“Internal and external drivers of inflation in Nigeria”

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INTERNAL AND EXTERNAL DRIVERS OF INFLATION IN NIGERIA

Abstract

This study contributes to the literature on inflation dynamics by examining whether internal or external factors drive inflationary pressure in Nigeria. Using the annual time series data from 1981 to 2017 and applying Johansen cointegration analysis, the vector error correction mechanism and the impulse response function, the study reveals some compelling evidence to suggest that external forces are responsible for inflationary pressure in Nigeria. The results, amongst others, reveal that: external drivers – exchange rate, imported inflation and openness – induce a positive and direct relation to inflation. This is because a percentage change in these variables results in an increase in inflation of 0.49%, 0.47% and 4.28%, respectively, on average, ceteris paribus; the internal drivers – government expenditures, net food exports and lending interest rate – dampen inflation by 0.48%, 1.70% and 0.02%, respectively, on average, ceteris paribus; there is evidence of cointegration indicating that 57.48% of short-run errors will be corrected in the long run; imported inflation contributes to a deviation of about 33% deviation in the first five periods and accounts for cumulative average of over 100% deviation in inflation. Policy implications are discussed.

Keywords inflation dynamics, inflation targeting, domestic inflation, external inflation, Nigeria

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INTRODUCTION

Inflation dynamics in developed and developing economies differ significantly. For example, the developed OECD's countries maintain very low and stable single-digit figures as opposed to developing economies of sub-Saharan Africa (SSA) with high and double-digit figures. The domestic drivers of inflation in Nigeria, as identified by previous studies, include: unemployment (Nguyen, Dridi, Unsal, & Williams, 2015), broad money supply (Lim & Sek, 2015; Nguyen, 2015; Q. Alam & S. Alam, 2016; Khandan & Hosseini, 2016; Dahiru & Sulong, 2017; Mutwiri, 2017), interest rate (Kundu, 2016; Nagy & Tengely, 2018), GDP growth (Lim & Sek, 2015), fiscal deficit (Nguyen, 2015; Kundu, 2016), inflation uncertainty (Nagy & Tengely, 2018), and budget deficit (Khandan & Hosseini, 2016), while external drivers are exchange rate (Q. Alam & S. Alam, 2016; Kundu, 2016; Dahiru & Sulong, 2017; Mutwiri, 2017), oil prices (Dahiru & Sulong, 2017; Hemmati, Niakan, & Varahrami, 2017; Osei, 2017), foreign borrowings (Nguyen et al., 2015) and trade deficit (Nguyen et al., 2015; Osei, 2017).

Research on Nigeria is extremely important. It is an open economy, the largest economy in SSA, which is heavily reliant on imports of finished and semi-finished products with a consistent trade deficit position since 1980 to nowadays. The country's inflation forecast shows a

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declining trend from 15.37% in December 2017 to 14.33% in February 2018, then to 11.61% and 11.14% in May and July 2018, respectively. It rose slightly to 11.23% in August 2018 above market expectations of 11.11%, which was the first major rise since the downward trend since January 2017, when it reached a 12-year high of 18.7%, while the rate was 11.28% as of November 2018. From the experience of recent global financial crises, it has become evident how external factors can easily distort domestic equilibrium. Crises that began in the United States in late 2007 filtered across several economies by the end of 2009, transporting inflationary pressures, amongst others, in its wake. The effect of exchange rate misalignment was evident in the trend of inflation, as it grew by 104.9% in the period 2014–2017, following naira devaluation by 92.9% in the same period. Since Nigeria's central bank does not pursue inflation targeting but growth-promoting policies, this study attempts to identify internal and external factors contributing to inflation trends in Nigeria and to analyze which have a greater influence.

Given the recent misalignment in the exchange rate, there is a need to re-assess factors triggering inflationary pressure in Nigeria. The decline in oil exports between 2014–2017 with declining prices and the decision of the monetary authority to let off the erstwhile floating pegged regime saw the Naira plummeting from around naira 150 per USD 1 to around naira 500 per USD 1 at the parallel market in the wake of 2017. Such an event arose from the Nigerian government's inability to continually defend the naira, having lost USD 1 billion on speculating attacks in 10 days. The decline in oil prices (arising from Shale revolution), declining quantities (due to the unrest in the Niger Delta region) and excessive pressure on relatively scarce foreign exchange (forex) to finance consumer food imports bill meant dire forecasts for the economy. This means that prices for food and consumer goods are rising steadily.

The democratic regime, which began in 1999, led to a further devaluation of Naira from naira 21.8 per USD 1 to naira 101.7 in 2001 representing 380%; also, inflation rose from 6.6% to 18.3%, which is 177% for the same period. In addition, consistent devaluation results in higher inflation. Inflation consistently records double digits, with the exception of 2006–2007 and 2013–2015 with an average of 7.5% and 8.5%, respectively. The post-democracy experience signifies a close link between exchange rate and inflation in Nigeria, whereas, the trend differs for the pre-democracy regime; hence there is a need to empirically examine the drivers of inflation. In recent times, in the light of depression in the economy, the Central Bank of Nigeria (CBN) has been caught between the rock and a hard place, making the monetary policy rate remained consistently unchanged. There is an acute need to stimulate the economy by ensuring credit expansion. However, at the same time, caution is being exercised not to put too much cheap funds at the disposal of importers – this is required to reduce excess pressure on the dollar. Since the release of too many free funds threatens measures to stabilize naira, it transmits inflationary pressures and further deepens the recession. In the light of this dichotomy, it is necessary to ascertain the degree of response of inflation to domestic and external forces of inflationary pressure in Nigeria.

