



A Test of the Fiscal Theory of Price Level: Case Study of Nigeria

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Received: 22 July 2019

Accepted: 25 September 2019

DOI: <https://doi.org/10.32479/ijefi.8768>

ABSTRACT

The paper tests the efficacy of fiscal theory of price level in Nigeria using an autoregressive distributed lag model for the period from 2002 Q1 to 2017 Q4. The study seeks to test the hypothesis that of Leeper (1991) and Sims (1998) that the price level is not independently determined by the monetary authorities, rather it is as a result of the relationship between monetary and fiscal authorities. The Nigerian Federal Government has had to resort to continuous borrowing in order to meet its financial obligations. The size of the fiscal deficit has ballooned which if not controlled could worsen fiscal vulnerability and eventually lead to financial distress. We find that fiscal deficits have a positive and statistically significant effect on inflation in all models estimated, attributed to the high degree of fiscal dominance in Nigeria. Giving our findings, Nigerian economy needs to address the challenge of high fiscal imbalances.

Keywords: Fiscal Deficits, Inflation, Nigeria

JEL Classifications: E62, H620

1. INTRODUCTION

In general terms, the emphasis of macro-economic policy globally remains full employment, price stability (control of inflation), balance of payment equilibrium, exchange rate stability, economic growth and development. Fischer et al. (2002) contends that the significance of inflation as a macroeconomic phenomenon in an economy and its impact on the wider economy has always been a hot debate among economists, policy makers, investors and monetary policy authorities.

In particular, the developing countries including Nigeria have attracted special attention on fiscal view of inflation as a result of general notion that inefficient tax collection, political instability and limited access to external borrowing are predominant challenges of developing nations. These tend to reduce the relative cost of seigniorage and raise dependence on the inflation tax (Cukierman et al., 1992; Calvo and Vegh, 1999; Alesina and Drazen, 1991; Usman and Apinran, 2019). Empirically, the studies conducted among developing economies reveal existence of significant affiliation between inflation and fiscal deficit especially

in high inflation countries (Metin, 1998; Domaç and Yücel, 2005; De Haan and Zelhorst, 1990).

Inflation has been affected with the development of assorted channels via empirical and theoretical endeavors by researchers. Notable among these is the famous work of Friedman (1956) where he documented that inflation is everywhere and always a monetary phenomenon. Friedman was able to link this with the fluctuation in price, monetary policy as well as money supply in an economy. He shows that the rise in the supply of money would positively lead to inflation and this position is supported by the studies of (Komulainen and Pirttilä, 2002, Grauwe and Polan, 2005). Meanwhile, Sargent (1999) noted that it is the financial obligations and requirements of the fiscal authorities that encourage the supply of money and is not independently determined by the central bank. This affirms the endogeneity of money supply and results of seigniorage requirements as a result of government's fiscal deficits.

In most developing and emerging market economies, more money is printed through the central bank to finance deficit by

the fiscal authority, hence the independence of the central bank to form viable monetary policy becomes compromised Catao and Terrones (2005). They noted further that imposition of tax is another source of financing deficit but it has political cost and not easy to implement. Thus the decision of the fiscal authority to finance deficit through the instrumentality of the central bank can be inflationary and it should not be encouraged especially in the developing countries where there is obvious lack of monetary policy autonomy and systemic inefficiency. The fiscal theory of price level (FTPL) affirms that the interaction of monetary and fiscal policies are influenced by the workings of the price level in an economy. Based on this background, Leeper (1991) and Sims (1998) contend that the sustainability of government deficit must be ascertained and to sustain stable price in an economy, the inter temporal budget constraint of government must be balanced.

The central focus of this study is to critically evaluate the fundamental determinants of inflation outside monetary factors as generally believed. The study also investigates whether the lingering fiscal deficit in Nigeria has any influence on inflation in the long-run and identify other factors causing inflation as highlighted by Hanif (2012) and Coppin (1993). Nigeria as an emerging market is suitable for the study of fiscal deficit–inflation nexus, because over the last decade, the monetary authority has continually attributed the rising inflationary presence partly to excessive borrowing to finance budget. Even though this area has gained scanty attention among researchers, more studies have emphasized inflation as a monetary phenomenon (Ujiju and Etale (2016), Gbadebo and Mohammed (2015)). There are fewer studies that have established significant affiliation between inflation and budget deficit in Nigeria (Oseni and Sanni (2016), Oladipo and Akinbobola, 2011). Inflation continues to negatively affect the purchasing power, drawback the standard of living and subject the vulnerable segments of the society to an untold hardship especially in the high-inflation third world countries. It also has a political cost as the ruling government may show restraint in raising tax to avoid backlash from the electorates. This has further necessitated the need to critically reevaluate the underlining cause of inflation in Nigeria aside the traditional monetary factors. It is particularly essential to note that in the Nigerian economy, high deficits have caused inflation over the years and the deficits have become unsustainable.

