

The Relationship between Inflation and Unemployment in Nigeria

Kayode Bamidele Adebowale

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Approval of the Institute of Graduate Studies and Research

Prof. Dr. Serhan iftiođlu
Acting Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Economics

Prof. Dr. Mehmet Balcılar
Chair, Department of Economics

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Economics

Asst. Prof. Dr. ađay Cořkuner
Supervisor

Examining Committee

1. Assoc. Prof. Dr. Sevin Uđural

2. Asst. Prof. Dr. Kemal Bađzıbađlı

3. Asst. Prof. Dr. ađay Cořkuner

ABSTRACT

The main objective of this study is to examine the relationship between inflation and unemployment in Nigeria for the period 1977 – 2013 through the use of the Phillips Curve. To analyze the data on inflation and unemployment, this study used Vector Error Correction Model and Granger Causality technique in order to test the validity of the Phillips Curve relationship in Nigeria. The Granger Causality Test shows that inflation Granger causes the unemployment. Inflation and unemployment are destructive rather than helpful to the economic development and growth in Nigeria. According to the empirical findings of this study, as in the Philips Curve, there is a negative relationship between inflation and unemployment rates in Nigeria.

Keywords: Phillips Curve, Cointegration, Inflation, Unemployment.

ÖZ

Bu tezde amaçlanan Nijerya için 1977'den 2013'e enflasyon ve işsizlik arasındaki negatif ilişkiyi Phillips Eğrisi üzerinden incelemektir. Çalışmada enflasyon ve işsizlikle ilgili veri setini analiz etmek amacıyla eşbütünleşme testi, vektör hata düzeltme modeli ve Granger nedensellik yöntemi kullanılarak Phillips Eğrisi'nin geçerliliği Nijerya için test edilmiştir. Granger nedensellik testi, enflasyonun işsizlik üzerinde Granger nedenselliği kurduğuna işaret etmektedir. Enflasyon ve işsizlik Nijerya ekonomisi için büyüme ve kalkınma üzerinde yardımcı değil yıkıcı bir yön izlemiştir. Çalışmanın ampirik bulgularına göre, Nijerya'da enflasyon ile işsizlik oranları arasında negatif bir ilişki bulunmaktadır.

Anahtar Kelimeler: Phillips Eğrisi, Eşbütünleşme, Enflasyon, İşsizlik.

DEDICATION

This thesis work is dedicated to Almighty God. It also dedicated to my lovingly Daughter (Tomilola Stella Adebawale) and son (Ayomide Samuel Adebawale).

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ADL	Autoregressive-Distribution Lag
ANOVA	Analysis-of-Variance
BLUE	Best Linear Unbiased Efficient
CBN	Central Bank of Nigeria
CPI	Consumer Price Index
ECT	Error Correction Term
E.G.	Exempli Gratia (Latin Word)
ETC.	Et 'ke tera (Latin Word)
FDI	Foreign Direct Investment
FOS	Federal Office of Statistics
GDP	Gross Domestic Product
GDP-def.	GDP-deflator
INF	Inflation Rate
INF ^{exp}	Expected Inflation
INT	Interest Rate
KPSS	Kwiatkowski-Perron Schmidt-Shin
Max	Maximum
Min	Minimum
NAIRA	Non-Accelerating Inflation Rate of Unemployment
NRU	Natural Rate of Unemployment
OLS	Ordinary Least Square Method
PP	Phillips Perron

PPI	Producer Price Index
SFEM	Second-Tier Foreign Exchange Market
SIC	Schwarz Information criteria
UK	United Kingdom
UNEMP	Unemployment
U-UN	Cyclical Unemployment
USA	United State of America
VEC	Vector Error Correction
VECM	Vector Error Correction Model

LIST OF SYMBOLS

$D(INF(-1))$	Difference
F_{value}	$F_{statistics}$
No.	Number
X_t	It could be inflation, Unemployment, and Inflation
ΔX_t	Change in X_t or symbol of difference operator
U_t	Error Term/Stochastic Error Term/Supply Shock
Eqn	Equation
t-tab	t-tabulated
%	Percentage
{ }	Error Bracket
()	t-statistics Bracket
Z_1^*	Error Reform Coefficient
Π	αB
α	Error Correction Coefficient
B	Cointegration Parameters
ε_t	Vector of Residuals/Residual Value and \sum_t implies Summation
$B_i, \alpha_i, M_i, \text{ and } N_i$	The Short-Run Coefficient

Chapter 1

INTRODUCTION

1.1 Background of the Study

This thesis attempts to test a negative relationship for Nigeria by using data from 1977 till 2013. Philip curve is an important concept in macroeconomics because it deals with two of the most important variables in macroeconomics: inflation and unemployment.

More specifically, Phillips Curve is a negative relationship between unemployment and inflation rates. Moreover, Phillips Curve implies that if there is an increase in the price of products and services, automatically, there will be a reduction in the rate of the people who are looking for job and conversely. If there is an exchange (e.g. a trade-off) between the price of the product and services, and the people who are looking for jobs, then the strategic or a master planner (i.e policy-maker) can use Phillips Curve to make adjustments to the economy. In the sense that they can improve Inflation and Unemployment rates at the expense of the other variable when needed.

The ability to make adjustments to the economy through the use of Phillips Curve is specifically why the Phillips Curve and thus this study is so important. Before we will give an example of inflationary gap in Nigeria, we will like to discuss the existence of inflation in Nigeria. The existence of inflation in Nigeria came up in the middle of 1970's when there was an oil boom, the inflation rate manifest on the suddenly since the military government did not assist the situation with the inflation policy through

the fiscal and monetary policies. Udoji awards came to an existence during the General Yakubu Gowon as Nigeria's Head of State between 1974 and the award was established from the decision of Gowon administration's to increase civil servants' salaries. This has enabled the civil servants to earn more money. Buhari regime tried to reduce the rate of inflation on the excesses of civilian administration (Shagari). Babangida introduced the structural adjustment program and it was very good policy because of the potential benefits which led the macro-economic environment highly sabotaged. The economic democracy system (1999), makes the inflation rate much higher than the further undermine government efforts to lay-off some workers which makes the Nigeria macro-economic stability. The Obasanjo debt reduction policies from 1999-2007 did not help the reduction of increase in inflation in Nigeria because the corruption and death of infrastructures throughout his tenure have seriously sabotaged efforts by some of his cabinet members to restore macro-economic stability. The weakness of Jonathan regime was the inability to sustain fiscal discipline and reduce the current increase in national debt.

The year budget is large in the history of Nigeria because most of the revenue financing came through borrowing which further contribute pressure on the inflation. Ibn Khaldun (2012), stated that Jonathan regime has made 2012 year budget looks like a budget of a country that is experiencing a war because what people see during the Second World War when Keynesian explanatory policies were adopted by European governments that makes inflation uncontrollable. In (2012), there was a motion in the National Assembly whose objectives is to decline the powers of the Central Bank in order to reduce its independence but the warning from the IMF and former CBN governor (Charles Soludo) shows that if they does that it will affect the bank ability to perform its monetary functions and seriously affect the performance in the Nigeria

economy. At the beginning of (2011), CBN promised that by 2012 inflation rate would be brought down to a single digit. It looks like efforts to bring Nigeria inflation rate into a single digit are proven to be in vain despite many promises by the CBN to achieve this objective within a special period of time. Moreover, countless factors can be highlighted as the failure of such policy such as increase in the fuel prices, increase in liquidity injections into the economy by the federal government of Nigeria, etc.