This study is about understanding what drives inflation and why inflation research is important; what factors have a greater influence on inflation, whether internal or external? The rest of the study is as follows. Section 1 gives a brief literature review on inflation dynamics, section 2 details the model and data, section 3 discusses the results and the last section concludes with policy recommendations.

1. LITERATURE REVIEW

The literature is swamped with two basic theoretical strands explaining the cause of inflation; these are the monetarist and structuralist views. The monetarist view is based on the famous opinion of its proponent, Milton Friedman, who suggested that inflation was always and everywhere a monetary phenomenon. This strand sees inflation arising from unbridled expansion in aggregate demand resulting from government deficits financed in part by increases in money supply and directed credit allocation. This ideology has received impressive support in literature (Kundu, 2016; Alagidede, Coleman, & Adu, 2014; Khandan & Hosseini, 2016), affirming that expansionary

monetary policy and large external inflows exert an upward pressure on domestic prices.

On the other hand, experience of some small open import dependent economies has shown that monetary and fiscal constraints (inflation targeting) might not achieve desired result, rather they could be counter-productive. Here, inflationary pressures are largely supply-sided due to heavy import dependency and relatively volatile exchange rate. Hence, adopting monetary and fiscal constraints could hamper growth and further cause inflation to plunge. This is basically the structuralist view or the supply-side approach to explaining inflation. This could also be a prominent determinant of inflationary pressure because supply dynamics, such as food and consumer goods, are vital in price variations in developing economies, as well as the excessive exposure to external shocks due to falls in domestic production, weak industrial base or structural rigidities in the agricultural sector translate to hike in food prices, which automatically pass through to the general price level (Alagidede, Coleman, & Adu, 2014).

Akuns, Obioma, Udoh, Uzonwanne, Adeleke, and Mohammed (2016) employed the vector autoregressive (VAR) model to simulate two scenarios of a full-fledged inflation targeting and a nominal GDP-targeting framework to identify, which will be more suitable and productive in the Nigerian context. Findings reveal that the former may not be relevant in the post-crisis Nigeria as it does not support the employment, economic growth, exchange rate and foreign reserves variability objectives of the Nigerian economy. However, the second scenario was found to increase these key macroeconomic variables, which is more consistent with the New Keynesian theory. Similarly, Alagidede et al. (2014) investigated the vital issue of inflation persistence in Ghana, which is useful for assessing the implications for policy and welfare. Results show that inflationary shocks have asymmetric impacts across Ghana's sectors and regions, and effects of the shocks on year-on-year inflation were obviously different from those of the month-on-month series. Based on these, the study contributed to empirical literature in two major ways; it suggests asymmetries in the degrees of inflation persistence across the sectors. Also, the choice between using year-on-year and month-on-month inflation can lead to substantially different conclusions about inflation persistence. In addition, it is concluded that the poor class is likely to be more adversely affected, which increases welfare cost of inflation, which will ultimately impact poverty and income distribution.

Q. Alam and S. Alam (2016) found domestic, and not external, factors influence inflationary pressures in India. They show that monetary growth and money supply bottlenecks are most responsible for increasing domestic prices both the short and long run, though the importance of supply bottlenecks was relatively short in the long-run period. Kundu (2016) used the Bounds testing approach to analyze the determinants of inflation for Bangladesh and found that the effect of exchange rate on inflation was negative, while government expenditure was positively related with money supply and interest rate having no significant effect in the long run. Likewise, Chaudhary and Xiumin (2018)'s results were consistent with monetary theory for Nepal, as money supply, real GDP and imported prices (Indian prices) were significant determinants of inflation. The study suggested that the open border of Nepal with India provided the high prospects for Indian domination against the domestic prices of Nepal, thereby recommending the establishment of a mechanism for monitoring price developments in India to ensure harmonization of domestic prices.

In the same vein, Dahiru and Sulong (2017) used the autoregressive distributed lag (ARDL) technique to confirm a long-run relationship between inflation and key macroeconomic variables, such as money supply, exchange rate, GDP, interest rate, oil price and financial instability. While exchange rate, oil price and money supply had a positive relationship with inflation, interest rate, financial instability, GDP and broad money supply nominal effective exchange rate irritation term were negative. The study recommended that price stability should be pursued through either monetary policy or exchange rate target given that shocks in money supply and exchange rate influence variations in inflation. Nagy and Tengely (2018) discussed the external and domestic factors that could spur the incidence of inflation in Hungary using a combination of the Principal Component Analysis (PCA) technique and the four-dimensional

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Bayesian VAR method. Their results revealed that internal and external factors had time-varying effects on inflation in Hungary. Essentially, as the Hungarian market became more receptive to global exchanges and production process beyond the European Union (EU), domestic inflation development in Hungary was strengthened by external factors at some specific time period, while beyond 2012, global factors became responsible for the changes in inflation in the country. The implication of this finding is stressed in the fact that the Hungarian domestic inflation showed higher sensitivity to developments in global factors (that is, the output gap of the EU) than domestic factors or causes (which was represented by that domestic consumption gap).

