DOES MACROECONOMIC AND POLITICAL ISSUE AFFECT EXCHANGE RATE IN MALAYSIA?

BY

BEH SEW LUAN
CHONG HUI YOKE
THIVYARANI A/P VISIONATHAN
TRISSNA A/P DURAISINGAM
YOLANDA TAN LAY ANN

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

BACHELOR OF BUSINESS ADMINISTRATION
(HONS) BANKING AND FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE
DEPARTMENT OF FINANCE

AUGUST 2016

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.

Name of Students:	Students ID:	Signature:
1. BEH SEW LUAN	13ABB07697	_____
2. CHONG HUI YOKE	13ABB07168	_____
3. THIVYARANI A/P VISIONATHAN	13ABB07422	_____
4. TRISSNA A/P DURAISINGAM	13ABB06832	_____
5. YOLANDA TAN LAY ANN	13ABB06829	_____

Date: 25 August 2016

ACKNOWLEDGEMENT

First and foremost, we are grateful to have Ms. Josephine Kuah Yoke Chin as our project's supervisor for the provision of expertise and guidance. Without her superior experience and knowledge, we won't be able to achieve this outcome. She is like a mentor and a friend as she is very patient in overseeing us throughout this research. We are truly thankful to be under her supervision.

Moreover, we are grateful to have Puan Nur Amalina Binti Borhan as our second examiner, in the Department of Finance. We are very thankful for her willingness to share expertise and her sincere guidance towards us.

Lastly, we would like to express gratitude to all of the department faculty members for being very helpful as well as incredibly supportive. We also want to thank our parents and friends for their continuous support and encouragement.

DEDICATION

Firstly, we would be please to dedicate our research project to our supervisor, Ms. Josephine Kuah Yoke Chin for her sincere advice, guidance and support throughout this research. We hope that this research will make her proud and reflect on all teaching towards us thus far. Moreover, this research paper is also for to our friends and respective family members for their endless love and encouragement. Their patience and moral support towards us has been nothing short of amazing. Last but not least, we would like to dedicate this research to future researchers in hopes that our research can be a tool for their future studies. In the field of study of exchange rate, we hope that our research has brought some fresh air and perspective for further exploration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDIX

LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ANOVA	Analysis of Variance
ARCH	Autoregressive Conditional Heteroscedasticity
BLUE	Best Linear Unbiased Estimator
BNM	Bank Negara Malaysia
CLRM	Classical Linear Regression Model
CPI	Consumer Price Index
ECM	Error Correction Model
EMH	Efficient Market Hypothesis
et al.	And others
E-View 9.0	Econometric View 9.0
EXC	Exchange Rate
FE	Fisher Effect
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GE	General Election
GLS	Generalized Least Squares
IFE	International Fisher Effect
IMF	International Monetary Fund
INF	Inflation Rate
JB	Jarque-Bera
LM	Lagrange Multiplier
MLRM	Multiple Linear Regresssion Model
OLS	Ordinary Least Squares Method
PP	Phillips Perron
PPP	Purchasing Power Parity
RESET	Ramsey Regression Equation Specification Error Test
RM	Ringgit Malaysia

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

Minister, although reining the position as the ruling government, Barisan National won with only a minority vote (Sani, 2014).

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 & Nnneka, 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

H_0b: Terms of trade does not influence exchange rate.

H_1b: 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)

H_0c: General election does not influence exchange rate.

H_1c: 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 horns 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 Vähämaa (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 & Phisuthtiwatcharavong, 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 Namjour, 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 leads to the depreciation of exchange rate. A study done by Dauvin (2014) results depicts 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 Phisuthtiwatcharavong (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:

$$e = \frac{\boldsymbol{\pi 1 - \pi 2}}{\boldsymbol{1 + \pi 2}} \qquad (1)$$

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

$$ECA = \frac{\boldsymbol{C1 - C2}}{\boldsymbol{1 + C2}} \qquad (2)$$

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.

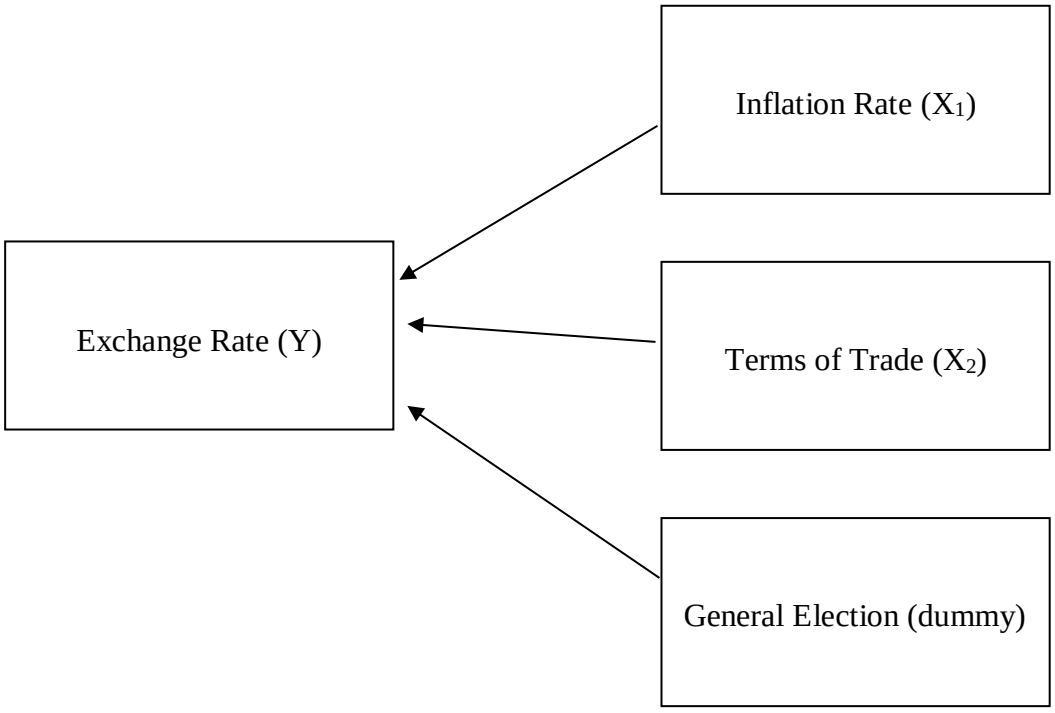
Weak form of market efficiency indicates that the historical price reflected on the current price only. Jensen (1978) proved that the weak market efficiency does not profitable when the marginal benefit of information is less than the marginal cost of accumulating it. For semi-strong form, it showed 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:



$$\text{Exchange Rate } (Y_i) = \beta_0 + \beta_1 \text{Inflation Rate } (X_{i1}) + \beta_2 \text{Terms of Trade } (X_{i2}) + D_i \text{ General Election}$$

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 3.2: Sources of Data

Variables	Proxy	Units	Explanation	Data sources
Exchange Rate	EXC	RM/USD	Direct quote of Ringgit Malaysia per US Dollar	The World Development Indicators (WDI)
Inflation Rate	INF	Percentage (%)	Annual percentage change in consumer price index by taking the year 2010 as the base year (Base rate 2010 = 100)	The World Development Indicators (WDI)
Terms of Trade	TOT	Percentage (%)	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)	The World Development Indicators (WDI)
General Election	GE	Election year	General Election in Malaysia	Journals, news and official website