Section two of the paper discusses the literature review while section three presents the methodology. Section four discusses the empirical results while section five concludes with policy recommendation.

2. LITERATURE REVIEW

In both developed and the third world countries, managing government budget deficits has become intractable and computing government debts has also become a major concern in the recent decades. Researchers have developed both theoretical and empirical models to examine the affiliation between macro-economic variables and budget deficits. Meanwhile, the school of thought with the monetarist inclination has established that the fiscal deficits are harmful to an economy in both long and

short-run (McCallum, 2001, 2003 and McCallum and Nelson, 2005 and; Niepelt, 2004). While recent upsurge in budget deficits has been attributed to debt service payments on public debt, the most worrisome remains the declining tax revenue emanating from recession.

However, the view of researchers like (McCallum, 2001; 2003 and McCallum and Nelson, 2005) and that of Niepelt (2004) who are monetarist economists run afoul of the price level of fiscal theory as authored by Leeper (1991); Sims (2011) and Woodford (2001), where stable price level in an economy can only be guaranteed with sustainable government finances. Meanwhile, the work of Friedman (1956) shows inflation as a monetary phenomenon but that has been recently punctured by the combined studies spearheaded by both Sims (1994) and Leeper (1991) which found inflation as a fiscal phenomenon via the instrumentality of FTPL. Sims (1994) in his study further documented that inflation in most cases is more of fiscal phenomenon and tends to be a product of expectations people have on fiscal policy. The efficacy of the FTPL has been empirically put to test in many countries with mixed outcomes (Bajo-Rubio et al., 2009).

In the earlier work of Sargent and Wallace (1981), it is revealed that when government runs consistently on deficit financing, it can trigger higher inflation as such deficits will be financed by money creation. Catao and Terrones (2005) highlighted other factors that are capable of fuelling inflation.

Furthermore, the existing literature is yet to reach any compromise with respect to inflationary pressure of budget deficits, while some argue in favor, others are against it. For example, Oyejide (1972) opines that the persistent rise in the government deficits in less developed countries are hardly established without some considerable level of inflation. Empirical research abounds regarding the relationship between inflation and budget deficit which remains a critical and burning issue in both third world and advanced countries (Dwyer, 1982; Ahking and Miller 1985; Dogas, 1992; Sowa, 1994; Metin, 1995; Hamburger and Zwick, 1981, Hondroyiannis and Papapetrou, 1994; 1997). Meanwhile, the result of these investigations do not reach any conclusion in respect of both short and the long-run nexus between inflation and budget deficit. But there has been sufficient literature in the third world countries on the positive relationship between inflation and budget deficit as established by (Dogas, 1992; Choudhary and Parai, 1991; Buitter and Patel, 1992; Sowa, 1994; and Metin, 1995; 1998; Darrat, 2000; Oyejide, 1972; Hondroyiannis and Papapetrou, 1994; Abiola, 1995; Anayochukwu, 2012; Siddiqui, 1989). However, several arguments have been thrown up on the budget deficit inflation relationship. Central to these arguments are two crucial and related questions. The first question is related to whether there exist a causal association between inflation and budget deficit while the second one is whether the causality is indirect or direct. The first question has been broadly substantiated in empirical research and has featured prominently in the work of (Hondroyiannis and Papapetrou, 1997) and (Crozier, 1977). However, budget deficit inflation nexus has enjoyed little attention in the literature in Nigeria. Further studies regarding the developing countries on the positive relationship between

fiscal deficit and inflation have also been proven. For instance, in the work of Oladipo and Akinbobola (2011) for Nigeria, they established a causal relationship from fiscal deficit to inflation. In Zimbabwe, (Makochekanwa and Kambarami, 2011) showed that as a result of current and non-development government expenditure, there exist a consistent fiscal deficit as evident in the seigniorage, thus causing inflation. Meanwhile, (Mehdi and Reza, 2011) in their work for Iran conclude that fiscal deficit significantly causes inflation as a result of non-independence in the decision process of the central bank of Iran. In similar version, the fiscal dominance in the Italian economy has also been evident in the work (Fratianni and Spinelli, 2001) where they ascertain a positive connection between the fiscal deficit and inflation. Studies on Russia, Bulgaria and Romania show a weak evidence of fiscal deficit as the determinant of inflation as observed by Komulainen and Pirtilä (2002). But finding from both Tekin-Koru and Özmen (2003) for the Turkish economy indicated no clear proof of any possible relationship between inflation and fiscal deficit.

However, recent investigation on selected SAARC countries as spare headed by (Nawaz et al. 2012) using panel data also rejects the FTPL. The significance and negative effect of fiscal deficit on prices was observed with the use of a pooled least squared method. The outcome shows no proof in random and fixed effects models. Also, the relationship is put to test among the European countries and the study concludes on a no standardized affiliation but a long –run cointegrating relationship between deficit and inflation Sahar and Bektasoglu (2010).