Similarly, Plessis, Reid, and Siklos (2018) in their contribution to inflation expectations vis-à-vis demographics and inflation targeting in South Africa, have noted that within a ten-year timeline across over 12,000 observations, inflation expectations are largely driven by domestic economic conditions. A combination of time-series and cross-sectional data was analyzed using the survey technique from stylized facts and the quantile regression to elicit demographic information from households in South Africa on inflation expectation under an inflation targeting regime by the central banking authority. Study results further showed that demographic variables, such as age, gender, race and education, had effects on inflation expectation over time. However, the demographic response to inflation expectation, according to these authors, is asymmetric – the younger class of individuals showed a lower inflation expectation, while the elderly showed otherwise. Further, it was also observed that income and educational levels of individuals necessitated an inverse reaction to expectations on inflation in South Africa (Plessis, Reid, & Siklos, 2018).

Hemmati, Niakan and Varahrami (2017) also studied exogenous determinants of inflation in Iran using the ordinary least squares (OLS) single equation model as well as the vector error correction model (VECM). Using the consumer price index (CPI) as the main proxy for inflation, they revealed that, in the long run, money supply, exchange rate, import price index and intensified sanctions by the governing authority of Iran contributively raised the general price index. Their study further asserts that the direction of response of inflation to sanctions made by the government was positive such that an increase in the severity of sanctions provoked an increase in the inflation rate. Hemmati et al. (2017) state that the combination of external determinants (or variables) had a predictive influence on inflation rate, particularly the exchange rate and effective tariff. Similarly for Iran, Khandan and Hosseini (2016) examined inflation dynamics using a system of simultaneous equations, factors which are responsible for the high inflation rate as experienced in the country for over forty years. Econometric results confirm the basic monetarist view of inflation as well as the quantity theory of money, which supports the proposition that money supply growth is the major determinant of increases in the general level of prices. Specifically, Niakan and Varahrami (2017) claim that money supply increases through government's budget deficit that plays an indirect role in the generation of inflationary pressures in Iran.

Lastly, Lim and Sek (2015) dichotomized experimental focus between two groups of countries with a view to assess the determinants of inflation between 1970 and 2011. Using the autoregressive distributed lag (ARDL) and the corresponding error correction model (ECM), they reveal that output growth and import of goods and services in low-inflation countries show a significant impact on inflation in the long run. On the other hand, money supply, national expenditure and output growth were observed to have a great impact on inflation in the high-inflation countries in the long run. Further implementation of their ARDL estimates reveals nil short-run effect of all variables on inflation in high-inflation countries, while money supply, imports and output growth show high potencial to affect inflation in the low-inflation countries.

2. DATA AND METHODOLOGY

2.1. Data and sources

The study uses annual time series data on Nigeria from 1981 to 2017. Table 1 details the variables used, their measurements and sources.

Table 1. Description of variables

Source: Authors' compilation, World Bank (2018).

Variables	Measurement	Label	Sources
Lending interest rate	Percentages	int	World Development Indicators (WDI)
Government expenditure	Constant 2,000 USD	exp	WDI
Official exchange rate	LCU per USD, period average	exch	WDI
Trade openness	Degree	opn	WDI
Net food export	Percentages of merchandise exports	nfx	WDI
Inflation rate of trade of trading partners (import)	Average for the economies accounting for 70% of total Nigeria imports	inftps	WDI
Inflation rate	Annual percentages	inf	WDI

Note: LCU – Local currency unit.

2.2. Model specification

To examine how internal or external factors drive inflation in Nigeria, this study is based on the existing literature on theories of inflation by specifying the model as:

$$\inf = f\left(int, exp, exch, opn, nfx, inftps\right), \tag{1}$$

where *inf* – inflation; *int* – lending interest rate; *exp* – government expenditure, *exch* – official exchange rate; *opn* – trade openness; *nfx* – net food export; and *inftps* – inflation rate of trade of trading partners.

Equation (1) expresses inflation as an implicit function of the endogenous variables, the explicit form of which is specified in its logarithmic form:

$$\begin{aligned} \ln inf_t &= b_0 + b_1 \ln inf_t + b_2 \ln int_t + \\ &+ b_3 \ln exch_t + b_4 \ln opn_t + b_5 nfx_t + \\ &+ b_6 \ln inftps_t + e_t, \end{aligned} \tag{2}$$

where b_0 is the intercept, b_1 to b_6 are the parameters to be estimated, and e_t is the error term.

3. ESTIMATION TECHNIQUES

The study employs three techniques to analyze the study objectives: (1) the Johansen cointegration technique within the vector autoregressive (VAR) model, (2) the vector error correction mechanism (VECM) and (3) the impulse response function (IRF). The Johansen cointegration test, which explores cointegration, is used to express the dynamic relationship amongst the variables of interest, and to observe the short- and long-run dynamics of the model. Hence, co-integration equation with VAR (p), as proposed by Pfaff (2008), is given as:

$$y_t = \mu + \lambda_1 y_{t-1} + ... + \lambda_p y_{t-p} + \varepsilon_t, \tag{3}$$

where y_t represents the vector of the endogenous variables, inf_t, int_t, $exch_t$, opn_t, nfx_t, $inftps_t$ which are all stationary at $I(1)$, and ε_t represents the vector of shocks. Therefore, as consistent with the literature, the VAR(p) model is re-written as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} G_i \Delta y_{t-i} + \varepsilon_t, \tag{4}$$

$$\text{where } \Pi = \sum_{i=1}^{p} \lambda_i - I \text{ and } G_i = -\sum_{j=i+1}^{p} \lambda_j \tag{5}$$