3.3 Sampling Design

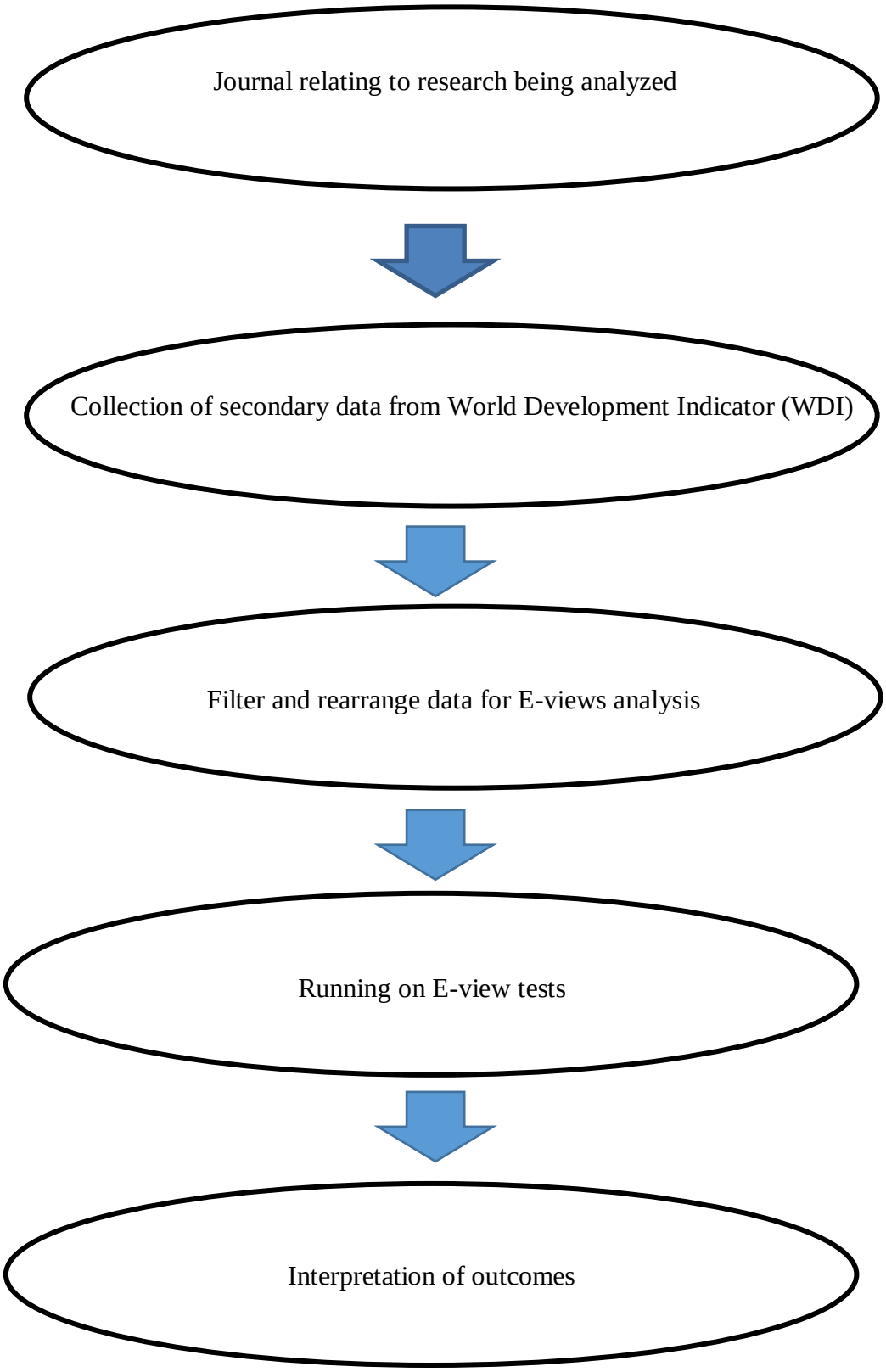
3.3.1 Target Population

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



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:

$\ln EXC_t$ = f [Inflation Rate (INF_t), Terms of Trade (TOT_t), General Election (GE_t)]

Economic Model in Logarithm Form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_t$$

$$\ln EXC_t = \beta_0 + \beta_1 INF_t + \beta_2 TOT_t + \beta_3 GE_t + \varepsilon_t$$

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

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

ε_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:

$\mathbf{H_0 : \beta_i = 0}$

$\mathbf{H_1 : \beta_i \neq 0}$ **, where** $\boldsymbol{i}$ **= 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, α=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***.

$$\boldsymbol{t = \frac{\widehat{\beta_i} - \beta_i}{se(\widehat{\beta_i})}}$$

Where,

$\widehat{\beta_i}$ = Estimates of independent variable

β_i = Actual independent variable

$se(\widehat{\beta_i})$ = 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:

$\mathbf{H_0 : \beta_1 = \beta_2 = \beta_3 = 0}$

H_1 : At least one of β_i 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: α=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***.

$$\mathbf{F} = \frac{\boldsymbol{R^2/k}}{\boldsymbol{(1 - R^2)/(n - k - 1)}}$$

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:

$$\mathbf{VIF} = \frac{\mathbf{1}}{(\mathbf{1} - \mathbf{Rij^2})}$$

$$\mathbf{TOL} = \frac{\mathbf{1}}{\mathbf{VIF}}$$

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 Heteroscedasticty (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: The model is homoscedasticity.

H_1: The model is heteroscedasticity.

Significant level: α=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 : The model has no autocorrelation problem.

H_1 : The model has autocorrelation problem.

Formula for Breusch-Godfrey LM Test:

$$(n - p)R^2$$

Significant level: α=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 : The model specification is correct.

H_1 : The model specification is incorrect.

Significant level: α=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:

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

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 : The error term is normally distributed.

H_1 : The error term is not normally distributed.

Significant level: α=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:

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

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:

Constant mean:

$$\mathbf{E(yt)} = \boldsymbol{\mu}$$

Constant Variance:

$$\mathbf{var}\ (\mathbf{yt}) = \boldsymbol{\sigma^2}$$

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:

H_0: All variables have a unit root and non-stationary.

H_1: All variables do not have a unit root and stationary.

Significant level: α=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:

H_0: Variable X does not granger causes the variable Y.

H_1: Variable X does granger causes the variable Y.

Significant level: α=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:

$$\mathbf{F} = \frac{(\boldsymbol{SSE_{reduced}} - \boldsymbol{SSE_{full}})\,/(\boldsymbol{k_{full}} - \boldsymbol{k_{reduced}})}{\boldsymbol{SSE_{full}}/(\boldsymbol{n} - \boldsymbol{k_{full}} - \mathbf{1})}$$

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: α=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, hetereoscedasticity, 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

$$\ln EXC_t = \beta_0 + \beta_1 INF_t + \beta_2 TOT_t + \beta_3 GE_t + \varepsilon_t \quad (1)$$

$$\ln EXC_t = 0.592165 - 0.027065\, INF_t + 0.005994\, TOT_t + 0.010153\, GE_t \quad (2)$$

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

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

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

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)**:

$\mathbf{H_0 : \beta_1 = 0}$

$\mathbf{H_1 : \beta_1 \neq 0}$

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)**:

$\mathbf{H_0 : \beta_2 = 0}$

$\mathbf{H_1 : \beta_2 \neq 0}$

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)**:

$\mathbf{H_0 : \beta_3 = 0}$

$\mathbf{H_1 : \beta_3 \neq 0}$

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

F-Test	
p-value = 0.005570	α = 0.05

$\mathbf{H_0 : \beta_1 = \beta_2 = \beta_3 = 0}$

$\mathbf{H_1}$: At least one of $\mathbf{\beta_i}$ 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 brings 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

	INF	**TOT**	**GE**
INF	1.000000	-0.266366	-0.000239
TOT	-0.266366	1.000000	-0.029154
GE	0.000239	-0.029154	1.000000

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)

Independent variables	**INF**	**TOT**	**GE**
t-ratios	-1.541116 (0.017562)	1.960394 (0.003058)*	0.305735 (0.033208)
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

	R^2	VIF $= 1/(1 - R_2)$	TOL $= 1/VIF$	Conclusion
INF	0.071007	1.0764	0.9290	No serious multicollinearity
TOT	0.071797	1.0774	0.9282	No serious multicollinearity

GE	0.000911	1.0009	0.9991	No serious multicollinearity

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 4.2 (d): ARCH Test Result

Autoregressive Conditional Heteroscedasticity (ARCH) Test	
p-value = 0.0031	α = 0.05

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	α = 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

H_0 : The model specification is correct.

