</td>
<td>-1.482026 (0)</td>
</tr>
<tr>
<td>INF</td>
<td>-3.521151 **(0)</td>
<td>-3.503879 *(0)</td>
</tr>
<tr>
<td>TOT</td>
<td>-1.946663 (0)</td>
<td>-1.358129 (0)</td>
</tr>
</tbody>
</table>

NOTE: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. The figure in parenthesis (…) represents optimal lag length based on Akaike Info Criterion (AIC)
Level phases:

Intercept:
The null hypothesis for INF is rejected yet the other variables which are lnEXC and TOT are not rejected at 5% significance level. It is concluded that INF is stationary at level phase only.

Trend and intercept:
The null hypothesis for all the variables except INF are not rejected at 5% significance level. This showed INF is the only variable that stationary at level phase only.

First differences:

Intercept:
The null hypothesis for all variables are rejected at 1% significance level. The conclusion is that all the variables are stationary at first differences.

Trend and intercept:
The null hypothesis for all variables are rejected at 1% significance level. The conclusion is that all the variables are stationary at first differences.

4.4.2 Phillips Perron (PP) Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>First difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Trend and Intercept</td>
</tr>
<tr>
<td>InEXC</td>
<td>-1.720890 (1)</td>
<td>-1.482026 (0)</td>
</tr>
<tr>
<td>INF</td>
<td>-3.384224 **(2)</td>
<td>-3.352737 * (2)</td>
</tr>
<tr>
<td>TOT</td>
<td>-1.928863 (2)</td>
<td>-1.134058 (4)</td>
</tr>
</tbody>
</table>
NOTE: *, **, *** indicates the rejection of null hypothesis at 10%, 5%, and 1% of significance level. The figure in parenthesis […] represents bandwidth based on Newey-west bandwidth criterion

**Level phases:**

**Intercept:**
The null hypothesis for INF is rejected yet the other variables which are lnEXC and TOT are not rejected at 5% significance level. It is concluded that INF is stationary at level phase only.

**Trend and intercept:**
The null hypothesis for all the variables except INF are not rejected at 5% significance level. This showed INF is the only variable that stationary at level phase only.

**First differences:**

**Intercept:**
The null hypothesis for all variables are rejected at 1% significance level. The conclusion is that all the variables are stationary at first differences.

**Trend and intercept:**
The null hypothesis for all variables are rejected at 1% significance level. The conclusion is that all the variables are stationary at first differences.

### 4.5 Granger Causality Test

The granger causality test is used to determine the causal relationship between the chosen independent variables and the exchange rate as if there is unidirectional or bidirectional relationship exist between them. The result is illustrated and showed by the table as follows.
$H_0$ : Variable X does not granger cause Y.

$H_1$ : Variable X does granger cause Y.

Decision Rule:

If the p-value is less than significant level of 0.05, then the null hypothesis will be rejected. Otherwise, do not reject null hypothesis.

Table 4.5 : Result of Granger Causality Test

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>P-value</th>
<th>Significance level ($\alpha=0.05$)</th>
<th>Decision</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF</td>
<td>LEX</td>
<td>0.7575</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>LEX</td>
<td>INF</td>
<td>0.7845</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>TOT</td>
<td>LEX</td>
<td>0.2415</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>LEX</td>
<td>TOT</td>
<td>0.7039</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>GE</td>
<td>LEX</td>
<td>0.7994</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>LEX</td>
<td>GE</td>
<td>0.1802</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>TOT</td>
<td>INF</td>
<td>0.6690</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>INF</td>
<td>TOT</td>
<td>0.5009</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
<tr>
<td>GE</td>
<td>INF</td>
<td>0.6710</td>
<td>0.05</td>
<td>Do not reject $H_0$.</td>
<td>No granger cause.</td>
</tr>
</tbody>
</table>
Based on the result from Table 4.5, it indicates that there is no causal relationship between the variables. Besides, the existence of short run relationship between the independent and dependent variables is proved to be absent from this research through the granger causality test.

### 4.6 Johansen Co-integration Test

The researcher conducted Johansen Co-integration Test to identify the existence of long run effect between the variables. By using this test, the researcher also can determine the co-integration order of each of the variables in the model.

<table>
<thead>
<tr>
<th>Hypoth - sized No. of CE(s)</th>
<th>Trace</th>
<th>Max-Eigen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stats.</td>
<td>Critical value (5%)</td>
</tr>
<tr>
<td><em>r = 0</em></td>
<td>91.988</td>
<td>47.856</td>
</tr>
<tr>
<td><em>r ≤ 1</em></td>
<td>43.202</td>
<td>29.797</td>
</tr>
<tr>
<td><em>r ≤ 2</em></td>
<td>11.802</td>
<td>15.494</td>
</tr>
<tr>
<td><em>r ≤ 3</em></td>
<td>3.4156</td>
<td>3.8414</td>
</tr>
</tbody>
</table>
NOTE: *denotes significant at 5% significant level.

\( H_0 \): There is no long run relationship between the variables.

\( H_1 \): There is long run relationship between the variables.

**Decision Rule:**

If the p-value is less than significant level of 0.05, then the *null hypothesis* will be rejected. Otherwise, do not reject *null hypothesis*.

**Result:**

Reject null hypothesis since the p-value of Trace statistic (0.0000) and Max-Eigen (0.0000) is less than the significant level of 0.05. Since all the variables are integrated at the same order, this research has sufficient evidence to conclude that there is long run relationship between the variables at the significant level of 0.05.

**4.7 Conclusion**

In this chapter, the Ordinary Least Square (OLS) method and diagnostic is run. In this research, empirical results obtain from the methodologies have been expressed in table or figure form. The results have been interpreted clearly and accurate in this chapter. The final chapter will be enlightening about the summarization of the entire research.
CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

This chapter provides the summary of entire diagnostic checking, hypothesis checking and inferential analysis in the previous chapter and discussed in detail the major finding that has been obtained. The three independent variables which are inflation rate, terms of trade and general election and its relationship towards the dependent variable which is exchange rate is thoroughly discussed to have a better understanding on the results obtained. Implications derived based on findings are also highlighted. Finally, limitations faced during this research in addressed and recommendation for future study is also brought forward in the final section of this research prior to the conclusion for.

5.1 Summary of Statistical Analyses

Table 5.1a: Summary of Diagnostic Checking

<table>
<thead>
<tr>
<th>Test</th>
<th>Hypotheses</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multicollinearity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Variance Inflation Factor (VIF)</td>
<td>$H_0$ : The model has no multicollinearity problem. $H_1$ : The model has multicollinearity problem.</td>
<td>The model has no serious multicollinearity problem.</td>
</tr>
<tr>
<td>(b) Tolerance Value (TOL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heteroscedasticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Autoregressive Conditional Heteroscedasticity Test (ARCH)</td>
<td>$H_0$ : The model is homoscedasticity. $H_1$ : The model is heteroscedasticity.</td>
<td>The model is heteroscedasticity. Solved by White Test.</td>
</tr>
</tbody>
</table>
### Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Hypothesis</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(b) White Test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autocorrelation</td>
<td>$H_0$: The model has no autocorrelation problem. $H_1$: The model has autocorrelation problem.</td>
<td>The model has autocorrelation problem. Solved by Newey-West Test.</td>
</tr>
<tr>
<td>LM Test</td>
<td>(a) Breusch-Godfrey</td>
<td></td>
</tr>
<tr>
<td>(b) Newey-West Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model Specification</td>
<td>$H_0$: The model specification is correct. $H_1$: The model specification is incorrect.</td>
<td>Model is correctly specified.</td>
</tr>
<tr>
<td>(a) Ramsey RESET Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Normality Test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Jarque-Bera Test</td>
<td>$H_0$: The error term is normally distributed. $H_1$: The error term is not normally distributed.</td>
<td>Error term is normally distributed.</td>
</tr>
<tr>
<td><strong>F-Test</strong></td>
<td>$H_0$: $\beta_1 = \beta_2 = \beta_3 = 0$ $H_1$: At least one of $\beta_i$ is different from zero, where $i = 1, 2, 3$.</td>
<td>The overall model is significant at the significant level of 5%.</td>
</tr>
<tr>
<td><strong>Unit Root Test</strong></td>
<td>$H_0$: lnEXC/ INF/ TOT have a unit root and non-stationary. $H_1$: lnEXC/ INF/ TOT do not have a unit root and stationary.</td>
<td>Stationary at first difference.</td>
</tr>
<tr>
<td>(a) Augmented Dickey Fuller Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Phillips Perron Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Granger Causality Test</strong></td>
<td>$H_0$: Variable X does not granger causes the variable Y. $H_1$: Variable X does granger causes the variable Y.</td>
<td>No causality exists between all the variables.</td>
</tr>
<tr>
<td>Johansen Cointegration Test</td>
<td>$H_0$ : There is no long run relationship between the variables.</td>
<td>$H_1$ : There is long run relationship between the variables.</td>
</tr>
</tbody>
</table>
Table 5.1b: Summary of OLS Regression and Consistency Journals

