

Impact of Fiscal Policy on Inflation Expectations in Nigeria

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Abstract:-Recent theoretical position is that monetary policy alone is not sufficient to stabilize prices and that the traditional macroeconomic roles of policies can be reversed such that monetary policies are used for debt stabilization while fiscal policies are used to stabilize prices. This study therefore investigates the impact of fiscal policy on inflation expectations in Nigeria. The study began by investigating the causal relationship between inflation and inflation expectations in Nigeria and confirmed the existence of a bi-causal relationship. Basing its theoretical position on the rational inflation expectations theory, the study sourced data spanning from 1981(Q1) to 2018(Q2) for sixteen variables. These variables were separated into four groups and the principal component of each group of data was used as explanatory variables while the Hodrick-Prescott filtered inflation rate data was used as proxy for inflation expectations. The study applied the Vector Error Correction Mechanism (VECM) and established a negative relationship existing between inflation expectations and fiscal policy in Nigeria. However, the result was not significant. The study then recommends more in-depth studies on inflation expectations related issues generally and specifically, a disaggregated study of the impact of fiscal policy variables on inflation expectations for Nigeria for effective control of inflationary trends in Nigeria.

Key words: “Inflation”, “Inflation Expectations”, “Fiscal policy”, “Monetary Policy”, “Structural variables”, “principal component analysis”

I. INTRODUCTION

One of the key issues of monetary policy is how to reduce inflation persistence. In spite of this, inflation persistence still remains one of the most exasperating economic phenomena in Nigeria and it had been resistant to, or at best been sluggish in responding to traditional restrictive policies. For example, despite the Central Bank of Nigeria (CBN)'s efforts to rein-in inflation, actual inflation rate are oftentimes higher than CBN's benchmark inflation rate. Worst still, high inflation rates in Nigeria strives alongside high unemployment rates and excess capacity contrary to theory-based expectations.

Many economists including Robb (2000) and Brissimis and Migiakakis (2013) are of the opinion that inflation becomes policy-resistant and develops a momentum of its own when the sources of persistence is ignored or not properly investigated. Pointing to the mechanism through which inflationary pressures are transmitted, Brissimis and Migiakakis

(2013) opined that demand pressures are transmitted to prices via a complicated and circuitious channel and this channel, in its turn, is heavily influenced by expectations. This is also in line with Coibion and Gorodnichenko (2012) and Assenza, Bao, Hommes and Massaro (2014) who are of the opinion that agents are guided by expectations when making economic decisions such as how much to consume or save or when to hire and fire and these decisions, through series of market clearing interactions, ultimately determine realised macroeconomic outcomes. Moreover, the empirical findings of Nalewaik (2016) indicate that expectations have a positive causal effect on actual subsequent inflation. Emphasizing the importance of understanding agents' expectations, Greenspan (1996) and Adamgbe (2004) pointed out that policy makers oftentimes attribute the successes and failures of monetary policy to abilities to understand and anchor agents' expectations. Understanding what guides economic agents' expectations about future price trends is therefore crucial.

The need to understand what guides economic agents's expectations incited a number of researches over the years. In Brazil, Cerisola and Gelos (2005) found out that fiscal policy had been instrumental in shapening expectations while in india, Patra and Ray (2010) proved that monetary policy, and real interest rate in particular, has significant influence on expectations. For Nigeria, inflation expectations related studies include Adamgbe (2004) and Umoru and Oseme (2013). The study conducted by Adamgbe (2004) concentrated mainly on monetary policy variables as major determinants of inflation expectations. Umoru and Oseme (2013) also concentrated on the effect of inflation expectations on variation in interest rates. The research question which his study seeks to find answers to are: (1) what type of policy variables influence economic agents' inflation expectations in Nigeria. (2) Does Fiscal Policy have significant impact on inflation expectations in Nigeria? This study therefore investigates previous results obtained by Adamgbe (2004) and Umoru and Oseme (2013) and secondly, extends the findings of these studies by investigating the impact of fiscal policy variables on inflation expectations in Nigeria.