In the same vein, recent investigation by Lin and Chu (2013) also attest to a strong positive relationship between fiscal deficit and inflation in developing countries with a long history of high inflation. In addition, fiscal deficit has significant long run impact on long run inflation in countries with moderate inflation. However, such long-run impact has less or no weight on the level of inflation in advanced nations whose inflation has been historically low. The seemingly weak affiliation recorded in the developed world can be attributed to more monetary policy freedom and credibility in the system while the developing nations suffer lack of strong institutions and inflationary deficit financing. According to (Catao and Terrones, 2005; Lin and Chu, 2013), the relationship between the fiscal deficit and inflation among under developed countries is easily linked to a dynamic non-linear and heterogeneous nexus.

Nevertheless, in the work of Pekarski (2011), he classifies fiscal deficit into two main part namely one with inflationary effect and the one without inflationary effect. Based on the documented study of (Tiwari et al., 2012), it is the consumption components of the expenditure of the government that leads to a long-run expanded fiscal deficit while the investment expenditure are more sustainable in the long term.

Moreover, the existing literature has proven that fiscal deficit is not the only determinant of inflation but other factors such as interest rate, trade openness, growth rate of the economy, food prices, oil price, exchange rate can also shape the direction of inflation in any economy (Coppin, 1993; Thomas (2012); Romer, 1993; Lin and Chu, 2013; Bowdler and Nunziata, 2006).

Ezeabasili et al. (2012) use Nigeria as a case study among the developing countries in their effort to reexamine the persistent inflationary trend with data from 1970 to 2006. The study employs a modeling technique which includes structural analysis and integration approach. The authors conclude on a positive but insignificant affiliation between fiscal deficit and inflation in Nigeria. While the study fails to establish any evidence linking inflation with the past budget deficit, a positive long-run money supply and inflation nexus was established in Nigeria within the review period. This scenario suggests a procyclical money supply with tendency to outgrow the inflation rate.

Jalil et al. (2014) evaluates the theory of fiscal deficit of price level from 1972 to 2012 in Pakistan with the adoption of autoregressive distributed lag (ARDL) approach. They conclude that other parameters such as the interest rate, government sector borrowing, and private sector borrowing also play crucial role in the determination of the price level along with the fiscal deficit. Oseni and Sanni (2016) examine the causal impact of fiscal policy and inflation volatility from 1981 to 2014 in Nigeria. The authors establish that there is bi-directional causality between fiscal deficit and inflation volatility based on the calculated and tabulated F- statistic figure (F-statistic = 5.86 and 3.96; $P < 0.05$).

Suleiman Sa'ad et al. (2018) evaluates the quantitative effects of exchange rate depreciation on budget deficit and inflation in Nigeria with SVAR, cointegration and the error correction model. The outcome shows trend in the affiliation between exchange rate, budget deficit and inflation and a positive impact on exchange rate, inflation and budget deficit but not statistically significant. Ishaq and Mohsin (2015) scrutinize whether budget deficits are inflationary or not in the presence of dependent central bank and fragile financial system. Panel data set was adopted for eleven Asian countries from 1981 to 2010. The overall result indicates that deficits are inflationary for the selected countries and the outcome further reveals that inflationary pressure emanating from budget deficit is essentially stronger in the face of a very weak financial markets and central bank not free to follow their goal and objectives to the core.

3. DATA AND METHODOLOGY

3.1. Data

This study adopted quarterly series from 2002Q1-2017Q4. The data were sourced from World Development Indicators, International Monetary Fund (IMF), the Central Bank of Nigeria's statistics database, and Bloomberg (Table 1).

3.2. Empirical Model

In examining the quantity theory of money, Fisher (1911) shows that changes in money supply is caused by changes to the price level given the velocity of money in circulation is exogenously determined. The major determinant of inflation is monetary policy and fiscal policy has no neutral impact on the price level. Leeper (1991), Sims (1994), Sargent and Wallace (1981), Woodford (2001) and Niepelt (2004) show that the price level in an economy is not autonomously determined by monetary policy solely, rather it is the

Table 1: Description of variables

Variable	Description	Source
CPI	Consumer price index	CBN
TOP	Trade openness (Total trade, exports plus imports, at current prices, as % of GDP)	CBN
FD	Fiscal deficit	CBN
DB	Domestic borrowing	CBN
EB	External borrowing	CBN
PLR	Prime lending rate	CBN
Oil	Oil prices	Bloomberg
EXR	Inter-bank exchange rate	CBN
WP	Wheat prices	IMF
IMP	Import value index	World bank

result of interdependence of fiscal and monetary policies. Leeper (1991) shows that when governments finance deficits, they do this to satisfy inter-temporal budget constraints inadvertently causing inflation. In countries with high fiscal dominance, monetary authorities are left to finance budget deficits which unintentionally causes inflation. However, if there were monetary dominance, fiscal policy would be constrained as the central bank would limit government financing through a reduction in currency printing. However, in the face of monetary dominance, it would be correct for the central bank to deploy an inflation targeting framework as an antidote. Hence, the price level is mostly determined by the fiscal deficit of the government. The degree of dominance of monetary or fiscal policy determines the impact of the deficit of inflation.

