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Abstract
The study estimates consumption function for Nigeria applying strictly "Absolute Income" hypothesis as introduced by Keynes. Formulating a model that specifies real consumption as a stable function of real income we applied Granger representation theorem so as to identify short and long run relationship. And our data set being the Gross domestic product by type of expenditure (proxy of income) and household consumption expenditure (both at constant 2005 prices - naira) for the period 1970-2011. The marginal propensity to consume MPC is ≈ 0.64 and Nigeria's autonomous consumption is estimated to be 1.93 trillion naira. Since Keynes emphasizes short run consumption function, the short run MPC (0.78) is less than APC (0.88), which makes it non-proportional, this complies with Keynes theoretical position but defies the long run consumption function of being proportional to APC as 0.64 is not equal to 0.88.

1.0 Introduction

Individual spending habits are influenced by a large and complicated set of interrelated factors such as age, sex, family size, current income etc. But if his current income is subject to various windfalls, an individual's consumption pattern is more closely geared to his long range circumstances than his current income. In this case, the person may find that it would be appropriate to redefine the whole concept of his income for purposes of predicting consumption and savings behavior (Dernburg and McDougall, 1976).

On the aggregate, household behavior to national trends in income exemplify how the overall economy operates. This behavior manifests as national consumption trends. Consumption behavior is crucial for understanding both short-term business cycles and long term economic growth (Samuelson and Nordhaus, 1998).

The pattern of movement in household consumption expenditure (HHCE) in Nigeria for the period of the study (1970-2011) was unstable though within low margins. It started to rise not from the origin in 1970 with slight fluctuations and dropped sharply in 1987. It rose again steadily from 1988 until it dropped in 1993; same in 2006, 2008 and 2010 but 2008 witnessed the highest drop during the period of our study. 2001 and 2007 experienced a very sharp rise in HHCE, but 2007 is higher. In sum, the fluctuation in the period 2008-2011 appears steeper than the 70s, 80s and 90s (See Table A or Figure 1).

Table A

year	HHCE	GDP	APC	GDP - HHCE
1970	5,271,975,296,816	4,996,677,336,216	1.06	-275,297,960,600
1971	6,011,611,616,510	5,708,080,848,912	1.05	-303,530,767,598
1972	6,219,174,106,236	5,900,115,645,564	1.05	-319,058,460,672
1973	6,500,685,519,886	6,218,294,750,583	1.05	-282,390,769,303
1974	7,262,063,334,371	6,912,298,390,212	1.05	-349,764,944,159
1975	7,024,020,208,007	6,550,940,879,881	1.07	-473,079,328,126

Year				
1976	7,454,553,036,462	7,143,299,995,866	1.04	-311,253,040,596
1977	8,017,296,733,509	7,573,620,805,724	1.06	-443,675,927,785
1978	7,734,441,750,253	7,137,065,306,420	1.08	-597,376,443,833
1979	6,436,592,911,317	7,619,490,306,597	0.84	1,182,897,395,280
1980	6,548,357,708,051	7,939,877,000,621	0.82	1,391,519,292,570
1981	7,537,818,424,829	6,897,539,437,333	1.09	-640,278,987,496
1982	7,131,886,064,278	6,824,895,513,505	1.04	-306,990,550,773
1983	6,222,105,882,215	6,480,207,502,346	0.96	258,101,620,131
1984	5,739,531,533,985	6,349,207,673,155	0.90	609,676,139,170
1985	6,218,714,927,019	6,877,641,415,105	0.90	658,926,488,086
1986	5,060,876,179,404	6,275,560,513,603	0.81	1,214,684,334,199
1987	3,991,184,784,662	5,600,831,065,068	0.71	1,609,646,280,406
1988	4,442,991,933,250	6,023,274,981,782	0.74	1,580,283,048,532
1989	4,282,524,253,090	6,412,811,687,981	0.67	2,130,287,434,891
1990	5,251,613,853,438	7,231,471,816,335	0.73	1,979,857,962,897
1991	5,416,257,113,868	7,186,792,125,164	0.75	1,770,535,011,296
1992	6,025,654,193,852	7,217,963,064,943	0.83	1,192,308,871,091
1993	5,908,391,265,267	7,368,845,762,519	0.80	1,460,454,497,252
1994	5,635,430,335,461	7,435,884,819,480	0.76	1,800,454,484,019
1995	5,984,609,235,392	7,413,021,781,070	0.81	1,428,412,545,678
1996	7,189,250,513,155	7,783,206,260,205	0.92	593,955,747,050
1997	6,940,144,200,524	8,001,311,658,762	0.87	1,061,167,458,238
1998	6,988,937,382,089	8,218,598,502,138	0.85	1,229,661,120,049
1999	6,568,647,609,059	8,257,574,214,150	0.80	1,688,926,605,091
2000	6,689,313,749,791	8,696,719,610,037	0.77	2,007,405,860,246
2001	10,232,550,427,165	9,361,331,453,900	1.09	-871,218,973,265
2002	10,438,228,275,255	11,359,738,800,832	0.92	921,510,525,577
2003	12,329,563,758,913	12,522,174,903,217	0.98	192,611,144,304
2004	11,397,763,026,536	13,834,435,484,846	0.82	2,436,672,458,310
2005	11,075,058,594,223	14,735,323,977,828	0.75	3,660,265,383,605
2006	8,592,419,384,005	15,624,014,741,468	0.55	7,031,595,357,463
2007	14,458,532,191,332	16,631,737,389,342	0.87	2,173,205,198,010
2008	11,657,986,623,287	17,674,590,908,159	0.66	6,016,604,284,872
2009	15,355,402,801,922	18,900,220,825,552	0.81	3,544,818,023,630
2010	13,979,630,884,050	20,381,948,878,734	0.69	6,402,317,994,684
2011	15,529,652,089,657	21,891,629,349,712	0.71	6,361,977,260,055
		TOTAL OF APC	36.76	
		APC (1970-2011)	0.88	

