NEAR EAST UNIVERSITY

GRADUATE SCHOOL OF SOCIAL SCIENCES

ECONOMICS MASTER'S PROGRAMME

MASTER'S THESIS

THE IMPACT OF INFLATION ON ECONOMIC GROWTH: EVIDENCE OF MALAYSIA FROM THE PERIOD 1970-2014

HEMIN TAWFIQ AZIZ AL.TAESHI

NICOSIA

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NICOSIA

2016

DECLARATION

I hereby declare that:

This master thesis is the final product of my own work and has not been submitted before for any degree, examination or any related qualifications at any university or institution and ALL the sources I have used or quoted , have received due acknowledgments as complete references.

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Signature……..

Date……

NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES

Economics Master's Program
Thesis Defense

The Impact of Inflation on Economic Growth: Evidence from Malaysia

We certify the thesis is satisfactory for the award of degree of Master of Economics

Prepared by Hemin Tawfiq Aziz Al. Taeshi (20145331)
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DEDICATION

This study is dedicated to my ever caring late father and mother, my brothers Osman, Omran, Serwan, elder sister Pakhshan and to beloved wife Kany and my dear son Rand. Deepest appreciation also goes to my elder brother Osman who has played a greater role towards this milestone event.

ABSTRACT

The study analyses the impact of inflation on economic growth in Malaysia. The undertaking of this study follows a series of upward trends that have been observed in Malaysia's economic growth patterns. However such increases in economic growth were accompanied with almost similar increase in the inflation rate. Time series data from the FRBL covering the period 1970-2014. The study employed co-integration, Granger causality, variance decomposition and impulse response functions techniques, and the ordinary least squares method to determine the responsiveness o inflation to economic growth. The study established that there is a long relationship between economic growth and inflation. The results of the study also showed that Economic growth in Malaysia has an inelastic response to inflationary pressure.

Key Words: *Inflation, Economic growth, Gross savings, Imports, Malaysia.*

ÖZ

Çalışma Malezya'daki enflasyonun ekonomik büyümenin etkisini analiz etmektedir. Bu çalışmanın girişimi Malezya'nın ekonomik büyüme modellerinde gözlemlenen bir dizi artış eğilimini izlemektedir. Ancak ekonomik büyümedeki bu gibi artışlar enflasyon oranındaki artışlara neredeyse benzer artış göstererek eşlik etmiştir. FRBL'den gelen zaman serisi verileri 1970-2014 dönemini kapsamaktadır. Çalışmada enflasyonun ekonomik büyümedeki duyarlılığını belirlemek için eşbütünleşme, Granger nedensellik, varyans ayrıştırma ve dürtü yanıtı fonksiyonları teknikleri ve sıradan en küçük kareler yöntemi kullanılmıştır. Çalışma, ekonomik büyüme ve enflasyon arasında uzun vadeli bir birlik olmadığını ortaya çıkarmıştır. Çalışmanın sonuçları ayrıca Malezya'daki ekonomik büyümenin enflasyonist baskıya esnek olmayan bir tepki verdiğini göstermiştir.

Anahtar Kelimeler: *Enflasyon, Ekonomik büyüme, Brüt tasarruflar, İthalat, Malezya.*

TABLE OF CONTENTS

ACKNOWLEGMENTS ..... **i**
DEDICATION ..... **ii**
ABSTRACT ..... **iii**
ŐZ ..... **iv**
TABLE OF CONTENTS ..... **v**
LIST OF FIGURES ..... **viii**
LIST OF TABLES ..... **ix**
LIST OF ABBREVIATIONS ..... **x**
CHAPTER ONE **1**
INTRODUCTION **1**
1.1 Background of Study 1
1.2 Statement of the Problem 3
1.3 Research Objectives 4
1.4 Research Questions 4
1.5 Hypothesis 4
1.6 Significance of the Study 4
1.7 Scope and Limitation of the Study 5
1.8 Justification of the Study 5
1.9 Organization of the Study 5
CHAPTER TWO **6**
THEORETICAL AND EMPIRICAL LITERATURE REVIEW **6**
2.1 Theoretical Literature Review 6
2.1.1 Classical Growth Theory 6
2.1.2 Neo- Classical 7
2.1.3 Neo-Keynesian 8
2.1.4 Monetarism 9
2.1.5 Endogenous Growth Theory 10
2.1.6 Keynesian 11
2.2 Empirical Literature Examining the Link between Inflation and Economic Growth 12
2.3 Empirical Implications about Inflation and Economic Growth in Malaysia 17
2.4 Inflation, Growth and Central Banks 18
2.5 Sustainable Level of Inflation and Economic Growth 19
2.6 Transmission Mechanism between Inflation and Economic Growth 19
2.7 Chapter Summary 21

CHAPTER THREE **22**
GENERAL OVERVIEW OF THE MALAYSIAN ECONOMY **22**
3.1 The Malaysian Macroeconomic Environment Outlook 22
3.2 Economic Growth Patterns in Malaysia 23
3.2.1 The Changing Pattern of Economic Growth 23
3.2.2 The Colonial Development 23
3.2.3 Post-independence Developments 24
3.2.4 The Need for Economic Development 24
3.2.5 Recent Trends 24
3.3 Inflation Trends in Malaysia 26
3.3.1 Measuring Inflation in Malaysia 26
3.4 Economic Growth vs Inflation in Malaysia 28
3.5 Malaysia's Economic Policies and Strategies 28
3.5.1 Measures to Curb Inflation 28
CHAPTER FOUR 31
RESEARCH METHODOLOGY 31
4.1 Introduction 31
4.2 Model Specification 31
4.3 Stationarity Tests 32
4.4 Cointegration 33
4.5 Granger Causality 34
4.5 Stability Diagnostics 35
4.7 Definition and Selection of Variables 35
4.7.1 Gross Domestic Product (GDP) 35
4.7.2 Inflation Rate (INFL) 36
4.7.3 Imports (IMP) 36
4.7.4 Gross Savings (GS) 37
CHAPTER FIVE **39**
ANALYSIS AND INTERPRETATION OF RESULTS **39**
5.1 Introduction 39
5.2 Stationarity Tests 39
5.3 Co-integration Test 41
5.4 Responsiveness of GDP to the Variables 43
5.5 Variance Decomposition 44
5.6 Impulse Response Function 45
5.7 Granger Causality 46
CHAPTER SIX **48**

SUMMARY, CONCLUSIONS AND RECOPMMENDATIONS 48
6.1 Introduction 48
6.2 Summary of Major Findings 48
6.3 Conclusions 49
6.4 Recommendations 50
6.5 Suggestions for Future Research 51
REFERENCES 52
List of Appendices 58
Appendix 1: Lag Selection Criteria 58
Appendix 2: Cointegration Results 59
Appendix 3: Responsiveness- Ordinary Least Squares 60

LIST OF FIGURES

Figure 2.1: Transmission Mechanism between inflation and Economic Growth 20
Figure 3.1: Annual GDP Growth rate 25
Figure 3.2: GDP for Malaysia 25
Figure 3.3: Inflation Trends from 19990-2012....26
Figure 4.1: Stationarity Autoregression Model 33
Figure 4.2: Economic Growth Trend 1970-2014 35
Figure 4.3: Experienced Inflation levels 1970-2014....36
Figure 4.4: Malaysia's Level of Imports 1970-2014 37
Figure 4.5: Level of Gross Savings 1970-2014....37
Figure 5.1: Variance Decomposition 45
Figure 5.2: Impulse Response Functions 46

LIST OF TABLES

Table 3.1: Inflation Forecasts for 2016-2020 28
Table 4.1: Data Sources and Expected results 38
Table 5.1: ADF test Stationarity results. 40
Table 5.2: PP test Stationarity results 41
Table 5.3: Johansen Co-integration test 42
Table 5.4: Model data Summarry results 43
Table 5.5: Responsiveness of GDP to the variables 44
Table 5.6: Granger causality test results 46

LIST OF ABBREVIATIONS

CPI: Consumer Price Index

FRBL: Federal Reserve Bank of St Louis

GDP: Gross Domestic Product

GS: Gross Savings

INFL: Inflation

IMP: Imports

ADF: Augmented Dickey Fuller

PP: Phillips Perron

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Macroeconomic policy makers aim to achieve high economic growth and very low inflation in their economies. Past studies have 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. Inflation has thus been a bone of contention with regards to being beneficial or harmful to economic growth.

Exorbitant inflation rates tend to inflict various challenges to the economy. Monetary authorities are therefore entrusted with a mandate to eradicate inflationary repercussions on the economy. Prevailing economic conditions provide a mirror of possible inflationary consequences on economy performance. Substantial inflation is synonymous to severe price volatility and this extends to hamper other economic outcomes such as investment and economic growth.

The effects of inflation can be distractive in most cases and they can hamper notable sector of the economy. For instance, inflation distorts the natural tendency of balance that exists between lending and borrowing. Thus a significant amount of resources might suffer from a decline in monetary in value as it wiped away by monetary pressure. As the effects of inflation become predominant, the erosion of economic value will also be taking effect (Bruno and Esaterly, 1996). Thus during the aftermath of exorbitant inflation, individuals with fixed income or assets with fixed interest rates will experience significant decline in value (Dornbuusch, 1977). Inflation has thus been greatly criticized for further redistributing income. In addition, economic savings will move in a bilateral position with the level of inflation. Rationality therefore forces individuals to utilize their savings before their value is wiped away.

On the other hand, it is apparent that increases in inflation is bilaterally related with unemployment. In this regard, efforts to promote employment are said to be inflationary especially when they involve an injection of money supply into the

economy. This implies that the growth in money supply must be matched or outpaced with increases in output. However, insights can be obtained that there is a threshold inflationary level at which increases inflation have positive effects on economic growth. Such ideas are of the support that there is a certain level of inflation that is necessary for economic growth. Threshold inflationary rates are however different from one economy to another or from nation to another. Ideas behind such differences is centered on the level of economic development or economic activity that is being enjoyed in that country. This implies that a certain increase in price level stimulate economic activity.

Despite this assertion that there is a threshold inflation rate that is stimulative to economic growth, major or significant contentions do reveal that inflation poses adverse effects on economic performance and other major outcomes. This was reinforced by insights provided by Boyd et al. (2001) established that inflation needs to be capped below sustainability. This entails that inflation can pose no harm when it is considered sustainable and opposite effects can set it when deemed unsustainable. Meanwhile Bruno and Easterly (1996) reinforced the same arguments citing that increases in price level can inflict severe economic damages especially when the price increases are unsustainable. Irrespective of such notions, revelations by Boyd et al. (2001) also revealed that stabilization policies must be utilized to bring inflation into controllable subjection. The nature of stabilization however differs with the magnitude and impact of inflation that is being experienced in that country. Severe cases of inflation are usually advocated that they be addressed using tight or restrictive monetary approaches. Stabilization efforts are therefore strongly recommended to adopt a complementary approach which involves a combination of fiscal and monetary policy instruments (Dornbusch, 1997).

Assertions are very high that effects of inflationary pressure usually set in during the course of a wage. A wage is events or circumstance that transpires when a lag exists between changes in input, output prices and wages. Notable effects of a wage lag can be attributed to incidents when such lags remain in force to enable firms to attain high levels of profitability. Wage lag thus provide opportunities for further investment as profits earned provide an incentive to maximize more profits.

According to Khan and Schımmelpfennıng (2006), the authors developed a model for inflation in Pakistan in order to gather data from 1998 to 2005. The main focus of the study was to identify the monetary determinants of inflation in Pakistan. The private sector credit and CPI was analyzed and the findings of the research showed that in the long run there exists no tradeoff between growth and inflation however that was not the case for the short run. Findings further revealed that 5 percent of inflation contributed to economic stability and growth in the country.

1.2 Statement of the Problem

General contention is that inflation has adverse effects on economic implying that increases inflation will result in a decline in economic growth. This can be augmented by ideas established by Dornbusch (1997) which strongly advocates that inflation be contained at all cost and must not be allowed to fluctuate beyond the single digit level. This mirrors inflationary trends that have been taking shape in Malaysia in which inflation increased from the 2.6% mark to 3.9% between the periods 1991-1996. During the same period economic growth expanded from 4.2% - 9% reinforcing the contention that a certain low level of inflation is necessary for economic growth. Malaysia happens to be one of the few that had high inflation during the period of 1973 to 1981 and a low inflation recorded during the period of 1985 to 1987. Benefits derived from the low level of inflation were improved growth rates and the low inflation rate was as a result of policy mix incorporated by the Malaysian government in an effort to reinforce economic growth. Contrary deductions can be made when Malaysia's economic performance took and downward swing to plunge to -7.4% in 1998 and the inflation was revolving around the 1.7% mark (Cheng and Tang, 2000). This has however be the norm during the past 6 years and thus contradicts with the same notion that there is a threshold of inflation that has unilateral relationship between economic growth and inflation. Furthermore, it can be noted that economic growth in Malaysia has fluctuated significantly showing different patterns that contradict with both assertions about the linkage that exist between inflation and economic growth. This entails that economic growth has been exhibiting different responses to changes in inflation. This therefore sought to establish the impact of inflation on economic growth with regards to Malaysia.