As one looks at the data from Nigeria, he or she sees that there is significant variation in both unemployment and inflation statistics.

For example, due to the devaluation of the currency in Nigeria in 1973, inflation rose to 15.4% and the prices of imported goods increased and the unemployment rate was 4.3% in 1977. The inflation figure in 1983 was about 23.2% but rose to 39% in 1984 and to 40.9 in 1989. It became worse in 1993, 1994 and 1995 when inflation rate rose to 57.2%, 57.0%, and 72.8% respectively.

In 1986, Second-tier Foreign Exchange Market (SFEM) was established which makes the Inflation rate decline in 1996 to 29.3% and in 2013, the inflation rate was 8%. In many cases, inflation and unemployment have been controlled by successive governments but it has not yet been eliminated. Thus, one wonders if these variations in inflation and unemployment are tried together in a Phillips Curve.

As I said earlier, this paper attempts to test a Phillips Curve relationship between Inflation and unemployment. However, in 1970s, the Phillips Curve had been modified as inflation Augmented Phillips Curve in 1958 since many countries in the world have started to experience a systematic inflation.

This study tries to test whether there is a negative relationship between Unemployment and Inflation. In this study, I also attempt to introduce interest rate into Phillips Curve equation because the government tries to fight inflation through the use of interest rate.

The social and economic cost of unemployment in Nigeria is that crime rate increases, high rate of poverty, less standard of living, a threat to peace and stability, decrease in investment. It also results in high rate of dependency, waste of human resources and increase in migration from Nigeria. In fact, Nigerian government has put many measures in place to curb this problem but yet, the unemployment rates continue growing rapidly.

In the literature review of this study, a paper to be considered similar to this research work was examining the relationship between inflation and unemployment for the period of 1977 to 2009 in Nigeria. Other studies focused on other countries like India, USA, Malaysia, Czech Republic, France, Namibia, South Africa, etc.

In the course of this research work, the null hypothesis states the negative relationship between unemployment and inflation in Nigeria at 5% significance level. While alternative hypothesis states a positive and or no relationship between unemployment and inflation in Nigeria at 5% significance level. In this research work, we will try to verify whether the Philips Curve assumption will work for Nigeria economy or not.

1.2 Organizational Structure

This study is categorized into eight broad chapters and the chapters are:

Chapter one deals with introduction of the study. The introduction is made up of, the background and the organizational structure of the study.

The theory of inflation and unemployment rates were analyzed in chapter two. It is categorized under the following headings such as the definition of inflation, how inflation is measured, why inflation is necessary, causes of inflation.

It includes the definition of unemployment, how it computes, types of unemployment, caused by unemployment, consequences or social and economic cost of unemployment, Philips curve and augmented Phillips Curves.

The third Chapter focuses on the literature review, and deals with previous research. Chapter four analyzes the empirical research specification, and comprises the model for the study (that is, the model of the study consists of specification of the regression equation and shows the indication of the expected signs of dependent and independent variables) and the theoretical expectation from the model.

Chapter five describes the methods and techniques used in getting facts and figures in writing this paper. It includes country; period sampled and descriptive statistics that shows the mean, median, maximum, minimum, standard deviation and computation techniques of these variables (if applicable).

Chapter six focus on econometric modeling strategy that include Vector Error Correction Method, Cointegrated Method together with the necessary tests such as Unit Root test, Stationary, and Granger Causality Test.

The seventh Chapter provides the econometric modeling strategy results. Finally, Chapter Eight describes the conclusion of the study, policy recommendation (if any) and limitation of the study.

Chapter 2

THEORIES ON INFLATION AND UNEMPLOYMENT

This study employs the augmented and traditional Phillips curves to investigate the relationship between the inflation and unemployment in Nigeria. Phillips curve indicates an adverse links between increase in price and unemployment.

A policy tool to adjust one or the other variables (that is, inflation and the unemployment) is referred as Phillips curve. It is an important concept in the macro-economic issues because of the economic significance of the unemployment and inflation. In this section, we first present theories and studies related to inflation and unemployment, and then present the principles related to Phillips curve.

2.1 Definition of Inflation

Let us first start with inflation,

A percentage increase in the price of products and services throughout a year is regarded as inflation. Often, it is assumed that Inflation is when big current of medium of exchange (that is, money) is pursuing too few goods. However, this is incomplete story. In fact, there are several types of inflation with its causation. For example;

a. Demand – drag Inflation: Inflation occurs as a result of greater in the demand for products and services than its supply. Therefore, inflation occurs as real GDP increases and unemployment decreases. That is, the state of a country is moving through the direction on the Phillips curve since there is a continuous increase in the prices of the products and services that result from high demand. Due to this, large amount of

current medium of exchange pursuing few products. Moreover, money exhausted on the products causes inflation. The factors responsible for this is due to population increase, increase in workers' salaries and wages, or a sudden change in taste.

b. Cost – Push Inflation: This occurs as a result of the rise in the price of inputs (E.g., the cost of production) such as labor, raw materials, etc. Cost push inflation arises as a result of an increase in the factors of production (e.g. Land, Labor, Capital, and Entrepreneur) which leads to a drop in the provision of the products.

C. Hyper increase in the Price: it refers to as dash or run-away inflation. It occurs when the usefulness of the current medium of exchange continue decreasing quickly as a result of unstoppable in a constant increase in the price. The medium of exchange fails to its usefulness to purchase a product as a result of high speed of increasing in the price of the products. The primary causes are war, persistent budget deficits, financial crises, etc.

d. Persistent or Creeping Inflation: Creeping inflation is the conditions whereby the price of goods and services of a country increases progressively but repetitively over time and thereby reduces the value of a currency significantly.

It refers to long-standing increase in the price. Hyper-inflation materializes if there is a low speed and stable in the capacity of medium of exchange and a drop in the supply of the products.

2.1.1 How Inflation is measured

Inflation can be measured in two different ways such as:

- a. Consumer Price Index (CPI)
- b. GDP-Deflator (GDP-Def.)

Bureau of Labor Statistics (January 2012), explained Consumer Price Index as follows: CPI appraises different in the price level of a market final consumer products bought by individual or a group of individuals. The prices of a sample of an indicative of the commodities whose prices obtained from time to time can be used to determine CPI. Inflation can be calculated by using CPI. That is, inflation is equal to Consumer Price Index for the current year minus Consumer Price Index of the previous year divided by Consumer Price Index for the current year.

US Bureau of Economic Analysis (July 2008) states that, the GDP-Deflator is estimated as the prices of the new, the home production and the final commodities in the country. Gross domestic product is the sum of usefulness of the final commodities and services manufactured within the country at a specific duration of time. Inflation is measured by using GDP-Deflator. Inflation is equal to Gross Domestic Product-Deflator in the current year minus Gross Domestic Product-Deflator of the last year.

Table 2.1: Methods of Measuring Inflation

(1). Consumer Price Index	(2). GDP-Deflator
$(CPI_t - CPI_{t-1}) / (CPI_{t-1})$	$(GDP-Deflator_t - GDP-Deflator_{t-1}) / (GDP-Deflator_{t-1})$ Or $(Nominal\ GDP / Real\ GDP) * 100$

Where (t) is equal to current years and (t-1) is equal to the previous year. Whereas, the nominal GDP is computed by using current year's prices while the Real GDP is computed by using the previous year's prices.

