opción

Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía, Lingüística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 34, 2018, Especial N° 14

Revista de Ciencias Humanas y Sociales
ISSN 1012-1587/ ISSNe: 2477-9385
Depósito Legal pp 198402ZU45

Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
Maracaibo - Venezuela

Opción, Año 34, Especial No.14 (2018): 12-
ISSN 1012-1587/ISSNe: 2477-9385

The effectiveness of monetary policy in tackling inflation in emerging economy

Vincent A. Onodugo[1]
[1]Department of Management, University of Nigeria, Enugu Campus, Nigeria.
vincent.onodugo@unn.edu.ng

Oluchukwu F. Anowor[2]
[2]Department of Economics, Godfrey Okoye University, Enugu, Nigeria.
global@ores.su

Grace N. Ofoegbu[3]
[3]Department of Accountancy, University of Nigeria, Enugu Campus.
grace.ofoegbu@unn.edu.ng

Abstract

This study decided to investigate the success and failure of monetary policy in tackling inflation in order to achieve desired economic objectives by making use of the econometric procedure in estimating the relationship between the variables. The method of data analysis is the ordinary least square[1] multiple regression. The results of our analyses showed that the instruments of monetary policy would have had a greater impact on inflation if inflation were not of structural nature. As a conclusion, the financial system needs to be strong, sound, viable, and shock-resilience in order to achieve the standard of a sustainable economy.

Keywords: inflation,monetary, policy, fiscal, cointegration.

[1] OLS

Recibido: 10-12-2017 •Aceptado: 13-02-2018

La efectividad de la política monetaria para hacer frente a la inflación en las economías emergentes

Resumen

Este estudio decidió investigar el éxito y el fracaso de la política monetaria para hacer frente a la inflación con el fin de lograr los objetivos económicos deseados mediante el uso del procedimiento econométrico en la estimación de la relación entre las variables. El método de análisis de datos es la regresión múltiple por mínimos cuadrados ordinarios. Los resultados de nuestros análisis mostraron que los instrumentos de política monetaria habrían tenido un mayor impacto en la inflación si la inflación no fuera de naturaleza estructural. Como conclusión, el sistema financiero debe ser fuerte, sólido, viable y resistente a los impactos para alcanzar el estándar de una economía sostenible.

Palabras clave: inflación, monetaria, política, fiscal, cointegración.

1. INTRODUCTION

Over a long period of time, price stability has always been one of the macroeconomic objectives of any government that is interested in advancing the welfare of its citizenry. The reasons for making price stability a key policy objective are not far-fetched. Price fluctuations generally make economic valuation of goods, services and assets to be fraught with difficulty. The value placed on assets varies overtime along the direction of price fluctuations. If the price level maintains a

steady rise (inflation) it drastically reduces the value of assets, goods and services accordingly. The reverse is the case if the price level comes down with time. Since peoples' welfare is predicated on the quantity and quality of goods and services available to be consumed by them, it therefore follows that if wages and salaries are constant, as is the case with most emerging economies, and inflation is on the increase, then the amount of goods and services, their relatively constant nominal wages commands overtime begins to decrease. In other words, the real purchasing power, and by extension, their welfare starts coming down as inflation rises.

Further, inflation calls to question the role of money as a store of value. Savings during the time of inflation is usually discouraged because the value received at the end of the period of savings may be smaller than the value at the beginning. This is one of the justifiable reasons for paying interest on savings. To business organizations that require debt to fund their various projects, factoring in interest rates that is largely determined by inflation in their business projections and calculations is critical to successful costing and pricing of goods and services. Some of these costs obviously involve the average rate of inflation and others relate to the variability and uncertainty of inflation (Barro, 2013).

The global economy in general and Nigerian economy in particular have been experiencing a steady increase in the general price level since the 1970s (Sarel, 1996). However, the rate at which inflation has grown in the last five years has been outrageous 10.8% in

2011; 12.2% in 2012; 8.5% in 2013; 8.0% in 2014; 17.9% in 2015; 18.48% in 2016 (CBN, various issues). Presently, the rate of inflation is at all time high at 18.55% compounded by a radical drop in the value of naira vis-à-vis other international currency.This situation is further exacerbated by recession characterized by high rates of unemployment. Consequently, the nation is caught in the web of a simultaneousrise in the twin evil of both inflation and unemployment, which economists now refer to as stagflation (Barsky and Kilian, 2000; Moorthy, 2014). Several factors have been adduced as being responsible for this disturbing scenario. All factors ultimately hold the structure of the Nigerian economy that is heavily dependent on oil culpable. The profligacy of over dependence on imported goods and services acquired during the time of oil boom could not be sustained during the period of a sharp fall in prices which has been the case for the last four years. In other words, earning trails far behind expenditure, especially importation such that the pressure for fewer available goods drive up the general price level (Bello and Saulawa, 2013).

Inflation has been an age-long malaise and it is conventionally managed by economists by a combination of both fiscal and monetary policies. These two approaches are rooted in the two fundamental schools of thought in economic management. The Keynesians that believe in the efficacy of fiscal policies – government expenditure and revenue in dealing with inflation; while the monetarists believe inflation can only be managed through controlling excess liquidity and money supply in circulation (Ruby, 2003; Blinder and Rudd, 2008). The sharp divide between these two schools seem to have found a

middle ground by modern day scholars who seem to believe that it requires a combination of both fiscal and monetary policies to be effective. Otherwise, progress made by one could be upturned by the other if not handled.

It is against this backdrop that this study sought to assess the efficacy of monetary policy instruments in coping with the menace of inflation. Relying on the findings by Sarel (1996) which discovered that inflation rates were somewhat modest in most countries before the 1970s and after then inflation rates started to be high; this study is doing a trend analysis between 1970 and 2015. Specifically, the study responded to and was guided by the following questions:

- What kind of monetary policies has been adopted to fight inflation since 1970?

- .What is the impact of various instruments of monetary policy on inflation since 1970?

- .What kind of inflation has been witnessed in Nigeria since 1970?

Informed by the questions above, this study, therefore decided to examine and also investigate the success and failure of monetary policy in tackling inflation in order to achieve desired economic objectives.

2. THEORETICAL BASES

2.1 Overview of the concept of inflation and monetary policy

The primary task of most central banks is to set their respective nation's monetary policy to promote the objectives of maximum employment, stable prices, and moderate long-term interest rates. Central Bank of Nigeria (CBN) has the primary responsibility for formulating monetary policy and has enjoyed a good deal of independence in doing so, although the final authority for the policy rests with the Federal Executive Council (Akujuobi, 2010). Monetary policy is referred to as the credit control measures adopted by the central bank of a country (Jhingan, 2000).It is a combination of measures designed to regulate the value, supply and cost of money in an economy, in consonance with the expected level of economic activity (Folawewo andOsinubi, 2006).This policy employs a central bank's control of the supply of money (1976), mostly through the deposit money banks, as an instrument for achieving desired economic goals. These instruments as noted in Folawewo and Osinubi (2006) are the cash reserve requirement, liquidity ratio, open market operations, primary operations and among others to influence the movement of reserves.