According to Deyshappriya (2014), if the coefficient matrix Π has the reduced rank G < n, then there exist $n \cdot G$ matrices α and β each with rank G such that:

$$\Pi = \alpha \cdot \beta. \tag{6}$$

In addition to this, Johansen (1988) introduced the cointegration test to determine the number of co-integration vectors. This test has two statistics, which are Trace and Maximum Eigenvalue tests. These are used in this study to ascertain the existence of cointegration in the model. The VECM is a cointegrated VAR, which is only justified and important after establishing the existence of a long-run relationship among the variables. This gives the instance to evaluate the cointegrated series. The conventional multivariate VECM is written compactly as follows:

$$\begin{aligned} \Delta y_t &= \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta y_{t-i} + \sum_{j=1}^{k-1}{}_j \eta_j X'_{t-j} + \\ &+ \lambda ECT_{t-1} + u_t, \end{aligned} \tag{7}$$

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Table 2. Summary statistics

Source: Authors' computations.

Variables	Mean	Median	Maximum	Minimum	SD
inf	18.54672	12.94178	72.8355	3.45765	15.89535
int	15.45867	16.84883	31.65	6	6.255279
exp	9.90E+09	1.94E+09	3.36E+10	1.44E+09	1.20E+10
exch	63.86742	21.88521	305.7901	0.5467809	78.4673
opn	36.28081	36.67399	46.85661	26.83875	5.253881
nfx	–11.30837	–13.31349	23.10358	–28.7655	9.99261
inftps	29.2731	5.713986	299.0433	1.701487	61.23735

Note: inf – inflation; int – lending interest rate; exp – government expenditure, exch – official exchange rate; opn – trade openness; nfx – net food export; inftps – inflation rate, SD – standard deviation.

where y_t is as explained previously; X' is the vector of endogenous regressors; ECT_{t-1} is the lagged OLS residual obtained from the long-run cointegrating equation given as $ECT_{t-1} = Y_{t-1} - \eta_1 X'_{t-1}$, the cointegrating equation, which deviates from the previous period from the long-run equilibrium (which is an error), affects the short-run movement in the dependent variable; λ is the coefficient of the ECT and the speed of adjustment, which measures the speed at which y returns to equilibrium after changes in X'; γ, η are parameters to be estimated; k is the optimal lag length and u_t is the white-noise error.

The IRF, on the other hand, simulates the effect of a shock to one variable in the system on the conditional forecast of another variable. According to Elder (2003), there are numerous interesting applications, in which a researcher might be interested in calculating an impulse response function. Without any loss of consistency, this approach accommodates interactions among the variables in the system. This view is also supported by Lin (2006), who affirms that a further advantage of the IRF is that it can also be used to evaluate the effect of a policy change on the target variable(s). The generalized impulse response function of y_t at horizon h is defined as:

$$IRF\left(h,\delta,I_{t-1}\right) = E\left[y_{t+h} \mid e_t = \delta, I_{t-1}\right] - \\ -E\left[y_{t+h} \mid I_{t-1}\right] \quad (8)$$

where δ is the one-time exogenous shock. Equation (8) explains that the impulse response function equals the expected value of current and future values of an endogenous variable, given the shock and past information minus the expected value of the endogenous variable given past information. In other words, it is the effect of the shock on the current and future values of the endogenous variable.

4. ECONOMETRIC ANALYSIS AND RESULTS

4.1. Summary statistics and correlation analysis

Table 2 shows the statistics of variables used in the study from 1970[1] to 2017. The statistics reveal that average inflation rate in Nigeria over 48 years was approximately 19 percent. The average interest rate and exchange rate over the same period was approximately 15 percent and 64 percent, respectively. Average government expenditure was USD 9.9 trillion. The average degree of openness of the country during those years was set at 36 percent. Also, the data indicates that inflation rate, government expenditure, exchange rate and average inflation rate are skewed to the right, since their mean values are greater than their median values, while interest rate, degree of openness and net exports are skewed to the left. Moreover, inflation rate, interest rate, degree of openness and net exports are symmetric in nature because their means and media values are similar.

Furthermore, the normality of the data distribution is verified using the standard deviation. The data shows that all variables, except degree of openness, are normally distributed because they have a spread that falls within 1 to 3 standard deviations on each side of the mean. Additionally, the wide disparity

1 9.90E+09 = 9,900,000,000.00 (USD 9.9 billion); the summary statistics is performed for years 1970 to 2017 to show the statistics of the variables, while estimation is done on the restricted time series from 1981 to 2017.

Table 3. Pairwise correlation analysis

Source: Authors' computations.