H_1 : 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***.

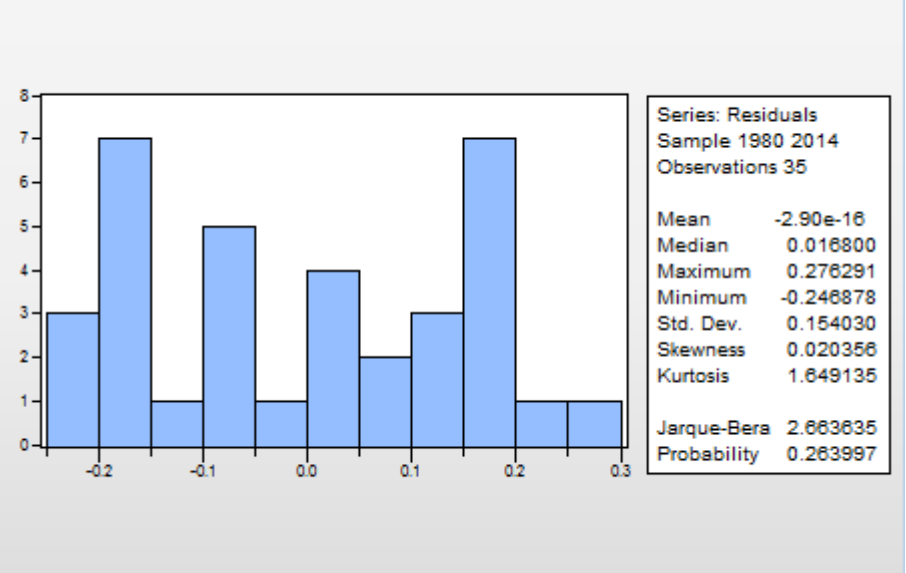
Result:

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



H_0 : The error term is normally distributed.

H_1 : 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.

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.

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

Variables	Level		First difference	
	Intercept	Trend and Intercept	Intercept	First difference
InEXC	-1.684853 (0)	-1.482026 (0)	-4.768685 ***(0)	-4.746770 ***(0)
INF	-3.521151 **(0)	-3.503879 *(0)	-5.010151 ***(1)	-5.156984 ***(1)
TOT	-1.946663 (0)	-1.358129 (0)	-6.157591 ***(0)	-6.917377 ***(0)
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 4.4(b): Results of PP test

Variables	Level		First difference	
	Intercept	Trend and Intercept	Intercept	First difference
InEXC	-1.720890 (1)	-1.482026 (0)	-4.724072 ***(3)	-4.677028 ***(4)
INF	-3.384224 **(2)	-3.352737 *(2)	-8.291027 ***(3)	-8.579873 ***(3)
TOT	-1.928863 (2)	-1.134058 (4)	-6.137604 ***(3)	-6.917377 ***(0)

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

X	Y	P-value	Significance level (α=0.05)	Decision	Conclusion
INF	**LEX**	0.7575	0.05	Do not reject H_0.	No granger cause.
LEX	**INF**	0.7845	0.05	Do not reject H_0.	No granger cause.
TOT	**LEX**	0.2415	0.05	Do not reject H_0.	No granger cause.
LEX	**TOT**	0.7039	0.05	Do not reject H_0.	No granger cause.
GE	**LEX**	0.7994	0.05	Do not reject H_0.	No granger cause.
LEX	**GE**	0.1802	0.05	Do not reject H_0.	No granger cause.
TOT	**INF**	0.6690	0.05	Do not reject H_0.	No granger cause.
INF	**TOT**	0.5009	0.05	Do not reject H_0.	No granger cause.
GE	**INF**	0.6710	0.05	Do not reject H_0.	No granger cause.

INF	**GE**	0.5928	0.05	Do not reject H_0.	No granger cause.
GE	**TOT**	0.6606	0.05	Do not reject H_0.	No granger cause.
LTOT	**GE**	0.3869	0.05	Do not reject H_0.	No granger cause.

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 4.6: Johansen Co-integration Test

Hypoth-esized No. of CE(s)	**Trace**			**Max-Eigen**		
	Stats.	**Critical value (5%)**	**P-value**	**Stats.**	**Critical value (5%)**	**P-value**
r = 0	91.98836	47.85613	0.0000*	48.78625	27.58434	0.0000*
r ≤ 1	43.20211	29.79707	0.0008*	31.39964	21.13162	0.0013*
r ≤ 2	11.80247	15.49471	0.1667	8.386817	14.26460	0.3407
r ≤ 3	3.415648	3.841466	0.0646	3.415648	3.841466	0.0646

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

Test	**Hypotheses**	**Results**
Multicollinearity (a) Variance Inflation Factor (VIF) (b) Tolerance Value (TOL)	$\mathbf{H_0}$: The model has no multicollinearity problem. $\mathbf{H_1}$: The model has multicollinearity problem.	The model has no serious multicollinearity problem.
Heteroscedasticity (a) Autoregressive Conditional Heteroscedasticity Test (ARCH)	$\mathbf{H_0}$: The model is homoscedasticity. $\mathbf{H_1}$: The model is heteroscedasticity.	The model is heteroscedasticity. Solved by White Test.

(b) White Test		
Autocorrelation (a) Breusch-Godfrey LM Test (b) Newey-West Test	$\mathbf{H_0}$: The model has no autocorrelation problem. $\mathbf{H_1}$: The model has autocorrelation problem.	The model has autocorrelation problem. Solved by Newey-West Test.
Model Specification (a) Ramsey RESET Test	$\mathbf{H_0}$: The model specification is correct. $\mathbf{H_1}$: The model specification is incorrect.	Model is correctly specified.
Normality Test (a) Jarque-Bera Test	$\mathbf{H_0}$: The error term is normally distributed. $\mathbf{H_1}$: The error term is not normally distributed.	Error term is normally distributed.
F-Test	$\mathbf{H_0}$ **:** $\beta_1 = \beta_2 = \beta_3 = 0$ $\mathbf{H_1}$ **:** At least one of β_i is different from zero, where i = 1, 2, 3.	The overall model is significant at the significant level of 5%.
Unit Root Test (a) Augmented Dickey Fuller Test (b) Phillips Perron Test	$\mathbf{H_0}$: lnEXC/ INF/ TOT have a unit root and non-stationary. $\mathbf{H_1}$: lnEXC/ INF/ TOT do not have a unit root and stationary.	Stationary at first difference.
Granger Causality Test	$\mathbf{H_0}$: Variable X does not granger causes the variable Y. $\mathbf{H_1}$: Variable X does granger causes the variable Y.	No causality exists between all the variables.