From the above it may be forgiven, if one terms inflation a “fiscal phenomenon.” However, the fiscal view of inflation especially in developing countries takes the interpretation that giving developing countries have a tendency to have a lower tax base, high degree of political instability and high cost to borrowing from international financial markets. The cost to seigniorage is cheaper and hence governments benefits from inflation tax.

Moser (1995) examined the determinants of inflation in Nigeria to include monetary expansion, driven mainly by expansionary fiscal policies, explains to a large degree the inflationary process. Other factors which may affect the level of inflation in Nigeria are the degree of trade openness; Romer (1993), Catao and Terrones (2005) and Bowdler and Nunziata (2006) find that trade openness more trade openness leads to lower inflation. The volume of trade may be increased due increase in imports. Darrat (1997), Deme and Fayissa (1995) and Boujelbene and Boujelbene (2010) find that import prices are an important determinant for the level of inflation. Several studies Boschi and Girardi (2007), Darrat (1997), El-Sakka and Ghali (2005) and Boujelbene and Boujelbene (2010) have also taken into account of countries exchange rates when explaining the level of inflation. Furthermore, Kandil (2005) and Kose et al. (2012) show that the cost of borrowing capital (interest rates) is an important determinant for inflation especially on the cost-push side.

The model used in the analysis takes into account the determinants of inflation in the literature with special emphasis on fiscal deficits. Therefore, the model takes the following format as in Jalil et al., (2014).

$$\ln(CPI_t) = \delta_0 + \ln(\delta_1 FD_t) + \ln(\delta_2 Trade_t) + \ln(\delta_3 PLR_t) + \ln(\delta_4 ER_t) + \ln(\delta_5 DB_t) + \ln(\delta_6 EB_t) + \ln(\delta_7 X_t) \quad (1)$$

Where CPI is the log of consumer price index which is used to measure the level of inflation; FD is the log of fiscal deficit; Trade is the log of degree of trade openness; PLR is the prime lending rate; ER is the log of exchange rate. DB is the log of the amount of domestic borrowing and EB is the log of the amount of external borrowing. The variable X represents other control variables that will be used in the analysis which are linked to the underlying forces of inflation in Nigeria. These include log of oil prices, log of wheat prices, log of gross domestic product (GDP) and log of import prices.

The parameters in equation (1) capture the response of inflation to changes in its determinants. The fiscal deficit variable is expected to be positive. Trade openness is expected to be negative. The lending rate is expected to be positive. The ER was used to capture the substitution between domestic and foreign currencies which measure the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. The ER is also expected to be positive. We also incorporate the role for expectations in the model as it has been established in that price increases generate further expectations in a price hike in the future in an economy. The public in anticipation of this price hike in the future expect salaries to increase. The availability of credit meant for the real sector is then diverted to the speculative sectors such as the housing market and real estate as profit-seeking agents become active during periods of high inflation. These expectations would be captured by using the lag of the CPI.

Given weight of food inflation is 50.4% in Nigeria. We will include commodity prices of wheat being a staple food and top commodities Nigeria imports.

3.3. Modelling Techniques

This study adopts the ARDL model developed by Pesaran and Shin (1998). The model is used because of its suitability in modelling a time series particularly in small samples as using an ordinary least squared model may lead to spurious results. Hence in determining the long run relationship it has a big advantage in that regardless of the order of the variables (be it in level $I(0)$ or first-difference $I(1)$), it overcomes the unit-root pitfalls in regression, in addition to solving the often present problem of serial correlation in economic times series see (Pesaran (1997), Laurenceson and Chai (2003) and Banerjee et al. (1993). Following Pesaran and Shin (1998), the error correction version of the ARDL model is stated as follows:

$$\Delta y_t = \varpi + \sum_{i=1}^{n-1} \Lambda_i \Delta y_{t-i} + \sum_{i=0}^{n-1} \Pi_i \Delta x_{t-i} + \Omega_1 y_{t-n} + \Omega_2 x_{t-n} + \varepsilon_t \quad (2)$$

Equation (2) captures the error correction in the ARDL model in which, ϖ is the constant vector parameter, Λ and Π are the short run parameters; y_t captures the endogenous vector variable, x_t is a vector of the other explanatory variables as outlined above and Ω_1 and Ω_2 are the parameters of the long-run relationship. ε_t is error term, assumed to be serially uncorrelated and homoscedastic.

All the variables have to be stationary, either in level or at first difference, to check this property before proceeding to the full ARDL model, the study uses the Augmented Dickey fuller (ADF) test. This is to ensure that none of the variables is $I(2)$, otherwise the use of the ARDL becomes invalid.