1.3 Research Objectives

In this study, critical attention is devoted towards analyzing the impact of inflation on economic growth. Proceeding objectives will thrive to attain the following;

- To determine the responsiveness of economic growth to changes in inflation.
- To ascertain the existence of a long run relationship between economic growth and inflation in Malaysia.
- To explore policy initiatives that can be put in place to promote economic growth without igniting an inflationary response.

1.4 Research Questions

In order to accomplish the research objectives stated above, this study attempts to answer the following research questions:

- What the impact of inflation on economic growth in Malaysia?
- What is the responsiveness of economic growth to changes in inflation in Malaysia?
- Is there a long run relationship between economic growth and inflation in Malaysia?
- What are the policy initiatives that can be put in place to promote economic growth without igniting an inflationary response?

1.5 Hypothesis

The following hypothesis will be tested;

- **H_0:** Inflation rate has no significant impact on economic growth of Malaysia.
- **H_1:** Inflation rate has a significant impact on economic growth of Malaysia.

1.6 Significance of the Study

Significant importance can be attached to this study in ascertaining the impact of inflation on economic growth in Malaysia. This is in regards to elucidating the responsiveness of economic growth to changes in inflation. As such will position monetary authorities and scholars in a better position to understand the interlinkages

that exist between threshold inflation levels and economic growth. It is in this regard that appropriate economic measures can be undertaken to rectify and alleviate the adverse effects of inflation.

1.7 Scope and Limitation of the Study

The undertaking of this study is mainly centered on analyzing the impacts that are posed by inflation on economic growth. This will be aided by the utilization of secondary data which runs from 1970 to 2014. As such will endeavor to establish the responsiveness of Malaysia's economic growth to changes in inflation.

1.8 Justification of the Study

This study in partial fulfill of the requirements of the MSC of Economics at Near East University. This thesis will be of great value to the following stakeholders to the researcher as it will enhance the researcher's problem solving and analytical skills. Thus through this study, the researcher will be in good position to deduce appropriate solutions from any inflation and economic growth related matters. Other students at Near East University will be able to access this study for their future studies. Thus this study will serve as a source of reference about economic growth related issues. It must be noted that the ability of this study to solve the problem at hand and going an extra mile to identify deeper and hidden solution, and deduce appropriate recommendations will improve policy initiatives aimed at improving Malaysia's economic performance.

1.9 Organization of the Study

The study will assume a six chapter structure. Chapter one is an outline of the problem and its setting. Literature review is addressed in chapter two while chapter three gives an overview of the Malaysian economic environment, inflation trends and economic growth outlooks. Research methodology is dealt with in chapter four whereas chapter five looks at the analysis and presentation of results findings. Chapter six concludes this chapter by looking at conclusions, policy recommendations and suggestions for future studies.

CHAPTER TWO

THEORETICAL AND EMPIRICAL LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Classical Growth Theory

The Classical Growth Theory forms a base upon which a significant number of economic growth models are based. The formulator of the Classical Growth Theory Adam Smith asserts that economic growth can be expressed in the form of a supply side model. Under this model, the supply side model is assumed to be determined by capital, labor and technology and expressed in the form of a production function and it assumes the following nature;

$$\mathbf{Y = f\ (K, L, T)}$$

Where K is capital, L is labor and T is technology. Thus total output produced is determined by capital, labor and technology. This model further asserts that output (Y) is primarily influenced by investment ($\mathbf{I_k}$), changes in productivity ($\boldsymbol{\alpha}$), land growth ($\mathbf{L_t}$) and population growth ($\mathbf{P_L}$). As a result,

$$\mathbf{Y = \mathit{f}\ (I_k, L_t, P_L, \alpha)}$$

This theory implies that growth can exhibit increasing returns to scale because it is self-reinforcing. It also contends that investment ascertained by amount of savings in the economy and that investment ultimately affect growth levels or patterns (Haslag 1995). The theory further posits that the rate at which the economy grows is driven by income distribution. In addition, it reveals that it is competition for workers among capitalists that causes a decline in profits through increases in wages and not decreasing marginal rate of productivity. This theory does not clearly give a detailed description of the nature of association between economic growth and inflation but

outlines that inflation is as a result of increase in taxes and high wage and salaries which hamper profit levels. It therefore contends that the nature of association between economic growth and inflation is bilateral.

2.1.2 Neo- Classical

The Neo-classical theory is based on the idea by Mundell (1963) which outlines that there is a linkage between economic growth and inflation. Mundell asserts that changes in inflation or inflationary expectations have an effect on wealth. An increase in inflation is thus said to reduce wealth through a decrease in the rate of return. Mundell posit that the need to acquire more assets causes people to save and in the process the prices of assets rise as their demand increases causing interest rates to fall. However, the higher the savings available the higher the level of capital accumulation and thus a high level of growth.

Tobin (1965) made improvements to the Neo-classical theory to come up with what is known as the 'Tobin Effect'. This model outlines that consumers postpone current consumption by either investing in capital or holding money. Thus individuals are assumed to hold money for either speculative or precautionary motives.

The model suggests that as people switch from money they switch to capital which causes an increase in capital stock which causes the steady state to increase as well. The increase in output is temporary as the economy is assumed to be in a period of adjustment or going through a transition. The changes caused by inflation on capital accumulation and economic growth are termed the 'lazy dog effect' were it causes were both capital accumulation and economic growth will rise but will fall when the rate of return on capital starts to decline. Inflation is thus said to be having an upward effect on economic growth through capital accumulation

However, recent models have exhibited that a bilateral association between inflation and economic growth can also exist. For instance, Stockman (1991) argued that inflation causes the steady state to decline. This is based on the notion that inflation erodes the purchasing power of both capital and consumer goods so individuals will cut down their purchases and as a result the level of the steady state falls. It can also

be noted that inflation negatively impacts the labor returns and cause individuals to substitute leisure for consumption. The marginal rate of return of labor falls in line with the increase in inflation and both the level of the steady state and capital returns will decline.

The neoclassical models can produce models with different theoretical results about the association between economic growth and inflation. For instance, the 'Stockman Effect' contends that an upswing in inflation causes output to fall. Other assertions argue that output will not change while the 'Tobin Effect' contends that output will increase. These differences can cause researchers to adopt different approaches which may make it difficult to compare or apply study results.

2.1.3 Neo-Keynesian

The Neo-Keynesian assumes that there exist an output level where production levels are optimum given the existing natural and institutional constraints. This optimum level of output is similar to the natural rate of unemployment (NAIRU) (Haslag 1995). At the NAIRU level, inflation is stable, that is, it neither falls nor rises. This theory asserts that inflation is ascertained by the natural rate of employment and the level of GDP. Three basis assertions can be deduced from this model and these are;

The first assertion outlines that assuming all other things remain constant, if GDP levels outweigh the unemployment level at a level where the unemployment level trails the NAIRU, inflation will cause suppliers to increase prices which further propels prices upwards (Blanchard and Kiyotaki 1987). Inflationary pressure will build and shift towards stagflation where both unemployment and inflation are greater.

The second assertion contends that when unemployment stands above the natural rate and GDP stands below its potential level ceteris paribus, suppliers will expand capacity causing prices and inflation to fall. The Phillips curve shifts to reflect low inflation and unemployment levels (Blanchard and Kiyotaki 1987).

The last assertions is based on the idea that inflation will not change when actual GDP equals is equivalent to expected level and is unemployment equivalent to the natural rate (NAIRU) assuming that there are no supply shocks. This theory posits that the Phillips will assume a vertical shape at the NAIRU.

It can be deduced that the natural level of unemployment and potential output can be determined with preciseness. Moreover, it can be criticized on the bases that inflationary behavior is not symmetrical and it changes asymmetrically. This is because downward changes in prices are rigid.

2.1.4 Monetarism

Monetarism is an idea developed by Milton Friedman and centers on long run supply. Friedman contends that there are long run supply elements that can be used to relate money supply to growth (Gomme, 1993). For instance, the Quantity Theory of Money establishes a linkage between economic growth and inflation by equating the total amount of money in circulation to the economy's total spending. According to Friedman, the equation can be specified as follows;

$$\mathbf{MV = PY}$$

Where M = money stock in circulation

V = velocity of circulation

P = price

Y = output

Using the above equation the inflation rate can be determined as follows; $\mathbf{p = v + m - y}$

Where p = inflation rate

V=velocity of circulation m= money stock

y = output growth rate

From this equation, Friedman postulated that was aggravated by increases in velocity and supply of money that are greater than the prevailing level of economic growth.

He further argues that the effects of inflation on economic growth dependent on whether inflation is anticipated or not. Anticipated inflation causes consumers to adjust their patterns of consumption and lobby for wages increases such that the increase in inflation might match the increase in wages (Gomme, 1993). When this is the case an increase in inflation will have no effect on either employment or growth and this condition is known as neutrality of money. In this case inflation can be said to be harmless. It can therefore be deduced from the monetarism approach that money growth affects long run prices and not growth and that inflation occurs as a result of money supply being higher than the level of economic growth.

2.1.5 Endogenous Growth Theory

This theory is based on the idea that economic growth is determined by factors that are inherent of the production function such as technological change and economies of scale or returns to scale and not exogenous factors. The endogenous growth model is based on the concept of a single regression model where the dependent variable is economic growth and the independent variables can either be capital accumulation or inflation (Haslag, 1995). The significant difference endogenous growth model and the neo-classical model is that in the endogenous growth model capital returns tend to fall as the level of capital accumulation rises and will not fall to below negative values. The model does consider the idea of the impact of externalities on capital decisions and returns to scale' effects on the production process.

The endogenous growth model contends that economic growth is determined by capital returns, wages and salaries but taxes are seen as inducing a negative effect on rates of return on capital investments. High taxes will propel individuals to substitute work for leisure while imposing taxes on capital hinders economic growth. Arguments have been placed about the extent to which inflation affects economic growth (Gomme, 1993). The study revealed that the inverse relationship between inflation and employment induces negative shifts in growth levels. The channels through which inflation affects economic growth are marginal rate of productivity of labour and capital accumulation which diminish with the increase in inflation. Gomme (1993) further points to the fact that efforts to reduce inflation will have minimum effect on economic growth. Haslag (1995) however argues that inflationary

effects are normally witnessed through a decline in deposits which eventually reduces savings, capital accumulation and hence ultimately economic growth.

2.1.6 Keynesian

This theory is posits that the association between economic growth and inflation can be analyzed using aggregate supply and aggregate demand curves. It is based on the idea that the short run aggregate supply curve is upward sloping and hence changes in demand will only cause a change in prices. Thus shifts in the AS curve will effect changes in both output and prices (Dornbusch et al., 1997). This applies in the short run period because output and inflation are determined by a lot of factors such as monetary and or fiscal policy, changes in labor force and expectations.

The model assumes that as the economy enters the long run 'steady state', factors such as monetary and or fiscal policy, changes in labor force and expectations will have a balancing effect. The steady state thus implies that there are no changes but adjustments in the AS and AD curves result in what is known as the 'adjustment path'. The model further asserts that there will be a positive relationship between inflation and economic growth in the 'adjustment path' or during the 'adjustment period'. A negative relationship can thus be only witnessed after the 'adjustment period' or 'adjustment path'.

The positive relationship between inflation and economic growth is as a result of time inconsistency. This means that producers will be perceiving that their prices are higher than those of other producers in the economy and yet all prices have gone up causing them to continue to produce more output. The positive relationship between inflation and economic growth can be attributed to market agreements between suppliers and consumers to supply goods at a later date. Thus changes in prices of goods will not cause a change in output since the supplier has to supply the agreed quantity of goods at the agreed price (Blanchard and Kiyotaki, 1987).

It can also be ascertained that during the 'adjustment period' the bilateral relationship between inflation and economic growth is termed stagflation. This is a situation

which occurs when prices rise but causing output to either fall or remain the same. The model also suggest that during the 'adjustment period' inflation does not necessarily increase but follows an 'adjustment path' of temporal increase and then it falls.