Variables	int	exp	exch	opn	nfx	inftps
int	1	–	–	–	–	–
exp	–0.1136	1	–	–	–	–
exch	0.3808	0.774	1	–	–	–
opn	0.0541	0.1309	0.002	1	–	–
nfx	–0.6105	0.1437	–0.3727	–0.0639	1	–
inftps	0.4399	–0.3352	–0.2934	0.1999	0.1051	1

Note: inf – inflation; *int* – lending interest rate; *exp* – government expenditure, *exch* – official exchange rate; *opn* – trade openness; *nfx* – net food export, and *inftps* – inflation rate.

between the minimum and maximum values of the inflation rate, interest rate and exchange rate, shows the extent to which the value of currency in the country has been both strong and weak. Also, the average net food export of the country shows that the food production capacity of the economy has been for most part being dependent on imports from other countries. Likewise, the pairwise correlation matrix in Table 3 shows the possibility of a collinear relationship among two or more independent variables in a model. This collinear relationship could be low, moderate or high. The matrix presented below shows that there exists no problem of multicollinearity which may lead to biased estimates.

4.2. Unit root test results

The analysis begins with examining the time series properties of the variables. This is accompanied by using the unit roots test to check stationary status. Prior to the use of variables in regression analysis, it is necessary to clarify that this possesses a mean and variance, whose distributions are independent of time. This study uses the augmented Dickey-Fuller (ADF) and Philip-Perron (PP) tests to establish this. Table 4 shows that all the variables are not stationary at level both for the ADF and PP tests, indicating that the series are not mean-reverting at their level forms, $I(0)$. Following this evidence, the study implies that the classical approach of the ordinary least squares (OLS) procedure will provide spurious results if adopted. In ascertaining the stationary for such variables, a differencing (first-order) mechanism is incorporated and the ADF and PP statistics reject the null hypothesis of the existence of unit root, hence, implying that all variables in the model become stationary at first order of integration $I(1)$. The differencing is conducted by including the drift component, an appropriate optimal lag (of zero), and the Schwarz information criterion (SIC) is used for the ADF test. The PP test also includes the drift component but uses the Newey-West band and a spectral estimation method based on Bartlet-Kernel approach.

Table 4. Unit root test results

Source: Authors' computations.

Variables	Augmented Dickey-Fuller test		Philip-Perron	
	Level	First difference	Level	First difference
inf	–1.3904	–6.9886	–0.2253	–14.2976
exch	1.0555	–3.6138	1.5596	–3.5660
exp	–0.8600	–3.5787	–0.9467	–3.7731
inftps	–1.4553	–7.6153	–0.4569	–17.8046
int	–1.7759	–7.6181	–1.7336	–7.6342
opn	–0.9549	–10.7554	–2.1533	–38.2711
nfx	–1.4894	–7.2695	–1.6600	–7.4925
	Critical value			
	Level	First difference		
1%	–3.5778	–3.5847		
5%	–2.9252	–2.9281		
10%	–2.6007	–2.6022		

Note: inf – inflation; *int* – lending interest rate; *exp* – government expenditure, *exch* – official exchange rate; *opn* – trade openness; *nfx* – net food export, and *inftps* – inflation rate.

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4.3. Cointegration test results

Having obtained first-order integration *I*(1) for the series at the 5% significance level, the study proceeds to estimate the Johansen cointegration test. Based on SIC, the optimal model, as determined by the Trace and Max-Eigen statistics, is at three (3) and one (1) cointegrating vectors, respectively, with no drift and trend. Likewise, a one-order lag specification for differencing endogenous variables is included and tested at 5%. The result indicates that the Mackinnon-Haug-Michelis *p*-value cannot reject the null hypothesis of one co-integrating relationship. Hence, the foregoing shows the feasibility of a long-run relationship among the variables in the model.

The middle panel of Table 5 shows the normalized cointegration (long-run) coefficients. The results show that all the explanatory variables are significant at the 1% and 5% levels. Also, evidence from the result suggests that external factors are responsible for driving inflationary pressure in Nigeria. The readily available evidence indicates that exchange rate, imported inflation and openness induce a direct relation to inflation in Nigeria. This is because percentage changes in exchange rate, imported inflation and openness lead to an increase in inflation by 0.49%, 0.47% and 4.28%, respectively.

Also, net food export exhibits similar pattern, as inflation responded positively to a percent change in net food exports. Specifically, a one percent change in net food export results in an 0.02% increase in inflationary pressure in Nigeria. This implies that the bulk of inflationary pressure in Nigeria economy is foreign-driven. This result is not related to the fact that Nigeria is a net importer of consumer goods and food items, which is the largest inflation component in the economy. Likewise, the country is heavily dependent on imports for its fast paced consumables – financed by commodity exports (crude oil-based). Aside from continuing currency devaluation, which makes imports more expensive, the economy has also consistently witnessed dwindling proceeds from crude oil exports due to falling oil prices arising from international glut owing to changing preferences, technological breakthrough (for instance, the shale revolution) and lifting of export ban on economies like Iran. All this coupled with the unrest in the Nigeria oil producing regions, has limited exports, which has led to dire foreign exchange crunch in the economy. The rising import bills, declining demand and production of crude oil and the continuing naira devaluation plunged the economy into recession and further transmitting inflationary pressure, as witnessed in recent years. Similarly, the net food export contributes adversely to inflationary pressure due to weak agricultural productivity and forward linkages in the economy. In Nigeria, agriculture is still largely practiced at the subsistence level, and output availability is essentially seasonal and depends on weather conditions.

Table 5. Johansen cointegration rank test

Source: Authors' computations.

