Threshold Analysis of Fiscal Deficits with Respect to Monetary Growth: Evidence from Nigeria

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Abstract

This paper aims at determining the threshold level of fiscal deficits with regards to monetary growth. Data for the study are obtained from Central Bank of Nigeria Statistical publication between 1986 and 2016. The empirical findings suggest that optimal level of fiscal deficits with regards to monetary growth is at the point where the fiscal deficits, as a percentage of GDP is 31. The major conclusion from the study is that continuous accumulation of deficits in the economy by the government should be avoided. This can be done by strengthen fiscal consolidaton and provision of viable institutional fiscal rules so as not reach the threshold level.

1. Introduction

Great deal of attentions have been devoted in economic literature to analysis of interdependence between fiscal and monetary policies in various economies with the intention of investigate the presence or absence of fiscal dominance, (Aiyagari and Gertler, 1985, p.19-44; De Resende, 2007.p.10;Sanusi and Akinlo, 2015, p.125). Evidence from the literature suggests that the relation between fiscal deficits and monetary growth have been largely debatable and remain inconclusive. None of these existing studies has looked into the threshold level of deficits; below which monetary growth would not be stimulated and above which growth of money will be stimulated. This could be a reason for inconclusiveness of the available empirical findings. On the other hand, available studies on threshold analysis of fiscal deficits have been carried out with respect to economic growth. These studies include, among others, (Adam and Bevan, 2003, p.572), (Onwioduokit & Bassey, 2013, p.22), (Olayiwola, 2013, p.7) and (Onwioduoki and Bassey, 2014, p.3). Hence, this study differs from existing studies by examining the threshold level of fiscal deficits with respects to monetary growth in Nigerian economy. This paper is divided into four sections. Section 2 presents the method of estimation. Empirical findings are contained in section 3 while section 4 concludes the study.

2. Empirical Method

This study adopts the formulated model of Khan and Sendhaji (2001) to test the threshold level of fiscal deficits with respect to monetary growth. The model to be estimated is of the form:
$$dlog(X_t) = \alpha_0 + \alpha_1 log(Y_t) + \alpha_2 D[\{log(Y_t) - log(Y^*)\}] + U_t \dots\dots\dots\dots\dots 1$$
Where Y^* is the threshold point for fiscal deficits.

X_t = growth rate of monetary base

Y_t = growth rate of fiscal deficits

U_t = random error term, which represents measurements error in the explanatory variables.

The dummy variable D is defined in the following way:

$$D= \{1 \; if Y_t > Y^*\} \, , \; \{0 \; if Y_t \leq Y^*\}.$$

The coefficients of the dummy variable α_2 measures the impacts of fiscal deficits on growth rate of monetary base when it is greater than the assumed structural break level (i.e fiscal deficits is high) and opposite for the coefficient of fiscal deficits α_1. Fiscal deficit is measured by the excess of government spending over the generated revenue and is captured in the estimation process as EGR. While growth rate of monetary base is measured by annual growth rate of high powered money and is captured in the estimation process as CC.

3. Empirical Results

Time series data on growth of fiscal deficit and growth of monetary base were used for the study. The data were sourced from Central Bank Statistical Bulletin, 2016. Preliminary tests that were carried out showed the absence of serial correlation among the variables. Model stability is done by means of OLS-based CUSUM process, using R-statistical Package. The OLS-based CUSUM test has better power for structural changes early and late in the sample period (Zeileis, 2000b, p.1-50). The result is presented in figure 1 the OLS-based CUSUM process does not exceed its boundary, our model is adjudged stable.

Figureno. 1: OLS-Based CUSSUM Stability Test
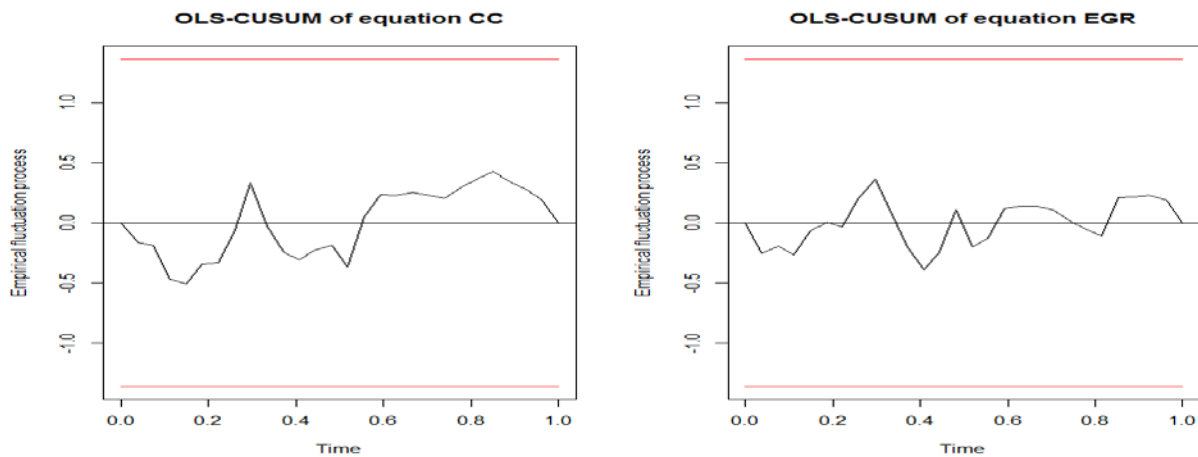
Source: (Author, 2017)

