DETERMINANTS OF INFLATION IN NIGERIA:

A CO- INTEGRATION APPROACH

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ABSTRACT

Inflation is undeniable one of most leading and dynamics macroeconomics issues confronting almost all economies of the world. Its dynamism has made it an imperative issue to be considered. Hence the study examines the factors affecting inflation in Nigeria. Time series data were employed for the study. The data was sourced from the Central Bank of Nigeria and National Bureau of Statistics. Descriptive statistics and co-integration analysis were the analytical tools used. It was observed that there were variations in the trend pattern of inflation rate. Some of the variables considered were significant in determining inflation in Nigeria. The previous total export was found to have a negative impact on current inflation while the previous total import exerts a positive effect likewise the food price index. It has thus been recommended that policies that will set the interest rate to a level at which it will encourage investment and increase in production level could be institutionalized, importation should be reduced in Nigeria such that it will not encourage change of consumer taste resulting to inflating prices, exchange rate system should be maintained at a level that will not impose threat on the Nigeria economy and the domestic consumption of petroleum product should be focused, not only exportation.

INTRODUCTION

Inflation has become a leading topic of discussion in Nigeria families and press as its effects penetrate more deeply into nation's life due to prevailing increase in prices. Continuous increases in prices are among the most serious economic problem in Nigeria as well as Africa. Considering the urban, rural and combined consumer price index in

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Nigeria, all components of price index rose at generally higher rate than previous years. The index for food dominated the increase in the aggregated index for most of the period. This could be due to the fact that inflation has a general effect on farm economy compared to any other sector since it (agricultural sector) is highly competitive, most of the outputs are perishable and that is the least sector able to pass input cost increases directly into higher output prices (Obasi, 2007) . Other major components of consumer outlay which record substantial higher rates of price increase include household goods and other purchases, clothing, accommodation and transportation.

There are many theories of inflation, namely demand- pull, cost – pull, structural, monetary and imported inflation. The demand- pull paradigm suggests that the inflation occurs when aggregate demand for goods and services is greater than the aggregate supply, such that the resultant excess cannot be satisfied by running down the existing stocks, diverting supplies from the export market to the domestic market, increasing imports or postponing demand. The cost pull school suggests that inflation arises from increase in the cost of production, rising wages from trade union activities and embodies a sociopolitical view (Anyanwu, 1992). The cost-push views attribute inflation to a host of non- monetary supply- oriented influences of shocks that raise costs and consequently price. In recent time, this school of thought has attributed inflation to such random non-monetary shocks such as crop failures, commodity shortages and increase in the price of oil (Onwiodukit, 2002).

The structuralist explain the long- run inflationary trend in developing countries in terms of structural rigidities, market imperfection and social tension relative inelasticity of food supply, foreign exchange constraints protective measures, rise in demand for food, fall in

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export earnings, hoarding import substation, industrialization, political instabilities (Onwioduokit, 2002). Monetarists opine that "inflation is always and everywhere ", hence prices tend to rise when the rate of inflation in money supply is greater than the rate of increase in real output of goods and services (Johnson, 1973). On the other hand, imported inflation arises from international trade where inflation is transmitted from country to the other, particularly, during periods of rising price all over the world (Anyanwu, 1992).

Ojameruaye (1988) noted that inflation is usually the result of the interplay of many factors. In most developing counties, including Nigeria, poor and inadequate tax programmes makes government unable to generate enough expenditure, hence the pursuance of the policy of financing the government expenditure by creation of money becomes inevitable (Onwioduokit, 2002). And more recently, the drought that hit most part of the world has created a supply crisis, aggravating the upward trend in food prices (Durmus, 2008). On the demand side, the huge jump in energy prices and rising environmental and political concerns force many countries to seek alternative sources. The high inflation rate has become not only a concern in the industrial and emerging market economies but to the general economy of the nation. In addition, this general rise in prices constitutes one of the factors responsible for the farmer's poverty state. This study therefore examines the factors affecting inflation in Nigeria.

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METHODOLOGY

The area of study is Nigeria which is situated in the West African region and lies between longitudes 3 degrees and 14 degrees and latitudes 4 degrees and 140 degrees. It has a land mass of 923,768 sq.km.