Cointegration rank	Trace test			Maximum eigenvalue		
	Statistics	Critical value	*p*-value	Statistics	Critical value	*p*-value
None	167.778	111.781	0.000	69.564	42.772	0.000
At most 1	98.214	83.937	0.003	35.028	36.630	0.076
At most 2	63.186	60.061	0.027	29.703	30.440	0.062
At most 3	33.484	40.175	0.200	21.283	24.160	0.117
At most 4	12.2012	24.276	0.689	6.762	17.800	0.833
At most 5	5.4388	12.321	0.508	4.837	11.225	0.501
At most 6	0.6013	4.130	0.499	0.601	4.130	0.99

Normalized cointegrating coefficients

ln*inf* – 0.492ln*exch* + 0.480ln*exp* – 0.469ln*nftps* + 1.70ln*int* – 4.28ln*opn* – 0.02*nfx*						
t–stat	(–4.70)	(6.2)	(–6.2)	(4.3)	(–7.2)	(–2.0)

Error correction coefficients

Variable	Δ(ln*inf*)	Δ(ln*exch*)	Δ(ln*exp*)	Δ(ln*inftps*)	Δ(ln*int*)	Δ(ln*opn*)	Δ(*nfx*)
ECM_1	–0.5748	–0.1469	0.0333	–0.0210	–0.0661	0.1435	–2.8154
t–statistics	–3.9489	–2.0165	0.4239	–0.1476	–2.2464	4.7022	–2.3503

Note: inf – inflation; int – lending interest rate; exp – government expenditure, exch – official exchange rate; opn – trade openness; nfx – net food export and inftps – inflation rate.

On the other hand, government expenditure (–0.48) reduces inflationary pressures in Nigeria. Evidence posits that the inflationary pressure reflects under-capacity utilization of production activities. This implies that increasing government spending in critical productive sectors of the economy will enhance domestic production thus reducing domestic pressure for imported consumer goods. Contrary to expectations, the lending interest rate (–1.70) varies inversely with inflation in Nigeria, suggesting that increasing lending rate is due to declining inflation and vice-versa. However, it confirms the assertion of the Central Bank of Nigeria (CBN) Monetary Policy Committee (MPC) that reducing the retail lending rate will result in rising consumer prices, which jeopardizes the economy's recovering process. The Committee has consistently maintained a monetary policy rate (MPR) of 14% for the past 36 months, the figure that translates to about 25%–30% retail lending, which is considered counterproductive for recovering economy. The Committee based its decision on the need to restrict the importers from accessing cheap funds, which is used to demand foreign exchange and further transmits inflationary pressures. Hence, given the current structure of trade in the economy, lowering the cost of capital could endanger growth recovering process. Instead, the government embarked on concessional loan arrangement via some industry-specific banks such as, the Bank of Industry and the Bank of Agriculture. This arrangement makes the processes more engaging and ensures that the loans are used for intended productive purposes.

4.4. Vector error correction model results

In an attempt to assess the stability of the long-run relationship among the variables, the study adopts the vector error correction model. Here, the error correction mechanism (ECM) is estimated to ascertain how well the short-run dynamics in the model are adjusted on the long-run equilibrium path. The estimated ECM satisfies all the theoretical conditions for validity. The coefficient is negative implying convergence in the long run, the absolute value of the magnitude is between zero and one (0.5748) and it is statistically significant at the 5% significance level. This evidence suggests that 57.48% of the short-run errors will be corrected in the long-run equilibrium path. Hence, the model possesses a good error correction, as there is about 57% certainty that shocks that occurred in the immediate period are adjusted as the model converges in the long run.

4.5. Impulse response function results

Table 6 shows the response of the inflationary pressures in Nigeria to a one standard deviation change in and external stimulants/variables adopted in the model. As the time horizons expands, external factors tend to drive inflationary pressures, significant among these factors, is that of imported inflation, which represents the average inflation rates for the 10 economies that constitute over 80% of Nigerian imports. In the first five periods of the time horizon, imported inflation contributes to about 33% deviation in inflationary pressure, whereas the last five periods in the time horizon witnessed imported inflation accounting for cumulative average of over 100% deviation in inflationary pressure in Nigeria.

Also, net food exports have consistently contributed to the deviations in inflationary pressure in Nigeria, an evidence that is intrinsically connected to the widening gap in productivity, as more than 70% of consumer goods and food items are imported. At early stages of the time horizon, the deviation in inflation caused by net food export was quite infinitesimal, whereas, the relation changes with time; the food production gap causes a cumulative average deviation of about 45% in the last ten time horizons. This can be attributed to the gross neglect of the agriculture following the discovery of crude oil in commercial quantities in Nigeria.

Similarly, the data obtained on the response of inflationary pressure to a one standard deviation change in government expenditure and interest rate were similar to the conclusion reached with the result of the Johansen long-run coefficients. The inflationary pressure responds inversely to government expenditure and interest rate. This implies that a standard deviation increase in government expenditure reduces inflationary pressure by a cumulative average of 5%, as indicated by the IRF. Also, a one standard deviation reduc-

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Table 6. Response of ln*inf* to Cholesky 1 Standard Deviation Innovations

Source: Authors' computations.

