PRIVATE CONSUMPTION EXPENDITURE FUNCTION IN NIGERIA: EVIDENCE FROM THE KEYNES’ ABSOLUTE INCOME HYPOTHESIS

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ABSTRACT

The study examined private consumption expenditure function in Nigerian using the Keynes’ absolute income hypothesis. Data were collected for private consumption expenditure and national income covering the period 1981-2012. The Augmented Dickey-Fuller (ADF) unit root test results showed that the logarithm of consumption expenditure and income were stationary after differencing once, which indicated the possibility of spurious regression if the level form of these variables were used in a regression. A long-run relationship was found between the variables, this allowed for the estimation of a parsimonious error correction model whose results showed a positive relationship between private consumption expenditure and national income. The adjustment process is quick. It takes a year for 68 percent of previous year’s errors to be corrected. The study therefore concluded that the Nigerian consumption function follows the Keynesian postulation, with a high marginal propensity to consume out of income, 0.92 the multiplier effect of an autonomous change in government or investment expenditure was 12.5 indicating the importance of a viable fiscal policy in the economy. A strong public-private partnership was therefore recommended to raise national income.

Keywords: Absolute Income Hypothesis, Autonomous Change, Consumption Function, Income Multiplier, Marginal Propensity to Consume

JEL: E20 E62

1. Introduction

Private consumption expenditure has been seen over the years as a major determinant of aggregate demand, both in the Classical and the Keynesian sense. The level of consumption of any society also shows the level of wellbeing of its citizenry. A survey of the trend in the Nigerian consumption expenditure shows the following. The average percentage change of the Nigerian private consumption expenditure showed a decrease of 0.86% between 1981 and 1995 but increased by 6.56% between 1996 and 2012. The Nigeria’s Real GDP recorded 1.05%, 8.75%, 10.75% and 0.31% percentage change in 1982, 1986, 1987 and 1995, respectively and remained positive between 1995 and 2012 with the largest figure of 33.74% recorded in 2004. On the average real GDP growth rate which stood at 0.67% between 1981 and 1995 increased dramatically to 7.14% between 1996 and 2012(CBN Statistical bulletin, 2012). Real GDP growth has remained fairly stable between 2006 and 2012 but the same cannot be said of private consumption expenditure, which has been fluctuating during the same period thus raising puzzles. Although various studies have been carried out to assess the relationship between income and consumption expenditure (Kweka and Morrissey,1998; Forgha,2008; Deaton, 2001; Hall, 2001; Flavin, 2003; Zeldes, 2005; and Eswaran and Kotwai, 2006), there seem to be no consensus amongst scholars on this relationship in Nigeria (Adedotun, 1978; Uwujaren, 1977; Iyoha, 2001 and Akekere and Yousuo, 2012; Tsenkwo, 2011; Nwabueze, 2009). Moreso, most of the studies relating to Nigeria suffered serious methodological setbacks. Therefore this study is carried out as an improvement on previous works and addition to the stock of knowledge.
2.0 Literature Review

2.1 Theoretical Underpin

There are basically four major hypotheses that explain the determinants of consumption expenditures: (i) the Keynes Absolute Income Hypothesis (AIH) (ii) the Duesenbarry (1949), Relative Income Hypothesis (RIH) which states that the APC of a family depends on the family’s level of income relative to that of her neighbourhood with which she identifies; (iii) Milton Friedman (1957) Permanent Income Hypothesis (PIH) which says that consumption is a function of permanent income rather than current disposable income; and (iv) Ando and Modigliani (1963) Life Cycle Hypothesis (LCH) which states that consumption is a function of life time expected income of consumers. The theoretical underpin of this study is the Keynes’ AIH.

