

INTERACTIONS BETWEEN FISCAL BALANCE AND MONETARY VARIABLES IN NIGERIA

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Abstract:

This paper investigates the relationship between fiscal balance and key monetary variables viz; inflation, interest rate, money supply and exchange rate over the period 1980-2019. It first tests the series for unit root using the Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) unit root tests. The long run and short run dynamic interaction between the fiscal balance and monetary variables was carried out using the ARDL bound test technique of Pesaran et al. (2001). The results indicate that interest rate, money supply and exchange rate all have influence on the fiscal balance. While interest rate and money supply affects fiscal balance negatively, domestic currency's exchange rate has a positive effects on fiscal balance. Inflation affects fiscal balance in the short run period. The short run effect does not extend into the long run. Thus, the results indicates that a deterioration of monetary variables in Nigeria has a powerful and significant effect on the country's fiscal balance. The implication of the study is that government should consider long term fiscal consolidation in the conduct of monetary policy.

Key Words: Fiscal Balance, Monetary variables, ARDL

JEL Classification: C22; E63; H6

Introduction

Macroeconomic policies are central towards providing an effective and sustainable stability in the economy thus ensuring a speedy economic growth. These are realized through well coordinated fiscal and monetary policies. By set up, the fiscal and monetary policies should be adopted in a coordinated manner to stabilize the domestic economy's output and inflation rate (Demid, 2018). The objective of the two main stabilization policies sometimes differs, resulting to the divergent policies pulling the economy in opposite directions. This results to suboptimal policy mix, and decline effectiveness in relation to macroeconomic stabilization. Absence of well coordinated fiscal and monetary policies leads to economic instability and a poor overall economic performance (Alesina & Perotti, 1995).

For some reasons as highlighted by Alesina and Perotti (1995), the tendency is for fiscal policy to be overly

expansionary. Under such situation, the burden of macroeconomic stabilization would fall to the monetary authority, which would have to run an overly contractionary monetary policy. Thus, resultant high-interest rates and crowding out resulting from this mix of policies could dampen long run economic growth. Otherwise, the failure of monetary authority to pursue an appropriately contractionary policy would compromise macroeconomic stabilization objectives. Monetary variables are likely to affect the degree of coordination between the two policies. The current trend in macroeconomic management emphasized the complimentary use of both fiscal and monetary policies strategies to achieve a sustainable economic growth.

Beginning from 1970s, Nigeria adopted fiscal policy as a major policy instrument in macroeconomic management. This cannot be unconnected to some basic reasons; first, the public sector becomes dominant in all economic

activities; the oil boom of the 1970s and the urgent need for reconstruction following the civil war; the import substitution industrialization strategy. More so, the fall in the international oil price in the late 1980s again buttressed the need to concentrate on fiscal policy in the economy. The persistence increase in the Nigeria's fiscal balance is being associated to certain domestic macroeconomic problems leading to a slow and negative growth in the domestic output. The rising interest rates are unable to slow down the surge in inflation. This might not be unconnected to the persistent fiscal deficits, which hampers the ability of monetary policy to control inflation (Mishkin, 2009). Thus, inflation targeting is a challenging duty to economies faced with weak institutions, low policy credibility and fiscal unsustainability (Amato, & Gerlach, 2002). Fiscal imbalance and government indebtedness are prone to threaten the credit worthiness of the government (Tran, 2019).

Considering the high vulnerability to fiscal performance, investigating the effects of fiscal balance on monetary variables would be important to policy makers more especially to a developing economy like Nigeria. The Nigerian national budgets suffers from a larger deficits occasioned by a rising public debt profile. Similarly, the rate of inflation continues to surge despite several efforts by the central bank to tighten monetary policy.

The effects of fiscal policy on monetary variables have been tested empirically by several studies over the years. Despite the numerous studies on how the balance of government budgets impacts on inflation in developed countries, there are little empirical studies on this area in developing countries. While few studies were carried out on the relationship between fiscal balance and monetary variables, no consistent evidence exists as to the exact relationship or a clear direction of the relationships (Fasanya et al. 2020). Results and evidence from different countries and regions differs. Different studies employed different econometrics techniques in their analysis. For instance, studies by Dwyer, 1992; Darrat 1990; King and Plosser, 1985; Findlay (1990); Protopapadakis and Siegel, 1987 and Barnhart and Darrat, 1988 on advanced countries had an inconclusive and often conflicting results on the fiscal deficit-inflation relationships. More so, findings are often inconclusive (Tran, 2019).