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypotheses</th>
<th>Results</th>
<th>Consistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation Rate</td>
<td>$H_0 : \beta_1 = 0$</td>
<td>Negatively but insignificant</td>
<td>• Proti (2013)</td>
</tr>
<tr>
<td></td>
<td>$H_1 : \beta_1 \neq 0$</td>
<td></td>
<td>• Nwude (2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Vikram and Vikram (2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Ramasamy and Abar (2015)</td>
</tr>
<tr>
<td>Terms of Trade</td>
<td>$H_0 : \beta_2 = 0$</td>
<td>Positively significant at 10% significant</td>
<td>• Bashir and Luqman (2014)</td>
</tr>
<tr>
<td></td>
<td>$H_1 : \beta_2 \neq 0$</td>
<td>level.</td>
<td>• Naseem, Tan and Hamizah (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malik and Asghar (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Raja and Naeem-Ullah (2014)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Camarero, Cuestas and Ordóñez (2008)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Dauvin (2014)</td>
</tr>
<tr>
<td>General Election</td>
<td>$H_0 : \beta_3 = 0$</td>
<td>Positively but insignificant</td>
<td>• Hasenzagl (2013)</td>
</tr>
<tr>
<td></td>
<td>$H_1 : \beta_3 \neq 0$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2 Discussions of Major Findings

This research found that only terms of trade and general election have a positive sign with the exchange rate while the other determinant which is the inflation rate shows a negative sign. The result shows that terms of trade is significant in explaining exchange rate. However, the result of inflation rate and general election are insignificant with the exchange rate.

5.2.1 Inflation Rate (Consumer Price Index)

This research shows that inflation rate is negatively but insignificant related with exchange rate. It showed that the inflation rate does not have an influence on the movement of RM/USD exchange rate. The result is in accordance with the research carried by Proti (2013) where the inflation rate and exchange rate movement have no significant relation. The researcher commented that the government may intervene to appreciate the value of currency to deal with high inflation rate. Inflation rate refers to continual increase in general price level of the goods and services and a low purchasing power of people. In other words, the result obtained from this research could be due to the prices of goods in Malaysia is partially controlled by the government through the implementation of certain subsidies in domestic goods such as sugar and petrol. Thus, the percentage change in Consumer Price Index (CPI) is not significant in bringing impact to the exchange rates movement. The result is also opposed towards the purchasing power parity (PPP) theory in the sense that high inflation rate will depreciate the value of the country’s currency. This scenario is also supported by Nwude (2012) who adopted PPP theory in his research who found out that its result is in contrast with the theory. On the other hand, the result also against with the IFE theory as the inflation rate is insignificant to affect the exchange rate in Malaysia. The insignificant relationship between the inflation rate and exchange rate is further supported by Vikram and Vikram (2016) and Ramasamy and Abar (2015).
5.2.2 Terms of Trade

The result of exchange rate and terms of trade is positively significant. The result is in line with the research carried by Bashir and Luqman (2014). The results of Johansen Co-integration test shows that terms of trade has a positive relationship with real exchange rate of Pakistan. Statistically, the relationship is significant is because of the rise in price of exportable goods. Hence, exports will decrease and causes the depreciation in real exchange rate in the country. Therefore, when terms of trade goes up, real exchange rate will depreciate. Besides that, the result is the same as Raja and Naeem-Ullah (2014) and Camarero, Cuestas and Ordóñez (2008). Terms of trade shows whether home country offers favorable terms and conditions to enable foreign trade to have a positive significant coefficient. This clearly shows that a more open policy towards trade has positive significant impact towards exchange rate of home country. The result is further supported by Malik and Asghar (2013), Naseem, Tan and Hamizah (2009) and Dauvin (2014). Also in line with what suggested by Cakrani (2013), where the income effect is stronger than the substitution effect will cause the currency to depreciate if there was an improvement in the terms of trade. Based on the positive and significant results, it is highly possible Malaysia experienced a higher income effect.

5.2.3 General Election

This research shows that general election is positively but insignificant related with exchange rate. The result is similar by Hasenzagl (2013) conducted a research on the effect of left and right wing party win towards the exchange rate. It is found that, no matter which the winning side is, the winning party does not significantly influence the exchange rate. In line with this, it indicates that the election is insignificant with the movement of exchange rates. From the country perspective, this could be due to the reason that the exchange rate in Malaysia is actually practising managed float system. It means that there is a free float of the exchange rate according to
the law of demand and supply yet the government has authority to intervene the value of its currency occasionally to prevent the rates from deviating away beyond the implicit boundaries. The result is further supported by Ashour and Sarkar (2014) who stated that there is insignificant relationship between presidential terms and foreign exchange rate.

### 5.3 Implications of the Study

#### 5.3.1 Policy Maker

Based on the research outcome, better insight is provided to the policy maker to determine the relationship of macroeconomic variables with Malaysian exchange rate. Since policy makers are viable to come up with most suitable regime for the policy for exchange rate in a country. Besides that, understanding the exchange rate is important to reduce uncertainty in the economy as this would strengthen the betterment of the society. If this issue is no properly and carefully monitored by the policy makers, especially during an economic downturn, the policy makers would find it hard to recover because they have failed to study the exchange rate well. Hence this is why research on exchange rate is crucial towards policy makers. The policy makers are able to identify which variable is highly affecting the exchange rate for them to use resources available wisely.

#### 5.3.2 Investors

Investment decision could be made from this research by investors who are involved in foreign investment. They could make prudent choice in the investing time, by taking in the effect of the list of factors that are primarily contribute to exchange rate volatility. Moreover, parties such as multinational firms and portfolio traders who are involved in international
trade would enable them to have a good planning on the best hedging period in order to avoid the exchange rate risks. Besides that, if they planned to decrease the overall exchange rate risks exposed to their companies then the firms would most likely change to domestic activities. Financial stability of foreign country should be taken into account before the multinational firms decided to invest in foreign direct investment. Other than that, the incidence of presidential election could cause the market anxiety. Through this research, investors could forecast a better future macroeconomic policy and also a present performance of the foreign exchange market.

5.3.3 Central Bank

In this study, the objective of central bank in improving the monetary policies could be referred. It also helps the central bank to regulate the factors that underwrite the appreciation and depreciation effect of the currency value of Ringgit Malaysia. By knowing the effect of each macroeconomic variable in limiting the exchange rate volatility, it could benefit the central bank. Besides that, the reform which central bank had experience could be a great potential to cause the exchange rate variability and its reform is proposed to align with the democratic reform.
5.4 Limitations of the Study

Due to constraints such as time and resources, there are several limitations faced in conducting this research.

The title of this research is aim at finding out if macroeconomic and political issues affect exchange rate of Malaysia. Having said that, there seems to be in inability to have a perfect answer to the questions as per shown in the results. Certain macroeconomic variable affected exchange rate while some did not. As for political issue, there are many events that can be categorized as political issues however this research only focuses on general election which resulted to be insignificant. There is always a possibility that other political issues may affect the Malaysian exchange rate.

