

GROUP A70

EFFECT OF MACROECONOMIC VARIABLES
TOWARD INFLATION IN MALAYSIA'S
ECONOMY

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- (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.
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Dedication

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	Page
COPYRIGHT PAGE	ii
DECLARATION.....	iii
ACKNOWLEDGEMENT	iv
DEDICATION	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
LIST OF ABBREVIATIONS	xii
LIST OF APPENDICES.....	xiii
PREFACE.....	xiv
ABSTRACT.....	xv
 CHAPTER 1 RESEACH OVERVIEW	
1.0 Introduction.....	1
1.1 Research Background.....	1
1.2 Problem Statement.....	5
1.3 Research Objective.....	7
1.3.1 General Objective.....	7

1.3.2	Specific Objective.....	8
1.4	Research Questions.....	8
1.5	Hypothesis of Study.....	8
1.5.1	GROSS DOMESTIC PRODUCT (GDP).....	9
1.5.2	FOREIGN DIRECT INVESTMENT (FDI).....	9
1.5.3	EXCHANGE RATE (EXC).....	9
1.5.4	TRADE (TR).....	10
1.6	Significance of Study	10
1.7	Chapter Layout	12
1.8	Conclusion.....	13
CHAPTER 2 LITERATURE REVIEW		
2.0	Introduction.....	14
2.1	Review of the Literature	
2.1.1	The relationship between Gross Domestic Product (GDP) and Inflation.....	14
2.1.2	The relationship between Foreign Direct Investment (FDI) and Inflation	15
2.1.3	The relationship between Exchange Rate (EXC) and Inflation.....	17
2.1.4	The relationship between Trade (TR) and Inflation	18
2.2	Review of Theoretical Framework	20
2.3	Proposed Theoretical Framework	21
2.4	Conclusion.....	22
CHAPTER 3 METHODOLOGY		
3.0	Introduction.....	24

3.1	Proposed Empirical Model	24
3.2	Variable Descriptions	25
3.2.1	Consumer Price Index	26
3.2.2	Gross Domestic Product	26
3.2.3	Foreign Direct Investment	27
3.2.4	Exchange Rate.....	28
3.2.5	Trade	29
3.3	Data Collection Methods.....	29
3.4	Flows of methodology	30
3.5	Methodology	31
3.5.1	Unit Root Test.....	31
3.5.2	Cointegration Testing Approach.....	32
3.5.3	Diagnostic Checking	
3.5.3.1	Heteroscedasticity.....	34
3.5.3.2	Model Specification.....	35
3.5.3.3	Jarque- Bera Test for Testing Normality	35
3.5.3.4	Serial Correlation	36
3.5.3.5	Stability Test	37
3.6	Conclusion.....	37
 CHAPTER 4 DATA ANALYSIS		
4.0	Introduction.....	39
4.1	Unit Root Test.....	39
4.2	Bounding Testing.....	41
4.3	ARDLs Selection.....	42
4.4	Normality Test.....	44

4.5	Stability Test.....	44
4.6	Long run Coefficients.....	46
4.6.1	Sign of Coefficients.....	46
4.6.2	Significance of Coefficients.....	47
4.7	Cointegrated Regression	47
4.8	Conclusion.....	48
 CHAPTER 5 DISCUSSION, CONCLUSION AND IMPLICATION		
5.0	Introduction.....	49
5.1	Summary of Major Findings.....	49
5.2	Discussion of Major Findings	50
5.3	Implications of the Study	53
5.4	Limitation of Study	55
5.5	Recommendations for Future Research	57
5.6	Conclusion.....	58
REFERENCES.....		60
APPENDICES.....		68

LIST OF TABLES

Page

Table 3.1: Data Measurement	30
Table 4.1: Unit Root Test.....	39
Table 4.2: Bounds F-tests for Cointegration Relationship.....	42
Table 4.2.1: Critical Bounds of F-statistics.....	42
Table 4.3: Diagnostic Tests for the Underlying ARDL Models.....	43
Table 4.4: Jarque-Bera (JB) Test.....	44
Table 4.6: Estimated Long Run Coefficients.....	46
Table 4.7: Cointegrated Regression and Short-Run Coefficient	47

LIST OF FIGURES

	Page
Figure 1.1: Mean Monthly Household Income and Expenditure (RM) in year 2014.....	2
Figure 1.2: Inflation and Economic Growth in Malaysia.....	3
Figure 1.3: Overview inflation rate in Malaysia.....	4
Figure 1.4 Inflation: percentage change in Consumer Price Index.....	5
Figure 2.1: Relationship between inflation and its independent variables.....	22
Figure 4.5.1: CUSUM Plots for Estimated Coefficient.....	45
Figure 4.5.2 CUSUMQ Plots for Estimated Coefficient.....	46

LIST OF ABBREVIATIVES

ADF	Augmented Dickey-Fuller
AIC	Akaike Info Criterion
ARDL	Autoregressive Distributed Lag Model
CLRM	Classical Linear Regression Model
CUSUM	Cumulative Sum
CUSUMQ	Cumulative Sum of Square
DF	Dickey-Fuller test
Eviews 9	Electronic Views 9
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
EXC	Exchange Rate
TR	Trade
JB	Jarque- Bera test
PP	Philips-Perron
RESET	Ramey Regression of Specification Error Test
SIC	Schwartz Information Critetion
CPI	Consumer Price Index
INF	Inflation
AD	Aggregate Demand
AS	Aggregate Supply
UECM	Unrestricted Error Correction Model
CLRM	Classical Linear Regression Model

LIST OF APPENDICES

	Page
Appendix 1: Data of variables.....	69
Appendix 2: Augmented Dickey-Fuller unit root tests results (without trend, level).....	70
Appendix 3: Phillips-Perron unit root tests results (without trend, level).....	71
Appendix 4: Augmented Dickey-Fuller unit root tests results (with trend, level).....	73
Appendix 5: Phillips-Perron unit root tests results (with trend, level).....	75
Appendix 6: Augmented Dickey-Fuller unit root tests results (without trend, first difference).....	76
Appendix 7: Phillips-Perron unit root tests results (without trend, first difference).....	78
Appendix 8: Augmented Dickey-Fuller unit root tests results (with trend, first difference).....	80
Appendix 9: Phillips-Perron unit root tests results (with trend, first difference).....	81
Appendix 10: Bound test.....	83
Appendix 11: Autoregressive Distributor Lag Model (ARDL)	84
Appendix 12: ARDL Breusch -Godfrey Serial Correlation LM Test (Result for Serial Correlation).....	85
Appendix 13: ARDL ARCH test.....	86
Appendix 14: ARDL Normality Test (Jarque-Bera)	86
Appendix 15: ARDL Ramsey RESET Test (model specification).....	87
Appendix 16: Stability Test	88
Appendix 17: Result for Long Run Coefficient.....	89

Preface

Inflation has always been a major economy topic discussed for the development of a country, whether it is developing or industrialised. It can be described as the sustained increase in goods & services' price levels which caused by the drop in value of currency, and ultimately leads to the reduction of purchasing power. A changes in price level is definitely a concerning issue for Malaysian, as they have a limited savings and low income level.

In Malaysia, increase in inflation has always been the main concern for economist, mainly due to the increased cost of transport caused by the increase of global oil prices and weak Malaysian currency. The Business Times stated that Malaysia's consumer price index rises for 3.2% in January from 2016 and reaches the peak since February 2016, as shown in the government data. With the increase of price level on food items in recent days, it is getting burdensome and more difficult for Malaysians consumer to take care of their daily finances today.

This research will investigate into the relationship between the inflation rate in Malaysia with macroeconomic determinants such as gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR). We hope that the result and findings in our study will provide a clearer and larger picture for policy makers, investors, consumers, or future researchers to improve the economic efficiency of Malaysia in the long run.

Abstract

This study examines the relationship between macroeconomic variables and inflation rate in Malaysia from the period year of 1986 to 2015, which consisted of annually data in the total of 30 observations. Time series econometrics were used to capture the effect of macroeconomic variables toward inflation rate in Malaysia. Moreover, this study also examines the long run, short run, stability, normality, and specification errors of the empirical model.

Macroeconomic determinants such as gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR) are selected in this study. The empirical results concluded that all of the determinants above are significant towards inflation rate in Malaysia. Furthermore, gross domestic product (GDP), foreign direct investment (FDI) showed positive relationship towards inflation, whereas exchange rate (EXC) and trade (TR) displayed negative relationship towards inflation in Malaysia. Therefore, Malaysia's government should strive for an economy growth rate that is stable and consistent with the growth rate of inflation, rather than beating inflation first to strike for a faster growth.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

The aim of the research is to examine the effect of macroeconomic variable toward the inflation in Malaysia's economy from year 1986 until year 2015. We are using five macroeconomic variables in this research which is inflation rate as our dependent variable whereas the independent variable are gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR) to show the impact of inflation in Malaysia.

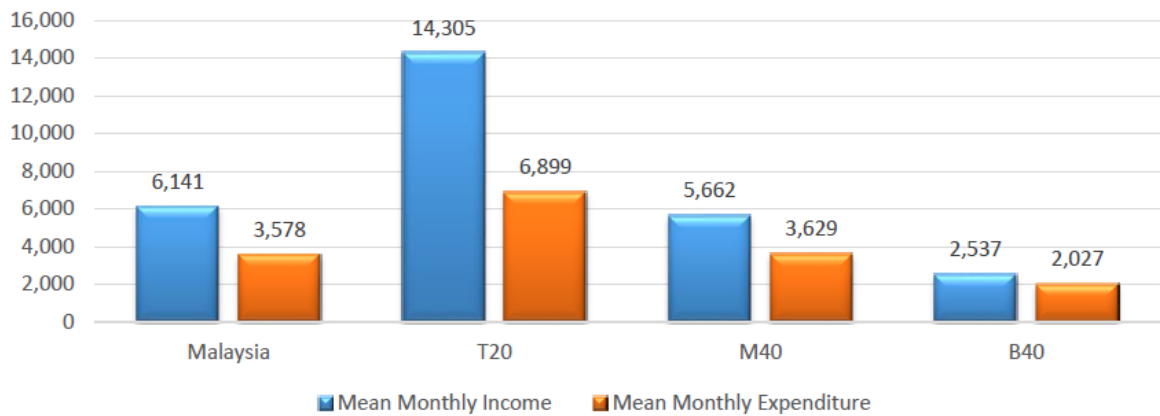
First of all, the research background of study will be discussed and Malaysia is targeted country. The general ideas on impact of inflation toward residents of Malaysia will be firstly discuss, which is effect of macroeconomic variables toward the inflation in Malaysia's economy. Next, some of problem regarding the impact of inflation in Malaysia have identified and discussed. Besides, the general objective and specific objective will be determines in the study. Moreover, significance of study is the roughly explanation of the contribution and importance of our research. Furthermore, there are hypotheses listed in this study as well. Lastly, chapter layout and short conclusion will be reviewed.

1.1 Research Background

Inflation happens will be the serious case for every human being and evens the company because these assets not only decrease in the overall purchasing power of the monetary unit, but also increase in the general level of prices quoted in units of money. Therefore, inflation is important for every people and the change in an impact of inflation is a concerning issue. High changes of inflation will affect less saving for people. Less money is being saved as people spend more to support their current standard of living. This will result in less loanable funds. However,

Malaysians have limited savings and low income level; they are heavily dependent on debts to finance their consumption.

Figure 1.1: Mean Monthly Household Income and Expenditure (RM) in year 2014



Source: Department of Statistics Malaysia (Household Income & Expenditure Survey 2014)

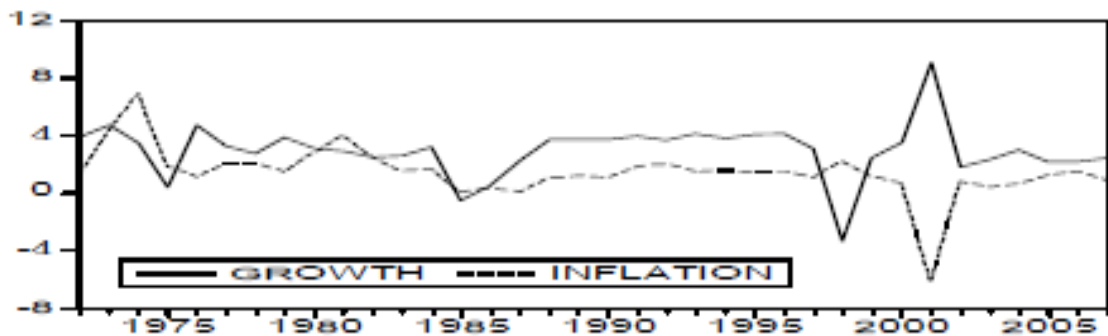
Based on the above statistics, low income group in Malaysia also known as B40 (Bottom 40%) group spends almost 80 percent of household income on daily necessary expenses whereas T20 (Top 20%) and M40 (Middle 40%) groups spend about 64 and 48 percent respectively. The gap between household income and expenditure of B40 shows the cost of living is high and there is limited future savings.

Moreover, Sattarov (2011) stated that it was better to hold capital that relative to money in higher inflation. This caused higher capital intensity and tends to higher economic growth. However, inflation rates higher in the countries would start to reduce economic growth rates. It is rational to think about the optimal level of inflation if high inflation is harmful and low inflation is beneficial for an economy. According to Sattarov (2011), inflation originates from the rising in money supply

and rising in inflation is related to an increase in money supply. Therefore, inflation occurs due to money supply increase.

Next, the line graph below shows that negatively relationship between inflation and economic growth. In this regard, macroeconomic policy makers think that inflation is essential for economic growth and aim to achieve high economic growth and very low inflation in their economies. In addition, Taeshi (2016) argued that this line graph below had mainly focused on the effect inflation has on the economic growth and income distribution with respect to macroeconomics, this is due to the level of impact inflation has on the economy as a whole. Thus, inflation has been a bone of argument with regards to being useful or harmful to economic growth. In addition, excessive inflation rates tend to expose various challenges to the economy and extend to limit other economic outcomes such as saving and investment. Taeshi (2016) proved that increases in price level can lead to serious economic damages especially when the prices increase continuously.

