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Inflationary Pressure in Nigeria: The Structuralists' Approach (Pp 338-352)

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Abstract

Opinions differ on the right solutions to inflation in Nigeria. This is due mainly to the fact that while a school of thought sees inflation as a fundamental monetary phenomenon, another school sees it as structural. This paper examined the structural aspect. Structural factors in Nigeria as principal causes of inflation were identified. These structural factors were grouped together under budget deficits, external reserves, and the level of the Nigerian economy (represented by the GDP). Using data on these variables for 32 years (1977 - 2008), and analyzing them with Co- integration and Error Correction Model (ECM), it was found that inflation is 77% affected by structural variables and that the Nigerian economy, as expected, is negatively correlated to inflation while budget deficits and external reserves are positively correlated. All the variables are significant at 5% significant level. The policy implication of the finding is that the supply management of curbing inflation cannot be ignored in tackling inflation in Nigeria.

Key words: Inflation   Structural   Fundamental   Budget deficit   External reserves   GDP

Introduction

Inflation does not lend itself to a precise definition thereby becoming highly controversial (Olowo, 2003). To the neo-classical, inflation is fundamentally a monetary phenomenon. And in the words of Friedman (1956), inflation is always and everywhere a monetary phenomenon and can be reduced only by more rapid increase in the quantity of money than output.

Some other economists like Argy (1978), Harberger (1978) however do not agree that money supply is the only cause of inflation. The structuralists' school of inflation stresses structural rigidities as the principal cause of inflation in developing countries.

One of the most traumatic events that accompany the bid to develop the world over, especially in the developing countries is the problem of inflation. As reflected in the Composite Price Index (CP), Nigeria has been undergoing periods of inflationary pressure. The rate of inflation, which was 6.1% in 1960 rose to as high as 40.9% in 1989, 57.2% in 1993 and 72.8% in 1995 (Olowo, 2003). It however went down to 11.3% in 2003. Government efforts at reducing inflation rate have not been easy probably because emphasis has always been placed on the monetarist theory of inflation rather than on the structuralist theory.

This study aims at identifying structural rigidities as one of the main causes of inflation in Nigeria and measures the relative contributions of other factors identified. The findings here would serve as a guide to suggestions on how to reduce inflation in the country. The period chosen for the study is 1977 – 2008. The rest of the paper is divided into four sections. Section two is on review of related literature, while section three discusses research methodology and model specification. Section four is on findings and discussions while section five summarises and concludes it.

Review of Related Literature

There are three main alternative schools of thought that provided relevant contributions to inflation theory, namely: the Marxists, the post – Keynesians, and the structuralists, which include a latter day's subdivision, usually referred to as inertialists or neo - structuralists (Vernengo, 2005). According to the structuralist view, inflation has its origins in the supply side. In that sense, excess demand caused by fiscal deficits is relevant. In particular, the inelasticity of food supply that results from the concentrated structure of land ownership is seen as the major cause of inflation (Cardoso, 1981). Also, the structural dependency of capital imports, and the lack of

foreign reserves means that developing countries have recurrent balance of payments problems. Currency depreciation is endemic, with or without foreign exchange control or other types of capital control. Hence, depreciation is also seen as an essential part if the inflationary problem. In that sense, the structure of land ownership and the dependence on foreign exchange are shocks to the terms of trade provide the spark that ignites the inflationary process. Structuralists emphasize both the shocks that initiate inflation and the propagation mechanism that maintains it alive. It must be noted that some structuralists, in particular Noyola (1956) and Furtado (1959), argue that the propagation of inflation is the result of incompatible income claims. If after an inflationary shock a group is dissatisfied with its income share it will try to pass its losses to another group. Further, for structuralists, inflation is not a monetary phenomenon, and results from real disequilibria. Hence, monetary policy is a passive element in the inflationary process. The notion that monetary policy is passive is close to the post – Keynesian view on the endogeneity of the money supply as developed by Kaldor (1982) and Moore (1988).