First and foremost, the limitation of study that encountered by the researchers is the selection of data. Since macroeconomic variable and general election are the variables, choosing the most suitable frequency of data was a challenge. Macroeconomic variable is best suited on yearly basis while general election is most suitable for daily data. Yearly data was eventually used to study the relationship. Obtaining the data was also quite a challenge especially the data of recent years. The researchers do not included year 2015 as the number of observations due to the data of terms of trade index in Malaysia is unavailable.

Besides that, the study relating to general election is limited and mostly the general elections are studied on daily data with the period divided into pre, post and during election. Moreover, there is also other political related news that at immeasurable yet crucial towards the volatility of exchange rate. As the country was hit by several political related issues in recent times in line with the depreciation of RM/USD exchange rate, the originally thought out research was unable to be carried out. This is due to immeasurable way to mathematically quantify those issues that the country faced for example the 1MDB scandal.

Having limited knowledge on various methods is also one of the limitations faced. Since there is a combination of quantitative and qualitative dependent variables, a suitable method needed to be used and due to lack of knowledge in econometrics model, ordinary least square was chosen as it is more familiar and easier to interpret.
As it is known, there are many other factors that affect exchange rate besides those that are conducted in this research. Due to lack of data, the research was limited to only a certain variable and caused important variables such as oil price to be left out of this research. This may be crucial in explaining the exchange rate. Moreover, Malaysia adopts a managed floating rate system. This serves as limitation as the currency tends to balance back according to its supply and demand. This will cause an uncertainty as to which variable affects the exchange rate used.

Moreover, the data used in this research is from 1980 to 2014. Malaysian exchange rate was pegged to the USD from 1998 to 2005 and hence the pegged period was included within the sample size (Goh, 2008). This brings forward a question of inability to investigate the effects of the macroeconomic variable and political issues towards the exchange rate as the constant rate during 1998 to 2005 may not reflect on the variables in study due to restriction on the exchange rate and OLS could not properly analyze the exact relationship.

Lastly, in the output obtained through Eviews, the $R^2$ of the model is found to be at a low side which is around 33%. $R^2$ serves as an indication of how much percentage of variation in dependent variable explained by the independent variables in this research. This serves as a limitation in this research hence it is required for future researchers to take better steps in terms of data and variable selection.

The limitations faced has helped in discovering more ways to conducts research within the capability and this provides a guideline for future researchers to prepare themselves and find alternatives to face any similar limitations.
5.5 Recommendations for Future Research

Future researchers could consider studying the exchange rate based on different time frame. For instance, they could make a comparison on the exchange rate between the 80s, 90s and the 2000s. This is due to the economic and political difference between these times and having a more comprehensive understanding in determining what does and does not affect exchange rate. It is also advised to do a comparison of exchange rate determinants before the RM was pegged as well as after, which is before and after 1998. This would give a better understanding to researchers on the factors that cause the exchange rate appreciation and depreciation and might solve the problem of the insignificance relationship of the exchange rate and some of the independent variable.

China and Singapore being the largest exporter of Malaysia, it is crucial to study the factors that affect exchange rate in those countries too as it could be significantly affecting Malaysia’s exchange rate as well. This would paint a bigger picture in how exchange rate works as there are numerous other factors that exist externally out of a country that effect exchange rate of a country.

Future researchers are suggested to increase the sample size. When sample size increase it implies a higher degree of freedom. Hence, there would be more accurate results. Besides that, future researchers are advice to include other independent variable so that a better and more relevant model could be estimated. This are some of the steps that research could take if face a low $R^2$ as faced by this research.

Since the research focuses both on macroeconomic variable and general election, it would be suggested to focus on either variable. As per this research, the number of research studying macroeconomic variable is quite wide yet the research on political issues are not as popular, especially in Malaysia. Since political issue has been a popular topic in Malaysia in recent times, it is encouraged for future research to emphasize more on political issues such as general election, changes in governmental policies and war to have a better understanding on how factors besides from macroeconomic variable have effect on exchange rate.
5.6 Conclusion

As a concluding remark, this research has found that general election and inflation rate is insignificant while terms of trade has a significant relationship with exchange rate. Furthermore, variety of tests has been applied to identify and justify the appropriate determinants of exchange rate. The limitations and recommendations also outlined in this study to provide some improvements for the future researchers. Implications has been review and discussed for policy makers, investors and central bank in order for them to carry out investment strategy and also implementation of policies. Hence, this paper has accomplished the research objectives which are to investigate the relationship between inflation rate terms of trade and general election towards exchange rate.
REFERENCES


Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?


APPENDICES

APPENDIX 1: ORDINARY LEAST SQUARES (OLS) METHOD

Dependent Variable: LOG(EXC)
Method: Least Squares
Date: 06/17/16   Time: 14:41
Sample: 1980 2014
Included observations: 35

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<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<tbody>
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R-squared 0.330014  Mean dependent var 1.087995
Adjusted R-squared 0.265177  S.D. dependent var 0.188180
S.E. of regression 0.161311  Akaike info criterion -0.703750
Sum squared resid 0.806662  Schwarz criterion -0.525996
Log likelihood 16.31562  Hannan-Quinn criter. -0.642389
F-statistic 5.089878  Durbin-Watson stat 0.411303
Prob(F-statistic) 0.005570
APPENDIX 2: MULTICOLLINEARITY

Pair-wise Correlation Coefficients

<table>
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Variance Inflation Factor (VIF) / Tolerance (TOL)

Dependent Variable: INF
Method: Least Squares
Date: 06/17/16   Time: 15:22
Sample: 1980 2014
Included observations: 35

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<th>Prob.</th>
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<tr>
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<td>2.826842</td>
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</table>

R-squared 0.071007  Mean dependent var 3.053305
Adjusted R-squared 0.012945  S.D. dependent var 1.945827
S.E. of regression 1.933191  Akaike info criterion 4.238038
Sum squared resid 119.5913  Schwarz criterion 4.371353
Log likelihood -71.16566  Hannan-Quinn criterion 4.284058
F-statistic 1.222958  Durbin-Watson stat 1.029428
Prob(F-statistic) 0.307748
Dependent Variable: TOT  
Method: Least Squares  
Date: 06/17/16  Time: 15:22  
Sample: 1980 2014  
Included observations: 35

<table>
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<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
<th>Prob.</th>
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R-squared 0.071797  Mean dependent var 96.11542  
Adjusted R-squared 0.013784  S.D. dependent var 13.58399  
S.E. of regression 13.49004  Akaike info criterion 8.123597  
Sum squared resid 5823.397  Schwarz criterion 8.256912  
Log likelihood -139.1629  Hannan-Quinn criter. 8.169617  
F-statistic 1.237609  Durbin-Watson stat 0.297976  
Prob(F-statistic) 0.303590
Dependent Variable: GE
Method: Least Squares
Date: 06/17/16  Time: 15:23
Sample: 1980 2014
Included observations: 35

<table>
<thead>
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<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
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<th>Prob.</th>
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R-squared 0.000911  Mean dependent var 0.228571
Adjusted R-squared -0.061532  S.D. dependent var 0.426043
S.E. of regression 0.438955  Akaike info criterion 1.272977
Sum squared resid 6.165807  Schwarz criterion 1.406292
Log likelihood -19.27709  Hannan-Quinn criter. 1.318997
F-statistic 0.014589  Durbin-Watson stat 2.595942
Prob(F-statistic) 0.985524

### Variance Inflation Factor (VIF) / Tolerance (TOL)

<table>
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<tr>
<th></th>
<th>( R^2 )</th>
<th>( VIF = 1/(1 - R^2) )</th>
<th>( TOL = 1/VIF )</th>
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<td>Inflation (INF)</td>
<td>0.071007</td>
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APPENDIX 3: HETEROSCEDASTICITY