The trend of fiscal deficits and monetary growth are examined and they are shown as in figure 2a and figure 2b.
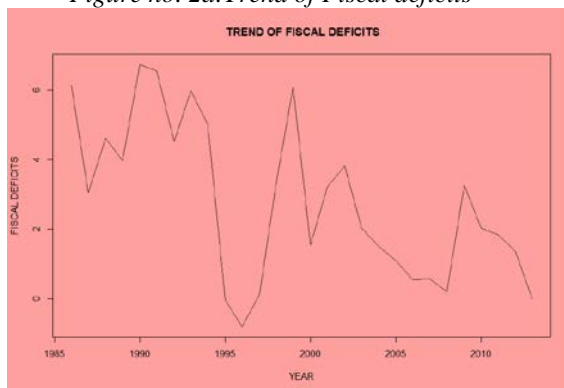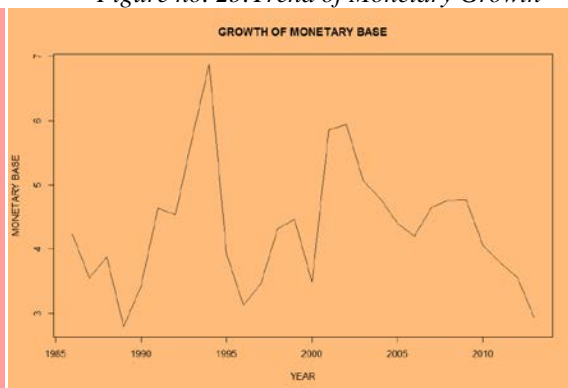
Figure no. 2a:Trend of Fiscal deficits   *Figure no. 2b:Trend of Monetary Growth*

Sources: (Author, 2017)

The results showed that fiscal deficit and growth rate of monetary base in Nigeria swing during the period under analysis. They, on average increased, between 1986 and 1999, and later declined until 2002 and continued to decline.

Unit Root Results

Table no. 3.1   Unit Root Test for the Variables in Levels

	ADF AT LEVEL		PHILLIPS-PERRON AT LEVEL	
Series	ADF Stat	Critical Val	PP Stat	Critical Val
CC	-2.778	-2.9762	-2.820644	-2.976263
EGR	-2.7070	-29762	-2.7595	-2.976263

Sources: (Author, 2017)

Table no. 3.2 Unit Root Test for the Variables in 1st Difference

	ADF AT 1st DIFF		PHILLIPS- PERRON AT 1st DIFF	
Series	ADF Stat	Critical Val	PP Stat	Crtical Val
CC	-4.649530	-2.9862	-6.384563	-2.9810
EGR	-5.8466	-2.9810	-7.1363	-2.9810

Sources: (Author, 2017)

The results of the unit root test of the variables evaluated at both levels and 1st difference are presented in Table 3.1 and Table 3.2 Using the ADF and PP tests, all the variables were regarded as non-stationary at their levels, since the reported t-statistic for each of the variables was not greater than the critical values at 5% level of significance. The result was followed by testing whether the first differencing makes the variables stationary. In other words, for each variable, we tested null hypothesis that the variables are I (1). The results presented in table 3.2, however, confirmed that differencing once is what is required to bring these variables to stationary at 5% significance level. The variables were as well rightly signed.

