

A dynamic analysis of the effects of Government size on inflation in Nigeria

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Abstract

This study determines the dynamic relationship between the size of government and inflation in Nigeria. Although there have been some studies on fiscal deficit and inflation in Nigeria, not much has been done on the effect of government size on inflation in Nigeria. This study employs the Error Correction Methodology using quarterly time series data to examine the long-run and short-run mechanism of interaction between inflation and the size of government.

Introduction

It is widely accepted that the pursuit of price stability is primary to long-term growth and development and should be the concern of every economy. One of the reasons for this is the high varying inflation rate which has social and economic shocks on the economy as a result of its negative effect on price stability, savings and investment. Given this scenario, the focus of monetary policy has primarily been narrowed to the pursuit of low inflation rather than output or unemployment. However, complementary fiscal policy measures have often been advocated by policy advisors in curbing the inflation menace. It has been argued that one of such fiscal measures is the reduction in government fiscal activities. This, economists view, would directly reduce domestic absorption and push down the price level.

One of the thorniest issues in Nigeria's policy arena today is how to put inflation under effective control. The control of inflation has been central to both monetary and fiscal policy in the last few years, as demonstrated in the various budgets and policy statements. Historically, the origin of the current inflation dates back to the 1970s when the revenue accruing to the government from the non renewable oil resource rose steeply. With the increase in public expenditure enhanced by oil revenues, there was vast expansion in aggregate demand with the inelastic supply of domestic output. Inflation inevitably resulted. The rapid growth in money supply, as a result of the monetization of the earnings from oil, also exerted upward pressure on the general price

level.

The role of government size in inflationary movements is particularly of relevance considering the mode of financing the high and often arbitrary government spending. In recent years, excess revenue sharing has become the practice among the tiers of government and this has significantly increased the size of government. Indeed, this has increased money supply and the attendant inflationary implications.

Studies that have focused on government spending and deficit financing have found negative relationships. In an interesting study of the determinants of inflation in Nigeria. Akinnifesi (1984) emphasized that the increase in government expenditure financed by monetization of oil revenue and credit from the banking system were responsible for the expansion of money supply which in turn with a lagged-in-effect contributed immensely to inflationary tendencies.

II REVIEW OF RELATED STUDIES

There is a vast body of empirical literature on inflation and this is usually dichotomized into two parts: the structuralist and monetarist perspectives. Our brief review here is not bifurcated into the structuralist-monetarist controversy. We begin with studies on inflation in Nigeria. In 1974, a national conference on inflation in Nigeria was organized by the Nigerian Institute of Social and Economic Research (NISER), Ibadan. Several aspects were addressed, but the papers prepared for section two of the conference focused on the proximate causes of inflation. In general, the findings of some of the key articles reveal that neither monetary nor structural factor alone explain the Nigeria inflation. Striking evidence from this conference was that a combination of both factors precipitate the inflationary process.

Prior to the NISER conference on inflation, few studies had addressed the issues of inflation. The work of Oyejide (1972) is particularly appealing as he takes the impact of deficit financing in the course of inflation as the focal point of his empirical enquiry. Having established the theoretical link between domestic money supply and inflation from

the Fisherine equations, Oyejide determined statistically the impact of alternative definitions of deficit financing on inflation. Evidence from this research demonstrates that there is a direct correspondence, though not on a one-to-one basis, between the general price level and measures of deficit financing over the 14 year period from 1957-1970. One point of importance from this is that less emphasis on deficit financing may limit the growth of price inflation in Nigeria.

The results of Ajayi and Awosika (1980) can be juxtaposed against this. An important conclusion from various econometric models employed by these authors indicates that inflation in Nigeria is determined largely by developments in the external sector, but complemented by internal influences. Specifically, their findings demonstrate that the openness of the economy is highly correlated with inflation. For Pinto (1987), the monetization of the foreign exchange earnings from crude oil export, that vastly expanded the growth of MI, constituted the single most important factor to explain movements in the general price levels in the 1970s to the early 1980s.

According to Akinifesi (1984), factors such as changes in money supply, lagged changes in money supply, credit to government by the banking system, government deficit expenditure, industrial production and food price indices were variable captured while changes in the annual data for 1960-1983 were used in empirical inflationary tendencies in Nigeria. The study however, emphasized that the increase in government expenditure financed by monetization of oil revenue and credit from the banking system were responsible for the expansion of money supply which in turn with a lagged-in-effect contributed immensely to inflationary tendencies.