Autoregressive Conditional Heteroskedasticity (ARCH) Test

Heteroskedasticity Test: ARCH

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<td>F-statistic</td>
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<tr>
<td>Obs*R-squared</td>
<td>8.764163</td>
<td>0.0031</td>
</tr>
</tbody>
</table>

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/17/16  Time: 14:58
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
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<tr>
<th>Variable</th>
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<th>Prob.</th>
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<tr>
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<td>0.011830</td>
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R-squared 0.257769  Mean dependent var 0.023613
Adjusted R-squared 0.234575  S.D. dependent var 0.018820
S.E. of regression 0.016465  Akaike info criterion -5.318147
Sum squared resid 0.008675  Schwarz criterion -5.228361
Log likelihood  92.40850  Hannan-Quinn criter. -5.287527
F-statistic 11.11329  Durbin-Watson stat 2.383050
Prob(F-statistic) 0.002176
### White Test

Dependent Variable: LOG(EXC)
Method: Least Squares
Date: 06/17/16  Time: 15:02
Sample: 1980 2014
Included observations: 35

White heteroskedasticity-consistent standard errors & covariance

<table>
<thead>
<tr>
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<tbody>
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R-squared 0.330014  Mean dependent var 1.087995
Adjusted R-squared 0.265177  S.D. dependent var 0.188180
S.E. of regression 0.161311  Akaike info criterion -0.703750
Sum squared resid 0.806662  Schwarz criterion -0.525996
Log likelihood 16.31562  Hannan-Quinn crite. -0.642389
F-statistic 5.089878  Durbin-Watson stat 0.411303
Prob(F-statistic) 0.005570  Wald F-statistic 8.511641
Prob(Wald F-statistic) 0.000286
APPENDIX 4: AUTOCORRELATION

Breush-Godfrey Serial Correlation LM Test

| F-statistic | 28.32641 | Prob. F(2,29) | 0.0000 |
| Obs*R-squared | 23.14984 | Prob. Chi-Square(2) | 0.0000 |

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/17/16 Time: 15:03
Sample: 1980 2014
Included observations: 35
Presample missing value lagged residuals set to zero.

<table>
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R-squared 0.661424 Mean dependent var -2.90E-16
Adjusted R-squared 0.603049 S.D. dependent var 0.154030
S.E. of regression 0.097045 Akaike info criterion -1.672470
Sum squared resid 0.273117 Schwarz criterion -1.405839
Log likelihood 35.26823 Hannan-Quinn criter. -1.580429
F-statistic 11.33056 Durbin-Watson stat 1.845486
Prob(F-statistic) 0.000004
### Newey-West

Dependent Variable: LOG(EXC)
Method: Least Squares  
Date: 06/17/16  Time: 15:03  
Sample: 1980 2014  
Included observations: 35  
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

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Adjusted R-squared 0.265177  S.D. dependent var 0.188180  
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Sum squared resid 0.806662  Schwarz criterion -0.525996  
Log likelihood 16.31562  Hannan-Quinn criter. -0.642389  
F-statistic 5.089878  Durbin-Watson stat 0.411303  
Prob(F-statistic) 0.005570  Wald F-statistic 6.027439  
Prob(Wald F-statistic) 0.002338
APPENDIX 5: MODEL SPECIFICATION

Ramsey Regression Equation Specification Error Test (RESET) Test.

Ramsey RESET Test
Equation: EQ01
Specification: LOG(EXC) INF TOT GE C
Omitted Variables: Squares of fitted values

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<td>F-statistic</td>
<td>1.071682</td>
<td>(1, 30)</td>
<td>0.3088</td>
</tr>
<tr>
<td>Likelihood ratio</td>
<td>1.228481</td>
<td>1</td>
<td>0.2677</td>
</tr>
</tbody>
</table>

F-test summary:

<table>
<thead>
<tr>
<th></th>
<th>Sum of Sq.</th>
<th>df</th>
<th>Mean Squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test SSR</td>
<td>0.027822</td>
<td>1</td>
<td>0.027822</td>
</tr>
<tr>
<td>Restricted SSR</td>
<td>0.806662</td>
<td>31</td>
<td>0.026021</td>
</tr>
<tr>
<td>Unrestricted SSR</td>
<td>0.778840</td>
<td>30</td>
<td>0.025961</td>
</tr>
</tbody>
</table>

LR test summary:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted LogL</td>
<td>16.31562</td>
<td>31</td>
</tr>
<tr>
<td>Unrestricted LogL</td>
<td>16.92986</td>
<td>30</td>
</tr>
</tbody>
</table>

Unrestricted Test Equation:
Dependent Variable: LOG(EXC)
Method: Least Squares
Date: 06/17/16   Time: 15:04
Sample: 1980 2014
Included observations: 35
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed)
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

bandwidth = 4.0000)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF</td>
<td>0.082859</td>
<td>0.119645</td>
<td>0.692539</td>
<td>0.4939</td>
</tr>
<tr>
<td>TOT</td>
<td>-0.020070</td>
<td>0.028006</td>
<td>-0.716616</td>
<td>0.4792</td>
</tr>
<tr>
<td>GE</td>
<td>-0.035680</td>
<td>0.058688</td>
<td>-0.607954</td>
<td>0.5478</td>
</tr>
<tr>
<td>C</td>
<td>0.166431</td>
<td>0.621744</td>
<td>0.267684</td>
<td>0.7908</td>
</tr>
<tr>
<td>FITTED^2</td>
<td>2.180372</td>
<td>2.407483</td>
<td>0.905665</td>
<td>0.3723</td>
</tr>
</tbody>
</table>

R-squared 0.353122  Mean dependent var 1.087995
Adjusted R-squared 0.266872  S.D. dependent var 0.188180
S.E. of regression 0.161125  Akaike info criterion -0.681706
Sum squared resid 0.778840  Schwarz criterion -0.459514
Log likelihood 16.92986  Hannan-Quinn criter. -0.605005
F-statistic 4.094156  Durbin-Watson stat 0.541637
Prob(F-statistic) 0.009151  Wald F-statistic 8.897820
Prob(Wald F-statistic) 0.000073
APPENDIX 6: NORMALITY TEST

Jarque-Bera Test

![Histogram and summary statistics for Jarque-Bera test]

- Series: Residuals
- Sample: 1980-2014
- Observations: 35
- Mean: -2.90e-16
- Median: 0.018909
- Maximum: 0.276291
- Minimum: -0.246878
- Std. Dev.: 0.154030
- Skewness: 0.020358
- Kurtosis: 1.649135
- Jarque-Bera: 2.663635
- Probability: 0.283997
APPENDIX 7: UNIT ROOT TEST

Augmented Dickey-Fuller Test

**Variable: lnEXC**

**Level and Intercept**

Null Hypothesis: LEX has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>Description</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-1.684853</td>
<td>0.4296</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.639407</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.951125</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.614300</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 06/16/16   Time: 18:33
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX(-1)</td>
<td>-0.105039</td>
<td>0.062343</td>
<td>-1.684853</td>
<td>0.1017</td>
</tr>
<tr>
<td>C</td>
<td>0.125974</td>
<td>0.068652</td>
<td>1.834971</td>
<td>0.0758</td>
</tr>
</tbody>
</table>

R-squared 0.081482 Mean dependent var 0.011993
Adjusted R-squared 0.052778 S.D. dependent var 0.070000
Level, Trend and Intercept

Null Hypothesis: LEX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% level</td>
<td>-4.252879</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.548490</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.207094</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 06/16/16   Time: 18:38
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX(-1)</td>
<td>-0.148217</td>
<td>0.100010</td>
<td>-1.482026</td>
<td>0.1484</td>
</tr>
<tr>
<td>C</td>
<td>0.154236</td>
<td>0.086025</td>
<td>1.792913</td>
<td>0.0828</td>
</tr>
</tbody>
</table>
@TREND("1980") 0.001062 0.001910 0.556058 0.5822