Figure 1.2: Inflation and Economic Growth in Malaysia

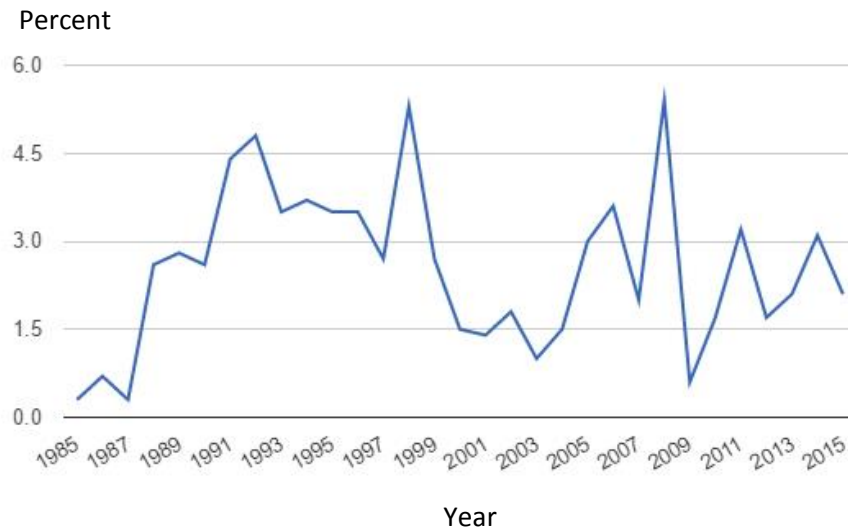


Source: Developed from the research

Furthermore, the meaning of inflation is continuous, general rises in the price of goods and services. The change of inflation is a concerning issue which will bring a lot of impact to us. For example, when the inflation happen, the price of good and services will increase which will increase the burden on the people. Kasidi and Mwanemela (2013) found that the most countries' central objective of the

macroeconomic policy is to improve sustainable economic growth and the continuous of price stability.

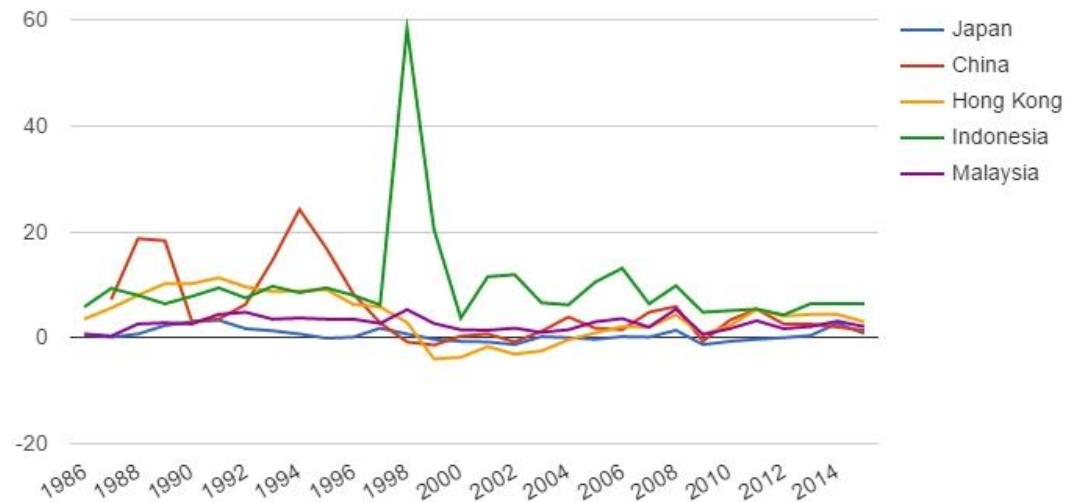
Figure 1.3: Overview inflation rate in Malaysia



Source: TheGlobalEconomy.com, The World Bank

By analyzing the line graph above, the inflation rate (%) in year 2008 is the highest which is 5.4% compare to other years in Malaysia while the lowest inflation rate in year 1987 is 0.3%. This survey proves that shock of oil price causes inflation in Malaysia since 2008. The international price of crude oil was high and cause the fuel price was force to increase. It also can be found in other countries such as India. In fact, the higher price of fuel would affect the people who are working or studying in Malaysia. Furthermore, it has been quite evident in the past few years though such price increase was still slow and under controlled. The government is also actively in the oil price control because Malaysia is engaging in oil producing country. However the energy price that increase slowly and continually has been pushed up the production cost which contribute to the cost push inflation. Figure 1.4 below shows the inflation of percentage change in the Consumer Price Index (CPI) in Asian country from year 1986 until year 2015.

Figure 1.4 Inflation: percentage change in Consumer Price Index



Source: TheGlobalEconomy.com, The World Bank

The top three highest rates of inflation in Asian countries are Indonesia, Hong Kong and Malaysia. Apart of other countries, only in Indonesia country that show a steadily growth of inflation rate until a peak of 58.4% in year 1998. Malaysia has a less fluctuation of inflation rate since 1986 until 2015, hence it raises the importance for this study to analyse and identify the significant of macroeconomic variables toward inflation in Malaysia's economy.

1.2 Problem Statement

Inflation has always been a major economy topic discussed for the development of a country, whether it is developing or industrialised. It can be described as the sustained increase in goods & services' price levels which caused by the drop in value of currency, and ultimately leads to the reduction of purchasing power.

Nevertheless, there has always been observable debate on the relationship between inflation and economic growth, either it is harmful or promotes economic

growth. The study of Munir, Mansur and Furuoka (2012) proclaim that the argument of the existence and nature of relationship between inflation and economic growth has always been the topic of considerable interest and debate, although the precise relationship between them is still remains open.

Several consequences or problem may arise if we overlook the impact of inflation on macroeconomics variables. This is because inflation will lead to hyperinflation whereas consumers spend more before the prices increase higher when they detect a rise in price. Kasidi and Mwakanemela (2013) found that inflation impact economic growth negatively and causes harms to the economy of Tanzania. In short term, relationship between GDP and inflation appears to be statistically significant and negative. The increased demand for goods causes it to overstretch the supply, hence the manufacturing cost for supply will rise.

Trade usually creates economic growth and also causes inflation. Romer (1993) found that more open countries has lower inflation rate because of real exchange rate depreciation due to anticipatory monetary expansion. The results in Mukhtar (2010) shows the trade is significant and displayed negative relationship towards inflation proved that Romer's hypothesis does exist.

Moreover, foreign direct investment (FDI) is a vital channel through which the impact of inflation is indirectly transmitted in economic growth for the enrichment of society (Andinuur, 2013). Therefore, FDI was important from the country perspective because it was an indicator to detect the health of an economy. Additionally, Madesha, Chidoko and Zivanomoyo (2013) stated that there are unidirectional causality between inflation and exchange rate. The country's exchange rate system would affect the country's exchange rate and it would influence the inflation. Several studies also suggested that inflation and economic growth are negatively related. Andres and Hernando (1997) obtained a significance negative correlation between inflation and income growth in long periods. However, the study in Gokal and Hanif (2004) showed the existence of unfavourable and weak relationship between inflation and economic growth in Fiji's economy.

Many researchers had brainstorm on the issue of inflation that influence economic growths in various countries worldwide. Nonetheless, the literature on the impact of inflation had received varied opinions and still could not come out with a same conclusion. For Malaysia, increase in inflation has always been the main concern for economist, mainly due to the increased cost of transport caused by the increase of global oil prices and weak Malaysian currency. The Business Times stated that Malaysia's consumer price index rises for 3.2% in January from 2016 and reaches the peak since February 2016, as shown in the government data. With the increase of price level on food items in recent days, it is getting burdensome and more difficult for Malaysians consumer to take care of their daily finances today. Moreover, inflation are expected to increase further in 2017 due to the weakening of ringgit, and also the increase of cost-rationalizations and reduction policy implemented by government on daily consuming product. Economists had given warning that consumer price index (CPI), which reflect the inflation level of Malaysia would go up as much as 2.8% in 2017, as reported by The Edge Daily. This phenomenon definitely received attention of investors and public as they were afraid that the persisting economic condition will affects their activity. Besides, the effect of macroeconomic variables toward inflation also received significant attention from policy makers in the effort to attain sustainable economic growth and price stability.

Therefore, our study will look into the effect of macroeconomic variables toward inflation in Malaysia's economy with macroeconomic variables such as gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR).

1.3 Research Objectives

1.3.1 General Objective

This research aims to examine the impact of selected macroeconomic variables on inflation to the economic growth of Malaysia. Four selected set of macroeconomic

variables using time-series data were included which consists of gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR).

1.3.2 Specific Objective

The specific objectives of this paper are:

- i. To identify the long run relationship between Gross Domestic Price (GDP) and inflation.
- ii. To identify the long run relationship between Foreign Direct Investment (FDI) and inflation.
- iii. To identify the long run relationship between Exchange Rate (EXC) and inflation.
- iv. To identify the long run relationship between Trade (TR) and inflation.

1.4 Research Questions

- i. Whether all of the determinants have long run and short run relationship towards inflation?
- ii. Do we have sufficient evidence to conclude that the variables are significant?

1.5 Hypothesis of the Study

In this study, four hypotheses were chosen by us to determine the relationship between inflation rate and the impact of macroeconomic variables towards it in Malaysia.

1.5.1 GROSS DOMESTIC PRODUCT (GDP)

H₀: There is no significant relationship between inflation rate and gross domestic product

H₁: There is a significant relationship between inflation rate and gross domestic product

Since economic growth is determined in gross domestic product (GDP), which measures the total value of goods and services produced, it is without doubt that GDP will be an important economic indicator and tools to measure the rate of inflation. Kasidi and Mwakanemela (2013) stated that inflation negatively impact the economic growth of Tanzania. Hence, GDP is included in this paper as an independent variable to determine the impact of inflation.

1.5.2 FOREIGN DIRECT INVESTMENT (FDI)

H₀: There is no relationship between foreign direct investment and inflation

H₁: There is a relationship between foreign direct investment and inflation

The foreign direct investment (FDI) has a positive relationship with inflation (Andinuur, 2013). A simple explanation would be that FDI leads to heavy creation of jobs and infrastructure. It is leading to people getting employed and also increase in income. Because of the higher wages at work, people will tend to increase their consumption expenditure to purchase goods and services. When a large number of people have more money and start to demand goods in a larger quantity, prices will tend to rise if supply of goods does not increase proportionately. Hence, inflation will happen at that time.

1.5.3 EXCHANGE RATE (EXC)

H₀: There is no relationship between Exchange Rate and Inflation

H₁: There is a relationship between Exchange Rate and Inflation

Madesha, Chidoko & Zivanomoyo (2013) stated inflation and exchange rate having a significant and negative relationship. As the exchange rate or currency of one country depreciates, the imports become expensive. For instance, price of inputs imported from other countries are become more costly, which leads to a higher production costs. The inflation would going on when the price of the good continues increase.

1.5.4 TRADE (TR)

H₀ : There is no relationship between Trade and Inflation.

H₁ : There is a relationship between Trade and Inflation.

Inflation will be lower when trade are more open in the economies. (Romer, 1993). Mukhtar (2010) stated that the result is same with the Romer's hypothesis in Pakistan which is proven the relationship between inflation and trade is significant and negative. The cheaper of price for imports goods will cause the domestic producers to reduce their price. The availability of cheaper import price lead to cheaper input and reducing the cost of production and hence inflation.

1.6 Significance of Study

Inflation is a major economy issue for a country development, especially in Malaysia. It cause plenty of problems for countries around the world in their economic development. It is crucial for Malaysia government macroeconomics policies to attain sustainable economic growth and price stability. In this study, the impact of inflation on economic growth, evidence in Malaysia will be examined. This is attempting to investigate into the relationship between inflation and growth rate of GDP in Malaysia, whether it is harmful or not to the economic growth of

Malaysia. This study is significant as it will help to define the impact of inflation in Malaysia. Macroeconomic factors plays important role on the movement of inflation in Malaysia. Thus, this study will reveal the relationship of macroeconomic factor which are gross domestic price, foreign direct investment , exchange rate and trade with respect to Malaysia's inflation level.

Malaysia has an especially experience involve in inflation. Many countries are facing challenges to maintain a lower and stable inflation rate in the macroeconomic policy. Economic growth with stability price become an important objective for policymakers in Malaysia. Hence, Sethi (2015) mentioned many economists believed that the high inflation affect the efficient working of the economy when it crosses certain minimum threshold. Thus, this is important for policymakers making the decision with concerned the economy condition and overcome the challenges to control inflation in Malaysia.

Besides that, expectation of inflation are important for private sector firms to manage their portfolio management in order to avoid financial losses. There are some kind of businesses which having a certain natural protection from inflation with passing their higher selling price to customers and reinvest their investment. Investors should have a well understanding for their decision-making in order to achieve the economic growth and good productive performance with moderate inflation rate.

In additional, government of Malaysia need to identify the factor that affect the inflation so they can make financial decision with understand why and how the inflation volatility by time to time. Hence, government can adopted effective approaches and making decision effectively and efficiently to reduce inflation risk in the future.

In the nutshell, this study provides indicators to policymakers, government, future economist researchers, and private sector firm towards the inflation in Malaysia. By having further understanding in this studies, the government or relevant authorities will have a better control on the economic growth in terms of maintaining the economic stability. This will enhance the economic efficiency and

Malaysia will become more competitive in the long run. This study leads to further scope to investigate the inflation level and also need to analyze those problems that due to the inflation.

1.7 Chapter Layout

The first chapter will introduce an overview of inflation rate in Malaysia, which include the impact of inflation towards Malaysia. Besides, research problem, general research objectives, specific objectives and research questions related to the linkage of inflation rate with macroeconomic are discussed in this chapter. The hypothesis of study of each variable toward the inflation in Malaysia's economy is to be tested and included in this chapter. Lastly, significance of study will then be discussed in the final part of this chapter.

Chapter 2 will introduce an overview of the present and past relevant literature that were studied by researchers and summarized of all studies. The conceptual frameworks and theoretical models of inflation rate will then be elaborated in this chapter. Moreover, the four independent variables that would be tested in the research which is Gross Domestic Products, Exchange Rate, Foreign Direct Investment and Trade.

Chapter 3 presents and explains the methodology and research method that were used in this study. Besides, the data collection ways and sources of information for each variable are summarized and presented in table form. Sampling of techniques and designs for examining the data purpose also included and discussed as well.

Chapter 4 will display the empirical result and interpretation of the data and methods. Moreover, a few tests will be carried out afterwards to study the significance, long run relationship, short run relationship, normality and stability between inflation rate and the independent variables. The research questions and

hypothesis tested of each variable presented will be answered through the analysis results made by researchers.

Chapter 5, which is the last chapter will presents the conclusion and policy implication in this research. It include the conclusion of summarizing the whole findings from chapter 1 to chapter 4. Furthermore, several recommendations proposed based on the results will then be explained in this chapter. The limitation of our research is also been discussed in the last part of this chapter.