This paper investigates the impact of monetary variables on fiscal balance in Nigeria a developing economy faced with a rising and unstable inflation rate, rising unemployment rates, slow economic growth. We employed the linear ARDL approach developed by Pesaran et al.(1999) and Pesaran et al.(2001). An advantage of this approach is that it accommodates

variables with integration order $I(0)$, $I(1)$ or a combination of both.

Literature Review

There are two distinct approaches to the theoretical linkage between fiscal policy and monetary variables. First is the traditional approach which propounds that fiscal policy influence interest rate and exchange rate via variations in private consumption. According to the traditional approach, there exists an inconsistency in the response of interest rate and exchange rates to fiscal posture. This is due to the important assumption regarding the forward-looking economic agents in any theoretical model (Hebous, 2011). For instance, in the absence of forward-looking attitude, the orthodox Keynesian theory depicted in the IS-LM models framework argued that an expansionary fiscal policy stimulates the aggregate demand and then leads to a rise in nominal interest rates. This further leads to an appreciation in the exchange rate resulting from capital inflows (Mundell, 1963). In a similar manner, the crowding-out theory suggest that larger deficits results in higher interest rates. Nonetheless, it regards a rise in interest rate caused by government debt crowding out private capital, instead of an output increase resulting from expansionary government expenditure (Engen and Hubbard, 2004). Regarding the assumption of forward-looking behavior and fully flexible prices, the Ricardian equivalence position argued that fiscal policy has no effect on the interest rate.

Second, the non traditional approach discusses the role of sovereign risk premium in analyzing fiscal policy, with little regard for private consumption. This approach linked the fiscal policy and monetary variables in a distinct way. They argued that the increase in budget deficits arising from expansionary fiscal policy can raise the probability of sovereign defaults, which in turn causes a higher risk premium, and eventually a higher interest rate spreads (Flandreau et al. 1998). At once, the higher the default risk, the weaker the domestic currency will be. In a small open economy, forward-looking economic agents expect the exchange rate pass-through to import prices, which will ultimately raise inflation. As a result, chronic and persistent budget deficits worsen government solvency and dampens economic stability.

Most empirical studies build on the non-traditional model focuses on the effects of fiscal policy on interest rates. Policy makers generally believe that fiscal deficit together with government debt is positively correlated with sovereign spreads, as well as with medium and long term interest rates. For instance, studies such as Dai and Philippon (2005) investigated the impact of expansionary budget deficits on the long term interest rate differentials

in the United States over the period 1980-2000. Few literatures found a positive relationship between fiscal balance and inflation. Such studies includes; Canzoneri et al. (2001); Cerisola and Gelos (2005); all established the role of fiscal policy in shaping inflation expectations.

Sargent and Wallace (1987), in a debate over central bank's influence on inflation control, posits that central banks control over inflation is limited. Thus, fiscal policy can as well be a source of inflation. From the "fiscal dominance" framework, a loose fiscal policy drives inflation because the central bank must ultimately monetize the public debt, consistently with the unpleasant monetarist calculations (Sargent & Wallace, 1987). On the other side of the argument, the proponents of the fiscal theory of the price level argued that under fiscal dominance, newly issued nominal government bonds will lead to an increase in the price level to meet up with the government's intertemporal budget constraint. Government can reduce budget deficits through the aggregate demand component either by increasing tax revenue or cutting down expenditure. Alternatively, it can borrow from banks. If government finances budget deficits by selling government bonds to public then budget deficits will not create any inflation as no new money is created in the process. Nonetheless, if government borrows from the banks, bank deposits will increase and causes inflation (Easterly & Hebbel, 1993).