Keynes (1936) postulated the absolute income hypothesis (AIH). The AIH states that current consumption expenditure is a function of current disposable income and that as income increases, consumption expenditure also increases but at a rate that is less than the rate of increase in income. According to Keynes, the marginal propensity to consume (MPC) is less than the average propensity to consume (APC) and that APC declines as income increases. The bottom line is that:

i. the MPC is positive but less than unity (the relationship between income and consumption is dynamically stable)

ii. the APC declines as income increases

2.2 Empirical Literature

Kweka and Morrissey (1998) investigated the impact of economic growth on consumption expenditure. Using the Granger causality test approach on time series data for Tanzania, they showed no evidence or impact of GDP on consumption expenditure in Tanzania. Forgha (2008), attempted to formulate econometric models of consumption and savings functions for Cameroon during the period 1970 to 2007 under the co-integration error correction methodology. Using a Two-Stage Least Squares (2SLS) technique of estimation, Forgha showed that disposable income, general price level, expected inflation, interest rate and dependency ratio impacted positively on private consumption and only family wealth had a negative impact while disposable income, numbers of financial institutions and branches, political stability had positive had positive impact on savings. Interest-inflation rate differential had a negative impact on savings. The speed of adjustment in the consumption function was found to be 45.291 percent and that savings was 35.65 percent. Other studies like that of Deaton (2001), Hall (2001), Flavin (2003), Zeldes (2005) and Eswaran and Kotwai (2006) identified savings, unanticipated shocks, and attitude of consumers and presence of liquidity constraints as important factors determining consumption.

In Nigeria, study by Adedotun (1978) showed positive correlation between consumption expenditure and per capita income. On the other hand, Uwujaren (1977) related consumption in Nigeria to Friedman’s permanent income Hypothesis and showed that consumption is a function of current and permanent income. In a similar vein, Iyoha (2001) perceived consumption as a function of disposable income and lagged value of income. In a more recent study Akekere and Yousoo (2012), investigated the impact of change in gross domestic product (income) on private consumption expenditure in Nigeria over the period 1981 to 2010. Using the OLS simple regression analysis they showed a positive and significant impact of Gross Domestic Product (income) on Private Consumption Expenditure. The unit root test (order of stationary) also showed non existence of unit root at the level form of the variables. The issue with this study is that the series were actually non-stationary as against the claim of the authors. The ADF statistics were all positive and therefore not tenable for a negative alternate hypothesis as that of the ADF unit root test therefore conclusions reached based on their results may be misleading. In another study Tsenkwo, (2011) attempted to gauge Nigeria’s marginal propensity to consume (MPC) and average propensity to consume(APC) over the period 1980 to 2004. He showed that the MPC and APC conform to Keynes proposition, however the results for MPC though less than one and stable exhibit the tendency to grow above one. The issue with this study is that the MPC and APC were calculated over the years there was no empirical estimation to determine the sign and statistical properties of the MPC and APC. The co-integration regression suffered micronumerosity since the dataset spans only 25 years (data points) and therefore untenable in the parlance of asymptotic analysis. Nwabueze (2009), investigated the casual relationship between gross domestic product and personal consumption expenditure in Nigeria for the period 1994 – 2007.
The OLS results showed no significant effect of gross domestic product on personal consumption expenditure in Nigeria. This is expected since the study period is too short. Benjamin and Joseph (2011) studied the Nigerian small scale farmers using the disaggregated Engel function. The results showed that increase in absolute income lead to a corresponding increase in each of the disaggregated expenditure groups. Households had high marginal propensity to consume for every naira increase in household’s income but the proportion of income spent on consumption is less than proportionate to the rise in income.

It is obvious from the foregoing that there is dearth in empirical works relating to Nigeria on the subject. Most of the available studies were based on short time series data and therefore did not conform to the central limits theorem while others reached conclusions based on some incorrectly applied methodologies. Therefore, by examining the relationship between private consumption expenditure and national income in Nigeria for the period 1981 – 2012 this study will serve as an improvement on previous works and fill the gap identified.

3.0 Methodology

3.1 Data and Scope of Study

The data for this study were drawn from the Central Bank of Nigeria Statistical Bulletin, 2013. The dataset spans the period 1981-2012. Variables used are private consumption expenditure, C and national income, Y.