1.8 Conclusion

The inflation rate are in continuous increment trend especially Malaysia. Nowadays, inflation is continuous, the price of goods and service are general rise. The top three highest rates of inflation in Asian countries are Indonesia, Hong Kong and Malaysia. The inflation rate in Malaysia peaked in year 2008 due the oil price shock. Besides, the factors that led the continuous increment inflation rate in Malaysia were seen as the most widely popular topic in recent years. Thus, this chapter would be provides outline of the topic and the purpose of the research to examine effect of the macroeconomic variables toward inflation in Malaysia. We are using the role of macroeconomic factors towards the inflation rate for better understanding and the four independent variables which are gross domestic product, foreign direct investment, exchange rate and trade are employed in this research. Then, the main ideas are introduced and elaborated the problems of this study, a literature review is followed next and summarize the existing and past relevant studies that related to our study in next chapter which is Chapter 2.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

There are always diverge and contrast point of view on the relationship between inflation and macroeconomic variables. Therefore, literature review of our study will discuss in detail on the relationship between inflation (INF) and explanatory variables. First, argument of past researcher's literature or research on the relationship between inflation (response variable) and all of the independent (response variable) will be reviewed in this paper. Next, relevant theoretical framework of inflation with macroeconomic variables will then be discussed. Lastly, proposal of the theoretical model of this study and the brief summary of this chapter will then be explained.

2.1 Review of the Literature

2.1.1 The relationship between Gross Domestic Product (GDP) and Inflation

Gross domestic product, or gross value of goods & service produced in an economy is an important indicator for the economic health of a country. Economist generally assumed that stable and moderate inflation will stimulate the economic growth of one country. It is crucial for policy makers to design and implement sound fiscal and monetary policy to control the inflation rate to the advantage of a country. Overall, there has always been considerable and mixed debate on whether inflation promotes or harms economic growth.

Most of the researches argue that there happens to be a negative relationship between GDP growth and inflation. Kasidi and Mwakanemela (2013) found that inflation negatively impact and harms the economic growth of Tanzania. In short term, relationship between GDP and inflation appears to be statistically significant and negative. It further indicates that inflation and economic growth is not related in long run, with the absence of long-run relationship. Enu, Attah-Obeng and Hagan (2013) also supported the argument. The research argues that a strong and negative linear relationship is present between inflation rate and GDP growth rate in Ghana. The studies in Madurapperuma (2016) also revealed that a long run significant and negative relationship is present between economic growth and inflation in Sri Lanka, bringing adverse effect to the economic growth of the country. Moreover, Munyeka (2014) also supported the existence of negative relationship between economic growth and inflation. The research further clarify on the linkage, as the additional cost imposed by inflation on the economy will therefore reduce economic growth. On the other hand, Umaru and Zubairu (2012) proposed that GDP causes inflation, but not inflation causing GDP in their results of causality test. Furthermore, it is suggested that inflation can be reduced to the minimum level by increasing the GDP of a country.

In contrast, some researchers do not agree with the statement above. They argues that positive relationship exists between economic growth and inflation. Mallik and Chowdhury (2001) revealed that there is an existence of positive relationship between growth rate of GDP and inflation in the long run in countries of India, Bangladesh, Sri Lanka and Pakistan. It is understand that modest inflation is helpful to growth, yet accelerated economic growth will eventually responds back into inflation. Moreover, the reactiveness of inflation to changes in GDP growth rate is found to be higher compared to GDP growth rate to changes in inflation rate. Hussain (2011) also concluded that inflation is positively related to economic growth in Pakistan. The research propose that both variables have significant impact between them while also affecting each other positively.

2.1.2 The relationship between Foreign Direct Investment (FDI) and Inflation

ShaguftaNasreen, UzmaFazal, Pirzada, Khanam and Tariq (2014) stated foreign direct investment (FDI) referred as a company situated in foreign country directly invest in enhancing the production of target country and this investment can be done by foreign country in many way like increase the on hand activities in target country or purchase a firm. In another way, Andinuur (2013) argued that foreign direct investment (FDI) acted as a significant channel through which the effect of inflation was indirectly transmitted in economic growth for the enrichment of society. So, FDI was important from the country perspective because it was an indicator to detect the health of an economy. After conducted the study on the phenomenon of FDI, researchers came out a review of studies concluding that FDI was positively or negatively and significantly or insignificantly affecting inflation.

In short, there was a negative and significance relationship between FDI and inflation. ShaguftaNasreen, UzmaFazal, Pirzada, Khanam and Tariq (2014) found out that there was a negative relationship between FDI and inflation in Pakistan in year 1967 to 2012. They recommended that to reduce the size of funds deficits should be by increasing returns that would have systematic improvements in the tax structure and by decreasing unproductive spending. Besides, Niazi, Riaz, Naseem & Rehman (2011) also supported the negative relationship but insignificant hypothesis. Foreign investor was encouraged to invest with a lower inflation in the country. This study was also come to the same conclusion and results are proved that the change in foreign direct investment is due to inflation. In fact, increase in inflation lead to decrease in foreign direct investment. In the research conducted by Gharaibeh (2015), he stated that there was an inverse and significance relationship between inflation and FDI. FDI inflow was likely to discourage in a high level of inflation as indicated by many researchers. It found that level of inflation was negatively correlated with FDI flows into Africa.

In contrast, some researchers proved that there might be a positive and strong relationship between FDI and inflation and no directional causality was found from inflation to FDI and growth. Andinuur (2013) had revealed the positive

relationship in between and argued that FDI may not be attracted by the stable price because of the unidirectional causality from FDI to inflation. High FDI is central to low levels of inflation in Ghana. Therefore, to attract the more FDI in Ghana is necessary to set up the fiscal and monetary policies. Besides, Abu and Nurudeen (2010) also emphasize that FDI was positively but insignificantly related to inflation. In order to attract more foreign investment, the government might take some action to reduce the dollar price of some industries by allow the exchange rate to depreciate further.

In a nutshell, FDI may have both positive or negative and significant or insignificant affect toward inflation. However, it was undeniable that foreign direct investment was one of the vital determinants of inflation.

2.1.3 The relationship between Exchange Rate (EXC) and Inflation

From finance perspective, exchange rate are refers to a country's currency can be exchanged for the currency of another country. Another way to say, exchange rate indicate as the strength of a currency. Besides, exchange rate reflects the consequence of an economic perspective on inflation.

According to Madesha, Chidoko and Zivanomoyo (2013), there are unidirectional causality between inflation and exchange rate. They commended that the impact of exchange rate on inflation itself depend on the country's exchange rate system. However, the change of exchange rate would have a significant impact on overall economy.

Furthermore, Madesha, Chidoko and Zivanomoyo (2013) explain this relationship is in long-run relationship. When a country's currency is weakening, the cost of the import will be more expensive causes the higher cost of production and price of products or goods will increase. The inflation was happen when the price level aggregate in the country continues increases. As Madesha, Chidoko and

Zivanomoyo (2013) had suggested that Zimbabwe's policy maker should minimize the impact of inflation on the economy, even if inflation and exchange rate have long-term relationship, but exchange rate change might not lead to short-term inflationary pressure.

In contrast, some researchers also argued that there might be a strong correlation between exchange rate and inflation. According to Achsani, Fauzi and Abdullah (2010), exchange rates have a significant impact on inflation in Asian countries, while the EU and North America display that there is no such relationship. In order to maintain the stability of economic, the managing inflation is very important. However, compared with the European Union and North America, inflation management in Asia has become more complex because of the large impact of exchange rate changes.

In short, few researchers found that there are negative relationship between inflation rate and exchange rate. From the research conducted by Onyekachi and Onyebuchi (2016), they stated that exchange rate is negative and significant effect on inflation. However, there are negative weak correlation exist between inflation and exchange rate. The exchange rate depreciation might be leading the inflation increase (Imimole & Enoma, 2011). The researchers explain that exchange rate very significant effect on inflation in long run and inflation has lagged cumulative effect toward the Nigeria. The researcher had suggested that Nigeria government should broaden the scope of monetary authorities to reinforce them to control the activities of parallel exchange market and stabilize the fluctuating inflationary rate (Onyekachi & Onyebuchi, 2016; Imimole & Enoma, 2011).

In addition, the research conducted by Pelesai and Michael (2013), the other factors which will affects the result of the research need included such as low productivity, concentration of wealth in the hands of the minute few, financial dualism, among other.

2.1.4 The relationship between Trade (TR) and Inflation

Alfaro (2003) and Tasci, Esener, and Darici (2009) stated that trade referred as a share of GDP that is the sum of exports and imports of goods and services divided by the GDP. Trade usually creates economic growth and also cause inflation. Unstable price in domestic cause by increase in openness of the economy, it would be lead to unexpected impact on the country. According to Romer (1993), real exchange rate depreciation in the expansion of anticipatory monetary cause inflation is lower when more open countries. Thus, it will increase the cost of production in more open countries, so the authorities expanded less and cause lower inflation rate.

Mukhtar (2010) stated the results proven the Romer's hypothesis is existed and shown trade has negative relationship towards the inflation. Protectionism is inflationary since the prices will be decline when associated with trade liberalization. Besides, Mukhtar (2010) also mentioned that the cheaper price of imports finished goods and intermediate inputs may lead to decline in all level of price causing trade is negative relationship on inflation. In additional, competition will increase when trade trend to foster domestic productivity growth for lower inflation. Hence, this will encourage firms to pay higher wages without passing the cost to their consumer in form of higher price.

Terra (1998) found the relationship between trade and inflation is negative and significantly. The author also stated that the value of currency will be more depreciated when the country's trade share becomes lesser. Thus, the economy tend to inflate cause by the depreciated of the currency. In additional, Sikdar et al. state that policymakers need to conduct some specific policies likes increase the productivities that can facilitate trade to enhance the international trade to achieve economic growth and overcome inflation.

On the other hand, many studies show that trade is positive relationship towards inflation. Munir and Kiani (2011) stated that significant positive relationship among inflation and trade openness as Pakistan has rich agriculture base with large amount of agri-product in exports shows the positive result on inflation.

Besides that, Zakaria (2010) shows that trade is significantly positive affect towards inflation since the economy of Pakistan is depending on the degree of trade openness that will affect the domestic price level. Next, Tasci et al. (2009) found that trade has positive effects on inflation. In fact, increase in economic activities and the supply side of the slow economy reaction will lead to rise of price with increase the trade.

2.2 Review of Theoretical Framework

In theory, the classical Keynesian aggregate demand (AD) and aggregate supply (AS) framework supported the positive relationship between inflation and economic growth. Based on the model, aggregate supply (AS) curve is upward sloping in short run. Therefore, the changes in aggregate demand (AD) will affect the price and output level of a country. This can be explained whereby as aggregate demand (AD) increases, the general price levels will increase together with the increase of output. It includes the changes in expectation, labour force and also fiscal or monetary policy. Furthermore, the concept of time inconsistency problem is said to be the main cause of the positive short run inflation growth.

However, in long run, the vertical aggregate supply (AS) curve will then causes the changes in aggregate demand (AD) to only affect the price level but not the output level. This is due to the opening positive relationship between inflation and growth will undergo an adjustment path of downturn to become negatively related in long run. This phenomenon can be explained as the economy go after a volatile path where inflation rise and falls, but does not move directly to higher inflation.

According to Onyekachi and Onyebuchi (2016) applied three theoretical approaches in their study. The first approach is Traditional Flow Model, which used to determine the exchange rate through foreign exchange market demand and supply. The exchange rate depreciation would be influence domestic price increases relative to foreign price and which show negative effect on the exchange rate. The import would increase when the domestic goods more expensive

compare with foreign goods. The prices of import goods and services would be affected by the country's exchange rate change and hence contribute to high inflation in the country.

Moreover, the Monetary Model is another of the approaches applied by the researchers. This is used to explain exchange rate change in relation to changes in the demand and supply of money between two trading countries (Onyekachi & Onyebuchi, 2016). The model explains that the exchange rate depreciation is due to inflationary pressures and an increase in the money supply. According to Maswana (2006), it asserts that inflation occurs when the money supply exceeds the potential output or demand dictated by trade. However, the assumption that domestic and foreign bonds are close substitutes is one of the major criticisms of the monetary model. Hence, account must be taken of the differences in their prices and yields when the two assets are not close substitutes.

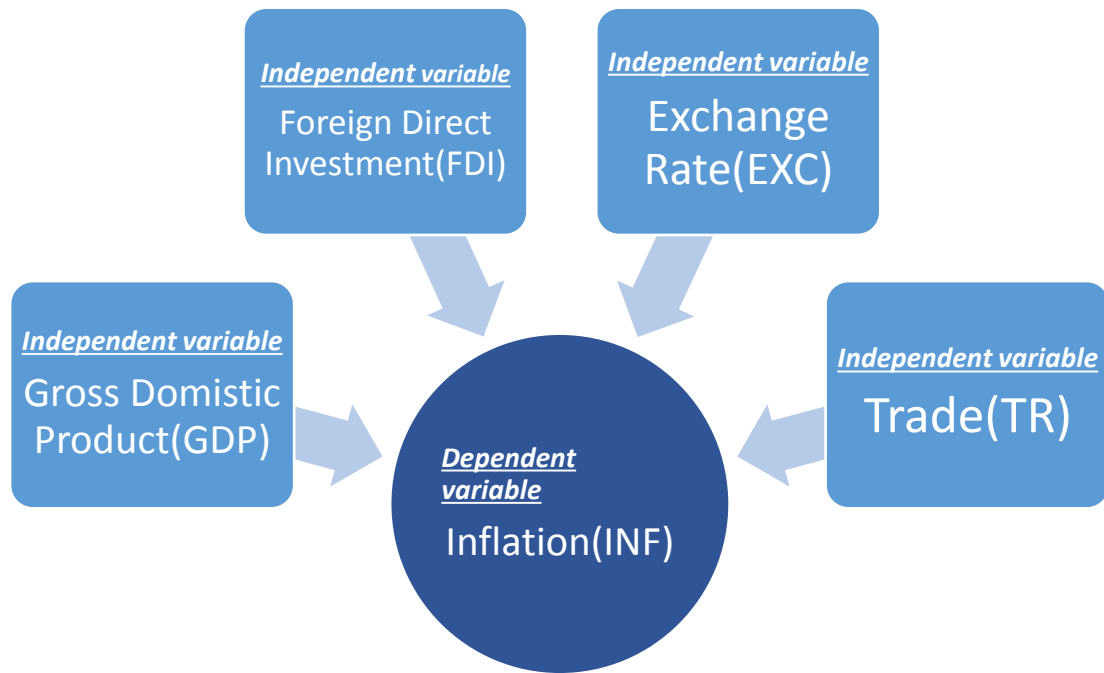
Other than that, the Purchasing Power Parity model is a crucial assumption in both versions of the monetary and portfolio balance models. According to the Purchasing Power Parity model, the exchange rate is determined by the relative price level. When there is a change in price level, the exchange rate also changes (Onyekachi & Onyebuchi, 2016). The theory attempts to explain the equilibrium value of the exchange rate in terms of differences in inflation rates between two countries. According to Ebiringa, Thaddeus and Anyaogu (2014), if the inflation rate of a country rises relative to another country, it experiences a decline in exports and an increase in imports, thus the value of the country's currency depreciates. The theory seeks to quantify the inflation-exchange rate relationship by adhering to the principle that changes in exchange rates are caused by inflation rate differentials.