2.2 Empirical Literature Examining the Link between Inflation and Economic Growth

The existence and nature of the link between inflation and economic growth have extensively been investigated in the economic literature. The main focus of research carried out has been done on an international level however there is need to contextualize the present research in order to derive the best policies and strategies.

According to Barro (1995) there is a negative correlation between economic growth and inflation. They researcher conducted a study based of more than 100 sample data economies for the year 1960 to 1990. In order to analyze the effect inflation has on economic growth a number or regression equations were used by whilst some of the determinants were ceteris paribus. The study revealed that there was a negative correlation between growth and inflation. A 10 percent increase in inflation showed that there was an adverse relationship of
0.2 to 0.3 percent decrease in economic growth.

Another study carried out by Bruno and Easterly (1995) investigated the determinants of economic growth of 26 countries that encountered a high level of inflation rate during certain time frames. Based on their study, an inflation rate that was over 40 percent is considered as an inflation crisis. The study concluded that, in order to recover from inflation crisis, a reduction in the inflation rate would be helpful to an economy. More so, the study concluded that a high inflation rate does not necessarily damage the economy.

Sarel (1996) employed secondary data in the investigation of the existence of non-linear inflationary consequences on economic growth using OLS estimation to analyse observations collected from 87 countries from the periods 1971-1995. Study

findings revealed that marginally beneficial outcomes exist below the structural break and that adverse impacts can set in at levels beyond the structural break.

Fisher (1993) analysed the association between inflation and economic growth based on panel data collected from 93 countries. The study employed simple regression analysis and the results showed that the negative effects of inflation on economic growth are in the form of reduced productivity and a decrease in investment levels. Conclusions drawn by Fisher (1993) outlined that inflation causes a misallocation of resources as it affects the price mechanisms.

Khan and Senhadji (2001) examined the effects of inflation on economic growth based developing countries and industrial sectors for 140 countries. The time series data from the period 1960-1998. The study established that there is a threshold under which inflation imposes negative effects on economic growth. The threshold was established to be within the range of 11-12% for developing countries and 1-3% for developed countries. The study further showed that industrialized countries have lower thresholds than developing economies.

Mubarik (2005) found that the threshold tends to vary from one country to the other and is influenced by economic activities which include the level of economic development and industrialization. The study by Mubari (2005) was based on a study conducted about the impact of inflation on economic growth in Pakistan. The study outlined that the inflation threshold for Pakistan is 9% and levels beyond that are associated with bilateral association between inflation and economic growth.

Malik and Chowdhurry (2001) postulated that the effects of inflation on economic can be positive and this was based on VECM results for Srilanka, Pakistan, India and Bangladesh. The results further showed that there is a long run association between inflation and economic growth. It was also outlined that moderate inflation is necessary for economic growth.

Bruno and Easterly (1995) found that there is no empirical support of the interrelationship between inflation and economic growth. The study however established that economic growth tends to decline sharply especially at levels where

the inflation rate surpasses 40%. At levels above 40% the relationship between economic growth and inflation is postulated to be negative but temporal and that economic growth rebounds back to a positive trend at levels below 40%.

Ghosh and Phillips (1998) postulated that at low levels of inflation, attempts to lower the inflation rate have negative effects on economic growth. The results were based on panel data from 1960-1996. Two non-linearity associations were observed to exist between inflation and economic growth. The first non-linearity was associated with positive relationship between economic growth and inflation at 2-3% levels of inflation while the second non-linearity asserts that at 10-40% levels of inflation, economic growth and inflation are bilaterally related.

Results by Neil (2000) contend that inflation always inflicts adverse effects on economic growth. This assertion was backed by a study conducted in relation to South Africa covering the period 1960-99. The study employed a VAR analysis procedure and the results revealed that single digit inflation has positive effects on economic growth as opposed to double digit inflation.

Faria and Carnerio (2001) investigated the relationship between inflation and economic growth in the context of the Brazilian economy. A VAR model was employed to analyse time series data from the period 1980-1995. The results established that there is no existent long run relationship between inflation and economic growth. It was established that in the long run productivity and output are not related to inflation in the long run but short run relationships do exist.

Gillman et al. (2002) explored the impacts of inflation on economic growth through a reduction in capital. The study was based on the analysis of OECD countries from 1961-97. The study results exhibited that there is a negative association between inflation and economic growth but the effects tend to vary with the rate of inflation. Thus at very low levels of inflation the magnitude of impact tend s to be very low but doubles as the rate of inflation increases within the range of 0-10%.

Khan and Qasim (1996) outlined that irrespective of disaggregates of inflation that are being looked at, money supply is the major instrument behind inflation. The study was centered on examining food and non-inflationary effects in Pakistan. Insights drawn suggested that the price of electricity and wheat, and devaluation were major elements behind increases in inflation in Pakistan.

Boyd et al. (2001) undertook a cross sectional study based on time series data from 1960-1995. The study examined the impact of inflation on economic growth by incorporating variables such as trading volume, stock market capitalization, bank liabilities and domestic credit to the private sector. The results of the study revealed that a sustainable rate of inflation was associated with insignificant domestic credit to the private sector. The study further showed that inflation and financial development have a non-linear association. Established results showed that repercussions from the interplay between inflation and economic growth are limited to a certain point and tend to decrease as the level of inflation continues to rise. In addition, it can be noted that there is an association between economic growth, inflation and investment. Studies by Barro (1995) revealed that investment and economic growth are unilaterally related and this implies that investment causes an increase in economic growth. Insights revealed by Barro (1999) asserts that yearly increases inflation by a magnitude of 10% will resultantly cause an increase in economic growth by 0.2-0.24%.

Hasanov (2010) utilized annual time series data from the period 2001-2009 to examine the effects on inflation on economic growth in Azerbaijan. The study incorporated gross fixed capital formation as an additional variable and the results showed strong evidenced that the linkage between economic growth and inflation was associated with threshold effects. Threshold results further revealed that the association between economic growth and inflation is non-linear and positive effects of inflation on economic growth were observed at levels below 13%. At levels beyond 13% the relationship between economic growth and inflation tends to be significantly positive. Thus increases in the inflation rate to levels beyond 13% were presumed to restrict economic growth by 3%. This was reinforced by Umaru and Zubairu (2012) who established that economic growth granger causes inflation but inflation does not granger cause economic growth and at low levels of inflation, increases inflation have a stimulus response on economic growth. This also augments

study findings by Malik and Chowdhurry (2001) who strongly posited that inflation and economic growth are strongly unilaterally related and that higher levels of inflation hamper economic progress. Meanwhile, Frimpong and Abayie (2010) outlined that the threshold revolves around 11% in Ghana. The study examined the relationship between economic growth and inflation from the periods 1960-2008 but the results indicated that the association between inflation and economic growth is insignificant. The relationship is however, significantly positive at low levels of inflation. This study does not reveal the nature of sensitivity between the two variables. Khan and Senhadji (2001) undertook a cross sectional analysis of 124 companies to examine the threshold effects of inflation on economic growth. The study was based on threshold models that utilized time series data from the periods 1950-2004 and the results showed that inflation targeting of 17% and 2% for developing and developed economies were necessary.

Khan et al. (2001) also employed panel data to examine the relationship between inflation and economic growth. The study was based on data that spans from 1960-1999 and was based on an examination of 168 countries. Results from the NLLS was undertaken using non-instrumental and instrumental variables showed that the relationship between inflation and economic growth is associated with a threshold in which the effects of inflation on economic growth are substantial up to a certain level. The results also revealed that there are bilateral associations between inflation and indicators of financial depth.

It can be deduced from the above analysis that the effects of inflation are effectively transmitted through financial institutions. However, the transmission effects are always non-linear and adverse. It is undoubtable that financial development is also significantly intertwined with economic growth. Having inflation affecting financial development implies that the ability of financial development to effect positive changes in growth is also undermined. Such effects are observed in relation to capital accumulation, technological innovation as the role of financial intermediaries is undermined. Thus the effects of inflation is therefore viewed as negatively impacting capital accumulation, innovation and financial intermediary roles.

Empirical support of the relationship between inflation and economic growth is inconclusive and most of these studies have not established a common consensus about the impact of inflation on economic growth. Such studies have differed in

terms of the inflation threshold, non-linearity of the relationship between inflation and economic growth. It can be established as well that transmission mechanisms of the impacts of inflation on economic growth though relatively linked to financial institutions and capital accumulation, tend to vary. This implies that there is need to conduct studies that address these two aspects either separately or combined. Meanwhile, questions can be raised about the desirable level of inflation. Though most studies have highlighted that at low levels of inflation economic growth tends to increase in relatively lower proportions. Thus higher rates of inflation are viewed as obstacles to economic performance and hence the need to curb them. Conditions have however not been established, that is under which conditions do lower levels of inflation positively affect economic growth.

2.3 Empirical Implications about Inflation and Economic Growth in Malaysia

Deductions can be made from the established literature that the interplay between inflation and economic growth is hugely aggravated by money supply. Emphasis is significantly placed on the need to utilize money supply as a regulatory tool or adjustment mechanism to manipulate economic outcomes. However, vast literature which addresses probes into the interplay between economic growth and inflation outlines two distinguishing features. That is, there are threshold effects that are associated with certain rates of inflation below which a unilateral association can be observed between economic growth and inflation. This implies that there exist low levels of inflation that simultaneously result in an increase in economic growth. The second feature highlights that unsustainable rates of inflation are detrimental to economic progress and hence need to be contained.

It can also be deduced that inflationary effects on economic growth tend to exhibit variations in line with prevailing economic activities in a particular country. Differences are observed when the level of economic activities and development vary between from country to the other. This implies that economic activities and development play an essential role towards determining the inflationary trends or pressure that are experienced in a country.

Expectations can therefore be made that inflation in Malaysia will be in response to changes in economic activities that are taking place. Implying that the level of economic growth plays a crucial role in the Malaysian economy in curbing and

addressing inflation related challenges. Thus we can ascertain that the greater the level of economic activities that are taking place in Malaysia the greater the potency to curb inflation. Further assertions, can be made that inflation will be associated will have threshold effects on economic growth. This study will attempt to identify the extent to which economic growth responds to changes in inflation. This implies that the inter relationship between inflation and economic growth is associated with a certain level of responsiveness, that is, elasticities.

Notable effects can be observed to be poised through channels or transmission mechanisms. Emphasis should be placed in dealing with the root causes of inflation and minimizing the extent to which inflation influences transmission mechanisms. This study will attempt to identify transmission mechanism through which inflationary effects are transmitted to inflict economic growth.

Conclusions can be made from the employed empirical frameworks that required policy approaches to combat inflation do differ with circumstances and time and hence policy formulation and implementation must also be changed to reflect such conditions. Severe cases of inflation can thus be contended to require a combination of monetary and fiscal policies. Efforts must be undertaken to ensure that economic policies meant to combat inflation must be complementary to each other. This stems from the fact that most countries do suffer from inconsistent policies which severely slow down progress meant in addressing inflationary problems.

In conclusion, expectations are that economic activities in Malaysia are a reflection of the ability of the Malaysia monetary authorities to curb inflationary problems. A threshold inflation rate is also anticipated and the responsiveness of economic growth to changes in inflation is expected to be inelastic.

2.4 Inflation, Growth and Central Banks

There is a basic notion that inflation is an economic phenomenon which entails that increases in money supply always spur an increase in inflation. Thus basic policy recommendations require that there be a reduction in money supply in order to reduce inflation. Sustainable economic growth requires that the inflation rate not to surpass economic growth rate. Efforts to achieve price stability are sometimes viewed as detrimental to certain macroeconomic aims such as sustainable growth, export

promotion strategies and full employment. Central bank efforts are therefore seen as two ways channels where by efforts to control inflation poses effects or contagion effects on other economic variables such as inflation. This can be evidenced by the fact that an increase in money supply to finance growth projects might be a prerequisite and yet efforts to achieve price stability are a main priority. In this case price stability efforts can be said to be growth repelling. The effect of inflation on economic growth therefore depend on whether Central Banks policy effects are either permanent or transitory (Sarel, 1996). The general agreement is that inflation is bad and hinders economic growth and that price stability has favourable consequences.

2.5 Sustainable Level of Inflation and Economic Growth

Despite general agreements that inflation poses harmful effects on the economy, there is a level of inflation that can be sustainable and does not pose harmful effects on economic growth. Questions about what level of inflation is harmful to growth hinges on whether the association between economic growth and inflation is a short run or long run. There are different assertions about the linkage between inflation and growth. For instance, Stockman (1991) posits that there is a strong bilateral association between inflation and growth while it is established that inflation is not a major determinant of growth (Barro and Sala-i-Martin, 1997). On the other hand, Andres and Hernando (1990) established that there is a bilateral non-linear relationship between inflation and growth. Sarel (1996) suggests that reducing inflation offers substantial benefits which are reflected by increases in output. Sarel (1996) contends that a reduction in inflation by 1% will increase output by a margin of 0.5% to 2.5%.

