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The Relative Efficacy of Fiscal and Monetary Policy in Curtailing Recession: Empirical Evidence from Nigeria

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Abstract: This study examines the relative effectiveness of fiscal and monetary policy during economic recession. The study employed logistic smooth transition regression on Nigerian quarterly data spanning from 1982 to 2017. The findings revealed that expansionary monetary policy helps in ameliorating recession, while contractionary monetary policy during expansion promotes the economic growth, as it helps in reducing money supply in order to stabilize price. However, fiscal policy does not exert any significant effect during recession and expansion, though increment in government spending exacerbates recession, giving cautious credence to the grabbing hand thesis. It is also known that the effect of monetary policy during recession is more pronounced than its effect during expansion. Thus, the study recommends the implementation of sound monetary policy, as an effective tool during economic downturn.

Keywords: Logistic Smooth Transition Regression, Recession, Monetary and Fiscal Policy and St. Louis Equation

JEL No: E32, E52, H30.

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1. Introduction

Macroeconomic policies are often deployed by public authorities to help lift an economy in difficulty to the path of economic stability towards the realization of broad-based societal goals both in developing and advanced economies. There abound varied forms of macroeconomic policies, namely debt management policy and income policy, but the two main traditional regulatory macroeconomic policies are fiscal policy and monetary policy, and economic researchers have continued to question their efficacy, especially during periods of economic uncertainties.

Ever since the seminal work by the Federal Reserve Bank of St. Louis proposing the now well-known 'St Louis Equation', there has been intense debate as to which of the traditional policy measures, whether fiscal or

monetary policy, is more effective to stimulate economic growth. The St Louis conclusion can be summarised neatly: monetary actions have a significant, permanent effect on nominal US GNP growth, while fiscal actions exert no statistically significant lasting influence on GNP (Batten and Hafer, 1983).

Nigeria, like other global nations remains buffeted by undesirable economic malaise which often result to increases in price level, accompanied by unsustainable level of unemployment rate. The onus of policy makers is to pursue the attainment of macroeconomic goals which includes full employment, price stability, rapid economic growth, debt management and balance of payment equilibrium, amongst others. Although, simultaneous realization of these macroeconomic goals might not be plausible as some of these goals, such as full employment and price stability are counter-interactive. However, in the bid to ensure the realisability of these goals, monetary and fiscal policy are often deployed. Through these policies, the government mediates in the economy with the view to correct any disequilibria in the economy which might have been caused by the interactive forces of demand and supply, or other exogenous factors.

There has been an age-long debate on the most effective policy in ameliorating the economy in the face of recession. This study is poised to ascertain the more potent policy in stabilizing the economy during recession and tactically validate the St. Louis Model in Nigeria. There is considerable controversy among members of the economics profession regarding the efficacy of both fiscal and monetary policy on economic activities.

Using diverse methodologies and modified version of the St-Louis equation, some authors have meticulously accessed the relative effectiveness of fiscal-monetary policies with mixed findings. Sanni, Amusa, and Agbeyangi (2012), for example, opined that, none of the policies are better off than the other, and that a proper mix of the policies may enhance a better economic growth outcome. However, this study attempted to re-examine the St-Louis equation in the Nigerian context, using more advanced empirical analytical tools.

2. Review of Related Literature

2.1. Theoretical Framework

Keynesian versus monetarist

Keynesian View

The Keynesians pioneered by the celebrated work of J.M Keynes (1936) were of the opinion that economic recession is borne out of ineffective demand. They noted that wages and prices adjust slowly during recession. Hence, the downward stickiness in price and nominal wages creates involuntary unemployment which consequently distorts the production and consumption

which steered the economy away from its potential level of production for a long period of time. To this effect, they suggested that the economy should actively intervene during this period through fiscal stimulus, i.e increase in government spending and tax cut. They believed that the strong force of recession dampens demand and reduces spending, thus fiscal stimulus will help by creating production and generating employment which will eventually pull the economy back to its potential production level.