The pursuit of price stability via monetary policy instruments invariably implies the indirect pursuit of other objectives which can only take place under conditions of price stability and allocative efficiency of the financial markets (Chipoteandkhetha-Kosi, 2014).

Perceptibly, inflation targeting has dominated monetary policy focus in virtually all economies on the postulation that it is an essential tool in achieving macroeconomic stability. Inflation, which has been defined as a persistent and appreciable rise in the general price level of commodities, remains one of the major economic variables that can distort economic activities in both developed and less developed countries (Bello and Saulawa, 2013). Fiscal, monetary and balance of payments aspects have provided the three major explanations of inflation. Inflation in the fiscal aspect is caused fundamentally by budget deficits signifying that an economy spends more than she earns; while in the monetary aspect, it is considered to be due to an undue increase in money supply; emphasis is placed on the exchange rate in the balance of payments aspect mainly because the breakdown of exchange rate brings about inflation through higher import prices (imported inflation) and increase in inflationary expectations in the domestic economy.

Inflation, especially in the developing and emerging economies, from the works of scholars like Akinbobola (2012),Bello and Saulawa (2013),Darrat (1984),Grier and Grier (2006) and Humphery (1986), have been attributed to either expansion in monetary supply (excess money supply), structural imbalance in the economy (structural inflation), international motivation (imported inflation) or an interrelationship of all these factors. Specifically inflation, social and political unrest are the major causes of economic retardation in many developing economies (Akinbobola, 2012). Inflation causes misallocation of resources and uncertainty about future prices and this

affects the decision on expenditure, savings and investment. It hampers growth and development of an economy from the point of view of policy makers because it discourages savings and investment hence policy makers put in a lot of efforts to reduce inflation and several authors focus attention on the issue (Danjuma et al., 2012; Folawewo and Osinubi, 2006). Notably, the structural theorists (Structuralists) insist that inflation can result from a number of special problems and not just from excessive money growth. They argue that the manifestation of structural rigidities in the system when supply creates bottleneckslead to inflationary pressures as there are shortages and persistence fiscal deficit.

2.2 Monetary Theory as Development Theory

It is very pertinent here to discuss some of the developmental theories that will enhance the understanding of the economic development of nations. For example, the Keynesian economists emphasize the demand side of growth. They attributed the slow economic growth rate as the consequence of inadequate aggregate expenditures and the resulting gross national product (GNP) gaps. Hence, they proposed low interest rate, easy monetary policy to stimulate investment spending and consumption, so that a high level of investment will be attained. In contrast, the supply side economists emphasize those factors, which will increase the potential or capacity output of the economy overtime. They seek to stimulate savings,

investment and work efforts, and entrepreneurial skill, taking primarily through tax reductions (Inang, 1995). There are other economists like Okun (1962), Frisch (1983) and Prachowny (1993)who are more interested in the long run perspective by stressing those factors which cause full employment or capacity output of the economy to increase. Some other economists like Say (1834) andGordon (2004)believe that industrial policies are important growth stimulating policies.

This is a situation wherethe government will take a direct active role in shaping the structure and composition of the industry so as to promote growth (Asogu, 1991). Thus, government industrial policies according to this school of thought will help to increase expenditure on basic research and development to stimulate technological progress, which will eventually accelerate the rate of economic growth and development of a nation.

The reoccurring poor performance of the Nigerian economy over the years, which is visible in the high rate of inflation, high rate of unemployment, low capacity utilization, distress in the financial sector, fiscal deficits, interest and exchange rate instability etc., are major economic indicators which the monetary policy as a development theory should resolve. However, major economic indicators have shown that Nigerian economy has a lot to do in responding positively to the policy measures adopted so far.Ojo (1992) observes that the objectives of the monetary policy form an integral part of the overall management of economic objectives of the country; these objectives include stimulation of output and employment, promotion of stable

prices and support of external equilibrium. However, the pursuance of these objectives can conflict with one another; for example the stimulation of employment is likely to conflict with policies towards reducing inflation. This is supported by the illustrations in Phillips Curve (Philips, 1958) which captures a trade-off between inflation and unemployment, i.e. the rate of growth of wage inflation decreases with increases in unemployment; hence they are inversely/negatively related. When the money supply is restricted in order to slow down inflation, it triggers off unemployment. It should be noted however that the efficacy of any monetary techniques and instruments in achieving the objective of monetary policy is dependent on the sensitivity of investment to changes in the rate of interest and on the magnitude of the aggregate expenditure multiplier which in turn depends on the marginal propensity to save (MPS) as Derburg (1995) puts it "Monetary policy in Nigeria before the Structural Adjustment Programme (SAP) era was mainly guided to maintain relative price stability and a healthy balance of payment (BOP) position". This is because the pre-SAP era was characterized by the growing importance of the oil sector, the expanding role of the public sector in the economy and over-dependence on the external financial inflow. The fixing of interest rates at relatively low levels was done mainly to promote investment and growth, to stimulate the productive sectors and thereby stem inflationary pressures.

Apparently, after SAP, the objectives of the monetary policy remained the same only that in line with the general philosophy of SAP, the monetary policy is aimed at inducing the emergence of a

market oriented financial system for effective mobilization of financial savings and effective resource allocation. The thrust of economic policy in Nigeria after SAP has been to sustain economic growth, curb inflationary pressures and generally put the adjustment process back on course. Certainly, some other preconditions such as ridding the system of excess liquidity and putting in place a developed money market still require more time to be fully accomplished (https://www.cbn.gov.ng/documents/Monetarycreditguide.asp. 2016).

2.3 Previous Related Studies

There have been extensive empirical studies that examined the relationship between inflation and macroeconomic variables both in the context of developed and developing countries. The works of Omoke (2010), Akinbobola (2012), Aminu and Anono (2012), and Bello and Saulawa (2013) are among the recent studies conducted in Nigeria on this subject. Erbaykal and Okuyan (2008) examined the relationship between inflation and the economic growth in Turkey using quarterly data covering first quarter of 1997 to second quarter of 2006. They found the existence of long term relationship between these two variables using Bound Test, and the existence of a cointegration relationship between the two series was detected following the test Autoregressive Distributed Lag (ARDL) models result.Whereas no statistically significant long term relationship was found with the formed ARDL models, a negative and statistically

significant short term relationship was found to exist. Saaed (2007) explored the functional relationship between inflation and economic growth in Kuwait, using annual data set on Real Gross Domestic Product (RGDP) and Consumer Price Index (CPI) for the period of 1985 to 2005. The result showed a long-run and the strong inverse relationship between CPI and real GDP in Kuwait. Mubarik (2005) using an annual set of data between 1973 and 2000 ran an estimate of the threshold level of inflation for Pakistan. He employed the Granger Causality test as an application of the threshold model and the relevant sensitivity analysis of the model. His estimation of the threshold model suggested that an inflation rate beyond 9-percent is detrimental for the economic growth of Pakistan.

