Impact of Inflation on Economic Growth: Case Study of Nigeria (1970-2013)

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ABSTRACT

This study investigates the impact of inflation on economic growth of Nigeria. Typically, this relationship has been analyzed using simple correlations and deterministic models. In this analysis, a tri-variate vector autoregressive (VAR) model is used, incorporating unemployment rate into the framework for analysis, we capture the policy trade-off between managing inflation at a low rate and targeting low unemployment as described by the Phillip curve hypothesis. After checking the series for unit root, we identified that all the variables are stationary at first difference, that is I~(1). In the model, one cointegrating vector that describes the long run interaction of these variables is also estimated. In addition, we estimate the vector error correction model and the result indicates there is convergence among the variables in the long run and that takes about 5 consecutive years. The dynamics of the relationship within the system suggest that there is a one-period temporary shock to consumer price level, which shows that there is a slow positive short run contemporaneous impact on the real GDP of Nigeria. However, this dissipates into a negative and permanent shock after 5-6years. This conforms to the neo-classical theory of sticky prices and short run economic disequilibrium.

Keywords: Inflation, Economic Growth, Vector Error Correction, Cointegration, granger Causality and Nigeria.

ÖZ

Çalışmada amaçlanan enflasyonun ekonomik büyüme üzerindeki etkisini Nijerya için araştırmaktır. Genellikle bu ilişki basit korelasyon ya da belirleyici modellerle araştırılmıştır. Bu analizde, üçüncü derece vektör oto regresif model kullanılarak ve işsizlik oranı da analize dahil edilerek, Philips eğrisi hipotezi tarafından açıklandığı gibi enflasyonu düşük düzeyde tutmak ve aynı zamanda düşük işsizlik elde etmek hedefi arasındaki değiş tokuş politikası elde edilmiştir. Birim kök testi sonucunda tüm değişkenlerin birinci düzeyde durağan olduğu belirlenmiştir. Bu modelde bir eş bütünleşme vektörü aynı zamanda değişkenler arası uzun dönem ilişkisini de ölçmektedir. İlaveten vektör hata düzeltme modeli kullanılmış çıkan sonuçlar uzun dönemde yaklaşık beş yıllık bir süreç için yakınsaklık göstermiştir. Bu ilişkinin sistem içerisindeki dinamikleri tüketici fiyat düzeyinde bir dönemlik geçici şoka işaret ederken eş zamanlı olarak da Reel GSYİH üzerinde kısa dönem etkiye dikkati çekmektedir. Fakat bu durum 5 ya da 6 yıldan sonra negatif ve kalıcı bir şoka dönüşmektedir. Bu bilgiler aynı zamanda yeni klasik teorinin yapışkan fiyatlar ve kısa dönem ekonomik dengesizliğine de dikkati çekmektedir.

Anahtar Kelimeler: Enflasyon, Ekonomik Büyüme, Vektör Hata Düzeltme, Eş bütünleşme, Granger nedensellik, Nijerya.

In loving memory of my beloved Father,

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
CBN	Central Bank of Nigeria
CPI	Consumer Price Index
ECM	Error Correction Mechanism
GDP	Gross Domestic Product
IMF	International Monetary Fund
J&J	Johansen-Juselius
KPSS	Kwiatkowski Phillips Schmidt and Shin's test
LDC	Less developed country
LN	Natural Logarithms
NNSC	Nigeria National Supply company
PP	Phillips Perron
PPIB	Productivity, prices and income board
QTM	Quantity theory of money
SAP	Structural Adjustment Programme
USD	United states dollar
VECM	Vector Error Correction model
VAR	Vector Autoregressive

Chapter 1

INTRODUCTION

1.1 Background of Study

Maintaining price stability and growth together in an economy is one of the central macroeconomic policy objectives of most developing countries in the world today. In order to promote economic growth and strengthen the purchasing power of the domestic currency for the Nigerian economy, emphasis has been laid by the Central Bank of Nigeria on maintaining stability in prices through the use of expansionary or contractionary monetary policy, (Umaru A. & Zubairu A. A., 2012). One of the financial problems experienced by Argentina, Brazil, Bolivia, Africa and Latin America amidst others is inflation Deo Gregorio (1992). In general, inflation can be defined as the rise in the level of prices maintained over a given period in an economy. In other words, it refers to the general rise in the price of various goods or services thus leading to a fall in the purchasing power of a countries currency, (Lipsey R.G. & Chrystal K.A., 1995). Inflation is an economic situation and it occurs where an increase in the supply of money is greater than the amount of goods and services produced in a country, (Piana V, 2002). Inflation is categorized into various degrees and they are as follows: hyperinflation (3 digits % points), extremely high inflation (50 % to 100%), chronic inflation (15% to 30%), high inflation (30% to 50%), moderate inflation (5% to 25%-30%) and low inflation (1%-2% to 5%), (Umaru A. & Zubairu A. A., 2012). An economy where the purchasing power of money is expected to retain acceptable value, low level of Inflation is beneficial for

consumers and businesses to make long term plans. A low inflation rate leads to lower nominal and real interest rate that in turn reduces the cost of borrowing. An economy where inflation is low, "households" will be encouraged to purchase more goods that are durable and increase the rate at which they invest. This will lead to an increase in productivity and mass production of goods and services thus boosting economic growth. Inflation at a low level is necessary for economic growth, (Hossain E, Ghosh B.C, & K.Islam, 2012). A situation whereby inflation is on a high level is harmful to the economy because a high inflation rate has negative effects on the economic performance of general activities. High rate of inflation makes firms and households channel their resources from activities that are productive to other nonproductive activities to enable them reduce the burden of bearing inflation tax. Because of this, there is a high risk of losing money due to variability of relative prices leading also to a high chance of windfall gains. (Leijonhufvud A, 1977) is of the opinion that high inflation makes financial authorities use different instruments such as the fiscal and monetary policies to protect their financial assets from inflationary erosion. High inflation leads to a decline for labour available, thus leading to a decrease in production and in turn low growth. Zero inflation is not also encouraged in an economy because it is equally unsafe and harmful, it makes an economy stagnant (That is a period where economic growth increases at a very slow rate and is usually characterized by unemployment) in the economy.

Inflation in Nigeria can be traced to the "Cheap Money Policy" which started in 1960. It was a monetary policy used by the government to encourage development of key sectors in the economy after the country got her independence. It was characterized by reductions in interest rate which was targeted towards certain sectors in the Nigerian economy. This policy was implemented to aid the execution

of the first national development plan and later the prosecution of the civil war. This led to increased monetary expansion with the narrow and broad measures of money stock increasing at annual rates of 29.7% in 1961 and 44% in 1969.Consequently, inflation rose from 6.4% in 1961 to 12.1% in 1969, (Bayo, 2005). There was a boom in oil revenue of the country in 1970, this led to a rise in government expenditure and aggregate demand without a accompanying increase in the amount of goods and services produced domestically, thus leading to an increase in the amount of money in circulation. Monetization of oil revenue is also a factor that expanded money supply which also resulted in a rise in the general level of prices in Nigeria, (Oriavwote V. E. & Samuel J. E, 2012).

There is no clear decision on the relationship between economic growth and inflation. Different studies have been carried out on inflation and economic growth and results generated from conducted research states different views and opinions to the relationship existing between inflation and growth. (Mallik G. & Chowdhury A., 2001) are of the opinion that there is a positive relationship between inflation and growth, (Fisher, S, 1993) believes that there is a negative relationship between inflation and growth, (Sidrauski M , 1967) believes that there is no relationship whatsoever between inflation and growth, while (Umair M. & Raza U.) found out that high rate of inflation does not directly affect growth, they believe that inflation leads to high unemployment which in turn affects economic growth in the country.

1.2 Statement of the Problem

The Nigerian economy has remained underdeveloped for a long period despite being blessed richly with huge human and natural resources. This is a result of various factors such as corruption, unemployment, inflation e.t.c. During the period under

review (1970-2013), there has been an increase in the rate of inflation which has led to various economic distortions, a situation whereby the government of a country interferes in the economy using policies such as fiscal and monetary policies, examples of some policies that led to distortions in the economy are minimum wage, lump sum tax, taxation, and government subsidies. Also the over valuation of the Nigerian Currency (Naira) in 1980 after the fall of the oil boom contributed significantly to economic distortions in production and consumption thus leading to a high rate of dependence of the Nigerian economy on goods imported from other countries, that is more import less export. This led to a deficit in the balance of payment of the economy,(Bayo, 2005). Since the economy had a balance of payment deficit, in order to correct this various trade restrictions such as high import quotas, tariffs and export licenses were placed on the importation of various goods and services into the country. This led to a shortage in the availability of raw materials necessary for production thus leading to a decrease in the amount of goods and services available for purchase. This situation spurred inflation rate to rise from 20% in 1981 to 39.1% in 1984,(Itua , 2000).

Structural Adjustment Program (SAP) started in Nigeria in the year 1980. This led to a temporary reduction in fiscal deficits, the government reduced her involvement in the economy and subsidies on various goods and services were removed. However, as the effects of SAP gathered momentum, the Growth rate fell drastically in 1990 from 8.3% to 1.2% in 1994, while inflation rose drastically from 7.5% in 1990 to 57.0% in 1994. In 1994, the central bank of Nigeria (CBN) devaluated the local currency (Naira), which led to a fall in amount of agricultural output as machines and raw materials (imported) became expensive. In 1995, the rate at which financial institutions lend money to individuals and firm stimulated inflation to rise to 72.8%.

Previous records showed that inflation in the Nigerian economy has gross effect on savings, investment, productivity and balance of payment thus leading to a fall in growth rate from 26.8% in 1991 to 5.4% in 2000 and 3.5% in 2002. In Nigeria, inflation discourages investment in financial assets and led to low growth of cash value, (Obafemi F. & Epetimehin M., 2011). Accordingly this research aims to investigate the effects of inflation on the economic growth of the Nigerian economy.