Johansen Co-integration Test	$\mathbf{H_0}$: There is no long run relationship between the variables. $\mathbf{H_1}$: There is long run relationship between the variables.	Long run relationship exists between the variables.

Table 5.1b: Summary of OLS Regression and Consistency Journals

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

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

Achsani, N. A., Fauzi, A. J. F. A., & Abdullah, P. (2010). The relationship between inflation and real exchange rate: Comparative study between Asean+ 3, the EU and North America. *European Journal of Economics, Finance and Administrative Sciences*, *18*, 20-28.

Ahmad, M. N. N., Yusop, Z., & Masron, T. A. (2010). How did the Malaysian real exchange rate misalign during the 1997 Asian crisis?. *International Journal of Economics and Management, 18*(2), 161-195.

Andrikopoulos, A. A., & Gkountanis, D. C. (2011). Issues and models in applied econometrics: A partial survey. *South-Eastern Europe Journal of Economics, 9*(2), 107-165.

Ang, J. B. (2007). Financial deepening and economic development in Malaysia. *Economic Papers: A Journal of Applied Economics and Policy*, *26*(3), 249-260.

Ariff, M. (1998). The Malaysian economic experience and its relevance for the OIC member countries. *Islamic Economic Studies*, *6*(1), 1-41.

Asari, F. F. A. H., Baharuddin, N. S., Jusoh, N., Mohamad, Z., Shamsudin, N., & Jusoff, K. (2011). A vector error correction model (VECM) approach in explaining the relationship between interest rate and inflation towards exchange rate volatility in Malaysia. *World Applied Sciences Journal*, *12*(3), 49-56.

Ashour, S., & Sarkar, S. (2014). *US presidential cycle and foreign exchange rate.* Unpublished doctoral dissertation, University of Texas.

Babatunde, O. S., Ikughur, A. J., Ogunmola, A. O., & Oguntunde, P. E. (2014). On the effect of autocorrelation in regression model due to specification error. *International Journal of Modern Mathematical Sciences*, *10*(3), 239-246.

Baharumshah, A. Z., & Ariff, M. (1997). Purchasing power parity in South East Asian countries economies: A cointegration approach. *Asian Economic Journal*, *11*(2), 141-153.

Bashir, F., & Luqman, A. (2014). Long run determinants of real exchange rate: An econometric analysis from Pakistan. *Pakistan Journal of Commerce and Social Sciences*, *8*(2), 471-484.

Bekhet, H. A., & Yasmin, T. (2014). Assessment of the global financial crisis effects on energy consumption and economic growth in Malaysia: An input–output analysis. *International Economics*, *140*, 49-70.

Bhalla, S. (2008). Economic development and the role of currency undervaluation. *Cato Journal*, *28*, 313-340.

Blackwell, M. (2008). Multiple hypothesis testing: The F-test. *Matt Blackwell Research*.

Blomberg, S. B., Frieden, J., & Stein, E. (2005). Sustaining fixed rates: The political economy of currency pegs in Latin America. *Journal of Applied Economics*, *8*(2), 203-225.

Boskin, M. J., Dulberger, E. R., Gordon, R. J., Griliches, Z., & Jorgenson, D. W. (1998). Consumer prices, the consumer price index, and the cost of living. *The Journal of Economic Perspectives*, *12*(1), 3-26.

Bouraoui, T., & Phisuthtiwatcharavong, A. (2015). On the determinants of the THB/USD exchange rate. *Procedia Economics and Finance*, *30*, 137-145.

Bressler, S. L., & Seth, A. K. (2011). Wiener–Granger causality: A well established methodology. *Neuroimage*, *58*(2), 323-329.

Brooks, C. (2008). *Introductory econometrics for finance*. (2nd ed.). Cambridge: Cambridge University Press.

Brown, G. K. (2005). Playing the (non) ethnic card: The electoral system and ethnic voting patterns in Malaysia. *Ethnopolitics*, *4*(4), 429-445.

Cakrani, E. (2013). Factors that affect real exchange rate in the long-run and short-run in Albania. *Euro Economica, 32*(2), 93-100.

Camarero, M., Cuestas, J. C., & Ordóñez, J. (2008). The role of commodity terms of trade in the determination of the real exchange rates of the Mediterranean contries, *The Developing Economies*, *46*(2), 188-205.

Cermeño, R., Grier, R., & Grier, K. (2010). Elections, exchange rates and reform in Latin America. *Journal of Development Economics*, *92*(2), 166-174.

Chan, T. H., Lye, C. T., & Hooy, C.W. (2013). Forecasting Malaysian ringgit: Before and after the global crisis. *Asian Academy of Management Journal of Accounting and Finance*, *9*(2), 157-175.

Chandran, V., & Munusamy. (2009). Trade openness and manufacturing growth in Malaysia. *Journal of Policy Modeling, 31*(5), 637-647.

Cheung, Y. W., & Lai, K. S. (1995). Lag order and critical values of the augmented Dickey Fuller test. *Journal of Business & Economic Statistics, 13*(3), 277-280.

Chiu, I. M. (2008). An empirical study on the long-run determinants of exchange rate. *Review of Pacific Basin Financial Markets and Policies, 11*(3), 389-409.

Chowdhry, B., & Goyal, A. (2000). Understanding the financial crisis in Asia. *Pacific-Basin Finance Journal*, *8*(2), 135-152.

Chowdhury, M. S. R., & Hossain, M. T. (2014). Determinants of exchange rate in Bangladesh: A case study. *Journal of Economics and Sustainable Development*, *5*(1), 78-81.

Coudert, V., Couharde, C., & Mignon, V. (2015). On the impact of volatility on the real exchange rate–terms of trade nexus: Revisiting commodity currencies. *Journal of International Money and Finance*, *58,* 110-127.

Cumby, R. E., & Obstfeld, M. (1981). A note on exchange-rate expectations and nominal interest differentials: A test of the Fisher hypothesis. *The Journal of Finance, 36*(3), 697-703. doi:10.1111/j.1540-6261.1981.tb00654.x

Cunado, J., & De Gracia, F. P. (2005). Oil prices, economic activity and inflation: Evidence for some Asian countries. *The Quarterly Review of Economics and Finance*, *45*(1), 65-83.

Dauvin, M. (2014). Energy prices and the real exchange rate of commodity-exporting coutries. *International Economics*, *137*, 52-72.

De Winter, J. C. (2013). Using the Student's t-test with extremely small sample sizes.

Department of Statistics, Malaysia Official Website (2016). Retrieved from https://www.statistics.gov.my/

Diebold, F. X., & Kilian, L. (2000). Unit-root tests are useful for selecting forecasting models. *Journal of Business & Economic Statistics, 18*(3), 265-273.

El Khawaga, A., Esam, M., & Hammam, R. (2013). Exchange rates and interest rates: An empirical investigation of international fisher effect theory-The case of Egypt (2003-2012). *International Research Journal of Finance and Economics,* (117), 139-160.

Elder, J., & Kennedy, P. E. (2001). Testing for unit roots: what should students be taught? *The Journal of Economic Education*, *32*(2), 137-146.

Fahami, N. A. (2011). The structure of linkages and causal relationships between BRIC and developed equity markets. *2011 International Conference on Information and Finance*, *21*, 72-77.

Fama, E. (1984). Forward and spot exchange rates. *Journal of Monetary Economics*, *14*(3), 319-338.

Fisher, R. A. (1924). On a distribution yielding the error functions of several well known statistics. *Proceedings of the International Congress of Mathematics, Toronto, 2*, 805-813.