R-squared 0.090553  Mean dependent var 0.011993
Adjusted R-squared 0.031879  S.D. dependent var 0.070000
S.E. of regression 0.068875  Akaike info criterion -2.428944
Sum squared resid 0.147058  Schwarz criterion -2.294266
Log likelihood 44.29206  Hannan-Quinn criter. -2.383015
F-statistic 1.543325  Durbin-Watson stat 1.585184
Prob(F-statistic) 0.229641

First Differences and Intercept

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

Augmented Dickey-Fuller test statistic -4.768685 0.0005
Test critical values: 1% level -3.646342
5% level -2.954021
10% level -2.615817


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 06/16/16  Time: 18:51
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
</table>

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First Differences, Trend and Intercept

Null Hypothesis: D(LEX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-4.746770</td>
<td>0.0030</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-4.262735</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.552973</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.209642</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 06/16/16  Time: 18:54
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LEX(-1))</td>
<td>-0.862603</td>
<td>0.181724</td>
<td>-4.746770</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.023439</td>
<td>0.027455</td>
<td>0.853745</td>
<td>0.4000</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.000797</td>
<td>0.001333</td>
<td>-0.597781</td>
<td>0.5545</td>
</tr>
</tbody>
</table>

| R-squared        | 0.429942    | Mean dependent var | -0.000571 |
| Adjusted R-squared | 0.391939 | S.D. dependent var | 0.091816 |
| S.E. of regression | 0.071596 | Akaike info criterion | 2.349041 |
| Sum squared resid | 0.153781 | Schwarz criterion | 2.212994 |
| Log likelihood   | 41.75917    | Hannan-Quinn criter. | -2.303265 |
| F-statistic      | 11.31313    | Durbin-Watson stat | 1.938908 |
| Prob(F-statistic) | 0.000218 |                  |          |
Variable: INF

Level and Intercept

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3.521151</td>
<td>0.0134</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.639407
- 5% level: -2.951125
- 10% level: -2.614300


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 06/16/16   Time: 19:03
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF(-1)</td>
<td>-0.499959</td>
<td>0.141987</td>
<td>-3.521151</td>
<td>0.0013</td>
</tr>
<tr>
<td>C</td>
<td>1.421328</td>
<td>0.513762</td>
<td>2.766510</td>
<td>0.0093</td>
</tr>
</tbody>
</table>

R-squared 0.279255  Mean dependent var -0.103880
Adjusted R-squared 0.256732  S.D. dependent var 1.868558
S.E. of regression 1.610940  Akaike info criterion 3.848536
Sum squared resid 83.04411  Schwarz criterion 3.938321
Log likelihood -63.42510  Hannan-Quinn criterion 3.879155
F-statistic 12.39850  Durbin-Watson stat 2.121400
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

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Faculty of Business and Finance

Level, Trend and Intercept

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-3.503879</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-4.252879</td>
</tr>
<tr>
<td>5% level</td>
<td>-3.548490</td>
</tr>
<tr>
<td>10% level</td>
<td>-3.207094</td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 06/16/16   Time: 19:05
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF(-1)</td>
<td>-0.545227</td>
<td>0.155607</td>
<td>-3.503879</td>
<td>0.0014</td>
</tr>
<tr>
<td>C</td>
<td>1.958024</td>
<td>0.892507</td>
<td>2.193848</td>
<td>0.0359</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.022777</td>
<td>0.030862</td>
<td>-0.738039</td>
<td>0.4660</td>
</tr>
</tbody>
</table>

R-squared 0.291701 Mean dependent var -0.103880
Adjusted R-squared 0.246004 S.D. dependent var 1.868558
S.E. of regression 1.622524 Akaike info criterion 3.889941
First Differences and Intercept

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=8)

Augmented Dickey-Fuller test statistic \(-5.010151\) 0.0003

Test critical values:
- 1% level \(-3.653730\)
- 5% level \(-2.957110\)
- 10% level \(-2.617434\)


Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INF,2)
Method: Least Squares
Date: 06/16/16  Time: 19:05
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(INF(-1))</td>
<td>-1.462142</td>
<td>0.291836</td>
<td>-5.010151</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(INF(-1),2)</td>
<td>0.122096</td>
<td>0.170726</td>
<td>0.715159</td>
<td>0.4802</td>
</tr>
<tr>
<td>C</td>
<td>-0.183482</td>
<td>0.301219</td>
<td>-0.609132</td>
<td>0.5472</td>
</tr>
</tbody>
</table>
First Differences, Trend and Intercept

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5.156984</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.273277
- 5% level: -3.557759
- 10% level: -3.212361


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 06/16/16   Time: 19:05
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
</table>

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### Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

<table>
<thead>
<tr>
<th>D(INF(-1))</th>
<th>D(INF(-1),2)</th>
<th>C</th>
<th>@TREND(&quot;1980&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.538372</td>
<td>0.151410</td>
<td>-0.881610</td>
<td>0.036886</td>
</tr>
<tr>
<td>0.298309</td>
<td>0.171936</td>
<td>0.689249</td>
<td>0.032790</td>
</tr>
<tr>
<td>-5.156984</td>
<td>0.880617</td>
<td>-1.279087</td>
<td>1.124909</td>
</tr>
<tr>
<td>0.0000</td>
<td>0.3860</td>
<td>0.2114</td>
<td>0.2702</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R-squared</th>
<th>Mean dependent var</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.695596</td>
<td>0.153721</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjusted R-squared</th>
<th>S.D. dependent var</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.662982</td>
<td>2.866329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.E. of regression</th>
<th>Akaike info criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.663998</td>
<td>3.972792</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sum squared resid</th>
<th>Schwarz criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>77.52890</td>
<td>4.156009</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Log likelihood</th>
<th>Hannan-Quinn criter.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-59.56467</td>
<td>4.033523</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Durbin-Watson stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.32770</td>
<td>1.977849</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prob(F-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000000</td>
</tr>
</tbody>
</table>
**Variable: lnTOT**

**Level and Intercept**

Null Hypothesis: TOT has a unit root  
Exogenous: Constant  
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-1.946663</td>
<td>0.3080</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.639407</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.951125</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.614300</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation  
Dependent Variable: D(TOT)  
Method: Least Squares  
Date: 06/17/16  Time: 15:06  
Sample (adjusted): 1981 2014  
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOT(-1)</td>
<td>-0.130852</td>
<td>0.067219</td>
<td>-1.946663</td>
<td>0.0604</td>
</tr>
<tr>
<td>C</td>
<td>13.30606</td>
<td>6.524710</td>
<td>2.039333</td>
<td>0.0497</td>
</tr>
</tbody>
</table>

R-squared 0.105883  Mean dependent var 0.729634  
Adjusted R-squared 0.077942  S.D. dependent var 5.544678  
S.E. of regression 5.324214  Akaike info criterion 6.239430  
Sum squared resid 907.1122  Schwarz criterion 6.329216  
Log likelihood -104.0703  Hannan-Quinn criter. 6.270049  
F-statistic 3.789498  Durbin-Watson stat 1.951379
Prob(F-statistic)  0.060399

Level, Trend and Intercept

Null Hypothesis: TOT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-1.358129</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-4.252879</td>
</tr>
<tr>
<td>5% level</td>
<td>-3.548490</td>
</tr>
<tr>
<td>10% level</td>
<td>-3.207094</td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOT)
Method: Least Squares
Date: 06/17/16   Time: 15:07
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOT(-1)</td>
<td>-0.115098</td>
<td>0.084747</td>
<td>-1.358129</td>
<td>0.1842</td>
</tr>
<tr>
<td>C</td>
<td>12.43472</td>
<td>7.180129</td>
<td>1.731824</td>
<td>0.0932</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.036733</td>
<td>0.117342</td>
<td>-0.313042</td>
<td>0.7563</td>
</tr>
</tbody>
</table>

R-squared 0.108700  Mean dependent var 0.729634
Adjusted R-squared 0.051197  S.D. dependent var 5.544678
S.E. of regression 5.400877  Akaike info criterion 6.295097
First Differences and Intercept