Major studies founded on the framework of IS-LM model established that fiscal expansion has the tendency of increasing interest rates, but they fail to consistently explain the depreciation of exchange rate in response to expansionary fiscal policy shocks (Enders et al. 2011). Nonetheless, Dungey and Fry (2009) and Corsetti et al. (2012) argued that a rise in government spending lead to a fall in the interest rates, as their studies are underpinned by the theory of spending reversals. Lin and Chu (2013) using a dynamic panel quartile regression model under an ARDL specification. They used annual data for 91 countries covering 1960-2006 and investigated the deficit-inflation relationship. Their findings reveals that the relationship is more pronounced in high inflation periods due to the increase in money creation and that persistent fiscal deficit. It is inflationary in high and middle inflation countries and is less inflationary in low inflation economies. Lozano and Lozano (2008) investigated the relationship between fiscal deficit, money supply and inflation in Columbia. Annual data covering 1981-2007 was used with VECM technique. The study established that there is a long run relationship between fiscal deficit, money supply and inflation. Habibullah et al. (2011) using annual data covering 1950-1999 for 13 Asian countries investigated the relationship between deficits, money supply and inflation. Using Granger causality test and error

correction method, they found that a long run relationship exists between deficits, money supply and inflation. Dejtamrong (1993) studied the effect of budget deficits on money supply and output growth for a selected sample of South Asian countries over the period 1974Q2 to 1989Q4. The results from reduced form equations of fiscal and monetary policy indicated mixed results. No impact of fiscal policy on money supply in the case of Korea and Phillippines, but there exist a strong relationship in the case of Sri Lanka and Singapore. On the effect of fiscal policy on inflation, Cerisola & Gelos (2009) and Canzoneri et al. (2011) established that a higher rate of inflation emanates from a larger fiscal imbalance.

However, Guess and Koford (1986) applied Granger causality test on the annual data of 17 OECD countries over a period 1949-1981. They found that deficits are not responsible for changes in inflation and recession. King and Plosser (1985) applied VAR and single equation model on 13 developed countries including United States. Their empirical findings could not establish any evidence of relationship between fiscal balance, money supply and inflation. Protopapadakis and Siegel (1986) investigated the relationship between fiscal deficit and growth in money supply. Annual data for 10 industrialized countries covering the period 1974-1983. Rank Correlation and simple OLS estimation were used. Their findings showed no evidence of relationship between government debt and money supply. Karras (1994) investigates the impact of budget deficit on money supply, inflation, investments and real output growth. They employed annual data for a sample of 32 countries covering 1950-1989. They conclude that fiscal deficits are not inflationary.

A certain number of studies such as Zoli (2005); Aktas et al. (2010); and Bouakez and Eyquem (2015) employs a sample of high deficits and high risk aversion countries arrived at similar conclusions that high probability in defaults leads to an outflow of capital, thus causing a depreciation of the local currency. The effect of fiscal policy on the exchange rate appreciations/ depreciations is far higher than the effect of any traditional monetary transmission mechanisms, which eventually weakens the link between the policy rate and the local currency exchange rate. Zoli (2005) found that fiscal variables drive the exchange rate not only through an indirect way via sovereign spreads but also through a direct way, where news relating to fiscal actions influences the value of domestic currency. Aktas et al. (2010) investigated the role of fiscal discipline and debt dynamics on the monetary policy implementation for inflation control. They use annual data for Turkey covering the period 1997-2006. They established that due to high risk premium emanating from fiscal imbalance, a rise in

interest rates is expected to lead to depreciation in the local currency.

Blommestein et al. (2011) found that policy non coordination might likely be more serious in developing economies due to the fact that a larger percentage of fiscal deficits are being financed through borrowing from central bank. More so, the fiscal effect of monetary policy might be higher in developing countries. This is because changes in interest rates have a strong influence on fiscal flexibility in situations where the public debt is a large percentage of GDP and interest payments on the debt are large as a proportion of government expenditure.

In the case of developing economies, studies such as Baldacci et al.(2011) have investigated the role of budget deficit in interest rate fluctuations. Belhocine and DellErba, (2013); DellErba et al. (2015) both analyzed the effects of public debt on interest rate. In a similar study, Bouakez and Eyquem (2015) found that real exchange rate depreciates in response to positive public spending shocks if the impact of risk premium dominates over the effect of the interest rate channel of monetary policy, even in the case of developed countries with fiscal consolidation.

