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## **The Paradox of Thrift: Empirical Evidence in Nigeria**



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**ABSTRACT:** Vermann (2012) and Thies (1996)'s papers indicate that the paradox of thrift is no longer in vogue. This paper argues that the paradox of thrift is applicable to the developing country like Nigeria which is operating with deficient demand. The main objective of this paper is to determine whether the paradox of thrift is applicable to Nigeria. In doing this, a vector error correction model was estimated using annual data of gross national income, gross domestic saving, gross domestic investment and final consumption expenditure from 1986 to 2019. The results of the investigation showed final consumption expenditure and gross domestic saving increase when national income increases. Gross national income falls and current saving is unchanged when previous saving rises. The paradox of thrift is applicable to Nigeria. The target of economic policy should be gross national income and not gross domestic saving because naturally both final consumption expenditure and gross domestic saving will increase if gross national income increases in Nigeria.

**KEYWORDS:** Paradox of Thrift, Vector Error Correction Model, Nigeria

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### **1. INTRODUCTION**

Americans traditionally believed that saving is a virtue. Many economists believe that a major contribution of Keynesian economics was the surprising discovery that an increase in planned saving may not be beneficial. The paradox of thrift is the paradoxical result of the simple Keynesian model that when planned saving rises (the saving function shifts up), income falls and actual saving is no higher than before (Amacher and Ulbrich, 1986). Saving is a paradox because in kindergarten we are all taught that thrift is always a good thing (Samuelson, 1958:237).

The saving which is intended to be made by all the households in the economy during a period (say, a year) in the beginning of the period is called planned (or ex-ante or desired) saving. The actual saving is the ex-post or realized saving of all the households in the economy during a period, say a year. The words, "planned saving" used by Keynes made research on the paradox of thrift difficult because data on planned saving are not compile by data reporting agencies. Although data on actual saving are compiled by data reporting agencies, the words, current saving is used in place of actual saving in this study. Paradox of thrift becomes practicable in applied research when the words, previous saving is used in place of "planned saving" and the words, current saving is used in place of "actual saving". This change in semantics from planned saving to previous saving and actual saving to current saving does not alter the analysis of the Keynesian economic theory about the paradox of thrift. However, with this change in semantics from planned saving to previous saving and actual saving to current saving, paradox of thrift is the result of the simple Keynesian model that when previous saving rises (the saving function shifts up), income falls and current saving is unchanged.

Vermann (2012) investigates whether saving is good or bad for United States of America and concludes that it is OK to save for that big purchase since future consumption benefits both you and society. Vermann's paper indicates that the paradox of thrift is no longer in vogue. Thies' paper, "The Paradox of Thrift: RIP" indicates that the paradox of thrift is no longer in vogue. This paper argues that the paradox of thrift is applicable to the developing country like Nigeria which is operating with deficient demand. An increase in saving implies a decrease in consumption expenditures which causes demand to become more deficient (Amacher and Ulbrich, 1986).

In order to ascertain whether the paradox of thrift is applicable or not applicable to Nigeria, there are four fundamental research questions that must be answered. (1) What is the effect of an increase in previous saving on final consumption expenditure in Nigeria? (2) What is the relationship between final consumption expenditure and gross national income? (3) What is the effect of an increase in previous saving on gross national income? (4) What is the effect of an increase in previous saving on current saving in Nigeria?

The main objective of this paper is to determine whether the paradox of thrift is applicable to Nigeria from 1986 to 2019. The followings are the specific objectives of this study. (1) To determine the effect of an increase in previous saving on final consumption

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expenditure in Nigeria. (2) To analyze the relationship between final consumption expenditure and gross national income. (3) To examine the effect of an increase in previous saving on gross national income. (4) To evaluate the effect of an increase in previous saving on current saving in Nigeria.

This study is significant because of the followings reasons. It confirms the Keynesian proposition that an increase in income always leads to an increase in consumption and saving. It also confirms the Keynesian proposition that when previous saving rises (the saving function shifts up), income falls and current saving is unchanged. This study demonstrates that the paradox of thrift is applicable to Nigeria. This paper reveals that the target of economic policy should be gross national income and not gross domestic saving because naturally both final consumption expenditure and gross domestic saving will increase if gross national income increases in Nigeria.

This paper consists of six sections. The next section is literature review. Section 3 presents the methodology. Section 4 discusses the results. The conclusions based on research findings are drawn in section 5 and section 6 suggested areas for further studies.