II. LITERATURE REVIEW

The conceptual literature in this study draws mainly from a number of works including Lucas (1972), Souleles (2001),

Bryan and Venkatu, (2001) Mankiw, Reiss and Wolfman, (2003), Leiser and Drori (2004), Antoshin (2007), Keynes (1936) as in Olivares (2009), Olivares (2009), Rosser (2011), Doguwa, Olowofeso & Essien (2011), Berlemann and Nelson (2013), Adamu (2015), Wiederholt, (2015) and Caplin (2016). Inferences gathered from these literatures are that inflation expectations are unobservable opinions and arbitrary assumptions formed in the minds of economic agents and these agents are more concerned about the workability of their assumptions rather than the truth about existing hypotheses. The basic idea behind inflation expectations hypothesis is that people expect inflations and, based on the level of confidence they have on available information, they try to predict future inflationary trends with the hope that each independent prediction sufficiently predicts inflationary trends. Expectations hold a prime position in economics because while on one hand, economic theories are a combination of normative reasoning, expectations and psychological uncertainties, on the other hand, economic outcomes are determined by the waves of expectations (Souleles, 2001 & Wiederholt, 2015).

For some decades, a general concession among policy makers is that inflation expectations determine actual inflation. Based on this, central banks are expected to incorporate inflation expectations management in monetary policy formulations targeted at inflation rates (Bullard, 2016). Central Banks should provide adequate information that will enable economic agents incorporate expected inflation in their economic decisions because the more open a Central Bank is about its goals, the better the chances that the bank will be able to convince the public of its commitment to price stability (Evans & Ramey, 1998; Cukierman, 2009 & Ramey, 2015). Evolving paradigms, and particularly the Chicago School of thought, however are pointed towards the fiscal (or real) theory of the price level which assumes that monetary policies alone are not sufficient to stabilize prices. Rational agents are likely to also consider the effects of fiscal policies and shocks to government budgets on prices. According to this school, an appropriate blend of monetary and fiscal policies is needed to stabilize prices because effective fiscal and monetary policies are in reality, closely linked to individuals' expectations of policy outcomes, particularly future inflation. This school of thought also suggests that the traditional macroeconomic roles of these policies can be reversed such that monetary policies are used for debt stabilization while fiscal policies are used to stabilize prices (Christiano & Fitzgerald, 2000; Cochrane, 2019).

A number of empirical studies concerning inflation expectations exist. Antoshin (2007) modelled inflation expectations for the United Kingdom as a cointegrated system. The study controlled for different policy regimes, liquidity performance and macroeconomic variables. The result reveals that only monetary policy regime was useful in explaining inflation expectations in the United Kingdom. In order to test the effects of changes in Bundesbank monetary

policies on inflation expectations, Heinemann and Ullrich (2004) employed the Barro-Gordon theory on a flexible specification of expectations which allows for rational and adaptive elements. The result reveals that monetary regime changes do not have strong or lasting impact on inflation expectations formation.

Cerisola and Gelos (2005) examined the macroeconomic determinants of survey inflation expectations in Brazil since the adoption of inflation targeting in 1999. The study sourced monthly data for periods covering January 2001 to July 2004 and analysed these data using the Ordinary Least Square (OLS), the Generalised Method of Moments (GMM) and the Fully Modified OLS (FMOLS) methods. The results indicate that the stance of fiscal policy, as proxied by the ratio of the consolidated primary surplus to GDP, has been instrumental in shaping expectations. Patra and Ray (2010) explored the determinants of inflation expectations in India by estimating the stance of monetary and fiscal policies, marginal costs and exogenous supply shocks. The study employed data for variables including real exchange rates, GDP gap, real interest rate, price of primary articles and fuel inflation. The empirical findings of this paper show that the real interest rate has a significant effect on people's anticipations, outweighing the effects of fiscal policy or even exchange rate changes.

