

**THE RELATIONSHIP BETWEEN INFLATION, EMPLOYMENT AND ECONOMIC
GROWTH IN NIGERIA: 1970 - 2012**

BY

BULA YUNAH BULUS, B.SC (ABU) 2008

M.SC/SOC-SCI/07123/ 2010 - 2011

**BEING A RESEARCH THESIS SUBMITTED TO THE DEPARTMENT OF
ECONOMICS, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR
THE AWARD OF MASTERS OF SCIENCE DEGREE
IN ECONOMICS**

NOVEMBER, 2014

DECLARATION

I **Bula Yunah Bulus** (M.Sc./Soc-Sci/07123/2010-2011) hereby declare that this research work titled “**The Relationship between Inflation, Employment and Economic Growth in Nigeria: 1970 - 2012**” was undertaken by me under the supervision of **Prof. Abdul-Ganiyu Garba** and **Dr. M. C. Duru**. To the best of my knowledge, the work has not been presented anywhere for the award of Bachelor of Science or Masters of Science Degree in any institution of learning. All sources of information, materials and quotations used for this study was duly acknowledged by means of references.

.....

Bula Yunah Bulus

M.sc./Soc-Sci/07123/2010-2011

.....

Date

CERTIFICATION

This is to certify that this research thesis work “**The Relationship between Inflation, Employment and Economic Growth in Nigeria: 1970 - 2012**” conducted by **Bula Yunah Bulus** meets the requirement for the award of Masters of Science Degree in Economics in the Postgraduate School, Ahmadu Bello University, Zaria. The thesis work is this day approved for its contribution to knowledge and literally presentation.

.....
Prof. Abdul-Ganiyu Garba
Chairman, supervisory committee

.....
Date

.....
Dr. M. C. Duru
Member, supervisory committee

.....
Date

.....
Dr. (Mrs) Salamatu Isah
Head of Department (H.O.D),
Department of Economics,
A.B.U. Zaria

.....
Date

.....
Prof. Hassan A. Zoaka
Dean of Postgraduate School,
A.B.U. Zaria.

.....
Date

DEDICATION

This thesis is dedicated to the Almighty God, my parents; Mr and Mrs. Yunah Bula Kelle, Benjamin Y. Bula and Belinda Lirwanu who stood by me all the way.

ACKNOWLEDGMENTS

My appreciation first goes to the Almighty God, who manifested on every stage of this study. He has proved His supremacy by meeting all my needs beyond expectations. Indeed, He is Awesome. Halleluyah to His most Holy Name! I employ the Holy Spirit to express my heartfelt gratitude.

I am greatly indebted to my supervisors, **Prof. Abdul-Ganiyu Garba** and **Dr. M. C. Duru**. Thank you for your patience, painstaking corrections and incisive comments. The contributions you have made to this study and I in person have created an indelible mark in my heart; because you did not only disciple me academically but you have also assumed the position of my parents.

I will also thank **Prof. Mike Kwanashie, Prof. G. D. Olowonini, Prof (Mrs) P. S. Aku, Dr Sanusi Rafindadi, Dr Peter Njiforti, Dr. S. A. Abdulsalam, Dr. M. Usman, Dr. Ishaya Audu, Dr. Jibrin Mohammed, Dr. J. Adama, Malam Auwal Umar, Malam Dahiru Suleiman and Malam Ya'u Hamisu** for their suggestions and contribution. All members of the postgraduate committee are highly appreciated for their suggestions and contributions to this thesis work. I will also express my heartfelt gratitude to my Head of Department; **Dr. (Mrs). Salamatu Isah**. I also appreciated the Departmental Librarians, departmental computer instructor (Buhari) and non academic staff of the department (both junior and senior) for the role they played to make this work a success.

I am also grateful to my family. First, to my parents: Mr and Mrs. Y. B. Kelle, Mr. Benjamin Yunah Bula and Mrs. Belinda Lirwanu. You did support both in finance and in prayers. In fact, one of the sources of my confidence and inspirations to approach difficult situations and moments in the course of this study has been from your constant calls to reassure me of your

prayers every day. I appreciate your contributions in various ways. To my uncles and aunties: Mr. and Mrs. Obet Bula Kelle, Mrs. Rebecca S. Modi, Mrs. Rebecca Raymond Bula, Mr. Gibson Bula Kelle, Mrs. Dorcas Muranga, Mr. and Mrs. Zethan Fashim, Mr Simon Joshua Maina, Mr and Mrs. Nathan D. Jamiyel, Mrs. Ruskanah Ali, Mr. and Mrs. Heman Jamiyel, Mr. Lirwanu Sheegey, Mr and Mrs. Abednego Galadima, Mr and Mrs. David Lakwasa, Mr. and Mrs. Jonathan Dandi, Mr. and Mrs. Japtha Danbaki, Mr. and Mrs. Micah Kamat, Director Planning and Staff of Ministry of Economic Planning, just to mention a few. Thank you for your help and prayers.

To my friends, cousins and well-wishers: Danlami Bula, Zakayo Bula, Kiliyobas Memi, Gabriel Memi, Edward Sanda, Sandra Jonas Garba, Nathan Njengo, Clement Ibrahim, Ishaku Obet, Hanatu Obet, Raechel Raymond, Raphela Raymond, Rosebell Raymond, Amaya Fashim, Timothy Fashim, Frank Fashim, Yomimbe Daniel, Yulguoy Muranga, Cecelia Jamiyel, Iliya Jamiyel, Dauda Jamiyel, Samuel Maina, Dafe Silas Bello, Laurena Felix, Linda Sukar, Afodia Ibrahim, Sarah Lakwasa, Dorcas Lakwasa, Jacob Zakari, Victor Jibrin, Lawrence Yayirus, Steven Alaso, Numji Bawa, Husaini Audu, Janet Japtha, Joshua Yakubu, Laban Lot Luka, Samuel Bebe, Solomon Katto, Idibia James, Emeka Dingwoke, Ejiro Mudiare, Mr and Mrs Samuel Kehinde Alehile, Usman Isah, Emmanuel Bulus, Shinkut Hilary, Maryam Salisu Momoh, Deborah Bitrus, Emmanuel Yahaya, Grace Garba Gadi, Margret Haggai, Abigael Haruna Dalla, Mercy Abba, Mrs. Agabi, and 2010-2011 M. Sc. Class members. Space will not permit me to mention all; however, I sincerely express my gratitude to all that contributed to the success of this study.

TABLE OF CONTENTS	Pages
Title Page	i
Declaration	ii
Certification	iii
Dedication	iv
Acknowledgments	v
Table of Content	vii
List of Tables	xii
List of Figures	xiii
List of Appendices	xiv
Definition of Necessary Abbreviations	xv
Abstract	xvi
 CHAPTER ONE	
1.0 GENERAL INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem	4
1.3 Research Questions	6
1.4 Objectives of the Study	7

1.5 Research Hypotheses	7
1.6 Significance of the Study	7
1.7 Scope and Limitations of the Study	8
1.8 Organization of the Study	8

CHAPTER TWO

2.0 LITERATURE REVIEW	9
2.1. Concept and Measurement	9
2.1.1 Labour Force, Employment and Unemployment	9
2.1.2 Measuring Unemployment rate, Employment rate and Labour Force participation rate	10
2.1.3 Inflation, Growth and Gross Domestic Product (GDP).....	19
2.1.4 Measuring Inflation and GDP Deflator.....	20
2.2.0 Theoretical Analysis of the Relationships between Inflation, Employment and Economic Growth	26
2.2.1 AD-AS Model	26
2.2.2 Okun’s Theory	27
2.2.3 Traditional Phillips Curve	29

2.2.4 Modern Phillips Curve	31
2.2.5 Sacrifice Ratio	32
2.3 Empirical Analysis of the relationship between Inflation, Employment and Economic Growth	34
2.4 Gap in Literature	44
 CHAPTER THREE	
3.0 RESEARCH METHODOLOGY	45
3.1 Theoretical Framework	45
3.1.1 Relationship between Inflation and Growth	46
3.1.2 Relationship between Output Gap and Unemployment	49
3.2 Trend Analysis	50
3.3 Model Specification	52
3.3.1 Effects of Unemployment and Growth on Inflation	53
3.3.2 Effects of Unemployment and Inflation on Growth	55
3.4. Estimation Technique	56
3.4.1 Unit Root test.....	57
3.5 Expected Results	57

3.6 Source of Data	58
--------------------------	----

CHAPTER FOUR

4.0 PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULT	59
---	----

4.1. The Hodrick-Prescot (HP) Filters trend Series Analysis	59
---	----

4.1.1 Hodrick-Prescot (H P) Trend Analysis of Inflation, Unemployment and Real GDP: 1970 – 1993	59
--	----

4.1.2 Hodrick-Prescot (H P) Trend Analysis of Inflation, Unemployment and Real GDP: 1994 – 2012	62
--	----

4.1.3 The Hodrick-Prescott (HP) Filter de-trended Series Analysis: 1970 – 2012	64
---	----

4.2 Estimation Results and Analysis.....	66
--	----

4.2.1 Stochastic Properties of the Series.....	66
--	----

4.2.2 Regression Results and Analysis	66
---	----

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS	74
---	----

5.1 Summary of the Study	74
--------------------------------	----

5.2 Conclusion of the Study	75
-----------------------------------	----

5.3 Recommendations of the Study	75
--	----

5.4 Contribution to Knowledge	75
-------------------------------------	----

REFERENCES	77
-------------------------	-----------

LIST OF APPENDICES 85

LIST OF TABLES

	Pages
Table 2.1 Labour force participation Rate (%) by sex for Nigeria: 1990 -2011.....	15
Table 2.2 Nigerian National Unemployment rates: 1990 - 2012.....	16
Table 2.3 Urban and Rural Unemployment rates: 1990 -2011	17
Table 2.4 Unemployment rate by Age Groups: 2009 -2011	18
Table 2.5 Unemployment rate by Gender: 2009 - 2011	18
Table 2.6 Unemployment rate by Educational Attainment: 2004 - 2011	19
Table 2.7 Inflation rates: 1990 - 2012	24
Table 2.8 Nigeria Real GDP growth rates; 1990 - 2012.....	25
Table 3.1 Averages of Inflation rate, Unemployment rate and Real GDP	52
Table 4.1 Augmented Dickey Fuller Unit Root test of the Series	66
Table 4.2 Estimates of Inflation as Dependent Variable (1970 - 2012)	67
Table 4.3 Estimates of Inflation as Dependent Variable (1981 - 2012)	67
Table 4.4 Correlogram Q- Statistics Residua Diagnostic test	68
Table 4.5 Estimates of Growth as Dependent Variable (1970 - 2012)	70
Table 4.6 Estimates of Growth as Dependent Variable (1981 - 2012)	71

LIST OF FIGURES

	Pages
Figure 2.1: Unemployment Trend	16
Figure 2.2: Trend of Inflation rate	24
Figure 2.3: Trend of Real GDP Growth rate	25
Figure 2.4: The AD- AS Curve	27
Figure 4.1: Hodrick-Prescott (HP) of Inflation, Unemployment and Real GDP from 1970 - 1993.....	61
Figure 4.2: Hodrick-Prescott (HP) of Inflation, Unemployment and Real GDP from 1994 - 2012.....	63
Figure 4.3 Hodrick Prescott (HP) Filters de-trended Series Analysis	65

LIST OF APPENDICES

	Pages
Appendix I	85
Appendix II	87
Appendix III	88

DEFINITION OF NECESSARY ABBREVIATIONS

CMPR CHANGE IN MONETARY POLICY RATE

COEXR CHANGE IN OFFICIAL EXCHANGE RATE

CPI CONSUMER PRICE INDEX

INF INFLATION RATE

INF_{t-1} EXPECTED INFLATION

MPR MONETARY POLICY RATE

NGDP NOMINAL GROSS DOMESTIC PRODUCT

OEXR OFFICIAL EXCHANGE RATE

OP OPENNESS

RGDP REAL GROSS DOMESTIC PRODUCT

TGE TOTAL GOVERNMENT EXPENDITURE

UNEM UNEMPLOYMENT RATE

Abstract

This study investigates the relationship between Inflation, Employment and Economic Growth in Nigeria from 1970 to 2012 because of the problem of rising unemployment in a period of falling inflation and above 6% growth. The main objectives were to estimate relationships between Inflation, employment and economic growth and to infer the policy implications of the relationships. The study used secondary data and employed GMM technique to estimate the relationships. The study finds that: unemployment is positively correlated with growth contrary to Okun's Law of a negative relationship; inflation is negatively correlated with unemployment as stipulated by the Phillips curve; inflation is negatively related to growth and significant and the Phillips relationship is unstable over time. The study concludes that lower inflation is associated with increased growth and growth is non employment generating. It further concludes the existence of a Phillips relationship which is not stable over time. From these findings, the study recommends the need for policy makers to face the challenge of making growth employment generating.

CHAPTER ONE

1.0 GENERAL INTRODUCTION

1.1 Background of the Study

The key objectives of macroeconomic policies are the attainment of full employment, maintenance of relative stability in domestic prices, achievement of sustainable level of economic growth, maintenance of balance of payments equilibrium and exchange rate stability. These objectives can change from time to time depending on the economic fortunes and problems of a particular country. Obviously the subject matter of macroeconomics is of crucial importance because in one way or another macroeconomic events have an important influence on the lives and welfare of everybody. To Brain (2006), in the long run, real economic growth is the means by which the nation achieves higher living standards. It is difficult to overstate just how important satisfactory macroeconomic performance is for the well-being of the citizens of any country. An economy that has successful macroeconomic management should experience low unemployment and inflation, and steady and sustained economic growth or if not vice versa. To Jerry (2011), faster economic growth might be considered desirable, as would lower unemployment and inflation rates. However, there may be limits to how compatible those goals are. The success of macroeconomic policy cannot be measured by just one of these variables in isolation, because they are interdependent. Understanding that there may be limits that influence the behaviour of these variables is critical.

Inflation is one of the macroeconomic problems the Nigerian economy is facing. The average inflation rate from 1990 to 1998 is 33.3% and from 1999 to 2006 is 13.3%. From 2007 to 2012, the average rate is 11.01%. Inflation rate has been fluctuating over the years. From CIA World

Facts 2011, Nigeria's inflation rate is the 7th in the world where Venezuela is ranked first (30% for 2010). It is undoubtedly that these problems are a major cause of the general weakness of the Balance of Payments and the foreign reserves, and if continued it would almost certainly make the present rate of exchange untenable (Vikesh and Subrina, 2004).

Economic growth is much dependent on a number of factors especially for an economy like Nigeria which had witnessed various levels of decline in growth of some sectors (NBS, 2011). The economy is broken down into two broad groups namely: oil and non-oil sectors. In terms of contribution to real Gross Domestic Product, the Oil sector contributed 14.84 percent to real GDP in 2011, down from 15.70 percent it contributed in 2010 (NBS, 2011). According to NBS (2011), Real Gross Domestic Product (GDP) on an aggregate basis is 7.36 percent in 2011 as against 7.98 percent in the previous year. The economy grew at an average of 6.5 percent between 2000 and 2012.

Unemployment is also one of the most critical problems Nigeria is facing. Nigeria is endowed with diverse resources, both human and material. However, years of negligence and adverse intervention policies have led to the under utilization of human resources. These resources have not been effectively utilized in order to yield maximum economic benefits. Within the past five-year period there has been an average of about 1.8 million new entrants into the active labour market per year (NBS, 2011). The rate of unemployment in Nigeria stands at 23.9% for 2011 (NBS, 2011). To Sodipe and Ogunrinola (2011), economic growth is not the only solution to curb unemployment in Nigeria, as official statistics illustrate that previously unemployment did not always decline with economic growth.

The Nigerian economy has grossly underperformed relative to her enormous resource endowment than her peer nations. It has the 6th largest gas reserves and the 8th largest crude oil reserves in the world (Sanusi, 2010). The Federal Government (FG) has continued to make intervention policies aimed at reviving the ailing economy.

Aminu and Anono (2012) noted that the relation between unemployment and inflation is of interest in macroeconomics which was first studied by A. W. Philips. According to Phillips, a lower unemployment rate is associated with a higher rate of inflation. That is no longer widely considered to be a sustainable policy. That there is a stable relationship between the rate of economic growth and changes in the unemployment rate was first argued by Arthur Okun (Knotek, 2007). He empirically investigated the relationship between growth and unemployment and found an inverse relationship. It has become one of a number of discussions of many policy makers in Nigeria because of the jobless growth situation. The AD/AS model also provides us with the implications of equilibrium in the labour, goods and financial markets (relationship existing between inflation and growth) through the movement of output and prices. Various studies have found different kinds of relationships existing between inflation, employment and growth.

Understanding of macroeconomics, its objectives and goals, the dynamic relationship that exists between such goals and the policy implications of the dynamic relationships, is important in macroeconomic targeting and policy. To Jerry (2011), policy analysts need to consider a better procedure for making policy decisions when information about the state of the economy is limited and knowledge of how the economy works is incomplete. According to Guglielmo and Marinko (2011), unless the quantitative dynamic relationships between these variables (Inflation, Employment and Growth) are known exactly by policy makers, their actions are likely to result

in an overshooting or undershooting of the targeted equilibrium. Moreover, without this knowledge, it is not even possible to choose optimally the particular level of economic activity that should be targeted. A proper understanding of the employment, inflation and growth dynamic relationship is very important to policy makers in solving macroeconomic problems.

1.2 Statement of Problem

From a macroeconomic perspective, not all of the economic news in recent years has been good (Fatukasi, 2004). The level of economic indicators and dynamic relationships among economic variables are all essential in the formulation of policies. Policymakers and central bankers from both developed and developing world are so much interested in the level of economic indicators because of their impact on macroeconomic stability (Hussain and Malik, 2011).

Central Bank of Nigeria over the years have tried to keep inflation at a lower level of single digits but inflation still remain in double digit for some time. The Monetary Policy Rate (MPR) from 2011 to date has been 12% as set by the Monetary Policy Committee so as to tame inflation to single digit among other policy objectives but the varying double digit inflation remains. Taming inflation to a single digit is generally aimed by policy makers all over the world because of cost associated with high and varying inflation (Vikesh and Subrina, 2004). Furthermore, with the current slow increase of PMS (Petrol) price by the government as at January 2012, there is the possibility of slow rising general prices of goods and services.

The problem of unemployment in Nigeria raises serious concern to policy makers. Despite several interventions (NDE, NAPEP etc) by the government to curtail the problem of unemployment, the situation still persists (Sodipe and Ogunrinola, 2011). Akpan (2012) further stressed it is important for us to note that there have been government strategies and programmes

designed over the years to ameliorate the unemployment situation in the Nigerian economy but government efforts have not yielded the desired results as these problems are still lingering. Such intervention policies have also been ineffective with the population increase and poverty situation of the country. Youth and non-Youth unemployment also remains a problem because both category of unemployment are increasing. It is expected that as youth unemployment increases, non-youth unemployment should not follow suit. Statistical data have also shown that rural unemployment has been on the increase over years (World Bank, 2011).

The problem of job expectations and job opportunities of an increasingly large unemployed graduates and underemployed raises a number of important and challenging policy questions. A major and challenging problem is the appalling gap between growth in productive employment opportunities and the total Labour force.

From recent statistics, both inflation and unemployment rate are within the double digit region. Statistically, the Nigerian economy is also growing but still experiencing unemployment (jobless growth) which is contrary to economic theory (the Okuns law). It is apparent that the growth experienced is non employment generating. It is expected that there should be a threshold level where growth will be employment generating but as the economy grows, unemployment also increases. The unemployment situation always adds to the dependency ratio. According to Vinaye (2011), there are recent reports that Africa's impressive growth performance in recent years has not generated significant employment opportunities, especially for the youth and much of the growth has been driven by exports of natural resources that offer limited potential for job creation.

Records have also shown that new schools and universities have been opened over the years and enrollment into higher institutions has been on the increase (NBS, 2011). Available evidence

suggests that about thirty (30) millions youths who are able and willing to work cannot find employment (Akpan, 2012). Thus trained labour thrown into the labour market each year in the country usually outstripped the available vacancies and worsens the unemployment situation.

The phenomenon of high (double digit) inflation and unemployment and the jobless growth has implications on real economic activities which need to be regulated. There is considerable disagreement over which of the two (inflation or unemployment) is more harmful. All these economic situation and problem have the possibility of worsening the economy and increasing crime. This is because of its impact on the living standard and wellbeing of the populace.

This situation presented a serious puzzle to policy makers who expected desired results from policy interventions. In devising and implementing appropriate economic policies in Nigeria, adequate quantitative knowledge and understanding on how the economic system works is necessary (Ben, 2008). But in order to bring this knowledge to bear on the problem of formulating and attaining a consistent set of policy objectives, we require also knowledge of the quantitative dynamic relations between economic variables (Arturo and Fredric, 1999). Finally, a proper understanding of the employment, inflation, and growth dynamic relationship might also be instrumental to avoiding problems in policy and render more help in formulating fiscal and monetary policy.