Table 2.2: CPI, and GDP-Deflator do not always give same inflation due to the following reasons:

Consumer Price Index	GDP-Deflator
It includes only consumption goods.	It includes both consumption/final and intermediate goods.
It include domestic and foreign goods.	It includes only domestic goods.
It is fixed basket over time.	It is changing basket over time.

2.1.2 Significance of Inflation

Inflation is regarded as the cost of a general rise in the price level. Its classification falls into two major parts, namely, expected, and unexpected inflation.

The followings are the expected cost of inflation:

During inflationary period, people prefer to put money in the bank instead of keep it to himself/herself because of the cost of going to bank too often. Aforementioned refers as Shoe leather charge. Shoe leather cost sees as, the time and efforts people take to reduce the effect of inflation on the eroding purchasing power of money.

Menu cost is also identified as a significance of inflation, which refers to the variation of product prices. It refers to as "Menu Cost". Throughout the inflation, prices need to be brushed up because the cost of changing price tags, updating computer systems, reprinting catalogs, etc. are too often. Also, the government can get high returns from taxes during inflation as a result of a comprehensive volume of money inflow that is Tax laws.

During inflation, there is a skyrocketing or Increasing in the price of goods and service. It causes the products and services to be highly cost, variability in relative prices increases that result to inefficiency in resource apportionment and complicates

personal financial plans since decisions on how to spend money is dynamic during inflation.

On the other hand, the Unexpected Cost of Inflation is creditors' loss during inflation. That is, the value of money received is less than the amount of money borrowed out. Whereas, borrowers (debtors) gain during inflation because money has added value since the value of money received more than value of the money he/she borrowed which enable them to pay their debts with ease.

Those who received fixed income (e.g. Pensioners) suffer from inflation because the wages are fixed, and they can buy fewer goods and services. It refers to as fixed wage contracts.

In economics, risk aversion is the behavior of human's most especially final users and investors when opened to an issue, they try to reduce that risk. During inflation, the utility for risk-averse was decreased; savings rate is discouraged because people spend more money prominent to low or no savings. The interest rate increases because the rate at which banks give the loan to customers increases. In fact, the standard of living falls because too much money is chasing few goods. It brings a lot of impediments to salary earners since they spend enough money on costly products and services which leading to declining in standard of living. The level value of money as a result of little or no savings discourages investments while high prices discourage exports of goods and services. Exported goods are very costly, but it encourages the importation of the products and services since imported goods are less expensive, and there is hope of selling such goods in an economy that is experiencing inflation.

Money loses its value generally since less money chasing little goods and services since there is a reduction of money because its supply is more than its demand.

2.1.3 Causes of Inflation

Cole (1998); historically, it's been determined that causes of inflation in Nigeria are: Excessive bank lending leads to inflation of products and services because there is excess money in circulation chasing few goods and services.

The rate of production is low since supply cannot meet up with high demand because of low production of goods and service that leads to scarcity thereby inflation begins. The cost of production (like raw materials and factors of production) is very high. The level of importation is very high as well. That is, if there is a high cost of importing unfinished products which leads to high cost of finished products and later passes to final users.

The increase in the demand for goods and services is called demand-pull inflation. Inadequate storage facilities lead to inflation of the products since commodities manufactured cannot be stored for the future use.

Another factor that causes inflation are: Industrial strike leads to inflation of the products and services due to prolonged strike that create scarcity of the commodities. A war causes inflation because people are no longer producing goods and services due to war which resulting to the high volume of money chasing fewer goods. The money laundering leads to inflation because mass transfer and injection of money into circulation. The population explosion results to inflation because the unexpected rise in the number of the people without a match increase in the supply of the products to meet the demands of the consumers leads to inflation. The budget deficit leads to

inflation since what government spends out is more than what they realized. The rise in salaries and wages leads to excess money in circulation pursuing few goods because when salaries and wages raised without corresponding improve the supply of goods and service, it results from becoming inflation.

Finally, the hoarding of goods is an act of creating artificial scarcity of goods which leads to inflation.

2.2 Definition of Unemployment and how it is measured

Unemployment is a situation in which persons of working age, able and willing to work are unable to find paid employment. It also means when people, who are qualified by age to work cannot find a job. The unemployment rate can be calculated or measured as unemployment divided by total labor force multiply by 100. That is, $Unemployment = ((Number\ of\ Unemployed) / (Labor\ Force) \times 100)$. Where, Labor force is the combination of employed and unemployed people who are qualify by age and able to work in country. That is, labor force is the people who are willing and able to work. The size of the labor force is used to determine the unemployment rate. The percentage of the unemployed in the labor force is called unemployed rate.

2.2.1 Types of Unemployment

a. The natural rate of unemployment (NRU, NAIRU): NRU is the rate of unemployed people in a country, when the economy operates at its potential or natural level of GDP.

NRU combines the features of both structural and frictional unemployment. Structural unemployment occurs as a result of changes in distinct goods. Structural unemployment by implication leads to the reduction in output and also workforce in

general. Frictional unemployment is the type of unemployment which deals with the business cycle. It is when a worker leaves their present work and search for another, and this could be technological advancement, the level of education, etc.

There are many factors that affecting/contribute to NRU such as:

The speed of separation from and for finding jobs that are called frictional unemployment. Every day there is different in the methods of manufacturing products due to progress in technology. Therefore, machines are initiated in manufacturing of the products which tends to substitute for labor. This leads to lay-off of employee. Some workers quit their jobs voluntary, and some unemployed workers are employed. So, the time in between separation from job and finding jobs is referred to as one of the factors that contribute to NRU. Unemployment benefits/reservation wages only means that when some people decided not to work since they are receiving unemployment benefits from the government contribute to NRU. It is a social security paid by the government to unemployed people purposely for their recreation benefit, well-being etc.

The minimum wage laws are when government causes wages rigidity by trying to prevent wages from falling to the equilibrium level. Also, labor alliance serves as bargain "agency" in the organizations to make a mutual harmony in accordance in of their agreement that applicable to their members and lasts for a period of time. If the labor market is competitive, unions will raise wages and unemployment will also increase.

Another factor that contributes to NRU is efficiency wage theories (i.e. motivation). These theories hold that high wages make workers more productive. The low wages

due to the abundance supply of labor influences the workers efficiency and it may explain the failure of the firms.

Moreover, the theory holds that laborers should be encouraged by increasing some remunerations or reduce reliefs for the workers to work in an effectively and efficiently manner purposely to increase the level of production.

Monopolies: Monopolies are interested in increasing prices by reduction of production to expand revenue. Low demand leads to industries workforce reduction in the companies, this eventually results in the retrenchment of some workers because the little labor for production is required. This factor contributes to NRU.

b. Cyclical Unemployment (when the economics has no business cycle): This is the type of unemployment which affect numberless jobs or professions and companies at exactly changeless of time. In other words, quite often it is as a result of decrease or fall in the number of goods demanded. The industries are so pretentious that they need to undertake on lay-off of workers which result to unemployment. It refers to as mass unemployment.

2.2.2 Causes of Unemployment

The causes of unemployment in Nigeria are as follows:

Lack of industrial growth because Nigeria does not have enough industries that are capable of employing enough workers that lead to unemployment.