Periods	ln*exp*	ln*exch*	ln*inftps*	ln*int*	ln*opn*	nfx
1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	–0.01813	0.030324	0.182171	–0.13729	–0.08742	0.043972
3	–0.03806	0.058311	0.361174	–0.15125	–0.11802	0.101084
4	–0.05021	0.07696	0.504646	–0.08003	–0.11023	0.145542
5	–0.0558	0.087315	0.619406	0.017154	–0.08688	0.173618
6	–0.05761	0.09164	0.71576	0.110921	–0.06142	0.190316
7	–0.05777	0.091624	0.800284	0.19245	–0.03885	0.201101
8	–0.05737	0.088272	0.876252	0.26157	–0.02017	0.209488
9	–0.05683	0.082163	0.945167	0.32033	–0.00504	0.217218
10	–0.05624	0.073666	1.007792	0.37067	0.007136	0.224977
11	–0.05558	0.063066	1.064641	0.413962	0.016824	0.232956
12	–0.05479	0.050608	1.116164	0.45112	0.024372	0.241165
13	–0.05382	0.036522	1.162784	0.482799	0.030037	0.249563
14	–0.05262	0.021022	1.204906	0.509517	0.034018	0.258106
15	–0.05119	0.004307	1.242905	0.531725	0.036491	0.266758
16	–0.0495	–0.01344	1.277128	0.549833	0.03761	0.275485
17	–0.04755	–0.03204	1.307894	0.564218	0.037519	0.284262
18	–0.04535	–0.05135	1.335492	0.57523	0.036349	0.293062
19	–0.04289	–0.07121	1.360185	0.583192	0.034222	0.301861
20	–0.04019	–0.09151	1.382217	0.588404	0.031249	0.310636

Note: int – lending interest rate; *exp* – government expenditure, *exch* – official exchange rate; *opn* – trade openness; *nfx* – net food export, and *inftps* – inflation rate.

tion in interest rate will increase the inflationary pressure, as against prior expectation that reduction in interest rate should drive economy productivity, hence dwindling inflation. This situation is currently been sharply contested by the CBN monetary policy committee that the reduction interest rate fuels foreign exchange demands, hence, heightening the incidence of imported in-

Source: Authors' computations.

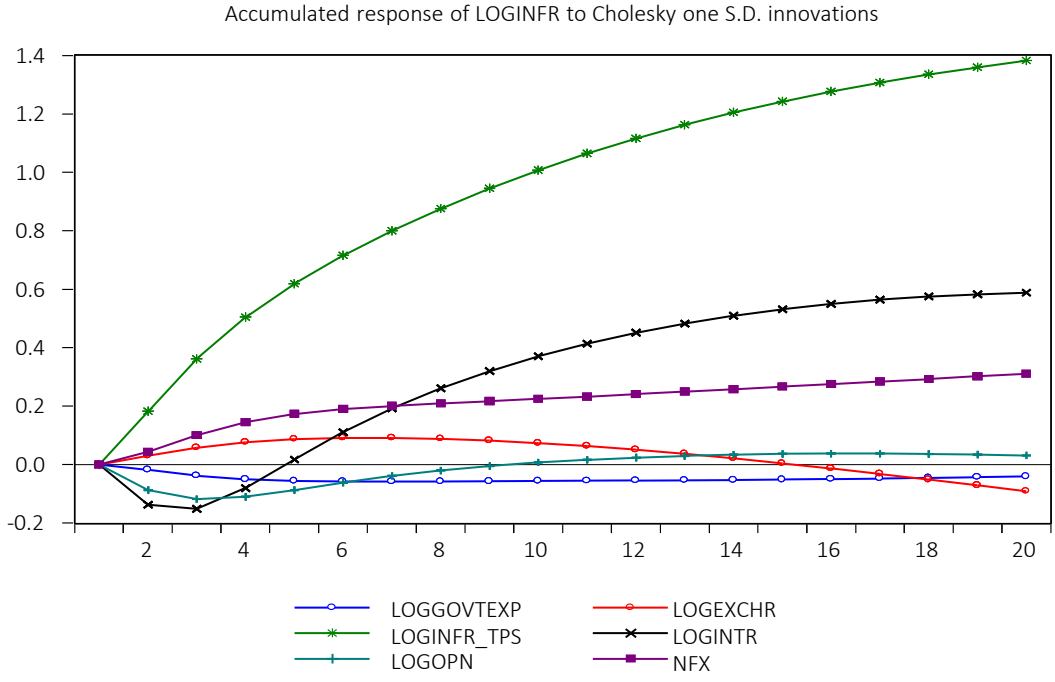

Figure 1. Combined responses of inflation to one standard deviation shocks from internal and external drivers of inflation

Source: Authors' computations.