3.4. ARDL and Bounds Testing Procedure

The Pesaran and Shin (1998) cointegration technique involves a 2-stage procedure in the estimation of the long-run relationship. In the first stage, the existence of cointegration amongst the variables (bounds testing) is tested using the standard Wald or Fisher F-test. The null hypothesis is that the coefficients of the lagged regressors in the error correction version of the ARDL model (equation 2) are zero i.e., $H_0 : \Omega_1 = \Omega_2 = 0$. This null is tested against the alternative hypothesis of $H_1 : \Omega_1 \neq \Omega_2 \neq 0$ ¹. The second stage of estimation can only proceed to once the cointegration of the variables have been established. At this stage, the short-run and long-run parameters are estimated² using the following two equations:

Long-run equation:

$$\hat{\Omega}_1 y_t + \hat{\Omega}_2 x_t = 0; y_t = -\frac{\hat{\Omega}_2}{\hat{\Omega}_1} x_t \quad (3)$$

Obtained from a version of equation (2) where appropriate lags would have been selected for both the dependent and independent variables using any of the information criterion after confirming the existence of long-run relationship in stage one.

The short-run dynamic error correction equation for coefficients obtained from the equation below:

$$\Delta y_t = c + \sum_{j=1}^k \chi_j \Delta y_{t-j} + \sum_{j=0}^q \gamma_{1j} \Delta x_{t-k} + \omega ec m_{t-1} + v_t \quad (4)$$

Where $ec m_{t-1} = y_{t-1} - \frac{\hat{\Omega}_2}{\hat{\Omega}_1} x_{t-1}$ obtained from (5) above; y_t and x_t are as previously defined; γ_{1j} are the short-run parameters; ω measures the speed of adjustment to a new equilibrium whenever there is a shock. It also provides another means of validating the existence of cointegration or long-run relationship among the variables. It is expected to be negative and significant and <1 in absolute value for the model to be stable.

3.5. Stability Checks

Using Brown et al. (1975) a stability check is carried out on the model of stability verification. The cumulative sum (CUSUM)

1 Pesaran and Shin (1998) provide critical values to test the hypothesis, with and without time trend. The critical values are grouped into "upper" and "lower" bounds, where, the upper bound assumes that all the variables are jointly first-difference stationary i.e., $I(1)$ and the lower bound assumes that all the variables are level stationary or $I(0)$. To reject the null hypothesis, the calculated F-statistic must be above the upper bound critical value. If the calculated F-statistic is found to be below the lower bound, a decision to fail to reject the null hypothesis is required for the model. As a final point, if the calculated F-statistic lies in-between the upper and lower bound, the test result is inconclusive. At this stage knowledge of the order of integration (or time series properties of the variables) is required to proceed.

Table 2: Unit root test

Variable	Augmented Dickey fuller (ADF) test		
	Levels	First difference	Order of integration
CPI	-0.342406	-3.645267	I (1)
Deficit	-3.309624	-7.698619	I (1)
Domestic borrowing	0.888517	-9.868012	I (1)
External borrowing	-1.217200	-3.038008	I (1)
Trade	0.329471	-2.608490	I (1)
Exchange rate	2.450966	-5.666560	I (1)
Prime lending rate	-2.685222	-7.869119	I (1)
Oil price	-2.264840	-6.367451	I (1)
Wheat price	-2.308342	-7.418610	I (1)
GDP	-1.444721	-2.913525	I (1)
Import index	-2.594796	-4.509348	I (1)

and CUSUM of square (CUSUMSQ) are called out on recursive regression residual. To accept that the model is stable, the plots must fall within 5% critical bounds of significance.

The CUSUM test is based on the CUSUM of recursive residuals based on the first set of n observations. It is updated recursively and plotted against the breakpoints. If the CUSUM statistic stays within the 5% significance level, the estimated coefficients are said to be stable. A similar procedure is used to carry out the CUSUMSQ that is based on the square of recursive residuals.

4. ESTIMATION AND RESULTS

This section discusses the empirical results comprising of the unit root tests, the bounds testing for cointegration, the long-run and short-run estimates of the model and finally, the stability and diagnostics test results.

4.1. Unit Root Test

Unit root examinations were carried out using the ADF test. Table 2 shows the results of the test in which all the variables are integrated of the order one.

From the ADF unit root test result above, all the variables are integrated at order 1(1) which paves the way for the use of the ARDL bounds testing procedure to test for long-run relationship.

As stated earlier, the ARDL model approach is implemented in two stages in estimating the long-run relationship. In the first stage, the existence of long-run relationship is tested using the bounds test. The bounds test F-statistic must be greater than the upper bound critical values at 5% or 10% (Table 3).

After the order of integration has been established, the next stage is to test the long run relationship between variables using the bounds test. From the Table 3 above we find strong evidence of a long run relationship between variables when compared with the Pesaran et al. (2001) critical value at the lower and upper bounds.

2 The lag length and lag criterion are chosen; the criterion could be any of Schwartz, Hannan Quinn or the Akaike. Stability and diagnostic checks are carried out for heteroscedasticity, serial correlation, functional form misspecification and normality of the data.