In similar findings, Baldacci and Kumar (2010) and Tomsik (2012) both established that a tightening fiscal policy narrow the gap between domestic government bond and benchmark bond yields. Using a data of 10 developing countries, Peiris (2013) adopts a panel data analysis and established that a 1% increase in the ratio of the budget balance to GDP can result to a reduction of long term bond yields by 20 basis points. Jaramillo and Weber (2013) deploy a monthly data of 26 emerging countries including the BRICS covering January 2005 to April 2011. They found that the effect of fiscal variable on long term interest rate depends on the level of global risk aversion. Specifically, when risk aversion is at low levels, inflation and output growth expectations are the most vital determinants of domestic bond yields. Nonetheless, once risk aversion goes up to high levels, interest rates are significantly driven by market expectations regarding fiscal deficits and public debts. Their findings show that each additional point in the budget deficit to GDP ratio is estimated to raise long term domestic bond yields by 30 basis points, while a 1% point increase in the expected public debt to GDP ratio leads to a 6 basis point rise in domestic bond yields.

For African countries, Kilindo (1997) found a strong relationship between fiscal deficits, money supply and inflation in Tanzania. In Nigeria, studies such as; Oyejide (1972); Onwioduokit (1999); Chimobi and Igwe (2010); Olusoji and Oderinde (2011); and Fasanya et al.(2020) investigated the relationship between fiscal deficit and

inflation. The study established that fiscal deficit is a major determinant of inflation in Nigeria. Olusoji and Oderinde (2011), investigated the effects of fiscal deficit on inflationary trend in Nigeria. They used annual data covering 1970-2006 and employed Granger causality test. They established no evidence of causality between fiscal deficit and inflation in Nigeria. Wesowei (2013) examined the relationship between fiscal deficit and some macroeconomic aggregates in Nigeria over the period 1980-2010. Using OLS and Engel Granger cointegration method, they found an insignificant negative relationship between fiscal deficit and GDP. And a bi-directional causality exists between fiscal deficit and GDP and between government tax and unemployment rate in Nigeria. The few studies have shown conflicting results on the relationship between fiscal balance and monetary variables. Thus the link between fiscal balance and monetary variables has been inconclusive.

Our study focus on Nigeria considering that recently authorities are getting worried that fiscal balance might be a factor influencing monetary variables in the economy which might be a major source of inflation (Fasanya et al. 2020). Less attention is focused on exploring these relationships in Nigeria.

Investigating the relationship between fiscal balance and monetary variables is crucial for a developing country like Nigeria faced with a rising inflation impacting negatively on the living standard of an average citizen in the country. Rising inflation erode purchasing power of the vulnerable members of the society, thereby having a political cost. Most available studies investigate the link between fiscal policy and the individual monetary variables such as interest rate, inflation and exchange rate separately (Tran, 2019). More so, there have been very little empirical studies on the impact of fiscal policy aftermath of the last global financial crisis in which the problem of budget deficit and government solvency becomes worse in developing countries.

This paper therefore contributes to the available literature by enriching an analysis of the influence of the fiscal balance on monetary variables. It analyzed the effects of inflation, interest rates, money supply, and exchange rate on fiscal balance. The study employs linear autoregressive distributed lag(ARDL) technique to empirically analyze the impacts of the monetary variables on fiscal balance in Nigeria.

Methodology

Annual data for the period 1980-2019 for fiscal balance (FB), measured as government revenue minus government expenditure as a ratio of GDP, inflation (INF), interest rate (IR), Money supply (MS), and real

exchange rate (EXR) was used. The data were obtained from the World Bank, World Development Indicators (WDI) data base and the Central Bank of Nigeria (CBN) database.