Some studies on African countries like Shitundu and Luvanda (2000) examined the impact of inflation on economic growth in Tanzania employing the Least Trimmed Squares (LTS) method. The empirical result from their study is of the view that inflation has been harmful to economic growth. Elsewhere in Ghana, Mahamadu and Abradu-Otoo (2003) using Error Correcting Mechanism (ECM) to explore the relationship among monetary growth, exchange rates and inflation observed the existence of a long run equilibrium relationship among inflation, money supply, exchange rate and real income. Chibber and Shafik (1990) also carried out a study covering 1965 to 1988 and discovered that growth in money supply is one principal variable that explains the Ghanaian inflationary process; and that official exchange rate and real wages could only exert a negligible influence on inflation. A similar study on Zimbabwe by Chhibber et al

(1989) employed a highly disaggregated econometric model that considers both monetary and structural factors in search of the cause of inflation; and the result suggested that monetary growth, foreign prices, exchange and interest rates, unit labour costs and real outputs are the determinants of inflation in Zimbabwe.

Similarly, Elbadawi (1990) with particular reference to Uganda attributed the inflation between 1988 and 89 to the rapid growth of domestic money supply and the precipitous depreciation of the parallel exchange rate. Thus the study concludes that the devaluation of the official exchange rate is not inflationary – since prices have adjusted to the parallel exchange rate. Obviously, this conclusion is consistent with the findings of Chhibber et al (1990), and Sowa and Kwakye (1993) with respect to Ghana. Fakiyesi (1996)considered the relationship between money supply and inflation on the one hand and between money supply and GDP on the other. His findings confirmed a long-run relationship between money growth and inflation.

Studies on Nigeria like Omoke and Ugwuanyi (2010) tested the relationship between money, inflation and output by employing cointegration and Granger-causality test analysis. Their findings revealed that there is no existence of a cointegrating vector in the series used. Money supply was seen to Granger-cause both output and inflation. The result suggests that monetary stability can contribute towards price stability in the Nigerian economy since the variation in the price level is mainly caused by money supply and also conclude that inflation in Nigeria is, to a large extent, a monetary phenomenon

where broad money (M2) appears to have a strong causal effect on the real output as well as prices. In addition, Fakiyesi (1996), using data from Nigeria and autoregressive distributed lag model (ADL) argued that inflation depends on the growth in broad money, the rate of exchange of the Naira visa-vis the dollar, the growth of real income, the level of rainfall, and the level of anticipated inflation, measured on the basis of the previous year's level of inflation. Omoke (2010) tested the causal long term relationship between budget deficit, money growth and inflation in Nigeria and the result of the study pointed to a close long term relationship between inflation and money supply. Odusola and Akinlo (2001) examined the link between the Naira depreciation, inflation and output in Nigeria, adopting Vector Autoregression (VAR) and its structural variant. Their results tend to suggest that the adoption of a flexible exchange rate system does not necessarily lead to output expansion, particularly in the short-term. This implies that such issues, as pointed by Dordunoo and Njinkeu, (1997), like discipline, confidence and credibility on the part of the stakeholders are essential to addressing economic challenges. Using a basic macroeconomic accounting framework Yahya (2000) concluded in his work that despite the distorting effects of a civil war followed by an oil commodity boom and burst, Nigeria's inflationary experience could be traced ultimately to excessive monetary growth; more so, the study is of the view that any adjustment policy that does not take into account the role of money and credit is likely to fall short of the overall goal of non-inflationary economic growth.

Akinbobola (2012) on the study of the dynamics of money supply, exchange rate and inflation in Nigeria exploring the cointegration and Vector Error Correction Mechanism (VECM) method found that increase in money supply led to increase in the inflation rate in the short run but had an insignificant effect in the long run. Therefore, it implies that monetary expansion has remained the main causal factor of the persistent increase in the price level in Nigeria and recommends that all stakeholders must be required to make input into monetary policy and be convinced about the sincerity of the government to properly and effectively curtail inflation in Nigeria. Omoke (2010) empirically examined the relationship between inflation and economic growth in Nigeria; testing the causal long term relationship using the consumer price index (CPI) as a proxy for Inflation and the GDP as a perfect proxy for economic growth in Nigeria and the result of the study showed that for the periods, 1970-2005, there was no co-integrating the relationship between Inflation and economic growth for Nigeria data. Aminu and Anono (2012) empirically investigated the effect of inflation on the growth and development of the Nigerian economy between 1970 and 2010 and the results of causality revealed that the GDP causes inflation to rise and not inflation to the GDP; therefore, inflation is desirable if it possesses a positive impact on economic growth, hence the need to encourage increasing productivity and output level. Obviously, a good policy to increase the level of output in Nigeria by improving productivity/supply will definitely reduce the prices of goods and services and simultaneously boost the growth of the economy. Bello

and Saulawa (2013) examined the relationship between money supply, interest rate, income growth and inflation rate in Nigeria for the period 1980-2010. The study employed a cointegration method, VAR, and Granger causality test to examine the relationship among the variables. They found that there is no long run relationship among the variables; the granger causality test also revealed that money supply, interest rate, and income growth all granger- cause inflation.

2.4 Inflation in Nigeria

The cause of inflation in Nigeria has been a controversial issue, which has been facing the country since independence. Judging from the existing literature, there seems to be no exhaustive treatise on the causes of the inflation phenomenon in Nigeria. However the following factors are likely to have caused the inflationary pressure in the country.

Structural problems created by the successive government in Nigeria since 1970 in implementing measures aimed at revamping the economy have also contributed to the inflationary pressure in the economy. Leaders then did not have their priorities straight or right during the period of the oil boom (1970 -1982) due to the fact that the concept of leadership was faulty, and they felt that we had no problem with the money, but on how to spend it(Oyetunji, 2014). This gave the wrong concept within the system that there was no limitation to the flow of earning from oil and as such everything is alright irrespective

of planning. The worst is the structure of the military-unitary system of governments (1970-1979 and 1983-1999) which entrenched dictatorship and also the continuous dominance of the ex-military personnel with a despotic mindset in the nascent democracy since 1999 making most decisions taken almost impossible to be opposed have an enhanced absence of planning towards a developmental project and infrastructure development to the extent that the country has been prompted to be imported dependence. Successive governments since 1970 till date, as noted by Oyetunji (2014) paid only lip service to the important idea of diversifying the economy away from oil and have not been able to use the oil revenue to establish a solid base for industrial development by boosting electricity, modern transportation, agriculture, telecommunications and industry. These weakened the basic structure of the economy and expose the country to inflationary pressure. For the fact that Nigerian industries are import dependent and fragile as opined by Onuchuku (1998), they have no alternative in the face of severe competition than closing down; this thereby will reduce national income and will further increase the price of commodities in Nigeria.