Frenkel, J. A., & Johnson, H. G. (2013). The economics of exchange rates (Collected works of Harry Johnson): Selected studies (1st ed.). New York, USA: Routledge.

Gámez, C. (2013). Political cycle, real exchange rate and aggregate supply in Mexico. *Journal of Accounting, Finance and Economics, 3*(1), 22-37.

Goh, S. K. (2008). The composition of capital flows to Malaysia: Forecasting the effects of removing the ringgit peg. *Journal of Economics, Banking and Finance*, *2*(1), 1-11.

Goodell, J. W., & Vähämaa, S. (2013). US presidential elections and implied volatility: The role of political uncertainty. *Journal of Banking & Finance, 37*(3), 1108-1117.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, *37*(3), 424-438.

Granger, C., & Newbold, P. (1974). Spurious regression in econometrics. *Journal of Econometrics, 2*, 111-120.

Grier, K. B., & Hernández-Trillo, F. (2004). The real exchange rate process and its real effects: The cases of Mexico and the USA. *Journal of Applied Economics, 7*(1), 1-25.

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics*. (5th ed.). McGraw. Hill International Edition.

Hai, L. H. (2002). Electoral politics in Malaysia: 'Managing'elections in a plural society. *Electoral Politics in Southeast and East Asia*, 101-148.

Hasenzagl, T. (2013). *Party ideology, elections and the exchange rate: A regression discontinuity design*. Unpublished doctoral dissertation, New York University.

Hassan, M. H., & Gharleghi, B. (2015). Exchange rate determination in Maldives: A study based on the sticky price monetary model. *International Journal of Business and Management*, *10*(7), 85-92.

Hendry, D. F., & Mizon, G. E. (1978). Serial correlation as a convenient simplification, not a nuisance: A comment on a study of the demand for money by the Bank of England. *The Economic Journal*, *88*(351), 549-563.

Hjalmarsson, E., & Österholm, P. (2010). Testing for cointegration using the Johansen methodology when variables are near-integrated: Size distortions and partial remedies. *Empirical Economics*, *39*(1), 51-76.

Hsing, Y. (2006). Determinants of exchange rate fluctuations for Venezuela: Application of an extended mundell-fleming model. *Applied Econometrics and International Development*, *6*(1), 139-146.

Hsing, Y. (2008). Application of monetary models of exchange rate determination for Poland. *South East European Journal of Economics and Business*, *3*(2), 19-24.

Hutcheson, G. D. (2011). Ordinary Least Squares Regression. *The SAGE Dictionary of Quantitative Management Research*, 224-228.

International Monetary Fund. (2016). International Financial Statistic. Retrieved from http://data.imf.org/regular.aspx?key=60998108

Jacob, S. (2015, March 5). Kinibiz. Retrieved from Why is the ringgit so weak? http://www.kinibiz.com/story/issues/150500/why-is-the-ringgit-so-weak.html?utm_source=applet_mkinicom&utm_medium=web&utm_campaign=mkinicom

Jarque, C. M., & Bera, A. K. (1980). Efficient tests for normality, homoscedasticity and serial independence of regression residuals. *Economics letters, 6*(3), 255 -259.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of consumer research, 30*(2), 199-218.

Jensen, M. (1978). Some anomalous evidence regarding market efficiency. *Journal of Financial Economics, 6*(2/3), 95-101.

Jiang, C., Jian, N., Liu, T. Y., & Su, C.W. (2016). Purchasing power parity amd real exchange rate in Central Eastern European countries. *International Review of Economics & Finance*, *44*, 349-358.

Jomo, K. S. (1998). Malaysian débâcle: whose fault?. *Cambridge Journal of Economics, 22*(6), 707-722.

Kamin, S. B., & Khan M. (2003). "A multi-country comparison of the linkages between inflation and exchange rate competitiveness". *International Journal of Finance and Economics, 8*(2), 167-183.

Khan, R. S. A. (2014). Analysis if the factors affecting exchange rate variability in Pakistan. *Journal of Business and Management*, *16*(6), 115-121.

Krugman, P. R., Obstfeld, M., & Melitz, M. (2015). *International trade: theory and policy*. Prentice Hall.

Kumari, S. S. S. (2008). Multicollinearity: Estimation and elimination. *Journal of Contemporary Research in Management*, *3*(1), 87-95.

Kwiatkowski, D., Phillips, P. C., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?. *Journal of Econometrics*, *54*(1-3), 159-178.

Lauridsen, L. S. (1998). The financial crisis in Thailand: Causes, conduct and consequences?. *World Development*, *26*(8), 1575-1591.

Lee, H. Y., & Sodoikhuu, K. (2012). Efficiency tests in foreign exchange market. *International Journal of Economics and Financial Issues, 2*(2), 216-224.

Lim, P., J. (2015, June 12). Malaysian ringgit may continue to be under pressure: Analysts. *Channel News Asia*. Retrieved from http://www.channelnewsasia.com/news/business/malaysian-ringgit-may/1909618.html.

Madura, J. (2011). *International Financial Management*, 11th edition. South-Western Cengage Learning.

Malik, F. I., & Asghar, M. N. (2013). Empirical relationship between general election and exchange rate: A study from Pakistani market 1970-2009. *IOSR Journal of Business and Management*, *7*(2), 89-93.

Mehrara, M., & Oryoie, A. R. (2012). Efficient markets hypothesis in foreign exchange market before and after the global financial crisis of 2007-08. *International Journal of Business and Social Science, 3*(9), 165-167.

Mirchandani, A. (2013). Analysis of macroeconomic determinants of exchange rate volatility in India. *International Journal of Economics and Financial Issues, 3*(1), 172-179.

Mizon, G. E. (1995). A simple message for autocorrelation correctors: Don't. *Journal of Econometrics*, *69*(1), 267-288.

Mohammadi, H., & Parvaresh, S. (2014). Energy consumption and output: Evidence from a panel of 14 oil-exporting countries. *Energy Economics*, *41*, 41-46.

Morrow-Howell, N. (1994). The M word: Multicollinearity in multiple regression. Social Work Researh, *18*(4), 247-251.

Namjour, R. P., Gholizadeh, M. H., & Haghighi, M. B. N. (2014). Survey the relationship between exchange rates and inflation rate in the first two years of fifth development plan. *Universal Journal of Management and Social Sciences, 4*(3), 31-40.

Naseem, N. A. M., Tan, H. B., & Hamizah, M. S. (2009). Exchange rate misalignment, volatility and import flows in Malaysia. *International Journal of Economics and Management, 3*(1), 130-150.

Nwude, E. C. (2012). A survey of foreign exchange rate determinants in Nigeria. *European Journal of Business and Management, 4*(13), 168-174.

Obaseki, P. J. (1998). The purchasing power parity (PPP) measure of Nigeria's equilibrium exchange rate, *Central Bank of Nigeria Economic and Financial Review, 35*(3), 274-297.

Oleka, C. D., Sabina, E. A., & Mgbodile, C. C. I. (2014). Empirical analysis of the relationship between foreign exchange rate and economic growth in a developing economy: Nigerian experience, *World Journal of Management and Behavioral Studies*, *2*(2), 28-36.

Ong, T. S., Soh, W. N., Teh, B. H., & Ng, S. H. (2015). Stock return, currency and general elections. *Pertanika Journal of Social Sciences & Humanities, 23*, 237-249.

Oriavwote, V. E., & Oyovwi, D. O. (2012). The determinants of real exchange rate in Nigeria. *International Journal of Economics and Finance, 4*(8), 150-160.