To empirically analyze the relationship between fiscal balance, inflation, interest rate, money supply, and exchange rate following Quattara (2004), we specify an ARDL model as follows;

$$\Delta \ln FB_t = \varphi_0 + \sum_{i=1}^{\rho} b_i \Delta \ln FB_{t-i} + \sum_{i=0}^{\rho} c_i \Delta INF_{t-i} + \sum_{i=0}^{\rho} d_i \Delta ITR_{t-i} + \sum_{i=0}^{\rho} e_i \Delta \ln MS_{t-i} + \sum_{i=0}^{\rho} f_i \Delta \ln EXR_{t-i} + \alpha_1 \ln FB_{t-i} + \alpha_2 \ln INF_{t-i} + \alpha_3 \ln ITR_{t-i} + \alpha_4 \ln MS_{t-i} + \alpha_5 \ln EXR_{t-i} + \mu_t \quad (1)$$

From equation 1, φ_0 is the drift component, the terms with summation notation and symbol Δ represents an error correction dynamics. Results of the error correction model designate the speed of adjustment back to long run equilibrium after a short run shock. The second part of the equation with α_1 to α_5 corresponds to the long run relationship.

In carrying out the empirical analysis, we first conduct the bound test procedure (Pesaran et. al. 2001). The bound test procedure identify the direction of the long run relationship by positioning a dependent variable on one side, followed by its forcing variables on the other side. The estimation of equation (1) tests for the presence of a long run relationship among the variables by carrying out F test for the joint significance of coefficients on first lagged of explanatory variables. The null hypothesis is;

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \mu_i = 0$$

Against the alternative hypothesis;

$$H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \varphi_1 \neq \varphi_2 \neq \varphi_3 \neq \varphi_4 \neq \mu_i \neq 0$$

A comparison is then made between the estimated F statistic and the critical value bounds computed by Pesaran et al. (2001). Since Z_t can be I(0) or I(1), there are two sets of critical values covering all possible cases of Z_t . The lower bound values are obtained for the case in which Z_t is assumed to be I(0), while the upper bound values are specified for the case in which Z_t is I(1). There is no cointegration in the system if the estimated F statistic lies below the upper bound. When the calculated F statistic lies above the upper bound, we reject the null hypothesis of no cointegration. Finally, if it falls within the bounds, the test result is inconclusive.

The ARDL bound test is adopted in this study for its superior power over the other cointegration techniques. The advantages of the method are as follows; first, compared to other multivariate cointegration techniques, ARDL is simple method because it allows the cointegration relationship to be estimated using OLS

once the lag order of the model is identified. Second, using the ARDL technique suggests that pretext unit root analysis is not required. Because the variables combination can either be I(0), purely I(1) or mutually cointegrated. Nonetheless, to satisfy the curiosity and quell the anxiety of spurious results from regression which is obtainable through regressing non stationary variables, and to further scrutinize the integrating level of the variables and ensure that none of the variables is of order I(2). The computed F-statistic provided by Pesaran et al.(2001) are not valid in the presence of I(2) variables because the bound test is based on the assumption that the variables are either I(0) or I(1). Thus, carrying unit root test in the ARDL analysis is still necessary to make sure that none of the series in the model is I(2) or beyond but fall within the computed F-statistics range as provided by Pesaran et al.(2001). Third, the ARDL technique makes it possible to simultaneously estimate the long run and short run parameters in the model.

Thirdly, the ARDL method can remedy the problem of serial correlation and endogenous regressor by appropriately expanding the lag lengths to remedy for autocorrelation and endogeneity (Pesaran & Shin, 1999). Fourth, the ARDL model yields efficient cointegrating relationships in small and finite sample sizes, while other testing procedures requires large sample data to obtain valid inferences (Pesaran & Shin, 1999). With this

technique, the ECM can be easily derived from the ARDL model to estimate the short run dynamic coefficients associated with the long run relationship.

Results and Discussion

Our analysis begins with unveiling the statistical properties of the variables in the model. The descriptive statistics are presented in table 1.

Table 1: Summary of Descriptive Statistics 1980-2019

Variable	Mean	Std Dev	Min	Max	Skewness	Kurtosis	J-B Stat	P-Value
FB	0.8696	2.1691	-4.228	6.4823	0.587	3.943	3.6851	0.1584
INF	2.6761	0.6937	1.6831	4.2882	0.8783	2.8696	5.0422	0.0804
ITR	2.8299	0.2819	2.0477	3.3945	-0.8031	3.9269	5.5889	0.0611
MS	6.7847	2.6023	2.7826	10.4666	-0.0875	1.6058	3.2086	0.201
EXR	3.4767	1.9849	-0.4817	5.725	-0.7822	2.3098	4.7511	0.0929

Note: FB; INF; ITR; MS AND EXR represent fiscal balance, inflation, interest rate, money supply and Exchange Rate respectively. Std dev is standard deviation; min is minimum; max is maximum; JB stat is the Jarque-Bera statistic. The p-value is the probability value of the Jarque-Bera statistic.