The lack of social amenities occurs as a result of inadequate social facilities like piped born water, electricity, solid road in a particular place and labor tends to be unavailable in such area.

It contributes to unemployment in Nigeria. Before someone can get a good job in Nigeria, the person must have attained sound educational qualifications, and the cost of education is too high. As a result of this, many people find it difficult to go to school. So, they end up with blue paper qualification, which may not permit them to get real employment.

The use of automated machines in some companies decline the demand for countless workers. It leads to unemployment. There are weak development plans in Nigeria because Nigeria government does not put in place development plans that can create more job opportunities for youth since they prefer spending trillions of Naira on politics. It can lead to unemployment. Deficiency in demand causes unemployment because companies may retrench workers due to overall fall in demand for goods. Over-population is another causes of unemployment. It happens if the country's population is too numerous which brings about producing many labor and such people may not get jobs to do. The geographical mobility of labor causes unemployment because when a worker finds it difficult to move from one place to another due to some situations, it leads to unemployment.

2.2.3 Social and Economic Cost of Unemployment

According to Cole, (1998), the unemployment rate in Nigeria is alarming. The following societal issues are the aftermath of unemployment among which are: Crime rate increases due to a large number of unemployed persons. If the number of unemployed youths increases, it leads to increasing in crime rate like aggravated assault, robbery, prostitute, forcible rape, larceny-theft, suicide, arson, etc. purposely to make ends meet. If there is an increasing in the number of unemployed persons, it results to threat the peace and stability.

High level of unemployment rate results to the reduction in investment and also, unemployment usually led to youths and adults moving out of the country to look for jobs in other countries. Unemployment rate wastes human resources because the money, energy and time spent in acquiring degrees and certificates will be drained, and labor would be made idle. The consequences of an unemployment rate in Nigeria is the high rate of dependency.

2.3 Phillips Curve

This section of the thesis describes the Philip Curve as the adverse relationship between the inflation and the unemployment rate.

Philips curve equation: $INF_t = \beta_0 + \beta_1 UNMP_t + U_t \dots \dots \dots (1)$.

Historical studies, Phillips (1958), studies the wages inflation and unemployment in the UK from 1861 to 1958. In 1958, an adverse relationship between unemployment and inflation in a graphical or equation formed discovered by William Phillips in a Britain. He found an unvarying negative relationship between the inflation and unemployment.

In other words, Phillips Curve shows that when there is a high rate of inflation that leads to lower unemployment (E.g., a tradeoff between inflation and unemployment). Failure after 1970s, a number of countries encountered high levels of both inflation and unemployment that is known as stag inflation. He shows that this would not be occurred since inflation and unemployment cannot increase at the same time. Original form of Phillips curve is no longer in use by most academician since there is no zero inflation because of a flexible exchange rate, increase in oil prices and it was shown to be too simplistic.

Now, this subsection of the thesis describes as the augmented Philips Curve.

As a result of systematic and continuous positive inflation rate that change the people's expectations for inflation rate leads to supplementary forms of the Phillips curve which take expected inflation into contemplation. Today, Phillips curve theory goes under names called augmented Phillips curve.

Augmented Phillips Curve equation: $INF_t = \beta_0 + \beta_1 UNMP_t + INF^{exp} + U_t \dots \dots \dots (2)$

In the short-run, augmented Phillips curve moves up when the expected inflation rises and the monetary policy cannot affect unemployment because, it changes back to its natural rate of unemployment in the long-run.

Moreover, the long-run disagrees with monetary policy since it does not permit short-run fluctuations. The potential of the monetary authority is to decrease unemployment for a limited period of time by increasing the price rate forever (Prasanna and Gopakumar, 2009).

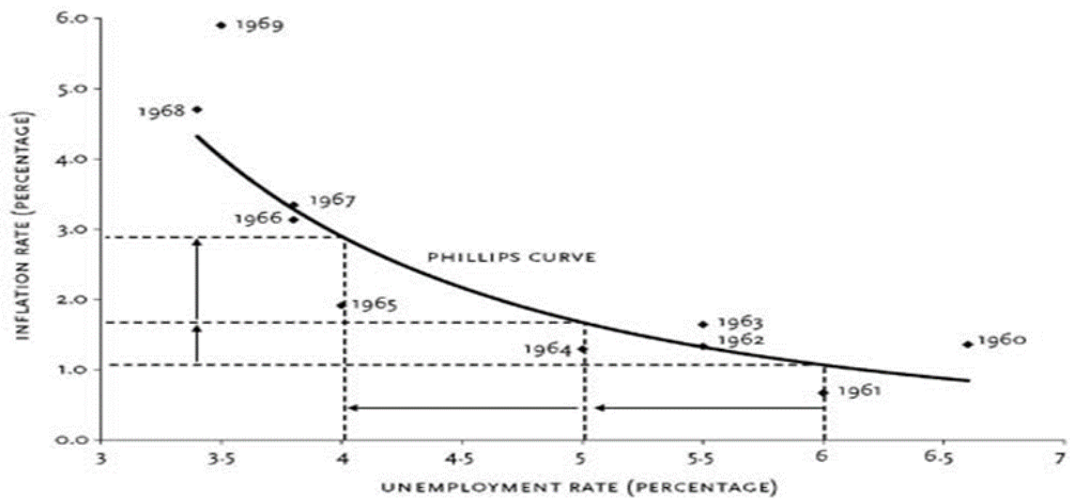


Figure 2.1: Phillips for the USA
Source: Bureau of Labor Statistics.

In the figure above, we present the Philips curve for the USA between the year 1961 and 1969. The horizontal axis is unemployment rate (%), and the vertical axis is inflation rate (%). The inflation rate is established on the Consumer Price Index.

According to the US Bureau of Statistics between 1961, 1964 and 1967, unemployment was 6, 5 and 3 percent respectively. Whereas, inflation rate was 4 percent, 1.2 percent, 1 percent respectively.

Chapter 3

LITERATURE REVIEW

Now, the relationship between the inflation and unemployment is a very crucial issue that has being examined from different angles.

The review of the relationship between inflation and unemployment are exceedingly significant and pertinent subject matter in the literature to meet human development goals. However, previous literature and actual discovering's on inflation and unemployment is used to comprehend proper existing apprehension.

Nigeria economy has witnessed a dramatic rise in inflation and unemployment over the past 50 years. Little information exists on the relationship between inflation and unemployment. Aforementioned creates an important and interesting question in my minds, how to examine the relationship between inflation and unemployment in Nigeria economy. Inflation needs efficient government policy to curb/reduce the rate of inflation in Nigeria. This study is all about the Phillips curve whether it would work for Nigeria. This study used an unemployment and inflation rate for Nigeria for the period 1977-2013.

Before we present our model, this thesis we give some literature on Phillips curve for non-identical countries in the world. A strong and significant relationship between the increase in the price and unemployment, implying the existence of Phillips curve. The other papers found no evidence on such Phillips curve. Considering the recent inflation

and unemployment in the Nigeria economy, a growing wish to evaluate the relationship between inflation and unemployment has been inveterate in the empirically studied.

Mohammed and Girijasankar (2014) examines the interdependence among three macroeconomic phenomena such as Output-Inflation, Output-Unemployment, and Unemployment-inflation trade off in Libya for the period 1962-2009. By employing unit roots test, Cointegration and Vector Error Correction Mechanism (VECM) techniques, and his empirical findings support an adverse relationship between inflation gap and the unemployment gap.