## 2. LITERATURE REVIEW

Many economists believe that a major contribution of Keynesian economics was the surprising discovery that an increase in planned saving may not be beneficial. When Keynesian economists criticize saving, they do so in the context of a nation which is operating with deficient demand. In this case, equilibrium income is less than the full-employment level of income. An increase in saving implies a decrease in consumption expenditures which causes demand to become more deficient.

An increase in planned saving means an upward shift in the saving schedule and also in the leakages line while the injections line remains unchanged. The increase in planned saving also means that consumers must spend less at each level of national income. This would be reflected by a downward shift of the consumption schedule and the total expenditures schedule. According to Keynesians, an upward shift in the leakages line and a downward shift of the total expenditures schedule cause the equilibrium level of national income to fall while actual saving remained unchanged. As people increase saving, their thrift ultimately causes income and output to decline. Furthermore, the intention to increase saving does not result in any increase in actual saving (Amacher and Ulbrich, 1986).

Keynes propounded the fundamental psychological law of consumption which forms the basis of the consumption function. He wrote, "The fundamental psychological law upon which we are entitled to depend with great confidence both a *prior* from our knowledge of human nature and from the detailed facts of experience, is that men are disposed as a rule and on the average to increase their consumption as their income increases but not by as much as the increase in their income" (Jhingan, 2003).

This law has three related propositions: (1) When income increases, consumption expenditure also increases but by a smaller amount. The reason is that as income increases, our wants are satisfied side by side, so that the need to spend more on consumer goods diminishes. It does not mean that the consumption expenditure falls with the increase in income. In fact, the consumption expenditure increases with increase in income but less than proportionately. (2) The increased income will be divided in some proportion between consumption expenditure and saving. This follows from the above proposition because when the whole of increased income is not spent on consumption, the remaining is saved. In this way, consumption and saving move together. (3) Increase in income always leads to an increase in both consumption and saving. This means that increased income is unlikely to lead either to fall in consumption or saving than before. This is based on the above proposition because as income increases consumption also increases but by a smaller amount than before which leads to an increase in saving. Thus with increased income both consumption and saving increase (Jhingan, 2003).

Thies (1996) reviews the Keynesian revolution in economics and why the paradox of thrift is no longer in vogue. Thies' paper, "The Paradox of Thrift: RIP" and the counter arguments against paradox of thrift from the works that he reviewed may be true for the developed countries but not in a developing country like Nigeria which is operating with deficient demand.

Singh (2018) analyzes the impact of saving during two historical recessions in order to know if saving is good or bad for United States of America. There are many weaknesses in Singh's study. First, the dependent variable was not stated. Second, the periods covered by the two historical recessions were not stated. Third, the research method used in the study was not stated. Fourth, data were not obtained for the study. Fifth, the analysis was too theoretical for an impact study. Sixth, the chart he was analyzing was not presented in his paper. Seventh, the research findings based on the objectives of the study were not presented. Eighth, the conclusion that saving is bad or good for United States of America was not drawn.

Vermann (2012) investigates whether saving is good or bad for United States of America. Using graphical approach, the paper shows the trends of U.S. personal saving rate, growth rate of gross domestic product (GDP), and recession periods from 2000 to 2011. It was found that during the Great Recession, the personal saving rate increases and growth rate of gross domestic product (GDP) falls. Vermann concludes that it is that it is OK to save for that big purchase since future consumption benefits both you and

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society, a conclusion that is not in line with his research findings. The conclusion that it is OK to save implies that the paradox of thrift is no longer in vogue. This paper argues that the paradox of thrift is applicable to the developing country like Nigeria which is operating with deficient demand. An increase in saving implies a decrease in consumption expenditures which causes demand to become more deficient (Amacher and Ulbrich, 1986).

Fanti and Zamparelli (2020) analyze the paradox of thrift in the two-sector Kaleckian growth model. They consider an economy with one consumption and one investment good, and differential sectoral mark-ups. They show that when the investment function depends on aggregate capacity utilization and on the aggregate profit share [the Bhaduri-Marglin (1990) investment function] the paradox of thrift in its growth version may fail if mark-ups are higher in the investment good sector. In this case, the reduction in the saving rate produces a reallocation of economic activity towards the investment good sector; the aggregate profit share rises and its positive effect on investment may offset the reduction in average capacity utilization if investment is relatively more sensitive to profitability than to the level of activity. This paper does not address the main issues about the paradox of thrift. The main issues about the paradox of thrift is the nexus among gross domestic saving, final consumption expenditure, and gross national income; and the effect of an increase in previous saving on current saving and gross national income.