Source: Researcher's Computation

From the table, money supply has the highest value of standard deviation of 2.6 followed by Fiscal deficit 2.2 and exchange rate 1.9. Considering the skewness statistics whose threshold value for symmetry (or normal distribution) is zero, none of the variables is exactly zero. Interest rate, money supply and exchange rate are negatively skewed indicating that more of the values of the variables fall on the left hand side of the mean values. Fiscal balance, and inflation are positively skewed and that their skewness statistics are greater than zero. The kurtosis value with a threshold of three shows that fiscal balance and interest rate are leptokurtic (highly peaked), having a kurtosis value of 3.94 and 3.93 respectively. Inflation, money supply and exchange rate are platykurtic (low peaked) with a value of 2.87, 1.61 and 2.31 respectively. Nonetheless, neither skewness nor kurtosis can individually ascertain the normality of a variable. Thus, since the Jarque-Bera statistic combines both skewness and Kurtosis properties, it provides more detail information. From the probability value (p-value) of the Jarque-Bera statistics, inflation, interest rate and

exchange rate has respective values of 0.0804, 0.0611 and 0.0929. Since the p-values are significant at 10% level, it then suggest that the hypothesis of normal distribution can be rejected, thus the variables can be regarded as not having a normal distribution. Fiscal balance and money supply has respective p-values of 0.1584 and 0.2010. This shows that the hypothesis of normal distribution cannot be rejected. Thus the series are normally distributed.

Next we try to unveil the unit root properties of each variable in the model. Augmented Dickey Fuller (ADF), and Phillip Perron (P-P) Unit root tests were conducted on each variable in the model. Table 2 depicts the unit root test estimates. From the test results, inflation and interest rate are stationary at level, $I(0)$ in both ADF and P-P. Fiscal balance, money supply and exchange rate become stationary after taking their first differences. The dependent variable, Fiscal balance is at first difference. This then justifies the application of ARDL bound test approach

Table 2: Unit Root Tests

A: Augmented Dickey Fuller

Variable	Level		First Difference	
	Intercept	With Trend	Intercept	With Trend
LFB	-2.3971	-2.3855	-6.5489***	-3.2906*
INF	-3.3938**	-4.4007**	-6.8423***	-6.7371***
ITR	-3.5964**	-3.3530*	-5.6018***	-5.8681***

LMS	-0.8157	-0.5186	-4.1360**	-4.1820**
LEXR	-2.0927	-1.2505	-5.2033***	-5.6084***
B: Phillip-Peron				
LFB	-2.5051	-2.4864	-7.6916***	-8.4284***
INF	-3.2803**	-3.2339*	-9.7159***	-10.2481***
ITR	-3.5771**	-3.2913*	-9.1459***	-9.5126***
LMS	-0.6994	-1.2773	-4.1647***	-4.1226*
LEXR	-2.2415	-1.2495	-5.2032***	-5.8083***

Note: ***, **, and * imply significance at 1%, 5% and 10% levels respectively. The figures show the t-statistic value for testing the null hypothesis that the variable possess a unit root. The Schwarz Information Criterion (Schwert, 1987) is used in the lag length selection. The critical values for constant without trend are -3.479, -2.883 and -2.578 while that of constant with trend are -4.028, -3.443 and -3.146 for 1%, 5% and 10% respectively. For PP the bandwidths are determined based on the Newey-West using Bartlett Kernel.. The critical values for constant without trend are -3.479, -2.883 and -2.578 while that of constant with trend are -4.028, -3.443 and -3.146 for 1%, 5% and 10% respectively. The figures are based on Mackinnon (1991).