Source: United Nations Statistics Division National Accounts Main Aggregate Database.
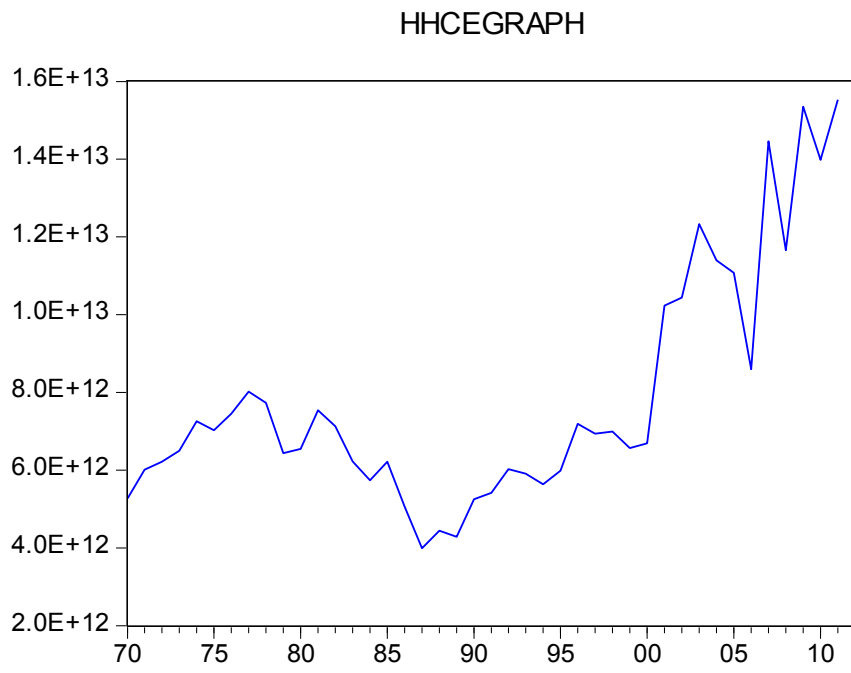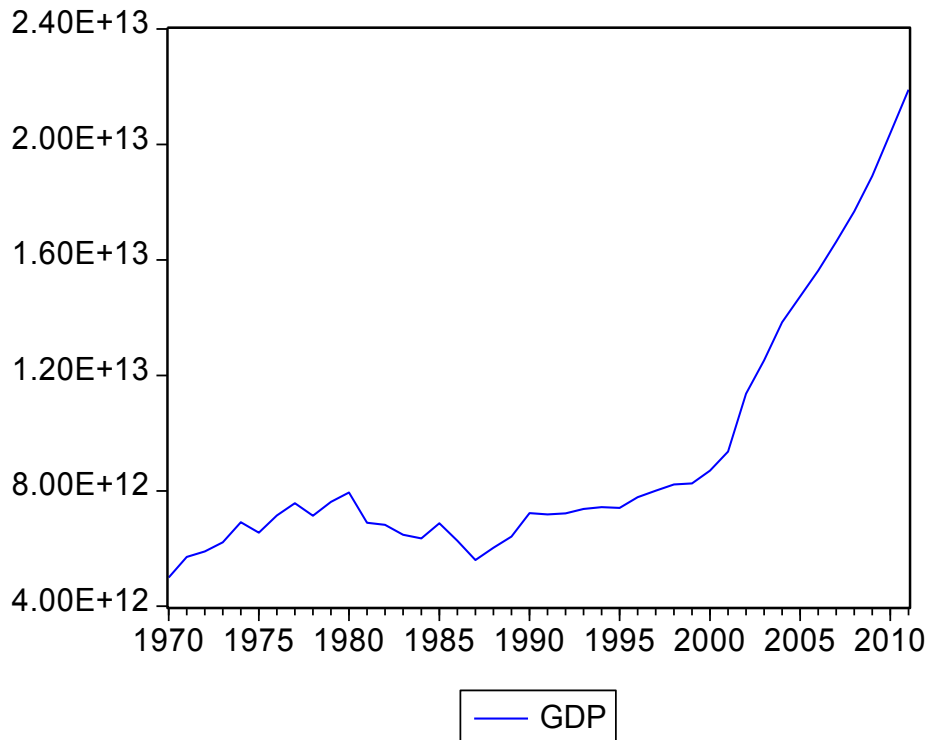
Figure 1