Abidemi and Maliq (2010) analyzed the dynamics and simultaneous inter-relationship between inflation and its determinants in Nigeria between 1970 and 2007. The time series variables properties were examined using the augmented Dickey Fuller (ADF) unit root test and the result revealed that inflation rate, growth rate of real output and money supply and real share of fiscal deficit were stationary while other incorporated variables in the empirical analysis, real share of import, exchange rate and interest rate are stationary at first difference. The result also revealed that unlike in the long-run, change in the growth rate of GDP, growth rate of money supply, real share of import and change in first lagged of inflation rate exert positive effects on the change in inflation rate; while, only change in growth rate of GDP, real share

of import and preceding rate of inflation rate have significant effect on change in inflation rate in the short-run and changes in the real share of fiscal deficit, exchange rate and interest rate have negative contribution to change in inflation rate during the short-run review.

Elsewhere, the causes of inflation have been the preoccupation of several studies particularly in recent years. It is important to document the findings of those related to the present study. In this respect, the work of Aghevil and Khan (1978) is illuminating. These author developed structural equations to demonstrate the two-way causation between budget deficit and inflation in developing countries". Empirical estimates from their study indicates that government expenditure respond faster to inflation than revenue thereby generating an enlarged budget deficit which further engenders inflations.

Chibber et al (1989) developed a detailed econometric model which takes into account both monetary and structural factors in the course of inflation in Zimbabwe. Their investigation shows that monetary factors is the course of inflation in Zimbabwe. Their investigation shows monetary growth, foreign prices, exchange rate and interest rates, unit labour cost and real income are the determinants of inflation in this country. A similar macro-economic model of inflation was employed for Ghana by Chhibber and Shafik (1990). This study, which covers 1965-88, suggests that the growth of money supply is one key variable explaining the Ghanaian inflationary process. Such variables as official exchange rates and real wages could not exert any significant influence on inflation.

However, a significant positive relationship was found between the parallel exchange rate and the general price level. Perhaps one policy implication arising from this is that recent price movements in Ghana have little relationship with the recent exchange rate policy implemented by the government

Still on the issues of inflation, Chhibber (1991) posits that there is one and only one relationship between exchange rate and price inflation, basing his argument on empirical studies of some African countries, one of his main conclusions is that devaluation could exert upward pressure on the general price level through its increased cost of production in the short-run. For Chhibber, the extent to which devaluation of a local currency engenders inflation is largely a function of the impact of such policy measures on the revenues and expenditures (budget) of government together with the monetary

policy that is simultaneously pursued.

Probably motivated by the findings of Chhibber and Shafik (1960a), Sowa and Kwakye (1991) also undertook a study of inflationary trend and control in Ghana. A highly simplified econometric model was employed to determine the relative effects of monetary and structural factors on the general price level. Their results show that monetary expansion exerted some influence on inflation. On the impact of the exchange rate, this variable could not have a significant direct relationship with price movement, a confirmation of one of the findings of Chhibber and Shafik. From their findings, the conclusion of Sowa and Kwakye is that the Ghanaian inflation is structural in character.

Focusing on Uganda, Elbadawi's (1990) research revealed that rapid monetary expansion and the precipitous depreciation of the parallel exchange rate were the principal determinants of inflation during 1988-89. He concluded from the comprehensive review of exchange rate and price movements that devaluation of the official exchange rate is not inflationary. Obviously, this conclusion is consistent with the findings of Chhibber and Skafik (1990a) and Sowa and Kwakye (1991) with respect to Ghana.

The work of Tegene (1989) cannot be ignored. His method of analysis departs from others as he does not utilize econometric techniques to investigate the role of domestic money supply in the course of inflation in the African countries. Rather, he employs the Granger and Piece-causality tests. Evidence from this study demonstrates a unidirectional casualty, from monetary growth to inflation, in the sample countries. A similar analytical methodology was employed by Canetti and Greene (1991) to evaluate the relative contributions of exchange rate movements and monetary expansion to price inflation in ten African countries. The broad conclusion that emerged from this comprehensive investigation is that exchange rate movement and monetary growth explain the inflationary trend in the study countries. In countries such as Sierra Leone, Tanzania and Zaire, the bivariate and trivariate Granger tests point out that the exchange rate has significant causal influence on inflation. With respect to the role of money supply, the statistical test identified causation from money to prices in Gambia, Sierra Leone and Uganda. As for Nigeria and Zambia, the various tests performed could not identify any significant causal relationship between money supply, exchange rate and inflation.