The F-statistic in each of the baseline model is greater than both the lower and the upper bounds critical value, hence the conclusion that there exist long-run relationship between the variables.

Subsequently equation (1) is estimated using the ARDL co-integration technique for long run estimates. Five (5) models are estimated in total, this is presented in Table 4 In the baseline model and subsequently, the coefficient for fiscal deficit is significantly positive (i.e., the coefficient 0.0564 implies that a 1% increase

in fiscal deficit increases inflation by 0.06%), this result is in agreement with the fiscal theory of the price level which attributes inflation to be a fiscal phenomenon as outlined by (Leeper (1991), Sims (1994) and Jalil et al. (2014).

The amount of domestic borrowing is positive and statistically significant in all models, this is because a policy of persistent fiscal deficits combined with the accumulation of excessive government debt will, at some point, trigger a downward revision of market

Table 3: Bound test for the existence of a long-run relations

Models	K	F-statistics	Lower bound critical value (1%)	Upper bound critical value (1%)
$Cpi=f(lnFD, lnDB, lnEB, lnTrade, lnEXR, lnPLR)$	6	5.444247***	2.88	3.99
$Cpi=f(lnFD, lnDB, lnEB, lnTrade, lnEXR, lnPLR, lnOil)$	7	7.423487***	2.73	3.9
$Cpi=f(lnFD, lnDB, lnEB, lnTrade, lnEXR, lnPLR, lnWP)$	7	5.731930***	2.73	3.9
$Cpi=f(lnFD, lnDB, lnEB, lnTrade, lnEXR, lnPLR, lnGDP)$	7	7.194673***	2.73	3.9
$Cpi=f(lnFD, lnDB, lnEB, lnTrade, lnEXR, lnPLR, lnIMP)$	7	7.367479***	2.73	3.9

*. **. *** and **** represent 10, 5, 2.5 and 1% level of significance respectively