The impact analysis conducted by Adamgbe (2004) was on inflation expectations, price volatility and inflation for Nigeria. The study added control variables such as fiscal impulse (using fiscal deficit as proxy), interest rate differential between the lending rate and the savings rate, growth rate of gross domestic product at current market prices, growth of money supply and the purchasing power parity to the targeted explanatory variables; price volatility and inflation expectations. The proxy used for inflation expectations was a data generated by applying the Gauss-Siedel algorithm on a simulated inflation rates data. Using annual data for periods between 1970 and 2000, the study employed the cointegration technique and also obtained the impulse response of the variables. The study showed that money growth is a weak determinant of inflation expectations. Umoru and Oseme (2013) examined the relationship between inflationary expectations and the variations in interest rate using the Generalised Method of Moment (GMM) estimator. The result revealed a negative and significant relationship between the focus variables. On the other hand, Adamu (2015) examined the predictive ability of survey based expectations on movements of inflation using the relationship between Business Expectations Survey (BES) and selected macroeconomic variables. Employing the Kaminsky-Reinhart Signal approach, the results reveal a weak and insignificant relationship between BES and lending rates and exchange rates variables.

Other related studies on inflation expectations in Nigeria include Doguwa and Alade (2013) and Bamanga, Musa, Salihu, Udoette, Adejo, Edem, Bukar and Udechukwu-Peterclaver (2016). However, compared to the number of

inflation expectations research conducted in most advanced countries, there is still need for further researches on inflation expectations in Nigeria.

III. METHODOLOGY

3.1 Theoretical Framework

One of the widely emphasized expectations theories is the rational expectations theory. The axiom behind the rational expectations hypothesis – otherwise called the “model consistent” hypothesis – is that economic agents correctly understand the markets they act in; correctly judge the actions and reactions of other actors and they understand the effects of these interactions on the economy. This implies a strongly efficient system where market participants themselves can perfectly interpret market dynamics independent of any external fundamental or technical analysts; neither do they need insider’s information. The third group is the prevailing government policies. Agents are assumed to be well informed about the true working of the economy which they learn through experience overtime and will use this knowledge optimally. With time, on the average, expectational errors becomes non-existent in the absence of shocks (Muth, 1961; Sargent et & Wallace, 1975; Evans & Honkapohja, 2001; Evans, 2004; Spahn, 2009; Assenza, Bao, Hommes&Massaro, 2014)

The only concern of rational agents therefore is to strive to improve the accuracy of their predictions by using all pertinent information available when forming their expectations about inflation. Based on this assumption, the conventional model for rational expectations as given in Drager (2011) as:

$$p_t^e = E_t(P_{t+1}|I_t(z)) \tag{2.1}$$

Agents’ expectations of next period’s price P_{t+1} formed in the current period is conditional on the public information set I_t , which in itself, is a function of exogenous processes in z (Lucas, 1972 & Dragger, 2011). Hendry (2005) pointed out that the sources of information are numerous because of real world complexities. Data generated from all these sources of information are likely to be unmanageably large and this makes information-based data generating processes associated with expectations far too complicated and highly dimensional to be completely modelled.

3.2 The Relationship between Inflation and Inflation Expectations

Available records indicate that the CBN began conducting expectations survey for Nigeria from second quarter of 2008. In order to conduct time series studies using sufficient number of observations, this study verified Lucas (1972) and Mills (2009) who are of the opinion that inflation expectations dictate actual inflation trends. This is to test how appropriate lead values of inflation is as proxy for inflation expectations in Nigeria. Figure 1 is a line plot of both variables.

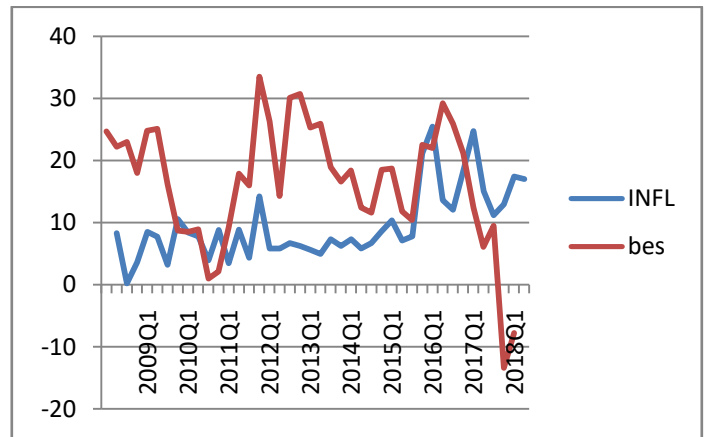


Figure 1: Inflation and inflation expectations trends

Source: Researcher’s computation

Figure 1 is a simulation of inflation rates (INFL) and Business Expectation Survey (BES) data on next period’s expected rates of inflation from 2008Q2 to 2018Q2. Figure 1 clearly indicate that INFL and BES move in tandem and in the same direction such that BES rises as inflation rises and falls along with inflation rates. The study also established if there is a causal relationship between the variables. The result of the granger causality test conducted is presented in Table 3.1