1.3 Significance of the Study

If the cause and source of inflation in Nigeria are identified and elaborated, it will lead to an increase in investment, productivity, exports, and employment opportunities, which would bring about increase in economic growth and development in the country. This study aims at identifying the relationship between inflation and growth and how inflation affects growth rate in the economy. Inflation in Nigeria is determined by major macroeconomic variables such as fiscal deficits, money supply, interest rate and exchange rates (Bayo, 2005).The study would serve as a tool and a guide towards the formation of policies and how they are implemented to help curb the problem of inflation in the country and increase growth.

1.4 Objective of the Study

The aim of this study is to measure the impact of inflation on the Nigerian economy and its effects on Real Gross Domestic Product of Nigeria based on the annual time series data from 1970-2013. A study of this nature is paramount especially in an economy where price level is unstable. The reason is that Nigeria as a country has been under pressure from international lending agencies such as World Bank and International Monetary Fund (IMF) to bring down the rate of inflation and boost economic growth in the country, also structural and infrastructural constraint such as

the elimination of fuel subsidy and destructive flood in various states in the country has also contributed to fluctuations in the rate of inflation in the economy. This research is to investigate the inflation and economic growth relationship in Nigeria as it is said that a country will grow faster in real terms if the rate of inflation is reduced to the barest minimum,(Osuala & Onyeike, 2013).

1.5 Research Questions

For achieving adequate research results, the following research questions are stated:

1. What is the causal relationship between inflation and economic growth in Nigeria?

2. What is the long run relationship between Inflation, economic growth and unemployment?

Chapter 2

LITERATURE AND THEORETICAL REVIEW

2.1 Monetarist Theory of Inflation

This theory was propounded by Milton Friedman and it is referred to as the as the quantity theory of money (QTM). The monetarists stated that money supply is the main determinant of the level of prices in an economy. Once there is a change in the quantity of money supplied in an economy, it will lead to a direct and proportional change in the price level. Using the Irving Fishers equation of exchange, the quantity theory of money can be written as follows;

$$MV = PQ$$

where:

M= Money Supply in an economy

V= Velocity of Money in Circulation

Q= Volume of transactions

P= General Price Level

The monetarists emphasized that inflation in an economy is a result of a change in the supply of money or quantity of money in circulation, this affects the price level but it does not affect the rate of growth in output in the economy. They believed that investments, exports and capital accumulation are greatly affected by the level of inflation, and thus affects the growth rate in an economy in the long run. They placed more emphasis on the long-run rather than the short run dynamics in an economy.

Dornbusch et al (1996) stated that in the long run, money supply affects prices but has no real effect on the rate of growth whereas in a situation where the supply of money is greater than the growth in output, there will be inflation in the economy.

2.2 Keynesian Theory of Inflation

This theory was propounded by John Maynard Keynes 1936 in a book titled "The General Theory of Employment, Interest and Money". The Keynesians believe in the intervention of the government in the affairs of an economy through expansionary and contractionary economic policies, which will boost investment and push demand to full production in the economy. The Keynesians came up with a model that consists of Aggregate Demand and Supply curves Dornbusch et al (1996) argued that there is a positive relationship between inflation and economic growth but due to the adjustment path of the AS and AD curves, this relationship turns negative. Another factor that leads to a positive relationship between growth and inflation is the consensus of firms to supply goods at an agreed price. When prices increase, firms produce more and buyers buy less this leads to a negative relationship between growth and inflation, (Gokal V. & Hanif S, 2004)

2.3 Classical Theory of Inflation

Adam smith is the father of the classical economist; he came up with a supply side model of growth where he pointed out three important production factors, which are land, labour and capital. He propounded a production function where he expressed output is a function of land, capital and land that is:

$$Y=f(L, K, T)$$

Y= Output **K**= Capital **L**= Labour **T**= Land

Adam Smith argued that savings leads to investment which leads to economic growth. He stated that growth in output is as a result of investment growth, population increase, land and increase in productivity generally. (Gokal V. & Hanif S, 2004) stated that the relationship between inflation and economic growth is negative by the reduction in firms profit level and saving through higher wage costs. This theory was criticized, as it does not give any direct reason of inflation and the tax effect on the level of profit and output.

2.4 Neo Classical Growth Theory

This theory was propounded by Solow and Swan. The neo-classicals stated that technology, labour and capital are the major determinants of growth in output, and they came up with a growth model, which states that technological change or scientific innovation replaces investment as the major factor thus explaining growth in the long-run. The neo-classicals stated that the level of technological change is determined exogenously, i.e. it is independent of all other factors including inflation. (Gokal V. & Hanif S, 2004) argued that the neoclassical economic theory of growth is built on the principle of diminishing returns of labour and diminishing returns of capital separately and constant returns to both factors jointly.

(Mundell R, 1963) is of the opinion that inflation leads to an increase in growth rate of output permanently through stimulation of capital accumulation because in reaction to inflation, households would prefer to hold less money and more assets. Mundell argued that there is an increase in greater capital intensity which promotes economic growth and this is as a result of inflation which makes individuals to convert their money into other assets. (Tobin J. et all, 1965) is also of the same opinion as Mundell that economic growth is positively related to inflation.

(Stockman A. C., 1981) came up with a model showing that there is a negative relationship existing between inflation and economic growth. Stockman's model shows that people's welfare decreases as a result of a lower steady state level which is caused by a rise in inflation rate. (Sidrauski M , 1967) argued that the rate of inflation in an economy does not necessarily lead to an adjustment in the unwavering stock of capital and economic growth.

2.5 Endogenous Growth Theory

This theory is also referred to as New Growth Theory and it was propounded by (Romer, 1990) In this theory, factors within the production process generate economic growth. The theory argues that technological progress is endogenous, which is different from what the neo-classical theory predicts. The endogenous theory speculates that the marginal product of capital is steady while the neoclassical are of the opinion that capital is diminishing on return.

The rate of return on capital that is human capital and physical capital is a key determinant of growth rate according to the endogenous theory. Goodfriend and Macalum (1987) are of the opinion that the rate of inflation would lead to a decline on all capital and growth rate.

2.6 Great Spurt Theory

The theory stated that all nations were once in a backward state that is a state of underdevelopment and less progress and the level of industrialization vary from country to country which was built on how backward the nation initially was. The theory classified countries into three different categories, namely the advanced, moderate and very backward. The theory argued that there is a need to use the intensive capital technique during the production process in other to establish great

spurt in countries. They argued that for a less developed country to move forward it needs a break from their past and move to a great spurt of industrialization, (Balami, 2006). The great spurt theory is similar to a country that has a lot of labour, it will end up increasing the amount of people who are unemployed thus leading to a decline in economic growth.

2.7 The Phillips Curve

This theory was propounded by A.W Phillips in 1958.His theory focused on the relationship that exists between inflation and unemployment. He estimated a curve known as the Phillips Curve, this curve showed that there is an inverse relationship existing between wages and the rate of unemployment using data from United Kingdom from 1862-1957. He argued that wages and prices move in opposite direction thus showing that there is a relationship between prices and unemployment. The backbone of the Phillips Curve is that empirically it shows that there is an existing reliable correlation economically and statistically between inflation and unemployment, (Umaru A. & Zubairu A. A., 2012).

(Lucas R., 1973) argued that inflation is an important engine for economic growth, he stated that low inflation conquered adamant nominal prices and wages while relative prices can be adjusted to fit structural changes during production to aid modernization period. This to him speeds up economic growth. (Romer D, 2001) is of the opinion that high rate of inflation leads to “Shoe leather cost” i.e. inflation which is accompanied with extra effort by people to make them reduce holding money and “Menu cost” i.e. inflation that leads to change of prices more often, this discourages investment and tax system in the long-run.

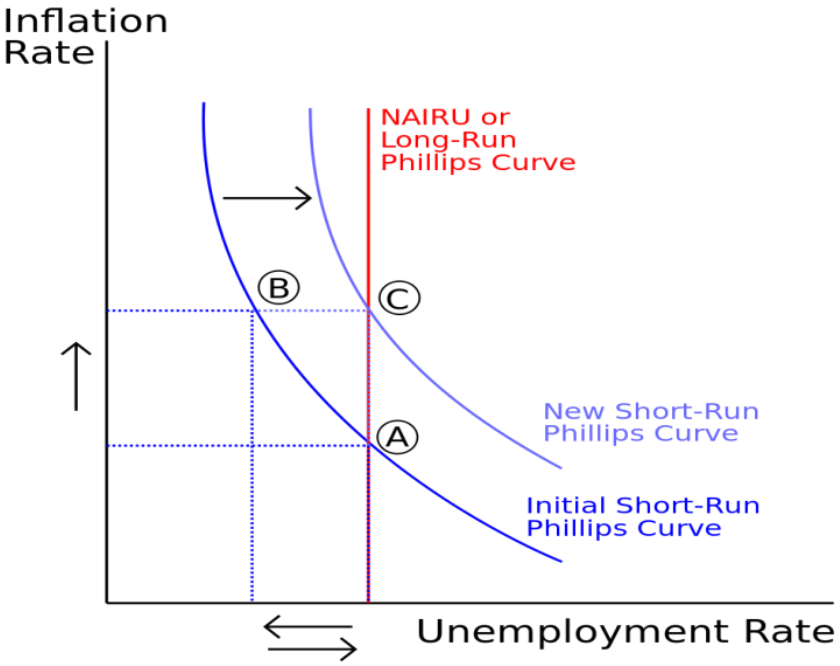

Figure 1: A Phillips curve showing the tradeoff between inflation and unemployment

(Barro, 1997) studied 100 countries for a period of 30 years 1960-1990. He came up with other determinants of economic growth additional to inflation while studying the relationship between inflation and growth. He analyzed data using the system of regression equation method. The results of the regression showed that as inflation increased on the average by 10% per year, growth rate of real gross domestic product declined from 0.2% to 0.3% annually, In addition a decline in investment from 0.4% to 0.6%. In the sample, using high inflation as an additional variable, the result becomes statistically significant.

Mallik and Chowdhury (2001) collected data from four South-Asian countries namely (Sirlank, India, Pakistan and Bangladesh). Co-integration and error correction model was used to estimate the data collected. The estimated result showed that a long run positive relationship exists between economic growth and

inflation. They concluded stating that a countries economic growth can speed up in a case where inflation is on a moderate level.