### 3. METHODOLOGY

#### 3.1 Theoretical Framework of the Study

The theoretical framework of the study is based on Keynes view of the accounting or definitional equality between savings and investment. It shows that actual savings and investment are always equal at any period of time and at all levels of income (Jhingan, 2003). Symbolically,

$$S_t = Y_t - C_t \quad (1)$$

$$I_t = Y_t - C_t \quad (2)$$

Where Y is income, C is consumption, S is savings, I is investment and subscript t is time in the current period. Since  $Y_t - C_t$  is common in equations (1) and (2), we can say that savings is equal to investment. Symbolically,

$$S_t = I_t \quad (3)$$

#### 3.2 Model specification

Based on the theoretical framework of the study, the functional form of the model for this study is stated in equation (4) below

$$GNI = f(GDS, FCE, GDI) \quad (4)$$

Where GNI is gross national income, GDS is gross domestic saving, FCE is final consumption expenditure, GDI is gross domestic investment and f is functional notation. The linear form of equation (4) is:

$$GNI = b_0 + b_1GDS + b_2FCE + b_3GDI + e_t \quad (5)$$

Where  $b_0$  is constant term,  $b_1$  to  $b_3$  are regression coefficients and  $e_t$  is the error term at time t.

This paper follows Palić et al. (2017) to utilize the Johansen cointegration test and vector error correction model to determine the relationships among a set of economic variables. The vector error correction model is used for this study because of three reasons. First, the time series are not stationary in their levels but are in their first differences. Second, the variables are cointegrated. Third, the variables of interest are simultaneously related, hence the need to treat each variable symmetrically and allow feedback among them.

The VECM is superior to a single equation approach for capturing the long run dynamics of variables (Enders, 1995 and Feasel et al. 2002). This technique enables us to verify the stationarity as well as the order of integration of the variables that are used in the model. The VECM also saves one from the agony of endogeneity problem and the inherent spurious inferences associated with OLS estimates.

The Johansen approach to cointegration is described in brief in this section. If the set of economic variables is observed, the long-run equilibrium can be written as:

$$\Pi Z_t + e_t = 0, \quad (6)$$

Where  $\Pi$  is matrix of parameters,  $Z_t$  is vector consisted of n economic variables,  $e_t$  is vector of innovations or vector of stationary random variables (Bahovec and Erjavec, 2009). The equilibrium is reached if  $\Pi Z_t = 0$ . In that case, the deviation from the long-run equilibrium is given by:

$$e_t = -\Pi Z_t, \quad (7)$$

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If the long-run equilibrium is reached, the deviation  $e_t$  is described to be a stationary process. It has to be emphasized that there are some differences between long-run equilibrium definition of economic theorists and of econometricians. Economic theorists use this term in the sense of equality between actual and desired state of economic variables. In econometric sense, the term refers to the long-run relationship between non-stationary variables. Cointegration does not require the long-run equilibrium to be the result of a market mechanism or behavior of individuals (see, for example, Palić et al., 2016) as cited in Palić et al. (2017).

The vector error correction model is given by:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \dots + \Gamma_k \Delta Z_{t-k+1} + \Pi Z_{t-k} + e_t, \quad (8)$$

Where  $\Gamma_i = A_i + A_{i-1} + \dots + A_1 - I$ ,  $\Gamma_k = \Pi = A_k + A_{k-1} + \dots + A_1 - I$ ,  $A_1, A_2, \dots, A_k$  are square matrices of the order  $n$ ,  $k$  is the lag length, and  $i = 1, 2, \dots, k - 1$ . In the equation (13) the term  $\Pi Z_{t-k}$  is observed as the long-run part of the model, whereas the short-run is presented by

$$\sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i}$$

(Bahovec and Erjavec, 2009). In order to determine the number of cointegration relations, the rank of matrix  $\Pi$  must be observed. There are three possible situations. If matrix  $\Pi$  is a zero-matrix, the cointegration is not present. If matrix  $\Pi$  is of full rank or the rank is equal to the number of variables in the model (rank is equal to  $n$ ), it is said that the process is stationary. If the rank of matrix  $\Pi$  is not full or the rank is lower than the number of variables in the model (rank is lower than  $n$ ), it is said that the process is non-stationary. The matrix  $\Pi$  can be written as:

$$\Pi = \alpha\beta, \quad (9)$$

Where  $\alpha$  is the matrix of error correction speed (speed of variables needed to return in equilibrium),  $\beta$  is the cointegration matrix (contains the parameters of long-run equations). Both matrices,  $\alpha$  and  $\beta$ , are of rank  $n$ .  $r$ . Consequently, there are  $r$  cointegration relations between variables. In order to determine the number of cointegration relations, the maximum eigenvalue test and trace test are conducted. For the detailed explanation of maximum eigenvalue test and trace test see Bahovec and Erjavec (2009) and Enders (2015) as cited in Palić et al. (2017).

### 3.3 Estimation Method

The VECM is estimated using e-view 10. The time series properties of the data are analyzed using Augmented Dickey-Fuller (ADF) unit root test of Dickey and Fuller (1979). Test of cointegration is carried out using the Johansen (1988) maximum likelihood procedure. The lag length is determined by the likelihood ratio (LR), final prediction error (FPE), Akaike information criteria (AIC), Schwarz information criteria (SC), and Hannan-Quinn information criteria (HQ). The VECM is estimated in order to determine the short and long run relationships among gross national income, gross domestic saving, final consumption expenditure and gross domestic investment in Nigeria and to measure the deviation of the variables from long run equilibrium within the short run and the speed of adjustment of the variables to long run equilibrium. The VEC Residual Serial Correlation LM Tests are used to verify the assumption of no serial correlation or no autocorrelation. The VEC Residual Normality Tests are used to verify the assumption that the residuals are normally distributed. The Inverse Roots of AR Characteristic Polynomial is used to verify whether the VEC model is stable.

### 3.4 Sources and Description of Data

The empirical analysis is conducted using annual data. The time span covered is 1986 to 2019. The choice of 1986 as the base year is due to the fact that the policy of deregulation of Nigerian economy started that year. The paradox of thrift was formulated based on economic conditions and circumstances of United States of America, a market economy. The application of the paradox of thrift to Nigerian economy should be limited to the period when the economic conditions and circumstances of United States of America and Nigeria are the same. The economic conditions of United States of America and Nigeria are the same as from 1986 when Nigerian economy was deregulated. The choice of 2019 as the terminal year is premised on the fact that the time series data of the variables required for the study are available only up to that year. The data of gross national income, gross domestic savings, final consumption expenditure and gross domestic investment are obtained from World Bank World Development Indicators. Gross capital formation is used as a proxy of gross domestic investment. All the data are in Local Currency Unit (LCU), that is, they are in naira. All the data are transformed to logarithms. This is because all the variables have the right skew (mean > median) as we can see in table 1. Taking the log would make the distribution of the transformed variables more symmetric (more normal).

## 4. RESULTS

### 4.1 Pre-Estimation Tests

Table 1 presents the results of descriptive statistics. The descriptive statistics is used to measure the spread of a given set of data.

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This facilitates the decision on the normality of the variables employed in this study and also helps to identify the variables that need to be transformed to logarithms. There is evidence of significant variation in the trends of the variables over the period under consideration. This shows the large difference between the minimum and maximum values of the series. It is revealed that all the variables display a mean lying between their minimum and maximum levels. This implies that they fall within the expected changes over the period under study.

Skewness is used to measure the symmetry of the distribution around its mean. Samples from a normal distribution have an expected skewness of 0. The skewness of each variable is greater than 0 and the mean is greater than the median for each variable. These imply that all the variables are skewed to the right or they show a long tail to the right.

Samples from a normal distribution have an expected excess kurtosis of 0 (which is the same as a kurtosis of 3). Kurtosis reveals that gross national income, final consumption expenditure and gross domestic investment are more peaked than normal. This implies that they are leptokurtic as they have values greater than 3. Kurtosis reveals that gross domestic saving is flatter than normal. This implies that it is platykurtic as it has value lower than 3.

The Jarque-Bera statistics is a goodness-of-fit test of whether sample data have the skewness and kurtosis matching a normal distribution. The Jarque-Bera statistics is far from zero and the probabilities of Jarque-Bera statistics are less than 5 percent. These results show that all the series are not normally distributed. Taking the log would make the distribution of the transformed variables more symmetric (more normal).