1.3 Research Questions

From the above discussions, the research questions are:

1. What are the relationships between inflation, employment and economic growth in Nigeria?
2. What are the implications of these relationships for economic policy?

1.4 Objectives of the Study

The objectives of the study include:

1. To investigate the relationships between inflation, employment and economic growth.
2. To deduce policy implications.

1.5 Research Hypotheses

In line with the above objectives, the study sought to test the following hypotheses.

H₀: There is no significant relationship between Inflation, Employment and Economic Growth in Nigeria.

H₁: There is a significant relationship between Inflation, Employment and Economic Growth in Nigeria.

1.6 Significance of the Study

This study is potentially useful as an ex post evaluation that is relevant for policy purposes to macroeconomic policy makers in the economy. In addition, it contributes to the literature on economic growth, inflation and employment relationship. Furthermore, it contributes to the understanding of the employment, inflation and growth dynamic relationship which might also be instrumental to avoiding or at least alleviating cycles. Knowledge of relation would lead to modification of the objectives (to attaining a particular policy) to make them consistent since an economic relation is only the result of fairly regular patterns of human behaviour. This will further lead to some modification of institutions or behaviour which would alter relation so as to permit some more desirable combinations of consistent aims (Phillips, 1962). In his 1962 article,

Phillips stressed the importance for policy makers of acquiring information about the nature of the quantitative relationship between employment growth, inflation and output growth in order to take appropriate policy measures. This study therefore serves as a guide for Nigerian macroeconomic policy makers when designing tools, targets, and measures for achieving macroeconomic objectives and goals. The aim is to avoid more damaging effect of inappropriate policy formation and direction. The result of the study is of importance to the Federal Government and Central Bank of Nigeria in developing policies that will positively affect the nation and bring about development base on performances of macroeconomic aggregates.

1.7 Scope and Limitations of the Study

The scope of the study covers the period 1970 to 2012. The period covers many policy changes in the Nigerian economy particularly planning (1970 - 1985) and the Structural Adjustment and its aftermath (1986-2012). The main limitation of the work is the quality of data. The data on employment and unemployment is less regularly collected compared to other macroeconomic data. It is important that the National Bureau of Statistics (NBS) improves on the quality and timeliness of economic data.

1.8 Organisation of Work

The study is organized into five chapters. Chapter one is the general introduction while chapter two is the conceptualization, theoretical and empirical literature. In chapter three, the research methodology is discussed and Chapter four presents, analyses and interprets the results. Chapter five is the summary, conclusion and recommendation. The study also presents the list of references and appendixes at the end of the work.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Concepts and Measurement

2.1.1 Labour Force, Employment and Unemployment

The Labour Force is the total number of the population that are gainfully employed and are not employed but are willing to work. It (Labour Force) must fall within a particular age bracket depending on the country during a particular period of time. According to Mankiw (1994), the Labour Force is the total number of workers, comprising the employed and the unemployed for a particular period. Mankiw defined employment as the number of employed people that are paid employees, self employed and unpaid workers in a family business. He also defines unemployment as the number of people not working who have looked for work during the previous 4 weeks.

According to National Bureau of Statistics (2011), the Labour Force comprises of people ages 15 to 64 who meet the International Labour Organization (ILO) definition of the economically active population (the employed and the unemployed) for a particular period. The employed population consists of persons aged 15 to 64 who have been at work for pay or profit during the 30 days before enumeration or who have had formal job attachment (NBS, 2011). The unemployed population comprises of all those persons aged 15 to 64 who fulfill the following conditions; Have not had a job and have not performed any work for pay or profit during the 30 days period before enumeration, have been available for work during the 30 days period before enumeration and have sought work during the 30 days before enumeration (NBS, 2011).

2.1.2 Measuring Unemployment rate, Employment rate and Labour Force Participation rate

When statistics are compiled for the Labour market, the population is classified either as being in the Labour Force or not in the Labour Force. Population in the Labour Force is also classified as either employed or unemployed. To Markus and Evi (2011), the adult population is the potential Labour Force (ages 15 or 16years and over). Adult population comprises of the population in the Labour Force and the population not in the Labour Force (inactive Labour Force). The Labour Force Participation Rate is the percentage of the adult population that is in the Labor Force (Mankiw, 1994).The percentage of the Labour Force that is employed and unemployed is the employment rate and unemployment rate respectively (Mankiw, 1994). According to National Bureau of Statistics (2010), unemployment rate is defined as the ratio of the total number of unemployed (ages 15-64 years) for the country (Nigeria) or a specific group of workers relative to the corresponding Labour Force (the sum of the total persons employed and unemployed).

To Mankiw (1994), Labor Force is expressed as:

$$L_t = E_t + U_t \dots\dots\dots (2.1)$$

Then, $E_t = L_t - U_t \dots\dots\dots (2.2)$

and $U_t = L_t - E_t \dots\dots\dots (2.3)$

Where, L_t is Labour Force in time t, E_t is number of Employed in time t and U_t is number of Unemployed in time t.

Dividing **eqn. 2.3** by the Labour Force (**L**) we have:

$$U_t/L_t = (L_t - E_t)/L_t \dots\dots\dots (2.4)$$

$$U_t/L_t = (L_t/L_t) - (E_t/L_t) \dots\dots\dots (2.5)$$

$$U_t/L_t = 1 - (E_t/L_t) \dots\dots\dots (2.6)$$

The above equations (**eqn. 2.5** and **eqn. 2.6**) give us the unemployment rate.

The Unemployment rate expressed in percentage is:

$$U_t/L_t = (U_t/ L_t) \times 100 \dots\dots\dots (2.7)$$

Unemployment Rate as expressed in **eqn. 2.7** is U_t/L_t and the Labour Force is the sum of the employed and unemployed which is also denoted in **eqn. 2.1**. The number unemployed is the difference between the number of persons in the Labour Force and the number of persons employed which is also expressed in **eqn. 2.3**.

The Unemployment rate depends on the number of people entering the Labour Force, the number of people seeking jobs (either getting the job or not) and number of people losing jobs (Adawo et al, 2012). Short-term changes in the unemployment rate relates to changes in employment and the Labour Force (Robert and James, 2000). To understand how unemployment rate is influenced by Employment and Labour Force, it is useful to begin by writing the expression for unemployment rate in terms of employment.

The ratio, E_t/L_t from **eqn. 2.5** and **2.6** is the proportion of the Labour Force that is employed which is the employment rate. The Employment Rate expressed in percentage is:

$$E_t/L_t = (E_t/L_t) \times 100 \dots\dots\dots (2.8)$$

The above expression (**eqn. 2.5** and **2.6**) shows that the unemployment rate rises when employment decreases relative to the size of the Labour Force and the unemployment rate falls

when employment increases also relative to the size of the Labour Force. This shows a negative relationship exists between employment and unemployment rate.

In the same vein from **eqn. 2.5 and 2.6**, assuming the Labour Force changes and the number of employed remain constant, the unemployment rate also changes showing a positive relationship existing between Labour Force and unemployment rate.

From **eqn. 2.6**, if we also assume the rate of change in Labour Force and employment to be the same, the unemployment rate remains constant.

However, if we use the symbols ΔL and ΔE for changes in the Labour Force and employment between two periods, we will have:

$$\Delta UR = \Delta (U/L) = (\Delta L/L) - (\Delta E/E) \dots\dots\dots (2.9)$$

Where **L** and **E** are the initial values of the Labour Force and employment, respectively, Δ is change, ΔL is change in Labour Force between two periods, and ΔE is change in employment between two periods. Dividing the change in a variable by its initial value gives the growth rate of the variable. So $\Delta L/L$ is the rate at which the Labour Force is growing and $\Delta E/E$ is the rate at which employment is growing.

Equation **(2.9)** confirms that if employment rises faster (or falls more slowly) than the Labour Force ($\Delta E/E > \Delta L/L$) then the unemployment rate falls ($\Delta UR < 0$). And if employment rises more slowly (or falls faster) than the Labour Force ($\Delta E/E < \Delta L/L$) then the unemployment rate rises ($\Delta UR > 0$). Furthermore, if Labour Force rises faster (or falls more slowly) than the employment ($\Delta L/L > \Delta E/E$) then the unemployment rate increases ($\Delta UR > 0$). And if Labour Force rises more slowly (or falls faster) than the employment ($\Delta L/L < \Delta E/E$) then the unemployment rate falls ($\Delta UR < 0$).

If we further assume a fixed Labour Force and Unemployment rate (**fixed at the natural rate**), the number of people losing jobs must be equal to the number of people finding jobs (Adawo et al, 2012). The natural rate of unemployment is determined by looking at the rate people are finding jobs (**F**), compared with the rate of job separation that is People quitting job (**S**). It is expressed as:

$$F(U) = S(E) \dots\dots\dots (2.10)$$

We can find the steady-state unemployment rate (the natural rate of unemployment) from **eqn. 2.2** which was expressed as:

$$E = L - U \dots\dots\dots (2.11)$$

That is the number of the employed equals the Labour Force minus the unemployed. This implies that:

$$F(U) = S(L - U) \dots\dots\dots (2.12)$$

Dividing both sides of the equation by the Labour Force (**L**) will give:

$$F(U/L) = S(1-U/L) \dots\dots\dots (2.13)$$

To solve for **U/L (Natural Rate of Unemployment)**, we have:

$$F(U/L) = S - S(U/L) \dots\dots\dots (2.14)$$

$$F(U/L) + S(U/L) = S \dots\dots\dots (2.15)$$

$$U/L(F+S) = S \dots\dots\dots (2.16)$$

$$U/L = S/ (F+S) \dots\dots\dots (2.17)$$

Where **E** is number of Employed, **U** is number of Unemployed, **F** is Job Finding Rate (which represents the fraction of unemployed people who are able to find a job) and **S** is Job Separation Rate (which represents the fraction of employed workers who lose their job).

This equation (**eqn. 2.17**) means that the rate of unemployment depends on the rate of job separation (**S**) and job finding (**F**). That is the unemployment rate (**U/L**) is positively related to the job separation rate and negatively related to the job finding rate. Therefore, a higher **S** will lead to a higher unemployment rate while a larger **F** yields a lower natural rate of unemployment. In conclusion, to reduce the natural rate of unemployment, **S** must be reduced or **F** must be increased.

The Labour Force Participation Rate is the ratio of the Labour Force to the Potential population. According to Robert and James (2000), the Labour Force Participation Rate (**LPR**), is expressed as:

$$LPR_t = (L_t/POP_t) \dots\dots\dots (2.18)$$

Where **LPR_t** is Labour Force Participation Rate in time **t**, **L_t** is Labour Force in time **t** and **POP_t** is Potential Population in time **t**.

The Labour Force Participation Rate (**LPR**) may be rearranged to yield an expression for the size of the Labour Force which is:

$$L = (LPR \times POP) \dots\dots\dots (2.19)$$

We can imply from the equation above (**eqn. 2.19**) that the growth rate of the Labour force is approximately the sum of the growth rates of the Labour Force Participation Rate and the Potential Population (Robert and James, 2000):

$$\Delta L/L = (\Delta LPR/LPR) + (\Delta POP/POP) \dots\dots\dots (2.20)$$

This implies that changes (Δ) in the Labour Participation Rate and Potential Population will affect the size of the Labour Force.

Table 2.1 shows that there was an increase of women labour participation rate from 39% in 1990 when compared to 2011 rate which is 48.1%. The average female labour force participation rate for the period 1990-1998, 1999-2006 and 2007-2011 is 41.2%, 46.3% and 47.8% respectively. For the same period, that of male is 71.9%, 64.1% and 62.8% respectively. It is clearly obvious that the Labour force participation rate of men is higher than those of women. In year 2011, the percentage of women that participated in Labour force can still be termed as low because is less than 50%. This is consistent with the view that women generally have higher rates of unemployment and especially of under-employment and disguised unemployment than men and finds it difficult to re-enter employment once they lose their jobs (Lim, 2002).

Table 2.1: Labour Force Participation rate (%) by Sex for Nigeria: 1990-2011

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Female	39	39.5	40.1	40.6	41.2	41.7	42.3	42.9	43.5	44.2	44.8
Male	74.7	74.1	73.5	72.8	72.1	71.4	70.6	69.7	68.8	67.8	66.8

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	45.5	46.1	46.8	47.5	47.5	47.6	47.6	47.7	47.8	47.8	48.1
Male	65.7	64.0	63.1	61.7	61.9	62.1	62.3	62.6	62.8	63.0	63.2

Source: World Bank, 2011

From table 2.2, the average unemployment rate from 1990 to 1998 is 3.1%. From 1999 to 2007, the average unemployment rate became 13.1% and from 2007 to 2012 is 19.1%. Year 1990 to 1999 shows unemployment rate was lower. Unemployment has been increasing over time and most especially from the early 2000's till date. This shows that the unemployment rate has been on the increase in the post military period (democratic regime) because it was lower during the military rule. The rate was higher in 2000 and has been fluctuating at a higher level in the millennium (2000's).

Table 2.2: Nigerian National Unemployment rates: 1990 – 2012

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
RATE	3.5	3.1	3.4	2.7	1.95	1.8	3.4	3.2	3.2	3	18.1

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
RATE	13.7	12.2	14.8	11.8	11.9	13.7	14.6	14.9	19.7	21.1	23.9	22.3

Source: NBS, 2011

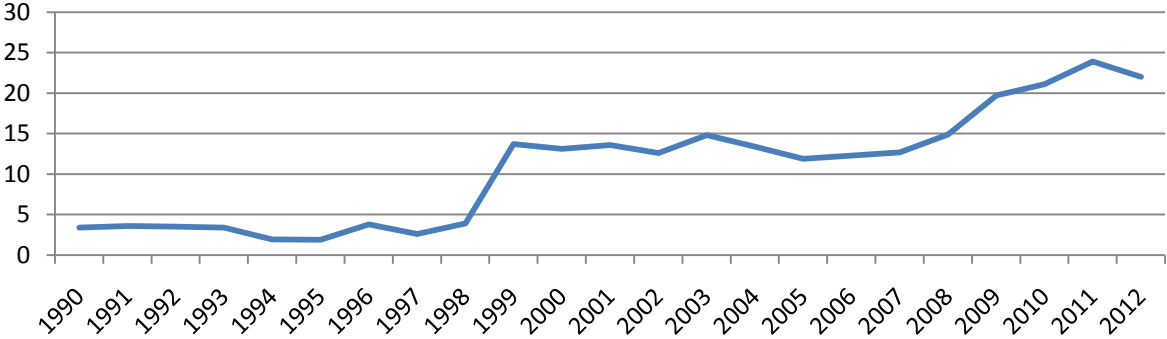


Figure 2.1: Unemployment rate Trend

Table 2.3 has shown that rural unemployment has been increasing over time from 1999 which was 15.1% to 25.6% in 2011. The average urban unemployment rate for the period 1990-1998, 1999-2006 and 2007-2011 is 4.5%, 11.8% and 16.5% respectively. For the same period, the average rural unemployment rate is 2.8%, 14.9% and 19.3% respectively. It also indicate that it is within the period (1999-2011) that rural unemployment became more than urban unemployment. Urban unemployment was only more than rural unemployment in the early 1990's. This has shown that rural unemployment has been higher in the democratic dispensation.

Table 2.3: Urban and Rural Unemployment rate: 1990-2011.

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
URBAN	5.73	5.18	4.83	4.03	3.03	3.35	5.90	3.80	5.50	10.8	14.2
RURAL	2.85	3.20	2.98	3.23	1.83	1.60	3.4	2.4	3.5	15.1	19.8

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
URBAN	10.3	9.5	17.1	11.0	10.2	10.9	10.8	12.6	19.2	22.8	17.1
RURAL	15.1	13.5	13.8	12.1	14.6	14.8	14.5	15.8	19.8	20.7	25.6

Source: Adopted from Cyril and Chijioke (2010) and NBS 2009, 2010 and 2011

Table 2.4 has shown that the problem of youth unemployment tends to be more because the age brackets 15-24 and 25-44 experiences higher unemployment in both the rural and urban areas within the period 2009 to 2011. Analysis of unemployment rate by age groups shows that the rate of unemployment was highest among age group 15-24 years, which was 49.9% (urban) in 2009. The age group 45-59 years recorded the lowest unemployment rate of 10% in 2009. This means that youth unemployment raises serious concern to policy makers.

Table 2.4: Unemployment rate by Age Group: 2009-2011

YEAR	2009	2009	2009	2010	2010	2010	2011	2011	2011
AGE	URBAN	RURAL	NAT.	URBAN	RURAL	NAT.	URBAN	RURAL	NAT.
15-24	49.9	39.6	41.6	26	24.8	25.2	33.5	38.2	37.7
25-44	16.3	17.3	17.1	22.7	19.6	20.7	16.3	24.1	22.4
45-59	10	12.1	11.5	20.8	19.3	19.9	12.5	19.6	18.0
60-64	18.2	16.2	16.7	22.5	20.6	21.3	17.8	22.1	21.4

Source: NBS, 2011 and CBN Annual Report 2011

Table 2.5 shows the average unemployment rate for male from 2009 to 2011 is 20.03% and that of female from the same period is 23.5%. Gender analysis of unemployment shows that female and male unemployment rates were respectively 24.3% and 23.5% in 2011. It is worth noting that female unemployment rates were higher in both rural and urban areas for all the periods.

Table 2.5: Unemployment rate by Gender: 2009-2011

YEAR	2009	2009	2009	2010	2010	2010	2011	2011	2011
GENDER	URBAN	RURAL	COM	URBAN	RURAL	COM	URBAN	RURAL	COMP.
MALE	17.2	16.9	17	21.6	18.5	19.6	16.9	25.1	23.5
FEMALE	21.7	23.9	23.3	24.2	23.1	23.5	17.2	26.1	24.3
NAT.	19.2	19.8	19.7	22.8	20.7	21.4	17.1	25.6	23.9

Source: NBS, 2011 and CBN Annual Report 2011

The average unemployment rate for those that have never attended school from 2009 to 2011 is 20.1%. The average in the same period for those that have primary school certificate is 19.4%. For those that have secondary school certificate, the average for the period 2009 to 2011 is 22.6%. It is 21.5% for those that have attended post secondary.

Table 2.6: Unemployment rates by Educational Attainment: 2004-2011

YEAR	Never Attended School	Primary School	Secondary School	Tertiary (Post Secondary)
2004	12.8	8.7	13.0	9.5
2005	12.5	8.4	14.4	9.8
2009	20.1	14.8	23.8	21.3
2010	17.9	21.8	23.9	23.1
2011	22.4	21.5	20.0	20.2

Source: Adopted from Robert (2012).

2.1.3. Inflation, Growth and Gross Domestic Product (GDP)

Inflation is define as persistence and continuous rise in the general price level of a broad spectrum of goods and services in a country over a period of time. By definition, inflation is a persistent and appreciable rise in the general level of prices (Jhingan, 2002). According to Fatakusi (2004), inflation has been widely described as an economic situation when the increase in money supply is faster than the new production of goods and services in the same economy. To Imimole and Enoma (2011), policy analyst usually try to distinguish inflation from an economic phenomenon of a onetime increase in prices or when there are price increases in a narrow group of economic goods or services. Inflation expectation is the rate of inflation that workers, businesses and investors think will prevail in the future, and they will therefore factor into their decision-making. It is then the expectations that consumers have concerning future inflation.

Growth is generally viewed as increase in value. Jorge and Omar (2012) define economic growth as the process by which national income or output increases. According to Jorge and Omar, an economy is growing if there is a sustained increase in the actual output of goods and services per

head. Furthermore, John (1997) also sees growth as an increase in economic variable, which is normally persisting over successive periods.

Gross Domestic Product (GDP) is the measure of a nation's goods and services that it produces over a period of time. GDP growth is then the increases in value of the nation's goods and service that are produced over successive periods. The goods and services that are measured are those that the country actually produces within its borders. Another measure of economic growth often referred to is the Gross National Product (GNP). The GNP is the sum of all production of a nation's permanent residents regardless of the production which occurred within that country's borders. Real Gross Domestic Product (RGDP) is mostly used as a measure instead of Nominal GDP. The output approach is used in Nigeria over the expenditure and income approach.

Nominal Gross Domestic Product (NGDP) is Gross Domestic Product evaluated at current market prices. Nominal GDP includes all of the changes in market prices that have occurred during the current year due to inflation or deflation. Real Gross Domestic Product is GDP evaluated at the market prices of some base year. For example, if 1990 were chosen as the base year, then Real GDP for 2011 is calculated by taking the quantities of all goods and services purchased in 2011 and multiplying them by their 1990 prices.