Table 3 presents the bound cointegration test results. The F_c of 10.96 is greater than the upper region value of 4.37 at 1% significant level based on the Narayan (2005) critical values. The test statistic exceed the upper critical value of the Narayan (2005), indicating that the null hypothesis of no cointegration is rejected at 1% significance level. This further provides a confirmatory evidence for the existence of a valid cointegrating relationship between the fiscal balance and inflation,

interest rate, money supply and exchange rate in Nigeria. This contrasts the findings of Tann, (2018) who found no evidence of cointegration between fiscal balance and monetary variables in the case of Brazil and India. This indicates the presence of a longrun cointegration amongst the variables in the model. Following this result, the paper further examines the short run dynamics and the long run relationship among the variables in the model.

Table 3 Bound Cointegration Test Results

Model	F_c	F-critical values	
		I(0)	I(1)
LFB, INF, ITR, LMS, LEXR	10.957***	3.29	4.37

Note: ***, **, and * imply 1%, 5%, and 10% significance level respectively. I (0) is the lower bound region, and I (1) is the upper bound region based on Pesaran et al. (2001), and Narayan (2005) critical values. The null hypothesis is no cointegration.

Table 4 Long Run ARDL Results

Variable	Long Run Estimates
Constant	47.133** (19.207)
INF	15.186 (8.700)
ITR	-5.327** (0.167)
LMS	-2.034** (0.987)
LEXR	5.891** (2.364)

Note: ***, **, and * imply significance levels at 1%, 5%, and 10% respectively. Figures in parenthesis are the standard errors. The estimation period is 1980-2019. Source: Researcher's Computation

Table 4 presents the longrun estimate result. The result reveals that interest rate, money supply and exchange rate have a significant influence on fiscal balance. Interest rate and money supply negatively affects fiscal balance, while a positive relationship exists between fiscal balance and exchange rate. Specifically, the coefficient value of -5.3 for interest rate implies that fiscal deficit will decrease by 5% with a 1% rise in interest rate. The negative relationship between fiscal deficit and interest rate follows the crowding-out theory. Studies by Dai and Philippon (2005), found that interest rate responds promptly and strongly to negative variations in fiscal balance.

Money supply exerts a negative impact on fiscal balance in the long run. With a negative coefficient of -2.03, it implies that a 1%tage increase in money supply will lead to a fall in fiscal balance by -2%. The findings that money supply affects fiscal deficit negatively corroborates the results of Kilindo (1997).

Exchange rate bears a positive influence on fiscal balance. With the appreciation of domestic currency's value, the fiscal deficit will increase. Thus, a coefficient of 5.89 indicates that a 1% appreciation in the domestic currency's exchange rate will jerk up the fiscal balance by 5.9%. our results are similar to the one obtained by Flandrean et al. (1998).

For inflation, the results show an insignificant positive estimate. The positive relationship between inflation and fiscal deficit is in line with the assertion of fiscal theory of price level (Sergent & Wallace, 1981). The insignificant estimates suggest that inflation does not influence fiscal balance in the long run. Studies such as, Findlay (1990); Lin & Chu (2013); and Olusoji & Oderinde (2011) found that fiscal deficit influence inflation rate negatively. Our results established a negative impact of inflation on fiscal deficit only in the short run, implying that the short run influence of inflation on fiscal deficit does not extend to the long run period.

Table 5 Short run ARDL Results

Variable	Short Run Estimates
$\Delta(\text{LFB}-1)$	-0.478*** (0.109)
$\Delta(\text{LFB}-2)$	-0.137 (0.091)
$\Delta(\text{LFB}-3)$	0.409*** (0.087)
$\Delta(\text{INF})$	-0.036*** (0.303)
$\Delta(\text{INF}-1)$	-3.519*** (0.419)
$\Delta(\text{INF}-2)$	-3.059*** (0.515)
$\Delta(\text{ITR})$	-3.469*** (1.006)
$\Delta(\text{ITR}-1)$	7.666*** (1.503)
$\Delta(\text{ITR}-2)$	3.175** (1.018)
$\Delta(\text{ITR}-3)$	2.527*** (0.719)
$\Delta(\text{MS})$	2.808** (1.314)
$\Delta(\text{MS}-1)$	2.471 (1.564)
$\Delta(\text{MS}-2)$	4.341*** (1.325)
$\Delta(\text{EXR})$	0.288 0.636
$\text{ECT}(-1)$	-0.336*** (0.036)

Note: ***, **, and * imply 1%, 5%, and 10% significance level respectively. Figures in parenthesis are the standard errors. The estimation period is 1980-2019.