However, Barro and Redlick (2009) held a heresy to the effectiveness of the Keynesians on fiscal stimulus, they posit that contrary to the Keynesians conviction of the government spending multiplier being greater than one, in actuality it is less than one. That is, an increase in government stimulates the economy less than the amount of government spending and also reduction of one-point percent in tax only increase GDP by 0.6 percent. The upshot of this will be a debt accumulation which would be borne by increase in future tax to pay the debt which might spur another episode of recession. Thus, these phenomena cast doubt on the efficacy of fiscal stimulus as an appropriate macroeconomic tool to ameliorate recessionary situation.

Monetarist View

The monetarist view championed by Milton Friedman opined that the economy will recover on its own as long as the monetary authority keep money supply from contracting. Buchanan and Wagner (1977) supported the monetarist view by attacking the fiscal stimulus package of the Keynesian. They noted that, if the public officials are aware that public debt is not inimical to the economy, they will no longer feel restrained to issue public debt or public spending. They therefore posited that fiscal stimulus will undermine fiscal discipline by giving the politicians the avenue to exercise their extravagant spending all in the name of increasing spending to stabilize recession which would in the long run lead to high indebtedness.

However, the monetarist view does not just pass without opposition. Samuelson (1948) in his book economics an introductory analysis opposed the use of monetary policy as the stabilizing tool during recession. He noted that, recessionary period is usually characterized by low industrial confidence and most private sectors are pessimist about the future demand hence unwilling to borrow even if the interest rate is very low.

2.2. Empirical Review

Leigh and Stehn (2009) investigated the impact of fiscal policy and monetary policy during economic downturn on G7 countries using quarterly data spanning from 1980 to 2007. The study used vector autoregressive regression for the estimate. The study concluded that monetary policy is a reliable countercyclical tool during economic downturn while fiscal policy is weak during this period. The findings equally showed that fiscal policy is pro-cyclical

in Europe and Japan but countercyclical in Anglo-Saxon countries. The authors submitted that although monetary policy is an effective tool during economic downturn, the timely fiscal policy could as well be a veritable tool during economic downturn.

Tas (2011) examined the effectiveness of fiscal and monetary policy in ending recession using survival analysis on quarterly data extracted from 22 different countries. He observed that expansionary fiscal policy significantly reduces the duration of recession while fixing of exchange rate doesn't exert any significant effect on recession duration. Contrariwise, expansionary fiscal policy has undesirable effect on duration of recession as it increases the duration of recession. The author thereby recommends an aggressive monetary policy as the appropriate tool for reducing recession duration.

Jie (2013) examined the effectiveness of monetary and fiscal policies during the twin crisis of banking and currency crisis using the dataset provided by Laeven and Valencia (2012) which spanned from 1970 to 2010. The study employed ordinal logistic regression and ordinary least square estimate. The empirical findings revealed that fiscal policy is not effective during the twin crisis. However, mild monetary expansion helps in shortening the duration of crisis while strong monetary expansion does not have any effect on crisis duration.

Sen and Kaya (2015) studied the relative effectiveness of fiscal and monetary policy on Turkish economic growth using a quarterly data which spanned from 2001 to 2014 employing structural vector autoregressive estimate (SVAR). The result revealed that monetary policy is more effective in stimulating economic growth than fiscal policy especially when interest rate is used as the monetary policy tool. The study thereby recommends that even though monetary policy is more potent than fiscal policy, both should be used jointly and effectively. This result was corroborated by findings by Adefeso and Mobolaji (2010), using cointegration and error correction modelling approach.

Jackson, Francis and Owyang (2017) examined the effect of fiscal and monetary policy in shortening recession and quickening recovery using quarterly data for extracted from 48 states in United States of America. The study employed baseline recovery model using Bayesian algorithm. The findings revealed that expansionary monetary policy at the national level helps to stimulate individual state recoveries from recession. Furthermore, national level decrease in taxes or targeted increase in spending appears to increase recovery time while fiscal expansion at state level helps to reduce the recovery time from recession.