2.6 Transmission Mechanism between Inflation and Economic Growth

The transmission mechanism between inflation and economic growth are based on the idea that inflation constricts returns to savings and because of this there is information asymmetry that negatively impacts financial institutions. This information asymmetry condition is known as information friction. The effects of information friction usually manifest in the form of credit rationing which hinders the supply of funds to profitable investments (inefficient allocation of funds). The

constriction in investment funds is the transmission mechanism or channel that compacts economic growth. This entails that credit rationing is an indication of the level of inflation in the economy as low inflation is associated with low credit rationing measures.

The transmission mechanism between inflation and economic growth is through financial intermediaries and then ultimately imposing direct effect on economic growth. Two transmission mechanism can be established and these are the level of investment and efficiency of investment. This can be shown diagrammatically in fig 2.1.

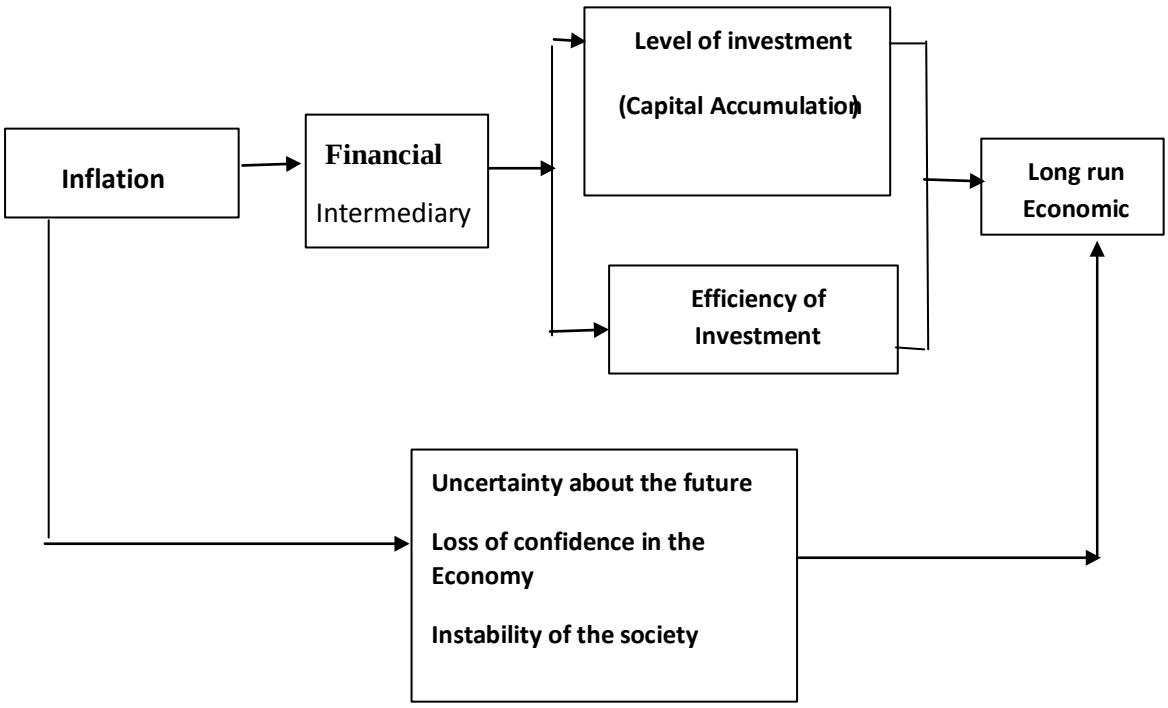


Fig 2.1 Transmission Mechanism between Inflation and Economic Growth (Source: Malik and Chowdhurry, 2001)

According to fig 2.1 the effects of inflation on financial intermediaries is a direct effect but the effect on economic growth in posed in two ways which are efficiency of investment and capital accumulation. These are the elements that pose a direct impact on economic growth.

2.7 Chapter Summary

This chapter has addressed both theoretical and empirical frameworks behind the association between economic growth and inflation. It was established that the Classical Growth theory posits that economic growth is determined by capital, labor and technology, and expressed in the form of a production function. The neo-Keynesian assumed when unemployment is above the natural rate and GDP is below its potential, an increase in prices propels inflation upwards. The neo-Keynesian suffered from limitations in that the natural level of unemployment and potential output cannot be determined with preciseness. Moreover, it can be criticized on the bases that inflationary behaviour is not symmetrical and it changes asymmetrically. This is because downward changes in prices are rigid. The Keynesian, classical, monetarism approach and the endogenous growth model are framework that incorporate the concept of money supply. Thus increases in inflation are seen as emanating from increases in money supply. These theories neglect other causes of inflation such as demand and costs etc. as a result they do not provide conclusive evidence about the association between economic growth and inflation. Central bank efforts were seen to be having two way channels where by efforts to control inflation poses effects or contagion effects on other economic variables such as growth, employment and export promotion. Despite general agreements that inflation poses harmful effects on the economy, there is a level of inflation that can be sustainable and does not pose harmful effects on economic growth. It was also noted that the transmission mechanism between inflation and economic growth is through financial intermediaries and then ultimately imposing direct effect on economic growth. However, it was noted that empirical literature does not also provide conclusive evidence about the relationship between inflation and economic growth. Moreover, the available literature showed that researchers have not yet reached a common consensus about the transmission mechanism or channels of inflation on economic growth. This therefore strongly justifies the conducting of this study. The next chapter will therefore proceed to look at the general overview of the Malaysian economy.

CHAPTER THREE

GENERAL OVERVIEW OF THE MALAYSIAN ECONOMY

3.1 The Malaysian Macroeconomic Environment Outlook

Looking back, Malaysia has experienced economic shocks such in the Asia financial crisis in 1997/1998 and most recently 2008/2009 global economic and financial crisis. Even with this adverse economic shocks Malaysia has managed to overcome them. A study done by the Asian Development Bank revealed that Malaysia will not face much of a challenge in being a high income economy, this is because Malaysia has managed to reach her 2015 Millennium development goals and has managed to incorporate the United Nations goals for sustainable development aimed at the year 2030.

Malaysia is characterized by world class physical infrastructure and a skilled workforce that benefit from social capital. One of her goals is to ensure that they attain an advanced economy by the year 2020. However, the challenge in reaching such an objective requires good moral, ethics and a better quality of life. On the down side again is the political situation that seems to be affecting economic agents especially investors, producers, markets and consumers. This is due to advancement in information technology. That is, media and the internet, as well as biased review from outside analysts.

The existence of economic busts and booms, investors turning back, institutional failures are all currently happening in Malaysia there by impacting negatively on the economy and financial sector. The Malaysian economy grew by 4.7% in the third quarter of 2015, this is a good sign for the economy regardless of pallid outside demand. The country's exports have contributed to growth by 40%.

A closer look at the macroeconomic medium perspective shows that risks are still evident but manageable. The US is hoping to provide the shot in the arm so as to boost Malaysia's services and goods together with its foreign exchange earnings. In the future Malaysia has to adapt to the new world economy so as to advance its economy.

3.2 Economic Growth Patterns in Malaysia

Malaysia is a country that enjoys a high standard of living due to its economic and social development patterns. Malaysia is a high income level country mainly because of its tin and rubber industries. World's largest production of tin and rubber which account for the high level 55 % of exports in the country. The Malaysian economic is rated as one of the fastest growing economy in the world (Badarudin, Khalid and Ariff, 2007). With these two resources being produced Malaysia has managed to develop entrepreneurs and managers with adequate skills and managerial expertise. Moreover the country has a vigorous private sector that is most efficient in public administration.

3.2.1 The Changing Pattern of Economic Growth

Dynamism is the major character of economic development. Speed is not such an important factor, however the dynamic attribute of any economy affects its attributes and aspirations. The following section will trace the economic development in Malaysia starting with the colonial era to the post-independence developments and recent trends.

3.2.2 The Colonial Development

The economic growth in Malaysia dates back to the 19th century where trade was the major source of its development with the Western countries. Because of the involvement with the West, trade became the key driver for economic development in Malaysia. This is supported by Sir Dennis Robertson who stated that foreign trade is apparently the 'engine of growth'. However, during this period there was no machinery to boost the path of economic development.

The nature of economic development during that time was referred to as lopsided economic development which was seen as no development at all. The economy encompassed the export sector as well as the domestic sector. These two sectors were key to the success of economic growth in Malaysian. The Malaysian economic development plan prior to the independence was meant to serve the lop sided pattern and dependent nature of the Malaysian economy (Badarudin, Khalid and Ariff, 2007).

3.2.3 Post-Independence Developments

Malaysia gained its independence in 1957. According to Badarudin, Khalid and Ariff (2007) the economy recorded an increase in economic growth of 9.9 % between 1965 and 1970, and GDP saw an increase from 10.4 % to 12.8% during the same period. The post-independence pattern is characterized by rapid usage of machinery to boost the development process.

3.2.4 The Need for Economic Development

The Malaysian economy faces a number of challenges, these include;

- The dependence on the major two exports, rubber and tin whose reserves are diminishing
- The country is faced with a high population increase, which poses a challenge to the labor force as every year new entrants compound the unemployment rate and this causes an increase of welfare costs that will be used to support the growing population
- The existence of unequal distribution of income

Because of its fast paced growing population, the country is in need of fast economic development so as to sustain the future population. The increasing population is evident in the increasing number of people seeking employment. If economic growth is not fast enough, the country will have to implement strategies in order to curb such a problem. Measures to be taken involve family planning to reduce birth rate, but this strategy is mostly likely to take time.

Economic development is a primary necessity of economic growth, this would require improvements in the standard of living that is better health care, quality education and good housing for the people. All this can be achieved through the improvement of economic infrastructure such as power, ports and roads.

3.2.5 Recent Trends

In the third quarter of year 2015, the private sector has contributed immensely to the country's economic growth. The GDP decreased to 4.7% in comparison to 4.9% of the previous year. This percentage reported is the lowest rate recorded over the past

nine quarters (Focus economics: 2015). The Malaysian government have forecasted a GDP of 4.5 % to 5.5% for the year 2015.

Fig 3.1 Annual GDP Growth Rate (Source: tradingeconomic.com)

The past two years have experienced fluctuation in the GDP. The highest GDP growth rate having been registered at 6.5 % during July 2014, over the following months the growth rate decreased, the reason behind this could be the inflation rate that increased.

The figure below shows the GDP growth rate in Malaysian from 1990 to 2012. As reflected in the figure below the country experienced it lowest GDP during 1997 and 1998 because of the global financial crisis. The highest GDP recorded in the figure was around 7.5 %.

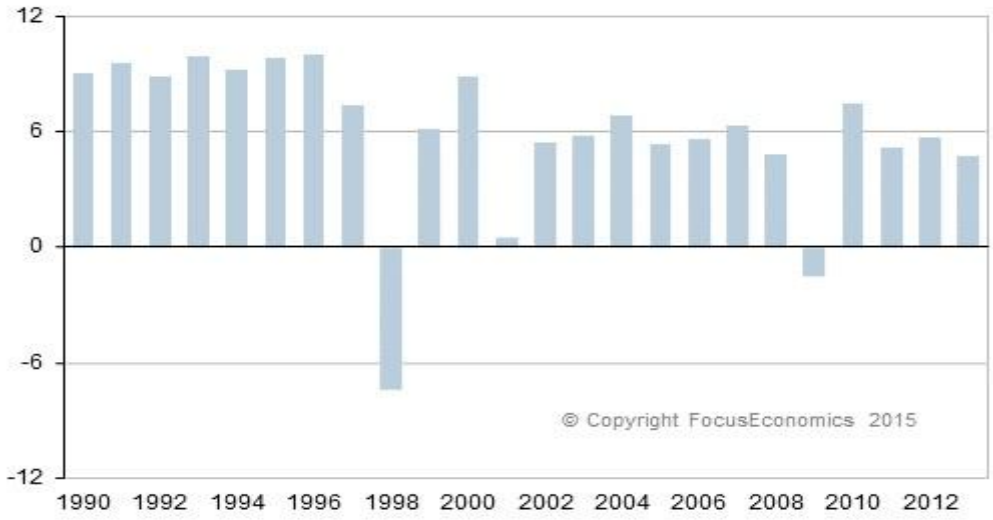


Fig 3.2 GDP for Malaysia (Source: Focus Economic, 2015)

3.3 Inflation Trends in Malaysia

3.3.1 Measuring Inflation in Malaysia

Inflation refers to the measure of consumer price index which is reflected as an annual percentage. It basically reflects the cost of acquiring the basket of consumer goods and services of a country. The CPI was used to measure inflation in Malaysia. During the computation of CPI, the Lapsers index was used to compute the rate of change in prices of different goods and services from different retail outlets (Public Bank Bernada, 2011)

The World Bank is the major source of data for obtaining inflation rate in Malaysia. The following figure provides inflation data in Malaysia from 1990 to 2014.