An econometric work carried out by Asogu (1991) on the nature and causes of inflation in Nigeria attempted to sort out the major contemporary causes of inflationary tendencies in Nigeria without separating them into monetary, structural, demand-pull, cost-push etc. The result of his work showed that changes in real income are always significant and have an inverse relationship with the rate of inflation.

2.5 Value Addition

It is obvious from the reviewed literatures above that various studies have been carried out on inflation and most of these studies generalized their research using instruments of monetary policy in terms of assessing the efficacy of monetary policy on inflation. The drawback of previous studies is that none attempted to consider the influence of investment while building the inflation model.This work included gross fixed capital formation (as a proxy for investment) and also test the model and chosen variables under structural changes split into three unrestricted periods of 1970-2015 (full period), 1970-1998 (Sub-Period I) and 1999-2105 (Sub-Period II). This work therefore will add to the existing literature of scholars on this subject.

3. METHODOLOGY

3.1 Data Source and Method of Analysis

The nature of the study makes it imperative that serial annual secondary data be used for this study. The annual time series data cover 45 years ranging from 1970-2015. The purpose of choosing this period is to empirically test the significance or the extent to which monetary policy instruments are in fighting inflation since 1970 to date; gross fixed capital formation (GFCF) was introduced as a check variable. The data was obtained from the CBN statistical bulletin of various editions.

This study made use of the econometric procedure in estimating the relationship between the variables. The method of data analysis is the ordinary least square (OLS) multiple regression method. The OLS method was chosen because it possesses some optimal properties; its computational procedure is fairly simple and it is also an essential component of most other estimation techniques. Also the justification for the selection of this method was that the data set is of time series as all such data exhibit random characteristics.

3.2 Model Specification

This statistical expression denotes the relationship between variables (dependent and independent variables) to be studied in a mathematical form. The model specification enables empirical exploration of the economic phenomenon. It is also called formulation of mathematical hypothesis.

The functional model for the study covering the period (1970 – 2015) can be put symbolically as stated below:

$$INF = f(CRR, INT, MPR, EXR, GFCF) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Econometrically, the model is specified as follows:

$$INF = \beta 0 + \beta 1CRR + \beta 2INT + \beta 3MPR + \beta 4EXR + \beta 5GFCF + \mu \ldots\ldots (2)$$

Where,

INF = Inflation rate

CRR	=	Cash Reserve Ratio
INT	=	Interest Rate
MPR	=	Monetary Policy Rate
EXR	=	Exchange Rate
GFCF	=	Gross Fixed Capital Formation (Proxy for Investment)

3.3 Data processing

3.3.1 Unit root and Co-integration analysis

Two data related challenges are common when working with time series data: unit root problem and long term relationship among the variables. The unit root problem arises when data used for analysis are non-mean reverting. When this problem exists, information contained in the data is not reliable. It is also possible to have a situation where the variables have long run relationship, in which case, the variables are tied together in the long run, a situation that will make it impossible to separate their individual impact on each other. These two cases arose in the study and were handled using Augmented Dickey-Fuller (ADF) unit root test and the Johasen and Juselius (1990) approach for testing and correction of co-integrated variables. In line with the ADF unit root test and Johasen and Juselius (1990) approach to co-integration verification, the applied data were examined for integration and long-run relationship.

4. ANALYSIS AND INTERPRETATIONS

4.1 Unit Root Test

In order to obtain credible and robust results for any conventional regression analysis, the data to be analyzed must be stationary. This is because estimating regressions using non-stationary variables based on ordinary least square leads to spurious and inconsistent results. Also the classical assumptions on the property of the disturbance term will be violated, as observed by Aiyagari (1994), and it will be impossible to conduct hypothesis testing in non-stationary variables; therefore stationarity needs to be achieved by applying appropriate differencing called order of integration in order to obtain credible and robust results. The ADF tests are thus stated:

$$\Delta Yt = \alpha + \beta_t + \delta Y_{t-1} + \Sigma di\, \Delta Y_{t-1} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where ΔYt-1 equals Yt-1 – Yt-2, ΔYt-2 equals Yt-2 – Yt-3 and so on, and m is the maximum lag length on the dependent variable to ensure that Ut is the stationary random error.

4.2 Cointegration Test

This study employs VAR based approach of Johasen (1988) and Johasen and Juselius (1990) test which proposes the use of two likelihood ratio tests.

The Trace test: The trace statistic for the null hypothesis of cointegrating relations is computed as follows:

$$\Gamma trace\ (r) = - \text{ʈ} \sum^{m} \log [1- \lambda t] \ldots\ldots (4)$$

Maximum eigenvalue static tests the null hypothesis of r cointegrating relation against r + 1 cointegrating relations and is computed as follows:

$$\Gamma max\ (r, r + 1) = - \text{ʈ} \log (1-\lambda r + 1) \ldots\ldots (5)$$

We tested the presence of a unit root for our variables both in their level form and their first differences as shown in Table 1 below. The Table is divided into three sections with section I showing full-time period (1970-2015), section II showing period before Nigeria entered into uninterrupted democracy (1970-1998) and lastly, section III showing period in which Nigeria has been experiencing uninterrupted democracy (1999-2015).

The ADF results of the stationarity tests in all sections in Table 1showed that the series are non- stationary at level form. But their graphical representations show that they still have trend thus differencing would make them stationary yet significant. However, at first and differencing, all the variables became highly stationary at either 10 or 5 or 1 percent confidence level. This is not unexpected as most time series data are non-stationary in levels. However, upon first differencing, the variables became stationary (i.e. I (1)). They became stationary as their ADF statistics became greater than their critical

values at 5 percent. Therefore, all the variables used to estimate the model have unit roots. However, though none of the variables is stationary, there may be a tendency, as shown in the table 1 above, for the long-run relationship between the dependent variable and the independent variables given the fact that the absolute value of the ADF statistic for the RESIDUAL at 5 percent level of significance is greater than its critical value. To confirm their long-run equilibrium relationship, we therefore applied cointegration test.

4.3 Johansen Cointegration Test

To estimate the long-run relationships among variables the Johansen cointegration technique based on the vector autoregressive (VAR) models was adopted. We have three different sub-periods with one combination of variables to construct three unrestricted VAR models. section I represents Model 1, which is a VAR for the full period from 1970 to 2015, while models II and III are respectively section II showing period before Nigeria entered into uninterrupted democracy (1970-1998) and lastly section III showing period in which Nigeria has been experiencing uninterrupted democracy (1999-2015). However, an Error Correction Model was constructed as the tests confirm cointegration; later parsimonious models of the series were also developed.