Prasanna and Gopakumar (2009) using Unit Root, Cointegration, and Error Correction Model methods to find the relation between the inflation, economic growth, and unemployment. Their empirical findings suggested that inflation negatively caused unemployment in the long-run in India for the period 1973-2008.

Aminu and Zubairu (2012) investigates the empirical scrutinize of the relation between unemployment and the inflation. They used Unit Root, Granger Causality, and Cointegration Tests to demonstrate that inflation impacted negatively on unemployment in Nigeria for the period 1977-2009.

Richard, Ching-Fan and Margie (1996) investigate the inflation by using the fractionally integrated ARIMA-GARCH Model for ten countries such as Japan, etc. for the period 1960-1992. They also, employing panel data approach and they found that inflation has a positive impact on unemployment.

They also, argue further that inflation should have a unit root and also Co-integrated with the nominal interest rate in ten different developed countries such as US, Japan, etc.

Funmitaka (2007) analysis the relation between the inflation and unemployment rate by investigates that “Does the Phillips Curve exist”. She employs ARDL technique, and her outcome supported the Phillips curve existence in Malaysia for the period 1975-2004.

The result was carried-out by using Unit Roots Test, Johannes Cointegration Test, Vector Error Correction Mechanism (VECM) and Granger Causality Test.

Josef, Marketa and Jindrich (2014) used ADL and Cointegration model for analyzing the validity of the Phillips curve in the Czech Republic for the period 1995-2012. Their empirical findings demonstrate the evidence of the negative relationship between the inflation and unemployment.

Kitov and Dolinskaya (2007), examine the relation between the inflation, unemployment and labor force variation rate in France. Their empirical results for 1971-2004 supported the long run Phillips curve by using Engle-Grangers, Johansen Co-integration, and Vector Error Correction (VEC).

Joel and Johannes (2010) used Co-integration, Unit Root Test, and Error Correction Method to test the determinants of unemployment for the period 1971-2007 in Namibia. They found that Phillips curve holds in Namibia. They stated further that it is essential to reduce unemployment by increasing aggregate demand.

Kirandeep (2014) demonstrates the relationship among the inflation, unemployment, Exchange rate and growth in India for the period 1990-2013. He uses OLS Method, Simple Linear Regression Model and ANOVA techniques to prove that inflation and the exchange rates are significant affects the unemployment rate in India.

Hussein (2014) used the Unit Root, Cointegration, VECM, and Granger causality tests to examine the trade-off between unemployment and inflation in Jordan for the period 1984-2011. His study found that there is no trade-off between unemployment and inflation. Moreover, he also found that there is no proof of causality in both directions. That is, Inflation does not Granger causes the Unemployment, conversely.

Muhammed, Munawar, Rizwan, Seemab (2014) examines the determinant factors that influence the employment level for the period 1983-2010. Their studies selected four independents variables as determinants such as GDP, inflation, FDI and population growth rates in Pakistan. By using Cointegration Method, Vector Error Correction Model to reveal that inflation has no significant relationship with the unemployment. But, FDI and population rate have a significant and negative relationship with unemployment.

Thayaparan (2014) investigates the impact of inflation on unemployment in Sri Lanka for 1990- 2012. She proves that only inflation was significant effect unemployment through the use of Augmented Dickey-Fuller for Unit Root, Cointegration, and Granger Causality Tests.

Funmitaka (2007), proof the theory that supported the existence of the Phillips curve in Malaysia. Josef, Marketa and Jindrich (2004) established the augmented Phillips

curve in the Czech Republic. Whereas, Kitov and Dolinskaya (2012), shows the long-run relationship between the Phillips curve variables in France.

The equation of the supplemented Phillips Curve become noticeable in recent New Keynesian dynamic stochastic overall equilibrium models with sticky prices.

This connection refers to as the “New Keynesian Phillips Curve”. The augmented Phillips curve and the New Keynesian Phillips curve says that increase in inflation leads to lower unemployment for a limited period of time and it cannot drop forever. Four papers that incorporated with augmented Phillips curve are Kirandeeep (2014), Joel and Johannes (2010), and Kitov and Dolinskaya (2012). The graphical form shows that short-run Phillips curve is L-shaped.

Due to the mixed empirical findings in the literature and recent rise in the price of goods in Nigeria. I was motivated to examine the empirical support for the relationship between inflation and unemployment in Nigeria.

Chapter 4

EMPIRICAL SPECIFICATION AND DATA

4.1 Model for the Study

The model for this study specified as “Augmented and Original Phillips Curve”. The negative relationship between the rate of inflation and unemployment rate was detected by Philips (1958). The technique adopted for estimation is the Ordinary Least Square method because of its BLUE properties i.e. Best, Linear, Unbiased, and Efficient.

The empirical specification for the traditional Philips curve is $INF = f (UNEMP)$.

$$INF_t = \beta_0 + \beta_1 UNEMP_t + U_t \dots \dots \dots (1)$$

The original Philips Curve for empirical specification, it works before 1970 because people are expecting zero inflation. Failure after 1970s, the system of inflation became problematic because of the flexible exchange rate, increase in oil costs and system of deflation. So, as a result of systematic and continuous positive inflation rate that changed the people expectations leads to augmented Phillips curve. Therefore, we need expected inflation to be added to original Phillips curve in order to become augmented Phillips Curve such as:

$$INF_t = \beta_0 + \beta_1 UNEMP_t + \beta_2 INF^{exp} + U_t \dots \dots \dots (2)$$

Where,

$$INF^{exp} = (INF_t + INF_{t-1})/2$$

INF^{exp} = expected inflation

INF_t = inflation

$U - UN$ = cyclical unemployment

β_0 = intercept of the model. It is constant

β_1 = the slope and the coefficient of unemployment

β_2 = the slope and the coefficient of the expected inflation

U_t = supply shock/stochastic error term

INF_t = inflation – dependent variable

INF^{exp} = expected inflation – independent variable

$UNEMP_t$ = unemployment – independent variable

4.2 Theoretical Expectation

The theoretical expectation is $B_1 < 0$. So, the theoretical expectation for original Phillips curve states that inflation and unemployment rates have a negative relationship. The augmented theoretical expectation for Phillips curve says that even when expected inflation added to the original Phillips Curve, inflation, and unemployment still shows negative relationship.

4.3 Data

This paper used Nigeria as a case study to find out the relationship between inflation and unemployment for the period 1977-2013. It uses a sample size of 37 observations because of inadequate data from the relevant data agencies. This study adopted the Ordinary Least Square (OLS) method for regression analysis and the annual time series data taken from the World Bank database for the period 1977-2013.

For the purpose of this research work, secondary data shall be employed. The literature review is considered a secondary source of data collection that played a vital role in the life of this research work. A lot of reliable data useful for this research work were gathered or collected from the following sources:

- (i). Central Bank of Nigeria "CBN" Bulletin for Unemployment Rate
- (ii). World Bank data indicators for Interest Rate
- (iii). Federal Office of Statistics (FOS) in Nigeria (Annual digest of statistics) for Inflation Rate.

The descriptive statistics for inflation and unemployment rates is stated below.