Orji, M. C. (2015). An empirical analysis of the determinants of real exchange rate in Nigeria (1981-2012). *International Journal of Economics, Finance and Management, 4*(3), 105-114.

Ortiz, A. S., & Monge, R. G. (2015). Finding international fisher effect to determine the exchange rate through the purchasing power parity theory: The case of Mexico during the period 1996-2012. *Applied Econometrics and International Development, 15*(1), 97-110.

Ozturk, I. (2006). Exchange rate volatility and trade: A literature survey. *International Journal of Applied Econometrics and Quantitative Studies, 3*(1), 1-18.

Patel, P. J., Patel, N. J., & Patel, A. R. (2014). Factors affecting currency exchange rate, economical formulas and prediction models. *International Journal of Application or Innovation in Engineering of Management, 3*(3), 53-56.

Proti, N. P. (2013). Exchange rate fluctuations-shock in Tanzania: An empirical analysis. *Scholarly Journal of Business Administration, 3*(1), 12-19.

Raja, Y. Y., & Naeem-Ullah, M. (2014). Determinants of foreign exchange markets. *IOSR Journal of Economics and Finance (IOSR-JEF), 2*(6), 10-16.

Ramasamy, R., & Abar, S. K. (2015). Influence of macroeconomic variables on exchange rates. *Journal of Economics, Business and Management, 3*(2), 276-281.

Razi, A., Shafiq, A., Ali, S. A., & Khan, H. (2012). Determinants of exchange rate and its impact on Pakistani economy. *Global Journal of Management and Business Research, 12*(16), 44-48.

Saleh, M. Z. (1991). *A structural model for Malaysian balance of payment, 1963-1982*. Garland Pub.

Sani, M. A. M. (2014). The social media election in Malaysia: The 13th general election in 2013. *Kajian Malaysia, 32*(2), 123-147.

Saradhi, V. R., & Goel, S. (2014). An empirical analysis of the relationship between capital flows and the real exchange rate in India. *International Journal of Applied Management and Technology, 13*(1), 64-81.

Shalishali, M. K. (2012). A test of the international fisher effect in selected Asian countries. *International Journal of Humanities and Social Science, 2(*4), 86-92.

Sidhu, J. S. (2015, August 19). Malaysian ringgit: The difference between now and 1998.

Stuards, M. (2015, September 30). Qatar-World's biggest LNG Exporter. *Maritime News.* Retrived from https://www.vesselfinder.com/news/4372-Qatar--Worlds-Biggest-LNG-Exporter

Tang, S. K. (2016, March 18). Rising political risks may halt Malaysian ringgit's rally: Analysts. *Channel News Asia*. Retrieved from http://www.channelnewsasia.com/news/business/rising-political-risks/2614314.html

Thaddeus, E. O., & Nnneka, B. A. (2014). Exchange rate, inflation and interest rates relationships: An autoregressive distributed log analysis. *Journal of Economics and Development Studies, 2*(2), 263-279.

Tuah, Y. (2013, August 25). Commodities: Malaysia's natural treasures. *Borneo Post Online*. Retrieved from http://www.theborneopost.com /2013/08/25/commodities-malaysias-natural-treasures/#ixzz4AVEaWB20

ul Islam, M. Z., & Raza, H. (2014). An empirical study on the factors affecting foreign exchange markets of Pakistan. *International Affairs and Global Strategy, 24*, 11-21.

Ul-Islam, T. (2011). Normality Testing- A new direction. *International Journal of Business and Social Science, 2*(3), 115-118.

Umaru, A., & Zubairu, A. A. (2012). Effect of inflation on the growth and development of the Nigerian economy (An empirical analysis). *International Journal of Business and Social Science*, *3*(10), 183-191.

Vikram, A., & Vikram, K. (2016). Exchange rate volatility & its impact on macro economic factors with respect to Indian economy. *International Journal of Social Science & Management, 4*(6), 1-21.

Wan, A. T. K., Zou, G., & Banerjee, A. (2007). The power of autocorrelation tests near the unit root in models with possibly mis-specified linear restrictions. *Economics Letters, 94*(2), 213-219.

Wiener, N. (1956). The theory of prediction. *Modern mathematics for engineers, 1*, 125-139.

Wu, J. L., & Chen, S. L. (1998). Foreign exchange market efficiency revisited. *Journal of International Money and Finance, 17*(5), 831-838.

Yaakop, R. (2014). The British legacy and the development of politics in Malaya. *Global Journal of Human Social Science (D), 14*(1), 54-66.

Yeo, J. (2015, August 17). 3 reasons why the Malaysia ringgit has fallen to a record low. *Yahoo Finance.* Retrieved from https://sg.finance.yahoo.com/news/3-reasons-why-malaysia-ringgit-043056146.html

Yoo, W., Mayberry, R., Bae, S., Singh, K., Peter, Q. H., & Lillard Jr, J. W. (2014). A study of effects of multicollinearity in the multivariable analysis. *International Journal of Applied Science and Technology*, *4*(5), 9-19.

Zakaria, Z., Hussin, Z., Noordin, N., & Mohamed Sawal, M. Z. H. (2010). Financial crisis of 1997/1998 in Malaysia: Causes, impacts and recovery plans. *Voice of Academia*, *5*(1), 79-96.

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.027065	0.014751	-1.834819	0.0761
TOT	0.005994	0.002114	2.835722	0.0080
GE	0.010153	0.064964	0.156286	0.8768
C	0.592165	0.222130	2.665846	0.0121

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

	INF	TOT	GE
INF	1.000000	-0.266366	0.000239
TOT	-0.266366	1.000000	-0.029154
GE	0.000239	-0.029154	1.000000

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT	-0.038187	0.024417	-1.563942	0.1277
GE	-0.034406	0.778514	-0.044194	0.9650
C	6.731511	2.381283	2.826842	0.0080

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 criter.	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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-1.859475	1.188966	-1.563942	0.1277
GE	-0.927533	5.430257	-0.170808	0.8654
C	102.0050	4.462825	22.85659	0.0000

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.001774	0.040138	-0.044194	0.9650
TOT	-0.000982	0.005750	-0.170808	0.8654
C	0.328380	0.601659	0.545790	0.5890

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)

	R^2	**VIF = 1/(1 – R_2)**	**TOL = 1/VIF**
Inflation (INF)	0.071007	1.0764	0.9290
Term of Trade (TOT)	0.071797	1.0774	0.9282
General Election (GE)	0.000911	1.0009	0.9991

APPENDIX 3: HETEROSCEDASTICITY

Autoregressive Conditional Heteroskedasticity (ARCH) Test

Heteroskedasticity Test: ARCH

F-statistic	11.11329	Prob. F(1,32)	0.0022
Obs*R-squared	8.764163	Prob. Chi-Square(1)	0.0031

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011830	0.004524	2.614785	0.0135
RESID^2(-1)	0.503114	0.150919	3.333660	0.0022

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.027065	0.014411	-1.878039	0.0698
TOT	0.005994	0.002025	2.959649	0.0059
GE	0.010153	0.061750	0.164421	0.8705
C	0.592165	0.213322	2.775915	0.0092

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	Wald F-statistic	8.511641
Prob(Wald F-statistic)	0.000286		

APPENDIX 4: AUTOCORRELATION

Breush-Godfrey Serial Correlation LM Test

Breusch-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.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.013630	0.009082	1.500779	0.1442
TOT	0.000953	0.001283	0.742605	0.4637
GE	-0.033875	0.041432	-0.817625	0.4202
C	-0.123023	0.135562	-0.907504	0.3716
RESID(-1)	0.846896	0.188658	4.489058	0.0001
RESID(-2)	-0.006156	0.189012	-0.032569	0.9742