3.2 Model Specification

The Keynesian consumption function postulates that (i) consumption, C is a function of income, Y

\[ C_t = f(Y_t) \]

(ii) there are two components of consumption expenditure: (a) the autonomous component, a; and (b) the income induced component (the component that depends on income), Y. Therefore the consumption function can be specified as:

\[ C_t = a + bY_t + \epsilon_t \]

and (iii) that consumption expenditure does not increase proportionately with income but that as income increases consumption expenditure also increases but at rate, b that is less than proportional to the increase in income. Since the study is interested in measuring degree of responsiveness (elasticity) the appropriate functional form is the double log model as shown in eqn.(3)

\[ c_t = \alpha + \beta y_t + \epsilon_t, 0 < \beta < 1 \]

where lower case letters represent log-transformed variable and \( \beta \) the marginal propensity to consume out of income.

For policy purposes the study is also interested in measuring the multiplier effect of exogenous increases in government expenditure and or investment expenditure. Consider the national income accounting framework for a three sector closed economy:

\[ y = c + i + g \]

where I is investment expenditure, \( G \) government consumption expenditure, and \( Y \) and \( C \) remain as before

Combining (2) and the Keynesian assumption that investment and government expenditure do not change at least in the short-run and substituting into (4) yields the following:

\[ y_t = \alpha + \beta y_t + i_0 + g_0 \]

\[ y_t - \beta y_t = \alpha + i_0 + g_0 \]

\[ (1 - \beta) y_t = \alpha + i_0 + g_0 \]

Dividing through by \( (1 - \beta) \) yields the following:

\[ y_t^* = \frac{1}{(1 - \beta)(\alpha + i_0 + g_0)} \]

where \( y_t^* \) is the equilibrium national income. Equation (5) states that an exogenous increase in either government consumption expenditure or investment expenditure increases the national income by some amount equal to \( 1/(1 - \beta) \), which is the
multiplier. The closer $\beta$ is to unity the larger the multiplier. This implies that the higher the marginal propensity to consume out of income the more impact a percentage increase in government or investment expenditure will have on equilibrium national income. Therefore, in economies where the marginal propensity to consume is very high expansionary fiscal policy will have a larger multiplier effect than in economies where the marginal propensity to consume out of income is low.

3.3 Estimation Technique and Procedure

The ordinary least square (OLS) technique is adopted in estimating equation (3) after which the multiplier in equation (5) is computed using $\beta$. Because of the spurious regression phenomenon that is often associated with estimating non-stationary time series on one another and the possibility of co-integration (long-run relationship) between them the study first tested for unit roots in the series using the Augmented Dickey-Fuller unit root test approach. Consider the following equation:

$$y_t = \beta_1 y_{t-1} + \varepsilon_t, \varepsilon_t iid(0, \sigma^2) \text{ and } -1 \leq \beta_1 \leq 1 \quad \ldots \quad (6)$$

If $|\beta_1| < 0$ $y_t$ does not have a unit root and is stationary

If $|\beta_1| = 1$ $y_t$ is has a unit root and is non-stationary

A test for unit root is therefore a test that $|\beta_0| = 1$. Dickey and Fuller transformed (6) by subtracting $y_{t-1}$ from both sides to arrive at:

$$\Delta y_t = \theta y_{t-1} + \varepsilon_t, \theta = \beta_1 - 1 \text{ and } 0 \leq \theta \leq 1 \quad \ldots \quad (7)$$

If $\beta_1 = 1, \theta = 0$ and $\beta_1 < 1, \theta < 0$ therefore the test that $\beta_1 = 1$ is equivalent to the test that $\theta = 0$. The Dickey-Fuller test therefore involves testing

$\text{Ho: } \theta = 0: y_t$ has a unit root against the alternate that $\text{Ha: } \theta < 0: y_t$ does not have a unit root.

A non-stationary series could be a random walk with drift (constant). If that is the case, the test model will then contain a drift parameter (constant) and is written as:

$$\Delta y_t = \alpha + \theta y_{t-1} + \varepsilon_t \quad \ldots \quad (8)$$

where $\alpha$ is the drift parameter (constant).

Also, a non-stationary series could be a random walk with drift and time trend and is presented as

$$\Delta y_t = \alpha + \delta t + \theta y_{t-1} + \varepsilon_t \quad \ldots \quad (9)$$

where $\alpha$ remains as defined in (6) $\delta$ is the trend parameter and $t$ is the time trend. The third model is for a case where the series does not contain drift or trend. Such case is the one presented in (7).