Null Hypothesis: D(TOT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-6.157591</td>
<td>0.0000</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.646342</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.954021</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.615817</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOT,2)
Method: Least Squares
Date: 06/17/16   Time: 15:07
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(TOT(-1))</td>
<td>-1.048995</td>
<td>0.170358</td>
<td>-6.157591</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>1.066371</td>
<td>0.952897</td>
<td>1.119083</td>
<td>0.2717</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.550177</td>
<td>Mean dependent var</td>
<td>0.265232</td>
<td></td>
</tr>
</tbody>
</table>

Sum squared resid 904.2537  Schwar茨 criterion 6.429776
Log likelihood -104.0167  Hannan-Quinn crit. 6.341026
F-statistic 1.890338  Durbin-Watson stat 1.990922
Prob(F-statistic) 0.168022
First Differences, Trend and Intercept

Null Hypothesis: D(TOT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6.917377</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.262735
- 5% level: -3.552973
- 10% level: -3.209642


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOT,2)
Method: Least Squares
Date: 06/17/16  Time: 15:08
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(TOT(-1))</td>
<td>-1.137664</td>
<td>0.164465</td>
<td>-6.917377</td>
<td>0.0000</td>
</tr>
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<td>C</td>
<td>5.070838</td>
<td>1.967222</td>
<td>2.577664</td>
<td>0.0151</td>
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</tbody>
</table>
@TREND("1980")  -0.218708  0.095707  -2.285175  0.0295

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.616867</td>
<td>Mean dependent var</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.591325</td>
<td>S.D. dependent var</td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>5.087335</td>
<td>Akaike info criterion</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>776.4292</td>
<td>Schwarz criterion</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-98.93524</td>
<td>Hannan-Quinn criter.</td>
</tr>
<tr>
<td>F-statistic</td>
<td>24.15094</td>
<td>Durbin-Watson stat</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000001</td>
<td></td>
</tr>
</tbody>
</table>

Mean dependent var: 0.265232
S.D. dependent var: 7.957954
Akaike info criterion: 6.177893
Schwarz criterion: 6.313939
Hannan-Quinn criter.: 6.223669
Durbin-Watson stat: 2.182250
Prob(F-statistic): 0.000001
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

Phillips-Perron (PP) Test

**Variable: InEXC**

**Level and Intercept**

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

<table>
<thead>
<tr>
<th></th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-1.720890</td>
<td>0.4121</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.639407
- 5% level: -2.951125
- 10% level: -2.614300


<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual variance (no correction)</td>
<td>0.004368</td>
</tr>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
<td>0.005144</td>
</tr>
</tbody>
</table>

Phillips-Perron Test Equation
Dependent Variable: D(LEX)
Method: Least Squares
Date: 06/16/16 Time: 19:30
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX(-1)</td>
<td>-0.105039</td>
<td>0.062343</td>
<td>-1.684853</td>
</tr>
</tbody>
</table>
Level, Trend and Intercept

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

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.482026</td>
<td>0.8162</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.252879
- 5% level: -3.548490
- 10% level: -3.207094


Residual variance (no correction) 0.004325
HAC corrected variance (Bartlett kernel) 0.004325
Date: 06/16/16   Time: 19:30
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX(-1)</td>
<td>-0.148217</td>
<td>0.100010</td>
<td>-1.482026</td>
<td>0.1484</td>
</tr>
<tr>
<td>C</td>
<td>0.154236</td>
<td>0.086025</td>
<td>1.792913</td>
<td>0.0828</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>0.001062</td>
<td>0.001910</td>
<td>0.556058</td>
<td>0.5822</td>
</tr>
</tbody>
</table>

R-squared 0.090553  Mean dependent var 0.011993
Adjusted R-squared 0.031879  S.D. dependent var 0.070000
S.E. of regression 0.068875  Akaike info criterion -2.428944
Sum squared resid 0.147058  Schwarz criterion -2.294266
Log likelihood 44.29206  Hannan-Quinn criter. -2.383015
F-statistic 1.543325  Durbin-Watson stat 1.585184
Prob(F-statistic) 0.229641

First Differences and Intercept

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

Phillips-Perron test statistic -4.724072 0.0006

Test critical values: 1% level -3.646342
5% level -2.954021
10% level -2.615817


Residual variance (no correction) 0.004716
Phillips-Perron Test Equation

Dependent Variable: D(LEX,2)
Method: Least Squares
Date: 06/16/16   Time: 19:31
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LEX(-1))</td>
<td>-0.842017</td>
<td>0.176572</td>
<td>-4.768685</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.008865</td>
<td>0.012491</td>
<td>0.709694</td>
<td>0.4832</td>
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</tbody>
</table>

R-squared 0.423152
Mean dependent var -0.000571
Adjusted R-squared 0.404544
S.D. dependent var 0.091816
S.E. of regression 0.070850
Akaike info criterion -2.397806
Schwarz criterion -2.307108
Durbin-Watson stat 1.950362

First Differences, Trend and Intercept

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

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.677028</td>
<td>0.0036</td>
<td></td>
</tr>
</tbody>
</table>
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

Test critical values:  
1% level: -4.262735  
5% level: -3.552973  
10% level: -3.209642


Residual variance (no correction): 0.004660  
HAC corrected variance (Bartlett kernel): 0.003871

Phillips-Perron Test Equation
Dependent Variable: D(LEX,2)  
Method: Least Squares  
Date: 06/16/16   Time: 19:32  
Sample (adjusted): 1982 2014  
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LEX(-1))</td>
<td>-0.862603</td>
<td>0.181724</td>
<td>-4.746770</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.023439</td>
<td>0.027455</td>
<td>0.853745</td>
<td>0.4000</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.000797</td>
<td>0.001333</td>
<td>-0.597781</td>
<td>0.5545</td>
</tr>
</tbody>
</table>

R-squared = 0.429942  
Adjusted R-squared = 0.391939  
S.E. of regression = 0.071596  
Sum squared resid = 0.153781  
Log likelihood = 41.75917  
F-statistic = 11.31313  
Prob(F-statistic) = 0.000218
**Variable: INF**

**Level and Intercept**

Null Hypothesis: INF has a unit root  
Exogenous: Constant  
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-3.384224</td>
<td>0.0186</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.639407</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.951125</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.614300</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Residual variance (no correction)</th>
<th>2.442474</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
<td>1.800319</td>
</tr>
</tbody>
</table>

Phillips-Perron Test Equation  
Dependent Variable: D(INF)  
Method: Least Squares  
Date: 06/16/16  Time: 19:27  
Sample (adjusted): 1981 2014  
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF(-1)</td>
<td>-0.499959</td>
<td>0.141987</td>
<td>-3.521151</td>
<td>0.0013</td>
</tr>
<tr>
<td>C</td>
<td>1.421328</td>
<td>0.513762</td>
<td>2.766510</td>
<td>0.0093</td>
</tr>
</tbody>
</table>

R-squared: 0.279255  
Mean dependent var: -0.103880
Level, Trend and Intercept

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

<table>
<thead>
<tr>
<th></th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-3.352737</td>
<td>0.0750</td>
</tr>
</tbody>
</table>

Test critical values:

- 1% level  -4.252879
- 5% level  -3.548490
- 10% level -3.207094


Residual variance (no correction) 2.400298
HAC corrected variance (Bartlett kernel) 1.920543
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF(-1)</td>
<td>-0.545227</td>
<td>0.155607</td>
<td>-3.503879</td>
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<tr>
<td>C</td>
<td>1.958024</td>
<td>0.892507</td>
<td>2.193848</td>
<td>0.0359</td>
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<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.022777</td>
<td>0.030862</td>
<td>-0.738039</td>
<td>0.4660</td>
</tr>
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</table>