Finally, neo – structuralists also provided an alternative view to monetarism. In particular, the experience with wage – indexation, and the failure of austerity measures to bring down inflation during the 1970s led many authors to argue that inflation was mainly inertial. The precursors of the idea of inertial inflation were Simonsen (1970) and Pazos (1972). Bresser, Yoshiaki and Nakano (1983), Arida and Lara – Resende (1985) and Lopes (1986) were the contributors to the notion of inertial inflation. These authors called for a "heterodox shock,' by which they meant extreme price controls, that is, prices should be frozen completely to avoid inertia. Given their distrust in orthodox policies, the inertialist authors became known as neo – structuralists.

Inflationary process in Nigeria has generated lively controversies about its genesis and solutions. To the structuralists, such perturbation has no linkage with monetary changes; rather, they should be ascribed to non – monetary imbalances. According to Olowo (2003), inflation occurs when members of the economy try to acquire more output of resources than the economy can make available at a given time. That means that inflation plagues a backward economy, attempting to develop because the level of capital formation required for such is difficult to come by. By implication, inflation is inevitable in an attempt to achieve a rapid economic growth.

A good case of this view was provided by Olowo (2003) when he stated that as the economy develops, rigidities arise which lead to structural inflation. In this initial phase, there are increases in non – agricultural incomes accompanied by high growth rate of population that tends to increase the demand for goods. In fact, the pressure of population growth and the rising urban incomes would tend to rise through a chain reaction mechanism; first the prices of agricultural goods; second the general price level and third; wages. Also, inadequate internal financial resources coupled with the foreign exchange constraints is recognized to aggravate structural inflationary process. The high rate of urbanization and such accompanied development (industrialization) efforts have widened the spectrum of government activities in areas of social and physical infrastructures in the face of inelastic government revenues. This gives room for deficit financing or inflationary mode of finance.

Sada (1997), as quoted by Olowo (2003) opined that the dwindling of agriculture's share in the GDP is partly explained by the phenomenal growth of the mining and industrial sectors. The discovery of oil in Nigeria and the consequent economic boom created a situation of irony, whereby instead of being a source of real economic growth and development, the oil boom led to distortions in the economy thereby accentuation the structural rigidities of the economy.

In Nigeria, Oyejide's 1972 study constituted a pioneering attempt at providing an explanation of the causes of inflation in Nigeria, most especially from the structuralist perspective. Specifically, he examined the impact of deficit financing in propagating inflation processes in Nigeria and concluded that there was a very strong direct relationship between inflation and the various measures of deficit financing that were in use between 1957 and 1970. In a commissioned study for the Productivity, Prices and Incomes Board of Nigeria, Ajayi and Awosika (1980) found that inflation in Nigeria is explained more by external factors, most especially the fortunes of the international oil market and to a limited extent by internal influences.

An important conference on Nigerian inflation process was organized by the Nigerian Institute of Social Economic Research (NISER) in Ibadan in 1974. In general, the findings of some of the key articles suggested that neither monetary nor structural phenomena alone explained Nigeria's inflation. One striking conclusion from this conference was that a combination of both factors precipitates the inflation process (Onitiri and Awosika, 1982).

Adeyeye and Fakiyesi (1980) estimated and tested the hypothesis that the main factor responsible for instability of prices and inflationary tendencies in Nigeria was government expenditure. Working with annual time series data spanning 1960 – 1977, they tested the hypothesis that the rate of inflation in Nigeria is linearly related to the rate of growth of money stock, government expenditure, especially deficit, and growth of government revenue, especially monetization of foreign exchange from oil export. The result established some significant positive relationships between inflation rate and growth in bank credit, growth of money supply and growth in government expenditure, while the relationship with growth of government revenue was uncertain.

Using quarterly data, Osakwe (1983) attempted to verify the amount of government expenditure that is, money supply in the ten – year period 1970 – 1980. Significant statistical evidence obtained from the analysis showed strong relationships between increases in net current expenditure and growth in money supply, on the one hand, and growth in money supply and inflation, on the other hand. Further increase in money wage rate and money supply (with a lag in effect) was identified as the two most important factors that influence the movement of prices during the period.