With the simple Dickey-Fuller test there is no guaranty that the error term will be white noised, Dickey and Fuller therefore included the lags of the dependent variable as part of the explanatory variables to deal with autocorrelation in the model to arrive at the Augmented Dickey-Fuller unit root test model. A general form of the model with $q$-lags is presented as

$$\Delta y_t = \alpha + \delta t + \sum_{t=1}^{q} \varphi_i \Delta y_{t-i} + \theta y_{t-1} + \varepsilon_t \quad \ldots \quad (10)$$

Two non-stationary time series are said to be co-integrated if there is a linear combination between them that is stationary. Therefore, the non-stationary series were subjected the the co-integration test using the Engle Granger approach.

Consider the equation

$$y_t = \varphi + \delta x_t + u_t \quad \ldots \quad (11)$$

where $x_t$ and $y_t$ are two non-stationary series. $x_t$ and $y_t$ are said to be co-integrated if there exists a linear combination between them, $u_t$ such that $u_t$ is stationary and Equn() is then interpreted as the long-run regression. This naturally leads to the concept of error correction. The error correction model (ECM) can then formulated as:
\[
\Delta y_t = y + \sum_{i=0}^{q} \theta_i \Delta x_{t-i} + \delta u_{t-1} + \varepsilon_t 
\]

where: \(\Delta\) is change operator; \(i=1,2, \ldots, q\) measures the lag length up to the qth lag; \(\sum_{i=0}^{q} \theta_i\) measures the short-run impact of \(x\) on \(y\); \(u_{t-1}\) is the first lag of the stationary error term; and \(\delta\) is the adjustment coefficient, it measures the percentage of previous errors, in case there are short-run fluctuations that is corrected within a single period.

4. Results and Discussion

The Augmented Dickey-Fuller unit root test results are presented in table 1. The results indicate that both the logarithm of income, \(y\) and the logarithm of consumption expenditure, \(c\) are integrated of order one, \(I(1)\). This implies that a level regression of the two variables may result in a spurious regression. The variables were therefore subjected to cointegration test using the Engle-Granger approach and there was a cointegrating (long-run equilibrium) relation found between them as the ECM term, which represents the linear combination of the two variables was integrated of order zero, \(I(0)\). This implies that, though there may be short-run fluctuations income and consumption expenditure will converge in the log-run. The study therefore estimated a parsimonious error correction regression for which results are presented in table 2.

Table 1: ADF Unit root Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF Test Statistic</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>First</td>
<td>difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>-0.8497</td>
<td>-3.4324**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>-1.4557</td>
<td>-3.1359**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECM</td>
<td>-3.4324**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s Computation

Table 2: Parsimonious Error Correction Results

<table>
<thead>
<tr>
<th>(\Delta c)</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0210</td>
<td>0.0375</td>
<td>0.5607</td>
<td>0.5795</td>
</tr>
<tr>
<td>nt</td>
<td>0.9188</td>
<td>0.1409</td>
<td>6.5229</td>
<td>0.0000*</td>
</tr>
<tr>
<td>(\Delta y)</td>
<td>-0.6764</td>
<td>0.2200</td>
<td>-</td>
<td>**</td>
</tr>
<tr>
<td>ECM (-1)</td>
<td>3.0752</td>
<td>0.0047*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.6141</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-Squared</td>
<td>0.5866</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s Computation

Based on findings, this study concludes that the private sector in Nigeria has a very high marginal propensity to consume out of windfall income as a result there has been serious shortage in investment capital. A situation where over 90 percent of windfall gain is expended on consumption is a call for concern. However, a small increase (se a percentage change) in autonomous expenditure has the capacity to increase national income by a large amount (12.5 times). The study also showed that both national income and private consumption expenditure became stationary after differencing once, \(I(1)\) and were co-
integrated, thus the appropriate model is the error correction model. This is against the findings of Akekere and Yousuo (2012) who erroneously showed that these series were stationary at levels, I(0) and therefore wrongly applied the OLS estimation technique on their level form.

It is therefore recommended that government should form a strong partnership with the private sector in her effort to raise aggregate demand and national income.

References