**Table 1: Descriptive Statistics Results**

Statistic	GNI	FCE	GDS	GDI
Mean	3.55E+13	2.74E+13	8.09E+12	6.96E+12
Median	1.25E+13	8.30E+12	4.29E+12	3.58E+12
Maximum	1.46E+14	1.16E+14	3.00E+13	3.82E+13
Minimum	1.98E+11	8.66E+10	1.12E+11	1.09E+11
Std. Dev.	4.32E+13	3.56E+13	8.28E+12	8.36E+12
Skewness	1.1034	1.1908	1.1208	1.9098
Kurtosis	3.9644	4.0810	1.9824	7.1588
Jarque-Bera	7.9008	9.0451	5.9935	45.1701
Probability	0.0317	0.0179	0.0243	0.0000
Sum	1.21E+15	9.32E+14	2.75E+14	2.37E+14
Sum Sq. Dev.	6.17E+28	4.18E+28	2.26E+27	2.30E+27
Observations	34	34	34	34

Source: Author's Computation Using E-view 10.

The unit root test is conducted using Augmented Dickey-Fuller (ADF) test (Table 2). All the variables are non-stationary at levels because ADF test statistic is less than test critical values in absolute terms and p-value of each variable is greater than 5 percent at 1 percent, 5 percent and 10 percent levels of significance. All the variables are stationary at first differences because ADF test statistic is greater than test critical values in absolute terms and p-value of each variable is less than 5 percent at 1 percent, 5 percent and 10 percent levels of significance. The ADF test indicates that the variables are of the same order of integration at 1 percent, 5 percent and 10 percent level of significance.

**Table 2: Augmented Dickey-Fuller Test**

Variables	Levels		First Differences		Order of Integration
	ADF test statistic	Prob*	ADF test statistic	Prob*	
LOGGNI	-0.2991	0.9146	-4.5363	0.0010	I(1)
LOGGDS	-2.3479	0.1640	-7.1842	0.0000	I(1)
LOGFCE	-2.1901	0.2134	-4.6957	0.0007	I(1)
LOGGDI	-1.6118	0.4556	-3.8503	0.0061	I(1)

Test critical values: 1% level -3.6537

5% level -2.9571

10% level -2.6174

\*Mackinnon (1996) one sided p-values

Source: Author's Computation Using E-view 10.



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The cointegration test was conducted using Johansen test for cointegrating vectors (Table 3). The Trace statistic is greater than 5 percent Critical Value and p-value is less than 5 percent for all the hypothesized numbers of cointegrating equations. The Trace test denotes rejection of all the hypothesized numbers of cointegrating equations at 5 percent level. The Trace test indicates 4 cointegrating equations at the 5 percent level. The Max-Eigen statistic is greater than 5 percent Critical Value and p-value is less than 5 percent for none and at most 3 hypothesized numbers of cointegrating equations. The Max-Eigen statistic is less than 5 percent Critical Value and p-value is greater than 5 percent for at most 1 and at most 2 hypothesized numbers of cointegrating equations. The Maximum Eigenvalue test denotes rejection of at most 1 and at most 2 hypothesized numbers of cointegrating equations at the 5 percent level. The Maximum Eigenvalue test indicates 2 cointegrating equation at the 5 percent level. Both the Trace and Maximum Eigenvalue tests indicate that all the variables are cointegrated or there is long-run equilibrium relationship among the variables. Since the variables are cointegrated and are stationary in their first differences, the VECM is applied in data analysis.

**Table 3: Johansen Test for Cointegrating Vectors**

Hypothesized No. of CE(s)		Trace			Maximum Eigenvalue		
Trace	Maximum Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**	Max-Eigen Statistic	0.05 Critical Value	Prob**
None*	None*	97.0381	71.7179	0.0003	41.4264	36.8466	0.0008
At most 1*	At most 1	58.5536	47.7541	0.0045	25.5425	27.5644	0.1367
At most 2*	At most 2	34.8702	27.8877	0.0356	19.2837	23.4315	0.2245
At most 3*	At most 3*	5.3326	3.8537	0.0232	6.3926	5.8525	0.0244

\*denotes rejection of the hypothesis at the 0.05 level

\*\* Mackinnon- Haug- Michelis (1999) p-values

Source: Author's Computation Using E-view 10.