Six variables were intended for the study and they are Inflation rate (INF, the regress and, Cash Reserve Ratio (CRR), Interest Rate

(INT), Monetary Policy Rate (MPR), Exchange Rate (EXR) and Gross Fixed Capital Formation (GFCF, Proxy for Investment). The co-integration results revealed that the long run relationship exists between inflation and the monetary policy variables together with Gross Fixed Capital Formation (GFCF) in the full period (1970-2015); also in the two sub-periods (1970-1998 and 1999-2015). This means that the variables are co-integrated since at least two co-integrating series were found in both the trace and the max-eigenvalues at either 5or 1 percent confidence levels. This is also because they were integrated of the same order, a linear combination of the variables was, however stationary, as indicated by the outcome of a unit root test for the residuals, which confirms the stationarity of the residual series. This implies that the variables are cointegrated and tends towards equilibrium. In other words, a long-run (equilibrium) relationship exists between them.

4.4 Error Correction Model (ECM)

Having established that the variables are cointegrated, the short-run relationship between them can be represented with the aid of ECM. The ECM involves using the lagged residual to correct for short run deviations from equilibrium. The lagged residual in the ECM therefore plays the role of error correction in the model, and for it to adequately play this role, its coefficient is expected to be negatively signed and statistically different from zero (i.e. statistically significant). The

negative sign implies convergence of the variables towards equilibrium. The absolute value of the coefficient of the lagged residual represents the speed of adjustment and indicates how quickly equilibrium is restored in the system in the event of temporary deviation or displacement therefrom. With the ECM, the long run empirical relationship which was lost in the process of differencing to secure stationarity is retrieved.

Table 3 in the appendix Iillustrates the short-run impact of monetary policy variables on inflation and how they adjust to short-run discrepancies. The coefficient of the first lag of the error term shows how quickly the short-run disequilibrium between inflation and the monetary policy variable is adjusted each period. The value of its coefficient, which is -0.331255 indicated that about 33 percent disequilibrium is being corrected at each period.

4.5 Testing for Structural Stability

Given the fact that this study used a regression model involving time series data, stability tests were carried out in search of structural change in the relationship between the regressors and the regresand in the study.

First, the Cumulative Sum (CUSUM)test was employed to ascertain the years of structural changes within the years of observation (1970 – 2015).

From the figure 1 in appendix II, there is a clear indication that prior to 2010; there were major structural changes in the period between 1980 and 1985; 1986 and 1993. Also, there were noticeable structural changes that caused a rise in the trend from 2005. Going by the economic history of Nigeria, these structural changes are in consonance with Nigeria's economic experiences: the fall in the price of crude oil in the beginning of the 1980s was a shock on the entire structure of the economy and forced the rest of the sectors to be less competitive hence increase in the prices of commodities; Structural Adjustment Programme (SAP) which was characterized by borrowing and spending was adopted around 1986 and was later dropped around 1990s because it brought further hardship on the citizens, moreover corruption within the domestic economy helped to shoot up the prices. The effects of the "Bank Recapitalization and Consolidation" introduced in 2004 by the then Central Bank Governor (Prof. Chukwuma Soludo) could be attributed to structural changes felt in 2005.There was a price increase, but was not felt because it met with an increase in output and the financial institutions were capable to finance investments

Based on these findings, the study used the Chow-Breakpoint test to determine if statistically significant structural changes actually occurred in the pre-determined years (following the cointegration tests) of 1986 and 1999. The results of the Chow-Breakpoint test for both years are given in Table 4 below.

From the result on the table 4 above, the study finds enough evidence to reject the null hypothesis and conclude that a statistically significant structural change existed in 1986 with the P-Value of the F-Statistic of 0.000 which is highly significant at 95 percent confidence level. However, the study finds not enough evidence to reject the null hypothesis of no structural change in the Chow-Breakpoint test for 1999 and conclude that a statistically significant structural change does not exist in 1999.

4.6 Evaluation of Results for the Long-run Regression Model

The result in table 5 is the long run regression result of our model. The result shows that there is a positive relationship between CRR and inflation; between MPR and inflation. However, INT and EXR each has a negative relationship with inflation in Nigeria within the period under review. On the other hand the result shows that there is a negative relationship between inflation rate and investment (GFCF); interestingly the relationship is statistically significant. However, the result revealed that our chosen monetary policy variables (CRR, INT, MPR and EXR) do not have statistically significant impact on inflation rate in Nigeria.

From the result in table 5, a unit increase in CRR caused inflation to increase by 0.0025 units; a unit increase in INT brought about 0.0488 units decrease in inflation; a unit increase in MPR caused

0.0219 units increase in inflation; a unit increase in EXR decreased inflation by 0.0016 units; also a unit increase in GFCF brought about a 1.4 percent decrease in the inflation rate in Nigeria.

A look at the summary statistics reveals that the model has a fairly good fit as the coefficient of determination (R-Squared) indicates that over 68.7% of the systematic variation in INF is explained by the regressors. The probability value of F-statistic (0.008092) passed the test of statistical significance at the 5% level, indicating that the independent variables jointly explained the dependent variable (INF) significantly. The DW-statistic (2.2031) is also satisfactory, and so the null hypothesis of the absence of serially correlated residuals is not rejected. Further, the Jarque–Bera test showed that the distribution of the error term is normal. These diagnostic tests confirmed the validity of the model. The model can therefore be relied upon for analysis, forecast and policy formulation.

4.7 Diagnostic Test of Serial Correlation

To ensure that inferences made from the long run regression model would not be unreliable, the model was subjected to "Breusch-Godfrey Serial Correlation LM Test".

The effectively probability value (0.1794) in table 6 strongly indicates the absence of serial correlation in the residuals. Therefore,

the results presented above showed that the null hypothesis of no serial correlation was accepted.

4.8 Model Specification (Ramsey Reset) Test

The F and $\chi 2$ statistic in table 7 with their p-values show that we cannot reject the null hypothesis. Thus the Ramsey specification test indicates that the model is well specified.

4.9 Correlation Matrix

From table 8, there is no fear of collinearity between any pair of the independent variables given that none of the pair-wise correlation is equal to or greater than 0.8.

4.10 White Heteroscedasticity Test

From the result of white hetroscedasticity test carried out on the residual as shown in table 9; given the probability value of the test, the result of White Hetroscedasticity test supports the non-violation of the homoscedasticity assumption of the Classical Normal Linear Regression Model (CNLRM). The conclusion drawn from this is the fact that the homoscedasticity assumption has not been violated, meaning that the variance is constant over time.