Source: Researcher's computation

The short run result is presented in table 5. The result shows an error correction term of -0.34 significant at 1% level. This implies that 34% of the disturbance in the equilibrium will be restored back annually. The adjusted R^2 shows that 85% variations in fiscal balance are explained by inflation, interest rate, money supply and exchange rate.

The diagnostic test result presented in table 6 suggests that the model pass through the entire diagnostic tests. It

is free from the problem of autocorrelation, normality or misspecification. The distribution is homoscedastics as the result of heteroscedasticity test shows.

As a robustness measure for the empirical results, we use the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) to test for the stability of the model. The plots as depicted in figure 1 shows that they all fall within the 95% confidence bounds, which confirm the stability of the estimated parameters.

Table 6 Diagnostic Tests Results

Test statistic	LM test	F-test
Serial correlation	1.8028(0.4060)	0.3529(0.7091)
Functional form	0.3884(0.7036)	0.1508(0.7036)
Normality	1.9104(0.3847)	N/A
Heteroskedasticity	13.1550(0.8305)	0.4754(0.9363)

Note: The Langrange multiplier tests are distributed as Chi-squared variables with degrees of freedom in parenthesis. The null hypothesis of the two tests is no serial correlation, normality, correct functional form and homoskedasticity respectively. Figures in parenthesis are the p-values.

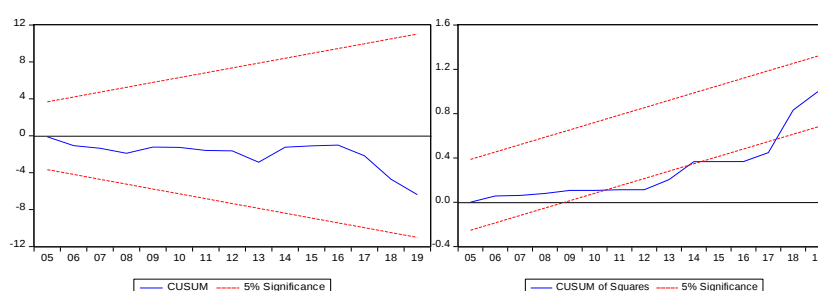


Figure 1 CUSSUM and CUSSUMSQ Plots

Conclusion and Recommendations

This study investigates the relationship between fiscal deficit, money supply, interest rate, inflation and exchange rate. Annual data of the variables covering 1981-2019 was employed. The unit root test suggests that the variables are of mixed integration order of $I(1)$ and $I(0)$, thus warrant the application of the ARDL bound test approach. From the results of the ARDL, money supply, interest rate, and exchange rate affects fiscal balance in both the long run and short run. Inflation affects fiscal balance only in the short run period.

The study analyzed the dynamic relationship between fiscal balance and monetary variables including inflation, interest rate, money supply and exchange rate in Nigeria. We employed the dynamic linear ARDL technique to explore the possible interaction amongst the dependent variables and each of the respective independent variables. Our study is build based on the model of sovereign risk premium which argued that when a nation suffers from a weak fiscal position, an increase in budget deficits could raise the probability of sovereign default, which then leads to an increase in interest rates, a depreciation of domestic currency and ultimately a higher inflation rate.

The findings shows that the deterioration of monetary variables has a more powerful and significant impact on the country's fiscal balance. The results indicates that the fiscal performance in Nigeria have shown a continuous budget deficits and government debt accumulation over the years, this buttress the idea that countries like Nigeria characterized by high fiscal deficits and high debt profile are much more vulnerable. Thus, the results further

reveal that fiscal un-sustainability is a primary cause of the ineffectiveness of tightening monetary policy. An important implication of this study is that government commitment to long term fiscal consolidation is very vital to the conduct of monetary policy in Nigeria. From the findings, it becomes necessary for Nigeria to consider monetary variables influence on fiscal policy design.

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