The quantitative impact of monetary expansion and exchange rate depreciation on price inflation in Nigeria was the focus of Egwaikhide, Chete and Fatokun (1994), which used time series econometric techniques of cointegration and Error Correction Mechanism (ECM). They concluded that Nigerian inflation seems to find explanation in both monetary and structural factors and that both the official and the parallel market exchange rates exert upward pressure on the general price level. They recommended the use of a combination of policy measures to put inflation under effective control in Nigeria.

Ajakaiye and Ojowu (1994), using an input – output price model, investigated the impact of the exchange rate depreciation witnessed in Nigeria between 1986 and 1989 on the structure of sectoral prices under alternative pricing regimes. They further simulated and analyzed empirically the impact of exchange rate depreciation under three different mark – up pricing regimes: a fixed mixed mark – up pricing regime, a flexible pricing regime with rational expectation; and a mixed mark – up pricing regime. Of the three pricing regimes considered, the influence of exchange rate depreciation on the structure of sectoral prices was found to be greatest under the mixed mark – up regime. It was also found that although exchange rate

depreciation under the universal flexible mark – up pricing regime with rational expectation will contribute reasonably to the changes in the structure of sectoral prices, the associated inflationary consequences are the highest. Thus, prices in all sectors are determined on the basis of actual and anticipated increases in the cost of imported inputs on account of exchange rate depreciation.

Olowo (2003) examined inflationary pressure in Nigeria using the structuralists' approach. Using variables like deficit financing as measured by domestic and foreign deficit, the Gross Domestic Product and Foreign reserves on Consumer Index (all items) as a measure of inflation, the three variables accounted for 65% of inflationary pressure in Nigeria between 1987 and 1996, the period covered by the study. Positive relationships were also shown between price level and each of the explanatory variables, which were all significant at 0.05.

A recent work on this topic was by Olubusoye and Oyaromade (2008) who modeled the inflation process in Nigeria for 1970 – 2003. The work was motivated by the conviction that inflation entails sizeable economic and social costs, and controlling it is one of the prerequisites for achieving a sustainable economic growth. The study analyzed the main sources of fluctuations in inflation in Nigeria. Using the framework of Error Correction Mechanism, it was found that the lagged Consumer Price Index (CPI), expected inflation, petroleum prices and real exchange rate significantly propagate the dynamics of inflationary process in Nigeria. The level of output was found to be insignificant in the parsimonious error correction model. Surprisingly, the coefficient of the lagged value of money supply was found to be negative and significant only at 0.01 level. One of the major implications of the result was that efforts of the monetary regulating authorities to stabilize the domestic prices would continuously be disrupted by volatility in the international price of crude oil.

Adebayo (2008) traced the sources of recent inflationary episodes in Nigeria, and observed that, given the present circumstances of the economy, the country is prone to hype – inflation. To achieve a one digit inflation rate that is consistent with rapid and sustainable economic growth and development, his study suggested strategies to promote expanded domestic production of agricultural and industrial goods to moderate the growth of monetary aggregates in line with the output performance of the national economy, and

to ensure fiscal viability. He was more or less suggesting structuralists' approach without mentioning it.

Methodology and Model Specification

Time series data were used to estimate the model and the observation period of 1977-2008, with 32 observations. The data used were obtained from the Statistical Bulletin of the Central Bank of Nigeria (CBN) for 2003 and CBN: Annual Report and Accounts for the year ended 31st December 2006 and Annual Report of Accounts of some banks for 2007 and 2008. E-view 3.1 statistical package software for econometric analysis was used to analyze the data. The Ordinary Least Square (OLS) method was not used as it has been found to be inconsistent when time series data are used. It usually makes one commit Type II error thereby leading to spurious results (Ogundipe, 2008). For the purpose of this study, the Co-integration and Error Correction Method were used since they are improvements over the OLS technique. This is in line with a recent work of Olubusoye and Oyaromade (2008). For the reliability of this study, parameters were estimated and analysis of results presented and explained to enhance further empirical clarifications of the study.