HHCEGRAPH

Figure 2

The pattern of changes in Nigeria's gross domestic product (GDP) in figure 2 or Table A is used to proxy income. GDP is contrary to household consumption expenditure,using the same period, because it experiences relative stability. It was slightly unstable in the period '70s till '80s. It had from 1988 rose consistently till 2011 with a negligible decline in 1995.

Table A and Figure 1&2 fulfill the implication of Keynes' Hypothesis that consumption rises as income rises, though with a few fluctuation. Alsoat low level of income, consumption is likely to exceed income. Nigeria, consistently, started consuming less than its income in 1983, with the exception of 2001. The proposition of Keynes' theory of the consumption function held out the hope that a firm has a basis for forecasting consumption expenditure. Since that time, economists have devoted considerable research effort on theorizing the determination of consumption function.

A closer study by Akekere and Yousuo (2010) on the empirical analysis of change in Income on Private Consumption Expenditure (at current prices) in Nigeria from 1981 to 2010 employs the classical simple regression analysis. This paper estimates consumption function for Nigeria by applying strictly "Absolute Income" hypothesis as introduced by Keynes, formulating a model that specify real consumption -unlike Akerekere and Yousuo- as a stable function of real income and taking a step further from least square by applying error correction model so as to identify short and long run relationship. Section two of this paper is on theories of consumption, section three and four discuss methodology and results, and section five concludes the paper.

2.0 Theory of the Consumption Function
2.1 Conceptual Framework
The concept of consumption function was introduced by Keynes (1935). It is based on the hypothesis that there is a stable empirical relationship between consumption and income. In symbols, this definition can be written as:

$$C = C(Y_d) \qquad \ldots \qquad (1)$$

Where C is the amount of consumption expenditure and Yd is personal disposable income.

Equation 1 simply indicates that the most important factor influencing consumption expenditure is the level of income. It can be rewritten mathematically in a linear function to be given an economic interpretation;

$$C = a + bY \quad \ldots \qquad (2)$$

The coefficient *'a'* is the intercept which denotes amount of consumption when income is zero. This is often referred to in the literature as autonomous consumption. The bY is the amount of consumption which varies with the level of income. The coefficient *'b'* of Y mathematically gives the slope of the consumption function. The economic interpretation is that it measures the rate of change in consumption as the level of income varies, termed the marginal propensity to consume (MPC). The MPC is the extra amount that people consume when they receive an extra naira of disposable income. Thus,

$$\text{MPC} = b = \frac{\Delta C}{\Delta Y} = \frac{\delta C}{\delta Y} \quad \ldots \qquad (3)$$

Based on the assumption that C will be less than Y, the MPC is always positive and lies between 0 and 1 i.e. $0 < \text{MPC} < 1$. This implies that when income increases the whole of it is not spent on consumption and when it falls consumption expenditure does not decline in the same proportion and never becomes zero.

Another important concept is the average propensity to consume (APC), derived thus;

$$\text{APC} = \frac{C}{Y} \quad \ldots. \qquad (4)$$

Keynes concern was primarily with the MPC due to its short-run effects while APC is useful for long-run analysis.