2.1.4. Measuring Inflation and GDP Deflator

The CPI (Consumer Price Index) is one of the measures of inflation which measures the price of a representative basket of goods and services purchased by the average consumer and calculated on the basis of periodic survey of consumer prices. CPI is available on monthly, quarterly and annual basis.

Another measure of price movements is the Gross Domestic Product (GDP) Deflator. A GDP deflator has to do with the overall production of goods and services in an economy. It is a price index which adjusts the overall value of GDP according to the average increase in the prices of all output. The GDP deflator equals the ratio of Nominal GDP to Real GDP and is available on an annual basis. However, it is rarely used as a measure of inflation. Other inflation measures include Wholesale Price Index (WPI) and Producer Price Index (PPI).

The National Bureau of Statistics uses the Laspeyres Price Index when calculating inflation in Nigeria.

The CPI using the Laspeyres Price Index is expressed as:

$$\mathbf{CPI}_t = \sum (\mathbf{P}_t \mathbf{q}_0) / \sum (\mathbf{P}_0 \mathbf{q}_0) \times 100 \dots\dots\dots (2.21)$$

Where \mathbf{CPI}_t is Consumer Price Index in time t, \mathbf{P}_t is the Current price, \mathbf{P}_0 is price in the base period and \mathbf{q}_0 is the quantity used in the base period.

Nominal Gross Domestic Product (NGDP) using the output method is measured as Prices of output multiplied by quantities of output which is expressed as:

$$\mathbf{NGDP}_t = \sum (\mathbf{P}_{it} \mathbf{Q}_{it}) \dots\dots\dots (2.22)$$

The Real GDP is measured by choosing a set of prices, called base year prices so that output of goods and services would not be influenced by changes in prices. Goods and services are then added up using these base year prices to value the different goods in both years. It is expressed as:

$$\mathbf{RGDP}_t = \sum (\mathbf{P}_{it,j} \mathbf{Q}_{it}) \dots\dots\dots (2.23)$$

The GDP Deflator is expressed as:

$$\mathbf{GDPD}_t = (\mathbf{NGDP}_t / \mathbf{RGDP}_t) \dots\dots\dots (2.24)$$

The Real GDP can also be calculated from the GDP Deflator as:

$$\mathbf{RGDP}_t = (\mathbf{NGDP}_t / \mathbf{GDPD}_t) \dots\dots\dots (2.25)$$

Where \mathbf{GDP}_t is Gross Domestic Product at time t, \mathbf{P}_{it} and \mathbf{Q}_{it} are prices and quantities of various commodities at a particular period respectively (time), \mathbf{P}_{it-j} is chosen base year price, \mathbf{RGDP}_t is Real GDP in time t, \mathbf{NGDP}_t is nominal GDP at time t and \mathbf{GDPD}_t is GDP Deflator at time t.

The difference between CPI and GDP Deflator is that GDP Deflator reflects prices of all goods and services produced within the country, whereas CPI reflects the prices of a representative basket of goods and services purchased by the consumers. CPI uses a fixed basket of goods and services whereas the GDP deflator compared the price of currently produced goods relative to price of goods in the base year.

The National Bureau of Statistics (NBS) uses the Consumer Price Index (CPI) as a measure of inflation. The CPI is the price of basket of goods and services relative to the price of the same basket in some base year. It turns the prices of many goods and services into a single index measuring the overall level of prices. It is computed using a fixed basket of goods.

Many believe that the CPI tends to overstate inflation because it is a Laspeyres index (Mankiw, 1994). When prices of different goods are changing by different amounts, a Laspeyres (fixed basket) index tends to overstate the increase in the cost of living because it does not take into account that consumers have the opportunity to substitute less expensive goods for more expensive ones (Mankiw, 1994). CPI does not reflect the ability of consumers to substitute

toward goods whose relative prices have fallen. It then overstates the impact of the increase in prices on consumers by using a fixed basket of goods and ignoring consumers' ability to substitute. Since CPI uses a fixed basket of goods, another problem with it is when new goods are introduced into the market it does not take that into account. In the same vein, CPI does not measure changes in quality because quality of product changes from time to time as a result of firms adjusting their quality to suit economic situation and current need.

The National Bureau of Statistics (NBS) normally revisits the base period for the Consumer Price Index (CPI) computation. The NBS changes the base year for the CPI as well as effected a change to the weighting of the index. The base period was changed from May 2003 to November 2009, while the re-weighting essentially involved changes in the weights of the different components in the index (NBS, 2011). To National Bureau of Statistics, the concept of re-basing and re-weighting is used to generate a more accurate and reliable measure of Inflation. Re-basing is the establishment of a new reference period for the index by designating the period for which the index equals 100 and recalculating the level of Index numbers to reflect the new base. Re-weighting on the other hand involves updating the weights of the different components of the CPI basket, in order to ensure the CPI gives a more reflective picture/pattern of household expenditure. This can cause a problem for using CPI as a measure and its relationship with other variables.

As seen from figure 2.2, from 1990 the inflation rate has been increasing till 1995. It was in 1996 that there was a sharp decrease in the inflation rate to the year 1997. The rate has been lower from 1997 to 2002. It increased in the year 2003. There was a decline between 2003 and 2007. The average inflation rate from 1990 to 1998 is 33.3% and from 1999 to 2006 is 13.3%. The

average rate decrease to 11.01% from 2007 to 2012. This shows the rate has been lower after the military regime. Table 2.8 has shown that the country's inflation rate was 5.57% in 2007 and has increased to 11.97 by 2009. The country's inflation rate trended lower in 2011 compared to 2010, even though 2011 was an election year with the potential for large monetary inflows within the economy. The average inflation rate for 2011 was recorded at 10.9%, down from the average of 13.59% in 2010. The Consumer Price Index (CPI) approach is used to measure inflation rates in Nigeria as it is easily and currently available on monthly, quarterly and annual basis (CBN, 2007).

Table 2.7: Nigeria Inflation rate: 1990-2012

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
RATE	7.5	12.9	44.6	57.2	57	72.8	30.4	8.2	10.3	6.5	6.9	
YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
RATE	18.9	12.9	23.8	14.9	17.9	8.2	5.3	11.6	13.7	10.8	10.3	12.3

Source: CBN, 2011, 2012

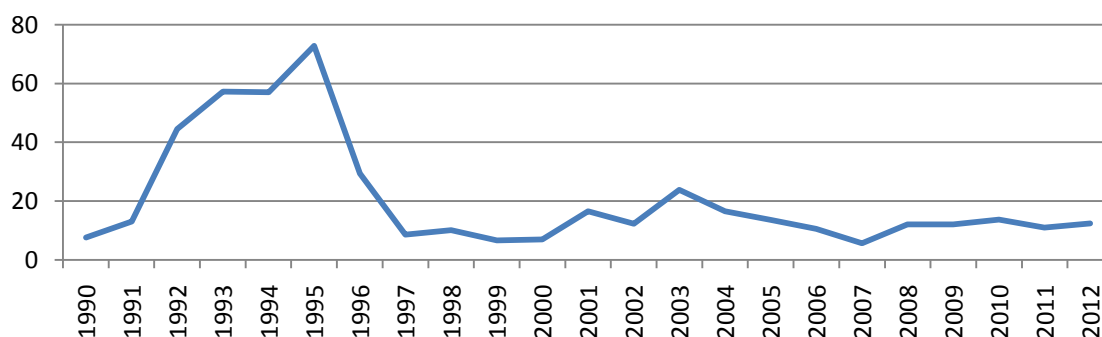


Figure 2.2: Trend of Inflation rate

Table 2.8: Nigerian Real GDP Growth rate: 1990-2012

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
RATE	13.01	-0.81	2.3	1.3	0.2	2.2	4.4	2.8	2.9	0.4	5.4

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
RATE	8.5	21.3	10.2	10.5	6.5	6.0	6.5	5.9	6.9	7.8	7.5	6.5

Source: CBN, 2011, 2012

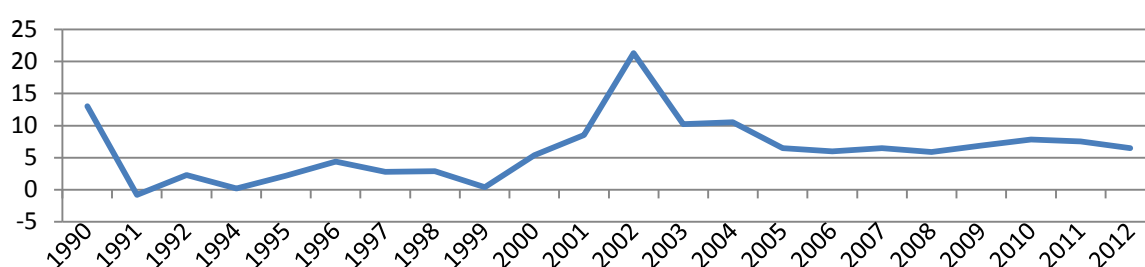


Figure 2.3: Trend of Real GDP Growth rate

As seen from table 2.8, from 1990 to 1998, the average Real GDP growth is 3.1%. The average Real GDP rose to 8.6% for the period 1999 to 2006. From 2007 to 2012, the average Real GDP is 6.9%. Figure 2.3 shows a fall in Real GDP from 13.01 in 1990 to -0.81 in 1991. Real GDP began to appreciate in 1999 to 2002. It was from that year (2002) that it began to fall. In 2012, the Nigerian economy grew at an estimated real rate of 6.5 percent. This was slightly lower than the 7.8 percent recorded in 2010. The economy recorded growth rates of 6.5% and 6.9% in 2007 and 2009 year respectively, which is an increase by 0.4 points. Real GDP growths were better in the post military period (democratic regime).

2.2.0 Theoretical Analysis of the Relationships between Inflation, Employment and Economic Growth

2.2.1. AD-AS Model

It is a macroeconomic model that explains price level and output through the relationship of Aggregate Demand and Aggregate Supply. The AD/AS model is used to illustrate the model of business cycle. Movement of the two curves can be used to predict the effects of various exogenous events on two variables: Output (Gross Domestic Product) and Price level. A shift in the Aggregate Demand will affect the level of output and then prices (if growth is caused by rising Aggregate Demand, then the growth is likely to cause inflation). The Model is based on the following assumptions:

- a) Financing deficit doesn't have any offsetting effects and size of government debt does not matter.
- b) The government knows what the situation is and knows the economy's potential income level.
- c) Fiscal policy doesn't negatively affect other government goals.
- d) Government has flexibility in changing spending and taxes.

The Aggregate Demand and Aggregate Supply model can take the form:

$$\text{INFL} = F(\text{GDP})$$

$$\text{INF} = \beta_0 + \beta_1 \text{GDP} \dots\dots\dots (2.26)$$

Where INF is inflation and GDP is Gross Domestic Product. This can be illustrated in form of a graph below:

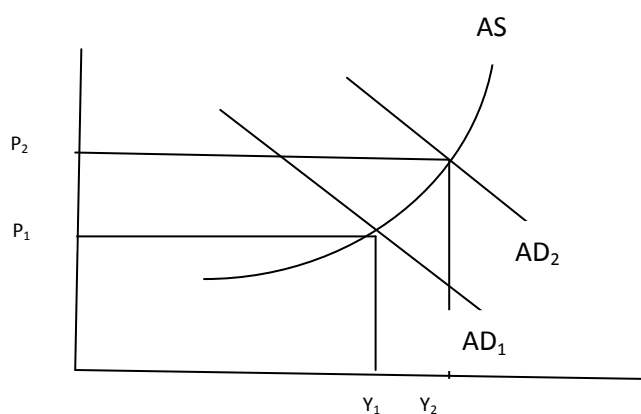


Figure 2.4 The AD-AS Curve

From the above graph, aggregate demand shifts to the right as a result of expansionary government policy which affects the level of output and then price level. This creates and causes a rise in inflationary pressure. This shows a positive relationship between price level and output level. A shift in aggregate demand from AD_1 to AD_2 causes the output level to shift from Y_1 to Y_2 which also affect the level of prices to shift from P_1 to P_2 . This then shows the relationship between growth and changing prices.

If growth is positively related to inflation, it then follows that employment is positively related to inflation and growth.

2.2.2 Okun's Theory

In his 1962 article, Okun presented two empirical relationships connecting the rate of unemployment to real output, which is known as Okun's law (Knotek, 2007). He postulated that a 1 percent increase in the growth rate above the trend rate of growth (or the growth in potential output) would lead only to 3 percent in the reduction of unemployment. Reversing the causality, a 1 percent increase in unemployment will mean roughly more than 3 percent loss in GDP

growth (Knotek, 2007). It also implies that output and unemployment does not move one for one. This relationship implies that the rate of GDP growth must be equal to its potential growth just to keep the unemployment rate constant (Apergis and Rezitis, 2003). To reduce unemployment, therefore, the rate of GDP growth must be above the growth rate of potential output. Okun's two relationships arise from the observation that more labor is typically required to produce more goods and services within an economy. The theory is based on the following assumptions:

- a) That there was a negative linear relationship between Unemployment and Output.
- b) There was a full employment level of unemployment for the sake of exposition and that this level was about 3%.
- c) Output depends on the amount of labour used in the production process.
- d) Assumes that one could use trial and error to construct a series for potential output based on the premise that potential output should equal actual output.

The unemployment rate can serve as a useful summary of the amount of labor being used in the economy. The theory took the form:

$$\Delta u_t = \beta_0 - \beta_1 \Delta y_t \dots\dots\dots (2.27)$$

Where Δ is change, β_0 is the intercept, β_1 is the Okuns coefficient, u_t is unemployment rate in time t and y_t is output in time t. It captures the correlation between output growth and movements in unemployment, that is, how output growth varies simultaneously with changes in the unemployment rate. This means Okun's Law gives policy makers and an indication of how the economy is performing in regard to both the labour market and the goods market. Furthermore, Central Banks, primarily monetary policy, use Okun's Law as a forecasting tool to predict changes in the structure of the economy and aid in the decision-making process because the implications of this observation is that higher output growth begets lower unemployment

rates, which in turn beget inflationary pressure. Another implication of this relationship is that any given high rate of unemployment, longer period of higher output will be required to reduce it. This is because output and unemployment does not move one for one. Okuns Law has implications for macroeconomic policy, particularly in determining the optimal or desirable growth rate, and as a prescription for reducing unemployment. It also indicates the cost of unemployment in terms of output. In the same vein, it can be used to interpret to what extent policymakers can predict the performance of output and unemployment in an economy. Hence these shows usefulness of Okun's Law as a forecasting tool, once instability of the relation is taken into account.

2.2.3 Traditional Phillips Curve Theory

In 1958, A.W. Phillips published a careful empirical study examining the relation between unemployment and wage inflation in the United Kingdom over a period extending from 1861 to 1957 (Georg and Mathias, 2010). That year saw the publication of an article in which he fitted a statistical equation $w=f(U)$ (to annual data on percentage rates of change of money wages (w) and the unemployment rate (U) in the United Kingdom) for the period. First he fitted a nonlinear function, negatively relating wage inflation to the rate of unemployment between 1861 and 1913, and then he demonstrated how this function could explain the relationship for the subsequent period between 1913 and 1957. Both sets of data, from 1861-1913 and 1913-1957 show that 5.5% unemployment meant zero inflation in UK money wage rates. This inverse empirical relationship seemed to suggest the relationship between inflation and unemployment (Posta, 2008).

Marika et al (2006) stated the Original Phillips Equation as:

$$W=f(U) \dots\dots\dots (2.28)$$

$$W = \alpha - \beta u \dots\dots\dots (2.29)$$

Where W is wage inflation, U is Unemployment, α is the constant and β is the coefficient.

The assumptions of the Traditional Phillips Curve are:

- a) That there is a linear negative relationship between unemployment and wage inflation.
- b) Existence of a non-zero long run trade off which implies a non-vertical Phillips Curve and thus no Non-Accelerating Inflation Rate of Unemployment (NAIRU) exists.
- c) Existence of competitive market.
- d) The structure of the economy does not change.

Traditional Phillips curve provides theory of how inflation is determined. In the traditional Phillips curve, it is the unemployment rate that is driving inflation. The main implication of the Traditional Phillips curve is that, because a particular level of unemployment will influence a particular rate of wage increase, the two goals of low unemployment and a low rate of inflation may be incompatible. It suggests the extent to which monetary and fiscal policies can be used to control inflation without high levels of unemployment. In other words, it provides a guideline to the authorities ' about the rate of inflation which can be tolerated with a given level of unemployment. The Traditional Phillips Curve (model) tends to suggest that the economy will be more stable if policymakers respond more aggressively to real activity such as unemployment rates and output gaps (Sill, 2011). That means that Policy makers should take decisions based on movements in real activities such as unemployment and Output gap.

Having reviewed the traditional Phillips Curve (which shows a negative relationship between inflation and unemployment) and the Okun's Law (a negative relationship between unemployment and growth), it also follows that inflation is positively related to growth.

2.2.4 Modern Phillips Curve

The modern Phillips curve is a widely used structural model of inflation dynamics (Gali, 2005). This relates inflation to the output gap and a cost-push effect influenced by expected inflation. Modern version of the Phillips curve implies that current inflation is determined by next period's expected inflation and by real marginal cost as the driving variable (Gali, 2005). The modern Phillips curve emphasizes the role played by the forward looking component of the Phillips curve relationships, and importance of the marginal costs as the driving force behind the inflationary process. The assumptions of the Modern Phillips Curve are as follows;

- a) Assumption of rational expectation, adaptive expectation and inflation inertia.
- b) Markets are imperfectly competitive.
- c) Prices and Wages are sticky.
- d) Monetary policy could systematically affect output in the short run.

The modern Phillips curve can be expressed as;

$$\pi_t = \gamma f E_t \pi_{t+1} + \lambda mc_t + \xi_t \dots\dots\dots (2.30)$$

Where t is time period, π_t , π_{t+1} are current inflation and expected inflation respectively, mc is marginal cost, γf and λ are functions of structural parameters, including the probability of price adjustment, and ξ_t is a random variable. The most important policy implication of models featuring the modern Phillips curve is the optimality of price stability (Goodfriend and King, 1997).

The Modern Phillips Curve specification has dramatic implications for the conduct of policy in that a fully credible central bank can bring about disinflation at no recessionary cost if inflation is a purely forward looking phenomenon. The Modern Phillips curve provides theory of how inflation is determined. The modern Phillips curve suggests that the short-run dynamics of

inflation are driven by the expected path of marginal cost (Gali, 2005). Under the modern Phillips curve model, looking at unemployment rates as indications of inflation pressure is not the obvious thing to do. A key feature determining inflation under the modern Phillips curve theory is the implication that inflation anticipates, or leads, measures of economic activity (Sill, 2011). The theory implies that inflation is determined by expected future real marginal cost, and marginal cost does not appear to be highly correlated with unemployment rates or output gaps, as conventionally defined. Monetary policy can end up being inflationary in the process. When monetary policymakers stimulate the economy by lowering interest rates, this action also stimulates demand. For firms to meet the higher demand, they must hire additional workers. Attracting additional workers requires a higher real wage which raises the marginal cost of production for firms.

2.2.5 Sacrifice Ratio

The sacrifice ratio is the cost of reducing inflation, the loss of output or employment that must be sustained by the economy in order to achieve a reduction in inflation (Caporale, 2011). This can then be defined as the cumulative increase in the unemployment rate (or cumulative reduction in output or employment) required to achieve a one percentage point to a sustained reduction in the rate of inflation. Meaning it is the ratio of the percentage loss of real output or unemployment to the change of trend inflation. The sacrifice ratio is then calculated as the ratio between the cumulative percentage output loss, i.e., the difference between actual and potential output, and the size of disinflation (Zhang, 2001). The theory according to Ball (1994) is based on the following assumptions:

- a) The assumption that output is at its trend or natural level at the start of a disinflation episode, that is at the inflation peak.

- b) Base on the assumption that output is again at its trend level four quarters after the end of an episode, that is four quarters after an inflation trough.
- c) Trend output grows log-linearly between the two points when actual and trend outputs are equal.

Sacrifice ratios are commonly estimated from the Phillips Curve relationship between output and inflation in a long time series, as in Okun (1978) and Gordon and King (1982).

The sacrifice ratio as defined in Ball (1994) is:

$$SR = \Delta Y / \Delta \pi = 1/(\pi_{peak} - \pi_{trough}) \sum_{t=0}^T (y_t - y_{trend}) \quad (2.31)$$

Where: Δ is change, π is inflation; y_t is output at time t ; y_{trend} is initial steady state output, and T is the time horizon over which output is below initial output. According to Ball, the numerator of the sacrifice ratio is the sum of the differences between this log-linear trend output and the log of actual output and the denominator of the sacrifice ratio is the change in trend inflation over the course of the disinflation episode. Any inflation reduction involves short-term costs associated with losses in output (Ball, 1994). Policy makers' decisions on the timing and extent of inflation reduction depend on a balancing of the benefits and costs of moving to a new, lower level of inflation, which in the end requires estimates of the size of each (Ascari and Ropele, 2010). The policy implication of the Sacrifice Ratio is that attempts to disinflation are always associated with output and employment loss, meaning an inverse relationship between disinflation and output loss.