2.3 Proposed Theoretical Framework

The graph 2.1 shows the conceptual framework that was derived from the literatures reviewed. The framework illustrates the relationship between the dependent variable

and independent variables. Figure 2.1 shows the relationship between the four selected variables with inflation in Malaysia.

Figure 2.1: Relationship between inflation and its independent variables



Source: prepared by author

The theoretical framework in graph 2.1 shows that the impact of independent variables which are Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Exchange Rate (EXC) and Trade (TR) towards dependent variable which is inflation (INF).

2.4 Conclusion

In short, the relationship of the inflation rate and macroeconomic factors based on the literature from past researchers will discuss in this chapter. There are found

that a strong correlation between the GDP, FDI, EXC, TR and the INF from the studies. The theoretical framework between inflation and its determinants will be reviewed in Chapter 2. In following chapter which is chapter 3, we will then discuss the methodology conducted to estimate the relationship between inflation and other macroeconomic variables in Malaysia.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter deals with the methodology and tests used to achieve the objective of this research will be discussed. This research is to examine the impact of selected macroeconomic variables on inflation and economic growth in Malaysia. The macroeconomic variables selected for this research included GDP, FDI, EXC, and TR. Furthermore, the sources of information collection and data methods, the unit measurement for each variable, the proxy for the variables, research model, research techniques and instruments, and flows of the methodology will be discussed.

First of all, inflation is dependent variable of this study with four macroeconomic variables as independent variable. The source of data collected for this research is from year 1986-2015 from World Bank's World Development Indicator. In this research, we are using the time series data and annually data to carry out the empirical analysis. For the interpreting, analysing and testing hypothesis, the time series econometric model was applied in this research. Furthermore, we are using Eview 9 software to read and analysis the results output for this study.

Secondly, the proposed empirical model of the research will discuss in section 3.1 whereby description of the variables will discuss in section 3.2. For the section 3.3, is the part of data source and data collection method of the research and section 3.4 will describe the data processing of the research. In section 3.5, the function, ideas and theories of the each methodology will discussed and the conclusion of this chapter will be the last section.

3.1 Proposed Empirical Model

This study investigated the effect of macroeconomic variables which are GDP, FDI, EXC, and TR towards the inflation in Malaysia's economy. The proposed empirical model expressed INF, GDP, EXC and TR in natural logarithms that has proved by Mukhtar (2010), Alfaro (2003), Sachsida (2015), and Cheng & Tan (2002) which can be specified as below:

$$\ln INF_t = \beta_0 + \beta_1 \ln GDP_t + \beta_2 \ln FDI_t + \beta_3 \ln EXC_t + \beta_4 \ln TR_t + \mu_t$$

Where,

INF = Inflation, consumer prices index (2010=100)

β_0 = slope coefficient

β_i = slope efficient for independent variables, where $t = 1,2,3,4,5$

GDP = Gross Domestic Product per capital (2010=100)

FDI = Real Foreign Direct Investment (2010=100)

EXC = Real Exchange Rate (2010=100)

TR = Trade (% of GDP)

μ = Error term

The natural logarithm form applied to the variables due to several reasons in this research. First of all, the natural logarithm scale of the coefficients can be directly interpreted as approximately proportionally different (Gujarati & Porter, 2009). For example, change in dependent variable (Y) corresponds to an approximate change in independent variable (X).

In additional, log the variables will turn into linear trend from data series and the economic variables are underlying rate of growth which mean that the data may or may not be constant. According to Asteriou and Hall (2007), the continuous increasing of mean and not integrated of data due to no amount of differencing can make the data stationary.

3.2 Variable Descriptions

3.2.1 Consumer Price Index

Consumer Price Index are normally used to measure the inflation rate. This is because it determines the changes in price level of consumer goods & services consumed by households. Nonetheless, CPI only point out the average measurement of goods, as not all of the goods are changing at the same velocity. Moreover, Consumer Price Index is said to be closely related to real purchasing power. This can be explained as an increase in CPI will likely decrease the consumer purchasing power due to the increase in price level. Once we obtain the CPI value of any two periods, inflation rate over the period can then be determined. The formula of CPI for a basket of items is shown below:

$$\text{CPI} = \frac{\sum_{i=1}^n \text{CPI}_i \times \text{weight}_i}{\sum_{i=1}^n \text{weight}_i}$$

Researchers and practitioners have always consider inflation as an important economic factor that influence economic growth of countries all around the world. Study conducted in Andinuur (2013) attempted to investigate the relationship between inflation, economic growth and foreign direct investment in Ghana. Moreover, study conducted by Romer (1993) stated that lower inflation exists in open countries due to the depreciation in real exchange rate caused by anticipatory monetary expansion. On the other hand, Madesha, Chidoko and Zivanomoyo (2013) also explained the long run relationship between exchange rate and inflation. Inflation occurs usually when the aggregate price level in a country continues to increase.

Previous researchers concluded that gross domestic product, foreign direct investment, exchange rate and trade shows significant relationship against inflation.

3.2.2 Gross Domestic Product

Gross domestic product, also described as the aggregate goods & service produced indicates the economic health of a country. In our study, GDP per capita that were chosen by us is used to calculate the total output of a country, which divides Gross Domestic Product (GDP) to the total number of population in Malaysia. An increase in GDP per capita indicates the increment of growth and productivity of a country's economy.

The relationship between inflation and GDP growth rate has attracted much attention especially in the past decade and a half. According to Enu, Attah-Obeng and Hagan (2013), their research argues that a strong and negative linear relationship is present between inflation rate and GDP growth rate in Ghana. Therefore, in our study, real GDP per capita were used as a key variable and the expected sign for GDP would be positive toward Consumer Price Index.

3.2.3 Foreign Direct Investment

Normally, foreign direct investment (FDI) was a type of investment involved the impregnation of foreign funds into a company that operates in another country of origin from the investor. In other words, FDI also refer to an investment of foreign asset into domestic products and services but does not included foreign investments in stock market. In order to define inflation, FDI should be used as our proxy in this study. Besides, this research used independent variable such as FDI and it act as a vital role in accelerating the development and economic growth of a country. Next, Xin et al. (2012) proved that developing countries that promote their economy as the countries faced capital shortage for their development process was depend on FDI. Moreover, in order to help the countries growth faster, FDI brings in skills, capitals and also technology into developing countries by satisfying the country's needs.

According to Asid et al. (2014), when the country had achieved a fixed level of financial development, then the benefits of FDI on the recipient countries can only

be enforced. If Malaysia was having a stable political surrounding and continued an economic growth, it would become one of a good future for FDI inflow. Typically, in order to attract FDI inflows, remain and continue strong economic growth to be a necessary condition for Malaysia. Low inflation also acts as an activator in encouraging and attracting investment. The technology gap among developing countries would actually narrow.

The expected sign of foreign direct investment (FDI) in this research is negative sign.

3.2.4 Exchange Rate

Exchange rate is referred to a rate of between two currencies and which one currency will be exchanged for another. In this study, the exchange rate used as independent variable and real exchange rate used as ratio of the number of units. In case of inflation, real exchange rate is better performance compare with nominal exchange rate (Klau & Fung, 2006). Hence, exchange rate is often considered as a determinant of the inflation rate as well. For the real exchange rate index is used to detect the result of purchasing power which is relative to other currencies in the study. In order to computation of exchange rate from the International Monetary Fund, the internationally accepted statistical methodologies are applied by the Department of Statistics Malaysia. The formula of real exchange rate index provided below:

$$RELKI_t = NELKI_t \times \prod_{i=1}^n \left(\frac{P_{Liet.t}}{P_{it}} \right)^{w_i}$$

According to Madesha, Chidoko and Zivanomoyo (2013), the imported input will become more expensive when the country's currency of depreciation. The price of good would be increased because the higher cost production and continuous

increase the price of good might lead to inflation. Next, the expected sign of exchange rate in this research is negative sign.

3.2.5 Trade

A proxy of openness of economy is referred by trade and defined as export plus import of goods and services divided by the value of GDP. The share of GDP is the ratio states the degree of Malaysia's openness to trade in worldwide. According to Mukhtar (2010), the more trade openness, the restriction in world trade will lesser thus the trade share in GDP will increase. However, Musa (1974) found that proponents of trade openness argue that trade will trend to decline the prices level, so that protectionism is inflationary (Musa, 1974). Besides, Temple (2002) also mentioned the imported goods and services will lead to inflation when the economic implied the expansion of money that will cause the depreciation of currency. Next, the expected sign of trade is negative effect on inflation since the cheaper price to import finished goods and intermediate inputs lead to decrease the level of price (Mukhtar, 2010). In fact, boosting productivity growth will trend to lower inflation indirectly. Thus, trade is a key indicator to determine inflation directly or indirectly.

3.3 Data Collection Methods

In the interest to identify the relationship between Inflation and four selected macroeconomic variables in Malaysia, research data and relevant information related to our research were collected. In this research, we are using the secondary data as our research data. According to Johnstone (2014), secondary data analysis is an applicable method to utilize in the process of inquiry when a systematic procedure is followed.

In this research, five unique variables including the dependent variables data is collected annually from year 1986 to year 2015 in Malaysia, which consist of 30

observations in total. All of the secondary data were retrieved from World Bank Database, which is available online.

Consumer Price Index (CPI) is used as the proxy of inflation in Malaysia. Besides, other time series data which include GDP per capita (proxy for GDP), official exchange rate (proxy for exchange rate), FDI in % of GDP (proxy for FDI) and Trade % of GDP (proxy for trade) were used in this research. This is because we believe that these are the most relevant factors that will affect the inflation rate in Malaysia. The details for all of our secondary data are listed in below.

Table 3.1: Data Measurement

Variable	Proxy	Source
Inflation	CPI	World Bank Database
Gross Domestic Product	GDP	World Bank Database
Foreign Direct Investment	FDI	World Bank Database
Exchange Rate	EXC	World Bank Database
Trade	TR	World Bank Database

Source: Prepared by author

3.4 Flows of methodology

First of all, our research conduct unit root test on all of the 5 variables to determine the stationarity of the time series data. Among all of the unit root test available, Augmented Dickey-Fuller test and Phillips-Perron test were chosen to analyse the stationarity conditions of each variable at both level stage and first difference stage, with or without trend. After that, we will then proceed to the Autoregressive Distributed Lag (ARDL) models approach.

Secondly, ARDL approach, also known as ‘Bound Test’ is then been conducted to determine whether a long run cointegration relationship is presence between

dependant variable and independent variables in the model. Before proceeding to bounds tests, it is important for us to identify whether the variables are in the form of $I(0)$ or $I(1)$. The reason for us to select ARDL approach is because it is relevant to test for cointegration relationship for small sample size. Next, ARDL Breusch - Godfrey Serial Correlation LM Test is then conducted to check for serial correlation error. This is to ensure that serial correlation problem does not exist in our model.

Next, ARDL ARCH test is then conducted to test for heteroskedasticity error. Normality Test is the conducted to test for the normality of our model, so that our data set is proven to be normally distributed. After that, we will proceed to Model Specification (RESET test) to test for model specification error. Lastly, Stability Test (Cusum and Cusum Square Root) is conducted to ensure the stability of our model.

3.5 Methodology

3.5.1 Unit Root Tests

A result of stationary or non-stationary in time series can be tested by used the unit root tests. With stationary, the economy condition can be forecast accurately. In contrast, the results will show spurious and no relationship between dependent and independent variable when used non-stationary time series data. This means R-square values and t-statistics are no longer valid to test the hypothesis tests. Thus, non-stationary time series data needs to transform into stationary data to receive constant result. In this research, Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) in unit root test will be used to analyse whether the result is unit root or no unit root in time series.

3.5.1.1 Augmented Dickey-Fuller Test (ADF)

The Augmented Dickey-Fuller test is used to test the stationary in time series. The ADF test can be used with serial correlation and it can handle more complex time series models than the Dickey-Fuller test. According to Fuller (1976), the optimal lag length should be chosen so that the variables are not serially correlated via determined by using two option, there are Akaike Information Criterion (AIC) or Schwartz Information Critetion (SIC). There are two types model in ADF test which are constant without trend model and constant with trend model.

Hypothesis:

H_0 : There is a unit root (Non-stationaty)

H_1 : There is no unit root (Stationary)

3.5.1.2 Phillips-Perron Test (PP)

The difference between Phillips-Perron (PP) and ADF tests which is how PP test conduct with serial correlation and heteroscedasticity in the errors term. Whereas, PP test is non-parametric test in unit root test when used time series data. In fact, the PP tests neglect all serial correlation in the test regression. Gujarati and Porter (2009) state that PP test does not need fixed an optimal lag length in the regression. However, general forms of heteroscedasticity in the error term is estimated by PP test.

Hypothesis:

H_0 : There is a unit root (Non-stationary)

H_1 : There is a no unit root (Stationary)

3.5.2 Cointegration Testing Approach (BOUND TEST)

Autoregressive distributed lag (ARDL) models which also known as “Bound Tests””, established by Pesaran and Shin (1995) to examine cointegration relation. In this study, we had decided to use ARDL model estimates the long term

relationship between the variables. The cointegration test can be test with different methods like Johansen test which is more suitable for large sample size, Dickey-Fuller test (DF) and Phillips-Perron (PP) which are unit root test for stationary. The bound test is favourable test used to identify the long run relationship between inflation and independent variables (gross domestic product, foreign direct investment, exchange rate and trade). The bound test which allow us to test the existence of the relationship between variables, regardless of whether the underlying regression are purely I(0), purely I(1) or mutually integrate is applicable. Since the sample size of this study is small, ARDL approach is suitable to examine the long-run relationship among the variables.

In the research, we are using two lags for annually data. In order to test the cointegrating relationship, the F-test is conducted and all lagged level variables are added at once to test their significance.