To confirm and as well as to establish the existence of a causal relationship between inflation (INF) and each of the explanatory variables, the pair-wise Granger causality test advanced by Granger (1969) was conducted. The test as shown in table 10 was conducted using annual time series data for each variable. Results obtained are as reported in Table 9 above shows that among all the variables there is evidence of unidirectional causality between Monetary Policy Rate (MPR) and Inflation (INF), with causality running from Monetary Policy Rate (MPR) to Inflation (INF).

5. CONCLUSION

The study examined the applicability of the monetary policy instruments in checking inflation in a developing country using data from Nigeria. Empirical evidence from available data showed that the monetary policy instruments do not statistically influence inflation in Nigeria within the review period. This is in line with the findings of Asogu (1991) but is contrary to (Omoke and Ugwuanyi, 2010). However, investment (GFCF) has significant impact on inflation, such that a unit increase in the level of investment in Nigeria will likely decrease inflationary pressure by about a 1.4 percent. The GFCF, though significant and conforms to theoretical expectation, is very weak and negligible in influencing inflation rate as it only exerts 1.4 percent influence. This outcome has actually necessitated the need to strengthen Nigeria's industrial capital base and re-evaluate the policies

towards diversifying the productive base of Nigeria from the direction of oil to non-oil sectors through genuine implementation of policies like import substitution and export promotion strategies. These can check imported inflation.

Consequent upon the observed relationships, we suggest that the insignificant impact of the monetary policy instruments on inflation is attributed to the scarcity of essential input which has led to the high cost of production, which often results to low productivity. Moreover, producers resort to importing these essential inputs in a bid to correct this, which due to weak local currency (Naira) are very expensive hence they put up the prices of products and induce inflation. Therefore, there is a greater need for encouraging and financing research and development (R&D) by both the public and private sectors so that these raw materials can be sourced locally and at a competitive cost. Again, there is the problem of structural and institutional rigidities especially on the supply side inflation; and this undermined the impact of the monetary policy on inflation in Nigeria within the review period.

The results of our analyses showed that the instruments of monetary policy would have had a greater impact on inflation if inflation were not of structural nature. Inflation in Nigeria is structural in nature given the fact that there are often policies inconsistencies as different regimes of leaders are wanting to develop and pursue different development goals that lack continuity from previous regimes. Also systemic-endemic corruption that is persistent in the

economy has not helped matters. Hence inflation in Nigeria is mainly caused by insufficient output because an increase inthe inflation ratecouldnot cause an increase in productivity(see the result of causality test: INF does not Granger Cause GFCF).This is in consonance with Onuchuku (1998) which stressed that Nigerian industries are fragile and are forced to close down when faced with severe competition, which thereby will reduce national income and will further increase the price of commodities in Nigeria.More so the underdeveloped nature of the Nigerian financial system makes it difficult for changes in money supply to reflect in the control of inflation in Nigeria. A causality analysis was undertaken to verify the relevance of the variables. The result obtained revealed that a unidirectional causality only runs from Monetary Policy Rate (MPR) to Inflation (INF) while the rest indicated non-causality. Policy makers therefore need to be conscious of this in order to ensure appropriateness in the timing of policies in this regard.

The issue of broad monetary policy instruments, as opined by Anowor and Okorie (2016) should be critically looked into by the monetary authorities, especially in Nigeria because it can be sometimes dangerous for the economy. They further suggested that efforts should be put in place in ensuring that deposit money banks follow Central Bank's guideline for financial intermediations; and that the recent Central Bank's policy of cashless society should be genuinely pursued with vigor as it will help in minimizing inappropriate moves by commercial banks to meet their customers' demand at the expense of macroeconomic policy objectives.

The improvement and expansion of the trading floors of the Nigeria Stock Exchange (NSE) will make the money in the economy more controllable by the monetary authorities and thus monetary policy will have a greater impact on inflation. The financial system needs to be strong, sound, viable, and shock-resilience in order to achieve the standard of a sustainable economy.

REFERENCES

AIYAGARI, R. 1994. **Uninsured Idiosyncratic Risk and Aggregate Saving.** The Quarterly Journal of Economics.Vol. 109 N^{o} 3: 659-684. UK.

AKINBOBOLA, T.2012. **The dynamics of money supply, exchange rate and inflation in Nigeria.** Journal of Applied Finance & Banking.Vol. 2 N^{o} 4: 117-141. UK.

AKUJUOBI, L. 2010. **Monetary Policy and Nigeria's Economic Development.** African Research Review. Vol. 4 No 4: 153-161. Ethiopia.

AMINU, U.,& ANONO, A. 2012. **Effect of inflation on the growth and development of the Nigerian economy (An empirical analysis).** International Journal of Business and Social Science. **Vol.**3. N^{o} 10: 183–191. USA.

ANOWOR, O., &OKORIE,G. 2016. **A reassessment of the impact of monetary policy on economic growth: study of Nigeria.** International Journal of Developing and Emerging Economies. Vol. 4. N^{o} 1: 82–90. UK.

ASOGU, J.1991. **An econometric analysis of the nature and causes of inflation in Nigeria.** Economic and Financial Review.Vol. 29. No 3. USA.

The control of money supply. 1976. New Jersey: Mcgraw Hill. USA.

BARRO, R. 2013. **Inflation and economic growth.** Annals of Economics and Finance.Vol. 14.N^{o} 1: 85–109. China.

BARSKY, R., & KILIAN, L. 2000. **A Monetary Explanation of the Great Stagflation of the 1970s**. University of Michigan. Michigan. USA.

BELLO, M., &SAULAWA, M. 2013. **Reationship between Inflation, Money Supply, Interest Rate and Income Growth in Nigeria 1980-2010.** An Empirical Investigation. Journal of Economics and Sustainable Development. Vol. 4 N^{o} 8: 7-13.Ethiopia.

BLINDER, A., &RUDD, J. 2008. **The Supply Shock Explanation of the Great Stagflation Revisited.** The Great Inflation. CEPS Working Paper. No 176. Brussels. Belgium.

CHHIBBE, A., COTTANI,J., FIRUZABAD,R., &WALTON,M. 1989. **Inflation, Price Controls and Fiscal Adjustment in Zimbabwe.**Research Papers and Books - World Bank Group. Washington DC: World Bank.USA.

CHIBBER, A., &SHAFIK,N. 1990. Exchange reform, parallel markets and inflation in Africa: The case of Ghana".Research Papers and Books - World Bank Group. Washington DC: World Bank.USA.

CHIPOTE, P, &KHETHA-KOSI,P. 2014. **Impact of Monetary Policy on Economic Growth: A Case Study of South Africa.** Mediterranean Journal of Social Sciences. Vol. 5 No 15: 76-84. Italy.

DANJUMA, I., SUCCESS,M., &SUCCESS,E.2012. **An assessment of the effectiveness of monetary policy in combating inflation pressure on the Nigerian economy.** Journal of Business Administration and Management.Vol. 1 N^{o} 1: 7-16. Poland.