(Fabayo J.A. & Ajilore O.T, 2006) using data from 1970-2003 studied the existence of "threshold impact of inflation on growth in Nigeria". They stated that a 6% level of inflation in an economy is the threshold. Their result showed that there exist is a positive impact of inflation on economic growth if inflation is below the threshold level.

(Wang Z) studied inflation and growth in the Chinese economy; he analyzed data using the co-integration model for which he concluded that inflation and economic growth are positively related with above 3 quarters lag.

(Umaru A. & Zubairu A. A., 2012) studied the impact of inflation on the growth and development of the Nigerian economy from 1970-2010 using the Augmented Dickey Fuller Technique and Granger Causality Test. Results showed that inflation and economic growth are positively related and that economic growth can be increased by encouraging growth in productivity, level of output and total factor productivity.

(Wajid A. & Kalim R., 2013) in their research "The impact of inflation and economic growth on unemployment", A Time series evidence from Pakistan for the period of 1973-2010.The researchers used the ADF, Johansen-Juselius 1990 maximum likelihood approach to study the long-run correlation between inflation, unemployment and economic growth. It was concluded that the rate of inflation significantly increases unemployment and there is a positive effect of economic growth on unemployment both in the long-run and short-run.

Chuan Yeh (2009) in his study “the causal relationship between economic growth and inflation”, he employed the use of cross sectional data for 140 countries from 1970-2005. He grouped the data into low income, high income and developing countries. He stated that inflation has a negative impact on economic growth but the effect is gainful. His result showed that inflation has a negative effect on growth in low-income countries than in developing and developed countries.

(Umaru A. & Zubairu A. A., 2012) analyzed the “impact of inflation on gross domestic product and unemployment in Pakistan” for the period of 2000-2010.They found out that the correlation between inflation and unemployment is positive at a 10% level of significance while the correlation between unemployment and gross domestic product was significant. They concluded that inflation influences gross domestic product and unemployment insignificantly thus making the relationship between them negative.

(Kasidi F. & Kenani M., 2012) used time series data from 1990-2011 to check the impact inflation has on economic growth. Results generated suggested that the impact of inflation on the growth rate in the economy is negative. It showed that no co-integration exists between economic growth and inflation during the period under study. It was concluded that in Tanzania no long-run relationship exists between economic growth and inflation.

(Fisher, S, 1993) Propounded a theory on inflation and growth; he came up with empirical evidences showing that a negative correlation exists between inflation and economic growth. He investigated the reason for this negative correlation and he concluded that the higher the rate of inflation, the lower the growth rate because

lower real balances leads to a decline in factors of production that is land, labour, capital and entrepreneurship thus making them inefficient.

(Fakhri, 2011) in Azerbaijan conducted his research titled "the relationship between inflation and economic growth" using a threshold model. Results showed that a non-linear relationship exists between inflation and economic growth with a threshold level of 13%.

(Abachi, 1998) studied the tradeoff that exists between inflation and unemployment in a LDC a case study of the Nigerian economy. He found out that the relationship between inflation, and unemployment in the Nigerian economy is negative. He used an OLS model to show the tradeoff existing between these variables. His result showed that Nigeria is plagued by Stagflation that is a situation whereby output decreases or remains unchanged and price rises.

(Aminu & Anono, 2012) studied the relationship between unemployment and inflation, using ARCH, Ordinary Least Square, ADF test for unit root, Johansen Co-integration, Granger Causality and Garch technique. The results generated showed that in the long-run, unemployment and inflation have a negative relationship

(Stephen B. A., 2012) From 1980-2008 studied the impact of unemployment on the economic growth of the Nigerian economy. He used the Cobb-Douglas production function in the model that was estimated. The result demonstrated an inverse relationship is existing between unemployment and growth In Nigeria.

(Williams O. & Adedeji O. S., 2004) using the error-correction model examined macro-economic stability and growth for 1991-2002 in Dominica. The study was based on collective effects coming from distortions in money and goods that are traded in periods of inflation using price dynamics in the republic of Dominican. It was realized that changes in monetary aggregates, foreign inflation, rate of exchange and real output are the major determinants of inflation. The researchers stated a long-term relationship in traded-goods market and the money market showing that disequilibrium in the market was influencing inflation in the republic of Dominica.

Shuai and Juan (2012) studied inflation, unemployment and economic growth in China, they applied the VEC, Granger Causality test, Unit root, Co integration and VAR model in studying the relationship that is existing between inflation, unemployment and the level of growth rate in China. The result showed no causality whatsoever exists between inflation and unemployment but causality exists between Growth rate and unemployment. The result also showed that there is a double-way causality between inflation and economic growth.

(Chimobi, 2010) using the VAR Granger Causality Test studies inflation and economic growth in Nigeria and came up with results showing that a unidirectional Causality exist from inflation to growth in Nigeria.

Finally, (Sidrauski M , 1967) found that there is no existing relationship either positive or negative between inflation and economic growth in Nigeria in the long run.

2.8 Measurement of Key Concepts

This section seeks to examine the right ways and methods of studying inflation, and economic growth to see the relationship that exists between them and inaugurate a more effective technique to measure these variables, it is crucial we take into consideration some notes on inflation and economic growth and relate them theoretically to one another.

(Balami, 2006) defined inflation as the general rise in the level of prices of a large group of goods and services for a long duration of time. Inflation is a refers to the continuous rise in prices and it can be measured using the CPI, Gross National Product Implicit Price Deflator. To measure inflation we consider three methods or index, The Consumer price Index [CPI], Gross National Product [GNP] implicit deflator and the Wholesale or Producer Price Index [WPI or PPI]. The consumer price index (CPI) serves as a measure of inflation rates in Nigeria because it is currently available in the country in Monthly, Quarterly and Annual bases CBN (1996).

Economic growth is defined as the general increase in the real value of goods and service that are produced in an economy over a given period. It is the capacity of a country to produce goods and services, compared from one time period to another. It can be measured using Real GDP, GNI or Real GDP per Capital.

Chapter 3

OVERVIEW OF THE NIGERIAN ECONOMY

On the 1st of October 1960, Nigeria gained her independence and was confirmed a republic on the 1st of October 1963. The country is divided into 4 major parts consisting of the North, South, East and Western regions. As a Federal republic it is located on the west seacoast of Africa. It is surrounded to the North by the Republic of Chad and Niger, to the South by the Atlantic Ocean, to the east by Cameroon republic and to the West by Benin Republic. Nigeria is approximately 923,768 square km, which is a bit bigger than the combined states of California, Washington and Maine. It is an economy where land is in abundance to carry our Industrial, Agricultural and Commercial activities. It is immensely industrialized and 50% of its Gross Domestic Product as at 1999-2004 came from the industrial sector.

Despite the fact that Nigeria is a country blessed with various mineral resources, she still suffers from 20 years of poor performance economically after the great oil price fall in the early 1980s. This was as a result of military dictatorship in the economy.Tthe military administration ignored macro-economic policies that were put in place by the previous government and the poor state of infrastructural facilities despite the steady growth experienced in the economy. In 1999 Civilian rule returned in to the country.

The African Development Banks countries policy in 2011 passed a judgment on Nigeria, They stated that essential reforms especially in public finance management has started in the country, this was carried out to improve the efficient allocation of resources, syllabus and projects implementation. Corruption is one of the widespread problems facing the Nigerian economy and to curb this the government of the country came up with the Economic and Financial crimes Commission (EFCC) and the Independent Corruption Practices and Other Related Offence Charge (ICPC) to fight any form of corruption in Nigeria but this commissions have not been successful because they are implemented by these set of corrupt leaders in the country.

The Nigerian government came up with the Millennium Development Goals, The aim of this agenda is to target extreme poverty in various dimensions such as hunger, education, gender equality, diseases and income poverty. There is a good chance of achieving the Millennium Development Goals (MDGs) on some areas such as universal primary education, environmental sustainability, promoting gender equality and women's authorization, and developing partnership globally to stimulate development. However, In Nigeria the end of poverty decay, corruption, diseases, maternal health and baby mortality, will be difficult to reach with the state of the country presently.

On the average, Nigeria's economic growth annually is 6.9% and this has been for over 10 years, In 2011 growth rate was recorded to be 7.4% which was triggered by the non-oil sector consisting of construction, hotel and restaurants, communication, wholesale and retail businesses, fabrication and agriculture. It was forecasted that economic growth will rise from be 7.4% in 2011 to 8.9% in 2012.

So far, the growth rate in the economy has been on an increase, and there has been an increase in poverty and no jobs for the unemployed. 2/3rd of the Nigerian population live on less than one dollar USD a day and as at 2011 the rate of unemployment was 23.9%, in 2012 it was 21.1%.37.7% consist of the age group of 15-24 who are unemployed while the age range of 24-44 who are unemployed is 22.4%. There was a youth Job creation incentive by the government of Nigeria to train youths and thus increase the rate of employed youths in the labour force of the country. The political structure is corrupt and the over dependence of the country on crude oil and gas is one of the great challenges the country is facing today. The government is trying to incorporate the private sector in the development so as to enable them assist in the growth and development of the non-oil sector.

3.1 Nigeria's Inflation Experience

Nigeria has been characterized by high volatility in the rates of inflation since 1970's.During this period Nigeria's inflation rate was in excess of over 30%.In 1969, Nigeria's inflation rate was 10.36% this was a source of concern then to the military government because of the civil war which was not coming to an end but led to the nation for the first time experiencing a double digit inflation in return the federal government implemented a policy that there should be freezing of wages generally for a period of one year, the government introduced a price control decree in early 1970 but this did not help much as inflation in the country kept on increasing, (Olubusoye O. E. & Rasheed O., 2008). In 1971, inflation increased to 16.0% as a result of an increase in salaries of workers by the wages and salaries review commission, which led to an increase in demand thus causing excess demand in the economy. To respond to this high rate of inflation, the government raised import restrictions on different goods and services while they reduced the excise duties on

some goods and services. They set up a credit policy so as to encourage the production of food, along with this there was the establishment of the national supply company NNSC which was solely responsible for supply of goods around the country thus leading to an increase in the supply of goods and services which could not meet up with the excess demand in circulation. This brought about a drastic decrease in the volume of inflation in 1972 to 3.2%.