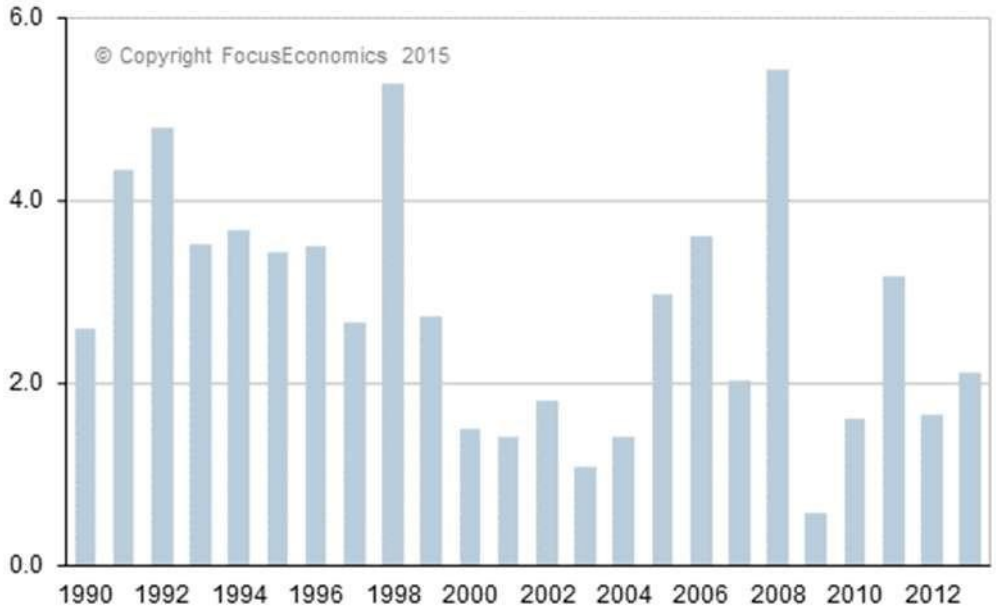


Fig 3.3 Inflation Trends from 1990 to 2012 (Source: Focus economics, 2015)

In an article by the Malaysian Star Newspaper (2013), it reported that consumers have had challenges in the rising prices of food and other necessities, the article suggested that consumers were having difficulties in price increases which were reducing their purchasing power. Economist reports show that Malaysia is experiencing an increase in inflation which the general citizens will not be able to adapt to. Reports made have shown evidence that prices are increasing at a faster rate than what is anticipated

The absence of subsidies has led to high price levels and in turn led to wage rate increasing so as to reimburse the workforce with an upper wage which would lead to higher costs of production. The increase in production will be transferred to consumers as they will experience an increase in goods and services leading to a cyclical phenomenon called the wage push inflation.

In order to be certain about the rate of inflation a comparison is required in order to measure the basket of goods from one country to another. With this in mind, the economist chose the MacDonald's big Mac which can found and produced in many countries including Malaysia.

The findings revealed that Malaysia had a positive index for the Big Mac and the actual rate. The economists compared this index with other countries such as the U.S and Japan and found that CPI was faring well (Star Newspaper, 2011).
Currently the Malaysian inflation stands at 2.5%, this is a bit higher than what economists assumed it would be at 2.4%. According to trading economics, inflation is predicted to be 2.40% by the end of the quarter. In the begging of the year the inflation average was recorded at 1.4 % mainly because of the reduction in petrol prices. The 2.5% is attributed to the rise in petrol prices from the 1st of June 2015.

Chew (1982) reported that the Malaysian Ringgit (Malaysia currency) fell due to inflation caused by a rumor that interest rates would rise during the economic meltdown. Research shows that an increase in interest rates has adverse effects on a currency. The Malaysia ringgit fell by 0.4 % to 4.1033 per dollar after an increase of 0.3% was recorded previously.

For the upcoming year, inflation rate is expected to be at 3.50 %, and for the year 2020 it is expected to be 3.47%. These forecast uses the ARIMA model (autoregressive integrated moving average). The model uses past data to make necessary adjustments on the econometric model to make future forecasts. Such forecasts are shown in table 3.1.

Table 3.1 Inflation Forecast for 2016 to 2020

Forecast	Actual	Q4/2015	Q1/2016	Q2/2016	Q3/2016	2020	Unit
Inflation rate	2.5	2.6	3.4	3.3	3.5	3.47	Percent

Source: tradingeconomics.com

3.4 Economic Growth vs Inflation in Malaysia

A very high inflation puts a strain on economic growth. The Public Bank Bernadin Malaysia reported inflation has insignificantly impacted economic growth because the inflation recorded over the years has managed to stay under control. Over the past 30 years the inflation in Malaysia was observed as gentle. The period of 1980s the inflation was recorded at an average of 3.65% and the1990s registered inflation at 3.7%. A drop in inflation was recorded in the year 2000s of 2.2 %. Over this period the economic growth in Malaysia was very good. In the 30 year period mentioned above, economic growth recorded at 5, 9 % per year (1980s), 7.3% (for the 1990s) and 5% per year in the 2000s.

Inflation was at its highest during the following periods

- 1980 -1982 caused by the oil price shock
- 1997-1998 caused by domestic demand and poor exchange rate for the ringgit currency
- 2008- Caused by resilient prices for commodities.

3.5 Malaysia's Economic Policies and Strategies

Strategies and policies are an important tool for curbing inflation and advancing economic growth of any country. Both economists and politicians in Malaysia agree that it is necessary to plan and implement these tools in order to see a brighter future for their economy.

3.5.1 Measures to Curb Inflation

In order to boost economic growth in a country, managing inflation is the driving force for stable development or growth. Managing inflation helps to preserve both social and political stability of any country. The main advantage of implementing measures is that it will prevent future inflation from sky rocketing.

Presently the monetary policy stance which is being employed in Malaysia is a strategy to prevent inflation from rising, but more so to manage the forecasted inflation. Monetary and non-monetary tools are used to deter high inflation. Monetary tools examples include interest rates, statutory reserves and exchange rates.

The non-monetary strategy that are used include food and fuel subsidies, tariff reduction on food and also the imposition of price ceilings (Public Bank Berhad, 2011). For basic food stuffs such as sugar and rice, the Malaysia government can issue permits to different companies rather than depending on a monopoly company to supply. This will lead to a reduction in the food bill which contributes 30% in to the consumer price index (CPI) weighting.

An upward swing in production will help reduce prices from rising. For example, to reduce the cost of health care, the Malaysia government can build more hospital and clinics. For example the Malaysia government has a clinic called the Malaysian Clinic that charges RM1 per visit. Such a project should be addressed to education that is building more schools and universities and reducing loans rendered to students. By so doing the government is investing in the future and as a result its economic growth.

Tax charged on the purchase of foreign government bonds and rendering limitations on particular purchase of local bonds by foreigners are measures that can also be used to curb inflation. In an attempt to minimize deflationary threats, most central banks have opted to minimize interest rates to as low as zero, and enforcing a loose monetary policy.

Fiscal policy can be used to address the rise of inflation. It does this by;

- Reducing unnecessary expenditure
- Increasing savings
- Planning a surplus budget, that is trying to generate as much revenue as it can and spending less of it.
- Increasing taxes but not so much that it would end up discouraging production, investments and savings.
- Postponing the payment of public debt.

Fiscal and non-monetary policy measures cannot be used alone to address the issue of rising inflation. The Malaysian government can therefore go as far as considering exercising its monetary policy through the following measures;

- Issuing a new currency- such a strategy is used when inflation is at its hyper stage.
- Credit control- the central bank of Malaysia control consumer credit by regulating it, also increasing banks rates and also increasing margin requirements.
- Demonetization of the currency- when they is excess money in the black market the government will have to demonetize the currency by introducing high denominations of money.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

This chapter deals with estimation procedures that will be undertaken to ascertain the association that exists between economic growth and inflation. As such, will encompass stationarity tests, co-integration, granger causality and diagnostic tests.

4.2 Model Specification

The study will adopt a vector auto regression model to ascertain the existence of co-integration and a model ordinary least squares regression method to examine the responsiveness of economic growth to changes in inflation using secondary data. The data used in the estimation process was retrieved from Federal Reserve Bank of St Louis (FRBL) and spanned from the period 1970-2014.

This study will adopt a model by Kasidi and Mwakanemela (2013) which was employed to examine the impacts of inflation on economic growth with regards to Tanzania. Kasidi and Mwakanemela (2013) employed co-integration and regression analysis to ascertain if a long run relationship exists between economic growth and inflation, and determine the responsiveness of economic growth to inflation. The results revealed that there is a negative relationship between economic growth and inflation. The primary model by Kasidi and Mwakanemela (2013) exhibiting the association between economic growth and inflation is expressed as follows:

$$\mathbf{GDP = \beta_0 + \beta_1 INFL + \mu} \quad \ldots\ldots\ldots\

Due to the formidable increases in initiatives to promote economic growth by the Malaysian government, policies and schemes targeted at promoting both foreign investment and domestic production have been taking toll in the Malaysian economy. Meanwhile patterns in imports of producer goods and gross savings have dramatically changed as well. This study therefore incorporates these elements to ascertain their impact on the association between economic growth and inflation. This is because these variables have shown significant variations in the Malaysian economy. Hence, excluding them from analysis will not project the real impact and transmission channels on economic growth. Thus in this study the following model will be used and will be based on time series data from the periods 1970 to 2014;

$$\mathbf{GDP = \beta_0 + \beta_1 GS + \beta_2 IMP + \beta_3 INFL + \mu} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{(2)}$$

Where, **GD**P = Gross domestic product

GS = Gross savings

IMP = Imports

μ = error term

The study will also attempt to ascertain the responsiveness of economic growth to a change in both the independent variables. Such responsiveness is termed elasticity and this is essential in determining the responsiveness of economic growth to a change in inflation. Converting the data to logs also helps to deal with the problem of heteroscedasticity. There the model can be remodeled as follows'

$$\boldsymbol{LGDP = \beta_0 + \beta_1 LGS + \beta_2 LMP + \beta_3 LINFL + \mu} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{(3)}$$

4.3 Stationarity Tests

Gudjarat (1997) outlined that stationarity is a condition that exists when the data's covariance, variance and mean have do not have a unit root. This implies that the variables' mean and variance are time invariant biased. Implications of stationarity can be noted in spurious results will can contain a high R square and the coefficients are associated with high t-statistics as well. Unlike regression, co-integration requires that there be a unit root in the model variables but becomes stationary when integrated at first difference, I (1). Thus to ascertain the presence of unit root in the

model data variables, Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests will be employed. The ADF and PP tests are based on the following auto regressive model;

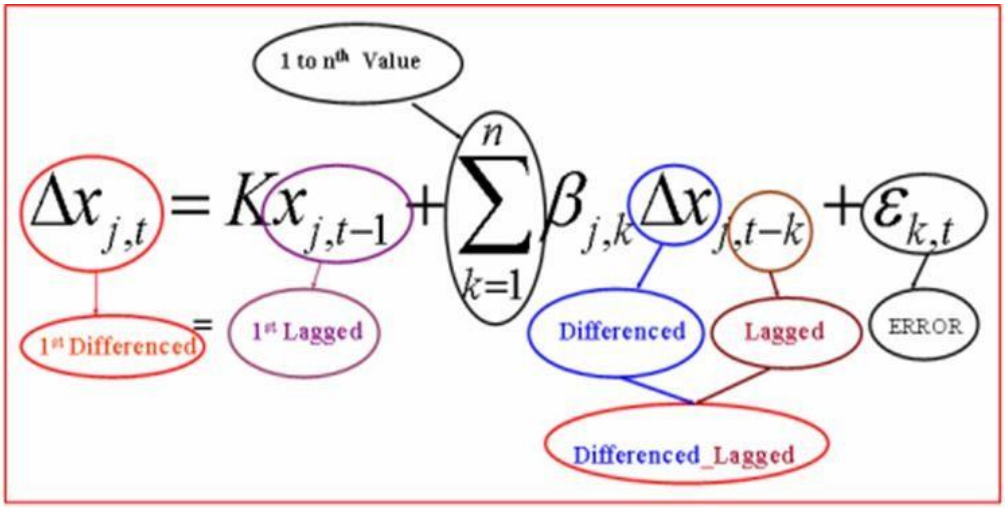


Figure 4.1 Stationarity auto regression model (Source: Dickey and Fuller, 1981)