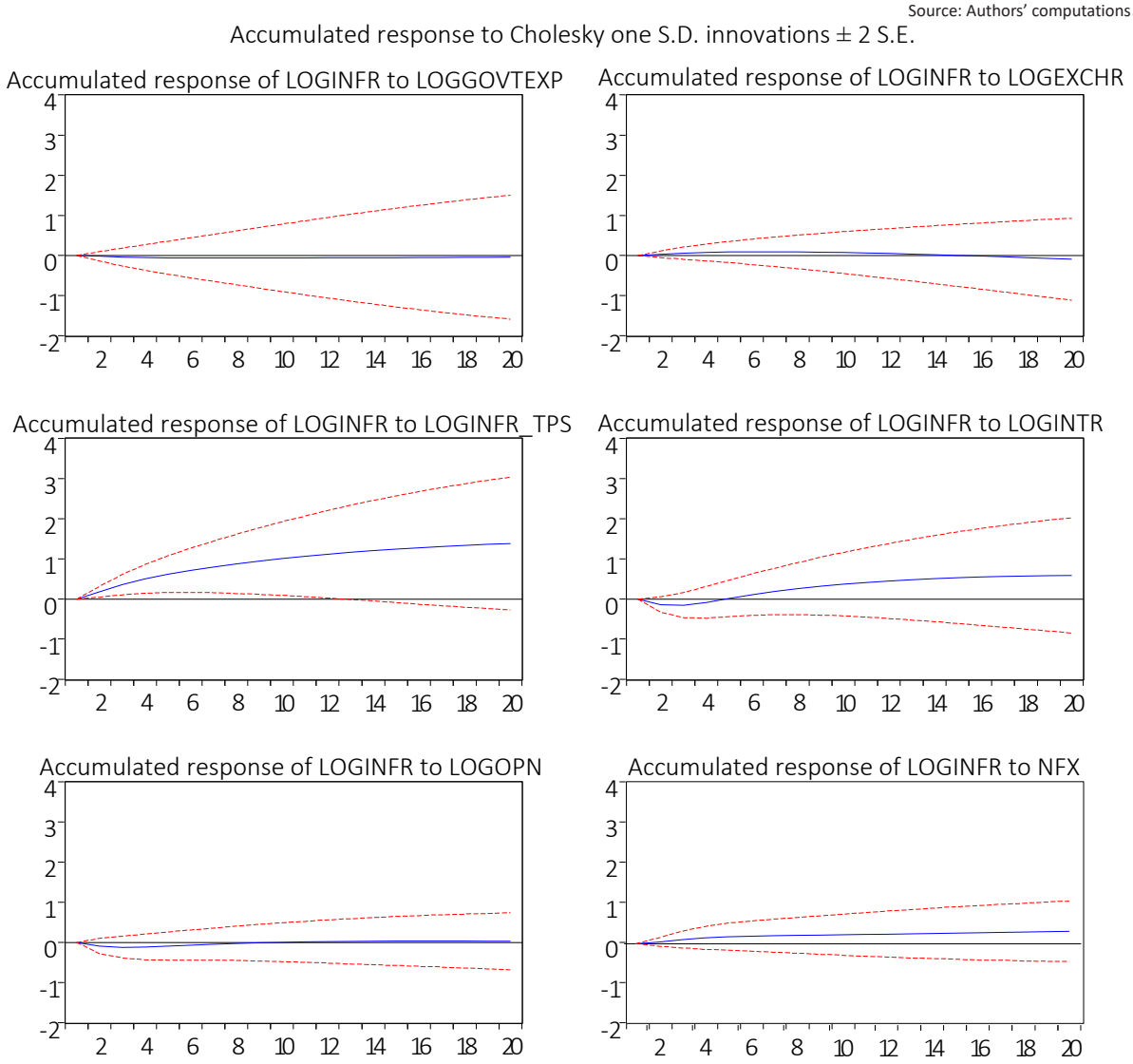

Figure 2. Individual responses of inflation to one standard deviation shocks from internal and external drivers of inflation

flation. Similar evidence is presented in Figures 1 and 2 that show graphically the accumulated responses of inflation to shocks from external and internal factors in combined and multiple graphs, respectively. Here, the pictorial expositions show clearly that inflationary pressure responds most significantly to one standard deviation change in the indicator of imported inflation followed by interest rate. Interestingly, at the initial stage of time horizons, deviation from changes in interest rate dwindles inflation until the fourth horizon when the pattern reverses. This reflects the changed pattern of the economy, expressing the sudden neglect in domestically produced goods and a growing impact on for imported goods.

CONCLUSION

As a result of the recent exchange rate misalignment and deepening economic crisis, inflation in Nigeria has risen remarkably reaching a 12-year high in 2017. This paper assesses the dominant factor responsible for driving inflationary pressure in Nigeria. It expresses the prominent theoretical views offered in

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the literature, basically monetarist and structuralist views. The former linked inflationary pressure to expansion in aggregate demand attributable to government deficit financing, while the latter perceived inflation as supply-side phenomenon. Literature is embraced with strength of inflationary drivers, as well as with remedial policy instruments and targets. The results of this analysis confirm the structuralist view, hence, proving that external drives, rather than monetary stimulants, are responsible for driving inflationary pressure in Nigeria.

The study found that exchange rate, imported inflation and trade openness raise the incidence of inflation in Nigeria. Recently, the economy has had to devalue the naira to preserve the external reserve; the partial free flow made imports more expansive, hence, transmitting inflationary pressure to import dependent consumer goods. This data is confirmed by the direct link between net food export and inflation, implying that bridging the food deficit gap raises inflation in Nigeria. Similarly, out of sample analysis of the model using the Impulse Response Functions (IRFs) features the external factor as a prominent diver of inflation, with the indicator of imported inflation contributing the largest deviation to inflationary pressure as the time horizon expands. The foregoing evidence suggests that monetary and fiscal constraints will not yield expected results. Structural adjustments, however, need to be taken to stimulate domestic production by deliberately channeling investment in import substitution efforts, especially for food and consumer goods.

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