Table 4.3: Descriptive Statistics

Series	Inflation	Unemployment
Sample	1977-2013	1977-2013
Observations	37	37
Mean	19.52432	8.856757
Median	13.00	6.400
Maximum	72.80	20.50
Minimum	5.40	1.80
Standard deviation	16.61687	62.005801
Skewness	1.671314	0.693765
Kurtosis	4.959703	2.002191
Jarque-Bera	23.14597	4.502995
Probability	0.000009	0.105241

Source: Authors creation using E-views 6.0

The above descriptive statistics for inflation and the unemployment rate in Nigeria with sample 1977-2013 and number of observations is 37.

For inflation rate: The average mean has found as 19.52; the Median is 13.0; the Max and Min are 72.80 and 5.40 whereas the Standard Deviation is 16.61 representatively.

For unemployment rate: The average mean found to be 8.86; the Median is 6.4; the Max and Min are 20.50 and 1.80, and the Standard Deviation is 62.01.

Chapter 5

ECONOMETRIC MODELING STRATEGY

To investigate both original Phillips curve and augmented Phillips curve, I employed the simple OLS regression equation as follows:

$$INF_t = \beta_0 + \beta_1 UNEMP_t + U_t \dots \dots \dots (1) \text{ for original Phillips curve.}$$

$$INF_t = \beta_0 + \beta_1 UNEMP_t + \beta_2 INF^{exp} + U_t \dots \dots \dots (2) \text{ for augmented Phillips Curve.}$$

The econometric modeling strategy is consistent with previous studies. It is necessary to test for Unit Root by using Augmented Dickey-Fuller (ADF), Phillips-Perron, and Kwiatkowski-P. Schmidt-Shin to ensure that the variables satisfy the stationarity.

5.1 Unit Root Test and Stationarity

This paper testing for stationary (no unit root) at level. If stationary at the level, it continues OLS estimate at level data. But if not stable at the level, it tests stationary at first difference.

If stationary at a first difference, then it test for cointegration. In case, if it is not cointegrated, it uses simple OLS regression equation at first difference.

Unit Root and Stationary equations at levels and difference regression can be derived as follows:

$$INF_t = \beta_0 + \beta_1 UNEMP_t + U_t \dots \dots \dots (1)$$

$$X_t = \alpha + \rho X_{t-1} + \epsilon_t \dots \dots \dots (3)$$

$$X_t - X_{t-1} = \alpha + (\rho X_{t-1} - X_{t-1}) + \epsilon_t$$

$$\Delta X_t = \alpha + (\rho - 1) X_{t-1} + \epsilon_t$$

Where,

X_t could be Inflation, Unemployment, and Interest rates.

$H_0: \rho = 1$. It implies that X_t has unit root.

$H_1: \rho \neq 1$. It implies that X_t has no unit root.

If $t_{\text{statistics}} > \text{ADF}$ and PP , reject H_0 . It simply means that the variables have unit root but if $t_{\text{statistics}} > \text{ADF}$ and PP , H_0 is reject. It means that the variables have an absence of unit root. That is, it is stationary.

5.2 Cointegrated Estimation Techniques

If INF., UNEMP, and INT rates are stationary (no unit root), then we needed to test for cointegration. If cointegrated, it uses cointegration method but if not cointegrated, it uses simple OLS regression equation. If the Cointegration exists between the variables, this forms the basis for the stipulation of the Vector Error Correction Model (VECM). The cointegration equation and test stated below as follows:

$$\text{INF}_t = \beta_0 + \beta_1 \text{UNEMP}_t + \epsilon_t \dots \dots \dots (1)$$

$$\epsilon_t = \text{INF}_t - \beta_0 - \beta_1 \text{UNEMP}_t \dots \dots \dots (4)$$

ϵ_t is Unit Root on error term

$$\epsilon_t = a + \beta \epsilon_{t-1} + U_t$$

$$\epsilon_t - \epsilon_{t-1} = a + \beta \epsilon_{t-1} - \epsilon_{t-1} + U_t$$

$$\Delta \epsilon_t = a + (\beta - 1) \epsilon_{t-1} + U_t$$

$H_0: \beta = 0$ implies that there is no cointegration between the variables.

$H_1: \beta \neq 0$ implies that there is presence of cointegration between the variables.

If $t < DF_1$, reject H_0 and conclude that our error is cointegrated. That is, the residual value is stationary.

Since there is cointegration between the variables, therefore, Vector Error Correction Mechanism must be established.

5.3 Vector Error Correction Method

If the Cointegration exists between the series, we need to conduct the specification of the Vector Error Correction Model (VECM) in which inflation rate is the dependent variable while unemployment and interest rate are independent variables.

$$INF_t = \alpha_0 + \alpha_1 \Delta UNEMP_{t-1} + U_t \dots \dots \dots (5) \text{ Short-run equation.}$$

If it happens that INF_t and $UNEMP_t$ are cointegrated which means the first difference are stationary? It implies that they have some long-run equilibrium value of INF_t that given by some linear combination of $UNEMP_t$.

$$\text{i.e } INF_t = \alpha + \beta_1 UNEMP_t^{\text{Equilibrium}} \dots \dots \dots (6)$$

Let us include some aspects of LR relationship,

$$INF_t = \alpha + \alpha_1 UNEMP_t + \alpha_2 UNEMP_{t-1} + U_t INF_{t-1} + U_t \dots \dots \dots (7)$$

The Vector Error Correction Model, which combines the long-run and short-run, is stated as follows:

$$\Delta X_t = \sum_{i=1}^m \Gamma_i + \Delta X_{t-i} + \Pi X_{t-1} + ECT_{t-1} + \epsilon_t \dots \dots \dots (8)$$

Where,

Δ indicates a symbol of difference operator.

X_t shows the 2 x 1 vectors (UNEMP, INF).

ϵ_t shows the 2 x 1 vector of residuals.

ΠX_{t-1} indicates the Error Correction term.

Π can be categorized into two distinct matrices such as $\Pi = \alpha \beta$, where α indicates the Error Correction Coefficients and β indicates the cointegrating parameters. Both are appraising the rapidity of convergence to the long-run changeless state.

ECT_{t-1} indicates the Error Correction Model.

Vector Error Correction Mechanism has proof regarding the short-run and long-run modification to changes in X_t through the calculated parameters Π and Γ_i . If there is a long-run connection between the series, shocks will result in disequilibrium in the short-run before the series return to their long-run equilibrium, and it captures in the Error Correction Term (ECT).

5.4 Granger Causality Method

If the variables are established to be cointegrated, Error Correction Mechanism must be stated. Cointegration among variables indicates that causality exists between two or more variables, but cointegration fails to display the causality relationship. Therefore, Granger causality test is required to know the direction.

Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. That is, Granger causality test is the test that deals with the track of the variables under consideration. Granger causality indicate that if cointegration occurs between two variables. Hence, there must be either unidirectional or bi-directional Granger causality between these variables in the long-run. The test involves estimating the pair of Granger causality test stated as the following regressions:

$$INF_t = \sum_{i=1}^m \alpha_{1i} UNEMP_{t-i} + \sum_{i=1}^m \beta_{1i} INF_{t-i} + U_{1it} \dots \dots \dots (9)$$

$$UNEMP_t = \sum_{i=1}^m \alpha_{2i} UNEMP_{t-i} + \sum_{i=1}^m \beta_{2i} INF_{t-i} + U_{2it} \dots \dots \dots (10)$$

H₀: The variable carefully thought does not Granger cause the other variable.