2.3 Empirical Analysis of the Relationships between Inflation, Employment and Economic Growth

This section presents empirical analysis of the relationships between inflation, unemployment and economic growth.

Richard (2005) investigates the Phillips curve for a set of 19 OECD countries with a modified version of the Phillips curve type using the maximum likelihood and Kalman Filter ranging all from 1968 to 2002 but with country specifics. The study was interested in the relationship of long term duration of unemployment and inflation. Results show a negative relationship between unemployment duration and inflation and that unemployment duration does matter in the determination of prices (inflation) and wages as concluded by Phillips curve. The impact of long term unemployment was also found not to be uniform across countries. The estimated results were found to range from -0.225 (Ireland) to -2.587 (United Kingdom). He concluded that the Phillips curve is still useful for forecasting inflation.

Ann (1999) investigate the short run Phillips curve to know if it is linear for Australia (1977:1-1997:4), Sweden (1979:3-1997:4) and United States (1978:1-1997:4) by looking at the expectation augmented short run Phillips curve using Regression model. The study aims at knowing if the Phillips curve in those countries is linear. Result indicates that there was a negative relationship between inflation and Unemployment in all the countries. The study found that in Sweden, inflation expectation has greater influence on inflation. The study also found a non linear Phillips curve in Australia and Sweden but for the United States, it appears to be linear. The Phillips coefficient were found to be -0.030 (Australia), -0.011 (Sweden) and -0.61 (USA). The study concludes that the results support the assumptions of the Original Phillips curve.

Ellis (2008) re-examine the Phillips curve in USA using VAR model covering the 1993 to 2007 and 1948 to 1953. The study aimed at finding estimates using different models. Using different estimating models, the study found estimates ranging from -0.56 to -0.65. This indicates a negative relationship. He concludes that the result of the study indicate a strong empirical evidence in support of a Phillips curve relationship.

Dimitrios (2006) investigate the relationship between inflation and unemployment in the New European Union member states using a non linear least square for the period 1994 to 2005. The study aims to determine the kind of relationship existing between the variables. The study found a negative relationship between the variables. He found that unemployment gap produces more inflationary pressure in the EU-25 (-0.281) compared to the inflationary pressure produced in the EU-15 (-0.235). The study also found that a change in unemployment rate produces less inflationary pressure in the EU-25 (-0.598) compared to the inflationary pressure produced in the EU-15 (-0.621). The study shows that any attempt to push unemployment rate below the estimated NAIRU for each specific new member states will result in accelerating inflation. He concludes that the Phillips curve is suitable for the task of estimating the tradeoff between inflation rate and unemployment rate.

Miles (2006) investigates the relationship between key macro economic variables (Okun's Law) for U S A using the OLS regression on Real GDP and Unemployment data for different Periods (1949 – 1972, 1973 – 1996 and 1997 - 2004) to know if it is relatively stable or not. His study finds that Okun's coefficient is relatively stable at about 2% and GDP growth has undergone some changes over time which shows a slowdown in GDP growth. The Okun's coefficient found for the periods were -2.1662 (1949 to 1972), -1.83 (1973 to 1996), and -1.95 (1997 to 2004). His

findings suggest that a 1% decrease in unemployment will lead to about 2% change in real GDP for the USA.

Hussain et al (2010) investigate and aim to look at the causal relationship between growth and unemployment for Pakistan using VAR technique for the period 1972 to 2006. The study found a long run positive relationship between growth and unemployment of 0.182. A one percent increase in unemployment will lead to 18% increase in growth in the long run. The study further found that there is short and long run causal relation between growth and unemployment including capital, labor and human capital as explanatory variables. The implication of the study was that growth policies has no significant impact on unemployment.

Francesco et al (2011) investigate the effects of financial crisis with respect to its pass through GDP change, on the unemployment rate for the period 1980 to 2005 of 70 countries using regression analysis to obtain their result. They were interested on the effects of financial crisis. The result of the study found Okun's coefficient for the various countries ranging from -0.50 to 0.953 . They conclude that financial crisis can have a deep effect on labour market not only because of the consequences of recession (fall in output reducing labour demand). Base on their result, they recommend that policy makers should be well aware of the consequences of financial crisis.

Ball et al (2012) also investigate the Okun's Law for United States and 20 advance economies from 1980 to 2011 using regression analysis. The study aims to see how well Okun's Law explains short-run unemployment movements. They found a result of Okun's coefficient of -0.4 to -0.5 (USA) and for the other countries a range of -0.15 (Japan) to -0.85 (Spain). They conclude that Okun's Law is a strong and stable relationship in most countries and the effect of

one (1) percent change in output to unemployment rate varies substantially across countries which are accounted for by idiosyncratic features of national labour markets.

Leopold and Alfred (2002) investigate the relationship of the Okun's Law for 15 OECD countries to check if there are differences using OLS technique from 1960 to 1999 (Germany, 1960 - 1989). They were interested in knowing if there are differences in the countries on the estimates. The study found that Okun's coefficient for the countries ranges from -0.12 (Austria and Japan) to -0.82 (Netherlands and GBR). Their study shows that there are differences in the coefficients. They conclude that countries with highly protected labour market actually exhibit a low reaction of employment to GDP variation (mainly due to hoarding). They further conclude that the differences from the countries are due to increase reactions of employment (labour demand) on GDP variations in various countries and labour force laws.

Kai and Ole (2003) investigate the output loss associated with disinflation (the sacrifice ratio) using VAR modeling for 6 small open economies where historical monetary policy has been identified; Canada (1976 :3 -1999 :4), Netherlands (1961 :3 -1998 :4), Norway (1979:3-1999:4), Sweden(1970:3-1999:4), Switzerland (1977:2-1999:4) and United Kingdom (1973:3-1999:4). They are interested in the output loss associated with disinflation. The study found a sacrifice ratio coefficient of -0.04 (Sweden), 0.53 (Norway), 0.78 (Switzerland), 0.87 (United Kingdom), 1.52 (Canada) and 3.58 (Netherlands). The Average sacrifice ratio found is 1.20. The result shows that Sweden and Norway have low cost of keeping inflation while the case of Canada and Netherlands is higher. The study suggests that the low cost of keeping inflation in Sweden and Norway might be accounted for by widespread use of income policies. They concluded that authorities of Norway and Sweden can be advised to pursue inflation targeting than authorities of Netherlands.

Sandeep (2012) evaluates the determinants of the sacrifice ratio for the OECD countries and the non-OECD countries (189 countries) for the period 1969 to 2009 using OLS technique. He was interested in the determinants of the sacrifice ratio. He state that the estimate of the sacrifice ratio was base on Ball (1994) and identify 78 disinflationary episodes for OECD and 348for non-OECD. The study found a mean sacrifice ratio of 1.15 for the OECD countries and a mean value of 0.43 for the non-OECD countries. He suggest that the speed of disinflation is one of the determinants leading to increase in sacrifice ratio for the OECD countries and a lower sacrifice ratio for the non-OECD is determined as a result of Central Bank Independence, Trade Openness and Higher Indebtedness. He concludes in the study that policy makers in OECD countries should try to reduce the speed of disinflation so as to have a lower Sacrifice Ratio while in the non-OECD countries, Openness and Central Bank Independence is necessary.

Merve (2011) investigates the cost of production loss as a result of change in inflation in Turkey from 1985 to 2009 using HP approach. The study is interested in knowing whether a disinflation policy affects inflation. Three disinflation episodes were identified. The first was the short period that followed the Gulf Crisis (1994:4 – 1995:4). The second was the recovery period from 1994 economic crisis (1999:4 – 2002:4). The final is 2007 to 2009 (financial crisis). The study found that in the first episode (EPISODE I), the output gap was -1.14 and the sacrifice ratio is -0.011 and episode two (EPISODE II) is 0.18 and 0.002 respectively. For episode three (EPISODE III), it is 0.29 and 0.031 respectively. His study shows that there was no significant sacrifice ratio estimates for the period under study. He concludes that disinflation is a favorable and desirable economic policy for developing countries since the sacrifice ratio is very low.

Arewa and Nwakanma (2012) investigate the relationship between output and unemployment (known as Okun's Law) for Nigeria using the first difference and the output gap of the regression

equations that were estimated by Okun. They use Vector Autoregressive (VAR) model to estimate the Okun's coefficient for the period 1981 to 2011. They were interested in estimating Okun's coefficient for Nigerian economy and to test the validity of Okun's Hypothesis with the aim of making recommendations to macroeconomic policy makers. They found a positive relationship between output and unemployment and the coefficients were 0.31 (for the first difference) and 0.26 (gap model). That means a decrease in the gap between Natural Rate of Unemployment and the current rate of unemployment leads to a decrease in the difference between Potential GDP and Real GDP. They concluded that the Okun's coefficient is not significant and valid in the Nigeria economy. They further emphasized on the need for a resource base diversification and an enabling ground for flexible credit facilities, sustainable electricity etc.

Rafindadi (2012) investigate the relationship between output growth and unemployment in Nigeria for the period 1970 to 2010 using Generalized Method of Moment (GMM). He was interested in determining the dynamic relationship of the variables. The study found a negative relationship between output growth and unemployment for the linear model. The Okun's coefficient for the linear model was found to be -0.28. The study also found a humped shaped relationship for the non linear model. A threshold of 5.5% was found. As output rises, unemployment will initially rise until a threshold is reached where unemployment will begin to fall as output increases. The study further stated that when unemployment is below 5.5%, jobless growth is experienced. The study concludes that employment policies can be more effective if they are directed at raising outputs.

Sodipe and Ogunrinola (2011) empirically investigate the employment and economic growth relationship for Nigeria using OLS regression for the period 1981 to 2006. The interest of the

study is to determine the kind of relationship existing between employment and economic growth. Result of the study shows that a positive and statistically significant relationship exists between employment level and economic growth in Nigeria while a negative relationship was observed between employment growth rate and the GDP growth rate in the economy. The Okun coefficient found in the study was 0.899326 meaning a one unit increase in real GDP will lead to a 0.899326 increase in employment. They concluded in the study by advocating for increased labour-promoting investment strategies that will help to reduce the high current open unemployment in Nigeria.

Adewale (2012) investigates the relationship between unemployment and economic growth in Nigeria using the OLS regression model for the period 1980 to 2006. The aim is to determine the impact of unemployment on economic growth. The study found that there is a significant but negative relationship between unemployment and economic growth in Nigeria. This study found a coefficient of -0.843936. He concluded that unemployment is an impediment to economic growth in Nigeria and that unemployment crisis has significant economic implications on the growth of Nigerian economy.

Baba (2012) empirically investigates the Okun's relationship for Nigeria using an autoregressive distributed lag (ARDL) approach, otherwise known as bound testing approach for the period 1985 to 2011. The aim of the study was to try to validate the Okuns relationship. The study found a negative relationship between unemployment and growth. The Okun's coefficient found in the study was -0.22. The study validates the law, but submits that the coefficient is lower than the value proposed originally by Okun. The study also concludes that Okun's law is not a tight relationship and relationship between output and unemployment varies at different times.

Abachi (1998) investigate the relationship between inflation and unemployment in Nigeria for the period 1970 to 1998 using the OLS technique. The aim of the study was to discover if there is a tradeoff between inflation and unemployment in Nigeria. The study found a positive relationship between inflation and unemployment for the period under study and concluded that it is evident that inflation and unemployment are not inversely related within the period. He also concluded that inflation unemployment tradeoff is irrelevant in the Nigerian economy. The study recommended the importance of agricultural policies in curbing inflation and unemployment problem.

Bakare (2011) investigate the relationship between unemployment and inflation in Nigeria for the period 1978 to 2008 using OLS and ECM technique. His study is interested in the determinants of unemployment in Nigeria. The study found that the variables are cointegrated and inflation is negatively related to unemployment. He concluded that unemployment has become a major socio-economic problem in Nigeria and that it has reached a crisis proportion is a serious problem especially among the young cohorts of the labour force. He suggested that government direct approach to create job through industrialization and mechanized agricultural system is required and expansion in the private sector is the key to a lower and sustainable level of unemployment in Nigeria.

Ojapinwa and Oluyori (2012) investigate the relationship of the Phillips curve in Nigeria for the period 1970 to 2010 using OLS and error correction (ECM) model. Their study was interested in determining the existence and stability of the Phillips curve relationship in Nigeria. The study found a negative short run relationship between inflation and unemployment but a positive relationship in the long run. They conclude that policy makers cannot use the trade-off relation in

choosing appropriate strategy and they should be careful in adopting a monetary policy that would keep inflation at a politically acceptable level in Nigeria.

Taiwo (2011) evaluates the Phillips curve relationship using inflation and economic growth for Nigeria from 1981 to 2006 using the OLS technique. The study is interested on the impact of inflation and investment on economic growth. From results, the study found a negative relationship between inflation and economic performance (RGDP) and a positive relationship between investment (GCF) and economic performance (RGDP). He concludes that investment should not be ignored as it leads to increased Real GDP.

CBN (2010) investigates the output loss through the control of inflation in Nigeria using Bayesian Econometric Approach for the period 1995 to 2007. The main objective of the study is to see whether the reaction function is useful for monetary policy. The study found a negative relationship between instruments {Monetary Policy Rate (MPR) and Interest Rate (IR)} and the output gap. He found an attempt to disinflation through the use of MPR (increase) reduces the output gap. An increase in MPR by 1 unit will reduce the output gap by 3 units. The reaction function was found to be useful for monetary. He said the monetary mechanism act like this; the Central Bank of Nigeria reacts to upsurge inflation by raising the interest rate which the reaction is strong enough to produce an increase in real interest rate gap, which in turn diminishes the output gap. He concludes that the Central Bank of Nigeria can control inflation and adopt a full-fledged inflation targeting regime which is quiet feasible could be a good example to other African countries.

In another study by Osuji and Akujuobi (2012), they evaluate whether or not one of the pre condition for a successful inflation Targeting (through the use of monetary instruments) is present in Nigeria and Ghana using VAR modeling for the period 1966 to 2010 using annual

data. They were interested in seeing whether there is a predictable relationship between inflation and monetary policy instruments. The study found no long run relationship between disinflationary instruments (such as money supply, exchange rate and interest rate) and inflation because the relationship was unstable and unpredictable. Rather, inflation was only explained by its lag. They found that inflation expectations are the cause of high inflation and most of the policy instruments and their lag are not related to inflation. The result also found that exchange rate has no impact on inflation. The study provides that attempts to disinflation will be futile. They conclude that the implication of the study is that policy linkage between inflation and monetary policy instruments is not strong and is unpredictable in the countries. This implies that Nigeria and Ghana are not to embark on inflation targeting regime.

Adebiyi (2011) evaluates the sacrifice ratio for Nigeria using VAR model for the period 1960 to 2004. The aim is to determine whether or not a stable and predictable relationship exists between inflation and the monetary policy instruments in Nigeria. The study found that monetary instruments are very poor in predicting inflationary behavior but inflationary expectations are the major cause of inflation. That means any disinflationary attempts with monetary policy instruments will be futile. The study shows that the relationship between the money supply and the price level (two variables) is unstable in Nigeria. The study also found no long run relationship between money supply, inflation (CPI) and interest rate in Nigeria which implies the instability of the relationships among the money supply, the price level and interest rates. In the same vein, the study found that interest rates provide no information about price changes in Nigeria. The study concludes that Nigeria is not a candidate for inflation targeting.

2.4 Gaps in the Literature

Empirical literatures on the relationship between inflation and unemployment, unemployment and growth and inflation and economic growth have been reviewed. The literature reviewed suggests that most of the studies have concentrated on the relationship between two variables (inflation and unemployment or inflation and economic growth or unemployment and growth) and not on the relationship between the three (3) variables (inflation, employment and growth). The study then aims to cover the three variables. Furthermore, the Real GDP used in most reviewed literatures is that calculated using the GDP price Deflator but the Real GDP used in this study is that as deflated by the Consumer Price Index (CPI) and its limitations are duly acknowledged in chapter three (3). The studies reviewed also paid little attention (but only a few) to the policy implications of the relationships of the variables in the study but rather concentrated on studying the kind of relationships existing between the variables, coefficients of the relationships, determinants of the variables and the link, causation and impact of the variables. The study further tries to expand the period of coverage from 1970 to 2012.

Most reviewed studies have used different analytical techniques and arrived at different results. Some studies found the existence of a positive relationship between the variables while others found a negative relationship. Furthermore from reviewed literature, little attention was given on the relationship between the variables (inflation, unemployment {employment} and growth) and policy instruments (such as MPR, Government expenditure etc.).

The existence of double digit inflation and unemployment (usually considered as high) and the situation of growth not employment generating imply that the Federal Government (Policy Makers) is still faced with challenges in the formulation and Implementation of policies to solve the problems of unemployment and inflation.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Theoretical Framework

This study is theoretically anchored in the modern Phillips Curve because the traditional Phillips curve only shows the relationship between unemployment and inflation. It is worth noting that most economic models, frameworks and reaction functions such as the Okun's law, Taylor's rule and Sacrifice ratio are derived from the traditional Phillips curve (Thomas, 1985). Economic development over the years has made it increasingly difficult to predict inflation using the traditional Phillips curve (CBN, 2010). According to Mankiw (1994), the Phillips curve that is used today differs from the relationship Phillips examined. First, the modern Phillips curve substitutes price inflation for wage inflation. Secondly, the modern Phillips curve includes expected inflation and finally includes supply shocks. The modern Phillips curve implies that policy can affect inflation quickly through the management of inflation expectations. This contrast with the traditional Phillips curve, according to which inflation is strongly path dependent, and disinflation can be slow and costly.

It has implications for the conduct of monetary policy in that a fully credible central bank can bring about disinflation at no recessionary cost if inflation is a purely forward-looking phenomenon (Hans and Laurent, 2003).

The assumptions of the modern Phillips Curve are:

- a) Sticky nominal wages and prices.
- b) Short-run relationship relating inflation to expected inflation.
- c) Markets imperfectly competitive.

- d) Monetary policy systematically affects output in the short run.
- e) Assumption of rational expectation, adaptive expectation and inflation inertia.

Mankiw (1994) pointed that the Phillips curve in its modern form states that inflation rate depends on expected inflation, unemployment gap (the deviation of unemployment from its natural rate) and supply shocks. It can thus be specified as:

$$\pi = \pi_e - \beta (U - U_n) + v \dots\dots\dots (3.1)$$

Where π is inflation, π_e is expected inflation, U is actual unemployment, U_n is natural rate of unemployment, $(U - U_n)$ is unemployment Gap, β is parameter measuring the response of inflation to unemployment gap and v is the supply shocks. The negative sign of the parameter implies negative relationship between unemployment and inflation. This means high unemployment tend to reduce inflation.

3.1.1 Relationship between Inflation and Growth

The equation of the modern Phillips curve can also be derived from the aggregate supply equation. The aggregate supply equation shows the relationship between price level and the level of output in an economy. Noting the assumption of sticky nominal wages, the sticky-wage model of the aggregate supply emphasized that when the nominal wage is stuck, a rise in the price level lowers the real wage, making labour cheaper and the lower real wage induces firms to hire more labour and the additional labour hired produces more output (Mankiw 1994). This means that the aggregate supply model shows that Output is determined by the production function:

$$Y = f(L) \dots\dots\dots (3.2)$$

Where Y is output and L is quantity of labour employed. The relationship above means the more labour employed, the more output produced, showing a positive relationship between employment and output.

The short run aggregate supply equation takes the form:

$$Y = Y_n + \alpha (P - P_e), \alpha > 0 \dots\dots\dots (3.3)$$

Where Y is actual output, Y_n is the natural rate of output, $(Y - Y_n)$ is the output gap, α is a positive parameter, P is the price level and P_e is the expected price level (Mankiw, 1994). This equation states that output deviates from its natural rate when the price level deviates from the expected price level. If the price level is higher than the expected price level, output exceeds its natural rate. Secondly, if the price level is lower than the expected price level, output falls short of its natural rate. Finally, if the price level is equal to expected price level then, actual output equals natural rate of output. This means that in the aggregate supply curve, the only reason why actual output should deviate from potential and the actual unemployment rate should deviate from the natural rate is because of incorrect expectations of what is going to happen with prices in the future. The aggregate supply curve therefore summarizes the relationship between price and output.

The modern Phillips equation can be derived from the equation of aggregate supply. Our aggregate supply equation can be re-written from equation 3.3 as:

$$Y - Y_n = \alpha (P - P_e) \dots\dots\dots (3.4)$$

Dividing both sides of the equation by α will give:

$$1/\alpha (Y - Y_n) = P - P_e \dots\dots\dots (3.5)$$

The parameter α indicates how much output responds to unexpected changes in the price level and $1/\alpha$ is the slope of the aggregate supply curve.