The lag length selection was done using the VAR Lag Order Selection Criteria (Table 4). The Sequential modified LR test statistic (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) indicate maximum lag length 1 at 5 percent level. Since the value of FPE (4.1E-07) at lag 1 is the smallest out of the values indicated by these five criteria, the VECM is estimated at a maximum lag length 1 based on Final prediction error (FPE) criterion.

**Table 4: VAR Lag Order Selection Criteria**

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.0008	4.2443	4.4275	4.3050
1	232.1563*	4.1E-07*	3.3541*	2.4380*	3.0505*
2	16.7261	5.74E-07	-3.0813	-1.4324	-2.5348

\*Indicates lag order selected by the criterion

Source: Author's Computation Using E-view 10.

### 4.2 Vector Error Correction Estimates

The vector error correction estimates is of two parts. The first part presents the estimates of the long run effects of gross domestic saving, final consumption expenditure and gross domestic investment on gross national income. The second part presents the estimates of the short run dynamic interactions among the variables. The second part is linked with the first part by error correction term.

The long run vector error correction estimates of LOGGNI are presented in table 5 in order to achieve the second and third research objectives. The second research objective is to analyze the relationship between final consumption expenditure and gross national income. A 100 percentage point increase in final consumption expenditure causes gross national income to increase by 2210 percentage point in the long run. That is there is a positive relationship between final consumption expenditure and gross national income in Nigeria. This result is in line with the Keynesian view that an increase in final consumption expenditure will lead to an increase in gross national income by the multiple effects through the multiplier process. It implies that a decrease in final consumption expenditure will lead to a decrease in gross national income by the multiple effects through the multiplier process.

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The third research objective is to examine the effect of an increase in previous saving on gross national income. A 100 percentage point increase in previous saving causes gross national income to fall by 3947 percentage point in the long run. That is there is a negative relationship between previous saving and gross national income in Nigeria. This result is in support of Keynesian proposition that as people increase saving, their thrift ultimately causes national income and output to decline. It is also in support of the Keynesian view that when injections schedule, taxes and imports are constant, an increase in previous saving leads to an upward shift in the saving schedule and also in the leakages line which cause the equilibrium level of national income to fall. This result shows that the paradox of thrift is applicable to Nigeria and so it does not support the conclusions of the previous studies that the paradox of thrift is no longer in vogue.

**Table 5: Long Run Vector Error Correction Estimates of LOGGNI**

Variable	Coefficient	Standard Error	t-statistic
LOGGDS(-1)	-39.4729	10.2669	-3.8447
LOGFCE(-1)	22.1031	7.6552	2.8873
LOGGDI(-1)	6.8278	15.0243	0.4545

Source: Author's Computation Using E-view 10.

The short run error correction estimates of D(LOGFCE) are presented in table 6 in order to achieve the first research objective. The first research objective is to determine the effect of an increase in previous saving on final consumption expenditure in Nigeria. A 100 percent increase in previous saving leads to 634 percent increase in final consumption expenditure in the short run. This means that there is a positive relationship between previous saving and final consumption expenditure in Nigeria. This is because according to Keynes increase in income always leads to an increase in consumption and saving. This implies that an increase in previous saving is not transmitted to a decrease in gross national income through a decrease in final consumption expenditure and total expenditure schedule.

A 100 percentage point increase in gross national income causes a 20 percentage point increase in final consumption expenditure in Nigeria implying that consumption is a positive function of income. This result confirms Keynesian proposition that increase in income always leads to an increase in consumption.

The coefficient of error correction term is negative and statistically significant. The negative sign of the error correction term indicates a backward movement of final consumption expenditure toward long run equilibrium from short run disequilibrium. Table 6 reveals that the deviation of the final consumption expenditure in the short run from long run equilibrium is corrected by 1 percent in one year.

**Table 6: Short Run Error Correction Estimates of D(LOGFCE)**

Variable	Coefficient	Standard Error	t-statistic
Intercept	0.09114	0.0569	1.6019
D[LOGGNI(-1)]	0.2034	0.0818	2.7939
D[LOGGDS(-1)]	6.3379	2.8999	2.3813
D[LOGFCE(-1)]	5.2930	1.9341	2.9514
D[LOGGDI(-1)]	0.3107	0.0331	9.1957
ECM(-1)	-0.0109	0.0039	-2.8408

R-squared: 0.9957

S. E. equation: 0.1569

F-statistic: 1617.739

Source: Author's Computation Using E-view 10.