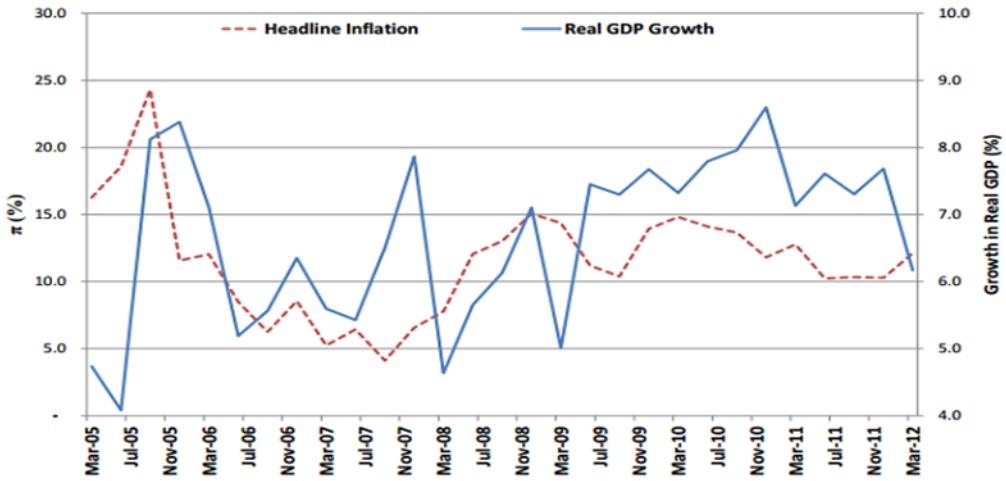

Figure 2: Recent Trend of Real GDP Growth and Inflation in Nigeria Headline
Source: (Maku A. O. & Adelowokan O. A., 2013)

Nigeria faced high inflationary pressure in 1973-1985 with an average rate of inflation at 17.96%. In 1973 the anti-inflation measures in 1971 was carried out over to 1973 and the inflation rate recorded was 5.4% but in 1974 the story was different. Inflation increased as high as 13.4% and this was as a result of an action that increased the expectation of the general increase in wages. Between the period of January and February 1975, the wage increase was paid with arrears backdated to April 1974. Private Parastatals and Armed forces also acknowledged the same increase in salaries. The arrears of April 1974 led to excess demand in the country which led to a high rate of inflation recorded at 33.9% in 1975. This period brought

about the phenomenon of imported inflation in Nigeria, (Olubusoye O. E. & Rasheed O., 2008). Despite the various policies by the government in 1972-1974, inflation rate was not significantly reduced in 1975-1974. The federal military government in late 1975 set up a special Anti-inflation task force, this force diagnosed both demand and factor cost in Nigeria and recommended the establishment of the productivity, prices and Income Board (PPIB).In early 1976, the PPIB came to existence, the price control system was restructured leading to a low level of growth in the consumer price by the end of 1970. However in 1981, the country recorded a high inflation rate of 20.9% and in response to this high increase, the government intensified efforts at the importation and distribution of important commodities. In this period, they had the Green Revolution Campaign. This led to a decline of the inflation rate to 7.7% in 1982.In 1983 the inflation rate was 23.2% and 39.6% showing that the decline in the rate of inflation in 1982 did not last long. In 1985 it dropped to 5.5% which is as a result of the forced backed system of price control in that period by the military government at that time, (Olubusoye O. E. & Rasheed O., 2008).

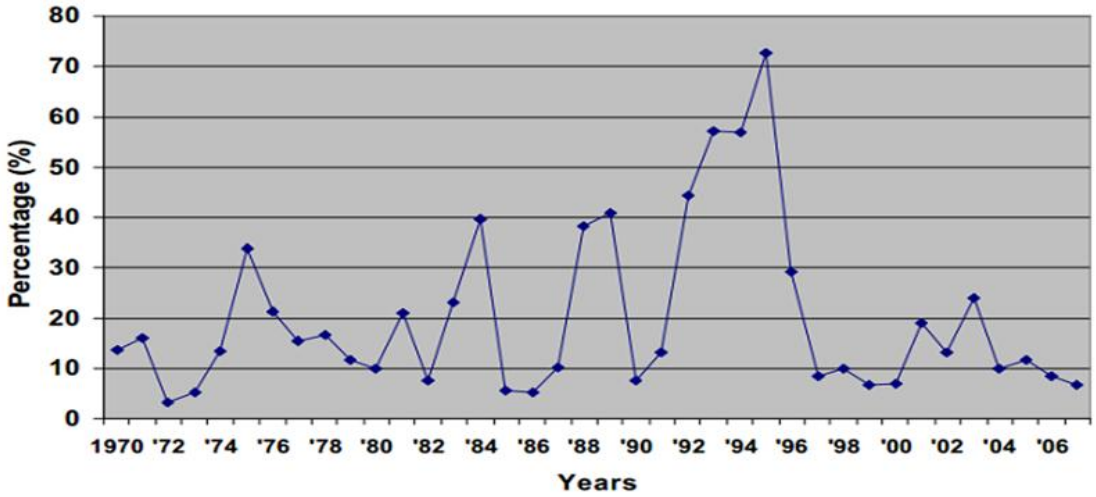

Figure 3: Rate of inflation in Nigeria, 1970–2006
Source: Olusanya and Rasheed (2008)

In 1986 inflation rate was 5.4% and in 1987 the inflation rate was 10.2%. This is as a result of an improvement in the supply of food in the year 1986.In 1988 the rate of inflation was 38.3% and 40.9% in 1989.In 1990 inflation rate suppressed and was recorded to 7.5% as a result of an increase in the output growth of food. This also did not last long as from 1991 there was an increase in domestic prices. In 1992 inflation rate was recorded to be 44.6%, 57.2% in 1993, 57.0% in 1994 and 72.8%in 1995. In 1996 there was an implementation of stabilization measures which consisted of discipline fiscal and monetary policies, this led to a decrease in inflation to 29.3% in 1996. In the year 1997 inflation dropped drastically to a single digit of 8.5% this was greatly influenced by fall in the price of food, sustained discipline of fiscal and monetary policies and good harvest as a result of good rainfall or climatic conditions. In 1998 there was an increase in inflation from 8.5% in 1997 to 10% in 1998.

The democratic period was from 1999-2007. In 1999 inflation rate was 6.6% this increased to 18.9% in the early months of 2001 but declined to 12.9% at the end of the year. In 2005 inflation increased to 17.9% but reduced by 53.1% to 8.4% in 2006

but there a decline in 2007 to 5.4%.Between the periods of 2008-2011 inflation rates increased and was averaged at 11.8% as a result of the introduction of the global financial crisis. See figure bellow

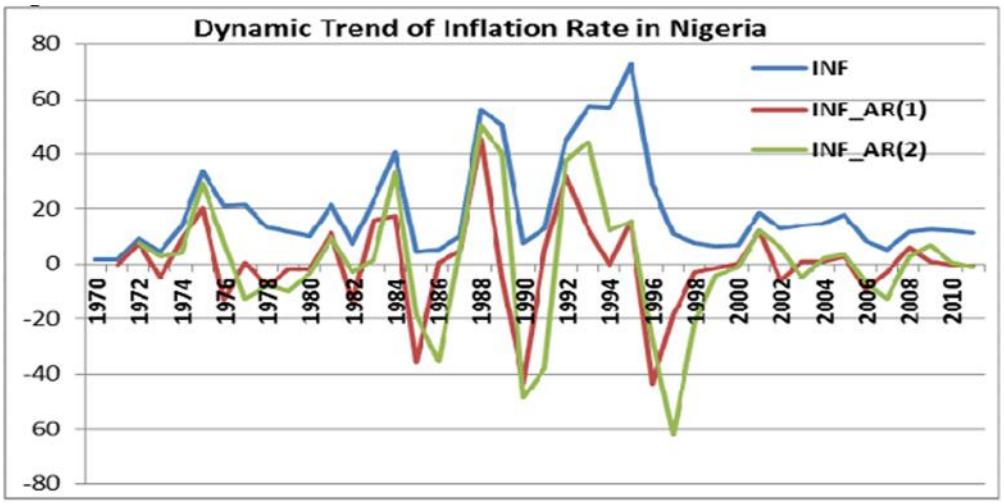

Figure 4: Dynamic Trend of Inflation Rate in Nigeria
Source: (Maku A. O. & Adelowokan O. A., 2013)

(Maku A. O. & Adelowokan O. A., 2013) observed that in Nigeria, there exists a strong correlation between the rates of inflation in the country. Looking at the inflation process overtime they found out that inflation rate in Nigeria has dynamic pattern overtime.

The Nigerian government is hoping to reduce inflation rate in 2013 to less than 10% though there was a decline in the rate of inflation in 2010 and 2011 from 13.7% to 10.2% respectively and this was as a result of the tightening of the monetary insurance and the replacement of the food Leontyne Price. In 2012 and 2013 inflation will reduce to 10.1% in 2012 and 8.4% in 2013. There was a decline in inflation from 13.7% in 2010 to 10.2% in 2011, this was as a result of monetary

insurance tightening and easing of food toll. Inflation is forecasted to decrease by 2012 from 10.1% to 8.4% in 2013.

Chapter 4

DATA AND METHODOLOGY

4.1 Variables and source of Data

The study employed the use of time series data generated annually from Nigeria from 1970 to 2013. Data was gotten from the World Bank databank (databank.worldbank.org). To analyze these data series, a vector autoregressive (VAR) model is designed. The VAR model is a very common model used to investigate the linkage between macroeconomic variables as we aim to do for this study. Further we employ other advanced time series methods such as the Granger Causality, Impulse Response, and then the Error Correction Model. Prior to formulating the systems of equations for the VAR, we perform various tests for stationarity of the series, and then check for the long run cointegration of the variables.