Making P subject, we have:

$$P = P_e + 1/\alpha (Y - Y_n) \dots\dots\dots (3.6)$$

Mankiw (1994) pointed that with adding supply shocks (v), subtracting last year's price level (P_{t-1}), and substituting output gap ($Y - Y_n$), the relationship between inflation and unemployment will be established.

Firstly, adding a supply shock to equation 3.6 gives:

$$P = P_e + 1/\alpha (Y - Y_n) + v \dots\dots\dots (3.7)$$

Supply shock (v) is added to the right hand side of the equation to represent exogenous events. Secondly, is moving from price level to inflation rates by subtracting last year's price level (P_{t-1}) from P and P_e on both sides of the equation respectively. We will have:

$$P + (-P_{t-1}) = P_e + (-P_{t-1}) + 1/\alpha (Y - Y_n) + v \dots\dots\dots (3.8)$$

$(P - P_{t-1})$ is the difference between the current price level and last year's price level, which is inflation (π) and $(P_e - P_{t-1})$ is the difference between the expected price level and last year's price level, which is expected inflation (π_e) (Mankiw, 1994). $(P - P_{t-1})$ can be replaced with π and $(P_e - P_{t-1})$ with π_e because it is the change in prices. It can then be specified as:

$$\pi = \pi_e + 1/\alpha (Y - Y_n) + v \dots\dots\dots (3.9)$$

Where π is inflation, π_e is expected inflation, $1/\alpha$ is the slope, $(Y - Y_n)$ is the output gap and v is the supply shocks.

3.1.2 Relationship between Output Gap and Unemployment

To show the relationship between output and unemployment, we adopted Okun's equation which states that the deviation of output from its natural rate is inversely related to the deviation of unemployment from its natural rate; that is, as output expands, unemployment falls. Okun's equation is an important feature of supply-side economics (Knotek, 2007). It gives policymakers an indication of how the economy is performing with regard to both the labour market and the goods market. It can be written as:

$$1/\alpha (Y - Y_n) = -\beta (U - U_n) \dots\dots\dots (3.10)$$

The negative sign (-) shows a negative relationship between output and unemployment as stated by the Okun's equation. Since the variable Output gap is equal to unemployment gap from the Okun's relationship, we can then substitute $-\beta (U - U_n)$ in place of $1/\alpha (Y - Y_n)$ from equation

3.9. Doing this will give:

$$\pi = \pi_e - \beta (U - U_n) + v \dots\dots\dots (3.11)$$

The above equation gives the modern Phillips curve where π is inflation, π_e is expected inflation, β is the parameter, $(U - U_n)$ is unemployment gap and v is supply shocks.

From the assumption that people forms their expectations of future inflation based on recently observed inflation (adaptive expectations), expected inflation is equal to last year's actual inflation (Mankiw, 1994). It can thus be expressed as:

$$\pi_e = \pi_{t-1} \dots\dots\dots (3.12)$$

Where π_e is expected inflation and π_{t-1} is last year's actual inflation. Substituting in equation 3.11 will give the modern Phillips curve as:

$$\pi = \pi_{t-1} - \beta (U - U_n) + v \dots\dots\dots (3.13)$$

The above models show that from the short-run aggregate supply equation, output is related to unexpected movements in the price level and from the modern Phillips curve, inflation is related to expected inflation and unemployment gap. The modern Phillips curve can therefore be derived from the aggregate supply equation to show the relationship between inflation, employment and output growth.

3.2 Trend Analysis

The period 1970 – 2012 was broken down into five periods: 1970 – 1980, 1981 – 1985, 1986 – 1998, 1999 - 2006 and 2007 – 2012. The periods were chosen to analyse the effects of key shifts in the economy. In the period 1970 – 1980, Nigeria designed the 2nd and 3rd National Development Plan and engaged in reconstruction as a result of the civil war. There was also the oil boom and military coup in the period. The oil boom gave the economy more financial strength to execute the reconstruction programme. Oil revenue also allowed for large investment programmes and increasing government expenditure. The period 1981 – 1985 witnessed the oil glut, economic stabilisation policy and two military coups of General Muhamadu Buhari and General Ibrahim B. Babangida respectively. With the oil glut, there was the need for Stabilisation policy so as to improve the economic situation of the country. There was the agricultural policy of Green Revolution which was aimed at boosting agricultural production. 1986 - 1998 witnessed the Structural Adjustment Programme (SAP), First Rolling Plan, declining oil export prices and the termination of military rule. The plan sought to address the problems of exchange rate instability, strong inflationary pressure, inadequate gainful employment, sluggish performance of key productive sectors of the economy etc. The period then witnessed decline in oil export prices and hence government revenue. Within 1999 – 2006 period, Nigeria witnessed the Civil Rule (4th Republic) and the Banking Consolidation. National

Economic Empowerment and Development Strategy (NEEDS) introduced by the civilian regime was aimed at wealth creation, employment generation, poverty reduction and value reorientation. The banking Consolidation was to strengthen the banking sector which led to a reduction in the number of banks to twenty Five (25) as at the period. 2007 – 2012 saw the Global Financial Crisis and the after math. The crisis led to crash of stock market prices and the price of Nigeria's crude oil in the international market, among others. This implies that volatility of petroleum prices has impact on the Nigerian Economy. This is because Nigeria's economy is monoculture and depends mainly on the proceeds from export of crude petroleum for funding.

Table 3.1 below shows the average inflation rate, unemployment rate and Real GDP from 1970 – 2012. From 1970 to 1980, the average inflation rate, unemployment rate and real GDP were 14.6%, 4.5% and N2623.7 million respectively. The averages for the period 1981 to 1985 were 19.38%, 6.3% and N2293.3 million for inflation rate, unemployment rate and real GDP respectively. It shows an average increase when compared to the previous period in both inflation rate and unemployment rate but real GDP declined. The result of increase in inflation and unemployment within the period suggests that the economy has relied on oil production, neglects primary production and presence of increasing government expenditure. The averages for the period 1986 to 1998 were 30.4%, 3.7% and N26610.9 million for inflation rate, unemployment rate and real GDP respectively. When compared to previous period, both inflation rate and real GDP appreciated while unemployment rate decreased. The period witnessed decline in oil export prices and hence government revenue. High expansionary monetary policy associated with monetary financing of budget deficit of the government is believed to have fuel inflation within the period. Covering from 1999 to 2006, the averages were 12.6%, 12.4% and N4522.2 respectively. This shows a decline in inflation rate when compared

to previous period while unemployment and real GDP appreciated. The emergence of civilian rule gave rise to sharp increase in the unemployment rate. The reliance on oil proceeds' and neglecting of industrial development contributed more to the unemployment problem in the country. From 2007 to 2012, the averages were 10.5%, 18.8% and N7600 million respectively. It shows an average increase when compared to the previous period in both real GDP and unemployment rate while inflation rate declined.

Table 3. 1: Averages of Inflation rate, Unemployment rate and Real GDP

Year (Period Averages)	1970–1980	1981-1985	1986–1998	1999–2006	2007–2012
Inflation rate (%)	14.6	19.38	30.4	12.6	10.5
Unemployment rate (%)	4.5	6.3	3.7	12.4	18.8
Real GDP(millions of naira)	2623.7	2293.3	2610.9	4522.2	7600.0

Source: CBN 2005, 2010, 2012, NBS 2010 and 2011. Unemployment rate: 2007 – 2011 due to unavailability of 2012 data.

3.2. Model Specification

The derivatives expressed in equations **3.3**, **3.6**, **3.9** and **3.11** shows that the modern Phillips curve and short-run Aggregate supply curve are two sides of the same coin. This means they are essentially the same thing that relates price movement to output. It is also clear that Okun's equation relates output changes to changes in unemployment as expressed in equation **3.10**. The models of the study are specified in line with the discussions above.

Furthermore, due to the availability of Unemployment rate Data and Specifications from theories on the relationships between Inflation, Unemployment and Economic Growth, the study used

Unemployment rate Data rather than Employment Rate Data. From Mankiw (1994), as Employment rate rises, Unemployment rate falls depending on the Labour Force.

Thus, we can combine relations to establish estimates.

3.3.1 Effects of Unemployment and Growth on Inflation

This is from the specification of the modern Phillips curve as in Mankiw (1994). Substituting **eqn. 3.10** into eq. **3.13** will yield:

$$\pi_t = \pi_{t-1} + \lambda (Y_t - Y_n) + v \dots\dots\dots (3.14)$$

The above equation (**eqn. 3.14**) shows that inflation depends on output gap ($Y_t - Y_n$), expected inflation (π_{t-1}) and supply shocks (v). Supply shock represent exogenous event that happen within an economic system.

Letting $Y_t - Y_n = \Delta Y_t$ (from equation **3.14**).

The model is thus re-specified with other included variables as:

$$INF_t = F (INF_{t-1}, \Delta Y_t, UNEM_t, COEXR_t, CMPR_t, TGE_t, OP_t) \dots\dots\dots (3.15)$$

Above equation (eqn. **3.2**) is thus parameterized as follows:

$$INF_t = \beta_0 + \beta_1 INF_{t-1} + \beta_2 RDGP_t + \beta_3 \Delta UNEM_t + \beta_4 COEXR_t + \beta_5 CMPR_t + \beta_6 TGE_t + \beta_7 OP_t + \mu_1 \dots\dots\dots (3.16)$$

Where: INF_t is the Inflation rate,

$RGDP_t$ is Real Gross Domestic Product (proxy for Growth),

$UNEM_t$ is Unemployment rate,

INF_{t-1} is Expected inflation,

COEXR_t is Change in Exchange rate

CMPR_t is Change in Monetary policy rate,

TGE_t is Total Government expenditure,

OP_t is Openness and

μ₁ is the disturbance term.

Expected inflation is captured as **INF_{t-1}** as from equation **3.12** base on the assumption of adaptive expectations (Mankiw, 1994). Exchange rate (**COEXR_t**) is used as a supply shock variable (**v**) in equation **3.14** since Nigeria relies so much on oil revenue. Variables such as Government expenditure (**TGE_t**) and Monetary Policy Rate (**CMPR_t**) are included in the model so as to capture the impact of fiscal and monetary policy on inflation in Nigeria.

Real GDP is used as a proxy for Growth by adjusting Nominal GDP using the CPI deflator measured as:

$$\mathbf{RGDP} = (\mathbf{NGDP}) / (\mathbf{CPI})$$

Where: **RGDP** is Real Gross Domestic Product,

NGDP is Nominal Gross Domestic Product and

CPI is Consumer Price Index (Using 1990 as base year).

It is worth noting that using **CPI** has its limitations because CPI uses a fixed basket of goods from some base year. This means that the quantities of goods and services consumed remain the

same from year to year in the CPI composition, while the price of goods and services changes. New products are also introduced and quality of goods and services changes from time to time.

OP is used as a variable to capture Openness of the economy which is measured as:

$$(\mathbf{Exp} + \mathbf{Imp}) / \mathbf{GDP}.$$

Where: **Exp** is Export,

Imp is Import and

GDP is Gross Domestic Product.

3.3.2 Effects of Unemployment and Inflation on Growth

Modifying the Okun’s equation (from equation 3.10) by letting $\mathbf{Y} - \mathbf{Y}_n = \Delta\mathbf{Y}$ and $\mathbf{U} - \mathbf{U}_n = \Delta\mathbf{U}$ will allow for capturing the variables as changes in output and unemployment rather than output gap and unemployment gap respectively from the original Okun’s equation. We will thus have:

$$\Delta\mathbf{Y} = - (\Delta\mathbf{U}) \dots\dots\dots (3.17)$$

The Okun’s equation with other included variables is modified as follows:

$$\Delta\mathbf{Y}_t = \mathbf{F} (\Delta\mathbf{UNEM}_t, \mathbf{INF}_t, \mathbf{COEXR}_t, \mathbf{TGE}_t, \mathbf{CMPR}_t, \mathbf{OP}_t) \dots\dots\dots (3.18)$$

This is explicitly re-specified and parameterized as follows:

$$\mathbf{RGDP}_t = \alpha_0 + \alpha_1 \mathbf{UNEM}_t + \alpha_2 \mathbf{INF}_t + \alpha_3 \mathbf{COEXR}_t + \alpha_4 \mathbf{TGE}_t + \alpha_5 \mathbf{CMPR}_t + \alpha_6 \mathbf{OP}_t + \mu_{1..} (3.19)$$

Where: **RGDP_t** is Real GDP (proxy for Economic Growth),

UNEM_t is Unemployment rate,

INF_t is the Inflation rate,

COEXR_t is Change in Exchange rate,

TGE_t is Total Government expenditure and

OP is the Openness,

CMPR_t is Change in Monetary policy rate and

μ₂ is the disturbance term.

We have to note that other variables tend to affect the level of growth in an economy. Monetary and fiscal policy instruments (**TGE** and **CMPR**) are included in the model so as to capture the effect and impact of monetary and fiscal policy. Exchange rate (**COEXR**) is added to the model to also serve as supply shock.

3.4 Estimation Technique

The estimation technique for the study is the Generalized Method of Moments (GMM). It is a category of instrumental variable multiple time series model that estimates the relationships among variables that are correlated (Eview Users Guide, 2001). Equation **3.16 and 3.19** follows a linear model which is estimated by GMM. GMM is a robust estimator in that it does not require information of the exact distribution of the disturbances and is based upon the assumption that the disturbances in the equation are uncorrelated with a set of instrumental variables (Eview Users Guide, 2001). The GMM estimator selects parameter estimates so that the correlation between the instruments and disturbances are close to zero as possible, as defined by a criterion function.

3.4.1 Unit Root Test

The study ran the stationarity (Augmented Dickey-Fuller) test to overcome the problem of spurious regression often associated with non-stationary time series which according to Gujarati (1995) are misleading and makes prediction unreliable. The starting point for stationarity test is to find the order of integration of both dependent and independent variables of the model. The order of integration would help ascertain the number of times a variable will be differenced to arrive at stationarity. It will also give the standing ground to make meaningful inferences from the estimation of the variables under investigation. The Augmented Dickey Fuller (ADF) test is used to examine the characteristics of the data samples at level, constant and trend. The general ADF equation is specified as follows:

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-i} + \varepsilon_t \dots\dots\dots (3.20)$$

Where; Δ = first difference operator, t = the trend variable, Y_t is the variable under consideration and ε_t is the white noise error term. In the case of equation 3.20, the null hypothesis is: $H_0: \delta = 0$ (i.e. there is a unit root or the time series is non Stationary) and alternative hypothesis is $H_1: \delta < 0$ (i.e. the time series is stationary possibly around a stochastic trend).

3.5 Expected Results (Apriori Expectations)

Equation	Expected Coefficients
Eq. 3.16	$\beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 > 0, \beta_5 < 0, \beta_6 > 0, \beta_7 < 0$
Eq. 3.18	$\alpha_1 < 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0, \alpha_5 < 0, \alpha_6 > 0$

3.6 Source of Data

The models specified above indicated that data used for the study include; Inflation rate (INF), Consumer Price Index (CPI), Unemployment rate (UNEM), Monetary Policy Rate (MPR), Openness (OP), Nominal Gross Domestic Product (NGDP), Real Gross Domestic Product (RGDP), Government Expenditure (GE) and Exchange Rate (OEXR). The exchange rate is Official Exchange rate. The data is obtained from the Central Bank of Nigeria Statistical Bulletin, Journals, website and annual reports and the National Bureau of Statistics (NBS) Abstract of Statistics. The data covers the period 1970 to 2012.

CHAPTER FOUR

4.0 PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

This chapter presents and discusses the trend characteristics of the time series data, the stochastic properties of the series, the results and analysis and finally the summary of the main findings.

4.1. The Hodrick-Prescott (HP) Filter trend Series Analysis

The Hodrick-Prescott (HP) filter is used to de-trend time series. It is one of the best known and most widely used de-trending methods by macroeconomists. The filter was first described in Hodrick and Prescott (1997) following a working paper published in 1981. It is a commonly used to extract a trend component from a time series. The goal of the Hodrick-Prescott filters is to serve as a means to separate the cyclical component from the long run (smoothened) component. The distilled component is displayed as the less volatile or smoothed" times series. When applied to business cycles, the HP filter finds a smoothed measure which is then taken to represent the economy's underlying potential, with deviations from this smoothed measure representing unsustainable temporary deviations from potential.

4.1.1 Hodrick-Prescott (HP) Trend Analysis of Inflation, Unemployment and Real GDP: 1970 – 1993.

From 1970 to 1985, figure 4.1 below has shown that both Unemployment rate and Inflation rate has been having an upward trend. On the average, trend indicated that the relationship has been positive between Inflation rate and Unemployment rate within the period 1970 to 1985. Though as Unemployment rate trend began to be downward in the period 1986 to 1993, inflation rate trend keeps increasing and moving higher within the period. The period (1986 to 1993) showed a

negative relationship: which is a kind of a Phillips Curve relationship between Inflation and Unemployment.

For the relationship between Inflation rate and Real GDP, figure 4.1 showed below that as Inflation rate and Real GDP kept increasing (upward trend) within the period 1970 to 1977; Real GDP from 1978 to 1987 began to decline (downward trend) while Inflation rate kept increasing (moving upward). As Inflation rate trend was increasing at a higher rate within the period 1988 to 1993, Real GDP was increasing at a lower rate. The period 1970 to 1993 indicates both positive and negative relationship between the two (2) variables.

Looking at Unemployment rate and Real GDP from figure 4.1 below showed that between the period 1970 to 1979, both unemployment rate and Real GDP trend have been increasing (upward trend) indicating a positive relationship between the two(2) variables. Between the period 1980 and 1987, Unemployment rate and Real GDP took a down turn and began to fall (downward trend) also indicating a positive relationship. From 1987 to 1993, Unemployment rate kept dropping (downward trend) while real GDP began to rise (upward trend) at a lower rate. This showed a little negative relationship between the two (2) variables.

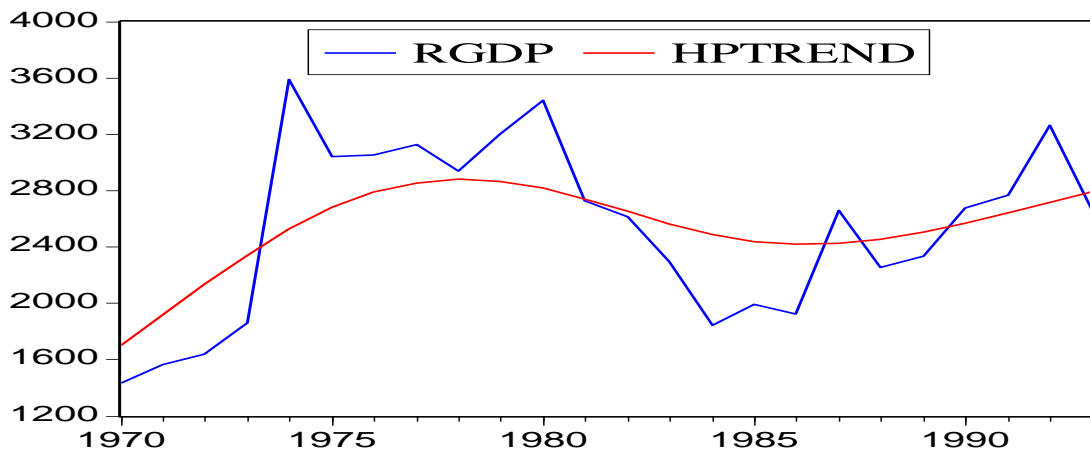
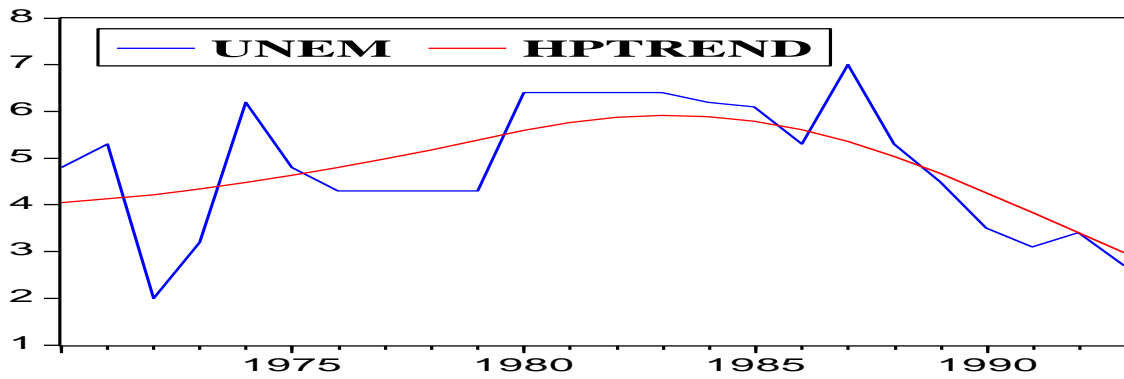
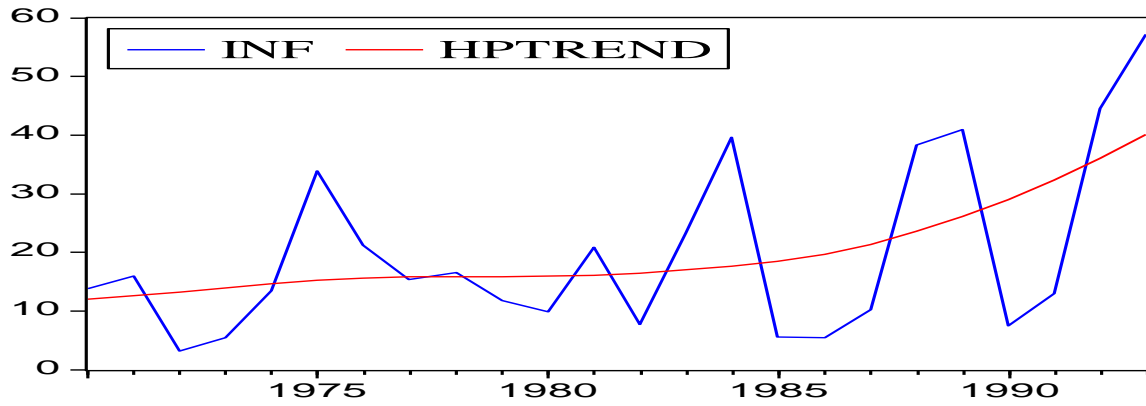


Figure 4.1 H P Trend of Inflation, Unemployment and Real GDP from 1970 - 1993

4.1.2 Hodrick-Prescott (HP) Trend Analysis of Inflation, Unemployment and Real GDP: 1994 – 2012.

Trends from figure 4.2 below further show that in the period 1994 to 2012, as unemployment rate is increasing (upward trend), inflation rate is decreasing (downward trend). This confirms the Phillips Curve kind of relationship between inflation and unemployment which is negative (inverse) in the period 1994 to 2012.