Friedman'sresults suggested that the St. Louis equation now "believes in" fiscal policy, since the equation yields a significant government spending multiplier of about 1.5, which conforms with neo-Keynesian school of thoughts, but Friedman noted that, the relatively strong impact of monetary actions continues to hold sway.

3. Research Methodology

Non-linear modelling has gained prominence in recent quantitative economics and financial related studies especially for research that requires modelling series which exhibits different dynamics in different phases such as business cycle, financial market modelling which includes bullish and bearish market etc. There are vagaries of nonlinear models, prominent among them are Threshold regression and autoregressive models, markov switching models and smooth transition regression. The study employed the Smooth Transition Regression which allow for smooth movement of variable of interest from one regime to another overtime. This is realistic as it usually takes sometimes for an economy to move from one phase of business cycle to another.

In the spirit of Terasvirta (1994), the smooth transition regression (STR) is modelled as follow.

$$Y_t = \varphi Z_t + \theta Z_t' G(\gamma,c,s) + U_t,\ t = 1\ldots\ldots T \tag{1}$$

Where $G(\gamma, c, s) = (1 + \exp\{-\gamma \prod_{k=1}^{k}(S - C)\})^{-1}$ given that $\gamma > 0$. (1.1)

The $Z_t=(W_t,X_t)$ is a vector of explanatory variables with $W_t=(,y_{t-1}\ldots..y_{t-p})$ as the vector of lags of endogenous variable and $X_t=(1,X_t\ldots..X_{tk})$ for the exogenous variables. Ut is an independent and identically distributed error term with zero mean and constant variance, i.e. iid Ut~iid(0, σ^2).φ and θ are linear and nonlinear coefficient respectively. The transition function $G(\gamma,c,s)$ is a continuous transition function which controls the dynamics of the STR model which is bound between 0 and 1 depending on the γ, s and *c*. γ is the slope parameter which indicates the speed of transition from one regime to another. While s is the transition variable, the c is the location parameter which indicates the threshold level which splits the regimes. The prominent transition function is that in which *k* =1 in eq 1.1. This function assumes that the parameter φ + θ'G(γ, *c*, *s*) changes monotonically as a function of *s* from φ to φ + θ. This is known as the logistic smooth transition regression (LSTR). This model is usually used to measure the phase of business cycle as the dynamic properties is different for expansion and recession (Terasvirta, 2004). In this model, the transition between the regimes is contingent upon whether the transition is below or above the threshold value c. Thus, if $(s\text{-}c) \to -\infty$ and $G(\gamma, c, s) \to 0$, the model corresponds to φ. In such case, linear model is appropriate. On the other hand, if $(s-c) \to +-\infty$ and $G(\gamma,c,s) \to \infty$, the co-efficient becomes (φ + θ) the nonlinear model and in some special case where *s*=*c* and $G(\gamma,c,s)$=0.5, the coefficient will be equal to $\left(\frac{\theta+\varphi}{2}\right)$ (Cheikh, Naceur, Kanaan and Rault, 2018). However, the there is another version of the smooth transition regression which assumes that the parameter changes symmetrically around the midpoint

($c1+c2/2$). In this case, the K in equation 1.1 is equal to 2. This is called the exponential smooth transition regression (ESTR) with the transition function:

$$G(\gamma, c, s) = G(\gamma, c, s) = 1 - \exp\{-\gamma(s-c)^2\}, \quad \gamma > 0. \tag{1.2}$$

The ESTR model is usually appropriate in a situation where the dynamic behaviour of parameter are similar at both large and small values of s but different in the middle (Terasvirta, 2004). In ESTR the dynamic behaviour of the parameter changes depending on whether the change in the transition variable is close or far away from a certain threshold c (Cheikh, *et al*, 2018)

According to Terasvirta (1994), in estimating the smooth transition regression, there are three procedures to follow. These are: specification and linearity testing, estimation of parameters and evaluation.Terasvirta (2004) noted that the linearity test performs two functions which includes testing the null hypothesis of linearity against the alternative of appropriate nonlinear STR (LSTR or ESTR) and also determining the best transition variable among the set of variables based on the lowest p-value.