The utilization of a combination of ADF and PP tests stems from the notion that the PP has a capacity to detect and deal with autocorrelation whereas the use of the PP is flexible to changes in lags. The above figure can be used to econometrically give a detailed description of the ADF is given in express 1, 2 and 3 as follows;

$$\Delta X t = \beta 1 + \beta 2 + \delta X t\text{-}1 + \sum \alpha i \ \Delta Xt\text{-}i + \varepsilon t \ldots\ldots\ldots\

Julius (1990), co-integration is based on the Vector Auto Regressive model can be illustrated using the following model expression;

$Xt = C + \Pi kX_{t-1} + \cdots \Pi X_{t-k} + \varepsilon t$ …….....……..... (4)

Where: C = intercept vector

Xt, X_{t-1} and X_{t-K} = current and lagged vectors I(1)

Π_1, and Π_K = (n x n) coefficient matrices

$\boldsymbol{\varepsilon t}$ = vector of random errors

4.5 Granger Causality

Granger causality seeks to determine if one variable causes a change in the other variable and the direction of causality between the two variables. Assuming that we have two variables Xt and Yt, then granger causality can be employed to determine the causal relationship between the variables and their direction of causality. Specifically, a regression model of the nature which is shown below can be utilised to explain granger causality (Granger, 1988):

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + \text{error}_t \text{.}\ldots\ldots\ldots\ldots\ldots \quad (1)$$

When lagged values of x are incorporated the expression can be expressed as follows:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + b_p x_{t-p} + \cdots + b_q x_{t-q} + \text{error}_t \text{.}\ldots\ldots\ldots \quad (2)$$

It is pre-required that the lagged values of X are regressed in model must be enhance the explanatory power of the model and their t-statistics must be significant. The null hypothesis that *x* does not Granger-cause *y* is rejected when lagged values of *x* remain in the model.

Granger causality test will be utilized to research if there is causality economic growth and inflation. Bidirectional causality from economic growth to expansion is said to exist when the slacked GDP are factually not the same as zero and the arrangement of evaluated coefficients on the slacked Inflation is not measurably not quite the same as zero.

Then again, a unidirectional causality from monetary development to inflation happens if the arrangement of slacked financial development coefficients are not

measurably not quite the same as zero and the arrangement of slacked expansion coefficients are factually unique in relation to zero. Two-sided Causality exists when both relapses of monetary development and expansion coefficients are factually essentially not the same as zero (Engle and Granger, 1987).

4.5 Stability Diagnostics

Stability tests are tests that are undertaken to determine if the utilised model is stable, that is, if it satisfactorily satisfies the OLS assumption. This requires that both the model and the residuals be subjected to recursive estimate tests. The recursive test requires that both the model and the residuals values lie within a stipulated band. If not so, then a structural break is said to exist and the model is not stable. A stable model cannot be used for policy decision making.

4.7 Definition and Selection of Variables

4.7.1 Gross Domestic Product (GDP)

The dependent variable used in the regression is denoted by GDP which measures the economic growth rate of an economy. In this study, market prices GDP in US$ were used to estimate the model using data collected from FRBL from the period 1970-2014. It can be seen in figure 4.2 that the economic growth pattern for Malaysia has been unsteady since the period 1970-2014. Major drop in economic growth were observed in the period 1975, 1985, 1998, 2001 and 2009. An upward trend started taking toll in 2014 with a growth rate of 5.99%.

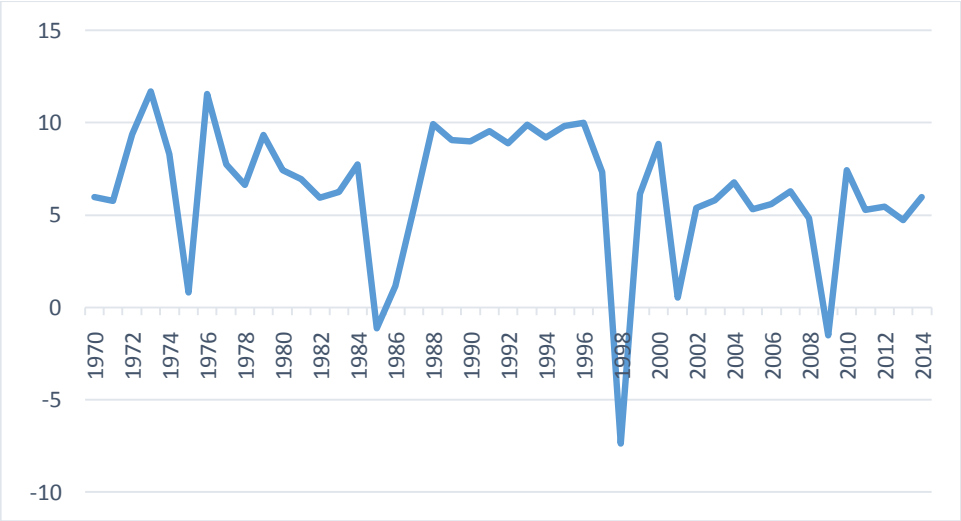


Figure 4.2 Economic growth trend 1970-2014 (Source: Researcher's own computation based on FRBL data)

4.7.2 Inflation Rate (INFL)

Inflation rate represented by the annual percentage growth rate of consumer price index (CPI), inflation is defined as a sustainable increase in the general level of price for goods and services. Obtained data from FRBL showed that the inflation rate for Malaysia has been relatively contained under a sustained level of 6%. A highest inflation rate of 17.34% was however recorded in 1974. A graphical description of the trend is shown in figure 4.3. The effects of inflation on economic growth are strongly asserted to be negative and ravaging by Kasidi and Mwakanemela (2013). This study seeks to determine if such results hold in Malaysia.

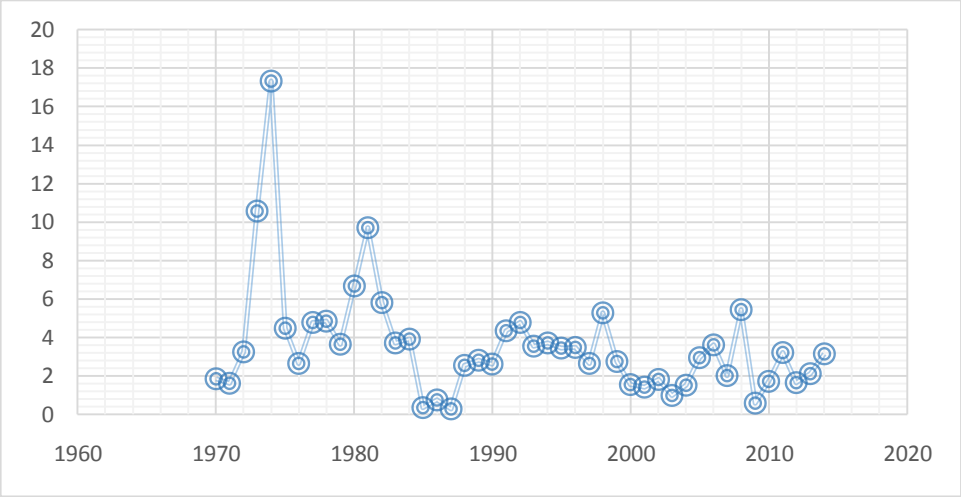


Figure 4.3 Experienced inflation levels 1970-2014 (Source: Researcher's own computation based FRBL data)

4.7.3 Imports (IMP)

Imports refer to goods and services that are purchased from other countries. Annual percentage changes in imports were used to estimate the model and spanned from the period 1970-2014 using data obtained from FRBL. It can be observed figure 4.5 that import levels for Malaysia have been on a steady increase. Kim et al. (2007) employed a VECM model to analyze the effect of imports on economic growth in South Korea. Results from the study should strong evidence of positive contributions from exports towards economic growth. A positive association is therefore expected between imports and economic growth.

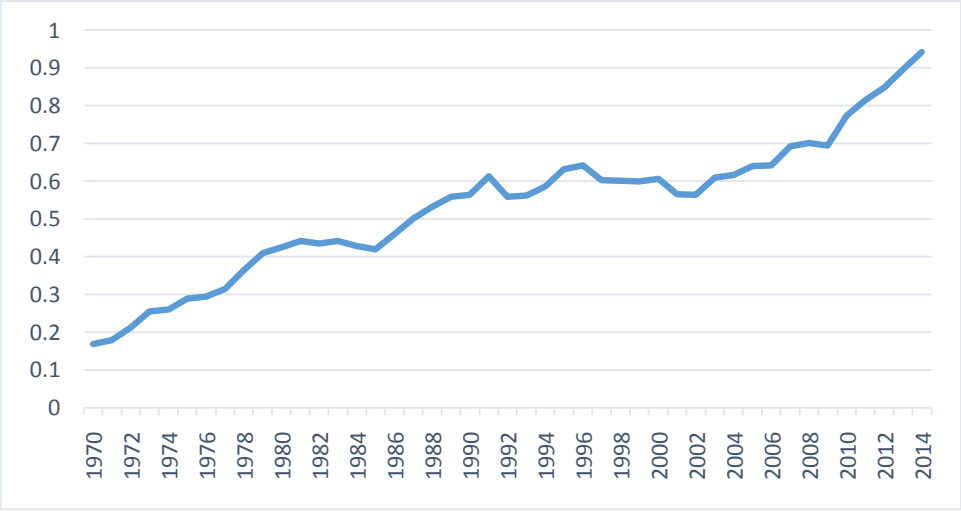


Figure 4.4 Malaysia's levels of imports 1970-2014 (Source: Researcher's own computation based FRBL data)

4.7.4 Gross Savings (GS)

Significant decline in gross savings was observed in 1998 when they submerged negatively below the 40% mark. Improvements are gross savings commenced in the early period of 2002 but such improvements have not maintained a constant favourable trend as shown below in figure 4.5.

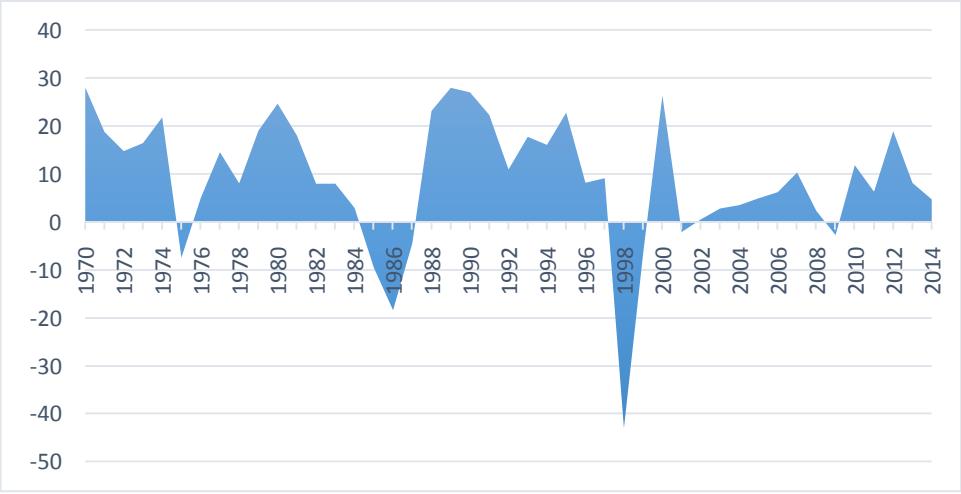


Figure 4.5 Levels of gross savings 1970-2014 (Source: Researcher's own computation based FRBL data)

A summary of data source sources used in this study and the respective variable with their expected association with economic growth is shown in table 4.1. Gross savings

were observed to be catapulting economic growth and hence a positive association between economic growth and savings is anticipated

.

Table 4.1 Data source and expected results

Variable	Data source	Period	Expected relationship
GDP	FRBL	1970-2014	……
GFS	FRBL	1970-2014	(+)
INFL	FRBL	1970-2014	(-)
IMP	FRBL	1970-2014	(+)

CHAPTER FIVE

ANALYSIS AND INTERPRETATION OF RESULTS

5.1 Introduction

This chapter provides an empirical evidence of the utilised data analysis and diagnostic tests provided in chapter four. Such techniques include ADF and PP stationarity tests, co-integration test, impulse response functions and variance decomposition. The main thrust behind this chapter is to offer numerical support that can used to offer concrete support about the impact of inflation on economic growth in Malaysia. Such a solid base of empirical results is essential in proffering sound policy recommendations. The obtained empirical results are herein discussed.