As real GDP trend is rising in the period 1994 to 2012 (figure 4.2), inflation rate is falling showing a negative relationship between inflation and real GDP. This relationship is against the AD-AS model postulation of a positive relation between Inflation and Growth.

Unemployment rate and Real GDP trend showed a positive relationship within the period 1994 to 2012. This kind of relationship is in contradiction to the Okun's Law which states a negative relationship between unemployment and Real GDP.

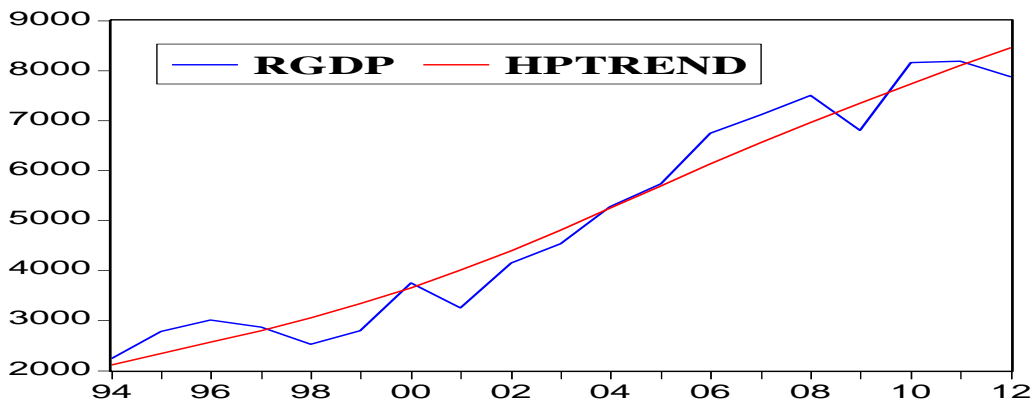
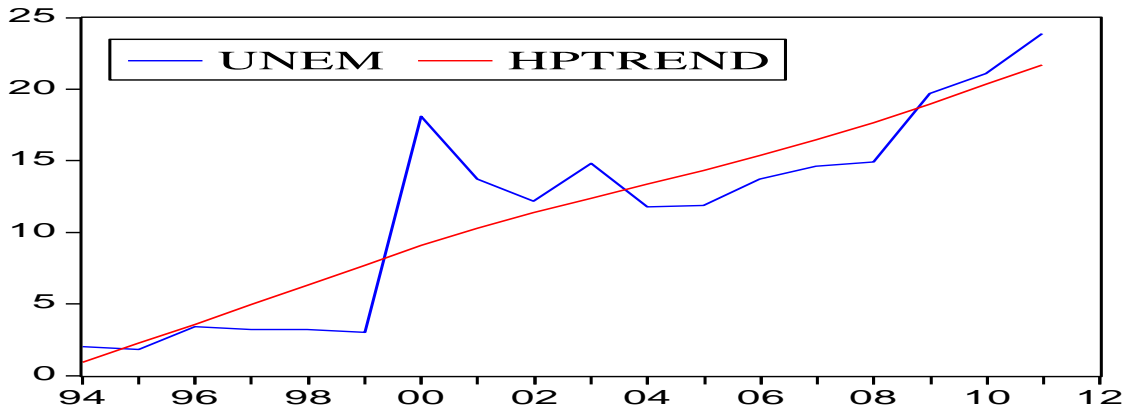
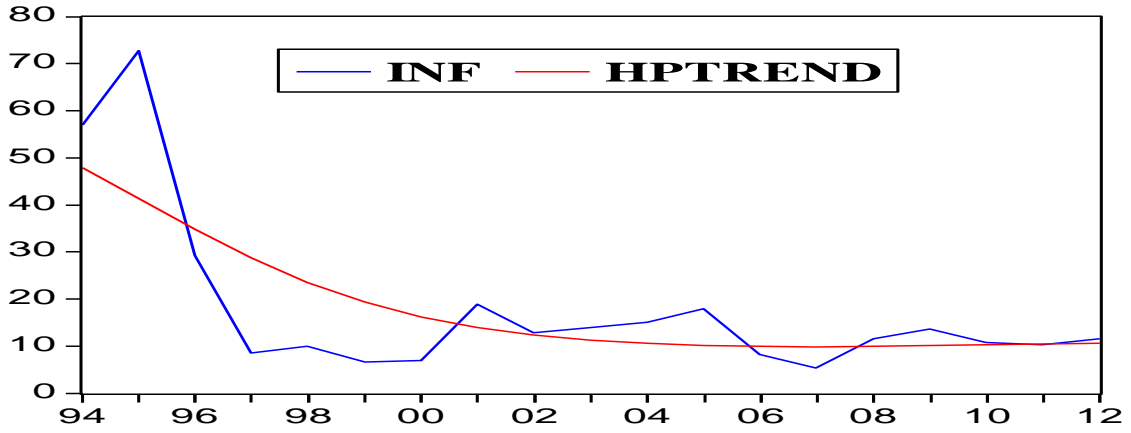


Figure 4.2: H P Trend of Inflation, Unemployment and Real GDP: 1994 to 2012.

4.1.3 The Hodrick-Prescott (HP) Filter de-trended Series Analysis: 1970 – 2012.

Figure 4.3 below showed that between 1970 and 2000, Inflation rate exhibited high volatility along the Hodrick-Prescott (HP) trend. This indicates deviation from its potential (hp trend) in the period 1970 to 2000. From 2001 to 2012, inflation rate was less volatile along the Hodrick-Prescott (HP) trend which showed less deviation from its potential.

Unemployment rate from the figure below (figure 4.3) indicated less volatility along the Hodrick-Prescott (HP) trend from the period 1970 to 1996. This shows there is less deviation of actual unemployment rate from its potential (hp trend) within the period 1970 to 1996. 1997 to 2012 indicated little deviation of unemployment rate from the Hodrick-Prescott (HP) trend (potential).

Between 1970 and 1995 (from figure 4.3), Real GDP showed little deviation from the HP trend. This indicates little deviation from its potential (Hodrick-Prescott trend) in the period 1970 to 1995. Real GDP showed less deviation from its potential (Hodrick-Prescott trend) for the case of 1994 to 2012.

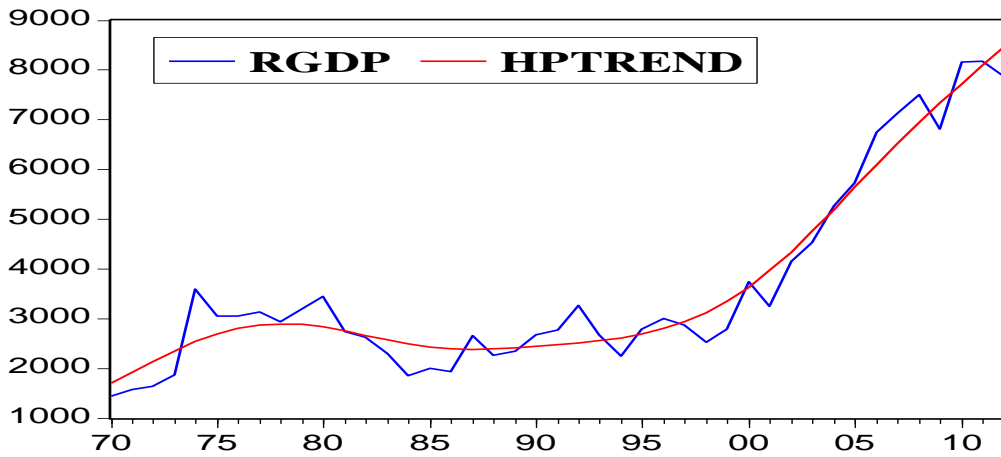
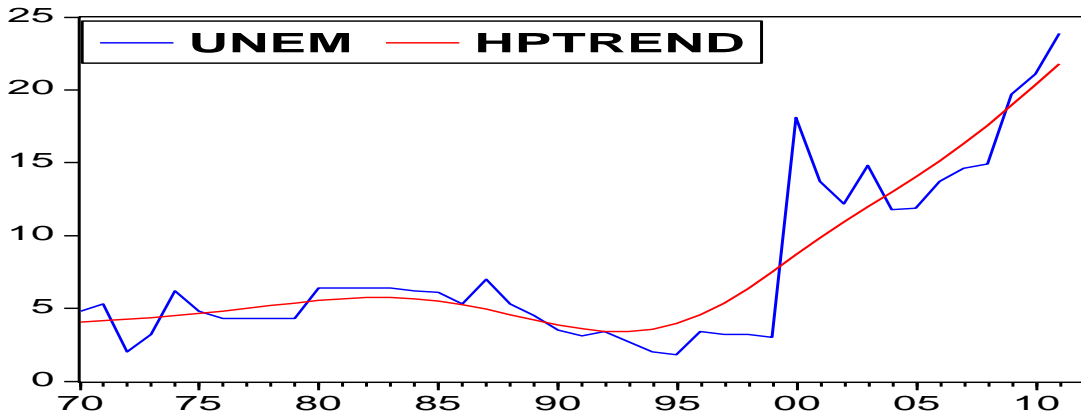
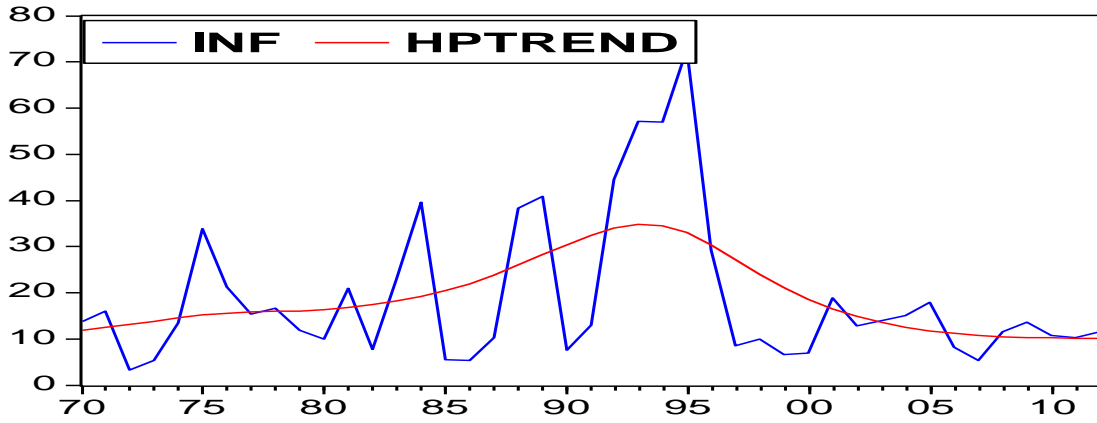


Figure 4.3 Hodrick-Prescott (HP) Filter de-trended Series

4.2 Estimation Results and Analysis

4.2.1 Stochastic Properties of the Series

Table 4.1 below shows the summary of results obtained from ADF unit root test. It shows that except for UNEM (Unemployment rate), RGDP (Real GDP), and OP (Openness) which are stationary at first difference, the series are all integrated of order zero. The ADF test statistics in absolute value are greater than the 5% critical value (also in absolute value) to be significant.

Table 4.1: Augmented Dickey Fuller Unit Roots Test of the Series

Variables	Levels		First Difference		Comment
	ADF Statistic	Test 5% Critical Value	ADF Statistic	Test 5% Critical Value	
INF	-3.409216**	-2.933158	-	-	I (0)
LRGDP	-1.848179	-3.520787	-7.129128**	-2.935001	I (1)
UNEM	-1.994706	-3.520787	-7.936362**	-2.935001	I (1)
CMPR	-6.801456**	-1.949319	-	-	I (0)
LTGE	-3.409216**	-2.933158	-	-	I (0)
COEXR	-5.512815**	-1.949097	-	-	I (0)
OP	-2.617559	-2.933158	-6.464365**	-1.949319	I (1)

***indicates significance at 5% level i.e. ADF test statistic > 5% critical value*

Source: Eviews Output

4.2.2 Regression Results and Analysis

Effects of Unemployment and Growth on Inflation

Table 4.2 and 4.3 below shows the estimates of the Phillips Curve for the periods 1970 - 2012 and 1981 - 2012. The R^2 for 1970-2012 regression is about 57%; which shows that 57% of variation in inflation is accounted for by the explanatory variables in the model. The Durbin-Watson statistics of 1.91 is within the acceptable range indicating non-serial correlation. The R^2 for the 1981-2012 regression result is 50%. The Durbin-Watson statistics of 1.41 suggest serial correlation. The Correlogram Q-statistics Residual Test (table 4.4) a more reliable test for serial

correlation was adopted. From table 4.4, the null hypothesis of no serial correlation was not rejected even up to 10 lags. As can be seen from the table, the p-values are greater than 0.05 baselines for 5% level.

Table 4.2: Estimates of Inflation as Dependent Variables (1970 – 2012)				
Instrument List: LINF C INF(-1) INF(-3) INF(-4) D(LNRGDP) D(LNRGDP(-2)) D(LNRGDP(-3)) D(LNRGDP(-4)) D(UNEM) D(UNEM(-1))D(UNEM(-3)) D(UNEM(-4)) COEXR COEXR(-2) COEXR(-4) CMPR CMPR(-3) CMPR(-4) LTGE LTGE(-1) LTGE(-2) LTGE(-3) LTGE(-4)D(OP(-2)) D(OP(-3)) D(OP(-4))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.07	0.19	10.35	0.00
INF(-1)	0.01	0.01	5.15	0.00
D(LRGDP)	-2.40	0.26	-9.28	0.00
D(UNEM)	-0.06	0.01	-5.89	0.00
COEXR	-0.02	0.00	-7.82	0.00
CMPR	0.01	0.01	0.59	0.56
LTGE	0.07	0.15	0.44	0.67
LTGE(-1)	0.61	0.22	2.73	0.01
D(OP(-2))	1.76	0.13	13.74	0.00
R-squared	0.57	Mean dependent var		2.74
Adjusted R-squared	0.39	S.D. dependent var		0.72
S.E. of regression	0.56	Sum squared resid		7.94
Durbin-Watson stat	1.91	J-statistic		0.34

Source: Eviews Output

Table 4.3: Estimates of Inflation as Dependent Variables (1981 – 2012)				
Instrument list: C INF(-1) D(LNRGDP) D(LNRGDP(-1)) D(LNRGDP(-2)) D(UNEM) D(UNEM(-1)) D(UNEM(-2)) COXR COXR(-1) LTGE LTGE(-1) D(OP) D(OP(-1)) D(OP(-2)) LTGE(-2) COXR(-2) LTGE(-2) INF(-2)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.29	0.58	3.96	0.00
INF(-1)	0.02	0.00	9.26	0.00
D(LRGDP)	-4.09	0.34	-11.92	0.00
D(UNEM(-1))	-0.07	0.01	-4.85	0.00
CEOXR(-1)	0.02	0.00	3.59	0.00
CMPR(-1)	-0.14	0.01	-10.05	0.00
LTGE	0.01	0.04	0.35	0.73
D(OP(-1))	0.81	0.09	8.62	0.00
R-squared	0.51	Mean dependent var		2.75
Adjusted R-squared	0.34	S.D. dependent var		0.82
S.E. of regression	0.67	Sum squared resid		8.95
Durbin-Watson stat	1.41	J-statistic		0.16

Source: Eviews Output

Table 4.4: Correlogram Q-statistics Residual Diagnostic Test						
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. **.	. **.	1	0.27	0.27	2.34	0.13
. * .	. ** .	2	-0.16	-0.25	3.15	0.21
. ** .	. * .	3	-0.20	-0.09	4.53	0.21
. .	. .	4	-0.02	0.05	4.54	0.34
. .	. * .	5	-0.06	-0.14	4.65	0.46
*** .	**** .	6	-0.44	-0.48	12.08	0.06
. ** .	. .	7	-0.21	0.04	13.79	0.06
. .	. * .	8	0.02	-0.15	13.81	0.09
. * .	. * .	9	0.09	-0.16	14.26	0.11
. * .	. ** .	10	-0.08	-0.22	14.52	0.15

Source: Eviews Output

The results from table 4.2 and table 4.3 reveal that the coefficient of inflation expectations (INF_{t-1}) is positive for both periods and statistically significant at 5% level. This implies that there is a positive relationship between inflation and inflation expectations. The coefficients in the 1970-2012 and 1981-2012 are statistically significant. This means that economic agents' expectations have great influence on actual inflation. For instance, economic agents' expectations that prices will rise will lead to about 1% and 2% increase in actual inflation respectively. Thus, for monetary authority to effectively combat inflation in Nigeria, effort needs to be directed toward conditioning agents' expectations because expectations affect agents' decisions. It is also noticeable that the impact of expectations has become stronger between 1981 and 2012.

The coefficient of log of Real Gross Domestic Product (RGDP) as reveal from the table is negative for both periods and statistically significant at 5% level. These indicate that as inflation falls, economic growth rises by 2.4% and 4.1% respectively. The policy implication from this empirical study reveals that lower levels of inflation lead to higher economic growth. This is in accord with some empirical studies. For example, the study by Oliver (2013) also found a negative relationship between growth and inflation in Nigeria.

The study also found that unemployment is negatively related to inflation (table 4.2 and 4.3) and statistically significant at 5% level. This is true for both 1970-2012 and 1981-2012 regressions. The results support the Phillip's curve that inflation and unemployment are inversely related. From the result, a 1% increase in unemployment (lagged once for 1981 - 2012) will cause 0.06% and 0.07% fall in inflation respectively. The differing coefficients between the two periods suggest that the Phillip's curve is not stable overtime. Despite this difference, one strong policy implication that can be deduced from their relationships is that the economy has to accept some level of unemployment to attain a low level of inflation. Studies of Ann (1999), Ellis (2008), Dimitrios (2006) and Bakare (2012) also found a negative relationship between inflation and unemployment.

Result also shows a negative relationship between exchange rate and inflation for 1970-2012 period and statistically significant at 5% level. The relationship for 1981-2012 is positive and also statistically significant. The differences in the kind of relationship from the estimates could be the differences in the period covered.

The result further shows that Monetary Policy Rate (MPR) is positively related to inflation in 1970 – 2012 period but not statistically significant at 5% level. For 1981 – 2012, MPR (lagged once) is negatively related to inflation and statistically significant at 5% level. The results suggest that the monetary policy rate has become more effective in targeting inflation in 1981 – 2012 period.

Openness (lagged once for 1981 – 2012 period) is also statistically significant at 5% level for both period and has a positive relationship with inflation. This suggests that external shocks can have significant impact on inflation.