The short run error correction estimates of D(LOGGNI) is presented in table 7 in order to achieve the second and third research objectives. The second research objective is to analyze the relationship between final consumption expenditure and gross national income. A 100 percentage point increase in final consumption expenditure causes gross national income to increase by 33 percentage point in the short run. That is there is a positive relationship between final consumption expenditure and gross national income in Nigeria. This result is in line with the Keynesian view that an increase in final consumption expenditure will lead to an increase in gross national income by the multiple effects through the multiplier process. It implies that a decrease in final consumption expenditure will lead to a decrease in gross national income by the multiple effects through the multiplier process.

The third research objective is to examine the effect of an increase in previous saving on gross national income. A 100 percentage point increase in previous saving causes gross national income to fall by 188 percentage point in the short run. That is there is a negative relationship between previous saving and gross national income in Nigeria. This is in support of Keynesian proposition that as people increase saving, their thrift ultimately causes income and output to decline. It is also in support of the Keynesian view

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that when the injections schedule, taxes and imports are constant, an increase in previous saving leads to an upward shift in the saving schedule and also in the leakages line which cause the equilibrium level of national income to fall. This result shows that the paradox of thrift is applicable to Nigeria and so it does not support the conclusions of the previous studies that the paradox of thrift is no longer in vogue.

The regression coefficient of error correction term is negative but statistically insignificant. The negative sign of the error correction term indicates a backward movement of gross national income toward long run equilibrium from short run disequilibrium. Table 7 reveals that the deviation of the gross national income in the short run from long run equilibrium is corrected by 1 percent in one year.

**Table 7: Short Run Error Correction Estimates of D(LOGGNI)**

Variable	Coefficient	Standard Error	t-statistic
Intercept	0.0350	0.0626	0.5588
D[LOGGNI(-1)]	0.9117	0.1933	4.7157
D[LOGGDS(-1)]	-1.8839	0.1692	-29.9849
D[LOGFCE(-1)]	0.3273	0.1541	4.9429
D[LOGGDI(-1)]	26.4298	0.9366	28.5084
ECM(-1)	-0.0062	0.0042	1.4541

R-squared: 0.9630      S. E. equation: 0.1593      F-statistic: 181.9386  
 Source: Author's Computation Using E-view 10.

The short run error correction estimates of D(LOGGDS) are presented in table 8 in order to achieve the fourth research objective. The fourth research objective is to evaluate the effect of an increase in previous saving on current saving in Nigeria. A 100 percentage point increase in previous saving causes current saving to rise by 5 percentage point in the short run. The effect of an increase in previous saving on current saving is statistically insignificant. Therefore, current saving remains unchanged when previous saving rises in Nigeria. This result confirms the Keynesian view that when the injections schedule, taxes and imports are constant, an increase in previous saving leads to an upward shift in the saving schedule and also in the leakages line which cause the equilibrium level of national income to fall while current saving remains unchanged. This result shows that the paradox of thrift is applicable to Nigeria and so it does not support the conclusions of the previous studies that the paradox of thrift is no longer in vogue.

A 100 percentage point increase in gross national income causes a 230 percentage point increase in gross domestic saving in Nigeria implying that saving is a positive function of income. This result confirms the Keynesian proposition that increase in income always leads to an increase in saving.

The coefficient of error correction term is negative and statistically significant. The negative sign of the error correction term indicates a backward movement of gross domestic saving toward long run equilibrium from short run disequilibrium. Table 8 reveals that the deviation of the gross domestic saving in the short run from long run equilibrium is corrected by 1.49 percent in one year.

**Table 8: Short Run Error Correction Estimates of D(LOGGDS)**

Variable	Coefficient	Standard Error	t-statistic
Intercept	0.0762	0.0809	0.9426
D[LOGGNI(-1)]	2.3006	0.5815	4.9685
D[LOGGDS(-1)]	0.0541	0.2360	0.2293
D[LOGFCE(-1)]	0.5225	0.2002	2.1790
D[LOGGDI(-1)]	0.8256	0.1607	14.2266
ECM(-1)	-0.0149	0.0055	-2.7268

R-squared: 0.9850      S. E. equation: 0.2110      F-statistic: 458.1361  
 Source: Author's Computation Using E-view 10.