The set of data for this study was time series data from secondary sources. These data were obtained from National Bureau of Statistics, Federal Ministry of Agriculture, and Central Bank of Nigeria- major economic and financial indicators.

Descriptive statistics such (graphical form) and co-integration analysis was employed for this study. The co-integration analysis is a process of integrating short-run dynamics with long run equilibria (Maddala, 2001). The analysis of short run dynamics is often done by first eliminating trends in the variable that is making the variables to be at the same level by making non-stationary variable stationary.

This analysis firstly involves the test for unit root or stationary test. The Augmented Dickey-Fuller (ADF) test was used for the test. The ADF F-ratio critical value was used to make decision on the stationarity of the variables as in equation (2). The Johansen procedure was used to test for co-integration in the model in equation (5). Johansen technique was used not only because it is vector auto-regressive based but because it performs better in multivariate model.

$$LY_t = \beta_0 + \beta_1 LX_{1t} + \beta_2 LX_{2t} + \beta_3 + LX_{3t} + \beta_4 LX_{4t} + \beta_5 LX_{5t} + \beta_6 LX_{6t} + \beta_7 LX_{7t} + \beta_8 LX_{8t} + U_t \quad \ldots\ldots\ldots (1)$$

Where Y_t = annual inflation rate (percent)

X_1 = annual total export (₦ million)

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X_2 = annual total import (₦ million)

X_3 = annual consumer price index for food (1985=100)

X_4 = annual agricultural output ('000 tonnes)

X_5 = annual interest rate (percent)

X_6 = annual government expenditure (₦ million)

X_7 = annual exchange rate (₦ US$ 1.00)

X_8 = annual crude oil export ('000 Barrels)

t = time

U_t = error term

For this study, inflation rate is the growth rate of the composite price index for all items over the years.

Hence the error term from equation (1) was tested for unit root for re-confirmation of co-integration.

RESULTS AND DISCUSSION

CO-INTEGRATION TEST RESULT

Table 4: **Result of stationary test from Augmented Dickey-Fuller Test**

Variables	Level	1st difference	2nd difference	Order of integration	Decision
LY	-0.2232	-4.0707***	-6.3468***	I(1)	Non-stationary
LX_1	-0.3998	-3.6503***	-6.7371***	I(1)	Non-stationary
LX_2	-0.2383	-4.9907***	-7.5756***	I(1)	Non-stationary
LX_3	-0.2746	-4.5024***	-6.6833***	I(1)	Non-stationary
LX_4	-0.0804	-4.9773***	-7.8701***	I(1)	Non-stationary
LX_5	-1.4191	-5.3681***	-10.5290***	I(1)	Non-stationary

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LX_6	-1.8748	-4.1292***	-6.8830***	I(1)	Non-stationary
LX_7	0.0347	-3.5449***	-6.4760***	I(1)	Non-stationary
LX_8	-3.0324	-5.5025***	-6.7372***	I(1)	Non-stationary

Note: L denotes log ; Critical values: 1% = -3.6289 denoted by ***

Table 4 presents the result of the unit root test from Augmented Dickey-Fuller test. All the variables exhibit unit root at the level, that is are non-stationary. But at the first differencing, they all became stationary at 1%. The differencing is needed in order to avoid having a spurious regression. Since the differenced variables are stationary, there is co-integration between the variables, meaning that there a long-run relationship between the inflation and total import, total export, consumer price index for food, agricultural output, interest rate, government expenditure, exchange rate and crude-oil export.

Table 5: **Johansen Co-integration result**

Eigen value	Likelihood ratio	5% critical value	1% critical value	Hypothesized no of CE(s)
0.9039	315.4393	192.89	204.95	None*
0.8233	233.4545	156.00	168.36	At most 1*
0.7638	172.7882	124.24	133.57	At most 2*
0.7026	122.2840	94.15	103.18	At most 3*
0.5531	79.8414	68.52	76.07	At most 4*
0.5126	51.6500	47.21	54.46	At most 5**
0.3296	26.4977	29.68	35.65	At most 6
0.2140	12.5006	15.41	20.04	At most 7
0.1098	4.0724	3.76	6.65	At most 8**

** (*) denotes rejection of the hypothesis at 5% (1%) significance level. Likelihood Ratio tests indicates 6 co-integrating equation(s) at 5% significance level

Table 5 presents the Johansen Co-integration result. The likelihood ratio shows that there are six co-integrating (CI) equations in the analysis. Only one of the CI equations was chosen. The CI equation chosen was based on the conformity of the coefficients with economic theory and its statistical significance.