Figure 1: Cumulative sum (CUSUM) and CUSUM of square model 1

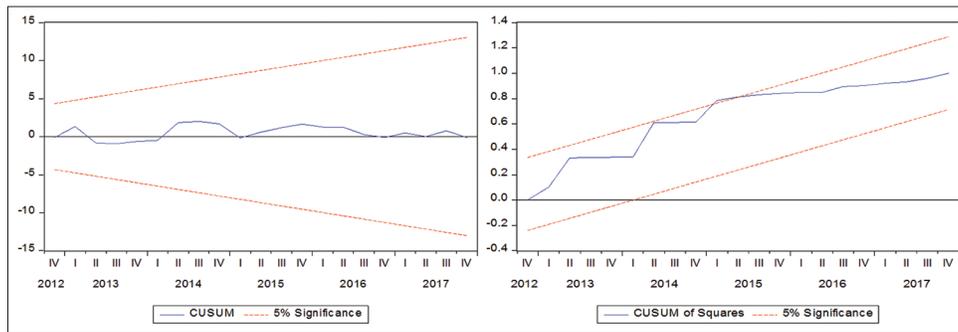


Figure 2: Cumulative sum (CUSUM) and CUSUM of square model 2

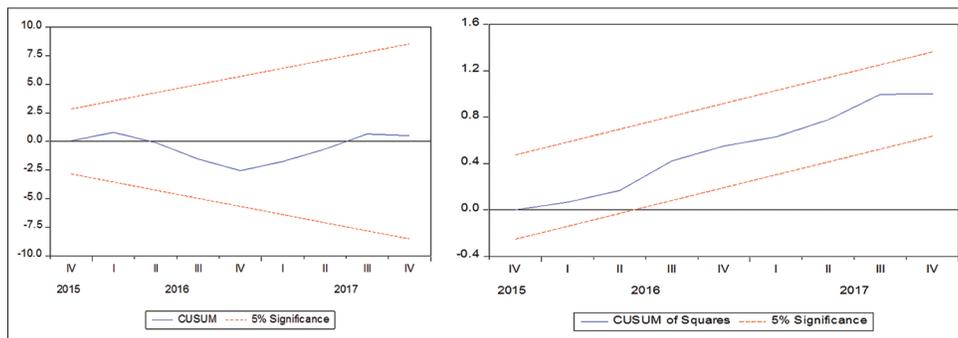


Figure 3: Cumulative sum (CUSUM) and CUSUM of square model 3

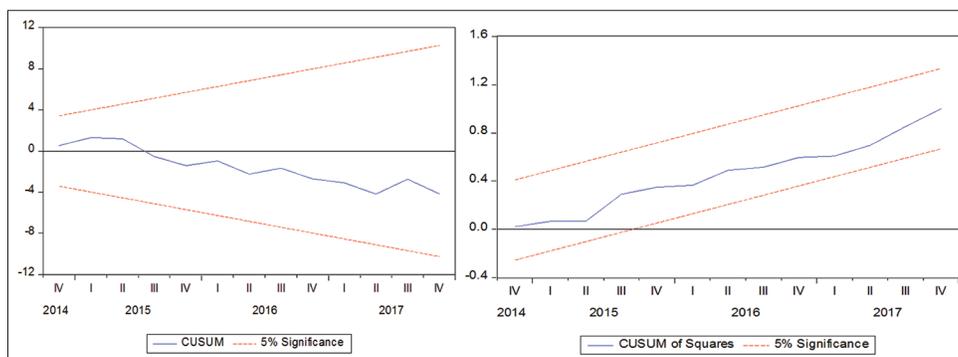


Table 4: Baseline model

Regressors	Dependent variable is natural log of consumer price index				
	Model 1	Model 2	Model 3	Model 4	Model 5
Fiscal deficit	0.056489*** (0.016239)	0.073495** (0.032241)	0.044067* (0.021172)	0.021655** (0.007636)	0.020116*** (0.004689)
Domestic borrowing	0.483858*** (0.026192)	0.211822** (0.066528)	0.541014*** (0.077379)	0.201124** (0.074887)	0.379494 *** (0.035989)
External borrowing	-0.051957*** (0.018257)	-0.073740** (0.011331)	-0.022090 (0.020682)	-0.012575 (0.012098)	0.042959 *** (0.013236)
Trade openness	-0.023587 (0.056371)	-0.291297** (0.063358)	-0.110834* (0.015148)	-0.046263* (0.038087)	-0.004929 (0.027511)
Prime lending rate	-0.448126*** (0.146809)	-0.048343 (0.141887)	-0.806309*** (0.248860)	-0.468397*** (0.098901)	-1.190662 *** (0.312873)
EXR	0.413699*** (0.068176)	0.657829*** (0.085433)	0.404528** (0.140863)	0.531854*** (0.044025)	0.333393 *** (0.051913)
Oil price	NA	0.206925** (0.050236)	NA	NA	NA
Wheat price	NA	NA	0.167067 (0.012085)	NA	NA
GDP	NA	NA	NA	0.205863*** (0.0056953)	NA
Import index	NA	NA	NA	NA	0. (0.034786)
Constant	-2.974401*** (0.724313)	-0.618159 (0.557341)	-1.894959* (1.050370)	-5.635082*** (0.954905)	-0.611581 (0.347980)
ECM_{t-1}	-0.778276*** (0.102129)	-1.441173*** (0.128288)	-0.607671*** (0.066567)	-0.961518 *** (0.100987)	-1.857306*** (0.176676)
Diagnostic test					
Functional form	0.1814	0.2066	0.2188	0.2190	0.2772
Heteroscedasticity	0.4537	0.8179	0.6813	0.6293	0.8470
Serial correlation	0.3639	0.5281	0.5272	0.5098	0.1006
CUSUM	Stable	Stable	Stable	Stable	Unstable
CUSUMSQ	Stable	Stable	Stable	Stable	Stable

Number in parenthesis are standard errors (** and *** represent 10, 5 and 1% level of significance respectively). Serial correlation test is carried out using LM test for serial correlation of variables, to test for functional form mis-specification, Ramsey rest test is used. Normality is tested using Jaque and Bera (1981) test. Finally, heteroscedasticity is tested using breusch-pagan test. CUSUM: Cumulative sum, CUSUMSQ: Cumulative sum of square

expectations regarding the future path of the “real output/base money” ratio. In turn, this shift in expectations may result in a significant fall in the value of money and an outbreak of high inflation.

The trade openness variable is observed to be negative and statistically significant at different levels in all models. This is in agreement with Romer (1993), Lin and Chu (2013) and Ctao and Terrones (2005) who find more trade openness leads to lower inflation. This is because higher trade income generated from taxes and levies will decrease other inflationary pressures by reducing the printing of money (i.e., seigniorage).

Additionally, the rate of interest is captured using the prime lending rate, the prime lending rate is found to be negative and statistically significant in all models. Rising interest rates reduce the amount of money in circulation, with less spending, the economy slows and inflation decreases. This is agreement with the fisher effect.

The exchange rate is found to be positive and statically significant in all models. The exchange rate of Nigeria has been continuously depreciating since the 1980's. The depreciation of the Nigerian Naira implies that the more naira for a dollar, which implies costly imports.