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)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.027065	0.017562	-1.541116	0.1334
TOT	0.005994	0.003058	1.960394	0.0590
GE	0.010153	0.033208	0.305735	0.7619
C	0.592165	0.318251	1.860686	0.0723

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	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

	Value	df	Probability
t-statistic	1.035221	30	0.3088
F-statistic	1.071682	(1, 30)	0.3088
Likelihood ratio	1.228481	1	0.2677

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.027822	1	0.027822
Restricted SSR	0.806662	31	0.026021
Unrestricted SSR	0.778840	30	0.025961

LR test summary:

	Value	df
Restricted LogL	16.31562	31
Unrestricted LogL	16.92986	30

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

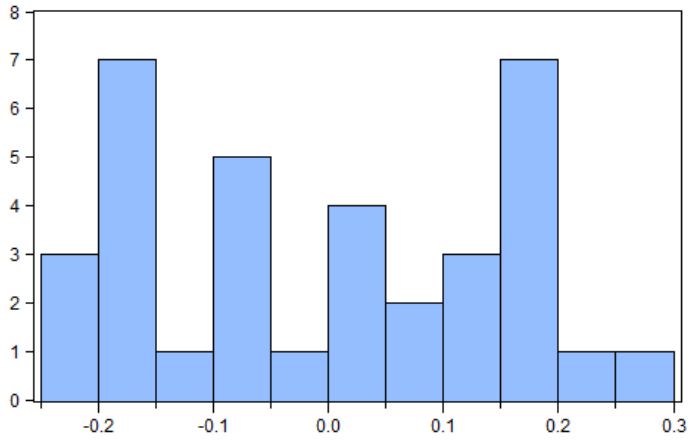
bandwidth = 4.0000)

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

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



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)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.684853	0.4296
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.105039	0.062343	-1.684853	0.1017
C	0.125974	0.068652	1.834971	0.0758

R-squared	0.081482	Mean dependent var	0.011993
Adjusted R-squared	0.052778	S.D. dependent var	0.070000

S.E. of regression	0.068128	Akaike info criterion	-2.477843
Sum squared resid	0.148524	Schwarz criterion	-2.388057
Log likelihood	44.12333	Hannan-Quinn criter.	-2.447224
F-statistic	2.838731	Durbin-Watson stat	1.636580
Prob(F-statistic)	0.101747		

Level, Trend and Intercept

Null Hypothesis: LEX has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.482026	0.8162
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.148217	0.100010	-1.482026	0.1484
C	0.154236	0.086025	1.792913	0.0828

@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)

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

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(LEX(-1))	-0.842017	0.176572	-4.768685	0.0000
C	0.008865	0.012491	0.709694	0.4832

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
Sum squared resid	0.155612	Schwarz criterion	-2.307108
Log likelihood	41.56379	Hannan-Quinn criter.	-2.367289
F-statistic	22.74035	Durbin-Watson stat	1.950362
Prob(F-statistic)	0.000042		

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)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.746770	0.0030
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.862603	0.181724	-4.746770	0.0000
C	0.023439	0.027455	0.853745	0.4000
@TREND("1980")	-0.000797	0.001333	-0.597781	0.5545

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)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.521151	0.0134
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.499959	0.141987	-3.521151	0.0013
C	1.421328	0.513762	2.766510	0.0093

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 criter.	3.879155
F-statistic	12.39850	Durbin-Watson stat	2.121400

Prob(F-statistic)	0.001315

Level, Trend and Intercept

Null Hypothesis: INF has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.503879	0.0549
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.545227	0.155607	-3.503879	0.0014
C	1.958024	0.892507	2.193848	0.0359
@TREND("1980")	-0.022777	0.030862	-0.738039	0.4660

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

Sum squared resid	81.61014	Schwarz criterion	4.024619
Log likelihood	-63.12899	Hannan-Quinn criter.	3.935870
F-statistic	6.383399	Durbin-Watson stat	2.050145
Prob(F-statistic)	0.004768		

First Differences and Intercept

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.010151	0.0003
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-1.462142	0.291836	-5.010151	0.0000
D(INF(-1),2)	0.122096	0.170726	0.715159	0.4802
C	-0.183482	0.301219	-0.609132	0.5472

R-squared	0.681839	Mean dependent var	0.153721
Adjusted R-squared	0.659897	S.D. dependent var	2.866329
S.E. of regression	1.671595	Akaike info criterion	3.954494
Sum squared resid	81.03271	Schwarz criterion	4.091907
Log likelihood	-60.27190	Hannan-Quinn criter.	4.000042
F-statistic	31.07443	Durbin-Watson stat	2.013219
Prob(F-statistic)	0.000000		

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)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.156984	0.0011
Test critical values:	1% level	-4.273277	
	5% level	-3.557759	
	10% level	-3.212361	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(INF(-1))	-1.538372	0.298309	-5.156984	0.0000
D(INF(-1),2)	0.151410	0.171936	0.880617	0.3860
C	-0.881610	0.689249	-1.279087	0.2114
@TREND("1980")	0.036886	0.032790	1.124909	0.2702

R-squared	0.695596	Mean dependent var	0.153721
Adjusted R-squared	0.662982	S.D. dependent var	2.866329
S.E. of regression	1.663998	Akaike info criterion	3.972792
Sum squared resid	77.52890	Schwarz criterion	4.156009
Log likelihood	-59.56467	Hannan-Quinn criter.	4.033523
F-statistic	21.32770	Durbin-Watson stat	1.977849
Prob(F-statistic)	0.000000		

Variable: lnTOT

Level and Intercept

Null Hypothesis: TOT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.946663	0.3080
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT(-1)	-0.130852	0.067219	-1.946663	0.0604
C	13.30606	6.524710	2.039333	0.0497

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)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.358129	0.8552
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT(-1)	-0.115098	0.084747	-1.358129	0.1842
C	12.43472	7.180129	1.731824	0.0932
@TREND("1980")	-0.036733	0.117342	-0.313042	0.7563

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		

First Differences and Intercept

Null Hypothesis: D(TOT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.157591	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOT(-1))	-1.048995	0.170358	-6.157591	0.0000
C	1.066371	0.952897	1.119083	0.2717
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

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.917377	0.0000
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOT(-1))	-1.137664	0.164465	-6.917377	0.0000
C	5.070838	1.967222	2.577664	0.0151

@TREND("1980")	-0.218708	0.095707	-2.285175	0.0295

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		

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.720890	0.4121
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Residual variance (no correction)	0.004368
HAC corrected variance (Bartlett kernel)	0.005144

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.105039	0.062343	-1.684853	0.1017

C	0.125974	0.068652	1.834971	0.0758

R-squared	0.081482	Mean dependent var	0.011993
Adjusted R-squared	0.052778	S.D. dependent var	0.070000
S.E. of regression	0.068128	Akaike info criterion	-2.477843
Sum squared resid	0.148524	Schwarz criterion	-2.388057
Log likelihood	44.12333	Hannan-Quinn criter.	-2.447224
F-statistic	2.838731	Durbin-Watson stat	1.636580
Prob(F-statistic)	0.101747		

Level, Trend and Intercept

Null Hypothesis: LEX has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.482026	0.8162
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

Residual variance (no correction)	0.004325
HAC corrected variance (Bartlett kernel)	0.004325

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEX(-1)	-0.148217	0.100010	-1.482026	0.1484
C	0.154236	0.086025	1.792913	0.0828
@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

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.724072	0.0006
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