To examine the integration for whole model, the equation for the Unrestricted Error Correction Model (UECM) is interpreted as follow:

$$\begin{aligned} \Delta INF_t = & \alpha_0 + \alpha_1 INF_{t-1} + \alpha_2 GDP_{t-1} + \\ & \alpha_3 FDI_{t-1} + \alpha_4 EXC_{t-1} + \alpha_5 TR_{t-1} + \sum_{i=1}^n \alpha_{1i} \Delta INF_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta GDP_{t-i} + \\ & \sum_{i=0}^n \alpha_{3i} \Delta FDI_{t-i} + \sum_{i=0}^n \alpha_{4i} \Delta EXC_{t-i} + \sum_{i=0}^n \alpha_{5i} \Delta TR_{t-i} + u_t \end{aligned}$$

The null and alternative hypotheses are set as below:

Hypothesis:

H0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ (there is no long run relationship)

H1: At least one $\alpha_t \neq 0$, where $t = 1, 2, 3, 4, 5$ (there is long run relationship)

According to Pesaran (1997) and Pesaran et al. (2001), the critical values bounds are provided for all categories of the variables into purely I (0), purely I(1), or a mixture of both. We should reject null hypothesis when the computed F-statistic falls above upper bound critical value and which has cointegration relationship. We should conclude that there is a long run relationship between variables.

However, we should not reject null hypothesis if computed F-statistic falls below lower bound critical value, which means it is not cointegrated, thus we conclude that there is no long run relationship between variables. For the case where the F-statistic falls between lower and upper bound critical value, the test is inconclusive, which means we do not reject both H_0 and H_1 .

Next, we applied Akaike Information Criteria (AIC) for determine the optimal lag-length in the model and select the ARDL model to be estimated. The maximum lag length is two based on annually data used in this study.

3.5.3 Diagnostic Checking

We have using some test to check whether econometric problem such as heteroscedasticity, autocorrelation and specification errors occur or not. If the models consist of these kinds of problems, the results would show biased, inconsistent and inaccurate and diagnostic checking to ensure the model is not affected by these problems.

3.5.3.1 Heteroscedasticity

Disturbance should have a constant variance independent is one of the assumptions of CLRM. Have an equal variance means that the disturbance is homoscedasticity. Figuratively, $E(\mu_i^2) = \sigma^2$ where $i = 1, 2, \dots, n$. There is heteroscedasticity variance of the error terms is depends on different observations, which violates CLRM assumptions. The null hypothesis and alternative hypothesis are:

Hypothesis:

H_0 : There are no heteroscedasticity problems.

H_1 : There are heteroscedasticity problems.

We can know whether the heteroscedasticity problems exists or not from p-value. Decision rule of the test is to reject H_0 if p-value is less than 1% significance level, otherwise do not reject H_0 . We expected do not reject null hypothesis so that we can conclude that there are no heteroscedasticity problems in this model.

3.5.3.2 Model Specification

The purpose of this test is to explain the regression model that we used is correctly specified or not. If the model is not correctly specified, we come across the problem of the model specification bias or model specification error. There are some specification errors which include: (1) including irrelevant variable, (2) adoption of wrong functional form, (3) omitting a relevant variable adoption of wrong functional form, and (4) error of measurement. If any types of error stated occurred, this will violates CLRM consumptions. We used Ramey Regression of Specification Error Test (RESET Test) to check whether this model is correctly specified or not. The null hypothesis and alternative hypothesis are:

Hypothesis:

H_0 : Model specification is correct.

H_1 : Model specification is incorrect.

We used p-value to test whether this model is correctly specified or not. Decision rule of this test is rejecting H_0 when p-value is less than 1% significant level, otherwise do not reject H_0 . In this test, we expected do not reject H_0 to conclude that the model we used was correctly specified.

3.5.3.3 Jarque- Bera Test for Testing Normality

Jarque- Bera test (JB) can be used to test the goodness of fits which is to detect whether the sample data have achieved the normal distribution (Gujarati & Porter, 2009). Normality test is an ordinary method when determining the statistical

procedures in linear regression model (Thadewald&Buning, 2004). Basically, normality distribution can be tested by two approaches; there are Jarque-Bera formulation and based on p value of computed JB statistics. The hypothesis for normality will be developed as follow:

Hypothesis:

H₀: Error terms are normally distributed.

H₁: Error terms are not normally distributed.

Decision rule of this test is to reject null hypothesis if probability value is less than significance level, otherwise, do not reject null hypothesis.

First approach which is the usual formulation of JB test based on the skewness and kurtosis to measure the OLS residual. The formula as shown below:

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

N represents as sample size, S represents skewness of the observations, and K represents kurtosis of the observation.

Moreover, second approach is based on p-value of the computed JB Statistics. By referring to p-value of computed JB statistics, if the p-value of JB test is more than 5% significant level, null hypothesis of JB should not be rejected. Therefore, there is insufficient evidence to reject null hypothesis which indicates that the error term is normally distributed.

3.5.3.4 Serial Correlation (ARDL Breusch -Godfrey Serial Correlation LM Test)

According to Gujarati (2008), the autocorrelation term can defined as the correlation between members of series of observations ordered in time series data. The serial correlation occurs when the error terms are interrelated. Serial

Correlation LM Test is used to detect the higher order of autocorrelation problem. The Breusch-Godfrey Serial Correlation LM Test would be displayed by using E-View 9.

The null hypothesis and alternative hypothesis are:

H_0 : There are no autocorrelation problems.

H_1 : There are autocorrelation problems.

We use the LM test with p-value to test whether autocorrelation problems exist or not. Based on the test, decision rule is to reject H_0 when p-value less than significance level, otherwise do not reject H_0 . We expected to reject null hypothesis and to conclude that there is no autocorrelation problems in this model.

3.5.3.5 Stability Test (CUSUM AND CUSUM SQUIRE ROOT)

In this study, Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMQ) is used to check stability of estimated coefficients.

The null hypothesis and alternative hypothesis are:

H_0 : The coefficients in the regression are stable.

H_1 : The coefficients in the regression are unstable.

Decision rule:

If the plot of CUSUM and CUSUMQ statics falls beyond the critical bounds of 5% significance level, reject null hypothesis, and otherwise do not reject H_0 . In this test, we expected do not reject null hypothesis to conclude that the coefficients in this regression are stable.

3.6 Conclusion

In conclusion, the sources of secondary data and their collection methods had being discussed clearly in the chapter above. Besides, this chapter also clearly explained the proxy that were used in our research. The research methodologies that were applied also been explained clearly and detailed. All of the tests applied will then be conducted through Eviews 9, and the empirical results and output for each methodology will then be shown in the following chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter target to analyse and interpret the empirical result acquired from the previous chapter of methodology. Section 4.1 explained Unit Root Test using Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test. Section 4.2 will then proceed to the Auto Regression Distributed Lag bound test to examine the long run relationship between the dependent variable and independent variables. The result is shown in Table 4.2, which explain the cointegration relationship between variables. After we identified that there is a long run relationship in our model, we then proceed to Section 4.3 to check for specification error. Table 4.3 consists of diagnostic Tests for the Underlying ARDL Models such as serial correlation, stability and heteroscedasticity error. Next, Section 4.4 will then presents Jarque-Bera Test to test for the normality of our model. We will then proceed to Section 4.5 for stability testing using Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) test. Last but not least, Section 4.6 to 4.8 will discuss on the long run coefficient of the model.

4.1 Unit Root Tests

Table 4.1: Unit Root Test

Table 1 Unit Root Tests		
	Augmented Dickey Fuller (ADF)	Phillips Perron (PP)
	Level	

Variable	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend
LINF	-1.103700 (0.7006)	-1.035920 (0.9228)	-1.009112 (0.7365)	-1.298044 (0.8683)
LGDP	--1.634112 (0.4530)	-1.998862 (0.5776)	-1.631424 (0.4543)	-1.998862 (0.5776)
LFDI	-4.516183*** (0.0012)	4.531493*** (0.0060)	-4.470333*** (0.0014)	-4.494621*** (0.0065)
LEXC	-2.263490 (0.1899)	-2.562037 (0.2987)	-2.374681 (0.1573)	-2.547781 (0.3048)
LTR	-2.002977 (0.2839)	-1.226596 (0.8858)	-2.080113 (0.2536)	-1.572539 (0.7791)
First Difference				
LINF	-4.735614*** (0.0007)	5.124261*** (0.0015)	-4.777082*** (0.0007)	-5.144801*** (0.0015)
LGDP	-4.720106*** (0.0008)	4.971655*** (0.0022)	-6.635698*** (0.0000)	-6.482802*** (0.0001)
LFDI	-6.022221*** (0.0000)	5.927221*** (0.0002)	-12.84949*** (0.0000)	-13.00090*** (0.0000)
LEXC	-4.459872*** (0.0015)	4.399556*** (0.0084)	-4.811383*** (0.0006)	-5.436658*** (0.0007)
LTR	-3.122850** (0.0363)	4.912665*** (0.0029)	-3.230944** (0.0286)	-6.098900*** (0.0001)
Note: *** and ** denotes significant at 1%, and 5% significance level, respectively. The optimum lag length selected based on Schwarz Info Criterion and Bandwidth used in the PP test based on Newey-West Bandwidth Criterion.				

Hypothesis:

H_0 : There is a unit root (Non-stationary)

H_1 : There is no unit root (Stationary)

Decision rule: Reject null hypothesis if P-value is less than the significant level, otherwise, do not reject null hypothesis.

The table above shows that inflation (LINF), gross domestic product (LGDP), exchange rate (LEXC), and trade (LTR) in both of ADF test and PP test are insignificant and fail to reject the null hypothesis at 1%, 5%, and 10% of significant level. This is because these significant level is less than the P-value of these four variable and these four variable are not stationary and consist a unit root at level form. In contrast, the foreign direct investment (LFDI) is significant to reject the null hypothesis when the P-value is less than the 1%, 5% and 10% of significant level. Hence, LFDI is stationary and do not have unit root at level form.

Since the most of the variable are insignificant and fail to reject null hypothesis at level form, so we have to proceed to first difference form in both ADF and PP test. The result shows that P-value of all variable are less than the 1%, 5%, and 10% of significant level and reject the null hypothesis at first difference form. Therefore, it can concluded that all variable are stationary and do not consist of unit root at first difference.

4.2 Bounding Testing

Based on our sample size (30observations) as our annual data for research, from 1986-2015, we decide using ARDL approach to estimate the long-run coefficients and ARDL bound test. The bound test is favourable test to examination the long-run coefficients is significant or not .Since the data we collected is the annual data, the lag lengths used in our study is two. According to Pesaran, Shin and Smith (2001), bound test which allow us to test the existence of a relationship between variables in levels which is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or mutually integrated. Reject null hypothesis when computed F-statistic falls above upper bound critical value and

which indicate that there is a long run relationship between the variables. Based on the result of bounds testing in shown in Table 4.2, there is cointegration in lag 2, means that there is long run relationship between the variables in this study.

Table 4.2: Bounds F-tests for Cointegration Relationship

Test statistic	Value (Lag 2)
F-statistics	18.98362***

Table 4.2.1: Critical Bounds of F-statistics

<i>k</i>	1% level		5% level		10% level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4	3.29	4.37	2.56	3.49	2.2	3.09

Note: Critical value taken from Pesaran et al. (1999), table C1.iii: Case III with unrestricted intercept and no trend. Asterisks (***) indicate reject the null hypothesis at 0.01, 0.05 and 0.10 critical value.

4.3 ARDLs Selection

Recently, Autoregressive Distributed Lag (ARDL) test was found in our result. An ARDL include lags of the dependent and independent variables and it was also a least squares regression (RAIZADA & DHILLON, 2016). According to De Vita & Abbott (2004), ARDLs method was applicable and can be used to examine the presence of long run relationship between the variables. This was a good

procedure to use for stationary variables as well as for a mixture of variable which was 0 and 1. We can assume that there was a long run relationship and to investigate specification error in this model. In addition, we would reject null hypothesis which was H_0 if p-value was less than 5% level of significance while we did not reject H_0 if p-value was more than 5% level of significance. According to result shown in Table 4.3, it was clear that there was no autocorrelation problem and no heteroscedasticity problem because three p-values in test statistics are larger than 0.05.

Moreover, we have conducted Ramsey's RESET test by setting no specification error in H_0 and specification error exist in H_1 in order to check the stability in this model. Since the decision rule is same as the autocorrelation test and concluded the model is stable due to p-value (0.4564) is higher than $\alpha=0.05$, we expected do not reject H_0 in Ramsey's RESET test to conclude that the model we used was correctly specified. The Ramsey Reset test was one of the methods to test whether there was keep some significant non-linear relationships when you had set up a linear regression model. In other words, this was a test to investigate whether non-linear combinations of fitted values explain the dependent variable at 5% significant level. Furthermore, some disadvantages occurred when using RESET test. Reset test was a common test for model misspecification, including heteroscedasticity and omitted variables that cannot observe. Next, Reset test has no power for detecting heteroscedasticity if having a correct functional form. It should not be used for other purposes since it just a functional form test.

Table 4.3: Diagnostic Tests for the Underlying ARDL Models

Test Statistics	Lagrange multiplier statistics
A: Serial correlation	2.523567 (0.1067)
B: Ramsey's RESET	0.759515 (0.4564)
C: Heteroscedasticity	0.872233 (0.3589)

Notes: The dependent variable is inflation whereas the independent variable are gross domestic product (GDP), foreign direct investment (FDI), exchange rate (EXC) and trade (TR)

Where:

A: Lagrange multiplier test of residual serial correlation;

B: Ramsey's RESET test using square of fitted values;

C: Based on the regression of squared residuals on squared fitted values. Figures inside the bracket are p-values.

4.4 Normality Test (JB)

Table 4.4: Jarque-Bera (JB) Test

Normality Residuals (Errors) Test	
Jarque-Bera Test Statistic = 1.496730	Probability = 0.473139

According to Gujarati and Porter (2009), the normality of error term is determined by using Jarque-Bera test. From the table above showing that the p-value of the Jarque-Bera Test is 0.473139 and which is higher than 0.05(significance level). Thus, there are insufficient evidence to conclude that the error terms are not normally distributed at 5% significance level. As result, we can conclude that the model meets the normality assumption of error term at 5% significance level.

4.5 Stability Test

Stability test is to assess the stability of the coefficients across the specific time period by using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares

(CUSUMSQ) test. According to the result, we do not reject null hypothesis, thus, the coefficients in the regression are stable. In accordance to the plot of CUSUM and CUSUMSQ below, the coefficients are within the critical bounds of 5% significance level. There are no structural changes in the model. Figure 4.1 and Figure 4.2 show the plots of CUSUM and CUSUMQ.