For the model, all variables in the system are assumed to be endogenous within the system of equations, but for the individual equations we regress each variable on its lag values, and other variables on their lagged values. The reduced form of VAR is expressed below as equation 1:

$$Y_t = \phi_0 + \sum_{i=1}^{2} \phi^i Y_{t-i} + \sum_{i=1}^{2} \phi^i \varepsilon_{t-i} + \varepsilon_t \quad (1)$$

Where $\phi_0 = \begin{bmatrix} \phi_{10} \\ \phi_{20} \\ \phi\_30 \end{bmatrix}$; $\phi^i = \begin{bmatrix} \phi_{11}^i \phi_{12}^i \phi_{13}^i \\ \phi_{21}^i \phi_{22}^i \phi_{23}^i \\ \phi_{31}^i \phi_{32}^i \phi_{33}^i \end{bmatrix}$; $\varepsilon_t = \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix}$ and $Y_t = \begin{bmatrix} Y_{1t} \\ Y_{2t} \\ Y_{3t} \end{bmatrix}$

Where LRGDP (natural log of real gross domestic product) is used to measure growth in economic activities of Nigeria; LCPI (the natural log of Consumer price index) is used to denote increase in general price level, i.e., inflation; LUNEMP (natural log of Unemployment rate) is used to denote increase in unemployment.

Since the main objective of this analysis is to investigate the impact of inflation on economic Growth of Nigeria in the long run, if there is rapid improvement in economic activities, aggregate demand in the economy would rise and that would lead to accelerated growth in general price level. If there is a decrease in economic growth, then unemployment rate may rise. Within a macroeconomic policy framework, the social planner's problem is to achieve optimal growth path, while the central planner targets policies that would accelerate economic growth, they are also saddled with the responsibility of keeping a low inflation rate without increasing the severity of unemployment. This makes the choice of economic policy, a trade-off between inflation and unemployment, which conforms theoretically to the Phillip curve hypothesis. We include the rate of unemployment in the VAR model to capture the cross implication of unemployment on inflation, and then growth (see Omoko, 2010).

Although according to the Phillip curve hypothesis, we expect a negative relationship between unemployment, economic growth and inflation, it is not particularly against any economic theory that this relationship be otherwise. Therefore, our model is expressly defined as an unrestricted VAR.

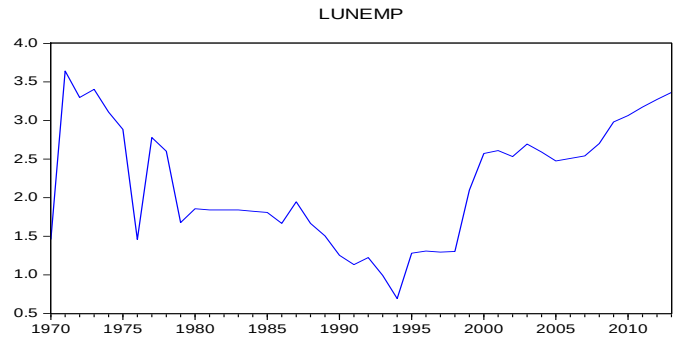

Figure 5: Graph for unemployment

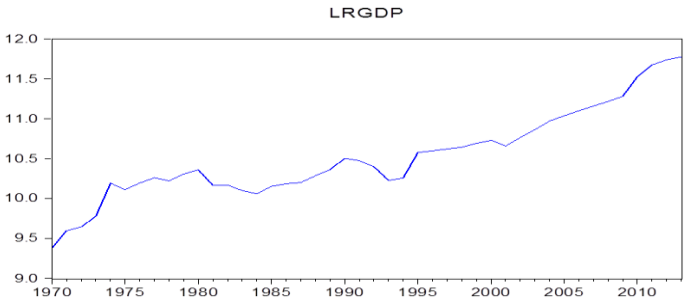

Figure 6: Graph for real gross Domestic Product

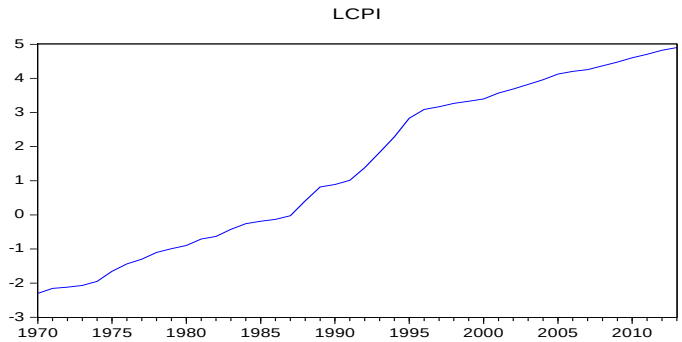

Figure 7: Graph for Consumer price Index

4.2 Stationarity Test

For any long run economic analysis, it is important that variables in the regression equations be stationary (Gujarati, 2009). Therefore, before estimating a model, we should test for stationarity of each of the time series variables to be included in our model to avoid estimating spurious regressions and making Type Type II errors or I. After estimation and stationarity is found in the series at level form, then the

estimation of a long-run equation would give reliable slope parameters and standard errors, otherwise the standard errors will not give reliable parameters for making any t-statistic test or inference. Also, the stationarity of all variables within the system of equations helps identify any possibility of long run connection between the systems of equation. For instance, if all the variables are integrated of 1st Order after 1st differencing, i.e. ~I(1),it means the series would have been transformed to their short run movements, there would be much possibility that they all converge in the long run.

This analysis uses the Augmented Dickey Fuller (1982) and Phillips-Perron (1988) approach to test for the stationarity of the variables.

4.3 Augmented Dickey Fuller (ADF)

The ADF is an adjusted type of the Dickey and Fuller (1981) test for stationarity. It is used to test for unit root in such situations where the disturbance in the series, $\in_t$, do not follow a white noise process (i.e. not iid). In such cases, the error in the series may be serially correlated. The ADF equation for testing for unit root is described below:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta^* Y_{t-1} + \sum_{i=1}^{P} \alpha_i \Delta Y_{t-i} + \in_t$$

Where:

$$\alpha_i = -\sum_{k=i+1}^{P} \delta k \qquad \text{and} \qquad \delta^* = \left(\sum_{i=1}^{P} \delta_i \right) - 1$$

Where: $\in t$ represents Gaussians white noise which is assumed to have a zero mean but possible serial correlation, Y denotes series to be regressed on time, t; β for the trend parameter, and μ for intercept. *p* denotes the maximum number of lags which is decided using the Akaike Information Criteria (AIC). The null hypothesis is given as

H_o: $\beta_1=0$ and $H_{o:}$ $\beta_2=0$ meaning there is unit root against the alternative $H_{1:}$ $\beta_1\neq0$ and H_1: $\beta_2\neq0$ meaning there is no unit root. This preference creates space for higher order of auto-regressive method (Greene 2003). The unit root equation stated above basically permits a null hypothesis test for trend, trend and intercept, no trend and no intercept.

4.4 Phillips Perron test

This is an option to the Augmented Dickey fuller test for testing for unit root and it was suggested by Phillip (1987) and Phillip and Perron (1988). It is a non-parametric method of wiping out high serial correlation in a series, ensuring that the partial auto-correlation function (PACF) of the series is generated and it exponentially disappears over time while the ACF clears after 1st period showing a 1st order autoregressive. Thus AR(1) shows residual variance that employs the use of Newey-West method in seeking for auto-parrallel and heteroscedasticity. The Newey- West employs the Phillips Perron unit root coefficient in the following form:

$$\omega_k = \frac{1}{T}\sum_{s=k+1}^{T} \ell_t \ell_{t-s} \qquad k = 0,\ldots, p = k^{\text{th}} \text{ autocovariance of residuals}$$

$$\omega_0 = \left[(T-K)/T\right]s^2 \qquad where \qquad \gamma = \omega_0 + 2\sum_{k=i+1}^{n}\left(1-\frac{k}{n+1}\right)\omega_k \quad s^2 = \frac{\sum_{t=1}^{T}\ell_t^2}{T-K}$$

Where n shows the number of lags used to estimate the Phillip Perron test statistic. represents the correlation coefficient of changes in residuals.

The attainment and establishment of the presence of unit root can be done efficiently using the Augumented Dickey fuller and the Phillip Perron test. Primarily under the test for unit root, there are two hypothesis that are established in the ADF and PP test. The null hypothesis states that there is unit root, meaning the series is not

stationary, meanwhile the alternative states that there is no unit root meaning the series is stationary.

Contrarily, in a case where the null hypothesis is rejected at level order (i.e. *=0), next would be to take the first difference of the series to give us a stationary process in the series. In the case where the null is rejected, it means that the alternative hypothesis is accepted, it means the series is stationary at first difference I~(1). When a model is differenced, it shows that the model is no longer a long run model. There will be additional test to be done on the short run model, to describe the long run convergence within the system.