DARRAT, A.1984. **The Dominant influence on fiscal actions in developing countries.** Eastern Economic Journal. Vol. 10 N^{o} 3: 271–284. Germany.

DERBURG, I.1995. **Inflation in the World economy.** Butterworth & co(publishers) limited. UK.

DORDUNOO, C., &NJINKWEU,D. 1997. **Foreign exchange rate region and macroeconomic performance in Sub-Saharan Africa.** Journal of African Economics.Vol.6: 121-149. UK.

DOROSHENKO, I. 2001. **Monetary Policy of Economic Growth in the Transitional Economy.** Ph.D Dissertation. Kyiv: Shevchenko National University. Kyiv. Ukraine.

ELBADAWI, I. 1990. **Inflationary process, stabilisation and the role of public expenditure in Uganda.** World Bank Working Paper. Washington DC. USA.

ERBAYKAL, E., &OKUYAN, H.2008. **Does inflation depress economic growth? Evidence from Turkey.** International Research Journal of Finance and Economics.Vol. 17: 1450-2887.Victoria Mahé, Seychelles.

FAKIYESI, T.**Further empirical analysis of inflation in Nigeria.** CBN Economic and Financial Review. Vol. 34 N^{o}1.Nigeria.

FOLAWEWO, A., & OSINUBI, T. 2006.**Monetary Policy and Macroeconomic Instability in Nigeria: A Rational Expectation Approach.** Journal of Social Sciences. Vol. 12 N^{o} 2: 93-100. UAE.

FRISCH, H.1983. **Theories of Inflation.** Cambridge University Press.Cambridge. UK.

GORDON, R.2004. **Productivity, Growth, Inflation and Unemployment.** Cambridge University Press.Cambridge. UK.

GRANGER, C.1969. **Investigating causal relations by econometric models and cross-spectral methods.** Econometrica. Vol. 37: 424-438. USA.

GRIER, R., & GRIER, K.**On the Real Effects of Inflation and Inflation Uncertainty in Mexico.** Journal of Development Economics. Vol. 80: 478-500. Netherlands.

https://www.cbn.gov.ng/documents/Monetarycreditguide.asp. 2016.Nigeria.

HUMPHumphery, T.1986. **Essays on Inflation.** Federal Reserve Bank of Richmond.Richmond. Virginia.USA.

INANG, E. 1995. **Structural Adjustment Programme and external trade in developing countries: lesson for Nigeria.** Proceeding of Nigerian Economic Society annual conference: Nigerian Economic Society.Ibadan.Nigeria.

JHINGAN, M.2000. **Monetary and Banking International Trade.** Vrinda Publications (P) Ltd. New Delhi. India.

JOHASEN, S. 1998. **Statistical analysis of cointegration vectors.** Journal of Economics Dynamic and Control. Vol.12: 231–254. Netherlands.

JOHASEN, S., &JUSELIUS. K.1990. Maximum likelihood estimation and inference on cointegration with applications to the demand of money. Oxford Bulletin of Economics and Statistic.Vol. 52: 169–210. UK.

MAHAMADU, B., &ABRADU-OTOO,P. 2003. **Monetary growth, exchange rates and inflation in Ghana: An error correction Analysis.**IDS Working Papers - Wiley Online Library. UK.

MOORTHY, V. 2014.**Understanding Stagflation Past and Present.** McGraw Hill Education (India) Private Limited.New Delhi. India.

MUBARIK, Y.2005. Inflation and growth: An estimate of the threshold level of inflation in Pakistan. SPB-Research Bulletin. Vol. 1 N^{o}1.Sweden.

ODUSOLA, A., &Akinlo, A.2001. **Output, inflation and exchange rate in developing Countries: An application to Nigeria.** CBN Economic and Financial Review. pp. 117-156.Nigeria.

OJO. 1992. **The application of monetary policy and practice in Nigeria**. Ibadan: Ibadan University Press.Nigeria.

OKUN, A.1962.Potential GNP, its measurement and significance. Yale: Cowles Foundation. Yale University.USA.

OMOKE, P. 2010. Inflation and economic growth in Nigeria. Journal of Sustainable Development. Vol. 3 N^{o} 2: 159–166. Canada.

OMOKE, P., &UGWUNYI, C.2010. **Money, price and output; A causality test for Nigeria.** American journal of scientific research.Vol. 8: 78-87.Victoria Mahé, Seychelles.

ONUCHUKU, O. 1998.**Inflation and stabilization policy measures in Nigeria.** Port Harcourt: Emhai Printing and Publishing Co.Nigeria.

OYETUNJI, A. 2014.**Nigeria: A History of Persistent Profligacy**. http://economicconfidential.com/2014/12/nigeria-a-history-of-persistent-profligacy. Nigeria.

PHILLIPS, A.1958. **The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957.** Economica.Vol. 25 N°100: 283–299. USA.

PRACHOWNY, M.1993. **Okun's Law: Theoretical Foundations and Revised Estimates.** The Review of Economics and Statistics.Vol.N° 2: 331–336. USA.

RUBY, D. 2003. **Income, Expenditure, Prices and Policy.** New York, NY: Touchstone. USA.

SAAED, A. 2007. **Inflation and Economic Growth in Kuwait: 1985-2005 Evidence from Cointegration and Error Correction Model.** Applied Econometrics and International Development. Vol. 7 N° 1: 56-67.USA.

SAREL, M. 1995.**Nonlinear effects of inflation on economic growth**. IMF Working Paper. IMF.Sweden.

SAY, J. B. 1834.**A Treatise on Political Economy**. (Sixth American Ed, 1803) . Philadelphia. USA.

SHITUNDU, J., &LUVANDA, E. 2000. **The Effect of Inflation on Economic Growth in Tanzania.** African Journal of Finance and Management. Vol. 9 N° 1: 45-67.Zimbabwe.

SOWA, N., &KWAKYE,J. 1993. **Inflationary trends and control in Ghana.** Research Paper. Nairobi: African Economic Research Consortium.Kenya.

YAHYA, K.2000. **Structural Disequilibrium and Inflation in Nigeria: A Theoretical and Empirical Analysis.** Centre for Economic Research on Africa.School of Business. Montclair State University. Upper Montclair. New Jersey. USA.