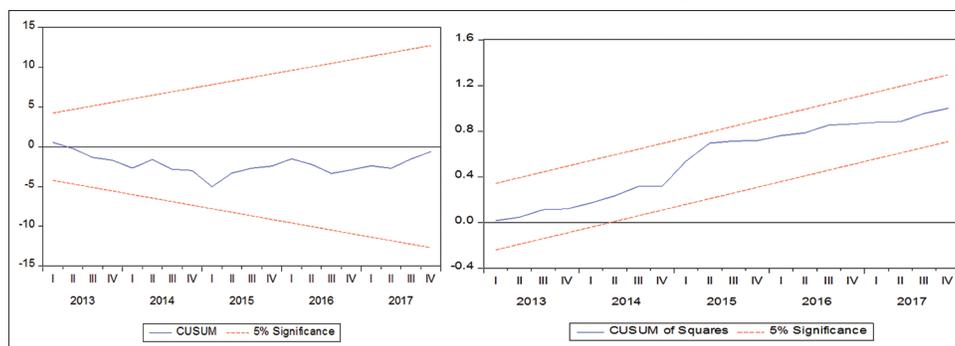
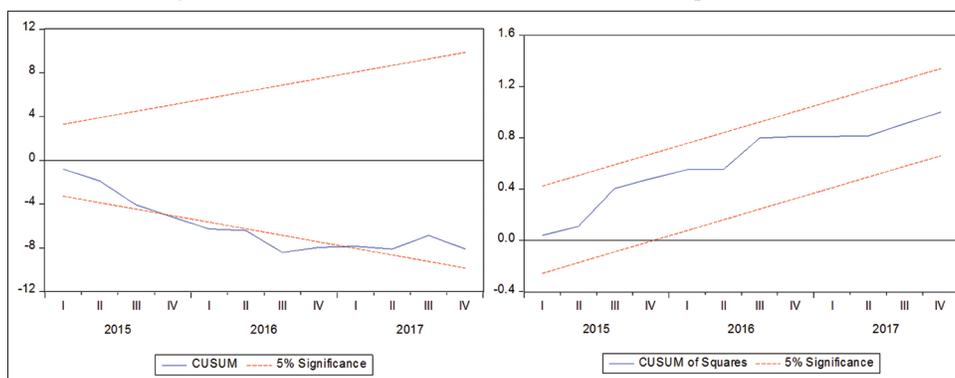
In subsequent models we add oil price, wheat prices, GDP and import index. All these variable are positive statisitcally significant when added to the model which is in agreement with Oladipo and Akinbobola (2011), Moser (1995) and Bayo (2005) that several factors are contributing to inflation in Nigeria besides the established variables such as money supply, interest rates and exchange rates.

The short-run estimates are in line with the long-run estimates, the noteworthy point from the short run is the error correction mechanism. The error correction term for models all the models are significant at 1%. This leads credence to the existence of a short-run relationship. The coefficient of the error correction mechanism is the adjustment mechanism that captures the disequilibrium in GDP which is captured in the next period. In the first model the magnitude -0.7782, which implies that it take on average 7 quarters before converging back to equilibrium path in the model.

Diagnostics tests were carried out on the models, the presence of serial correlation was rejected, the models are well specified, failed to reject for the presence of homoscedasticity meaning that the model is homoscedastic.

The stability of long-run coefficients is used to form the error-correction term in conjunction with the short-term dynamics. Some of the problems of instability could stem from inadequate modelling of the short-run dynamics characterizing departures from the long-run relationship. Hence it is important to incorporate the short-run dynamics for consistency of long-run parameters. In view of this we apply the CUSUM and CUSUMSQ tests developed by Brown et al. (1975).

The plots of the CUSUM and CUSUMSQ statistics are within the critical 5% critical bounds with the exception of model 5 where

Figure 4: Cumulative sum (CUSUM) and CUSUM of square model 4**Figure 5:** Cumulative sum (CUSUM) and CUSUM of square model 5

the CUSUM statistic steps out of the critical bound, these are presented in (Figures 1-5). However, majority of the models are all stable implying that the coefficients from the regression can be used for policy analysis as well as decision making purposes.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The paper set out to test the FTPL in Nigeria by examining the relationship between fiscal deficits and inflation and using non-monetary determinants of inflation. Quarterly observations for the period, 2002 Q1–2017 Q4, were used. The paper adopts the Pesaran and Shin (1998) ARDL bounds testing approach to determine whether a long-run relationship exist between the variables of interest.

While not refuting the impact of money supply on inflation in Nigeria, the study finds that fiscal deficits have a positive and statistically significant effect on inflation in all models estimated. This is likely attributable to the high degree of fiscal dominance in Nigeria which is in line with Leeper (1991), Sims (1994), Jalil et al. (2014) and Oladipo and Akinbobola (2011) and in disagreement with Nkaku (2015) who found the impact to be negative. Furthermore, the result also reveal that the oil price, wheat prices, GDP and import index impact inflation in Nigeria.

From the findings of the study, Nigeria is in need of fiscal consolidation as large fiscal imbalances are fueling inflation. Several policy implications can be derived from the findings of this study. First, monetary policy and fiscal policy are linked because

money growth, in the form of seigniorage, provides revenue to the fiscal branch of the government. The conduct of monetary policy in Nigeria should continue to focus on monetary aggregates, especially their growth rates. Secondly, monetary policy makers should remain independent of fiscal financing needs when setting policy goals and objectives. Additionally, fiscal discipline should be strongly established by all arms of government by ensuring fiscal and monetary coordination. Lastly, to finance budgets, fiscal authorities should increase the tax base by reducing the size of informal sector of the economy.

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