5.2 Stationarity Tests

Stationarity tests were performed to determine if the data has a unit root. The presence of a unit root signifies that the data is not stationary and this implies that the variance, covariance and mean are not stationary and thus results in spurious results especially in time series data. The ADF and PP were utilized to determine if the data has a unit root based on the null hypothesis that the data has a unit root. The results are presented in table 5.1

Table 5.1 ADF Stationarity Tests Results

Augmented Dickey Fuller Test @ Level						
Variables	**Intercept no Trend**			**Intercept and Trend**		
	Test Statistic	**Critical Value 1%**	**Prob***	**Test Statistic**	**Critical value 1%**	**Prob***
GDP	2.773261	-3.588509	1.0000	0.068505	-4.180911	0.9960
GS	-2.054833	-3.588509	0.2634	-2.431632	-4.180911	0.3591
IMP	0.072472	-3.588509	0.9599	-1.219390	-4.180911	0.8940
LINFL	-2.920491	-3.626784	0.0528	-2.959223	-4.234972	0.1572
	Augmented Dickey Fuller Test @ Ist Difference					
Variable	**Intercept no Trend**			**Intercept and Trend**		
	Test Statistic	**Critical Value 1%**	**Prob***	**Test Statistic**	**Critical Value 1%**	**Prob***
GDP	-5.691784	-3.592462	0.0000*	-6.881320	-4.186481	0.0000*
GS	-7.552156	-3.592462	0.0000*	-7.601225	-4.186481	0.0000*
IMP	-3.592462	-5.550922	0.0000*	-5.499481	-4.186481	0.0003*
LINFL	-5.768114	-3.615588	0.0000*	-5.665820	-4.219126	0.0002*
****Rejection of null hypothesis of unit root at 1% level of significance.***						

ADF tests results indicate that the data has a unit root and hence it can be said to be non-stationary. However, stationarity is observed when the data is first differenced, that is, I(I). Similar deductions can be made for the PP test but exceptions are observed with the variable inflation (LINFL) which is stationary at level and hence ADF test results are more preferable in this case.

Table 5.2 PP Stationarity Tests Results

PP Test @ Level						
Variables	**Intercept no Trend**			**Intercept and Trend**		
	Test Statistic	**Critical Value 1%**	**Prob***	**Test Statistic**	**Critical value 1%**	**Prob***
GDP	3.637257	-3.588509	1.0000	0.171854	-4.180911	0.9971
GS	-3.588509	-2.054833	0.2634	-4.180911	-2.457508	0.3466
IMP	-0.014969	-3.588509	0.9520	-1.471643	-4.180911	0.8244
LINFL	-3.857853	-3.588509	0.0048	-4.203741	-4.180911	0.0094
	PP Test @ Ist Difference					
Variable	**Intercept no Trend**			**Intercept and Trend**		
	Test Statistic	**Critical Value**	**Prob***	**Test Statistic**	**Critical Value**	**Prob***
GDP	-5.826279	-3.592462	0.0000*	-6.881320	-4.186481	0.0000*
GS	-7.891927	-3.592462	0.0000*	-8.203755	-4.186481	0.0000*
IMP	-5.553402	-3.592462	0.0000*	-5.501383	-4.186481	0.0003*
LINFL	-11.24493	-3.592462	0.0000*	-10.29999	-4.186481	0.0000*
****Rejection of null hypothesis of unit root at 1% level of significance.***						

5.3 Co-integration Test

Co-integration was conducted using the Johansen Co-integration test so as to determine if a long run relationship exists between inflation and economic growth. Thus the following hypothesis was subjected to testing;

H_0: There is no long run relationship between inflation and economic growth.

H_1: There is a long run relationship between inflation and economic growth.

Table 5.3 Johansen Co-integration Test

Unrestricted Co-integration Rank Test(Trace test)			
Hypothesized	**Trace**	**Sig. level: 0.05**	
No of CE(s)	**Statistics**	**Critical Value**	**Prob.****
None	47.54453	47.85613	0.0535
At most 1	21.26819	29.79707	0.3411
At most 2	5.455989	15.49471	0.7586
At most 3	0.851223	3.841466	0.3562
Trace test indicate no co-integration at the 0.05 level			
Unrestricted Co-integration Rank Test(Maximum Eigenvalue)			
Hypothesized	**Max-Eigen**	**Sig. level:**	
No of CE(s)	**Statistics**	**Critical Value**	**Prob****
None	26.27634	27.58434	0.0728
At most 1	15.81220	21.13162	0.2360
At most 2	4.604766	14.26460	0.7906
At most 3	0.851223	3.841466	0.3562
Max-eigenvalue indicates no co-integration at the 0.05 level			

Table 5.1 results exhibit that both trace and (Maximum Eigenvalue) tests show strong evidence of the absence of co-integration. Thus we reject hypothesis that there is a long run relationship between inflation and economic growth. Alternatively, the null hypothesis of no run lung relationship between inflation and economic growth is accepted at 5%. The normalized equation results are presented as follows;

LGDP = -1.007399**LGS -** 4.487764**LIMP -** 0.897013**LINFL**

It can be noted that a unit increase in gross savings results in a decrease in GDP by 1.01 units. This contradicts the results established in literature review which showed that there is a positive association between GDP and gross savings. Possible reasons suggest that savings are not being put to productive uses or are being spent towards consumption purposes at the expense of production. Imports can be observed to be negatively related with GDP by 4.488 which implies that a unit increase in imports results in a decrease in GDP by 4.488. This is in support of literature results which have also shown that there is a negative linkage that exists between GDP and imports. Imports in this case can be said to drain financial resources that can be used to finance domestic production and the composition of those imports is not contributing significantly to domestic production. A unit increase in inflation can be observed to cause a decrease in GDP by 0.897 and this contradicts study results established by Kasidi and Mwakanemela (2013). This suggest that the long run effects of inflation on economic growth are negative. Thus inflation can be said to be a big obstacle to economic growth.

5.4 Responsiveness of GDP to the Variables

The data was converted to logarithms so as to determine the responsiveness of economic growth to changes inflation. Such responsiveness is synonymously known as elasticity. Logs are also important in dealing with heteroscedasticity in time series data thereby making the data stationary. An ordinary least squares method was utilized to determine the responsiveness of GDP to a change in the independent variables. An R^2 of 0.9428 signifies that 94.28% variation in GDP is explained by imports, gross savings and inflation. The results are presented in table 5.4 and 5.5.

Table 5.4 Model Data Summary Results

R^2	0.9428
F-statistic	0.0000

Table 5.5 Responsiveness of GDP to the Variables

Variable	Coefficient	Std. Error	T-statistic	Prob
LGS	0.902371	0.305004	2.958558	0.0051*
LIMP	2.556407	0.137689	18.56659	0.0000*
LINF	-0.062795	0.057104	-1.099669	0.2779
C	2.717467	1.097452	2.476159	0.0175

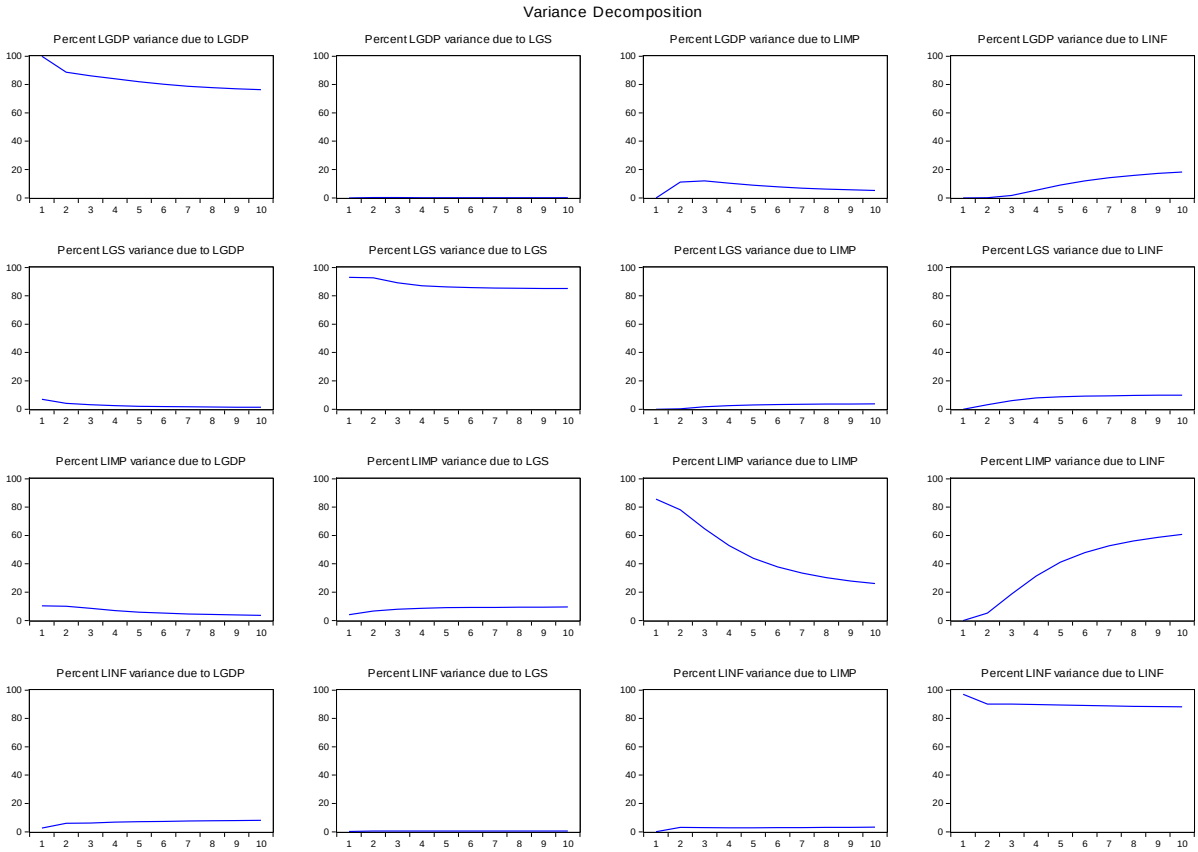
** Significant at 1% level of significance*

The elasticity coefficient of GDP to gross savings is inelastic (0.902) as it lies below 1. However, the elasticity coefficient of GDP to inflation is elastic since -0.0628. LGS and LIMP are significant at 1% as opposed to LINFL which is not. This contrast results established by Kasidi and Mwakanemela (2013) which showed that the elasticity coefficient is inelastic. Conclusions drawn by Kasidi and Mwakanemela (2013) revealed that inflation is an important determinant of economic growth in Tanzania. Thus it can be concluded that inflation is a relatively unimportant determinant in the Malaysian economy. This can be supported by the absence of no co-integrating equations in the long run.

5.5 Variance Decomposition

Variance decomposition shows the extent to which variations in variables is due to their associated innovations. From the above it can be noted that significant variations in GDP are due to variations in GDP itself and variations in imports and inflation. Innovations to GDP caused by imports commenced in the first year of the period under study while those caused by inflation commenced in the first half of year 2. The other variation is due to innovations in the other variables themselves. Significant variation in imports is positively related to changes in savings and inflation but variations caused by savings are less than those caused by inflation. Variations in inflation is slightly and positively attributed to inflation and insignificantly attributed to savings.