If event INF happens before event UNEMP. Then, it is likely that INF is causing UNEMP (i.e. if variable UNEMP Granger-causes variable INF then changes in UNEMP should lead to a change in INF). We are dealing with bilateral causality since this paper has two variables.

The feedback or bilateral causality of the sets of UNEMP and INF coefficients are statistically significantly divergent from zero in both regressions. That is the idea behind Granger Causality Test. If there is proof of cointegration between two or more variables, therefore, ECM should exist between the variables says by Granger.

Moreover, if inflation and unemployment are cointegrated, a VECM would have the following forms in the equation (6) and (7).

$$\Delta INF_t = \sum_{i=1}^m \alpha_i \Delta UNEMP_{t-i} + \sum_{i=1}^m \beta_i \Delta INF_{t-i} + Z_1 * ECT_{1,t-1} + U_t \dots \dots \dots (11)$$

$$\Delta UNEMP_t = \Delta \sum_{i=1}^m N_i UNEMP_{t-i} + \sum_{i=1}^m M_i \Delta INF_{t-i} + Z_2 * ECT_{2,t-1} + \epsilon_t \dots \dots \dots (12)$$

Where,

B_i, α_i, M_i and N_i indicates the short-run coefficients.

ECT₁ and ECT₂ indicate the Error Correction Term in Eqn. (11) and (12).

U_t and ε_t are residual values.

ECT_{1(t-1)} is the lagged worth of the leftover from combination regression of inflation on unemployment (11).

ECT_{2(t-1)} is the lagged worth of the leftover from combination regression of unemployment on inflation (12).

Unidirectional causality from unemployment to inflation (I.e., UNEMP Granger causes INF).

It occurs in Eqn. (11), if the appraised coefficients on the lagged unemployment (α_i) coefficients are non-zero. That is referred to as short-run causality. The Error reform coefficient (Z_1^*) of ECT_1 is significant. That is referred to as long-run causality.

Likewise, unidirectional causality from inflation to unemployment (inflation Granger-causes Unemployment) occurs in the eq. (12), whenever, the set of appraised coefficient on the lagged inflation (M_i) coefficients are not zero. That is referred to as short-run causality. Also, whenever the Error Correction coefficient (Z_2^*) of ECT_2 is significant. That is referred to as long-run causality. Therefore, there is a pair mode of feedback relationship between inflation and unemployment when the variables Granger causes apiece variant.

Chapter 6

ESTIMATION RESULTS

In this chapter, we present the results for the original/traditional Phillips curve function. It represented in equation (1) in chapter four, alongside with the non-stationary, stationary and, long-run and short-run estimates in other equations.

6.1 Unit Root Results

In this section, this paper is going to present the test result for the unit root testing. In a table (4.3), we introduce the results by using ADF, PP, and KPSS. Firstly, I test the unit root at the level data. The results with a drift and without trend, with the drift and trend, without a drift and trend are reported.

Table 6.4: Unit Root Test for ADF, PP and KPSS

LEVEL (STATISTICS)	INFLATION RATE	LAG	UNEMPLOY- MENT RATE	LAG	INTEREST RATE	LAG
Tt(ADF)	-2.923***	(0)	-0.884	(0)	-6.210*	(0)
Tu(ADF)	-3.325***	(1)	-2.202	(0)	-6.381*	(0)
T(ADF)	-1.840***	(0)	0.250	(0)	-6.268*	(0)
Tt(PP)	-2.918***	(3)	-0.512	(2)	-6.226*	(2)
Tu(PP)	-2.872	(4)	-2.093	(3)	-6.577*	(5)
T(PP)	-1.666***	(4)	-0.540	(1)	-6.285*	(2)
Tt(KPSS)	10.182	(3)	0.540**	(5)	0.277	(3)
Tu(KPSS)	0.129***	(4)	0.183**	(4)	0.099	(6)

STATISTICS (FIRST DIFFERENCE)	INFLATION RATE	LAG	UNEMPLOY- MENT RATE	LAG	INTEREST RATE	LAG
Tt(ADF)	-5.799*	(1)	-7.564*	(0)	-7.370*	(1)
Tu(ADF)	-5.749*	(1)	-7.601*	(0)	-7.266*	(1)
T(ADF)	-5.891*	(1)	-7.432*	(0)	-7.482*	(1)
Tt(PP)	-7.442*	(10)	-7.619*	(1)	-19.828*	(10)
Tu(PP)	-7.617*	(10)	-7.672*	(1)	-19.860*	(10)
T(PP)	-7.607*	(10)	-7.554*	(2)	-20.106*	(10)
Tt(KPSS)	0.186	(10)	0.0963	(0)	0.168	(10)
Tu(KPSS)	0.153**	(10)	0.043	(1)	0.154**	(10)

Note: H_0 : INF, UNEMP, INT has the unit root.

INF represents inflation rate (annual %); UNEMP represents unemployment rate, total (% of total Labor force) national estimate; INTt represents the interest rate (loan rate deduct down payment rate %); Tt represents with a drift and trend; T implies without a drift and trend; Tu indicates with a drift and without trend.

Figures in parenthesis are lag lengths cast-off in ADF test to unfasten serial correlation in the unexplained value. PP analysis number indicating Newey-West Bandwidth formed by Bartlett-Kernel. ADF, PP and KPSS tests, were performed to eliminate unit root test and ensure that it is stationary at trend and intercept model. ***, **, * designates the rejection of the H_0 at the 10%, 5%, and 1% levels indicatively. E-VIEWS 6 is used to sustain the Unit Root Test.

The outcome above shows inflation is stationary at 10% significant level while the interest rate is stable at 1% significant level. On the other hands, unemployment turns out to be non-stationary at level. Therefore, we decided to take the first difference of the data and proof for unit root at the first variance. These results are also reportedly at table 6.4, and with a drift and trend; with a drift and without trend; without a drift and trend, and they all shows that inflation, unemployment, and interest rates are all stationary at the first difference. This study also, set the maximum figure of lags equal to ten to ascertain the stationarity and used the Schwarz Info Criteria (SIC) to discover the optimum lag length.

Now, since the model is stationary at the first difference, we proceed or advisable or necessary to verify the Cointegration test of the data.

6.2 Cointegration Test Results

In this section, we are going to present the test result for the cointegration testing. In the table 6.5, which represent trace cointegration rank test whereas the table 6.6, represents maximum eigenvalue cointegration rank test.

These cointegration tests are carried out by using Johansen-Juselius cointegration under the deterministic trend expectation of test with constant (no trend) in CE and proof Variance. With 5% critical value.

Table 6.5: Trace for Cointegration Rank Test

HYPOTHESIZED NO. OF CE(s)	EIGENVALUE	TRACE STATISTICS	0.05 CRITICAL VALUE	PROB **
At Most 1	0.003816	0.133819	3.841466	0.7145
None	0.361135	15.81599**	15.49471	0.0447

H₀: There is no cointegration between the variables.

If t-statistics > critical value. Reject H₀.

Decision: Since t-statistics > critical value at most one level. H₀ is rejected but failed to reject at 5% significant none level. Therefore, there is one cointegration between INF and UNEMP at 5% significant level by using cointegration rank test under trace.

Table 6.6: Maximum Eigenvalue for Cointegration Rank Test.