Figure 4.5.1: CUSUM Plots for Estimated Coefficient

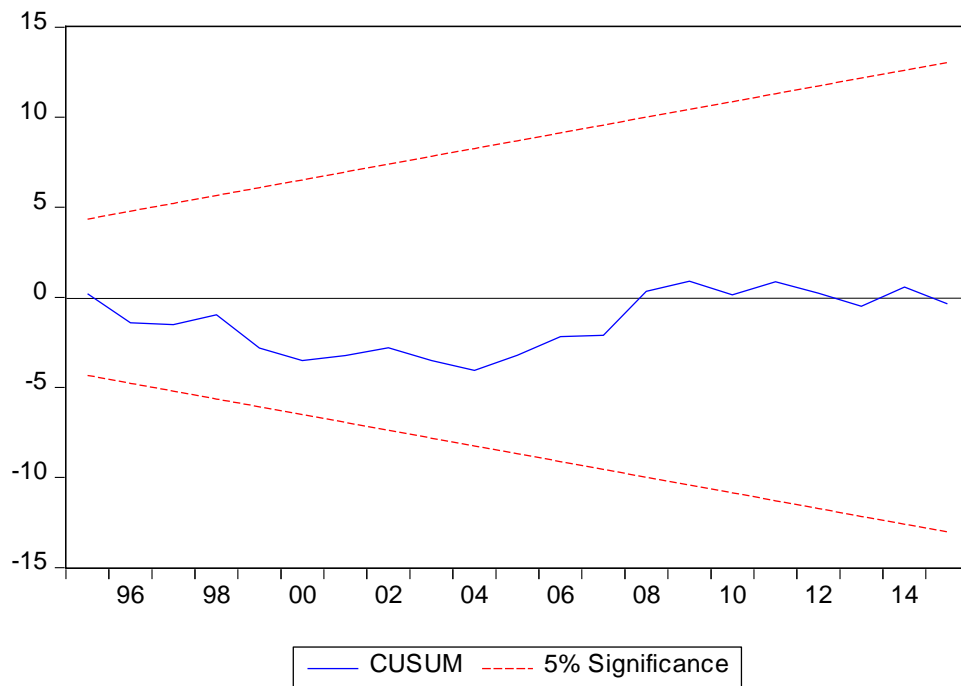
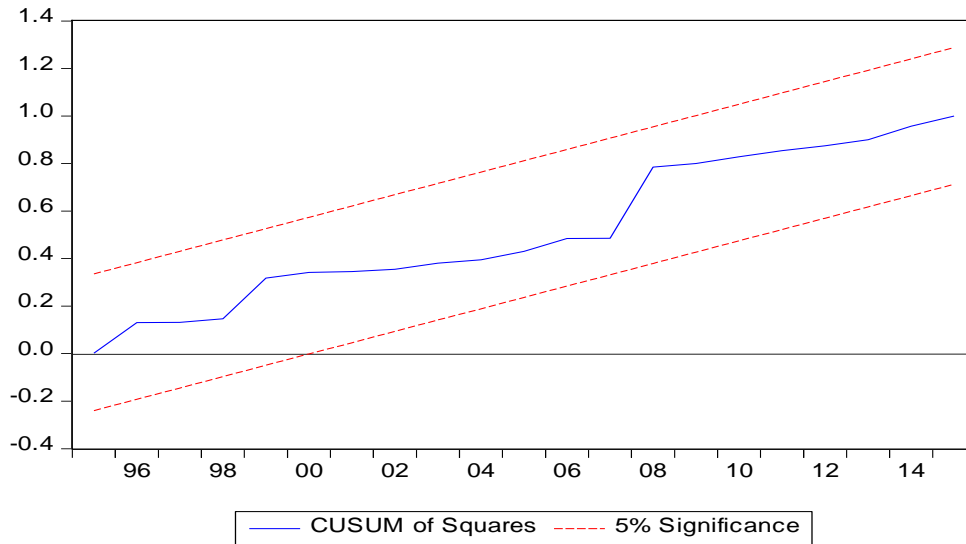


Figure 4.5.2 CUSUMQ Plots for Estimated Coefficient



4.6 Long Run Coefficient

Table 4.5 shows the estimated long run coefficients for these variables.

Table 4.6: Estimated Long Run Coefficients.

Independent Variables	ARDL(1, 1, 0, 1, 0)
LGDP	0.6061 (0.0000) ***
LFDI	0.0283 (0.0123) **
LEXC	-0.3437 (0.0005) ***
LTR	-0.1319 (0.0004) ***
C	0.7723

Note: *, ** and *** indicate variables are significant at 10, 5 and 1 per cent significance level

4.6.1 Sign of Coefficients

Based on the table above, the estimated coefficients demonstrated the result for Malaysia. Gross domestic product (GDP) and foreign direct investment (FDI) displayed a positive sign, while exchange rate (EXC) and trade (TR) displayed a negative sign towards inflation.

4.6.2 Significance of Coefficients

The coefficient of gross domestic product (GDP), exchange rate (EXC) and trade (TR) is significant at 1% level of significance, while foreign direct investment (FDI) is shown to be significant at 5% level of significance. It means that when gross domestic product (GDP) and foreign direct investment (FDI) increase by 1%, inflation (INF) will increase by 0.606066% and 0.028322% on average, holding other variables constant. When exchange rate (EXC) and trade (TR) increase by 1%, inflation (INF) will then decrease by 0.343669% and 0.131932% on average, holding other variables constant.

4.7 Cointegrated Regression

Table 4.7: Cointegrated Regression and Short-Run Coefficient.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP)	-0.155802	0.047179	-3.302382	0.0034***
D(LFDI)	0.007985	0.001242	6.430315	0.0000***
D(LEXC)	0.005420	0.032706	0.165724	0.8700
D(LTR)	-0.028632	0.024790	-1.155000	0.2611
CointEq(-1)	-0.297696	0.020013	-14.874845	0.0000***

Note: ***, ** and * indicate to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively.

The table above show the short run coefficient of $\text{CoinEq}(-1)$. The coefficient of $\text{CoinEq}(-1)$ is less than negative one and statistically significant at 1%. The ECT has coefficient of -0.2977 , indicating that adjustment rate is moderate to the long run equilibrium path. From the result, short run adjustment would be 29.77% per year to achieve long run relationship.

4.8 Conclusion

In this chapter, Unit Root Tests, ARDL Bound test, Diagnostic Tests for the Underlying ARDL Models, Normality test, Stability Test and Long run coefficient were shown. Gross domestic product (GDP) and foreign direct investment (FDI) displayed a positive sign, while exchange rate (EXC) and trade (TR) displayed a negative sign towards inflation. All of the results and findings had been simplified using figures, diagrams and tables in order to provide a clearer view for future researcher. We will then proceed to the next chapter to elaborate further on the major findings, limitation and recommendation of our paper.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATION

5.0 Introduction

In chapter 5, we will conclude the empirical result from previous chapter which is chapter 4 and the detail will be explained accordingly. Besides, we will discuss the policy implication of this study that provides the practical significance of decision to policy maker. Next, the limitation that occurred in this study will be thoroughly discussed. Lastly, we also will provide some recommendations for future researchers in Chapter 5.

5.1 Summary of Statistical Analyses

From results of the previous chapter that we obtain, the objective are achieved and try to solve the research question of this study. Next, we start our empirical test with the unit root tests – ADF and PP because the most of the macroeconomic variables are non-stationary and in order to prevent from spurious regressions. Both ADF and PP tests are employed to test for the stationarity of each variable and the results show that out of the four variables which are GDP, INF, EXG and TR are stationary at first difference. However, the ADF and PP test results shown that FDI is significant and stationarity at level form in unit root test.

In our research, we decide to continue use the ARDL bound testing approach after the result from the unit root tests had confirmed. Therefore, we would be proceeded to conduct the bounds test and found the long-run relationships between inflation with the macroeconomic variables which include GDP, FDI, EXC and TR. While continued to checking the sign and the significance of variable coefficient.

In our ARDL model, we find that the GDP and FDI have significantly positive relationship with the inflation in long-run, however the EXC and TR are negatively related to inflation in long-run in this research.

5.2 Discussions of Major Findings

5.2.1 Gross Domestic Product

Based on the empirical result of our study, gross domestic product (GDP) is found to be positively related to inflation at 1% of significance level. Therefore, the findings in this paper is consistent with the expected signs as stated in the previous chapters.

The findings of this paper is consistent with the studies of Mallik and Chowdhury (2001) that detect the existence of a long run and positive relationship between GDP growth rate and inflation in India, Bangladesh, Sri Lanka and Pakistan. It is known that moderate inflation promotes growth, but accelerated economic growth will eventually feed back into inflation. In addition, the finding of our paper also matches the studies of Hussain (2011), which suggested that inflation is positively related to economic growth in the country of Pakistan. Moreover, our study also matches with the findings on the presence of a significant relationship between inflation and economic growth in the long-run.

The findings in our results shows that GDP is negatively related to inflation in short run, but is positive related to inflation in long run. This phenomena is explained in the study of Hussain (2011), where the researcher stated that an attempt to speed up economic growth in long run may overheat the economy to the extent that the inflation rate becomes unstable. The study also further explained that inflation-growth relationship is positive in long run. Therefore, government faces a real challenge to strive for a growth rate that is consistent with

a stable inflation rate, rather than trying to defeat inflation by speed up the economic growth.

This phenomena also can be explained using the The AD/AS framework. In the long run, aggregate demand continues to shift to the right even though economy is already at or near potential GDP and also full employment. The increase in economic growth at this moment will only result in the increase of price level, as the economy are not capable to produce additional goods anymore due to the full employment of physical and labor capital.

5.2.2 Foreign Direct Investment

We can conclude that in this research, Foreign Direct Investment is an important determinant of inflation in Malaysia. According to Srinivasan (2011) and Addison and Heshmati (2003), inflation and FDI are positively related based on the result. Furthermore, a higher price level was due to higher inflation rate which may lead to the rising production activities of the host country (Addison and Heshmati, 2003). Then, a higher expected level of profitability would attracted many foreign companies to invest in the host country. In addition, as stated by Srinivasan (2011), increase in product price caused by a higher inflation, which then falling the demand for host country's money. As the investment capacity of the host country increase as a result of the decline in capital cost, the host country would attract more foreign direct investment into Malaysia because of the devaluation of the currency.

Moreover, some of the results that done by past researches was inconsistent. According to Shamsuddin (1994), Asiedu (2002), Demirhan and Masca (2008), and Azam (2010), there was a negative relationship between inflation and FDI while the researchers also found that inflation rate to be statistically significant to the FDI inflows. There was a sign of internal economic stability that taken in the host country which showed that lower inflation with higher FDI and vice versa

meanwhile reflecting a lesser degree of exposure which encourage foreign direct investment (Asiedu, 2002).

5.2.3 Exchange Rate

According to test result, the exchange rate is significant at 5% of significance level. Moreover, in the long-run relationship, exchange rate is negatively affecting inflation in Malaysia. The result of the test in this study is consistent with the expected sign as stated previous.

Besides, the researchers found that the exchange rate and inflation have strong negative relationship in the Asian countries (Achsani, Fauzi& Abdullah, 2010). As the exchange rate is depreciating, inflation rate tends to increased and exist in long-run relationship. Furthermore, Onyekachi and Onyebuchi (2016) also have found that the exchange rate and inflation is negatively correlated in Nigeria.

The exchange rate of Malaysia has negative relationship to inflation because the depreciation on exchange rate would be lead to higher price of inputs, higher cost of production and leading to raising the cost of goods. As result, the country's price level aggregate would increases and it would also lead to inflation. The floatation of exchange rate will directly influences the international firm, businesses or investor, hence influence the output and input price.

5.2.4 Trade

According to Mukhtar (2010), Romer (1993), Sikdar, Kundu and Khan (2013), Terra (1998) and Lin, Mei, Wang, and Yao (2017) showed that the trade has negative long run relationship on inflation. The researchers stated that increase the trade will fostering domestic productivity growth with import cheaper input and product that will decline the price level. In fact, boosting the productivity growth encouraged firms to pay higher wages without transform the cost to their

consumer. Therefore, this situation will keep the low inflation in economy. Furthermore, Malaysia is expected the trade has a negative relationship toward the inflation in long-run relationship. This is due to expand the production of companies can lead to lower manufactured goods price thus increase export.

However, the researchers Munir and Kiani (2010), Tasci, Esener, and Darid (2009), Zakaria (2010), and Kurihara (2013) argue that the relationship between inflation and trade is positive. The researchers stated the increase of trade in a country will lead to a higher level equilibrium of inflation rate which is retorted the Romer's hypothesis. These researchers also mentioned that increase in economic activities and the supply side factor in slow economy reaction can lead to raise the price level thus increase the trade. Furthermore, the raise of trade which causes financial expansions by monetary authority can lead to the real exchange rate becomes depreciate thus decrease the attractiveness to imply monetary expansion when inflation increase.

5.3 Implications of the Study

The country's inflation rate is one of the major economy issue for a country development that caught the attention of foreign investors to make their investment decision in our country. Besides, Malaysia's consumer were also concern about the inflation rate in our country as it affects their daily activities. Hence, it is important for us to understand which macroeconomic variables will bring the most effect on inflation rate in Malaysia.

Mallik and Chowdhury (2001) described the economy as it is on a knife-edge. Therefore, seeking to attain an accelerated economic growth may causes economy to overheat, and then inducing the inflation rate to become volatile. Hence, Malaysia's government faces a real challenge to strive for an economy growth rate that is stable and consistent with the growth rate of inflation, rather than beating

inflation first to strike for a faster growth. This is because an accelerated growth rate will also speed up the inflation rate, causing the economy to decline.

The adjustment between growth and inflation can be avoided in Malaysia, if the economy manage to increase its potential output by enhancing the performance of the country's supply side. By achieving continuous improvements in productivity, leading in technology and also product innovations, the long run aggregate supply (LRAS) will be improved. Besides, potential output and productivity can also be improved by developing the stock of capital goods through higher investments, and also by increasing the availability of labour supply.

After reviewed this research, it shows that Malaysia government should play significant role reacting in any events of changing FDI with employing alternative policies to attract more and more foreign investors to do foreign investment in the country. It is relevance for the government implements it because this might advantage country stimulating or controlling the economic growth through the policies of upgrading industrial and transferring technology.

In addition, set up well-organized environment is required for Malaysia to attract large number of foreign investors for involving more investment in the country. For example, policy makers should strengthen the development of financial or human capital systematically and also other supportive measures that influence FDI such as reduction for income tax, constraints that imposed in country. Improving a stability management on political environment should be focused for Malaysia governments as this could presents the country is secured without political chaos. Therefore, this may influence inflation on economic growth increase because a stable country may become attractive and aimed for the foreign to do investment business.