3.1. Model specification

Out_gap $\alpha + \Sigma_{j=1}^{n} \partial_j Out\_gap_{t-j} + + \Sigma_{j=1}^{n} \delta_j Intr_{t-j} + + \Sigma_{j=1}^{n} \psi_j gos_{t-j} + (\Sigma_{j=1}^{n} \theta_j$

$Out\_gap_{t-j}) G(\gamma, c, s) + \varepsilon$

The output gap lag is the transition variable st.

3.2. Variable description

OUTPUT GAP = This represents the level of economic activities in an economy which is calculated as the difference between actual real GDP1 from its filtered GDP as a percentage of the filtered GDP.

$\left(\frac{real\,RGDP - potential\,RGDP}{potential\,RGDP} \right) * 100^2$. The potential RGDP was derived from HP filter.

INTR= interest rate which serve as the monetary policy tool. This is proxied with percentage change in MPR; GOS= Government spending which proxy the fiscal policy is proxied with percentage change in government spending.

4. Empirical Findings

4.1. DescriptiveAnalysis

Table 1: Summary Statistics

	OUTGAP	*INTR*	*GOS*
Mean	-0.039516	0.792729	6.853202
Median	-0.056686	0.000000	5.922485

contd. table 1

	OUTGAP	*INTR*	*GOS*
Maximum	8.848726	45.14107	142.9424
Minimum	-6.153789	-40.43977	-68.76394
Std. Dev.	2.698568	7.791908	20.18970
Skewness	0.154892	0.486131	1.844999
Kurtosis	3.583954	15.62606	18.70589
Jarque-Bera	2.621808	962.1757	1561.746
Probability	0.269576	0.000000	0.000000
Sum	-5.690290	114.1529	986.8610
Sum Sq. Dev.	1041.365	8682.077	58290.23
Observations	144	144	144

Author's computation

The table 1 shows the descriptive analysis of the variables used. The null hypothesis of normality was rejected for interest rate and government spending but was not rejected for output gap as revealed by the Jarque-Bera p-values. Furthermore, all the variables were positively skewed. More so, government spending has the highest standard deviation which implies that it is the most volatile among the variables.

4.2. Stationarity Tests

Table 1 above shows the stationarity test for the variables using the augmented dickey fuller test (ADF). The null hypothesis of unit root was rejected at level for all at the conventional level of significance assuming the series DGP has an intercept; and or both intercept and trend. The result shows that all the series are stationary at level. The standard unit root usually has a low power in the presence of structural break which make it to be bias towards accepting the null hypothesis of unit root even if the series is stationary (Geda, Ndung'u and Zerfu, 2014). Thus, this study employed the Vogelsang (1993) unit root test with a single structural break. The result revealed that even in the presence of structural break, the series are still stationary at level.

Table 2: Augmented Dickey Fuller Test (ADF)

Variables	*Adf Statistics Intercept Only (level)*	*Adf Statistics intercept and Trend (Level)*	*Unit Root with Break in Intercept (level)*	*Break Dates*	*Remarks*
OUTPUT_GAP	-4.7809***	-4.036664***	-4.582178**	1982Q4	I(0)
INTR	6.1352***	-11.08915***	-12.40519***	1994Q1	I(0)
GOS	-7.338668***	-7.411474***	-17.32617***	2012Q1	I(0)

Authors'Computation; NOTE: P-values are represented with *, **, *** which implies 10, 5, and 1 percent level of significance, respectively.