4.5 Kwiatkowski Phillips Schmidt and Shin's Test

This test is carried out to wipe out any low strength against stationarity and to enhance the results generated from the ADF and PP test. (Kwiatkowski et al, 1992). The KPSS hypothesis is the opposite of the ADF and PP test, the null hypothesis is given as H0: r < 0 (i.e. variable is stationary and there is no unit root) against the alternative H1: r > 0 (i.e. variable is not stationary). In the case where the null hypothesis is rejected; it shows that there is no stationarity in the series. The LM statistics is employed to examine the stationary hypothesis of the series. This can be carried out as follows:

$$Y_t = \rho t + r_t + \eta_t;$$

where t = 1, 2,….,T for the series of Y_t, r_t is a random walk estimated by "$r_{t-1} + v_t$". The condition for the null hypothesis not to be rejected is that, variance of the disturbance from random walk σ_ε^2 should be zero (Kwiatkowski *et al* 1992). Hence the LM statistic is gotten from:

$$LM = \sum_{t=1}^{T} S_t^2 \Big/ \sigma_\varepsilon^2$$

S is the partial sum process of residual of the form;

$$S_t = \sum_{i=1}^{t} e_t$$

The *KPSS* test is specified with trend, and intercept and trend. which is quite akin to the Augmented Dickey Fuller and Phillips Perron tests.

$$Y_t = \alpha_0 + \mu t + k \sum_{i=1}^{t} \xi_i + \eta_t$$

4.6 Cointegration Test

There is a strong chance that the variables after they have been tested will not be stationary at the level form and this is often found in macroeconomic series such as the rgdp, CPI, etc. To analyze the long run equilibrium between the variables, cointegration test can be used to identify their long run interaction. Granger (1981) discuss the implication of non-stationarity in the model; it can result in spurious regression, and problems can also arise in a model when different order of integration of time series are regressed. As a result of this, Granger (1986), Engel and Granger (1987) and Cheung and Lai (1993) proposed that cointegration test should be conducted so as to determine the long run relationship between the series. Engle-Granger is a much aged technique of testing for cointegration. An uncommon analysis carried out for cointegration is the Johansen and Julius (1990) trace statistics. Among multiple variables, the test improves the existence of cointegrating vectors. When we first difference the variables, the series exhibits short run features and so the Cointegration test (J$J) identifies how the variables converge in the long-run. Below is an expression for the J$J cointegration test with k lags

$$Y_t = \tau_1 Y_{t-1} + \tau_2 Y_{t-2} + ... + \tau_k Y_{t-k} + \mu_t$$

This is assumed to be the first differencing of transformation to a short run model.

$$\Delta Y_t = \phi_1 \Delta Y_{t-1} + \phi_2 \Delta Y_{t-2} + ... + \phi_{k-1} \Delta Y_{t-k+1} + \phi_k Y_{t-k} + \mu_t$$ Where

$\phi_i = -I + \tau_1 + \tau_2 + ... + \tau_i; i = 1,2,...k.$ and I represent identity matrix (detailed and specified long run spot) and τ is the rank of matrix coefficient showing salient features of long run equilibrium in the midst of variables that are cointegrated within the system. If Y_t is I(1), ΔY_t would be I(0). Suppose that the variables cointegrate in a model, then the status for full rank should not grip the matrix ϕ (Maddala, 2005:563).

Johansen and Juselius (1990) examine 3 instances of relation amidst time variants which can be done with the rank of matrix coefficient (τ):

i. If the rank is *P, i.e r (τ) = P*, it implies that τ has full rank, then any linear combination of *I (1)* series is stationary.

ii. If the rank is zero, i.e r (τ) = 0, τ becomes a null matrix which means there is no cointegration.

iii. If the rank is between zero and P, i.e 0 < r (τ) < P), it implies that there are matrices A and B with P by r dimension, thereby making it feasible to represent τ = AB′. Matrix B is referred to as 'cointegrating matrix' and matrix A is the 'adjustment matrix'. Matrix B has a sensitive characteristic of producing a stationary procedure for B′Xt even as Xt is not in the equilibrium connection.

(λi) stands for the number of equations that are co-integrating which are also known as the Eigen value, testing if λi is statistically far from zero. In other to rank matrix coefficient arranged in an organized form i.e from lower to higher Johansen and

Juselius (1990) came up with the trace statistics (λtrace) computation for Eigen value.

$$\lambda_{trace} = -T\sum Ln(1-\lambda_i)$$

$$i = r + 1, \ldots, n - 1$$

Yt and Xt are not cointegrated is determined through the Johansen trace statistics and it is examined through the null hypothesis. Osterwald-Lenum (1992) approach makes it possible to test the values of the trace statistics and critical asymptotic values. The test carried out for the alternative hypothesis is as follows: Beginning from $r \geq 1$. If null r = 0 is rejected, it implies that there is at least one (1) cointegrating vector i.e ($r \geq 1$) so we test for r = 1 as null hypothesis. In a situation where the null hypothesis r = 1 rejected, then $r \geq 2$ is statistically significant, we further to r = 2, and continue the process till r = n – 1. If the null hypothesis is not accepted then the variables are not co-integrated which means that the value of the trace statistics is less than its asymptotic critical value, or if this is not the case then the alternative is accepted.

4.7 Level Coefficients and Error Correction Model

To explain a long run relationship, variables have to be cointegrated at the level form. At 1st difference, if there is cointegration, shows that there is possible convergence in the long run. By adjusting the time series data to first difference, there may be an adjustment mechanism for the short run model to describe the long run equilibrium within the system of equations. Using the Error correction model (VECM) the process of adjustment is defined with the ECT. Assuming that all the variables in the system are ~I (1), and they cointegrate in the long run, then the error correction model can then be expressed as:

$$\Delta Y_t = \delta(\Delta X_t) + \tau(Y_{t-1} - \theta X_{t-1}) + \varepsilon_t$$

The (Y_t - θX_{t-1}) component of the equation describes the long run adjustment of the system and τ is the estimator for the error correction term (ECT)θ.

4.8 Causality Test, [Granger Causality Test]

Regression result can end up spurious if there is no stationarity existing in the series, thus it may hinder a viable conclusion that is established in a causality model, Katircioglu (2009). If time series are stationary at 1st difference, and they are cointegrated at I~(1) then we can check for causality. A technique for solving Granger causality was developed by Toda and Phillips (1993) i.e the block exogeneity wald approach beneath the Vector Error Correction mechanism [VECM].

$$\Delta lrgdp_t = C_o + \sum_{i=1}^{m} \beta_i \Delta lunemp_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta lcpi_{t-i} + p_i ECT_{t-1} + \varepsilon_t \qquad (unemp, cpi \rightarrow rgdp)$$

$$\Delta lcpi_t = C_o + \sum_{i=1}^{m} \omega_i \Delta lunemp_{t-i} + \sum_{i=1}^{n} \theta_i \Delta lrgdp_{t-i} + \eta_i ECT_{t-1} + u_t \qquad (unemp, rgdp \rightarrow cpi)$$

$$\Delta lunemp_t = C_o + \sum_{i=1}^{m} \omega_i \Delta lcpi_{t-i} + \sum_{i=1}^{n} \theta_i \Delta lrgdp_{t-i} + \eta_i ECT_{t-1} + u_t \qquad (cpi, rgdp \rightarrow unemp)$$

According to the classical regression assumptions, t and u_t are incorporated to mean random errors are basically supposed to have zero mean and unit root variance. The importance of the test for granger causality is to extensively analyze the statistical significance of the various parameters which are α's and 's, sensitive to the optimal lag lengths of m and n. Here we are to create a causal relationship existing among the variables i.e rgdp, cpi and unemp: that is we test if cpi granger causes rgdp. Given the null and alternative hypothesis as follows: if the null hypothesis is not accepted it means (H_0); rgdp does not granger cause cpi and if the alternative is accepted it means (H_1); rgdp granger cause cpi. Similarly, we have to check if rgdp granger causes unemp, these scenarios are in four outcomes and one out of the four will stand

i.e unidirectional causality from rgdp to cpi or unidirectional causality from cpi to unemp and no causality between the both variables.

Error Correction and VAR model, block erogeneity test will be helpful to authorize the equilibrium for the long run needed to do a dynamic analysis. If the variables cointegrated and they are I(1), it shows that there is a relationship in the long run but in a case where there is no cointegration between the variables shows that there is no relationship in the long run, thus the Vector Autoregresive frame work will be suitable to test the direction or flow of causality.

In this study, both the short run equilibrium and the long run equilibrium will be examined. The first condition for estimation of a long run model in time series is used to check if the time series are cointegrated and stationary. As such the ADF and PP test for unit root is important, and in cases where we have mixed results, the KPSS test is important. In a case where the series is I(0) for the various variables it shows that naturally the variables are cointegrated and they can be used to estimate equilibrium in the long run, so we do not need to perform the cointegration test but if the series is I(1) we would have to perform a test for cointegration to see how the model can alter to a long run equilibrium in consideration of the fact that taking the difference of the series makes it no longer ideal for long run estimations and in economic analysis, short run equilibrium are not excellent. Also a case where the series is cointegrated, using the (VECM) the gradual adjustment to the equilibrium in the long run can be examined. But where there is no cointegration we can further estimate the model based on the VAR formulation and consequently we can perform the test for causality.

Chapter 5

INTERPRETATION OF RESULTS AND DISCUSSION

To avoid estimating a spurious regression model, we check for the stationarity of the series before doing any analysis. To check for stationarity, we apply the variance, unit root test that include the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) methodology. Table 1 presents both the results of the unit root test at the level form of the series and after first differencing in the case where stationarity is not found at the level form. From the results, we found that all the series are not stationary at their level form, but stationary at 1st difference, that is the series are all ~I(1). In addition, we checked for the stationarity with intercept and trend, intercept only, and neither intercept nor trend. For the CPI, after first differencing in the series, the ADF supports a hypothesis that the series is stationary however, the PP shows that the CPI is not stationary when we consider both intercept and trend. Hence, the need to further diagnose the stationarity of this series, which is now tested with the KPSS method.

Table 1: ADF and PP unit root test

Statistic (Level)	**Lrgdp**	**Lag**	**Lcpi**	**lag**	**lunemp**	**Lag**
τ_T (ADF)	-1.5507	(0)	-1.4774	(3)	-2.1354	(0)
τ_μ (ADF)	-0.3469	(0)	-0.9855	(2)	-2.1250	(0)
τ (ADF)	3.2886	(0)	-0.2132	(3)	-0.1519	(0)
τ_T (PP)	-1.8663	(3)	-1.3672	(3)	-2.2017	(3)
τ_μ (PP)	-0.4010	(2)	-0.5776	(3)	-2.2289	(3)
τ (PP)	3.1645	(2)	0.7553	(5)	-0.0150	(1)
Statistic(1^{st} Diff.)	**Δlrgdp**	**Lag**	**Δlcpi**	**lag**	**Δlunemp**	**Lag**
τ_T (ADF)	-3.4273***	(6)	-3.9512***	(0)	-10.484*	(0)
τ_μ (ADF)	-5.9331*	(0)	-3.2427**	(5)	-10.093*	(0)
τ (ADF)	-5.0935*	(0)	-1.8896***	(0)	-10.251*	(0)
τ_T (PP)	-5.9019*	(2)	-3.0332	(5)	-12.6942*	(5)
τ_μ (PP)	-5.9352*	(1)	-3.075**	(5)	-10.6490*	(2)
τ (PP)	-5.0735*	(2)	-1.7137***	(7)	-10.8260*	(2)

Note: rgdp represents real gross domestic product; CPI is the consumer price index and unemployment is the rate of unemployment. All of the series are at their natural logarithms. τ_T represents the most general model with a drift and trend; τ_μ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum 3) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255). *, ** and *** denote rejection of the null hypothesis at the 1%, 5% and 10% levels respectively. Tests for unit roots have been carried out in E-VIEWS 7.0

The Kwiatkowski Phillips Schmidt and Shin's test (KPSS) was carried out to eliminate possible low ranking of the series around the unit root circle. In particular the lCPI result for stationarity using the ADF shows that the series is stationary after 1st differencing whereas the PP test does not support these when checking for intercept and trend. Table 2 shows the result generated for the KPSS test for stationarity. The result suggests that at level form we cannot accept the null hypothesis for stationarity but after 1st differencing the lcpi becomes stationary and that supports further the ADF result that the lcpi is stationary after 1st differencing, for the other variables the KPSS test also shows that they are stationary after 1st

differencing. This means the series of this study are integrated of order ~I (1) and it can be used to examine the short run linkage within the system. (Ender, 1995).