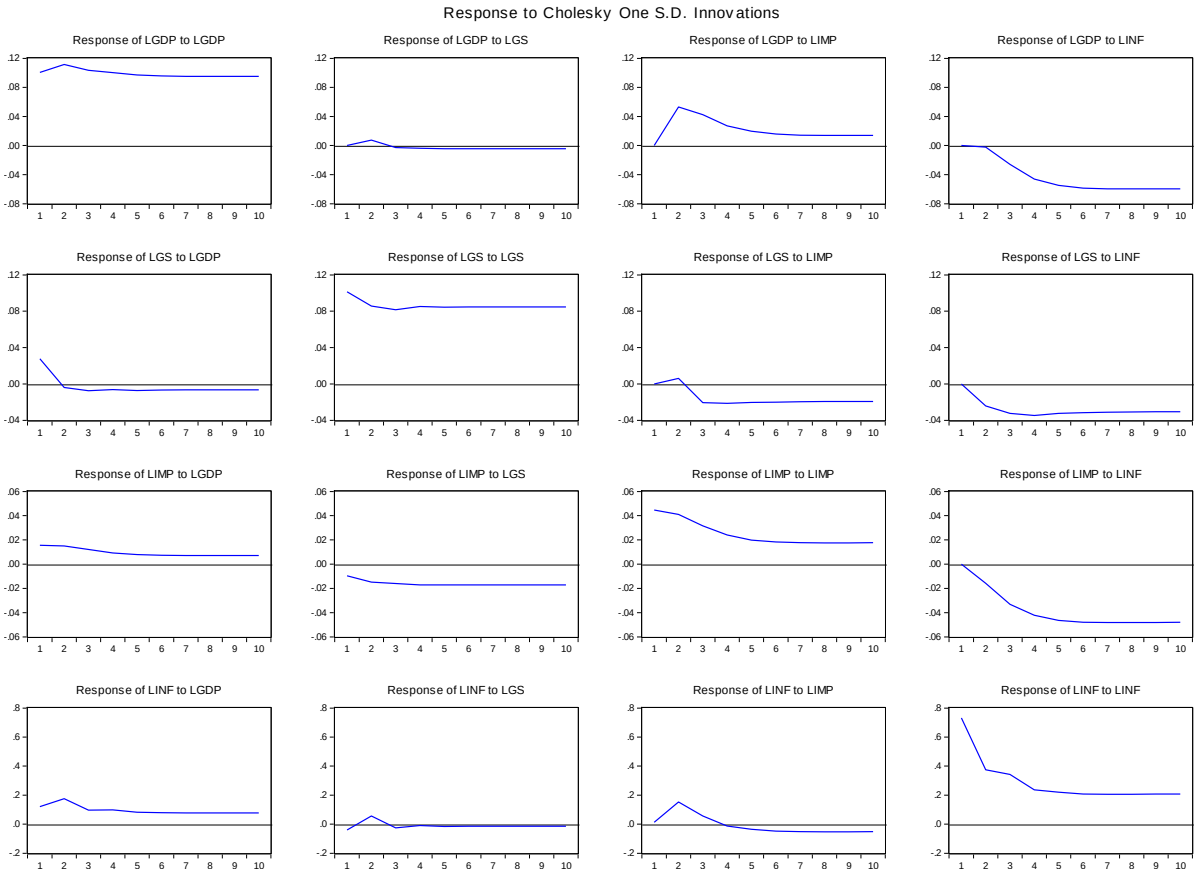
Figure 5.1 Variance Decomposition



5.6 Impulse Response Function

Impulse response functions are used to determine how endogenous variables react to each other. Impulse response functions were developed under VECM environment to determine how gross saving, imports and inflation react to each other. The results are shown in figure 5.6. It can be noted that economic growth is positively more responsive to changes in imports and negatively responsive to changes in inflation. This reinforces the notion that inflation negatively affects economic growth. Possible reasons attributed to an increase in economic growth following an increase in imports can suggest that the nature imports comprises of productive goods which are significantly contributing to economic growth. Gross savings can be observed to be negatively responding to changes in imports and inflation. This entails that much of the savings are being spent towards imports and inflation is eroding the value of savings and hence people opt to not to save. It can further be observed that inflation is relatively to a large extent not responsive to changes in economic growth. Thus in this respect economic growth can be said not to cause inflation.

Figure 5.2 Impulse Response Functions



5.7 Granger Causality

Table 5.6 Granger Causality

Null hypothesisll	Obs	F-statistics	Prob
LGS does not Granger Cause LGDP	43	1.03476	0.3651
LGDP does not Granger Cause LGS		2.09753	0.1367
LIMP does not Granger Cause LGDP		7.18211	0.0023
LDGP does not Granger Cause LIMP		3.64179	0.0357
LINFL does not Granger Cause LGDP	43	0.52989	0.5930
LGDP does not Granger Cause LINFL		3.34476	0.0459

LIMP does not Granger Cause LGS	43	0.10106	0.9041
LGS does not Granger Cause LIMP		0.13419	0.8748
LINFL does not Granger Cause LGS		2.34728	0.1093
LGS does not Granger Cause LINFL		0.48249	0.6210
LINFL does not Granger Cause LIMP		3.55249	0.0385
LIMP does not Granger Cause LINFL		3.77609	0.0319

It can be noted that gross savings do not granger cause economic growth and that economic growth do not granger cause gross savings. This is because their respective p-values are more than 5% and hence we can accept their null hypotheses. A contrasting analysis can be made for imports and economic growth. Since their p-values are less than 5% we can reject their null hypotheses. Thus it can be concluded that imports do granger cause economic growth and that economic growth granger causes imports. Economic growth can be said not to granger cause inflation but inflation granger causes economic growth. Thus there is a unidirectional relationship running from GDP to inflation. Bidirectional relationships can be said to exist between imports and gross savings; and inflation and gross savings while inflation and imports can be said to granger cause each other. The relationship between inflation and imports is thus bidirectional.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOPMMENDATIONS

6.1 Introduction

This chapter outlines policy implications that can be drawn from this study. As such, will proffer ideas that can be utilized to enhance economic performance and lower the negative consequences that are posed by increases in the rate of inflation. Such recommendations will be with regards to economic growth, inflation, imports and gross savings elements. This chapter will also dwell on conclusions that can be drawn from this study and proposed future areas of study.

6.2 Summary of Major Findings

The study employed the Johansen co-integration technique to ascertain the presence of a long run relationship between economic growth and inflation. The results of the study revealed that economic growth is negatively related with inflation. The OLS was also utilized to determine the responsiveness of economic growth to changes inflation, savings and imports. It was revealed that in the short run economic growth had an elastic responsive potency to changes in gross savings, and an insignificantly positive and inelastic responsive capacity to changes in inflation. This implied that low levels of inflation were necessary for economic growth. Results from variance decomposition exhibited that major variations in GDP in the long run were attributed to changes in inflation and imports levels. Meanwhile, impulse response functions revealed that the long run economic growth had high negative impulse responses to changes in inflation. Conclusions will therefore be drawn on these results.

6.3 Conclusions

Using the obtained results from this study, it can therefore be concluded that in the short run there is a threshold level at which the low levels of inflation rates have a stimulative capacity on economic growth which is relatively inelastic. Such a positive impact is being driven by sound and strategic capital goods import promotion and foreign direct investment policies that are being instituted by the Malaysian government. Low price increases are therefore setting in with an increased influx in imports of capital goods but the resultant increase in economic growth is greater than the increases in price levels.

Thus it can be concluded that there is a short run threshold rate of inflation beyond which will impose significant negative effects on economic growth. This means that low levels of inflation are necessary for economic growth but the increase in economic growth is relatively inelastic. Significant decline in economic growth will be observed when the inflation rate surpasses the threshold rate.

It can also be concluded that in the short run increases in imports are propelling Malaysia's economic growth but the extent to which they resultantly cause increases in economic growth is determined by the composition of imports. This implies that imports can be a negative driver of economic growth if they are hugely dominated by consumer goods.

Further conclusions can be drawn that gross savings have a positive effect on economic growth in the in short run. This is because Malaysia's financial system is highly diversified and hence has a greater capacity to mobilize savings which are being used as an engine of economic growth. It is in this regard that gross savings are being productively and effectively used in Malaysia in areas that promote economic growth.

In addition, it can also be concluded that inflation and imports are major forces behind the changes in Malaysia's economic growth. Hence implications can drawn that the ability of the Malaysian economy to grow depends on the ability to address import and inflation related issues.

An increase in imports has negative implications on gross savings in Malaysia and this being attributed to the notion that import incentives and schemes are being granted for the importation of strategic products. Thus it can be said that import opportunities are being regarded as lucrative and hence people in Malaysia are expending resources to imports.

In overall, it can be concluded that low levels of inflation have positive effects on economic growth and that unsustainable rates of inflation tend to restrict economic growth. It is in this regard that recommendations will be proffered.

6.4 Recommendations

Results obtained have shown strong evidence that low levels of inflation tend to negatively affect economic growth in the short run. This is implies that resultant change in economic output are being outstripped by positive changes in prices. Therefore recommendations can be made that monetary authorities should put measures that can promote positive changes in GDP. However, monetary and fiscal policies can be employed to contain inflation within the desired limits. This can be coupled with subsidies to lower costs of production. In relation to this notion, individually on firm level are advocated to undertake measures that will result in increase in productivity. Such measures may include investing in efficient technology or better methods of production.

The increase in imports can be seen to be inflationary and thus measures must be implemented to combat the soaring import levels. This might be done so as to discourage imports in favor of domestically produced products. Such measures may include availing incentives and other schemes to domestic producers so that they remain competitive and producing quality products at affordable prices and costs. Moreover, measures and schemes can be used to promote imports of productive goods or goods that are strategic to the functioning of the economy.

From the positive short run relationship between gross savings and gross domestic product policy implications must therefore be designed in a manner that promote

individuals to save more. As such can encompass increasing interest rates on deposits and lowering deposit fees. An increase in interest rates on savings deposit is therefore a means to continually lure customers to save more. This should be coupled with reduction in deposit fee.

Measures are also recommended that steps be undertaken to promote economic growth by creating employment, investing in capital accumulation and technological advancement. Moreover, economic growth initiatives can be enhanced through strategic imports promotion of capital goods that are pivotal to economic growth. Such imports of capital goods can be incentivized or can involve import schemes being given to strategically important industries.

6.5 Suggestions for Future Research

This study has offered significant insights about the impact of inflation on economic growth with regards to Malaysia. However, it was discovered during the course of the study that trade was moving positively with economic growth but the available data was incomplete and hardly accessible to enable examination of the impact of trade on economic growth. Hence other studies can however incorporate trade as an explanatory variable that can be used to aid explaining the impact of inflation on economic growth.

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List of Appendices

Appendix 1: Lag Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LGDP LGS LIMP LINF
Exogenous variables: C
Date: 05/14/16 Time: 07:49
Sample: 1970 2014
Included observations: 42

Lag	LogL	LR	FPE
0	-40.63581	NA	9.85e-05
1	109.9978	265.4021*	1.63e-07*
2	123.1801	20.71507	1.90e-07
3	132.5143	12.89004	2.76e-07

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 2: Co-integration results

Date: 05/23/16 Time: 19:18
Sample (adjusted): 1972 2014
Included observations: 43 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LGS LIMP LINF
Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.457234	47.54453	47.85613	0.0535
At most 1	0.307693	21.26819	29.79707	0.3411
At most 2	0.101553	5.455989	15.49471	0.7586
At most 3	0.019601	0.851223	3.841466	0.3562

Trace test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.457234	26.27634	27.58434	0.0728
At most 1	0.307693	15.81220	21.13162	0.2360
At most 2	0.101553	4.604766	14.26460	0.7906
At most 3	0.019601	0.851223	3.841466	0.3562

Max-eigenvalue test indicates no co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integrating Coefficients (normalized by b'*S11*b=I):

LGDP	LGS	LIMP	LINF
-1.280480	1.289954	5.746490	1.148606
-2.225352	3.804389	5.949326	-1.280160
-0.123878	7.935257	-2.488705	0.139059
2.993621	-2.456405	-6.091725	0.009389

Unrestricted Adjustment Coefficients (alpha):

D(LGDP)	-0.002248	-0.010381	0.013758	-0.011264
D(LGS)	-0.026282	-0.002393	-0.021483	-0.008961
D(LIMP)	-0.032976	-0.007210	0.007403	-1.48E-05
D(LINF)	-0.151858	0.342970	0.062117	-0.023019

1 Co-integrating Equation(s): Log likelihood 113.3019

Normalized co-integrating coefficients (standard error in parentheses)

LGDP	LGS	LIMP	LINF
1.000000	-1.007399	-4.487764	-0.897013
	(1.11261)	(0.56626)	(0.23630)

Appendix 3: Responsiveness- Ordinary least squares

Dependent Variable: LGDP
Method: Least Squares
Date: 05/14/16 Time: 07:56
Sample: 1970 2014
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGS	0.902371	0.305004	2.958558	0.0051
LIMP	2.556407	0.137689	18.56659	0.0000
LINF	-0.062795	0.057104	-1.099669	0.2779
C	2.717467	1.097452	2.476159	0.0175

R-squared	0.942803	Mean dependent var	3.933251
Adjusted R-squared	0.938618	S.D. dependent var	1.193399
S.E. of regression	0.295669	Akaike info criterion	0.485538
Sum squared resid	3.584235	Schwarz criterion	0.646130
Log likelihood	-6.924594	Hannan-Quinn criter.	0.545405
F-statistic	225.2740	Durbin-Watson stat	0.389109
Prob(F-statistic)	0.000000		

NEAR EAST UNIVERSITY
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Economics Master's Program
Thesis Defense

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We certify the thesis is satisfactory for the award of degree of Master of Economics

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