Table 3.1: Granger Causality Test Results for Inflation and Inflation Expectations

Null Hypothesis:	Obs	F-Statistic	Prob.
INFL does not Granger Cause BES(-1)	36	0.94755	0.4519
BES(-1) does not Granger Cause INFL		0.46460	0.7611

Source: Researcher’s Computation

Table 3.1 clearly shows that the null hypothesis can be rejected. Combining this with Figure 1, one can infer that there is a positive bi-causal relationship between inflation and inflation expectations. Based on these examinations, this study hinges its decision to uses the hodrick-prescott (lamda 1600) filtered value of inflation as proxy for inflation expectations.

3.3 The model

Atotal of seventeen variables were sourced and fifteen of them were grouped into the various predictor sets. Detailed information on the variables contained in each set is presented in appendix I. The principal component of each set of predictors were derived and used as explanatory variables based on this, the study specifies it functional model as:

$$INEXP_{t+1} = f(INFL, MPV, FPV, OPV, SV) \dots 3.1$$

Where inflation expectations is represented by INEXP, MPV and FV are principal components of variables traditionally termed monetary policy and fiscal policy variables

respectively while OPV is the principal component of variables directly associated with open economies. SV is the principal component of structural variables. Expressing 3.1 as an empirical model gives

$$\text{INEXP}_{t+1} = \beta_0 + \beta_1 \text{INFL} + \beta_2 \text{MPV} + \beta_3 \text{FPV} + \beta_4 \text{OPV} + \beta_5 \text{SV} + \varepsilon_t \quad \dots \quad 3.2$$

The major concern of this study is to ascertain by how much variations in the predictors affect variations in inflation expectations. Therefore the impact of change is of essence. Therefore 3.2 is expressed as:

$$\Delta \text{INEXP}_{t+1} = \beta_0 + \beta_1 \Delta \text{INFL} + \beta_2 \Delta \text{MPV} + \beta_3 \Delta \text{FPV} + \beta_4 \Delta \text{OPV} + \beta_5 \Delta \text{SV} + \varepsilon_t \quad \dots \quad 3.3$$

a priori sign expectations: $\beta_1, \beta_2, \beta_3, \text{ and } \beta_4 > 0; \beta_5 < 0, \varepsilon_t \sim N(\mu, \sigma^2)$

Quarterly time series data spanning from 1981(Q1) to 2018(Q2) were sourced for fifteen variables from various editions of the CBN statistical Bulletin. For the independent variable INEXP, The study relied on the Hodrick-Prescott filtered (Lambda 1600) year-on-year inflation rate as proxy for inflation expectations (INEXP) while the explanatory variables were reduced into the four principal components earlier mentioned.

3.4 Estimation procedure

The study began by running a preliminary investigation on the distribution, correlation and time series properties of the data sourced. The descriptive statistic results show that the data follows standard Gaussian distribution and the Jacque Bera statistics signify that each sample is an acceptable reflection of the population. The correlation test result also confirms moderate correlation between inflation expectations and the respective explanatory variable. All variables were stationary at first difference. The trace statistics and the maximum eigen statistics of the Johansen co-integration test indicates one co-integrating equation at the 5% level of acceptance. Based on the Johansen co-integration result, the study re-specified and estimated the following Vector Error Correction (VECM) models:

$$\Delta \text{INEXP}_{t+1} = \beta_0 + \beta_1 \Delta \text{INFL} + \beta_2 \Delta \text{MPV} + \beta_3 \Delta \text{FPV} + \beta_4 \Delta \text{OPV} + \beta_5 \Delta \text{SV} + \text{ECM}_{t+1} + \varepsilon_t \quad \dots \quad 3.4$$

$$\Delta \text{INFL} = \beta_0 + \beta_1 \Delta \text{INEXP}_{t+1} + \beta_2 \Delta \text{MPV} + \beta_3 \Delta \text{FPV} + \beta_4 \Delta \text{OPV} + \beta_5 \Delta \text{SV} + \text{ECM}_{t+1} + \varepsilon_t \quad \dots \quad 3.5$$