Table 2: KPSS test for unit roots

Statistic (Level)	**lrgdp**	**Lag**	**Lcpi**	**lag**	**Luemp**	**Lag**
τ_T	0.1497***	(5)	0.1069	(5)	0.1970**	(5)
τ_μ	0.8060*	(5)	0.8296*	(5)	0.2159	(5)
Statistic (1st Diff.)	**∆lrgdp**	**Lag**	**∆lcpi**	**lag**	**∆luemp**	**Lag**
τ_T	0.1399***	(2)	0.1438***	(3)	0.0843	(2)
τ_μ	0.1517	(2)	0.1576	(3)	0.918	(1)

Given that all the variables are transformed to their 1st difference form before achieveing stationarity it means all the variables lose their long term properties and we cannot measure the linkages using the level data, with the short term features of the series generated (the 1st difference form of the variables) the johansen test for cointegration helps us to identify whether this variables converge in the long run. Table 3 shows the result of trace statistics and the max Eigen values that was generated using the Johansen and Juseluis methodology.

Testing the first null hypothesis of no cointegrating vector (i.e. H0: r=0) among the three variables- lrgdp, lcpi, lunemp, both the trace statistic and the max Eigen values reject the null hypothesis of no cointegrating vector. Further, we test the null hypothesis that there is at least one cointegrating vector .The Johansen test supports this null hypothesis that there is at least one and not more than one cointegrating vector for the system of equations. Prior to the cointegration test for the three variables in the system, no cointegration was found between the lrgdp and the lcpi but after adding the lunemp, the system converged in the long run.

Table 3: Johansen cointegration test for overall model

Lag=1					
Null hypothesis	**Eigen-Value**	**Max-Eigen Statistic**	**Trace Statistic**	**5 %/1 % Critical Value (Trace)**	**5%/1 % Critical Value (Max-eigen)**
r = 0	0.4325	23.7940*	34.6877*	29.68/35.65	20.97/25.52
r = 1	0.2154	10.1914	10.8937	15.41/20.04	14.07/18.63
r = 2	0.0165	0.7022	0.7022	3.76/6.65	3.76/6.65
Lag=2					
Null hypothesis	**Eigen-Value**	**Max-Eigen Statistic**	**Trace Statistic**	**5 %/1 % Critical Value (Trace)**	**5%/1 % Critical Value (Max-eigen)**
r = 0	0.4666	25.7734*	37.2516*	29.68/35.65	20.97/25.52
r = 1	0.2041	9.36311	11.4782	15.41/20.04	14.07/18.63
r = 2	0.0502	2.1151	2.11514	3.76/6.65	3.76/6.65

The test for the cointegration between lrgdp and lcpi, lrgdp and unemp, unemp and lcpi, were performed but the results are not presented here since they were not cointegrated.

Since the cointegration test identifies at least one long run equation to define the relationship among the three variables then we will expect that the short run equation (The system of equations that are regressed using the 1st difference of the variables) have a long run relationship which would be defined by an error correction model in other words, the VAR form of the model would be the Vector Error Correction Model (VECM) as expressed in the methodology in equation

$$Y_t = \phi_0 + \sum_{i=1}^{2} \phi^i Y_{t-i} + \sum_{i=1}^{2} \phi^i \varepsilon_{t-i} + \varepsilon_t$$

Table 4 shows the unrestricted form of the long run relationship between lrgdp, lcpi and lunemp. The coefficient can be interpreted as the long run elasticities setting lag=1 both inflation and unemployment have negative impact on economic growth, with rgdp showing relatively less degree of responsiveness to changing general price level as compared to unemployment rate given the coefficient on table 4, a 1% rise in inflation will lead to about 0.16% drop in growth.

When the lag length is set to 2, the result generated is quite similar to those generated using one lag. The signs remain unchanged; the rgdp becomes a bit more responsive to inflation and not as much responsive to unemployment as the equation in table 4. This finding does not conform to the Phillips curve hypothesis in our study of the long run relationship between the variables.

Table 4: Unrestricted long run equation

Normalized co-integrating coefficients:		
Lag=1		
LRGDP	**LCPI**	**LUNEMP**
1.000000	-0.1616 (0.0383) [-4.219]*	-0.8717 (0.1528) [-5.5171]*
Lag=2		
LRGDP	**LCPI**	**LUNEMP**
1.000000	-0.188208 (0.02621) [-7.18077]*	-0.736749 (0.12728) [-5.7884]*

With all series in the system transformed to their short term forms, and the cointegration test providing support for at least one long run equation that describes the relationship of the variables within the system, we estimate the VECM to show the speed of adjustment from short run to long run equilibrium, in other words we estimate a short run model but also include an adjustment mechanism (ECT) that would help us identify the process of convergence of the variables in the longrun.

Table 5 presents the estimated parameters for the VEC model using both one lag and two lags. From the table above the ECT for the model 1 is estimated to be -0.109 and for the model 2 the ECT is estimated to be -0.217. The negative signs shows that the disequilibrium gradually disappears in the long run. We also present the result of the

Schwartz criterion, which helps to choose the best performing model. The Schwartz coefficient for the VEC model with 2 lags is lower in absolute term than the Schwartz coefficient estimated than the VEC with 1 lag therefore we will be focusing our analysis on the parameter estimate from the VEC model with 2 lags.

With the ECT estimated as -0.217, as in the VEC model 2, we can say that the disequilibrium among these three variables is reduced by 21.7% every year. This means that the short run form of the relationship converge to a long run equilibrium every 5 consecutive years. From the result we also find that all lags of the rgdp do not significantly impact on current rgdp, for inflation, both the 1^{st} and 2^{nd} lags have short run positive impact on current rgdp though the impact is delayed this shows some evidence of sticky prices in the case of Nigeria. The impact of Unemployment on rgdp is almost immediate as the table shows that the 1 lag parameter for unemployment is statistically significant whereas the 2 lag unemployment is not.

lrgdp= f(lcpi, lunemp)

Table 5: Error Correction Model (Short run equation with ECT for long run equilibrium)

	ECT	**Intercept**	**Δlrgdp(-1)**	**Δlcpi(-1)**	**Δlunemp(-1)**	**Δlrgdp(-2)**	**Δlcpi(-2)**	**Δlunemp(-2)**
VECM	-0.109438	0.0138	0.015264	0.238099	-0.073046			
(lag=1)	-0.03185	-0.02811	-0.14336	-0.13233	-0.03286			
	[-3.43588]	[0.4921]	[0.10647]	[1.79924]	[-2.22317]			
VECM	-0.217341	-0.0058	-0.076363	0.110698	-0.093126	-0.222753	0.329313	-0.039484
(lag=2)	(0.04683)	(0.0299)	(0.14191)	(0.13993)	(0.04071)	-0.13716	-0.1534	(0.03338)
	[-4.64125]	[-0.1954]	[-0.53810]	[0.79111]	[-2.28748]	[-1.62401]	[2.14682]	[-1.18276]

Table XX: Lag Selection (Schwartz Criterion)

	VECM (lag=1)	VECM (lag=2)
Schwarz SIC	-1.484291	-1.441162*

Table 6: Granger Causality for lrgdp = f (lcpi, lunemp)

Null hypothesis	lag 1		lag 2		lag 3		lag 4		Remark
	F-stat	t-stat (ECT)	F-stat	t-stat (ECT)	F-stat	t-stat (ECT)	F-stat	t-stat (ECT)	
lcpi does not granger cause lrgdp	2.26	3.23**	1.07	8.83*	0.64	6.71**	1.03	6.11	CPI…RGDP
lrgdp does not granger cause lcpi	1.54	0.06	0.15	1.17	0.89	1.73	0.67	2.49	
lunemp does not granger cause lrgdp	2.45	4.94*	2.25	5.28**	1.86	10.5*	3.09*	2.36	RGDP→UNEMP
lrgdp does not granger cause lunemp	0.05	2.83**	3.23**	9.24*	5.13*	10.23*	6.38*	10.63*	
luemp does not granger cause lcpi	8.94*	0.01	0.99	0.37	1.67	1.44	0.89	0.92	CPI→UNEMP
lcpi does not granger cause lunemp	0.33	4.77*	5.23*	4.67**	4.38*	8.00*	4.69*	7.24	

One interesting finding in this analysis is that the short run models conforms to our a prior expectations of a positive relationship between economic activities and the general price level(inflation), and the negative linkage between economic activities and unemployment whereas the long run unrestricted model identifies a negative connection between inflation and economic growth.

The VEC model estimated shows the impact of inflation and unemployment on economic growth but it does not specify the causal relationship between these variables, whether the variables lead economic growth or economic growth leads the variable. Table 6 shows the result from the granger causality test. For causality test of inflation and economic growth, there is no long run causality neither form inflation to real gdp nor real gdp to inflation, however the block exogeneity test suggests that inflation granger causes real gdp in the short run. Results for the causality between rate of unemployment and economic growth shows that there is a uni-directional causality from unemployment to real gdp, but only in the short run. for the same pair of variables, there is strong indication that real gdp leads unemployment both in the short run and in the long run. Testing for the causality between inflation and unemployment in the case of Nigeria, we found that inflation granger causes unemployment both in the short and in the long run.