### 4.3 Post-Estimation Tests

The results of the VEC residual serial correlation LM tests are shown in table 9. The Edgeworth expansion corrected likelihood ratio statistic at lag 1 and 16 degrees of freedom is 9.7252 and its p-value is 0.8806. The Rao F-statistic at lag 1 and 16 and 43.4 degrees of freedom is 0.5773 and its p-value is 0.8836. The null hypothesis of no serial correlation at lag 1 is accepted because of high p-values.



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**Table 9: VEC Residual Serial Correlation LM Tests**

Lag	LRE* stat	Df	Prob.	Rao F-stat	df	Prob.
1	9.7252	16	0.8806	0.5773	(16, 43.4)	0.8836

\*Edgeworth expansion corrected likelihood ratio statistic

Source: Author's Computation Using E-view 10.

Table 10 presents the results of Jarque-Bera (JB) normality test. If the computed p-value of the JB statistic in an application is sufficiently low, which will happen if the value of the statistic is very different from zero, one can reject the hypothesis that the residuals are normally distributed. But if the p-value is reasonably high which will happen if the value of the statistic is close to zero, we do not reject the normality assumption (Gujarati, 2004, 148). The JB statistic is 3.2198 and the computed p-value of the JB statistic is 54.5 percent. The computed p-value of JB statistic is reasonably high which indicates that the value of the statistic is close to zero. Therefore, the null hypothesis that the residuals are multivariate normal is accepted.

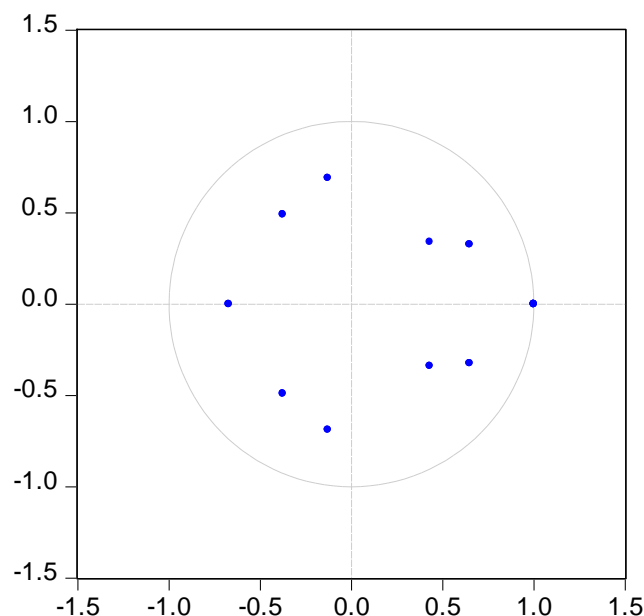
**Table 10: VEC Residual Normality Tests**

Component	Jarque-Bera	Df	Prob.
1	0.3450	2	0.8116
2	1.8371	2	0.3907
3	0.1455	2	0.8956
4	0.5922	2	0.7185
Joint	3.2198	8	0.5450

Source: Author's Computation Using E-view 10.

The Inverse Roots of Autoregressive (AR) Characteristic Polynomial is presented in Figure 1 in order to verify whether the vector error correction model is stable. The vector error correction model is stable if all roots of the characteristic AR polynomial have absolute values less than one and lie inside the unit circle. In this study, at least one root is equal to 1 which indicates that the model is unstable. That is the impact of the shock in some variables might not decrease with time. This can also be checked from the positive value of the coefficient of error correction term that is presented in table 8 of this paper.

**Inverse Roots of AR Characteristic Polynomial**



**Figure 1: Stability Test**

Source: Author's Computation Using E-view 10.

## 5. CONCLUSIONS

The following conclusions based on research findings are drawn. Increase in gross national income always leads to an increase in final consumption expenditure and gross domestic saving in Nigeria. Gross national income rises when final consumption expenditure increases in Nigeria. Gross national income falls when previous saving increases in Nigeria. Current saving remains unchanged when previous saving rises in Nigeria. Gross national income falls and current saving remains unchanged when previous

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saving increases in Nigeria. The paradox of thrift is applicable to Nigeria. The target of economic policy should be gross national income and not gross domestic saving because naturally both final consumption expenditure and gross domestic saving will increase if gross national income increases in Nigeria.

### 6. SUGGESTIONS FOR FURTHER STUDIES

- i. Future research should examine the relationship between savings and economic growth in countries with different economic systems.
- ii. Future studies should apply the paradox of thrift to countries with different levels of economic development.

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