Model Specification

Econometrically, the structuralist theory of inflation can be specified as P = (DF, X, V, PM, A, U), (Ogundare and Falegan, 1982), where the bracketed symbols stand for deficit finance, export earning variations, import prices, agricultural bottlenecks, foreign reserves availability and level of economic activity (as measured by labour unemployment) respectively.

For the purpose of this research study, the following model is deemed critical for theoretical validation. This is in line with the work of Olowo (2003).

CPI = f (DEFICIT, EXTRES, GDP)

CPI represents Composite Price Index (All items).

DEFICIT represents Deficit financing.

EXTRES represents External Reserves.

GDP represents Gross Domestic Product.

In linear form;

$$CPI = \alpha_0 + \alpha_1 DEFICIT + \alpha_2 EXTRES + \alpha_3 GDP + U_0$$

Where the coefficient of $\alpha_1, \alpha_2, \alpha_3, \alpha_4 > 0$

The above model is preferred because deficit financing influences, to a large extent, the money supply in the economy. Foreign reserves stand as a measure of the ability to import, which is determined largely by export earnings. Import prices were dropped because of non – availability of import price indexes. Agricultural bottlenecks could be measured by food prices. But food price is a major component of Consumer Price Index. Agricultural bottlenecks were therefore removed. Unemployment of labour was removed because it does not adequately measure economic activity as it leaves out the employment of other factors of production. GDP at cost was used instead as it measures the real level of economic activities. There is the likelihood that the variables in the model could contain some inevitable errors and the omission of some variables because of the inability to quantify them. One therefore expects a large error term. Onwioduokit (1999) in his *Ganger – causality test* of Nigerian data on fiscal deficit and inflation between 1970 and1994 used fiscal deficit and GDP.

Method of Data Presentation and Analysis
Before any sensible regression analysis of equation model can be made, it is essential to identify the order of integration of each time series provided that the variables can be transformed into stationary variables through differencing, concerning the dynamic Composite Price Index model in equation above which is rewritten below.

$$CPI = \alpha_0 + \alpha_1 DEFICIT + \alpha_2 EXTRES + \alpha_3 GDP$$

The differenced model can be written as:

$$DCPI = \alpha_0 + \alpha_1 DDEFICIT + \alpha_2 DEXTRES + \alpha_3 DGDP$$

Co-integration Technique
Most studies assume that time series data are stationary. However, it has been argued that this assumption is not appropriate for most economic variables and that these variables are better modeled as Integrated of order one I(1) or order two I(2) processes, that is, non stationary and need to be differenced once or twice as the case may be to become stationary (Ogundipe, 2008).
A non-stationary series can be reviewed as a testable hypothesis by performing unit root test. A test for unit root has its origin in the work of Dickey and Fuller (1979). The theory of co-integration arises out of the need

to ensure the long run equilibrium or relationship of the observed variables. The theoretical stages involved are as follows.

Testing for the Order of the Integration of the Series

The test for the order of stationarity has led to the development of the Dickey- Fuller (1979) set of unit root tests. We test the null hypothesis of a difference stationarity against the alternative hypothesis of a level stationarity. That is:

$$H_0: Y_t = I(1)$$

$$H_1: Y_t = I(0)$$

With critical values which are all negative and larger (in absolute terms) than ADF statistics; if the null hypothesis cannot be rejected then Y_t cannot be stationary. It may be I(1) or I(2) or have an even higher order of integration.