Table 7 presents the result for the variance decomposition. Since our main target is to check the impact of inflation on real gdp, only the sources of innovative shocks in real gdp is identified for the model. The results shows that not much of the error variance in real gdp can be attributed to shocks from inflation and/or unemployment for the early periods. The Cholesky variance decomposition for real gdp shows that after a long length of up to 10 years the own attribute of the error variance is reduced

to just about 35% while the remaining 65% in the error variance is explained by the unanticipated disturbance in inflation and unemployment rate.

Table 7: Variance decomposition for LRGDP

Period	S.E.	LRGDP	LCPI	LUNEMP
1	0.09	100.00	0.00	0.00
2	0.11	95.14	0.91	3.94
3	0.14	75.64	9.18	15.1
4	0.17	61.73	10.8	27.3
5	0.19	54.26	8.65	37.0
6	0.21	47.91	7.36	44.7
7	0.23	43.21	6.73	50.0
8	0.25	39.77	6.28	53.9
9	0.27	36.93	5.79	57.2
10	0.29	34.60	5.32	60.0

Since the VECM coefficients are a measure of short run interactions within the system, the interpretation of the parameters are not particularly useful in economic analysis. However, the coefficients are used to generate a series of parameters that explains the impulse response of each variable over time, to a unit standard deviation change in other variables. The one standard deviation impulse response of economic growth to a unit shock in inflation, as presented in the figure 8, shows that economic activities responds slowly initially and positively to such shock in inflation but in the long run it transmits negative and permanent effects to the real gdp. This is not far from expectation as it shows some support for the neo-classical sticky price hypothesis and reveals the bad long-run impact of inflation on real output.

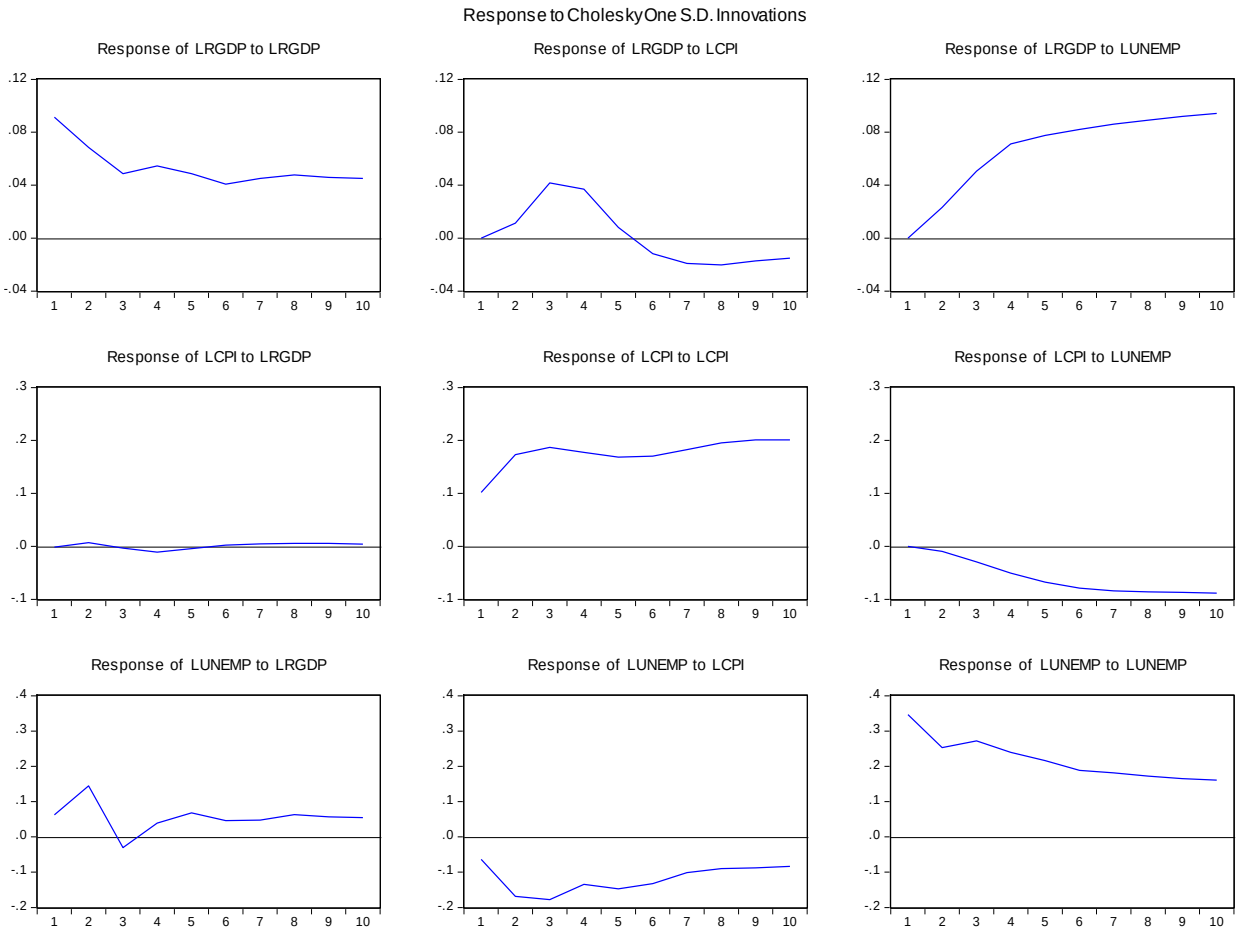

Figure 8: Impulse Response of variables

Chapter 6

SUMMARY, RECOMMENDATIONS AND CONCLUSION

6.1 Summary of Result

This research aims at empirically examining the impact of inflation on Nigeria's economic growth i.e real gross domestic product in Nigeria. Reviews conducted from different relevant Literatures suggest that the fluctuations in inflation rate in Nigeria is determined by structural and infrastructural constraint such as the elimination of fuel subsidy, destructive floods that occurred in the economy during the third and fourth quarter of the year and seasonal effects. These factors have one way or the other contributed to a rise in prices in the country. Time series data were collected annually for important variables for the period of 1970-2013. The study made use of the Augmented Dickey fuller (ADF), Phillips Peron (PP), Kwiatkowski Phillips Schmidt and Shin's test (KPSS) unit root tests and the Johansen co-integration test were used.

The results generated empirically for the ADF showed that at the level form, all the variables are non-stationary but after first differencing the variables showed that they were stationary and integrated of order one. The Johansen and Julius cointegrated test was employed to check if there exists a long run equilibrium between the variables, results from this test showed that the variables were cointegrated after 1^{st} differencing, meaning a long run equilibrium exists between the variables.

Considering that the variables are co-integrated, the Vector error correction model was used to examine the process of adjustment for the variables from the short run to the long run. The error correction model showed that disequilibrium disappears gradually and there is a convergence from the short run to the long run every 5 years. Employing this result in the long run model it was discovered that Real gdp does not have a significant impact on current rgdp for inflation, inflation has a positive impact on current rgdp although this impact is delayed which shows that there is some evidence of sticky prices in Nigeria. It was also found that the short run model conformed to the a prior expectation that there exist a positive relationship between inflation and economic activities and a negative relationship between unemployment and economic activities, while in the long run the result showed that there exist a negative relationship between inflation and economic growth.

From table 1, the ADF test showed that at level form all the variables are not stationary but after first differencing all the variables are stationary except the cpi which is not stationary for the PP test but stationary in the KPSS test.

Table 3 demonstrated that the short run model is attached to the long-run equilibrium relationship between the variables.

Table 4 result showed that at lag=1 both inflation and unemployment have a negative impact on economic growth and real gdp is less responsive to inflation as compared to unemployment, at lag=2, it shows that real gdp is more responsive to inflation and not as responsive to unemployment. The result from this finding does not conform to the Phillips curve hypothesis of a long run relationship between both variables.

Table 5 Granger Causality shows that no long run causality test exists between inflation and real gdp. Notwithstanding the block exogenous test states that inflation granger causes real gdp in the short run. The generated results between unemployment and economic growth shows a uni-directional causality in the short run exist from unemployment to real gdp for the same pair of variables, causality between inflation and unemployment showed that inflation Granger causes unemployment both in the short run and long run.

Table 6 shows the variance decomposition. Since it is the aim of the researcher to check for the impact of inflation on real gdp, the source of innovative shocks to real gdp is shown in the model, the generated result states that not much of the error variance in real gdp can be attributed to shocks from inflation and unemployment for early periods.

Table 7 shows the impulse response of economic activities to a unit shock in inflation, the result showed that economic activities responds slowly initially and positively shocks in inflation but in the long run it is negative and has a permanent effect to real gdp. This thus shows us that inflation has a bad long run impact on real output.

6.2 Policy Recommendation

As we try to exploit the long run impact of inflation on economic growth, our findings from this study shows that inflation has a long run negative and permanent effects on real gdp. The causality test further shows that there is strong causality from real gdp to unemployment. While the policy makers are watchful of the movements in general price level, policies that tend to reduce inflation can be costly

to the society as it is likely to slow economic activities and cause a rise in unemployment rate in the short run. The rise in unemployment rate that results from inflation reducing policies could have a temporary multiplier effect through the social hardship that would be inflicted upon those negatively affected by such policies.

As in the case of Nigeria, this analysis found that the effects of inflation transmits gradually as wages and prices adjust slowly to changing economic environment. Hence, we recommend that before making any inflation targeting policy, the social planner should build a dynamic model that can weigh the short run costs against the long run benefits of such plans. The short run cost of managing inflation within the economy to a low rate is the trade-off with unemployment that is expected to reduce in the long run when the economy starts to improve. In other words, in formulating the inflation targeting policies, the central authority should take a long-term structural view of the economy and the benefits of its policies. The success of achieving a minimal short-term cost of reducing inflation in the country would depend on the commitment of the government, which determines how the public view and behave towards such policy.

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