2.2 Theoretical Framework

Keynesian consumption function otherwise called the absolute income hypothesis (AIH) was based on the assumption that in a given modern society, as the real income of the society increases, the real consumption of such society is not likely to increase by an equal *absolute* amount.

Keynes's conjecture which emphasizes short run consumption function is therefore;

i) $0 < MPC < 1$

ii) Average propensity to consume (APC) fall as income rises.

iii) Income is the main determinant of consumption.

The Intertemporal Choice theory propounded by Irving Fisher is the foundation for subsequent work of other scholars on consumption theory. His model is based on a two period model where Period 1 represents the present and Period 2 represents the future.

Income and consumption for these periods are represented in the form;

Y_1, Y_2 = income in period 1, 2

C_1, C_2 = consumption in period 1, 2

$S = Y_1 - C_1$ = saving in period 1 ($S < 0$ if the consumer borrows in period 1)

Fisher assumes that consumer is forward-looking and chooses consumption for the present and future to maximize lifetime satisfaction and that consumers' choice are subject to an intertemporal budget constraint (a measure of resources available for present and future consumption). The timing of income is irrelevant as consumers can borrow at real interest rate r. If consumer is a saver, the rise in *r* makes him better off since he becomes richer. This tends to increase consumption in both periods.

The difference between the Keynesian consumption function and the two-period model is that Keynescurrent consumption depends only on current income. In the two-period model,current consumption depends only on the present value of lifetime income. The timing of income is irrelevant because the consumer can borrow or lend between periods.

Permanent income hypothesis (PIH) by Friedman (1957) posits that consumers do not respond equally to all income shocks but that consumption responds primarily to permanent

income. That is the theory suggests that consumption will not change at all under the impact of temporary income changes and even if the changes are permanent, it will take time to adjust consumption expenditure to the change in income. For example, if an employee is promoted to earn a higher income he is likely to consume a large fraction or proportion of such increase in income but if he receives a bonus (like end of the year productivity bonus) a larger proportion of the bonus may be saved. Thus, Friedman refutes the use of current income as the major determinant of consumption expenditure.

He represented PIH consumption function in the form:

$$C = \alpha Y^p \quad . \qquad . \qquad . \qquad\qquad (5)$$

$$Y = Y_p + Y_t \quad \ldots \qquad\qquad (6)$$

$$C = C_p + C_t \quad \ldots \qquad\qquad (7)$$

Where: α is the fraction of permanent income people consume per year (equation 5), current income (Y) is split into permanent (Y_p) and transitory components (Y_t) (equation 6) and same for consumption (equation 7).

In Friedman's postulate APC is represented in the form:

$$APC = C / Y = \alpha \, Y^p / Y \quad . \qquad . \qquad . \qquad (8)$$

Other testable postulates in this area of study include that of Ando and Modigliani (1963) which implies that people strive to smooth their consumption pattern over their life time so to ensure maximum utility. Consumers will save while working in order to sustain their consumption pattern in their twilight years. On this premise, his consumption would be proportional to his resources but the spent proportion in his plan for consumption would to a large extent depend on his age at the time of the plan.

Above theories are still parts of current discussions (see: Hall, 1978;Boskin, 1978; Carroll, 2001;Liabson et al., 2002). In our attempt to provide evidence for the consumption pattern in Nigeria, this study consider AIH as propounded by Keynes.

2.3 Empirical Evidence

Scholars have made attempts to evidence the best option (from the bundle of theories) in determining the consumption function without a consensus (Olofin, 2001). But the theoretical foundation of the earliest scholars form the basic foundation for those evolving and attempting to determine the MPC, APC and the relationship between the two concepts, both in the short and long-run.

In 1946, Kuznets carried out a study on the on the consumption and income data for the USA during the period 1869-1938. He found the estimated consumption function for the period as 0.9. These finding was later verified by Goldsmith (1955) who found the long run consumption function for USA to be stable at 0.87. These two studies revealed that the short-run consumption function is non-proportional because MPC<APC and the long-run consumption function is proportional as MPC=APC.

 Tobin (1951) and Smithies (1945) tested Keynes absolute income hypothesis in separate studies and came to the conclusion that the short-run relationship between consumption and income is non-proportional but the long-run relationship is proportional.

A similar more recent study is by Hall (1978) that employs econometric approach to the study of the life cycle–permanent income hypothesis on US data models an intertemporal consumption decision by a "representative consumer" with "rational expectations", found that apart from lagged values of consumption, real per capita disposable income, whose coefficients on lagged terms were found to be insignificant.