APPENDIX I (Tables)

Table 1: Results of Unit Root Test on Variables

SECTION I: Full Period (1970-2015)						
	At Levels: Critical Values (-3.974 for 1% and -3.513 for 5% and -2.980 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-2.541	-1.217	-2.293	-1.408	-1.063	-0.671
	1st Differences: Critical Values (-4.271 for 1%, -3.556 for 5% and -3.211 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-5.576***	-4.467***	-5.677***	-6.167***	-6.046***	-3.607**
SECTION II: Sub-Period (1970-1998)						
	At Levels: Critical Values (-3.681 for 1%, -2.981 for 5% and -2.963 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-2.318	-1.827	-2.451	-0.721	-1.431	-1.475
	1st Differences: Critical Values (-4.365 for 1%,-3.594 for 5% and -3.213 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-5.038***	-4.141**	-5.181***	-4.791***	-3.809**	-4.217**
SECTION III: Sub-Period (1999-2015)						
	At Levels: Critical Values (-3.972 for 1%, -3.522 for 5% and -3.321 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-2.254	-1.939	-2.383	-1.981	-2.932	-0.986
	1st Differences: Critical Values (-3.988 for 1%, -3.479 for 5% and -2.963 for 10%)					
	INF	CRR	INT	MPR	EXR	LGFCF
ADF Test	-4.640***	-4.093***	-4.201***	-4.301***	-5.182***	-5.125***
Note: ** ADF stationary at 10% and 5% critical values. *** ADF stationary at 10%, 5% and 1% critical values.						

Source: Computed by the authors using Eview 8.0

Table 2. Results of Johansen Cointegration Tests

SECTION I: Full Period (1970-2015)					
Eigen Values	0.678	0.568	0.349	0.187	0.097
Hypothesesa	r = 0	r ≤ 1	r ≤ 2	r ≤ 3	r ≤ 4
L.R. Statistic	129.435	79.491	38.515	17.678	5.917
SECTION II: Sub-Period (1970-1998)					
Eigen Values	0.873	0.835	0.781	0.445	0.321
Hypothesesa	r = 0	r ≤ 1	r ≤ 2	r ≤ 3	r ≤ 4
L.R. Statistic	172.021	115.915	66.752	27.871	13.108
SECTION III: Sub-Period (1999-2015)					
Eigen Values	0.965	0.891	0.841	0.720	0.631
Hypothesesa	r = 0	r ≤ 1	r ≤ 2	r ≤ 3	r ≤ 4
L.R. Statistic	216.006	143.548	93.709	53.264	23.732
a r is the hypothesized number of cointegrating vectors					

Source: Computed by the authors using Eview 8.0

Table 3. ECM Test Result

Variables	Coefficient	Std. Error	t-Statistic	Assessment
RESIDUAL(-1)	-0.331255	0.184137	-1.798957	It takes 33% speed to adjust from disequilibrium to equilibrium

Source: Computed by the authors using Eview 8.0

Table 4: Structural Change for 1986 and 1999 using Chow-Breakpoint Test

Chow Breakpoint Test: 1986			
F-statistic	12.653	Probability	0.000
Log likelihood ratio	50.321	Probability	0.000
Chow Breakpoint Test: 1999			
F-statistic	0.832	Probability	0.063
Log likelihood ratio	5.764	Probability	0.047

Source: Computed by the authors using Eview 8.0

Table 5: Dependent Variable (INF)

Variables	Coefficient	Std. Error	t-Statistic	P-Values
C	1.264361	0.716869	1.763728	0.0923
CRR	0.002598	0.035833	0.072510	0.9429
INT	-0.048878	0.033636	-1.453146	0.1610
MPR	0.021997	0.044592	0.493297	0.6269
EXR	-0.001615	0.002232	-0.723586	0.4773
LOG(GFCF)	-0.014517	0.005121	-2.834895	0.0099

Adjusted R-Squared = 0.68721; Prob(F-statistic) = 0.008092; DW-statistic = 2.2031; Jarque – Bera = 1.32 (0.6458)
Source: Computed by the authors using Eview 8.0

Table 6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.88678	Probability	0.3029
Obs*R-squared	1.90328	Probability	0.1794

Source: Computed by the authors using Eview 8.0

Table 7: Model Specification (Ramsey Reset) Test

F-statistic	0.1317	Probability	0.7257
Log likelihood ratio	0.1392	Probability	0.7314

Source: Computed by the authors using Eview 8.0

Table 8. Correlation Matrix

	CRR	INT	MPR	EXR	GFCF
CRR	1.000000	0.004772	0.076763	0.317375	0.048810
INT	0.004772	1.000000	0.663529	0.334487	-0.337733
MPR	0.076763	0.663529	1.000000	-0.056634	-0.680893
EXR	0.317375	0.334487	-0.056634	1.000000	0.291603
GFCF	0.048810	-0.337733	-0.680893	0.291603	1.000000

Source: Computed by the authors using Eview 8.0

Table 9. White Heteroscedasticity Test

F-Statistic	P-Value	Assessment
2.1430	0.0942	Homoscedasticity

Source: Computed by the authors using Eview 8.0

Table 10:Granger Causality Tests

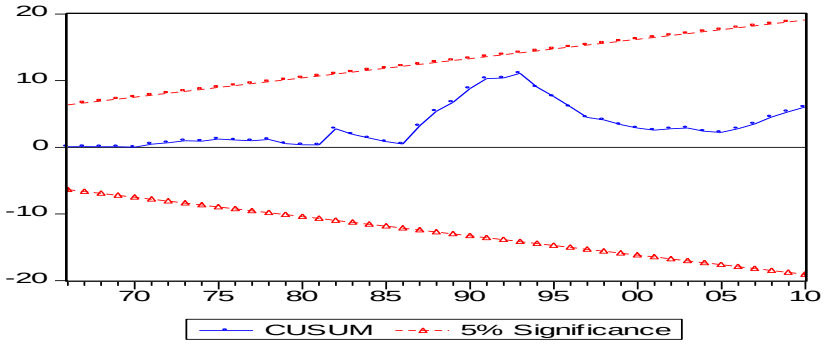
Test Hypotheses	F-Statistic	Probability	Decision
CRR does not Granger Cause INF	0.31539	0.73248	Accepted
INF does not Granger Cause CRR	0.32909	0.72277	Accepted
INT does not Granger Cause INF	0.85957	0.43422	Accepted
INF does not Granger Cause INT	3.17834	0.05702	Accepted
MPR does not Granger Cause INF	4.61048	0.01859	Rejected
INF does not Granger Cause MPR	2.41628	0.10763	Accepted
EXR does not Granger Cause INF	1.04869	0.36424	Accepted
INF does not Granger Cause EXR	1.02553	0.37215	Accepted
GFCF does not Granger Cause INF	0.15819	0.85447	Accepted
INF does not Granger Cause GFCF	0.12221	0.88545	Accepted

Source: Computed by the authors using Eview 8.0

APPENDIX II (Figures)

Fig 1: CUSUM Test for Structural Change in the regression model

Source: Computed by the authors using Eviews8.0



UNIVERSIDAD DEL ZULIA

opción
Revista de Ciencias Humanas y Sociales

Año 34, Especial N° 14, 2018

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.
Maracaibo - Venezuela

www.luz.edu.ve

www.serbi.luz.edu.ve

produccioncientifica.luz.edu.ve