4.3. BDS Test for Nonlinearity

The Brock-Dechert-Scheinkman (BDS) test of independence which is based on the correlation dimension can be applied to the residual of a linear model to detect some evidence of undetected nonlinearity (Terasvirta, 1994). The rejection of the null hypothesis of iid is interpreted as an evidence in favour of undetected nonlinearity. We estimated a linear OLS model and the residual generated was pre-whitened before subjected to BDS test. The result shows that the null hypothesis of *iid* is rejected for all dimensions. Thus, the test suggests that there is undetected nonlinearity in the model.

Table 3: Brock-Dechert-Scheinkman (BDS) Test of Independence

BDS Test for RESID01_W
Date: 06/03/19 Time: 14:44
Sample: 1982Q1 2017Q4
Included observations: 144

Dimension	*BDS Statistic*	*Std. Error*	*z-Statistic*	*Prob.*
2	0.044026	0.008671	5.077611	0.0000
3	0.079391	0.013884	5.718274	0.0000
4	0.100529	0.016663	6.033049	0.0000
5	0.115173	0.017507	6.578595	0.0000
6	0.118536	0.017021	6.964043	0.0000
Raw epsilon	1.624493			
Pairs within epsilon	14443.00		V-Statistic	0.706294
Triples within epsilon	1609811.		V-Statistic	0.550512

Authors' Computation

4.4. Optimal Lag Selection

The optimal lag selection based on various information criterion, reported in *Table 4*, suggests lag 1 as the optimal lag.

Table 4: Optimal Lag Selection

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-1393.397	NA	166311.8	20.53525	20.59950	20.56136
1	-1302.538	176.3727*	49904.47*	19.33145*	19.58845*	19.43588*
2	-1295.878	12.63493	51662.93	19.36585	19.81560	19.54862
3	-1293.206	4.950522	56731.42	19.45892	20.10141	19.72001
4	-1289.182	7.278523	61097.13	19.53209	20.36734	19.87152
5	-1284.956	7.458509	65640.39	19.60229	20.63029	20.02005
6	-1282.533	4.169176	72467.95	19.69901	20.91976	20.19509
7	-1274.643	13.22785	73887.73	19.71533	21.12883	20.28974
8	-1270.635	6.541303	79841.94	19.78875	21.39500	20.44149

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Authors' Estimates

4.5. Linearity Test

Terasvirta (2004) noted that this test performs two function which includes the testing for the linearity of the model and the selection of the appropriate transition variable based on the lowest p-value of the F statistics. The test rejected the null of linearity against STR and suggested the lag of the output gap as the best transition variable based on the lowest p-value. As indicated in *Table 5,* the best transition variable is asterisked and the appropriate specification for this model is the logistics smooth transition regression (LSTR1).

Table 5: Linearity Test

Transition variable	*F*	*F4*	*F3*	*F2*	*Suggested Model*
outp_gap(t-1)*	2.7189e-34	8.4039e-08	1.0203e-01	1.5905e-31	LSTR1
intr(t)	7.0766e-01	4.8842e-01	5.1318e-01	6.9869e-01	Linear
gos(t)	6.1094e-01	1.2602e-01	9.8505e-01	6.7267e-01	Linear
intr(t-1)	8.8544e-02	2.5631e-01	1.1555e-02	9.6270e-01	Linear
gos(t-1)	9.3333e-01	8.0547e-01	6.5868e-01	8.0989e-01	Linear
TREND	8.2107e-01	9.5385e-01	6.5173e-01	3.3244e-01	Linear