Effects of Unemployment and Inflation on Growth

The Growth model shows the relationship and estimates for 1970 – 2012 and 1981 to 2012 period in table 4.5 and 4.6. The result for 1970-2012 shows that the dependent variable has a positive relationship with unemployment, government expenditure and Openness while inflation, exchange rate and Monetary Policy Rate have a negative relationship. All the variables are statistically significant at 5% level. For the 1981 – 2012 period (table 4.6), all the variables are statistically significant at 5% level except for Openness. From table 4.6, the dependent variable has a positive relationship with unemployment, government expenditure and openness while exchange rate, monetary policy rate and inflation exhibit a negative relationship. Though the coefficient of openness is not significant at 5% level.

Table 4.5: Estimates of Growth as Dependent Variables (1970 - 2012)				
Instrument list: D(LNRGDP) C D(UNEM) D(UNEM(-1)) D(UNEM(-2)) D(UNEM(-3)) INF INF(-1) INF(-2) INF(-3) COEXR COEXR(-1) COEXR(-2) COEXR(-3) LTGE LTGE(-1) LTGE(-2) LTGE(-3) CMPR CMPR(-1) CMPR(-2) CMPR(-3) D(OP) D(OP(-1)) D(OP(-2)) D(OP(-3))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.11	0.17	42.72	0.00
D(UNEM)	0.02	0.01	2.14	0.04
INF	-0.01	0.00	-7.59	0.00
COEXR	-0.01	0.00	-11.51	0.00
LTGE	0.21	0.06	3.34	0.00
CMPR	-0.01	0.01	-2.55	0.02
D(OP(-1))	0.65	0.11	6.02	0.00
R-squared	0.76	Mean dependent var		8.13
Adjusted R-squared	0.62	S.D. dependent var		0.42
S.E. of regression	0.26	Sum squared resid		1.53
Durbin-Watson stat	1.88	J-statistic		0.19

Source: Eviews Output

Table 4.6: Estimates of Growth as Dependent Variables (1981 - 2012)				
Instrument list: D(LNRGDP) C D(UNEM) D(UNEM(-1)) INF INF(-1) COXR COXR(-1) LTGE				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.46	0.26	24.81	0.00
D(UNEM)	0.04	0.01	2.48	0.02
INF	-0.01	0.00	-2.68	0.01
CEOXR	-0.01	0.00	-2.61	0.01
LTGE	0.15	0.02	6.79	0.00
CMPR(-1)	-0.07	0.02	-3.31	0.00
D(OP)	0.60	0.52	1.16	0.26
R-squared	0.66	Mean dependent var		8.16
Adjusted R-squared	0.57	S.D. dependent var		0.47
S.E. of regression	0.31	Sum squared resid		2.12
Durbin-Watson stat	1.73	J-statistic		0.03

Source: Eviews Output

The diagnostic check of the estimates for the two periods reveals that both regressions are robust. The R^2 for 1970-2012 regression is about 76%; which shows that about 76% variation in growth is accounted for by the explanatory variables in the model. The Durbin Watson Statistic indicates no serial correlation. For 1981- 2012, the R^2 value is about 66% while the Durbin Watson Statistic indicates no serial correlation.

The result from table 4.5 and 4.6 implies that there is a positive relationship between growth and unemployment in both periods that are statistically significant at 5% level. The coefficients differ likely because of variation in sample. For 1970 – 2012 and 1981 – 2012, a 1% increase in unemployment will generate increase in growth by 2% and 4% respectively. The result is in conflict with the Okun’s relationship of a negative relationship between unemployment and growth. This is an indication that growth in some particular sectors of the economy is non employment generating. For instance, between 2003 and 2012 growth has been highly driven by communication sector which employs a relatively small percentage of labour force. Also, it may be attributed to growth in the service sector (financial sector) and improvement in technology

which reduces employment of labour while increasing output. The results are similar to those of Hussain et al (2010), Francesco et al (2011) and Arewa and Nwakanma (2012).

For 1970 – 2012 from table 4.5, the coefficient reveals a negative relationship between growth and inflation which is statistically significant at 5% level. A 1% fall in inflation will lead to a 0.01% rise in output. This indicates that measures taken through fiscal and monetary policies to bring a fall in inflation can increase output. The coefficient for 1981 to 2012 (table 4.6) also shows a negative relationship of inflation and growth and statistically significant at 5% level.

The coefficients from both periods reveal a negative relationship between exchange rate and growth. 1970 -2012 and 1981 -2012 indicates a 1% rise in exchange rate (depreciation) will lead to a 0.01% and 0.01% decrease in growth respectively. This relationship supports the argument of Wijnbergen (1989) who stated that in a typical semi industrialized country where inputs for manufacturing are largely imported and cannot be easily produced domestically, firms input cost will increase following domestic currency depreciation. Therefore, output will fall. There is indication of Nigeria over reliance on importation of consumables, machineries and spare parts for her production.

The result shows a positive relationship between government expenditure and growth in both periods. Fiscal policy has not been neutral within the period. It suggests that the structure of government expenditure should be well coordinated and distributed to key sectors of the economy.

The result further shows the relationship between monetary policy rate (lagged once for 1981 – 2012 period) and growth as statistically significant at 5% level and negative. This indicates that an increase in MPR will lead to a fall in output (growth).

The study found a positive statistically significant relationship between growth and openness (lagged once and twice for 1970 – 2012 period) in Nigeria. This indicates that openness affects the economy positively through transfer of technology, Foreign Direct Investment (FDI) and export of crude oil.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Study

The study analyzed the relationship between inflation, employment and growth in Nigeria from 1970 to 2012. The objectives of this study were to estimate the modified Phillips Curve and the modified Okun's law equation for Nigeria. The motivation was the persistence of unemployment in a period of Gross Domestic Product (GDP) growth exceeding 6%.

The result of the study supports the Phillips curve which shows an inverse relationship between inflation and unemployment and later concludes its instability over time. Furthermore, results showed that the relationship between unemployment and growth has been positive over time as against the Okun's law and that Inflation is negatively related to growth. Policy instruments are also found to affect economic variables.

From the Hodrick-Prescott (HP) trend analysis in 4.1 and the discussion in section 4.2.2, the following are the summary of the major findings of the study.

- a) Inflation and growth are found to be negatively related. This means that as inflation rises, growth falls. This suggests that low level of inflation is growth-enhancing while higher level of inflation is detrimental to growth.
- b) Unemployment and Inflation were also found to be negatively related as stated by the Phillip's curve. As unemployment increases, inflation falls.
- c) Growth and Unemployment are positively related, implying that Okun's law is not applicable to Nigeria.

- d) Phillips curve is not stable but changes over time. The Phillips curve is not a stable relationship as it changes over the period of the study.
- e) Fiscal policy (Government Expenditure), Monetary Policy Rate (MPR) and Openness affect inflation and economic growth in Nigeria.

5.2 Conclusion of the Study

The finding of the study leads to two main conclusions. First, the use of Okun's Law for macro-economic policy will generate adverse consequences, because it is not supported by data. Second, Phillip's curve will produce better counter-inflation policies because it is supported by data.

5.3 Recommendations of the Study

Given the above findings and conclusion, the study therefore recommends the following measures.

- a) Need to improve understanding of the relationships between unemployment and growth to ensure that growth generates positive and significant employment elasticity.
- b) Employ the short-run Phillip's curve in counter-inflationary policy taking due cognizance of the trade-offs.

5.4 Contribution to Knowledge

From the findings of the Study on the relationship between Inflation, Employment and Economic Growth in Nigeria for the period 1970 to 2012, results have shown a positive relationship between Unemployment and Growth in Nigeria for the period under study. This is contrary to the Okun's Law of a negative relationship between Unemployment and Economic Growth. The

finding of the study indicates that Okuns Law is not applicable in Nigeria. The study also showed that Phillip's curve will generate more effective counter-inflationary policies in Nigeria.

REFERENCES

- Abachi T. P. (1998). Inflation-Unemployment trade-off in less developed countries (LDCs): The case of Nigeria (1970-1995). Unpublished M.sc thesis submitted to the Department of Economics, ABU Zaria.
- Adawo M. A., E. B. Essien and N.U. Ekpo (2012). Is Nigeria's Unemployment Problem Unsolvable? *Current Research Journal of Social Sciences*. 4 (6), 389-395.
- Adebisi, M. A. (2011). Inflation Targeting: Can we Establish a Stable and Predictable Relationship between Inflation and Monetary Policy Instruments in Nigeria and Ghana? Unpublished paper, Department of Economics University of Lagos, Yaba-Lagos, Nigeria.
- Adeyemi, B. S. (2012). Stabilization policy, Unemployment Crises and Economic Growth in Nigeria. *Universal Journal of Management and Social Sciences*, 2 (4), 134-145.
- Akinboyo, G.B. (1987). "Job Creation as a Productivity Measure for Employment Problems in Developing Countries: The Nigeria and Holland Experience", *Increasing Productivity in Nigeria*, National Productivity Centre, Lagos, pp 404-411.
- Akpan H. E. (2012). Employment, Growth and Poverty Reduction in an Oil Export Economy: Evidence from Nigeria. Paper presented at the 53rd Annual Conference of the Nigerian Economic Society, 27 – 30, August, NICON Luxury Hotel, Abuja.
- Alexander M., Fabio R. and Johann S. (2008). The Small Open-Economy New Keynesian Phillips Curve: Empirical Evidence and Implied Inflation Dynamics. Henley Business School University of Reading.
- Alfred A. and Ian P. (2011). Empirical Evidence on Inflation and Unemployment in the Long Run. Economic Discussion Paper. No. 1109.
- Aminu U. and Anono A. Z. (2012). Effects of Inflation on Growth and Development of the Nigerian Economy (An Empirical Analysis). *International Journal of Business and Social Science*, 3 (1).
- Aminu, U. and Anono, A. Z. (2012). An empirical Analysis of The Relationship Between Unemployment and Inflation in Nigeria from 1977-2009. *Business Journal*, 1(12), 42-61.
- Ann C. E. (1999). Is the Short run Phillips Curve Non Linear? Empirical Evidence for Australia, Sweden and United States. Unpublished paper from Stockholm School of Economics, Department of Economic Statistics.
- Apergis N. and Anthony R. (2003). An Examination of Okun's law: Evidence from Regional areas in Greece. *Applied Economics*, 3 (35), 1147–1151.

- Arewa A. and Nwakanma P. C. (2012). Potential-Real GDP Relationship and Growth Process of Nigerian Economy: An Empirical Re-evaluation of Okun's Law. *European Scientific Journal*, 8, (9).
- Arturo E. and Frederic S. M. (1999). Rethinking the Role of NAIRU in Monetary Policy: Implications of Model Formulation and Uncertainty. University of Chicago Press. Chapter pages in book: 405 - 436.
- Ascari G. and Ropele T. (2010). Sacrifice Ratio or Welfare Gain Ratio? Disinflation in a DSGE Monetary model. Working Paper, No. 736.
- Awogbemi, C. A. and Taiwo, J. K. (2012). Empirical Analysis of the Causes and Effects of Inflation in Nigeria. *Journal of Economics and Sustainable Development*, 3, (11).
- Baba N. Y. (2012). The Validity of Okun's Law in Nigeria: A Bound Testing Approach to Co-integration. Paper presented at the 53rd Annual Conference of the Nigerian Economic Society, 27 – 30, August, NICON Luxury Hotel, Abuja.
- Bakare A.S. (2011). The Determinants of Urban Unemployment Crisis in Nigeria: An Econometric Analysis. *Journal of Emerging Trends in Economics and Management Sciences*, 2 (3), 184-192.
- Ball L., Daniel L. and Prakash L. (2012). Okun's Law: Fit at 50? Unpublished Paper presented at the 13th Jacques Polak Annual Research Conference Hosted by the International Monetary Fund Washington.
- Ball, L. (1994). "What Determines the Sacrifice Ratio?" in N. G. Mankiw (eds.), *Monetary Policy*, University of Chicago: 155-193.
- Ben B. (2008). The Fed Reserve Board Chairman in 2008 during the Boston Conference on the Existence of the Phillips Curve in 2008.
- Bent E. S. (2007). Teaching notes on GMM.
- Brain W. (2006). Economic Growth, Inflation and Unemployment: Limits to Economic policy. CRS Report for Congress.
- Brian S. and Howard R. (2005). Modern Macroeconomics: Its origin, developmet and current state. Edward Elgar publishing ltd. United Kingdom.
- Caporale T. (2011). Government Ideology, Democracy and the Sacrifice Ratio: Evidence from Latin American and Caribbean Disinflations. *The Open Economics Journal*, 1(4), 39-43.
- Central Bank of Nigeria (2006). "Inflation Targeting in Nigeria" Proceeding of the Fifteenth Annual Conference of the research And statistics offices, Bauchi, Nigeria.

- Central Bank of Nigeria (2007). CBN Annual Report and statement of Account, Abuja: Central Bank of Nigeria.
- Central Bank of Nigeria (2010). Inflation Forecasting Models for Nigeria. Research department, CBN, Occasional Paper No. 36.
- Central Bank of Nigeria (2010). Is the Phillips Curve Useful For Monetary Policy in Nigeria? Research Department, CBN Abuja. Occasional Paper No. 38.
- Central Bank of Nigeria (2011). Annual Report 2011
- Central Bank of Nigeria (2011). Statistical Bulletin.
- Central Bank of Nigeria (2012). Statistical Bulletin.
- Chari V. V. and Kehoe P. J. (2006). Modern Macroeconomics in Practice: How Theory Is Shaping Policy. *Journal of Economic Perspectives* 20,(4), 3–28.
- Cyril A. Awogbenle and K. Chijioke Iwuamadi (2010). Youth unemployment: Entrepreneurship development programme as an intervention mechanism. *African Journal of Business Management*, 4(6), 831-835.
- Dimitrios P. (2006). The Trade-Off between Inflation and Unemployment in the New European Union Member-States, *International Research Journal of Finance and Economics - Issue I (2006)* EuroJournals Publishing.
- Donnellan, T., Kevin H. and Thia H. (2012). Defining an Institutional Framework for the Labour Market, Working Paper No. 24.
- Ellis W. T. (2008). Recent Evidence of a Phillips Curve in United States Data: A Re-examination. Department of Economics Oberlin College.
- Engle, Robert F. and C. W. J. Granger (1987). “Co-integration and Error Correction: Representation, Estimation, and Testing,” *Econometrica*, No. 55, 251–276.
- EViews 4 User’s Guide (2001).
- Exim Bank (2009). Nigeria Brief Profile.
- Fatukasi B. (2004). Determinants of Inflation in Nigeria: An Empirical Analysis. *International Journal of Humanities and Social Science*, 1(18).
- Francesco B., Misbah T. C, Enrico M. and Marcello S. (2011). Financial Crises and Unemployment: Beyond the Okun’s Law.
- Friedman, M. (1968). "The Role of Monetary Policy," *American Economic Review*, vol. 58: 1-17.

- Gary K and Luca O. (2012). Estimating Phillips Curves in Turbulent Times Using the ECB's Survey of Professional Forecasters, European Central Bank, Working Paper Series No 1422.
- Gbosi, A.N. (2006). Modern Labour Economics and Policy Analysis. Park Publishers, Abakiliki: 56-92.
- Geoff R. (2011). AS Macroeconomics/International Economy. Eton College.
- Goodfriend M., and Robert G. K. (1997). "The New Neoclassical Synthesis and the Role of Monetary Policy." In *NBER Macroeconomics Annual*, edited by Ben S. Bernanke and Julio J. Rotemberg. Cambridge.
- Guglielmo M. and Marinko S. (2011). Employment Growth, Inflation and Output Growth: Was Phillips Right? Evidence from a Dynamic Panel. Working Paper No. 32.
- Guglielmo M. and Marinko S. (2011). Short and Long run Linkage between Employment Growth, Inflation and Output Growth. Evidence from a Large Panel. Working Paper 44: 11 -17.
- Gujarati, Damodar N. (1995). Basic Econometrics, 3rd Edition, McGraw-Hill.
- Hans G. and Laurent L. P. (2003). An Open Economy New Keynesian Phillips Curve: Evidence from Hong Kong. National Centre of Competence in Research Financial Valuation and Risk Management. Working Paper No. 144.
- Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica* 50, 1029–1054.
- Hussain S. and Malik S. (2011). Inflation and Economic Growth: Evidence from Pakistan. *International Journal of Economics and Finance*, 3 (5).
- Hussain T. et al (2010). A Coherent relationship between Economic Growth and Unemployment: An empirical evidence From Pakistan. *International Journal of Human and Social Sciences*. 3 (6).
- Imimole B. and A. Enoma (2011). Exchange Rate Depreciation and Inflation in Nigeria (1986–2008). *Business and Economics Journal*, 5 (6), 87- 110.
- International Labor Organization. (2007). *Global Employment Trends*. Geneva: International Labor Office. International Labour Organization (ILO, 2011), Labour Statistics Yearbook, Geneva.
- Jerry U. (2011). Macroeconomic Framework and Policy Consistency: 2011 Budget in Perspective. All Africa Newspaper, 6th April, 2011.
- Jhingan M. L. (2004). Macro- Economic Theory. Vrinda Publications Limited Delhi.
- John B. (1997). Dictionary of Economics. Oxford University Press. New York.

- John P. J. and Glenn D. R. (1998). Taylor's Rule and the Fed: 1970–1997. Federal Reserve Bank of San Francisco *Economic Review*, No. 3.
- Jorge D. and Omar L. (2012). Is the GDP Growth Rate in NIPA a Welfare Measure ? Barcelona Graduate School of Economics Working Paper Series No. 665.
- Kai L. and Ole B. R. (2003). Measuring the sacrifice ratio: Some international evidence.
- Knotek E. S (2007) How Useful is Okun's Law. Federal Reserve Bank of Kansas City, *Economic Review*, Fourth Quarter 2007.
- Leopold S. and Alfred S. (2002). An analysis on the structural stability of Okun's law: A cross country study, *Applied Economics*, 14, pp 1775-1787.
- Lim, L. L. (2002). "Female Labour Force Participation", Report of the Expert Group Meeting on Completing the Fertility Transition, held at the United Nations Headquarters in New York from 11-14 March.
- Luis F. C, Marcelo O. and Claudio S. (2005). An Estimated New Keynesian Phillips Curve for Chile. Central Bank of Chile. Working paper.
- Mankiw, N.G. (1994). *Macroeconomics*. 2nd Edn., Worth Publishers, New York.
- Mankiw, N. G. (2001). *Data of Macroeconomics*.
- Marika K., Hector S., and Dennis J. S. (2006). Phillips Curve and Unemployment Dynamics: A critique and a Holistic Perspective. Discussion Paper series No. 2265.
- Markus B. and Evi P. (2011). Fiscal Expansions, Unemployment and Labour Force Participation: Theory and Evidence.
- Melberg H.O. (1992). *Inflation: An overview of Theories and Solutions*.
- Merve B. (2011). Sacrifice Ratio in Turkey an Empirical Study of the Change in Inflation and Production Loss. *Empirical Studies in Social Sciences*, 6th International Student Conference. Izmir University of Economics, Izmir Turkey.
- Miles B. C. (2006). Estimating key macroeconomic relationships at the undergraduate level: Taylor rule and Okun's Law examples. Presented at the 2006 Meeting of the Allied Social Science Associations Boston, MA.
- Muhammed S. A. (2011). Unemployment in Nigeria: Implication on the Gross Domestic Product (GDP) over the years. *Internation Journal of Economic*, 2 (1), 66-71.
- NBS (2010). Labour Force Survey. No. 476.

- NBS (2010). National Manpower Stock and Employment Generation Survey.
- NBS (2011). Annual Socio- Economic Report.
- NBS (2011). CPI and Inflation Report November 2011.
- NBS (2011). Labour Force Survey.
- Ojapinwa, T. V. and Oluyori. S. (2011). Does Philips Relations Really Exist? Empirical Evidence From Nigeria.
- Ojo, M.O. (2000). The role of the Autonomy of the Central Bank of Nigeria In Promoting Macroeconomic Stability. *C B N Economic and Financial Review*, 38, (1).
- Okun, A. M. (1978). "Efficient Disinflation Policies," *American Economic Review*, 68(1), 348-352.
- Oliver I. I. (2013). Does Inflation Weakens Economic Growth? Evidence from Nigeria. *European Journal of Accounting, Auditing and Finance Research*, 1 (4), 139-150.
- Onyejeli N. (2010). Nigeria Workforce Profile No. 22, available at website of Global Prospective Institute.
- Osuji C. C. and Akujuobi, L.E. (2012). Inflation Targeting and Monetary Policy Instruments: Evidence from Nigerian and Ghana. *Kuwait Chapter of Arabian Journal of Business and Management Review* Vol. 1, No.11.
- Oye N.D., Inuwa I. and Muhammad S. A. (2011). Unemployment in Nigeria: Implication on the Gross Domestic Product (GDP) Over the Years. *International. Journal of Economic. Research*, 2(1):66-71.
- Phelps, E. S. (1967). 'Phillips Curves, Expectations of Ination and Optimal Unemployment over Time', *Economica*, 34(135), 254-281.
- Phillips, A. W. (1958). "The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957". *Economica*, 25 (100), 283–299.
- Pierre-Richard A. and Nihal B. (2008). Contracting Models of the Phillips Curve Empirical Estimates for Middle-Income Countries. Discussion Paper. Centre for Growth and Business Cycle Research, Economic Studies, University of Manchester, UK.
- Policy Archives (2006). Economic Growth, Inflation and Unemployment: Limits to Economic Policy. Library of Congress, Congressional Research Service.
- Posta V. (2008). The Nairu and The Natural Rate of Unemployment – A Theoretical View. The Ministry of Finance of the Czech Republic 2008. Research Study.