A revisit to the Keynesian AIH was applied to data by Emerson (2011), who used historical data from the United States to investigate the simple Keynesian consumption-income relationship. When structural breaks are taken into account, the theory of the simple Keynesian consumption function performs quite well in describing what is seen in the US

data. These results, demonstrate that the simple Keynesian consumption function does indeed perform quite well as a first approximation of the consumption-income relationship.

Ofwona (2013) in a paper presents a consumption function for Kenya for the period 1992-2011, estimating total household consumption expenditure against total income according to Keynes' absolute income hypothesis (AIH). The model was tested by ordinary least squares (OLS) and the results show that consumption is determined by income and the AIH was found to work for the case of Kenya.

Akekere and Yousuo (2010) carried out an empirical analysis of change in Income on Private Consumption Expenditure in Nigeria from 1981 to 2010. Using the classical (OLS) simple regression analysis, results agree with researchers' theoretical expectation of the existence of a positive significant impact of Gross Domestic Product (income) on Private Consumption Expenditure with a slope of 0.6708253 and the coefficient of determination (R^2 = .9838), implies a significant relationship between gross domestic product and private consumption expenditure in Nigeria.

3.0 Methodology
3.1 Sources of Data
For the purpose of this study, we obtained aggregate data on household consumption expenditure and gross domestic product (by type of expenditure, at constant 2005 prices - naira) for the period 1970-2011, from United Nations Statistics Division National Accounts Main Aggregate Database.

3.2 The Model
Our procedure with similar objectives was employed byAkekere and Yousuo (2010) on Nigeria's data, Emerson (2011) on the historical data of United States and Ofwona (2013) on Kenya's data. We use least square and error correction mechanism to investigate consumption-income relationship in Nigeria for 41years. As a first approximation, we ignore other influences and investigate the aggregate consumption-income relationship due to data limitation.

Our simple Consumption function based on Keynes AIH is in the form:
$$C_t/P = \beta_0 + \beta_1 (Y_t/P). \qquad . \qquad . \qquad (9)$$
Where:

C_t/P is the real household consumption expenditure

Y_t/P is real income represented by real gross domestic product

β_0 β_1 are coefficients, β_1 represents MPC

A priori: $\beta_0 > 0$ and $0 < MPC < 1$.

3.3 Method of Data Analysis
We employ the least square method and error correction mechanism (ECM) technique in the estimation of our model. The study started by conducting a unit root test on the variables of study. Then, we obtained the correlation matrix for the variables before regressing household consumption expenditure (HHCE) on gross domestic consumption (GDP). To know if we can refer to this regression as a static or long run and cointegrating regression we conducted a cointegration test (Trace and Maximum Eigenvalue), as suggested by Engle and Granger (1987). The Granger representation theorem advised that if two variables, like HHCE and GDP, are cointegrated, the relationship between them can be expressed as ECM so as to know if equilibrium error exist in the short run.

$$C_t/P = \beta_0 + \beta_1 (Y_t/P) + u_t. \qquad . \qquad . \qquad (10)$$
$$\Delta C_t/P = \alpha_0 + \alpha_1 (\Delta Y_t/P) + \alpha_2 u_{t-1} + \varepsilon_t. \qquad . \qquad . \qquad (11)$$

Equation 10 is our cointegrating regression model while equation 11 is the error correction model. α_2 is expected to be negative.

4.0 Discussion of Findings

To verify the stationarity of the two variables in our model Augmented Dickey Fuller (ADF) Test for unit root was conducted and summarized in Table B. None of the variables are stationary at level but at first difference I(1) stationary at 1percent and 5 percent.

Table B

variable	ADF statistics		Remark
	t statistic	lag	
HHCE***	-11.0881	0	I(1)
GDP**	-3.054204	0	I(1)
Critical values			
10%	-2.606857		
5%	-2.936942		
1%	-3.605593		

Note: *** and ** imply significance at 1% and 5% level of significance respectively.
Source: estimated by authors

The correlation result in Table C depicts consumption (HHCE) increases as Income (GDP) increases i.e. they have a strong positive linear association.