In this study, the investors are recommended to refer the exchange rate before making the decision. Investor need to better understanding the fluctuation of exchange rate in Malaysia economy although the investor can't control the exchange rate. In the Chapter 4 have reported, the exchange rate is significantly

have negative relationship with the inflation in Malaysia. When the exchange rate rises, the inflation rate decrease, and vice versa.

According to Madesha, Chidoko and Zivanomoyo (2013), the government should try to cushion the impact of inflation on the economy, even if the inflation and exchange rate have long term relationship but exchange rate will not lead to short-term inflationary pressure.

Besides, the government of Malaysia are necessary to develop the high transparency in monetary policy to curb the inflation.

Furthermore, if countries try to enhance trade to promote economic growth, they need to implement some specific trade policies and optimum strategy that can developing the trade. In this paper, policymakers and government are advised to implement supply side policies that can help to reduce cost push inflation, and lower price level that proved by researchers Tasci, Esener, and Darici. In fact, increase in productive and competitive of companies that can help to improve trade and promote investment to lower the unemployment rate. Besides, government should be reduces the duties fee and tariffs to enhance the companies to increase to trade their goods and service that can boost the economy growth (Bibi, Ahmad & Rashid, (2014).

5.4 Limitation of Study

In this study, several limitations have to be noted and focused. First of all, there is possible of the methodology limitation which is the problem for the size of a sample in time series data was limited. In our research, annually data can be replaced by quarterly or even monthly data in order to obtain a larger number of observations. At the beginning, we were using Johansen & Juselius Cointegration Test to run the e-view which only having 30 sample size. Unfortunately, we cannot run these this test successfully due to less sample size and it may be able to influence the accurateness of the result and cause this research to become invalid. Jacobson (1992) proved that if sample size less than 50, it considered less sample

size while more than 50 or even more sample size was considered large enough to run JJ test. We wonder the presence of more than one cointegrating relationship when using Johansen test on various data sets (Ssekuma, 2011). According to Skerman & Della Maggiora (2009), one of the limitations that cannot run Johansen test due to the small sample size was that the critical values are sensitive to small changes in time series features and the probability of generating outliers and also the variance were higher. However, we decided to use another method which was ARDLs Selection. One of the limitation that found in ARDLs was it did not provided strong results in the existence of variables that are integrated of variable I(2). Such variable cannot be used in ARDL model if any variable was I(2). Thus, it limits the use of only variables that are I(0) or I(1) or combination of them. When we test ARDLs selection, choose a suitable lag length was necessary because the calculation of F-statistic was sensitive to the lag order (Adamu & Darma, 2016). On the other hand, such variables that are integrated with the combination of I(0) and I(1), I(0) or I(1) are most preferable when using ARDL cointegration technique. Moreover, this technique provides strong results when there is a long run relationship between the variables in a small sample size (Nkoro & Uko, 2016).

Secondly, insufficient theory of all variables was one of the limitations in this study. In general, it was not enough for us to search or found some useful information or journal to prove in our study. Hence, a sufficient review of relevant theoretical models was unable to carry out by these studies to support the selected variables. For instant, some of the journals showed FDI as a dependent variable but we used FDI as one of the independent variable. Moreover, due to the limited knowledge of econometrics tests, this study was not able to examine and conduct more tests to test the relationship between the explanatory variable and response variables.

In addition, there should have more clear study and researches which related to inflation. This is due to it might improve industry's awareness towards the inflation in the economy. Besides, it also can create a visual multimedia such as a video that could attract attentions and show people on dangerous of inflation in an effective way. Video is considered as a predominant method which might increase

the understanding and awareness level on inflation more quickly and efficient as the evolution of information technology has been advancing day by day.

Last but not least, this study encountered problem that the limited data can be obtained from World Bank Data. We were only using time series data from year 1986 to year 2015 as a sample size. Besides, this study used the annually data as the sampling method and provides 30 observations have been introduced for each variable. It has limited the scope of study period and the legality of this study.

5.5 Recommendations for Future Research

First of all, size of a sample, or time period in time series data is very important for future researchers to take into account for. This is because the longer the time period involved in a research, the more accurate the result can be obtained. Future researchers are advised to take a larger sample size to conduct their study. Annually data that were used in this paper can be replaced by quarterly or even monthly data in order to obtain a larger number of observations. It will further improve the significance of study. This is because larger sample size will reduce the margin of error. Besides, a larger sample size is proven effective to reduce the problem of multicollinearity in a model. According to Kiula (2014), as sample size increase, standard error will decrease, hence it will offset the problem of high multicollinearity which causes high standard error of the coefficients. However, the additional observations must be proven to be accurate and reliable to ensure the significance of study, and researchers have to concern on the availability of data.

Nonetheless, it is not necessary that the higher number of observations will improve the model when conducting the test for the stationarity of economic time series. According to the research conducted by Giles (2014), when conducting the Augmented Dickey-Fuller test, it does not matter whether we select 20 annual observations, or 80 quarterly observations for the series. It is because temporary aggregation or selective sampling have no consequences in terms of size distortion

for Augmented Dickey-Fuller or Phillips-Perron test. In conclusion, the results in Giles (2014) shows that a unit root is presence in all of the time-series data, whether it is in quarterly, monthly or annually form.

Besides, future researchers are advised to conduct a similar research, but with the addition of comparison between multiple countries. This is because each country has their own economic, cultural and political conditions. Therefore, a country's policies will not be adaptable with other countries. By comparing with multiple countries, the research results will further be improved and become more appropriate and creditable to be used as a reference for other countries. By identifying the key macroeconomics factor that affects the inflation rate, it will definitely provide assistance to policy maker to enhance their policy development process.

On the other hand, it is also recommended for future researchers to include more variables that is relevant to the study to enhance their model in future research. This is because including more relevant variables in a research will provide more necessary information to policy makers or investors. This will further enhance the significance of study.

Last but not least, future researchers should take into consideration of the relationship between inflation and inflation uncertainty in their studies. Karahan (2012) stated that inflation uncertainty serve as one of the primary cost of inflation for real economy, as it affects decision making of economic agent. Furthermore, inflation uncertainty may causes inflation to be negatively affects macroeconomic variables such as consumption, investment and growth.

5.6 Conclusion

In this context, we found that inflation is a major economy issue for most countries that can badly influence economic growth in Malaysia. In fact, inflation is keeping weakness our purchasing power and domestic currencies. Main

objective of macroeconomic policies is to maintain high and stable economic condition, balance the macroeconomic situation with low inflation. Therefore, it is important for us to know the effect of macroeconomic variables toward inflation in Malaysia by determinants of Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Exchange Rate (EXC), and Trade (TR).

The literature review and theoretical framework of past research paper and journal had been discussed in previous chapter. Besides, we used annual time series data from year 1986 until year 2015 in Malaysia to test the data analysis with using Eview 9. Based on ours results, we found that EXC and TR have negative long run relationship towards the inflation in Malaysia. In contrast, GDP and FDI have positive long run relationship towards the inflation in Malaysia. Furthermore, the expected empirical findings shows that these four macroeconomic is same expected sign with our results in this research.

Lastly, major findings, implication of policy, and limitation have been discussed in the last chapter in this paper. The results derived from this study is very important for policymakers based on the current scenario of the Malaysia economy. Hence, policymaker, government, and future researchers had advised to implement some specific policies and strategy to keep low inflation and maintaining sustainable economic growth. The challenges for the future is to find out effective ways to overcome the inflationary problem.

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APPENDICES

Appendix 1: Data of variables

Year	Inflation, consumer prices index (2010=100)	Gross Domestic Product per capital (2010=100)	Real Foreign Direct Investment (2010=100)	Real Exchange Rate (2010=100)	Trade (% of GDP)
1986	52.31766665	3660.923687	1306211355	144.9973615	106.8778067
1987	52.46939202	3746.926512	1050891174	137.4204356	111.919592
1988	53.81078224	3999.904736	1726171706	124.6135385	122.6242272
1989	55.32458765	4237.81786	3830925495	122.3670959	136.6890623
1990	56.77287528	4491.771742	5160940457	117.2142314	146.8882525
1991	59.24722643	4789.368257	8541116134	113.9029537	159.3126263
1992	62.07167697	5080.531864	10811193327	121.5859275	150.6122205
1993	64.26689482	5442.662514	10040214640	122.3580354	157.9413797
1994	66.66081772	5795.418248	8378787574	118.4802845	179.9058631
1995	68.9609993	6205.545129	7780445711	118.6588016	192.1140638
1996	71.36674476	6654.331115	9121043439	123.0971292	181.7676989
1997	73.26689476	6962.402076	8914908242	118.905393	185.6647563
1998	77.12831069	6291.341746	3460663669	94.88367654	209.4914632
1999	79.24514446	6519.878249	6228167579	95.81572049	217.5694726
2000	80.46135158	6939.22574	5563458531	96.91985558	220.4073501
2001	81.60131572	6829.290853	826743022.6	101.6623008	203.364636
2002	83.07656344	7055.580194	4620696613	101.7927333	199.356492
2003	83.90136102	7323.699104	4509618058	96.14053639	194.1948903
2004	85.1754386	7677.682972	5783138723	91.96277528	210.3738221
2005	87.69736842	7941.573296	4764522616	91.86918108	203.8544606
2006	90.8625731	8236.021511	8978793827	95.0038432	202.5776539
2007	92.70467836	8854.843939	10394968545	96.97196766	192.4661076
2008	97.74853801	8991.760532	7747386668	97.55031497	176.6685921
2009	98.31871345	8617.7491	123507291	94.79257172	162.5590474

2010	100	9069.030717	10885614182	100	157.9450084
2011	103.2	9397.575954	14343049348	100.3618519	154.9377943
2012	104.9	9758.696096	8355543711	100.1046607	147.841804
2013	107.1	10062.9106	10591706425	100.6000557	142.7211316
2014	110.5	10512.13814	9717592123	99.87348965	138.3094465
2015	112.8	10878.38926	10069093313	91.9311316	134.1550762

Appendix 2: Augmented Dickey-Fuller unit root tests results
(without trend, level)

1. INF

Null Hypothesis: LINF has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.103700	0.7006
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

2. GDP

Null Hypothesis: LGDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.634112	0.4530
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

3. FDI

Null Hypothesis: LFDI has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.453044	0.5426
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

4. EXC

Null Hypothesis: LEXC has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.263490	0.1899
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

5. TR

Null Hypothesis: LTR has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.002977	0.2839
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

Appendix 3: Phillips-Perron unit root tests results (without trend, level)

1. INF

Null Hypothesis: LINF has a unit root

Exogenous: Constant

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

	Adj. t-Stat	Prob.*
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Phillips-Perron test statistic	-1.009112	0.7365
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

2. GDP

Null Hypothesis: LGDP has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.631424	0.4543
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

3. FDI

Null Hypothesis: LFDI has a unit root

Exogenous: Constant

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.304473	0.6138
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

4. EXC

Null Hypothesis: LEXC has a unit root

Exogenous: Constant

Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.374681	0.1573
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

5. TR

Null Hypothesis: LTR has a unit root

Exogenous: Constant

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.080113	0.2536
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

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

Appendix 4: Augmented Dickey-Fuller unit root tests results
(with trend, level)

1. INF

Null Hypothesis: LINF has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.035920	0.9228
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

2. GDP

Null Hypothesis: LGDP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.998862	0.5776
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

3. FDI

Null Hypothesis: LFDI has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.049018	0.1370
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

4. EXC

Null Hypothesis: LEXC has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.562037	0.2987
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

5. TR

Null Hypothesis: LTR has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.226596	0.8858
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

Appendix 5: Phillips-Perron unit root tests results
(with trend, level)

1. INF

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.298044	0.8683
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

2. GDP

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.998862	0.5776
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

3. FDI

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.081853	0.1292
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

4. EXC

Null Hypothesis: LEXC has a unit root

Exogenous: Constant, Linear Trend

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.547781	0.3048
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

5. TR

Null Hypothesis: LTR has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 16 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.572539	0.7791
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

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

Appendix 6: Augmented Dickey-Fuller unit root tests results (without trend, first difference)

1. INF

Null Hypothesis: D(LINF) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.735614	0.0007
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

2. GDP

Null Hypothesis: D(LGDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.720106	0.0008
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

3. FDI

Null Hypothesis: D(LFDI) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.604418	0.0000
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

4. EXC

Null Hypothesis: D(LEXC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.459872	0.0015
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

5. TR

Null Hypothesis: D(LTR) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.122850	0.0363
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

Appendix 7: Phillips-Perron unit root tests results (without trend, first difference)

1. INF

Null Hypothesis: D(LINF) has a unit root

Exogenous: Constant

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.777082	0.0007
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

2. GDP

Null Hypothesis: D(LGDP) has a unit root

Exogenous: Constant

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.699797	0.0008
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

3. FDI

Null Hypothesis: D(LFDI) has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.635698	0.0000
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

4. EXC

Null Hypothesis: D(LEXC) has a unit root

Exogenous: Constant

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.811383	0.0006
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

5. TR

Null Hypothesis: D(LTR) has a unit root

Exogenous: Constant

Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.230944	0.0286
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

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

Appendix 8: Augmented Dickey-Fuller unit root tests results
(with trend, first difference)

1. INF

Null Hypothesis: D(LINF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.124261	0.0015
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

2. GDP

Null Hypothesis: D(LGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.971655	0.0022
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

3. FDI

Null Hypothesis: D(LFDI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.482802	0.0001
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

4. EXC

Null Hypothesis: D(LEXC) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.399556	0.0084
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

4. TR

Null Hypothesis: D(LTR) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 2 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.912665	0.0029
Test critical values: 1% level	-4.356068	
5% level	-3.595026	
10% level	-3.233456	

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

Appendix 9: Phillips-Perron unit root tests results (with trend, first difference)

1. INF

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-5.144801	0.0015
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

2. GDP

Null Hypothesis: D(LGDP) has a unit root

Exogenous: Constant, Linear Trend

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-4.971655	0.0022
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

3. FDI

Null Hypothesis: D(LFDI) has a unit root

Exogenous: Constant, Linear Trend

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.482802	0.0001
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

4. EXC

Null Hypothesis: D(LEXC) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 21 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-5.436658	0.0007
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

5. TR

Null Hypothesis: D(LTR) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.098900	0.0001
Test critical values: 1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