ECM is the error correction term. It is expected that the ECM is stationary at levels, negatively signed and will be accepted in this study as significant at the 5% alpha level. The study proceeds by estimating models 3.4 and 3.5 though the main focus is model 3.4. The discussion of findings therefore is concentrated on 3.4.

IV. DISCUSSION OF FINDINGS

The empirical results are presented in Appendix III. Contrary to the results obtained by Cerisola and Gelos (2005) for Brazil,

the results of this study do not support fiscal policy variables as significant determinants of inflation expectations in Nigeria. All other candidate variables however, were found significant as determinants of inflation expectations in Nigeria. Another contradiction in the result obtained in his study is the sign expectations for monetary predictors. It is expected that expansionary monetary policies heightens inflation expectations. However, the result indicates the opposite.

The study also showed that variables that are directly related to the open economy -such as exchange rate and price of crude oil- are positive determinants of inflation expectations in Nigeria. The study also reveals that agents are also mindful of structural variables such as such as changes in the cost of transportation and utilities when forming their expectations about inflation. Again, the study confirms autoregressive nature of inflation expectations and its reliance on the history of inflation through its revelation that previous expectations and past inflationary trends are strong determinants of inflation expectations in Nigeria.

Though the high value of the F-statistics as well as the low values of the sum of squared residuals and the standard error of equation attests to the overall significance of the model, the study however proceeded to further test the validity of the model using several residual tests (see Appendices IV(a) and IV(b)). The kernel density results shows a Gaussian distribution and clusters concentrated around mean zero which indicate that the distribution of the residuals is consistent with the IID assumption thereby confirming that ε_t is white noise and no basis to suspect omitted variable bias.

V. CONCLUSION AND POLICY IMPLICATION

This paper has examined the effects of macroeconomic variables on inflation expectations formation processes in Nigeria. The results reveal that economic agents in Nigeria are less concerned about fiscal policy variables and would rather react to information contained in previous inflation history, previous inflation predictions, monetary variables as well as variables having direct link with the international communities like exchange rates and price of crude oil.

The study also reveals the bi-causal relationship between inflation and inflation expectations in Nigeria which implies that inflation in Nigeria can be controlled with effective expectations management. In order to improve expectations management in Nigeria, it is therefore pertinent that more research efforts are geared towards investigating inflation expectations and related issues in order to clearly understand expectations formation processes in Nigeria.

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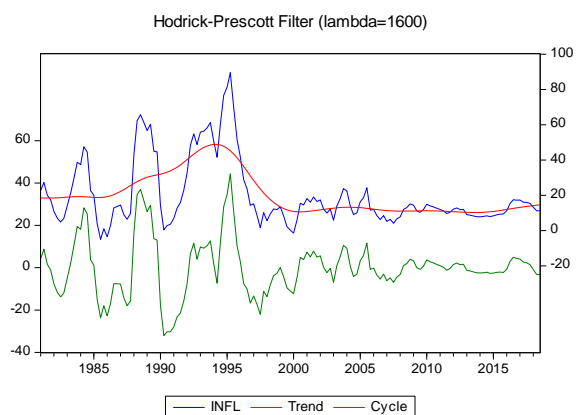
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APPENDIX I- DATA INFORMATION