Earlier, London (1989) had examined the role of money supply and exchange rate in the inflationary process in 23 African countries. The pure monetarist

model of the Harberger type was employed and the results revealed that in the period between 1974 and 1985 the growth of money supply, expected inflation and real income were significant determinants of inflation in the sample countries. London, however, argued that because the results obtained give account only of the period averages of the country studies, they should be seen as suggestive rather than definitive. In a related sense, the coefficients of the regressors may not adequately reflect the developments in a particular country; hence, the results should be interpreted with respect to a typical country on average over the period (London, 1989, p. 95). The exchange rate was later introduced as one of the explanatory variables in the pure monetarist model. The results of this indicate that exchange rate movements had a significant impact on the inflationary process in the 1980s. Conversely, the growth of the money supply played a decreasing role in the course of inflation on the continent. This possibly suggests that structural elements have been the proximate cause of inflation in recent years.

III METHODOLOGY

The study of the short-run dynamics and long-run equilibrium relationship between variables is done using the co-integration and Error Correction Methods. This method shows under what conditions a generic dynamic equation becomes consistent with the long-run equilibrium relationship. In the model the rate of inflation (INFL) is taken as the dependent variable. The principal explanatory variable of interest is the size of government. Government expenditure is very useful when estimating models of public sector and destabilization tendency. Thus, we proxy the size of government with government expenditure (GOVEXP); the other traditional determinants of inflation are money supply (MS), exchange rate (EXRT), and the general income level (GDP). According to theory, government expenditure, money supply and aggregate income have the same effect on inflation; positive. This is because each of the effects tend to stimulate aggregate expenditure which in turn, puts upward pressure on prices.

The model is then specified as:

$$\text{INFL} = f(\text{GOVEXP}, \text{MS}, \text{EXRT}, \text{GDP})$$

The ECM can be given as:

$$\Delta \ln \text{INFL} = \theta_0 + \theta_1 \Delta \ln \text{GOVEXP} + \theta_2 \Delta \ln \text{MS} + \theta_3 \Delta \ln \text{EXRT} + \theta_4 \Delta \ln \text{GDP} +$$

$$\theta_5 \text{ECT}_{t-1} + \varepsilon$$

The ADF test is used to test the stationary of the time series before we go ahead to estimate the ECM. Data to be used in this study is quarterly time series data which was sourced from the Central Bank of Nigeria. The ECM is expected to show the relationship between government size and inflation in Nigeria and also we would observe if a short-run stability relationship exists between the two variables. In this manner we would establish the condition for long-run interactions.

IV EMPIRICAL RESULTS

Table 1: Unit Root Test Result (without Trend)

Variable	lag Length	ADF Statistics	5% Significance Level	Remark
DLnINFL	1	-7.190	-2.887	Stationary
DLn GDP	1	-9.766	-2.887	Stationary
DLN GOVEXP	2	-5.522	-2.887	Stationary
DLn MS	1	-7.529	-2.887	Stationary
DLn EXRT	2	-5.470	-2.887	Stationary

For each of the variables, the ADF statistics value is greater than the 5 percent significance value. Thus, it is seen that each of the series is stationary and we

4.1 RESULTS OF THE AUGMENTED DICKEY-FULLER (ADF) TEST

The ADF test is applied according to the time series behaviour of the variables. Since we could not check the data for trends in the series, we present the two specifications of the test with intercepts alone and with trend and intercept. In the selection of lag length, the R-Bar squared criterion (choosing one with highest R-Bar squared) is used. The results of the Augmented Dickey-Fuller (ADF) are given in Tables 1 and 2. The variables are in first difference.

cannot reject the hypothesis of unit roots for each variable.