Authors Estimate 2019 using Jmulti

4.6. Estimation Result of LSTR model

Table 6: Estimation Result of LSTR model

Variable	*Linear model*	*Nonlinear model*
Constant	-5.81307***	11.07385***
	(1.5277)	(2.4705)
Intr	-0.12586**	0.24105**
	(0.0500)	(0.0959)
Gos	-0.02119	0.03302
	(0.0319)	(0.0581)
Intr(-1)	0.05157	-0.03525
	(0.0413)	(0.0850)
Gos(-1)	0.00161	-0.00588
	(0.0303)	(0.0543)
Gamma (γ)	0.96954***	
	(0.2973)	
C	-0.35100	
	(0.7092)	
AIC	9.0625e-01	
R^2	70.8%	
JB	1452.7895 [0.0000]	
ARCH (2)	0.0288[0.9716]	
Skewness:	1.8808	
Kurtosis	18.1551	

Authors' Estimate 2019 using Jmulti

Note: Standard errors are in bracket (), p-values are represented with *,**,*** which implies 10,5, and 1 percent level of significance respectively. The value in square bracket [] are p-values of diagnostic test.

Table 6 shows the estimated logistic smooth transition regression estimate. The R2 shows that the independent variables explained approximately 71 percent of the variation in the model. Furthermore, the autoregressive conditional heteroskedasticity (ARCH) test shows that the model is free from heteroskedasticity. In the same vein, the non-normality of the residual can be adduced to the fact that, the frequency below/above the threshold are not the same. The skewness statistic of 1.88 corroborates the non-normality result which implies the residual is positively skewed.

The gamma of the smooth transition regression in an important parameter which indicates the speed of transition from one regime to another. If the gamma which represents the speed of transition between the regimes is not statistically different from zero, the appropriate model in such case would be a linear model rather than nonlinear model. In the case of our model, the gamma coefficient is significant at 1 percent level of significant. Thus, a nonlinear model is appropriate for this estimate. Furthermore, the low gamma value of 0.9695 implies that the movement of the output gap is smooth rather than abrupt. This is supported by the transition function graph in *figure 1*. The C1 which is the location parameter is not significant even at 10 percent level of significance. Voor and Gert-jan (1999) noted that, when the location parameter is not significant, it indicates that the 2 regimes in the logistic smooth transition model can be characterized roughly by positive and negative changes over the sample period. The location parameter C1 is -0.35100 but not statistically significant. To put differently, the threshold value in absolute term is (|c| = 0.35100).This implies that if the output gap or economic activity in the country is less than 0.35 percent, the economy is in recession while if it's above the threshold of 0.35 percent, the economy is in expansion. The low output gap indicates that the economy is operating below its potential and hence there is a need for expansionary macroeconomic policies to push the economy to its potential operating level. However, high output gap indicates that the economy is operating above its potential level. This period is usually characterized with high rate of inflation as there would be higher supply of money than demand. To set the economy back to its appropriate track, a contractionary macroeconomic policy is desirable.

The negative and significant effect of interest rate movement of (-0.12586) on output gap implies that, when the output gap is below 0.34 percent, a 1 percent reduction in interest rate will improve the output gap by 1.26 percent. However, when the output gap is above the threshold of 0.35 percent, the effect of interest rate is positive and significant at (-0.12586+0.24105) is (0.11519). This implies that, when the output gap is above the 0.35 percent threshold, there is a need for the monetary authority to increase the interest rate in order to stabilize the price as this period is usually characterized by inflationary gap. When comparing the effect of monetary policy in both phases, it is obvious

that the effect of monetary policy is more pronounced during the recession (low output gap) than expansion (high output gap).

On the other hand, the government spending does not seem to exert any significant effect on output gap both during the recession and expansion. Although it has a negative effect during low output gap which implies that increase in government expenditure might crowd out other private investment thereby worsening the situation. However, the effect is positive in the expansion phase as an increase in government spending will improve the output gap. The various misspecification testsimply that the model passed the misspecification test.