Co-integration Representation

After determining the order of integration as established in the first stage, the second stage proceeds to obtain the co-integrating vector in the regression equation.

$$Y_t = \beta_0 + \beta_1 X_t + U_t$$

$$(Y_t - \beta_0 - \beta_1 X_t) = U_t$$

$$H_0: U_t = I(1)$$

$$H_1: U_t = I(0)$$

And then test if the residuals are stationary at level. We then reject the null hypothesis and accept that the long-run relationship of the variables exists. The relevant critical values as given in stage one above also become relevant. Time series can only be co-integrated if they are integrated of the same order. This preserves the long-run relationship.

Error Correction Representation

Given that the residuals from the above co integration regression are stationary, and that the variables are co-integrated, the third stage proceeds to estimate the error correction representation. The ECM incorporates the full (short run) dynamics of the model specified above. The theory of error correction model arises out of the need to integrate short run dynamics with long run equilibrium. At this stage all the conventional statistical tests of significance are considered to be appropriate including the diagnostic tests

for the assessment of the adequacy of the model. Co-integration is a necessary condition for error correction model to hold.

The purpose of the ECM is to switch to a short run model. Allowance is made for any short run divergence, in a corrective mechanism by which previous disequilibria in the relationship between the level of composite price index and the level of one or more of its determinants are permitted to affect the current change in composite price index.

Theory expects that the ECM be negative and highly significant implying that an error in the current period is being corrected in the previous period.

Findings and Discussions
This section focuses on the presentation and analysis of data, the analysis of the estimated regression results, and appraisal of the result as well as the test of hypotheses formulated in this study.

Data Analysis and Results Using Co-Integration Test
At levels, all variables are not stationary; (Table 1) but at the second level differencing, all variables became stationary at 5% and 10% levels (Table 2). A linear combination of the variables is attempted (since the order of integration is the same) in order to obtain the residuals. If the residual is stationary at levels, it implies that the variables are co-integrated and there exists a long-run equilibrium relationship or convergence of the variables.

The result of the stationarity of the residual is given in table 3:

ECM: This is the mechanism that draws the errors (divergence in variables) back to the original level or the equilibrium path. This is expected to be negative and ranges between zero and one. The ECM (-1) from the result is – 0.315 (Table 4), which implies that 32% of error generated in the previous period was corrected now.

The PARSIMONIOUS EQUATION for Composite Price Index is presented thus:

DCPI = -1433.07 + 0.0055DDEFICIT + 0.0033DEXTRES – 0.012DGDP +

$\quad\quad$ (-1.37) $\quad\quad$ (2.305) $\quad\quad\quad$ (4.57) $\quad\quad\quad\quad$ (-4.04)

$\quad\quad$ (0.18)* $\quad\quad$ (0.03)* $\quad\quad$ (0.00)* $\quad\quad\quad$ (0.00)*

0.00096DDEFICIT (-3) – 0.0049DEXTRES (-2) + 0.034DGDP (-1) – 0.315ECM (-1)

(0.29)	(-5.14)	(2.83)	(-2.29)
(0.77)*	(0.00)*	(0.00)*	(0.03)*

The t- statistic value is in parenthesis.

* The significant levels in asterisks.

Adjusted R – square 77.43   Probability (F – statistic) 0.000

Durbin Watson   1.92

Interpretation of Results
Homoscedasticity was achieved after adjusting the end points of all the number of years. The purpose of the white noise heteroscedasticity tests is to make the variances constant, thereby making the conclusions more reliable.
The adjusted R – square of the estimate model shows that about 77.43% of the variation in CPI is explained by the combined effects of all the determinants while the F – static shows that the overall regression is significant at 0.01. Also, the Durbin – Watson statistic value of 1.92 which is close enough to 2.00 indicates the absence of autocorrelation in the analysis.