Variables used	Components	Measurements/ Proxy	Source of Data
1. Endogeneous Variable INEXP	Inflation Expectations	Lead values of Hodrick-Prescott filtered year-on-year headline inflation rates	CBN Statistical Bulletin
1. Explanatory Variables	Interest Rate	Lending Interest Rate	CBN Statistical Bulletin
a. <u>MPV</u> (Principal Component of Monetary Policy Variables)	Credit to Private Sector Money Supply	Log value of Credit to core Private Sector Log value of Broad Money Supply	CBN Statistical Bulletin CBN Statistical Bulletin
b. <u>FPV</u> (Principal Component of Fiscal Policy Variables)	Government Expenditure Taxation	Log value of Federal Government Expenditure Proxy: log value of federal government's non-oil revenue	CBN Statistical Bulletin CBN Statistical Bulletin
c. <u>OPV</u> (Principal Component of Variables related to open economy)	Price of crude oil Balance of Payment External Debt Purchasing Power Parity	Price of crude oil Log value of Balance of Payment Position Log value of External Debt Proxy: $EXR+ (CPI^A - CPI)$ Where: EXR =Log level of the nominal exchange rate; CPI^A and CPI are the USA and Nigeria's log-levels of consumer price indices. (see Adamgbe, 2004)	OPEC/REUTERS CBN Statistical Bulletin CBN Statistical Bulletin CBN, World Bank and FBI files
d. <u>SV</u> (Principal Component of structural Variables)	Real Marginal Investment Agriculture Transportation Utilities	Proxy: $RGDP-RGDP_{t-1}$ Log value of private sector investment Log value of Contributions of the agricultural sector to nominal GDP Log value of Contribution of the transportation sector to nominal GDP Log value of Contribution of utilities to nominal GDP	CBN Statistical Bulletin CBN Statistical Bulletin CBN Statistical Bulletin CBN Statistical Bulletin CBN Statistical Bulletin
e. <u>Other Variables used</u> INFL BES	Inflation Rates (INFL) Business Expectation Survey(BES)	Consumer Price Index Business Expectation Survey	CBN Statistical Bulletin CBN Statistical Bulletin

APPENDIX II- HODRICK- PRESCOTT FILTER (INFLATION RATES)



APPENDIX III- VECM RESULTS

Vector Error Correction Estimates
 Date: 04/02/19 Time: 20:06
 Sample (adjusted): 1981Q4 2018Q2
 Included observations: 146 after adjustments
 Standard errors in () & t-statistics in []

CointegratingEq:		CointEq1	
INEXP		1.000000	
INFL(-1)		-2.309423 (0.21259) [-10.8631]	
C		26.22840	
Error Correction:		D(INEXP(1))	D(INFL)
CointEq1		-0.000610 (6.8E-05) [-8.93849]	0.250195 (0.02929) [8.54302]
D(INEXP)		2.085615 (0.01736) [120.148]	-47.75238 (7.44374) [-6.41511]
D(INEXP(-1))		-1.098147 (0.01708) [-64.2989]	47.79473 (7.32369) [6.52604]
D(INFL(-1))		-0.001605 (0.00016) [-9.81550]	0.457957 (0.07011) [6.53198]
D(INFL(-2))		-0.001314 (0.00018) [-7.36262]	0.313277 (0.07655) [4.09231]

C	0.002132 (0.00543) [0.39296]	4.408868 (2.32660) [1.89499]
MPV	-0.015684 (0.00620) [-2.52787]	3.640883 (2.66057) [1.36846]
FPV	0.000221 (0.00523) [0.04217]	-2.520801 (2.24405) [-1.12333]
OPV	0.005006 (0.00131) [3.83565]	-1.015329 (0.55962) [-1.81433]
SV	0.009754 (0.00292) [3.34084]	-1.232700 (1.25204) [-0.98455]
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R-squared	0.999790	0.467552
Adj. R-squared	0.999776	0.432317
Sum sq. resids	0.023189	4264.113
S.E. equation	0.013058	5.599444
F-statistic	71938.83	13.26934
Log likelihood	431.4159	-453.4950
Akaike AIC	-5.772821	6.349246
Schwarz SC	-5.568464	6.553603
Mean dependent	-0.024959	0.026096
S.D. dependent	0.872642	7.431761
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Determinant resid covariance (dof adj.)	0.004767	
Determinant resid covariance	0.004136	
Log likelihood	-13.71215	
Akaike information criterion	0.489207	
Schwarz criterion	0.938792	

APPENDIX IV- SENSITIVITY TESTS (RESIDUAL TESTS)