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

Residual variance (no correction)	0.004716

HAC corrected variance (Bartlett kernel)	0.004176

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.842017	0.176572	-4.768685	0.0000
C	0.008865	0.012491	0.709694	0.4832

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
Sum squared resid	0.155612	Schwarz criterion	-2.307108
Log likelihood	41.56379	Hannan-Quinn criter.	-2.367289
F-statistic	22.74035	Durbin-Watson stat	1.950362
Prob(F-statistic)	0.000042		

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.677028	0.0036

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

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEX(-1))	-0.862603	0.181724	-4.746770	0.0000
C	0.023439	0.027455	0.853745	0.4000
@TREND("1980")	-0.000797	0.001333	-0.597781	0.5545

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

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.384224	0.0186
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Residual variance (no correction)	2.442474
HAC corrected variance (Bartlett kernel)	1.800319

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.499959	0.141987	-3.521151	0.0013
C	1.421328	0.513762	2.766510	0.0093
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 criter.	3.879155
F-statistic	12.39850	Durbin-Watson stat	2.121400
Prob(F-statistic)	0.001315		

Level, Trend and Intercept

Null Hypothesis: INF has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.352737	0.0750
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

Residual variance (no correction)	2.400298
HAC corrected variance (Bartlett kernel)	1.920543

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.545227	0.155607	-3.503879	0.0014
C	1.958024	0.892507	2.193848	0.0359
@TREND("1980")	-0.022777	0.030862	-0.738039	0.4660

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
Sum squared resid	81.61014	Schwarz criterion	4.024619
Log likelihood	-63.12899	Hannan-Quinn criter.	3.935870
F-statistic	6.383399	Durbin-Watson stat	2.050145
Prob(F-statistic)	0.004768		

First Differences and Intercept

Null Hypothesis: D(INF) has a unit root

Exogenous: Constant

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.291027	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-1.368881	0.159348	-8.590514	0.0000
C	-0.249781	0.296831	-0.841490	0.4065

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	3.958353
Sum squared resid	89.63725	Schwarz criterion	4.049050
Log likelihood	-63.31282	Hannan-Quinn criter.	3.988869
F-statistic	73.79693	Durbin-Watson stat	1.849510
Prob(F-statistic)	0.000000		

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.579873	0.0000
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

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

Residual variance (no correction)	2.530739
HAC corrected variance (Bartlett kernel)	2.932487

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-1.387025	0.156830	-8.844143	0.0000
C	-1.069053	0.624498	-1.711862	0.0972
@TREND("1980")	0.045376	0.030596	1.483055	0.1485

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 criter.	3.993982
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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.928863	0.3157
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Residual variance (no correction)	26.67977
HAC corrected variance (Bartlett kernel)	21.57152

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT(-1)	-0.130852	0.067219	-1.946663	0.0604
C	13.30606	6.524710	2.039333	0.0497
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

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.134058	0.9080
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT(-1)	-0.115098	0.084747	-1.358129	0.1842
C	12.43472	7.180129	1.731824	0.0932
@TREND("1980")	-0.036733	0.117342	-0.313042	0.7563

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		

First Differences and Intercept

Null Hypothesis: D(TOT) has a unit root

Exogenous: Constant

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.137604	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOT(-1))	-1.048995	0.170358	-6.157591	0.0000
C	1.066371	0.952897	1.119083	0.2717

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.917377	0.0000
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

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

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

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOT(-1))	-1.137664	0.164465	-6.917377	0.0000
C	5.070838	1.967222	2.577664	0.0151
@TREND("1980")	-0.218708	0.095707	-2.285175	0.0295

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

Null Hypothesis:	Obs	F-Statistic	Prob.
INF does not Granger Cause LEX	33	0.28054	0.7575
LEX does not Granger Cause INF		0.24486	0.7845
TOT does not Granger Cause LEX	33	1.49568	0.2415
LEX does not Granger Cause TOT		0.35552	0.7039
GE does not Granger Cause LEX	33	0.22565	0.7994
LEX does not Granger Cause GE		1.82313	0.1802
TOT does not Granger Cause INF	33	0.40778	0.6690
INF does not Granger Cause TOT		0.70879	0.5009
GE does not Granger Cause INF	33	0.40467	0.6710
INF does not Granger Cause GE		0.53275	0.5928
GE does not Granger Cause TOT	33	0.42086	0.6606
TOT does not Granger Cause GE		0.98241	0.3869

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)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.782285	91.98836	47.85613	0.0000
At most 1 *	0.625154	43.20211	29.79707	0.0008
At most 2	0.230557	11.80247	15.49471	0.1667
At most 3	0.101240	3.415648	3.841466	0.0646

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)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.782285	48.78625	27.58434	0.0000
At most 1 *	0.625154	31.39964	21.13162	0.0013
At most 2	0.230557	8.386817	14.26460	0.3407
At most 3	0.101240	3.415648	3.841466	0.0646

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):

LEX	INF	TOT	GE
-0.026413	-0.047180	0.007198	7.214998
0.132984	0.589001	-0.080797	-0.735444
-6.292248	-0.587815	-0.018902	0.135646
-4.901269	0.279046	0.073318	-0.523090

Unrestricted Adjustment Coefficients (alpha):

D(LEX)	0.016044	-0.021097	0.006901	0.016475
D(INF)	0.007512	-0.870000	0.459502	-0.150468
D(TOT)	-0.279026	1.575886	2.025974	-0.552252
D(GE)	-0.432245	-0.061264	-0.000643	-0.009600

1 Cointegrating Equation(s):	Log likelihood	-103.8590

Normalized cointegrating coefficients (standard error in parentheses)

LEX	INF	TOT	GE
1.000000	1.786246	-0.272500	-273.1614
	(3.51461)	(0.45306)	(30.9589)

Adjustment coefficients (standard error in parentheses)

D(LEX)	-0.000424
	(0.00034)
D(INF)	-0.000198
	(0.00863)
D(TOT)	0.007370
	(0.02805)
D(GE)	0.011417

(0.00137)

2 Cointegrating Equation(s):	Log likelihood	-88.15915

Normalized cointegrating coefficients (standard error in parentheses)

LEX	INF	TOT	GE
1.000000	0.000000	-0.046037	-454.0473
		(0.76218)	(51.4299)
0.000000	1.000000	-0.126782	101.2660
		(0.17802)	(12.0125)

Adjustment coefficients (standard error in parentheses)

D(LEX)	-0.003229	-0.013183
	(0.00164)	(0.00716)
D(INF)	-0.115895	-0.512785
	(0.03649)	(0.15902)
D(TOT)	0.216938	0.941363
	(0.13658)	(0.59525)
D(GE)	0.003270	-0.015691
	(0.00679)	(0.02959)

3 Cointegrating Equation(s):	Log likelihood	-83.96574

Normalized cointegrating coefficients (standard error in parentheses)

LEX	INF	TOT	GE
1.000000	0.000000	0.000000	-117.8972
			(13.3339)
0.000000	1.000000	0.000000	1026.997
			(116.215)
0.000000	0.000000	1.000000	7301.766
			(823.491)

Adjustment coefficients (standard error in parentheses)

D(LEX)	-0.046651	-0.017240	0.001690
	(0.07565)	(0.01002)	(0.00100)
D(INF)	-3.007196	-0.782887	0.061662
	(1.57751)	(0.20891)	(0.02088)
D(TOT)	-12.53099	-0.249534	-0.167630
	(5.72780)	(0.75853)	(0.07580)
D(GE)	0.007316	-0.015313	0.001851
	(0.31514)	(0.04173)	(0.00417)