**First Differences and Intercept**

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

<table>
<thead>
<tr>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-8.291027</td>
</tr>
<tr>
<td>Test critical values: 1% level</td>
<td>-3.646342</td>
</tr>
<tr>
<td>5% level</td>
<td>-2.954021</td>
</tr>
<tr>
<td>10% level</td>
<td>-2.615817</td>
</tr>
</tbody>
</table>


| Residual variance (no correction) | 2.716280 |
| HAC corrected variance (Bartlett kernel) | 3.299048 |
Phillips-Perron Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 06/16/16   Time: 19:28
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(INF(-1))</td>
<td>-1.368881</td>
<td>0.159348</td>
<td>-8.590514</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.249781</td>
<td>0.296831</td>
<td>-0.841490</td>
<td>0.4065</td>
</tr>
</tbody>
</table>

R-squared: 0.704190
Mean dependent var: -0.060215
Adjusted R-squared: 0.694648
S.D. dependent var: 3.077249
S.E. of regression: 1.700448
Akaike info criterion: 4.049050
Schwarz criterion: 4.049050
Log likelihood: -63.31282
Hannan-Quinn criter.: 3.988869

First Differences, Trend and Intercept
Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8.579873</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values: 1% level: -4.262735
5% level: -3.552973
10% level: -3.209642

---

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<table>
<thead>
<tr>
<th>Residual variance (no correction)</th>
<th>2.530739</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
<td>2.932487</td>
</tr>
</tbody>
</table>

Phillips-Perron Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 06/16/16   Time: 19:29
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(INF(-1))</td>
<td>-1.387025</td>
<td>0.156830</td>
<td>-8.844143</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-1.069053</td>
<td>0.624498</td>
<td>-1.711862</td>
<td>0.0972</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>0.045376</td>
<td>0.030596</td>
<td>1.483055</td>
<td>0.1485</td>
</tr>
</tbody>
</table>

R-squared               | 0.724396    | Mean dependent var | -0.060215 |
Adjusted R-squared      | 0.706022    | S.D. dependent var | 3.077249  |
S.E. of regression      | 1.668476    | Akaike info criterion | 3.948207 |
Sum squared resid       | 83.51438    | Schwarz criterion  | 4.084253  |
Log likelihood          | -62.14541   | Hannan-Quinn crite. | 3.993892 |
F-statistic             | 39.42587    | Durbin-Watson stat | 1.954286  |
Prob(F-statistic)       | 0.000000    |                    |           |
**Variable: InTOT**

**Level and Intercept**

Null Hypothesis: TOT has a unit root  
Exogenous: Constant  
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.639407</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.951125</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.614300</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Residual variance (no correction)</th>
<th>26.67977</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
<td>21.57152</td>
</tr>
</tbody>
</table>

**Phillips-Perron Test Equation**

**Dependent Variable: D(TOT)**

**Method: Least Squares**

Date: 06/17/16   Time: 15:10  
Sample (adjusted): 1981 2014  
Included observations: 34 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOT(-1)</td>
<td>-0.130852</td>
<td>0.067219</td>
<td>-1.946663</td>
<td>0.0604</td>
</tr>
<tr>
<td>C</td>
<td>13.30606</td>
<td>6.524710</td>
<td>2.039333</td>
<td>0.0497</td>
</tr>
</tbody>
</table>

| R-squared | 0.105883 | Mean dependent var | 0.729634 |

---

**Faculty of Business and Finance**

Undergraduate Research Project  Page 130  of 139
Level, Trend and Intercept

Null Hypothesis: TOT has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.134058</td>
<td>0.9080</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.252879
- 5% level: -3.548490
- 10% level: -3.207094


Residual variance (no correction) 26.59570
HAC corrected variance (Bartlett kernel) 18.74611

Phillips-Perron Test Equation

Dependent Variable: D(TOT)
Method: Least Squares
Date: 06/17/16 Time: 15:10
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

### First Differences and Intercept

Null Hypothesis: \( D(TOT) \) has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOT(-1)</td>
<td>-0.115098</td>
<td>0.084747</td>
<td>-1.358129</td>
<td>0.1842</td>
</tr>
<tr>
<td>C</td>
<td>12.43472</td>
<td>7.180129</td>
<td>1.731824</td>
<td>0.0932</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.036733</td>
<td>0.117342</td>
<td>-0.313042</td>
<td>0.7563</td>
</tr>
</tbody>
</table>

**R-squared** 0.108700  **Mean dependent var** 0.729634

**Adjusted R-squared** 0.051197  **S.D. dependent var** 5.544678

**S.E. of regression** 5.400877  **Akaike info criterion** 6.295097

**Sum squared resid** 904.2537  **Schwarz criterion** 6.429776

**Log likelihood** -104.0167  **Hannan-Quinn criter.** 6.341026

**F-statistic** 1.890338  **Durbin-Watson stat** 1.990922

**Prob(F-statistic)** 0.168022

**Phillips-Perron test statistic** -6.137604  **Prob.*** 0.0000

**Test critical values:**
- \( 1\% \) level -3.646342
- \( 5\% \) level -2.954021
- \( 10\% \) level -2.615817


**Residual variance (no correction)** 27.62364

**HAC corrected variance (Bartlett kernel)** 29.50195
Phillips-Perron Test Equation
Dependent Variable: D(TOT,2)
Method: Least Squares
Date: 06/17/16   Time: 15:10
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(TOT(-1))</td>
<td>-1.048995</td>
<td>0.170358</td>
<td>-6.157591</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>1.066371</td>
<td>0.952897</td>
<td>1.119083</td>
<td>0.2717</td>
</tr>
</tbody>
</table>

R-squared     0.550177  Mean dependent var  0.265232
Adjusted R-squared 0.535666  S.D. dependent var  7.957954
S.E. of regression 5.422713  Akaike info criterion  6.277761
Sum squared resid 911.5802  Schwarz criterion  6.368459
Log likelihood  -101.5831  Hannan-Quinn criter.  6.308278
F-statistic       37.91593  Durbin-Watson stat  1.993948
Prob(F-statistic) 0.000001

### First Differences, Trend and Intercept

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

<table>
<thead>
<tr>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-6.917377</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.262735
- 5% level: -3.552973
- 10% level: -3.209642

Residual variance (no correction) 23.52816
HAC corrected variance (Bartlett kernel) 23.52816

Phillips-Perron Test Equation
Dependent Variable: D(TOT,2)
Method: Least Squares
Date: 06/17/16  Time: 15:10
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(TOT(-1))</td>
<td>-1.137664</td>
<td>0.164465</td>
<td>-6.917377</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>5.070838</td>
<td>1.967222</td>
<td>2.577664</td>
<td>0.0151</td>
</tr>
<tr>
<td>@TREND(&quot;1980&quot;)</td>
<td>-0.218708</td>
<td>0.095707</td>
<td>-2.285175</td>
<td>0.0295</td>
</tr>
</tbody>
</table>

R-squared 0.616867  Mean dependent var 0.265232
Adjusted R-squared 0.591325  S.D. dependent var 7.957954
S.E. of regression 5.087335  Akaike info criterion 6.177893
Sum squared resid 776.4292  Schwarz criterion 6.313939
Log likelihood -98.93524  Hannan-Quinn criter. 6.223669
F-statistic 24.15094  Durbin-Watson stat 2.182250
Prob(F-statistic) 0.000001
APPENDIX 8: GRANGER CAUSALITY TEST

Pairwise Granger Causality Tests
Date: 06/17/16  Time: 15:15
Sample: 1980 2014
Lags: 2