- Rafindadi S. (2012). Macroeconomic Policy, Output and Unemployment Dynamics in Nigeria: Is there Evidence of Jobless Growth? Paper presented at the 53rd Annual Conference of the Nigerian Economic Society on Youth Empowerment and Poverty Reduction in Nigeria, held at NICON Luxury Hotel, Abuja between 27th and 30th August, 2012.
- Raheem, M. I. (1993). "Nigeria for Africa: A Case for Labour Export", in Oyejide, T. A. and M. I. Obadan, *Applied Economics and Economic Policy - In Honour of Emmanuel C. Edozien*, Ibadan University Press, Ibadan.
- Richard A. and Nihal B. (2008). Contracting Models of the Phillips Curve Empirical Estimates for Middle-Income Countries. Discussion Paper. Centre for Growth and Business Cycle Research, Economic Studies, University of Manchester, UK.
- Robert C. A. (2012). Youth Labour Market Barriers in Nigeria: A Demand Side Analysis. Paper presented at the 53rd Annual Conference of the Nigerian Economic Society, 27 – 30, August, NICON Luxury Hotel, Abuja.
- Robert Dixon and James Thomson (2000). Okun's Law and Movements over Time in the Unemployment rate in Australia. The University of Melbourne, Department of Economics Research Paper No. 741.
- Roeger W. and Herz B. (2011). Traditional versus New Keynesian Phillips Curves: Evidence from Output Effects. *International Journal of Central Banking* . 8 (2).
- Rufus Ishola A. (2008). Reducing Unemployment through the Informal Sector: A Case Study of Nigeria. *European Journal of Economics, Finance and Administrative Sciences – Issue II*.
- Sandeep M. (2012). Determinants of the Sacrifice Ratio: Evidence from OECD and non-OECD countries. Department of Economics - Carswell Hall - Wake Forest University - Box 7505 - Winston Salem.
- Sanusi L. (2010). Growth Prospects for the Nigerian Economy. Unpublished Convocation Lecture paper at Igbinedion University, 26th November, 2010.
- Schmitt-Grohé S. and M. Uribe (2008). Policy Implications of the New Keynesian Phillips Curve. *Federal Reserve Bank of Richmond Economic Quarterly Economic Quarterly*, 94, (4).
- Sill K. (2011). Inflation Dynamics and the New Keynesian Phillips Curve. *Business Review* Q1 2011 17.
- Sodipe O. A. and Ogunrinola, O. I. (2011). Employment and Economic Growth nexus in Nigeria. *International Journal of Business and Social Science*, 2 (11).
- Stanford J. (2008). A “How-To” Guide: Labour Market and Unemployment Statistics. Canadian Centre for Policy Alternatives.

- Taiwo M. (2011). Investment, Inflation and Economic Growth: Empirical Evidence from Nigeria. *Research Journal of Finance and Accounting* 2 (5).
- Taylor, J. B. (1993). "Discretion Versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy* 39: 195–214.
- Thirlwall, A. P. (1969). 'Okun's Law and the Natural Rate of Growth', *Southern Economic Journal*, 36(1), 87-89.
- Thomas M. H. (1985). The Evolution and Policy Implications of Phillips Curve Analysis. Economic Review, Federal Reserve Bank of Richmond.
- Umer J. (2011). Validity of Okun's Law: Empirical Evidence from Pakistan (1981-2005).
- Vikesh G and Subrina H (2004) Relationship between Inflation and Economic Growth. Reserve Bank of Fiji Working Paper, No. 4.
- Vinaye A. (2011). Trade, Jobs and Growth in Africa: An Empirical Investigation of Exported Led Jobless Growth Hypothesis. A Paper Prepared for the 3rd I CITE Regional Congress on Trade, Jobs and Inclusive Development in Africa. September 22-23, Ramada Plaza Hotel, Gammarth, Tunisia.
- Wijnbergen, S. (1989). "Exchange Rate Management and Stabilization Policies in Developing Countries," *Journal of Development Economics*, 4 (23), pp 227-47.
- World Bank (1998). 1998 World Development Indicators. The World Bank, Washington, D. C.
- World Bank (2011). Labour Force Indicator Report
- Zhang, L. H. (2001). Sacrifice Ratios with Long-Lived Effects. Discussion paper, Department of Economics, The Johns Hopkins University.
- www.cenbank.org

APPENDICES

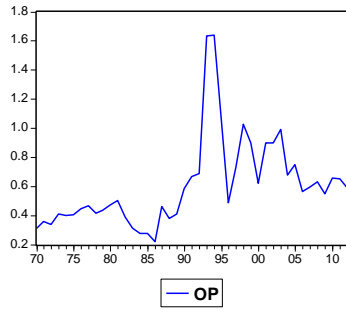
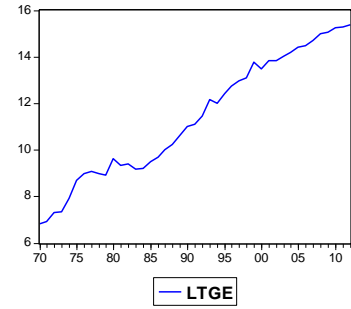
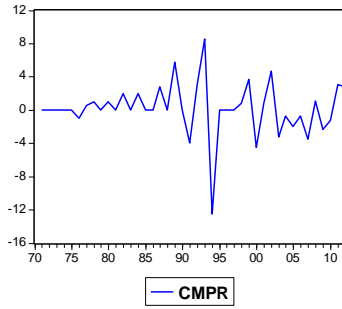
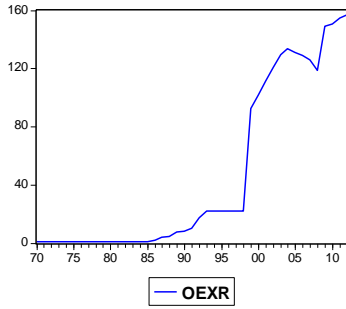
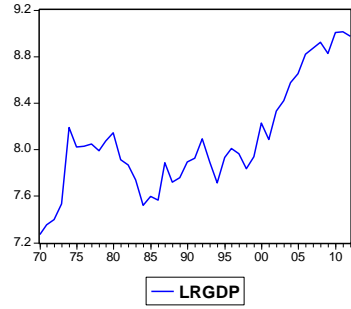
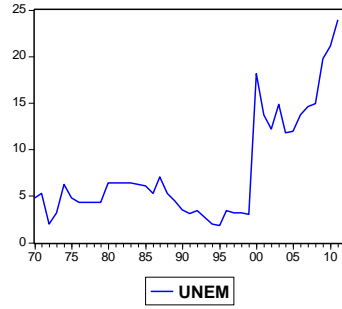
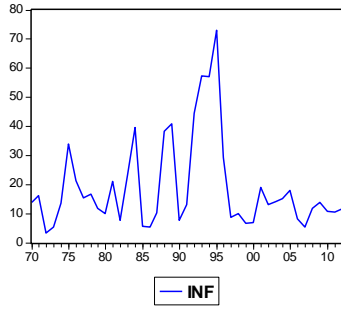
APPENDIX I: DATA

YEAR	INF	MPR	CMPR	UNEM	RGDP	TGE	OP	OEXR	COEXR	cpi(1990=100)
1970	13.8	4.5		4.8	1433.7	903.9	0.310882	0.71		3.683492497
1971	15.7	4.5	0	5.3	1560.0	997.2	0.356689	0.71	0	4.263301501
1972	3.2	4.5	0	2	1633.6	1463.6	0.337294	0.66	-0.05	4.399727149
1973	5.4	4.5	0	3.2	1860.6	1529.2	0.405909	0.66	0	4.638472033
1974	13.2	4.5	0	6.2	3583.7	2740.6	0.400152	0.63	-0.03	5.252387449
1975	34.4	4.5	0	4.8	3041.8	5942.6	0.40265	0.62	-0.01	7.060027285
1976	23.7	3.5	-1	4.3	3052.9	7856.7	0.446417	0.63	0.01	8.731241473
1977	15.6	4	0.5	4.3	3122.2	8823.8	0.46714	0.64	0.01	10.09549795
1978	16.6	5	1	4.3	2935.4	8000	0.41332	0.64	0	11.76671214
1979	11.6	5	0	4.3	3196.6	7406.7	0.436198	0.6	-0.04	13.13096862
1980	9.9	6	1	6.4	3440.2	14968.5	0.469096	0.55	-0.05	14.42701228
1981	21	6	0	6.4	2726.9	11413.7	0.501114	0.62	0.07	17.46248295
1982	7.6	8	2	6.4	2611.1	11923.2	0.386737	0.67	0.05	18.79263302
1983	23.2	8	0	6.4	2293.2	9636.5	0.308925	0.72	0.05	23.15825375
1984	39.6	10	2	6.2	1844.0	9927.6	0.272821	0.77	0.05	32.33287858
1985	5.5	10	0	6.1	1991.1	13041.1	0.276598	0.89	0.12	34.10641201
1986	5.4	10	0	5.3	1923.5	16223.7	0.215544	1.75	0.86	35.94815825
1987	10.2	12.75	2.75	7	2657.3	22018.7	0.458287	4.02	2.27	39.59754434
1988	56.1	12.75	0	5.3	2250.5	27749.5	0.378462	4.54	0.52	61.80081855
1989	50.5	18.5	5.75	4.5	2330.9	41028.3	0.409744	7.36	2.82	93.00818554
1990	7.5	18.5	0	3.5	2675.5	60268.2	0.581589	8.04	0.68	100
1991	12.9	14.5	-4	3.1	2765.8	66584.4	0.668148	9.91	1.87	112.8581173

1992	44.6	17.5	3	3.4	3264.3	92797.4	0.684702	17.3	7.39	163.165075
1993	57.2	26	8.5	2.7	2666.7	191228.9	1.633004	22.07	4.77	256.4461119
1994	57	13.5	-12.5	2	2234.6	160893.2	1.636173	22	-0.07	402.6944065
1995	72.9	13.5	0	1.8	2777.9	248768.1	1.032888	21.9	-0.1	695.9072306
1996	30.4	13.5	0	3.4	3003.8	337217.6	0.486356	21.88	-0.02	899.7612551
1997	8.2	13.5	0	3.2	2869.2	428215.2	0.726162	21.89	0.01	976.568895
1998	10.3	14.31	0.81	3.2	2521.6	487113.4	1.027585	21.89	0	1074.079127
1999	6.7	18	3.69	3	2789.2	947690	0.896598	92.34	70.45	1145.156889
2000	6.9	13.5	-4.5	18.1	3741.8	701059.4	0.621029	101.7	9.36	1224.590723
2001	18.9	14.31	0.81	13.7	3246.0	1018026	0.898934	111.23	9.53	1455.661664
2002	12.9	19	4.69	12.2	4138.7	1018156	0.89703	120.58	9.35	1670.190996
2003	14	15.75	-3.25	14.8	4529.9	1225966	0.988624	129.3	8.72	1873.567531
2004	14.9	15	-0.75	11.8	5270.7	1426200	0.678271	133.5	4.2	2165.006821
2005	17.9	13	-2	11.9	5723.6	1822100	0.749841	131.1	-2.4	2546.00955
2006	8.2	12.25	-0.75	13.7	6737.7	1938003	0.561994	128.7	-2.4	2755.3206
2007	5.3	8.75	-3.5	14.6	7114.0	2450897	0.591641	125.8	-2.9	2903.751705
2008	11.6	9.81	1.06	14.9	7502.0	3240820	0.631903	118.6	-7.2	3238.642565
2009	13.7	7.44	-2.37	19.7	6800.6	3452991	0.545232	148.9017	30.3017	3645.873124
2010	10.8	6.13	-1.31	21.1	8147.8	4194218	0.655921	150.298	1.3963	4171.043656
2011	10.3	9.19	3.06	23.9	8173.3	4299155	0.651919	154.74	4.442	4593.451569
2012	11.5	12	2.81	-	7862.4	4749101	0.594708	156.81	2.07	5156.718963

Source: cbn Statistical Bulletin 2003,2005, 2009, 2010, 2012, nbs 2010, 2011, www.cenbank.org

APPENDIX II: UNIT ROOT PROPERTIES



Unit Root Properties of the Series

APPENDIX III: OUTPUT OF GMM RESULTS

Dependent Variable: LINF

Method: Generalized Method of Moments

Date: 05/17/14 Time: 12:25

Sample(adjusted): 1975 2011

Included observations: 37 after adjusting endpoints

Kernel: Quadratic, Bandwidth: Andrews (0.94), Prewhitening

Simultaneous weighting matrix & coefficient iteration

Convergence achieved after: 26 weight matrices, 27 total coef iterations

Instrument list: LINF C INF(-1) INF(-3) INF(-4) D(LNRGDP) D(LNRGDP(-2)) D(LNRGDP(-3)) D(LNRGDP(-4)) D(UNEM) D(UNEM(-1)) D(UNEM(-3)) D(UNEM(-4)) COEXR COEXR(-2) COEXR(-4) CMPR CMPR(-3) CMPR(-4) LTGE LTGE(-1) LTGE(-2) LTGE(-3) LTGE(-4) D(OP(-2)) D(OP(-3)) D(OP(-4))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.066860	0.199629	10.35353	0.0000
INF(-1)	0.010230	0.001987	5.149486	0.0000
D(LRGDP)	-2.403067	0.259051	-9.276411	0.0000
D(UNEM)	-0.060303	0.010235	-5.892086	0.0000
D(UNEM(-1))	-0.001445	0.010506	-0.137500	0.8917
COEXR	-0.016319	0.002088	-7.815958	0.0000
COEXR(-2)	0.001197	0.003626	0.329992	0.7442
CMPR	0.007343	0.012429	0.590827	0.5599
LTGE	0.067512	0.154103	0.438094	0.6651
LTGE(-1)	0.607198	0.222493	2.729064	0.0115
LTGE(-2)	-0.630446	0.139090	-4.532652	0.0001
D(OP(-2))	1.757839	0.127939	13.73967	0.0000
R-squared	0.573163	Mean dependent var	2.743989	
Adjusted R-squared	0.385354	S.D. dependent var	0.718734	
S.E. of regression	0.563482	Sum squared resid	7.937811	
Durbin-Watson stat	1.911097	J-statistic	0.342701	

Dependent Variable: LINF
 Method: Generalized Method of Moments
 Date: 05/19/14 Time: 08:50
 Sample(adjusted): 1984 2011
 Included observations: 28 after adjusting endpoints
 Kernel: Bartlett, Bandwidth: Variable Newey-West (7), No
 Prewhitening
 Simultaneous weighting matrix & coefficient iteration
 Convergence not achieved after: 499 weight matrices, 500 total coef
 Iterations
 Instrument list: C INF(-1) D(LNRGDP) D(LNRGDP(-1)) D(LNRGDP(-2))
 D(UNEM) D(UNEM(-1)) D(UNEM(-2)) COXR COXR(-1) LTGE
 LTGE(-1) D(OP) D(OP(-1)) D(OP(-2)) LTGE(-2) COXR(-2) LTGE(-
 2)
 INF(-2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.290033	0.578036	3.961752	0.0008
INF(-1)	0.020992	0.002266	9.264004	0.0000
D(LRGDP)	-4.086042	0.342693	-11.92333	0.0000
D(UNEM(-1))	-0.064554	0.013318	-4.847317	0.0001
COXR(-1)	0.002152	0.000599	3.594189	0.0018
CMPR(-1)	-0.137892	0.013718	-10.05168	0.0000
LTGE	0.013524	0.039134	0.345577	0.7333
D(OP(-1))	0.810626	0.094062	8.617969	0.0000
R-squared	0.508223	Mean dependent var	2.751711	
Adjusted R-squared	0.336102	S.D. dependent var	0.821159	
S.E. of regression	0.669080	Sum squared resid	8.953366	
Durbin-Watson stat	1.412616	J-statistic	0.158886	

Date: 05/19/14 Time: 13:01

Sample: 1984 2011

Included observations: 28

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
. **.	. **.	1	0.274	0.274	2.3346	0.127
. * .	. ** .	2	-0.158	-0.252	3.1452	0.208
. ** .	. * .	3	-0.203	-0.092	4.5308	0.210
. .	. .	4	-0.016	0.045	4.5399	0.338
. .	. * .	5	-0.056	-0.143	4.6531	0.460
. *** .	. *** .	6	-0.441	-0.477	12.076	0.060
. ** .	. .	7	-0.207	0.038	13.798	0.055
. .	. * .	8	0.021	-0.147	13.817	0.087
. * .	. * .	9	0.099	-0.156	14.255	0.114
. * .	. ** .	10	-0.076	-0.217	14.522	0.150

Dependent Variable: LRGDP
 Method: Generalized Method of Moments
 Date: 05/18/14 Time: 09:23
 Sample(adjusted): 1974 2011
 Included observations: 38 after adjusting endpoints
 Kernel: Quadratic, Bandwidth: Andrews (1.52), No prewhitening
 Simultaneous weighting matrix & coefficient iteration
 Convergence achieved after: 24 weight matrices, 25 total coef iterations
 Instrument list: D(LNRGDP) C D(UNEM) D(UNEM(-1)) D(UNEM(-2))
 D(UNEM(-3)) INF INF(-1) INF(-2) INF(-3) COEXR COEXR(-1)
 COEXR(-2) COEXR(-3) LTGE LTGE(-1) LTGE(-2) LTGE(-3)
 CMPR
 CMPR(-1) CMPR(-2) CMPR(-3) D(OP) D(OP(-1)) D(OP(-2)) D(OP(-3))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.109009	0.166428	42.71515	0.0000
D(UNEM)	0.023423	0.010955	2.138081	0.0434
D(UNEM(-1))	0.003360	0.006243	0.538187	0.5956
D(UNEM(-2))	-0.014878	0.007735	-1.923389	0.0669
INF	-0.009587	0.001262	-7.599155	0.0000
INF(-2)	-0.012333	0.001573	-7.838941	0.0000
COEXR	-0.014204	0.001234	-11.50798	0.0000
COEXR(-1)	-0.007312	0.002298	-3.181728	0.0042
LTGE	0.210460	0.063029	3.339101	0.0028
LTGE(-1)	-0.083942	0.061692	-1.360659	0.1868
CMPR	-0.012684	0.004955	-2.559940	0.0175
CMPR(-1)	-0.040001	0.009028	-4.430734	0.0002
CMPR(-2)	-0.048478	0.010319	-4.698060	0.0001
D(OP(-1))	0.647736	0.107661	6.016439	0.0000
D(OP(-2))	0.522905	0.132098	3.958476	0.0006
R-squared	0.764100	Mean dependent var	8.129638	
Adjusted R-squared	0.620509	S.D. dependent var	0.418830	
S.E. of regression	0.258011	Sum squared resid	1.531104	
Durbin-Watson stat	1.876485	J-statistic	0.193125	

Dependent Variable: LRGDP
 Method: Generalized Method of Moments
 Date: 05/18/14 Time: 20:47
 Sample(adjusted): 1983 2011
 Included observations: 29 after adjusting endpoints
 Kernel: Bartlett, Bandwidth: Fixed (3), Prewhitening
 Simultaneous weighting matrix & coefficient iteration
 Convergence achieved after: 15 weight matrices, 16 total coef iterations
 Instrument list: D(LNRGDP) C D(UNEM) D(UNEM(-1)) INF INF(-1)
 COXR COXR(-1) LTGE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.458632	0.260355	24.80706	0.0000
D(UNEM)	0.042192	0.017011	2.480312	0.0213
INF	-0.005113	0.001911	-2.675197	0.0138
COXR	-0.001251	0.000479	-2.613218	0.0159
LTGE	0.145753	0.021452	6.794526	0.0000
CMPR(-1)	-0.066815	0.020148	-3.316139	0.0031
D(OP)	0.602575	0.521951	1.154465	0.2607
R-squared	0.663060	Mean dependent var	8.161224	
Adjusted R-squared	0.571168	S.D. dependent var	0.473857	
S.E. of regression	0.310307	Sum squared resid	2.118389	
Durbin-Watson stat	1.731744	J-statistic	0.032043	