Table 2: Unit Root Test Results (with Trend)

Variable	lag Length	ADF Statistics	5% Significance Level	Remark
DLnINFL	1	-7.190	-3.450	Stationary
DLn GDP	1	-9.722	-3.450	Stationary
DLN GOVEXP	2	-5.492	-3.450	Stationary
DLn MS	1	-10.835	-3.450	Stationary
DLn EXRT	2	-3.466	-3.450	Stationary

The result of the unit root test for the variables show that they are all stationary. Thus, when each of the series is difference, they become stationary. This means that all the variables are integrated of order one or 1(1). Since the variables are shown as stationary and also their order of integration is the same, we proceed to test for co-integration. This is done because as argued in Iyoha (2004), time series that are integrated of the same order often tend to possess cointegrating properties. In other words, these series are likely to exhibit long-run properties that may not be present in the original series (in levels).

4.2 CO-INTEGRATION TEST

Since the order of the integration of the variables is the same that is one, we can proceed further to apply the Engle and Granger (1987) two-stage methodology for checking the presence of cointegration among the variables. In carrying out this test, the first step is to perform a regression of LnINFL over all the integrated variables, obtain the residual. The second of LnINFL over all the integrated variables, obtain the residual. The second step is to perform an ADF unit root on the residual. If it is found to be stationary i.e. (1(0)), then we accept the hypothesis of cointegration among the variables. The result of the unit root test on the residual is shown in table 3 below:

Table 3: Cointegration Test (Using Engle and Granger Two-Step Method)

Variable	ADF Statistics	5% Significance Level	Remark
Residual	-4.661	-4.541	Stationary

The cointegration test shows that since the ADF statistics of the residual is greater than the critical value, the residual is stationary i.e. 1(0). In that case, we accept the hypothesis of cointegration among the variables. Therefore, a linear combination of the variables will produce a series that have long run properties.

Table 4: Error Correction Representation

Variable	Coefficient	T-Ratio
DLN GOVEXP	-1.173	-3.120
DLn GDP	0.444	1.317
DLn MS	1.530	1.526
DLn MS (-1)	2.331	2.353
DLn EXRT	0.888	2.201
DINPT	2.036	1.764
ECM (-1)	-0.230	-4.032

$$R^2 = 0.262$$

$$R^2 = 0.206$$

$$F(6,107) = 6.22$$

$$DW\text{-Statistic} = 1.88$$

In the result above, all the coefficient (except that of government expenditure) have the expected positive signs. That is, increase in each of the variables would cause inflation to rise. Moreover, the coefficients of GOVEXP, one period lagged money supply and exchange rate are all significantly different from zero at the 5 percent significance level. This reveals that these variables can actually predict the short run behaviour of inflation in Nigeria. A 10 percent increase in government size (government spending) leads to a fall in inflation at about 11.7 percent. This result agrees with that of Abidemi and Maliq (2010) where they found a negative relationship between the real share of fiscal deficit in total output and inflation in Nigeria.

Also, a 10 percent depreciation of the exchange rate causes inflation to rise at about 8.9 percent. This may be as a result of the high dependence of the Nigeria economy on imports. Depreciation actually raises the price of imports. This rise in prices is transmitted into a rise in domestic prices in the short run. The result also shows that money supply that impacts on inflations in the short run. A 10 percent increase in money supply increase inflation at about 20.4 percent after a delay of 1 quarter.

The coefficient of the error term is negative and significant different from zero. This means that though there is a short run disequilibrium from long

4.3 DYNAMIC ANALYSIS

The result of the error correction representation of the model is presented in table 4 below. This result reveals the behaviour of inflation in the short-run.

run stability, this deviation can be restored to long-run equilibrium. However, the adjustment process is slow, given the low value of error term.

The overall fit of the model is also good. Although the R-Squared is low and shows that only 26 percent of the short run inflationary trend is explained in the ecm, the F-statistic is highly significant, even at the 1 percent level. The DW-statistic also shows the absence of autocorrelation in the model.

5. CONCLUSION

This study has evaluated the impact of government size on inflation in Nigeria within a cointegration error correction framework, using quarterly data covering the period of 1981 Q1 to 2009 Q4. The result shows that, contrary to much assumptions, government size actually has a negative impact on inflation in Nigeria. However, money supply (which could be another components of government activity) has a stimulating effects on inflation in the short run. Indeed the elasticity was seen to be very large

6. RECOMMENDATION

The structure of government expenditure should be well coordinated and distributed to other key sectors of the economy with strict supervision in order to avail the continual problems of over spending and over-estimation of projects execution cost which might caused imbalances in price stability level in the economy.

Effective financial policy that will help to stabilize

the naira exchange rate should be adopted due to the resultant effect on domestic price level in the economy.

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