HYPOTHESIZED NO. OF CE(s)	EIGENVALUE	MAX- EIGENVALUE STATISTICS	0.05 CRITICAL VALUE	PROB **
At Most 1	0.003816	0.133819	3.841466	0.7145
None	0.361135	15.6827**	14.26460	0.0296

There is one cointegrating at 5% significant level says by Max-eigenvalue.

***, *, ** denotes the rejection of H₀ at 10%, 1%, 5% significant level by Mackinnon-Haug-Michelis (1999), p-values.

H₀: no cointegration among the three variables.

If Eigenvalue > Prob Value. Reject H₀.

Decision: since Eigenvalue > Prob Value under at none. Reject null hypothesis.

Therefore, at 5% level of significant there is one cointegration between the variables.

Our variables (inflation, unemployment, and interest rates) are established to be cointegrated when running Johansen-Juselius, which simply means that they part with stochastic trend, and it enlarges proportionally.

That is, they progress simultaneously in the long-run or they have a long-run connection.

The outcomes of cointegration proof presented in table 6.5, and table 6.6, indicates that the variables are cointegrated at 5% significant level.

Since there is one cointegrated among the series. Therefore, VECM should be employed to establish the short-run and long-run connection (if any).

6.3 Vector Error Correction Model Results

In this section, this study tries to find out whether there is a short-run and long-run connection between the series.

The short and long-run estimation result are presented in Table 6.7. The sign on unemployment coefficient is negative and statistically significant at 5%.

Table 6.7: Vector Error Correction Estimates

Cointegrating Eq:	Coit Eq 1	
INF(-1)	1.000000	
UNEMP(-1)	-1.175939 {0.511054} (-2.3010076)	
C	31.15037	
Error Correction:	D(INF)	D(UNEMP)
Coit Eq 1	-0.622432 {0.212232} (-2.93158)	-0.070912 {0.04876} (-1.45422)
D(INF(-1))	0.262538 {0.18627} (1.40943)	0.028135 {0.04278} (0.65766)

D(INF(-2))	-0.050114 {0.18110} (-0.27672)	0.021829 {0.04159} (0.52482)
D(UNEMP(-1))	0.930473 {0.80851} (1.15084)	-0.325581 {0.18569} (-1.75338)
D(UNEMP(-2))	-0.265759 {0.79826} (-0.33292)	-0.213837 {0.18333} (-1.16639)
C	-0.75429 {2.34439} (-0.32184)	0.715640 {0.53843} (1.32913)
INT	-0.312512 {0.14343} (-2.17878)	-0.015026 {0.03294} (-0.45615)

Standard Errors in { } and t-statistics in ().

The results above shows a long-run and short-run relationship into the dependent and independent variables. In the long-run, 1unit increase in the unemployment rate would decrease inflation rate by 1.176units. In the short-run, 1unit increase in the unemployment rate would decline inflation rate by 0.622units. In the short-run as well, 1unit increase in interest rate would reduce the inflation rate by 0.313units. Other short-run like D(INF(-1)), D(INF(-2)), D(UNEMP(-1)) and D(UNEMP(-2)) do not show any short-run relationship since they are statistically not significant at any significance level.

There is a short-run relationship into inflation and unemployment because short-run will converge to its long-run equilibrium point since short-run variables are

statistically significant. Therefore, the speed of adjustment will contribute to inflation since when the unemployment rate increases by 1 unit, inflation will decrease by 1.176 units in the long-run. Also, if unemployment increases by 1 unit, inflation will decrease by 0.622 units in the long-run. If there is a short-run and long-run relationship between the series, shocks would result in disequilibrium in the short-run. Before the series return to their long-run equilibrium, and it captures in the Error Correction Term (ECT).

6.4 Granger Causality Results

In this section, we find out the route of the causality between the series by using the Pair Granger test with sample 1977-2013. The direction of causality depends critically on the number of lagged terms in the model; I present below the results of the causality between the series by using different or several lags.

Table 6.8: Granger Causality Test

ROUTE OF CAUSALITY	NUMBER OF LAGS	F-VALUE	DECISION
UNEMP→INF	2	1.32155	Do not reject
INF→ UNEMP	2	0.92896	Do not reject
UNEMP→INF	3	0.74502	Do not reject
INF→ UNEMP	3	0.75778	Do not reject
UNEMP→INF	4	0.86937	Do not reject
INF→ UNEMP	4	0.55437	Do not reject
UNEMP→INF	5	0.57975	Do not reject
INF→ UNEMP	5	1.86687	Do not reject
UNEMP→INF	6	0.70439	Do not reject
INF→ UNEMP	6	1.36433	Do not reject
UNEMP→INF	7	0.51704	Do not reject
INF→ UNEMP	7	2.55823***	Reject

→ indicates the direction of causality from INF to UNEMP and UNEMP to INF
whereas, *** means it is significant at 10%.

H₀: The variable under meditation does not Granger cause the other variable.

If F-value > t-tab, H₀ should not be rejected. Since F-value > t-tab, H₀ is rejected.
Therefore, the variable under consideration Granger causes the other variable.

This thesis detect the optimal lag length at seven purposely to show the direction of the causality. Pantula theory states that to get the direction of two or more variables the lag length must be increased and the maximum lag length must not more than ten in order to measure the ability to predict the future values of a time series by using prior values of another time series. At seven lags, there is unilateral causality since we have two variables. The appraised F-statistics is significant at 10% level and the route of causality is from inflation to unemployment.

The result shows that Inflation causes Unemployment in Nigeria.

Chapter 7

CONCLUSION

I have scrutinized the correlation between inflation and unemployment in Nigeria using both original and augmented Phillips curve. This study was consistent with the existing literature that established a negative correlation between the inflation and unemployment. Therefore, I found that inflation and unemployment shows a negative relationship in Nigeria economy in the short and long-run. The outcome of this study is that 1unit increase in the unemployment rate would decrease inflation by 1.176units in the long-run. In the short-run, 1unit increase in the unemployment rate would reduce the inflation rate by 0.622units. In the short-run as well, 1unit increase in interest rate would decrease inflation rate by 0.313units. The result supported the Phillips curve assumption. I also concluded that the direction of causality is from inflation to unemployment since inflation Granger-causes unemployment in Nigeria from 1977-2013.

Economic reason behind this result is that during inflation, investments are encouraged by generating high profits to the owner. Therefore, number of investors will be increased that resulted to employ many workers purposely for the production. Hence, number of employment will be increased and number of unemployment will be reduced.

The main policy implication is that Nigeria is a developing country but blessed with many natural endowments such as fertile land, crude oil, etc. One way to eradicate or decrease the inflation rate in Nigeria is to provide or create more jobs opportunities. It can be done by investing in agricultural sectors and industrial sectors to provide vital services for the people who are capable and willing to work. By doing this, the unemployment rate would be reduced or completely erased, and the inflation rate would be wipe-out as well.

The major limitation of this study is inadequate data from the relevant agencies. It is advisable to re-think this results when a longer time series is sufficient. The direction for future research would add one or more valuables in addition to inflation and unemployment in the original/traditional Phillips curve equation.

Obviously, the additional variable to include should be an interest rate. Sometimes, the government tries to generate more revenue by using fiscal policy to increase the tax rate. Also, use apex of the monetary authorities to increase interest rate within the financial intermediaries. The two methods of generating revenue can leads to an inflationary gap in the economy.

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