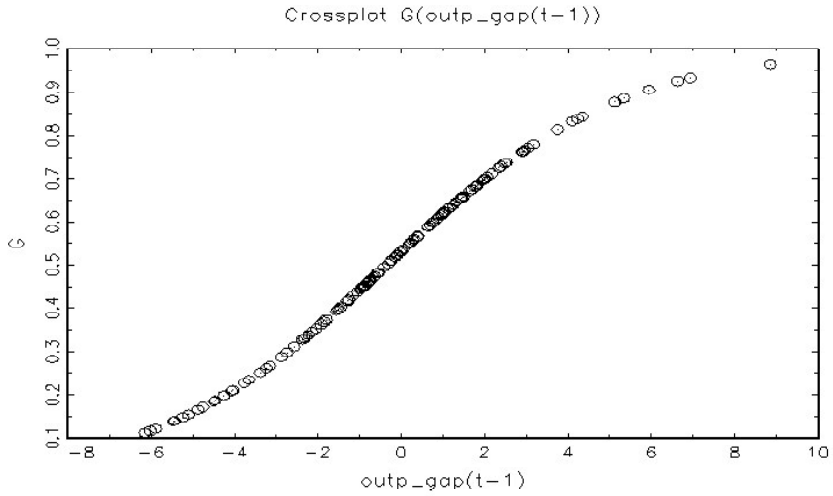

Figure 1: Transition graph

The graph shows that there is smooth transition from negative output gap to positive output gap.

4.7. Misspecification tests

Parameter Constancy

Table 7 shows the test for parameter constancy. The test with the null hypothesis of parameter constancy against non-parameter constancy. We fail to reject the null of parameter constancy at 5 percent level of significance.

Table 7: Test for Parameter Constancy

Transition Function	*F-Statistics*	*p-value*
H1	0.8603	0.5722
H2	1.2134	0.2575
H3	1.5470	0.0569

Authors' Estimate

4.8. No remaining nonlinearity

The *Table 8* shows the test of no remaining non-linearity with the null hypothesis of no remaining nonlinearity against the alternative of remaining un-modelled nonlinearity in the estimate given the change in government spending as the second transition variable. The test fail to reject the null as all the p-values for the F statistics are above 5 percent level of significance. In other words, our LSTR model has reasonably captured the nonlinearity embedded in the data.

Table 8

Transition variable	*F*	*F4*	*F3*	*F2*
GOS(t)	9.6846e-01	7.7193e-01	8.9451e-01	7.6220e-01

Authors estimate using Jmulti

4.9. Autocorrelation

Table 9 above shows the test for serial correlation in the error term. The null hypothesis is that there is no error autocorrelation against the alternative of autocorrelation. The test fail to reject the null of autocorrelation at 5 percent significant level. Thus, the model is free from autocorrelation at both lags 1 and 2.

Table 9: Test of No Error Autocorrelation

lag	*F-value*	*df1*	*df2*	*p-value*
1	3.4875	1	129	0.0641
2	2.6196	2	127	0.0768

Authors estimate 2019 using Jmulti

5. Conclusion

The present study examined the effectiveness of fiscal and monetary policy as stabilizing tools during recession, using quarterly data spanning from 1982 to 2017. The study employed smooth transition regression to estimate the data. The finding shows that, monetary policy is the major effective tool for stabilizing the economy during recession. The reduction in interest rate helps to improve the output gap thereby ameliorate the recessionary gap while the increase in interest rate during the expansion or boom phase helps to reduce the high money supply during this period due high economic activities which in turns helps to stabilize price. The fiscal policy does not have any significant impact in both phases of the business cycle. Although, it appeared that the increase in government spending during recession might exacerbate the situation as a result of the crowding out effect of government spending. The study thereby recommends that there is a need for an effective monetary policy as an ameliorating tool during economic downturn with cognizance of price stability especially during the expansion phase of the business cycle.

Notes

1. The original real GDP used exhibit some salient seasonality and it was deseasonalized using Tramo/Seats deseaonalizing approach before used for calculating output gap.
2. Baum and Koester (2011).

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