Both budget deficits and external reserves are positively correlated to inflation as can be seen from the positive coefficients of their values. They are both significant at 0.01. The findings here are quite in agreement with the work of Onwioduokit (1999) whose *Ganger – causality test* of Nigerian data on fiscal deficit and inflation between 1970 – 1994 found that fiscal deficit as well as GDP causes inflation. They are also in agreement with an earlier work of Olowo (2003). The GDP on the other hand which is negatively correlated and also significant at 0.01 negates the work of Olowo (2003) which used the Ordinary Least Square (OLS) (with its attendant shortcomings earlier pointed out) to analyze the data. The lag of GDP is however positively correlated and significant at 0.01. This shows that a buoyant economy in the previous year may lead to high inflation in the current year. All the lag variables, as expected, are significant at 0.01 with the exception of one. Olubusoye and Oyaromade (2008) used as many as eight (8) variables, both monetary and structural, to explain inflationary pressure in Nigeria and found that GDP is positively correlated to inflation.

Summary and Conclusion
The paper attempted to view inflation from the structuralists' perspectives. To the structuralists, inflation is influenced and can be controlled by such variables as deficit financing, exports earning variations, import prices,

agricultural bottlenecks, foreign reserves availability and the level of economic activities as measured by labour unemployment. The paper however made use of three of them – deficit financing, Gross Domestic Product (GDP) and foreign reserves. This is because deficit financing influences, to a large extent, the money supply in the economy. Foreign reserves stand as a measure of the ability to import, which is determined largely by export earnings. Import prices were dropped because of non – availability of import price indexes. Agricultural bottlenecks could be measured by food prices which form a major component of consumer price index. Agricultural bottlenecks were therefore removed. Unemployment of labour was removed because it does not adequately measure economic activities as it leaves out the unemployment of other factors of production. GDP at cost was used instead as it measures the real level of economic activities.

Using data on these variables for 32 years (1977 - 2008), and analyzing them with Co- integration and Error Correction Model (ECM), it was found that inflation is 77% affected by structural variables and that the Nigerian economy, as expected, is negatively correlated to inflation while budget deficits and external reserves are positively correlated. All the variables are significant at 5% significant level. The policy implication of the finding is that the supply management of curbing inflation cannot be ignored in tackling inflation in Nigeria.

One of the limitations of this work, which must be pointed out, is the fact that some economists recently argued that price indexes may not measure inflation rate accurately. For instance, Boskin (1998) argued that the CPI often neglects improvements in the quality of goods and services. Berg (2001) posited that since price indexes are based on fixed baskets of goods and services, adjustments in consumption patterns when the relative price changes are not properly captured. The implication of these two arguments is that price indexes tend to overstate inflation rate and, thus, understate economic growth. However, price indexes are still widely used to quantify inflationary phenomena since no empirical study has confirmed significant overstatement of inflation as observed by Adebayo, (2008).

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Table 1: Stationary Tests at Level

Variables	ADF	CV @ 1%	CV @ 5%	CV @10%	Order of Integration.
CPI	-1.76	-3.63	-2.98	-2.61	Not Stationary.
DEFICIT	-1.68	-3.63	-2.98	-2.61	Not Stationary.
EXTRES	-2.88	-3.63	-2.98	-2.61	Not Stationary.
GDP	-0.78	-3.63	-2.98	-2.61	Not Stationary.

Source: Computations from E –Views 3.1 Statistical Packages.

Table 2: Stationary Tests At Second Difference

Variables	ADF	CV @ 1%	CV @ 5%	CV @10%	Order of Integration.
CPI	-6.92	-3.64	-2.95	-2.61	I (2)
DEFICIT	-10.28	-3.64	-2.95	-2.61	I (2)
EXTRES	-3.99	-3.64	-2.95	-2.61	1(2)
GDP	-7.20	-3.64	-2.95	-2.61	I (2)

Source: Computations from E –Views 3.1 Statistical Packages.
Decision Rule:
If ADF_s > critical value – stationary
If ADF_s < critical value – Non stationary

Table 3: Stationary Test for Residual (ECM)

Variable	ADF	CV @ 1%	CV @ 5%	CV @10%	Order of Integration.
ECM	-2.72	-3.63	-2.95	-2.6	I (0)*

*The residual (ECM) is significant at 10%.
Source: Computations from E –Views 3.1 Statistical Packages.