Table C

	HHCE	GDP
HHCE	1.000000	0.921866
GDP	0.921866	1.000000

Source: estimated by authors

Table D

	Static Regression Model		Error Correction Model	
dependent variable	HHCE		D(HHCE)	
	Coefficient	Prob.	Coefficient	Prob.
variable:				
Constant	1.93E+12	0.0001	-6.47E+10	0.7605
GDP	0.63617	0.0000		
D(GDP)			0.784424	0.0085
ECM(-1)			-0.876878	0.0000
R2	0.849838		0.482087	
Adjusted R2	0.846084		0.454828	

9

Durbin Watson stat.	1.567463	1.910388

Source: estimated by authors

The consumption function from our static or long run regression result (see table D) can be expressed in the form;

$$\hat{C}_t = 1.93E+12 + 0.636Y_t \qquad . \qquad . \qquad . \qquad (12)$$

In our investigation of the Keynesian consumption-income relationship, the estimation result in equation 12 shows the Consumption function for Nigeria. The coefficient of income is positive in the period of analysis (1970-2011) and the constant is also positive. These coefficients are significant at 1% respectively, so we accept H_1 which means $0 < MPC < 1$ and the constant is greater than zero. The MPC is ≈ 0.64 and Nigeria's autonomous consumption to be 1.93 trillion naira.

Table E
Cointegration Test
Included observations: 40 after adjustments
Trend assumption: Linear deterministic trend
Series: HHCE GDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.1 Critical Value	Prob.**
None *	0.295970	18.60243	13.42878	0.0164
At most 1 *	0.107855	4.565049	2.705545	0.0326

 Trace test indicates 2 cointegratingeqn(s) at the 0.1 level
Source: estimated by authors

The cointegration test conducted (see Table E) depicts consumption and income has a long term relationship at 10% level in Nigeria. This gives us procession to perform ECM. The equilibrium error term (ECM) is nonzero as it is significant at 1% informing us to reject H_0 and accept H_1, which means the model is out of equilibrium in the short run and consumption is expected to restore to equilibrium in the next period i.e. in about one year one month and twenty one days or about 416 days (see Table D). The ECM regression result is expressed in equation 13 bearing a priori expectation.

$$\Delta\hat{C}_t = -6.47E+10 + 0.784\Delta Y_t - 0.877\hat{u}_{t-1} \qquad . \qquad . \qquad . \qquad (13)$$

The constant in the ECM regression result is not significant while the coefficient of change in GDP is significant at 1%. One can interpret the long run MPC as ≈ 0.64 and short run MPC as 0.78, for our period of analysis. The mean APC for our period of analysis is 0.88 (see Table A). Table F shows the correlation result of income and APC. APC has a weak negative linear relation with income.

Table F

	GDP	APC
GDP	1.000000	-0.454791
APC	-0.454791	1.000000

Source: estimated by authors

Diagnostic Tests

After a simulation to check for misspecification of our model the static regression result in Table D was chosen considering its lower Akaike info and Schwarz criterion.

The R squared and the Adjusted R squared of our static model is ≈ 0.85, implying 85 percent variation in consumption is explained by income in Nigeria. This is a good fit compared to the R squared and the Adjusted R squared of our Error Correction Model of 0.48 and 0.45 respectively. Change in income and Error term explains 48 percent variation in consumption (see Table D).

The Durbin Watson statistics (d), in Table D, of the two models fall within the decision range of $d_u < d < (4 - d_l)$

$d_u = 1.54$

$(4 - d_l) = (4 - 1.44) = 2.56$

$1.54 < d < 2.56$ i.e. $1.54 < 1.57$ and $1.91 < 2.56$

We cannot reject H_0, meaning there is no autocorrelation, positive or negative.

5.0 Conclusion and Recommendations

This study uses the historical data of household consumption expenditure and the gross domestic product of Nigeria to estimate the simple Keynesian consumption function ignoring other factors that could affect consumption. The value of 0.64 for the marginal propensity to consume,that we obtained, is rather low compared to USA's 0.99 Emerson (2011), but better than Kenya's 0.1168 Ofwona (2013) and close to Nigeria's 0.67 Akekere and Yousuo (2010). The difference between 0.67 and 0.64 can be attributed to the time difference in the two studies and the use of real prices in this study. The positive value of the intercept and the coefficient of income conform to the theoretical position of Keynes model of absolute income hypothesis. The short run MPC (0.78) is less than APC (0.88), which makes it non-proportional, but defies the AIH long run consumption function of being proportional: long run MPC (0.64) is not equal to APC.

This long run "no proportionality" contradicts Keynes believe that consumption is reversible if income falls. Since Keynes emphasizes short run consumption function, we conclude that the simple Keynesian consumption function is still relevant in explaining the MPC in developing countries like Nigeria. And recommend that there is need to improve MPC through employment generation, increased output through sustainable agricultural policies and improved level of wages in Nigeria's public and private sector.

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