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From the equation, almost all the independent variables are significant in determining inflation in Nigeria during the period studied..

Since it has been ascertained that the variables exhibit unit root I(1) (non stationary) at their levels but stationary after differencing and there also exist a long run relationship between the variables, error correction model is thus formulated which gives us the proportion of disequilibrium error that is accumulated in the previous period, corrected in the current period.

Appendix 3 presents the result from the test for order of integration of residual from static regression. This shows that the residual is stationary at all levels. This re-confirms that the variables in this model are indeed co-integrated. This implies that an error correction model would give a better fit than without it. Table 6 therefore presents the result of the estimated error correction model.

Table 6: **Results from the error correction model**

Regressors	Coefficient	t-statistics	Probability
Intercept	0.0051	1.3612	0.1851
$\Delta X_1(-1)$	-0.0567	-2.5725	0.0162
$\Delta X_2(-1)$	0.0607	3.1780	0.0038
$\Delta X_3(-1)$	0.9051	24.3244	0.0000
$\Delta X_4(-1)$	-0.0220	-0.5288	0.6014
$\Delta X_5(-1)$	-0.1240	-4.1730	0.0003
$\Delta X_6(-1)$	0.0007	0.1719	0.8649
$\Delta X_7(-1)$	0.0492	2.7876	0.0098

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$\Delta X_8(-1)$	-0.1133	-2.9570	0.0065
ECM(-1)	-0.7060	-4.1598	0.0003

Adjusted $R^2 = 0.969$

Standard error of regression = 0.013

F- Statistics = 84.353

The adjusted R^2 shows that about 96% of the variation in inflation is explained by the combined effect of all variables considered. The previous total export (ΔX_1-1) exerts a negative effect on the current inflation and it is significant at 10%.This could be due to the increase in demand for domestically produced goods in foreign countries, which thus raises the earnings of industries producing export commodities and thus create more demand for goods and services within the economy. Thus the last year increase in money in circulation has the tendency of increasing the production capacity of industries and lowers the high price of goods in the current year. Previous imports (ΔX_2-1) positively affect current inflation which may be due to the imported inflation that is, the price rise in industrial countries spread to almost all countries with which they have trade relations.

Consumer price index (ΔX_3-1) for food has its lagged values significantly affecting inflation positively at 1% which may be due to the fact it constitutes higher proportion of the total price index for all items. Previous interest rate (ΔX_5-1) is significant at 1% but negatively signed. This could be evident from the fact that reduction in interest rate attracts investors to move into production. This increased production increases the amount of money in circulation and therefore drives up the commodity prices in the current year. The previous exchange rate (ΔX_7-1) positively affects inflation while lagged

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crude oil export (ΔX_8-1) negatively affects inflation, both at 1%. By implication, an appreciation in naira increases the money availability in the economy which then raises current inflation. And also depletion in the oil reserves due to an increase in oil export in the previous year could lead to reduction in money available to the economy and thus lowers inflation in the current year.

CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis in this study, inflation in Nigeria can be curtailed if those factors that increase it are dealt with. These factors as being analyzed include the lagged export, the lagged consumer price index and lagged exchange rate which positively affect inflation. The factors that reduce inflation such as lagged total export, lagged interest rate and lagged crude oil export should be encouraged as this might lead to price stability or price reduction in Nigeria.

Based on the result from this study, the following policy measures are recommended:

- Policies that will set the Interest rate to a level at which it will encourage investment and increase in production level could be institutionalized such that the excesses produced could be exported if well monitored and which may thus lead to a reduction in inflation.
- Importation must be reduced in Nigeria such that it will not encourage inflation and change of consumer taste. This can be achieved by encouraging consumption of locally made items.

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- Exchange rate system should be maintained at a level that will not impose threat on the Nigeria economy, not too high nor too low.
- Domestic consumption of petroleum product should be focused, not only exportation that has the tendency of depleting oil level.

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