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF does not Granger Cause LEX</td>
<td>33</td>
<td>0.28054</td>
<td>0.7575</td>
</tr>
<tr>
<td>LEX does not Granger Cause INF</td>
<td></td>
<td>0.24486</td>
<td>0.7845</td>
</tr>
<tr>
<td>TOT does not Granger Cause LEX</td>
<td>33</td>
<td>1.49568</td>
<td>0.2415</td>
</tr>
<tr>
<td>LEX does not Granger Cause TOT</td>
<td></td>
<td>0.35552</td>
<td>0.7039</td>
</tr>
<tr>
<td>GE does not Granger Cause LEX</td>
<td>33</td>
<td>0.22565</td>
<td>0.7994</td>
</tr>
<tr>
<td>LEX does not Granger Cause GE</td>
<td></td>
<td>1.82313</td>
<td>0.1802</td>
</tr>
<tr>
<td>TOT does not Granger Cause INF</td>
<td>33</td>
<td>0.40778</td>
<td>0.6690</td>
</tr>
<tr>
<td>INF does not Granger Cause TOT</td>
<td></td>
<td>0.70879</td>
<td>0.5009</td>
</tr>
<tr>
<td>GE does not Granger Cause INF</td>
<td>33</td>
<td>0.40467</td>
<td>0.6710</td>
</tr>
<tr>
<td>INF does not Granger Cause GE</td>
<td></td>
<td>0.53275</td>
<td>0.5928</td>
</tr>
<tr>
<td>GE does not Granger Cause TOT</td>
<td>33</td>
<td>0.42086</td>
<td>0.6606</td>
</tr>
<tr>
<td>TOT does not Granger Cause GE</td>
<td></td>
<td>0.98241</td>
<td>0.3869</td>
</tr>
</tbody>
</table>
## APPENDIX 9: JOHANSEN CO-INTEGRATION TEST

Date: 06/17/16  Time: 15:16  
Sample (adjusted): 1983 2014  
Included observations: 32 after adjustments  
Trend assumption: Linear deterministic trend  
Series: LEX INF TOT GE  
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized</th>
<th>Trace</th>
<th>0.05</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of CE(s)</td>
<td>Eigenvalue</td>
<td>Statistic</td>
<td>Critical Value</td>
</tr>
<tr>
<td>None *</td>
<td>0.782285</td>
<td>91.98836</td>
<td>47.85613</td>
</tr>
<tr>
<td>At most 1 *</td>
<td>0.625154</td>
<td>43.20211</td>
<td>29.79707</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.230557</td>
<td>11.80247</td>
<td>15.49471</td>
</tr>
<tr>
<td>At most 3</td>
<td>0.101240</td>
<td>3.415648</td>
<td>3.841466</td>
</tr>
</tbody>
</table>

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level  
* denotes rejection of the hypothesis at the 0.05 level  
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

<table>
<thead>
<tr>
<th>Hypothesized</th>
<th>Max-Eigen</th>
<th>0.05</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of CE(s)</td>
<td>Eigenvalue</td>
<td>Statistic</td>
<td>Critical Value</td>
</tr>
<tr>
<td>None *</td>
<td>0.782285</td>
<td>48.78625</td>
<td>27.58434</td>
</tr>
<tr>
<td>At most 1 *</td>
<td>0.625154</td>
<td>31.39964</td>
<td>21.13162</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.230557</td>
<td>8.386817</td>
<td>14.26460</td>
</tr>
<tr>
<td>At most 3</td>
<td>0.101240</td>
<td>3.415648</td>
<td>3.841466</td>
</tr>
</tbody>
</table>

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level  
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values**

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

<table>
<thead>
<tr>
<th></th>
<th>LEX</th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX</td>
<td>-0.026413</td>
<td>-0.047180</td>
<td>0.007198</td>
<td>7.214998</td>
</tr>
<tr>
<td>INF</td>
<td>0.132984</td>
<td>0.589001</td>
<td>-0.080797</td>
<td>-0.735444</td>
</tr>
<tr>
<td>TOT</td>
<td>-6.292248</td>
<td>-0.587815</td>
<td>-0.018902</td>
<td>0.135646</td>
</tr>
<tr>
<td>GE</td>
<td>-4.901269</td>
<td>0.279046</td>
<td>0.073318</td>
<td>-0.523090</td>
</tr>
</tbody>
</table>

Unrestricted Adjustment Coefficients (alpha):

<table>
<thead>
<tr>
<th></th>
<th>D(LEX)</th>
<th>D(INF)</th>
<th>D(TOT)</th>
<th>D(GE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LEX)</td>
<td>0.016044</td>
<td>-0.021097</td>
<td>0.006901</td>
<td>0.016475</td>
</tr>
<tr>
<td>D(INF)</td>
<td>0.007512</td>
<td>-0.870000</td>
<td>0.459502</td>
<td>-0.150468</td>
</tr>
<tr>
<td>D(TOT)</td>
<td>-0.279026</td>
<td>1.575886</td>
<td>2.025974</td>
<td>-0.552252</td>
</tr>
<tr>
<td>D(GE)</td>
<td>-0.432245</td>
<td>-0.061264</td>
<td>-0.000643</td>
<td>-0.009600</td>
</tr>
</tbody>
</table>

1 Cointegrating Equation(s):

Log likelihood: -103.8590

Normalized cointegrating coefficients (standard error in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>LEX</th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEX</td>
<td>1.000000</td>
<td>1.786246</td>
<td>-0.272500</td>
<td>-273.1614</td>
</tr>
<tr>
<td>INF</td>
<td></td>
<td>(3.51461)</td>
<td>(0.45306)</td>
<td>(30.9589)</td>
</tr>
</tbody>
</table>

Adjustment coefficients (standard error in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>D(LEX)</th>
<th>D(INF)</th>
<th>D(TOT)</th>
<th>D(GE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LEX)</td>
<td>-0.000424</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D(INF)</td>
<td>-0.000198</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D(TOT)</td>
<td>0.0007370</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D(GE)</td>
<td>0.011417</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Does Macroeconomic and Political Issue Affect Exchange Rate in Malaysia?

(0.00137)

2 Cointegrating Equation(s): Log likelihood -88.15915

<table>
<thead>
<tr>
<th></th>
<th>LEX</th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1.000000</td>
<td>0.000000</td>
<td>-0.046037</td>
<td>-454.0473</td>
</tr>
<tr>
<td></td>
<td>(0.76218)</td>
<td>(51.4299)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td>0.000000</td>
<td>1.000000</td>
<td>-0.126782</td>
<td>101.2660</td>
</tr>
<tr>
<td></td>
<td>(0.17802)</td>
<td>(12.0125)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjusted coefficients (standard error in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>D(LEX)</th>
<th>D(INF)</th>
<th>D(TOT)</th>
<th>D(GE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>-0.003229</td>
<td>-0.115895</td>
<td>0.216938</td>
<td>0.003270</td>
</tr>
<tr>
<td></td>
<td>(0.00164)</td>
<td>(0.03649)</td>
<td>(0.13658)</td>
<td>(0.00679)</td>
</tr>
</tbody>
</table>

3 Cointegrating Equation(s): Log likelihood -83.96574

<table>
<thead>
<tr>
<th></th>
<th>LEX</th>
<th>INF</th>
<th>TOT</th>
<th>GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>-117.8972</td>
</tr>
<tr>
<td></td>
<td>(13.3339)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>1026.997</td>
</tr>
<tr>
<td></td>
<td>(116.215)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
<td>7301.766</td>
</tr>
<tr>
<td></td>
<td>(823.491)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Adjustment coefficients (standard error in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>D(LEX)</th>
<th>D(INF)</th>
<th>D(TOT)</th>
<th>D(GE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.046651</td>
<td>-3.007196</td>
<td>-12.53099</td>
<td>0.007316</td>
</tr>
<tr>
<td></td>
<td>0.07565</td>
<td>1.57751</td>
<td>5.72780</td>
<td>0.31514</td>
</tr>
<tr>
<td></td>
<td>-0.017240</td>
<td>-0.782887</td>
<td>-0.249534</td>
<td>-0.015313</td>
</tr>
<tr>
<td></td>
<td>0.01002</td>
<td>0.20891</td>
<td>0.75853</td>
<td>0.04173</td>
</tr>
<tr>
<td></td>
<td>0.001690</td>
<td>0.061662</td>
<td>-0.167630</td>
<td>0.001851</td>
</tr>
<tr>
<td></td>
<td>0.00100</td>
<td>0.02088</td>
<td>0.07580</td>
<td>0.00417</td>
</tr>
</tbody>
</table>