Cointegration Test

Table no. 3.3a Johansen Co-integration Test Results

Eigen value	Trace Statistic	5 Percent critical Value	Hypothesized NO of CE(s)
0.451223	21.58616	15.49471	None *
0.205605	5.984531	3.841466	At most 1 *

Sources: (Author, 2017)

Table no. 3.3b Johansen Co-integration Test Results

Eigen value	Max-Eigen Statistic	5 Percent critical Value	Hypothesized NO of CE(s)
0.451223	15.60163	14.26460	None *
0.205605	5.984531	3.841466	At most 1 *

Sources: (Author, 2017)

Notes:
i. Both Trace test and maximum Eigen Statistics indicate two co-integrating equations at 5-percent significant level
ii. * denotes rejection of null hypothesis at 0.05 significant level
iii. Critical Values are from Mckinnon-Haug-Michelis (1999)

Table no. 3.4 Philips and Ouliaris Co-integration Test Results

Deterministic Term	Test Statistic	Critical Values
Without Trend	9.52	-3.5625
With Trend	9.516	-4.1336

Sources: (Author, 2017)

Note: Critical Values are computed from the MacKinnon's table on co-integration

From table 3.3, the null hypothesis of no co-integration was rejected at 0.05 level of significance since there was at least one co-integration relationship between fiscal deficits and growth of monetary base in Nigeria. The existence of co-integration relationship was further confirmed by Philips and Ouliaris co-integration test result available in the software R in package urca. Since the test statistic values are greater than critical values as can be seen in table 3.4, the null hypothesis of no co-integration is rejected. We thus conclude that there is existence of co-integration relationship.

Table no. 3.5 Granger Causality

Direction of Causality	Chi-Sq	df	Prob
EGR > CC	12.957161	2	0.0034
CC> EGR	10.44065	2	0.0054

Sources: (Author, 2017)

Empirical evidence from table 3.5 shows that there exists causality running from fiscal deficits to growth of monetary base and vice visa. The task of identifying a precise level of fiscal deficits, above which has implications for monetary policy performance involves estimating the threshold level of fiscal deficits, beyond which it begins to correlate with the growth of monetary base in Nigeria.

The optimal threshold is the level of fiscal deficits or a point at which there is a break-point. The estimation of regression model in 2.1 showed that threshold level occurs at the point where the fiscal deficits. as a percentage of GDP is 31 as shown in the figure 3.

Figure no. 3 Threshold Level
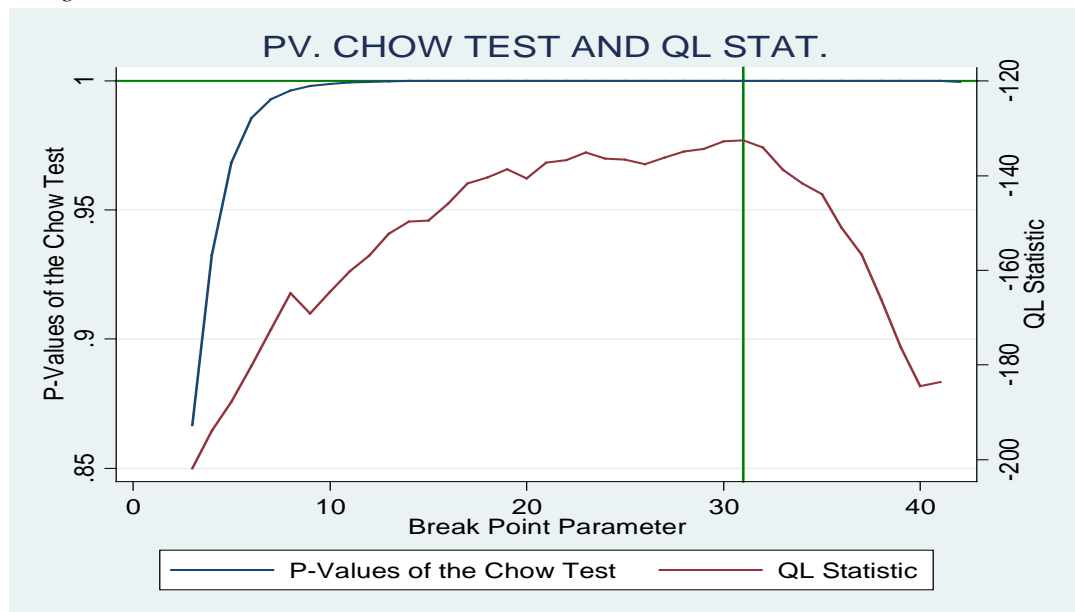
Sources: (Author, 2017)

4. Conclusion

The study investigated the threshold level of fiscal deficits in respect to growth of monetary base in Nigeria. The empirical findings from the study is that optimal level of fiscal deficits with respect to growth of monetarybase occurs at the point where the fiscal deficits, as a percentage of GDP is 31. The study concludes that government should avoid continuous accumulation of deficits in the economy by ensuring stringent fiscal discplines as not to reach the threshold level.

5. References

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