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

Appendix 10: Bound test

ARDL Bounds Test

Date: 06/20/17 Time: 12:08

Sample: 1987 2015

Included observations: 29

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	18.98362	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Test Equation:

Dependent Variable: D(LINF)

Method: Least Squares

Date: 06/20/17 Time: 12:08

Sample: 1987 2015

Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP)	0.014863	0.063032	0.235807	0.8159
D(LEXC)	-0.006430	0.043888	-0.146512	0.8849

C	0.239333	0.279692	0.855704	0.4018
LGDP(-1)	0.268015	0.055475	4.831282	0.0001
LFDI(-1)	3.67E-05	0.002074	0.017697	0.9860
LEXC(-1)	-0.125228	0.043792	-2.859628	0.0094
LTR(-1)	-0.049342	0.017622	-2.800021	0.0107
LINF(-1)	-0.398984	0.079448	-5.021971	0.0001
R-squared	0.627793	Mean dependent var		0.026492
Adjusted R-squared	0.503723	S.D. dependent var		0.012618
S.E. of regression	0.008889	Akaike info criterion		-6.379035
Sum squared resid	0.001659	Schwarz criterion		-6.001850
Log likelihood	100.4960	Hannan-Quinn criter.		-6.260906
F-statistic	5.060022	Durbin-Watson stat		2.500921
Prob(F-statistic)	0.001743			

Appendix 11: Autoregressive Distributor Lag Model (ARDL)

Dependent Variable: LINF

Method: ARDL

Date: 06/19/17 Time: 21:40

Sample (adjusted): 1987 2015

Included observations: 29 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): LGDP LFDI LEXC LTR

Fixed regressors: C

Number of models evaluated: 162

Selected Model: ARDL(1, 1, 0, 1, 0)

Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LINF(-1)	0.703538	0.060457	11.63692	0.0000
LGDP	-0.154213	0.067190	-2.295187	0.0321
LGDP(-1)	0.333889	0.062232	5.365247	0.0000
LFDI	0.008397	0.001996	4.207071	0.0004
LEXC	-0.004206	0.035990	-0.116855	0.9081
LEXC(-1)	-0.097679	0.035401	-2.759250	0.0118
LTR	-0.039113	0.013146	-2.975211	0.0072
C	0.228953	0.223173	1.025897	0.3166
R-squared	0.999351	Mean dependent var		4.374152
Adjusted R-squared	0.999135	S.D. dependent var		0.231431
S.E. of regression	0.006807	Akaike info criterion		-6.912648
Sum squared resid	0.000973	Schwarz criterion		-6.535463
Log likelihood	108.2334	Hannan-Quinn criter.		-6.794518
F-statistic	4620.110	Durbin-Watson stat		2.364022
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 12: ARDL Breusch -Godfrey Serial Correlation LM Test
(Result for Serial Correlation)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.523567	Prob. F(2,19)	0.1067
Obs*R-squared	6.086667	Prob. Chi-Square(2)	0.0477

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 06/20/17 Time: 12:14

Sample: 1987 2015

Included observations: 29

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF(-1)	0.018441	0.057370	0.321432	0.7514
LGDP	0.026302	0.065293	0.402827	0.6916
LGDP(-1)	-0.029181	0.060304	-0.483893	0.6340
LFDI	-0.001525	0.002098	-0.726862	0.4762
LEXC	0.028354	0.035925	0.789271	0.4397
LEXC(-1)	0.002582	0.033267	0.077629	0.9389
LTR	0.005860	0.012624	0.464172	0.6478
C	-0.195935	0.227463	-0.861396	0.3998
RESID(-1)	-0.470041	0.261697	-1.796131	0.0884
RESID(-2)	-0.439316	0.240814	-1.824294	0.0839

R-squared	0.209885	Mean dependent var	-1.12E-15
Adjusted R-squared	-0.164380	S.D. dependent var	0.005895
S.E. of regression	0.006362	Akaike info criterion	-7.010294
Sum squared resid	0.000769	Schwarz criterion	-6.538813
Log likelihood	111.6493	Hannan-Quinn criter.	-6.862632
F-statistic	0.560793	Durbin-Watson stat	1.929393
Prob(F-statistic)	0.811951		

Appendix 13: ARDL ARCH test

Heteroskedasticity Test: ARCH

F-statistic	0.872233	Prob. F(1,26)	0.3589
Obs*R-squared	0.908839	Prob. Chi-Square(1)	0.3404

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

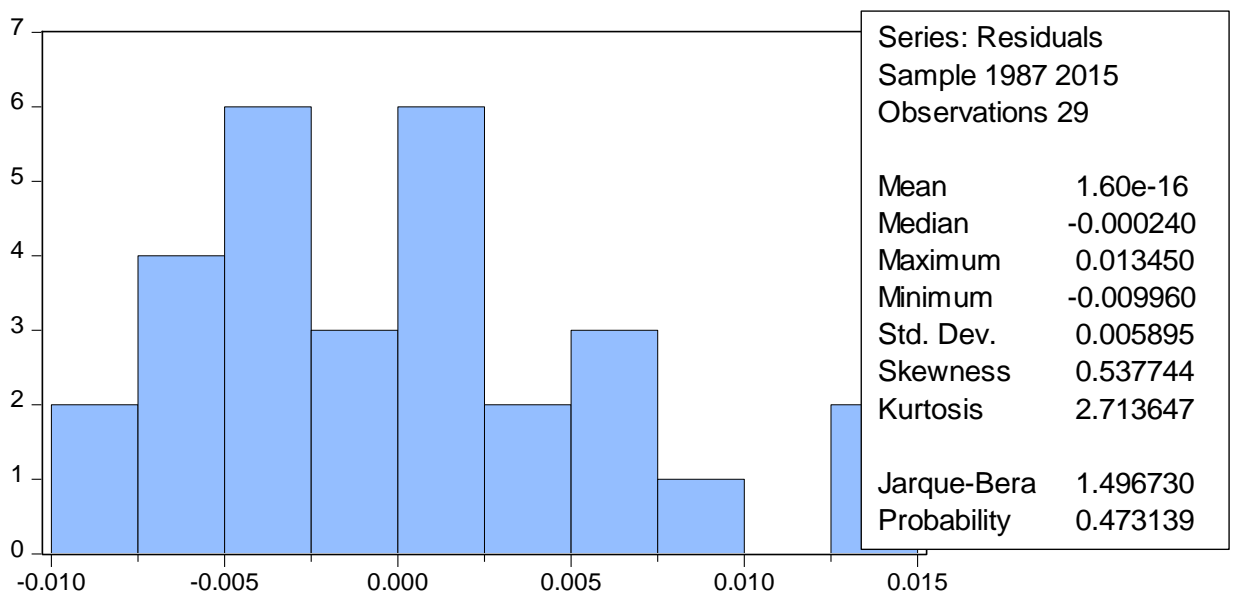
Date: 06/20/17 Time: 12:12

Sample (adjusted): 1988 2015

Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.93E-05	1.08E-05	3.633674	0.0012
RESID^2(-1)	-0.180055	0.192792	-0.933934	0.3589
R-squared	0.032459	Mean dependent var	3.32E-05	
Adjusted R-squared	-0.004755	S.D. dependent var	4.55E-05	
S.E. of regression	4.56E-05	Akaike info criterion	-17.08524	
Sum squared resid	5.40E-08	Schwarz criterion	-16.99008	
Log likelihood	241.1934	Hannan-Quinn criter.	-17.05615	
F-statistic	0.872233	Durbin-Watson stat	1.773726	
Prob(F-statistic)	0.358931			

Appendix 14: ARDL Normality Test (Jarque-Bera)



Appendix 15: ARDL Ramsey RESET Test
(model specification)

Ramsey RESET Test
Equation: UNTITLED
Specification: LINF LINF(-1) LGDP LGDP(-1) LFDI LEXC LEXC(-1) LTR C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.759515	20	0.4564
F-statistic	0.576863	(1, 20)	0.4564

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.73E-05	1	2.73E-05
Restricted SSR	0.000973	21	4.63E-05
Unrestricted SSR	0.000946	20	4.73E-05

Unrestricted Test Equation:

Dependent Variable: LINF

Method: ARDL

Date: 06/19/17 Time: 21:44

Sample: 1987 2015

Included observations: 29

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic):

Fixed regressors: C

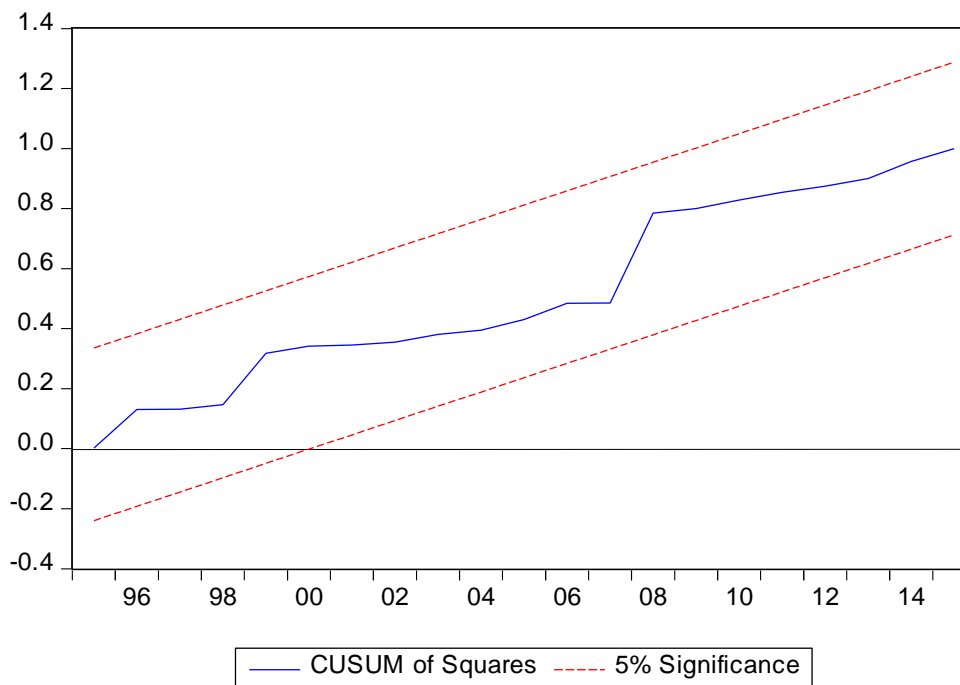
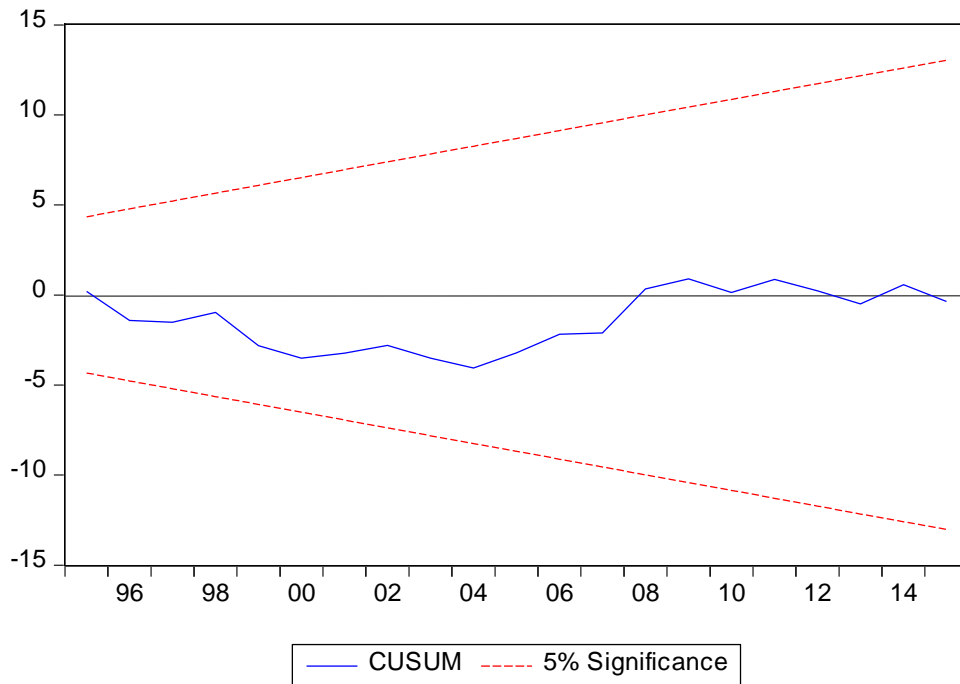
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LINF(-1)	0.047249	0.866245	0.054545	0.9570
LGDP	-0.026362	0.181503	-0.145243	0.8860
LGDP(-1)	0.042745	0.388449	0.110041	0.9135
LFDI	0.000548	0.010528	0.052046	0.9590
LEXC	0.025431	0.053334	0.476819	0.6387
LEXC(-1)	-0.013789	0.116098	-0.118771	0.9066
LTR	0.028562	0.090087	0.317047	0.7545
C	1.762341	2.031454	0.867527	0.3959
FITTED^2	0.106869	0.140707	0.759515	0.4564

R-squared	0.999369	Mean dependent var	4.374152
Adjusted R-squared	0.999117	S.D. dependent var	0.231431
S.E. of regression	0.006877	Akaike info criterion	-6.872118
Sum squared resid	0.000946	Schwarz criterion	-6.447784
Log likelihood	108.6457	Hannan-Quinn criter.	-6.739222
F-statistic	3961.213	Durbin-Watson stat	2.353596
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 16: Stability Test

The purpose of this test is to check stability of estimated coefficients in this model. Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMQ).



Appendix 17: Result for Long Run Coefficient

ARDL Cointegrating And Long Run Form

Dependent Variable: LINF

Selected Model: ARDL(1, 1, 0, 1, 0)

Date: 06/20/17 Time: 12:09

Sample: 1986 2015

Included observations: 29

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP)	-0.155802	0.047179	-3.302382	0.0034
D(LFDI)	0.007985	0.001242	6.430315	0.0000
D(LEXC)	0.005420	0.032706	0.165724	0.8700
D(LTR)	-0.028632	0.024790	-1.155000	0.2611
CointEq(-1)	-0.297696	0.020013	-14.874845	0.0000

Cointeq = LINF - (0.6061*LGDP + 0.0283*LFDI -0.3437*LEXC -0.1319*LTR + 0.7723)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.606066	0.033044	18.341384	0.0000
LFDI	0.028322	0.010345	2.737793	0.0123
LEXC	-0.343669	0.083032	-4.139001	0.0005
LTR	-0.131932	0.031728	-4.158245	0.0004
C	0.772282	0.704684	1.095927	0.2855