An Empirical Application of Debt Neutrality to the Nigerian Economy: Further Evidence

by
Taiwo Aderemi
University of Ibadan, Nigeria
adekunte22@yahoo.com

Abstract. Domestic debt accumulation by the Nigerian government has increased in recent times. One reason adduced for this is the need to finance the fiscal deficit. At the same time, the government is embarking on policies to stimulate economic growth. According to the debt-neutrality hypothesis, raising revenue either through domestic bonds or taxes does not matter. This means that domestic debt accumulation by the Nigerian government may not stimulate economic growth as desired. This study therefore investigates the debt-neutrality hypothesis. I found that the key variables in testing the validity of the proposition did not support the debt neutrality in Nigeria.

Key words: Ricardian, debt-neutrality, Nigeria, Debt.
JEL classification: H3, H63, H61

1 Introduction

The Nigerian government has continuously increased her borrowing from the domestic market in recent years. Domestic debt accumulation increased by 132 per cent from N2.7trillion in 2006 to N6.3trillion in 2012, compared to an increase of 69 per cent between 2000 and 2005. The increasing domestic debt profile has been attributed largely to the country's huge deficit, estimated at 3.1 and 2.4 per cent of the Gross Domestic Product in 2011 and 2012 respectively. Similarly many state governments are also issuing domestic bonds to bridge revenue-expenditure gap and also finance capital outlay. The political and high security risk in the Nigerian economy, coupled with sluggish global economic recovery[i] may have prompted the government to look inwards in financing her deficit, thus increasing issuing of domestic bonds to fund deficit.

Till date, the literature has not come to a consensus on the impact of domestic debt accumulation on economic growth. While some studies support the positive impact, others argued that there is no definite effect. Domestic debt as an effective instrument for driving private consumption, aggregate demand and economic growth in the short-run has been advocated by the Keynesians (Marinheiro, 2001). According to them, consumers treat government debt as net wealth and consume any interest payment on debt.

The proponents of the Ricardian Equivalence or Debt-Neutrality hold a divergent view. They assert that increases in government debt stock do not positively impact private wealth and consumption (Seater, 1993). Their reasoning is that when government substitutes bond for taxes in order to finance deficit, the public do not regard it as an increase in private wealth. Rather, it is perceived as borrowing on their behalf, which will be repaid in the future in form of high taxes. What this suggests is that consumers will increase their savings in order to offset the increase in future taxes.

As domestic debt issue by the Nigerian government continues to rise, there are concerns whether this policy signals increased future tax liabilities to the non-bank public. If it does, then according to Debt Neutrality proposition, the policy goal of stimulating the economy through increased consumer spending may not be achieved. On the other hand, the invalidity of the Debt Neutrality could mean that in the long-run, the short-run economic growth gains achieved could be eroded due to the crowding-out effect of private investments, arising from increased government domestic borrowing which is believed to drive up interest rates.

This topic has dominated a lot of discussions and debates in the advanced countries. Yet, it

has received little attention in developing countries despite the significant role played by private consumption expenditure in driving economic growth in any economy. For instance, between 2005 and 2011, the contribution of private consumption expenditure to Nigeria's gross domestic product averaged 69% (CBN statistical bulletin, 2011).

On this note, the purpose of this study is to present empirical test of the Ricardian Equivalence for Nigeria using macroeconomic data for the period 1982-2012. The paper contributes to the empirical literature in two ways. We adopted the consumption function approach in testing the debt neutrality case in Nigeria. This technique seems more appropriate due to the wide criticism of the interest rate approach and its limited applicability in Nigeria.[ii] It has been shown that in developing countries, consumption behaviour of households is hampered by credit constraints (Adji, 2007). Along this line, we introduced credit to the private sector as an explanatory variable in the consumption function.

The rest of the paper is organized as follows. Section two provides a background on Nigeria's public debt profile, private and government consumption expenditure. The literature review is presented in section three. The data and econometric methodology are described in section four. Results and analysis of the empirical findings are presented in section five, and section six concludes.

2 Stylized Facts on Domestic Debt, Government Expenditure, and Private Consumption in Nigeria

Table 1 shows the debt profile of Nigeria (domestic and external) and fiscal deficit as a percentage of the Gross Domestic Product between 1982 and 2011. Evident is the rapidly rising domestic debt, estimated at N3.5 trillion between 2007 and 2011, compared to N1.4 trillion between 2002 and 2006. Also surprising is the leap of 400% growth in domestic debt between 1997 and 2011.

The rising domestic debt has been linked to the country's huge fiscal deficit, estimated at 3.1% and 2.4% in 2011 and 2012. As shown in table 1, fiscal deficit as a percentage of the gross domestic product averaged 2.07% between 2007 and 2011. A substantial part of this deficit is financed through domestic borrowing. The issuing of 3-year tenor bond commenced in 2003, as a result of the need for long-term financing of capital projects. In subsequent years, 5,7,10 and 20-year bonds were further floated to meet the increasing and huge infrastructural gap in the country. Thus, as at 2012, Federal Government of Nigeria (FGN) bonds constituted 62% of the total domestic debt, while treasury bills accounted for 32%, while the share of treasury bonds was only 6%.

Table 1. Trends in Nigeria's Debt Profile and Fiscal Deficit from 1982 to 2011

	Domestic Debt (Naira, Billion)	Foreign Debt (Naira, Billion)	Fiscal Deficit as a percentage of GDP
1982-1986	23.24	18.59	-7.93
1987-1991	66.86	220.44	-8.21
1992-1996	290.06	632.81	-4.70
1997-2001	721.32	2,015.99	-4.19
2002-2006	1,429.03	3,289.60	-1.98
2007-2011	3,578.41	620.27	-2.07

Source: CBN Statistical Bulletin 2011, 2012 & Nigeria Debt Management Office

When the domestic debt is juxtaposed with the foreign debt, one would observe that the former dwarfs the latter between 2007 and 2011 as shown in table 1. During this period, the domestic debt was about five-times the external debt stock. Conversely, table 1 revealed that between 1987 and 2006 (i.e. averages) the external debt accumulation outweighed the domestic debt. The observed huge external debt could be attributed to increased government borrowing during the structural adjustment programme (SAP) of the International Monetary Fund (IMF) which was adopted by Nigeria in the 1980's. For instance, external debt increased unprecedentedly by 1,085% from N18.59 billion in 1982-1986 to N220.44 billion in 1987-1991.

Debt relief from Nigeria's major foreign creditors (i.e. Paris and London clubs) in 2006 resulted in a significant reduction in the volume of external debt from N3.289 trillion between 2002 and 2006 to N620.275 billion between 2007 and 2011, as shown in table1. Since then, domestic debt had overtaken and is rising faster than external debt. Consequently, domestic debt service has increased relatively to external debt service. The former increased by 78% from N306.2 billion in 2008 to N543.7 billion in 2013, while the latter declined from N66 billion to N48.3 billion in the same period.[iii]

Table 2. Trends in Private and Government consumption expenditure (1982-2011)

	Private Consumption (Naira, million)	Government Consumption (Naira, million)
1982-1986	41,865.12	8,908.47
1987-1991	138,578.81	12,340.25
1992-1996	999,671.81	154,540.54
1997-2001	2,616,725.09	359,853.94
2002-2006	8,826,419.77	800,221.79
2007-2011	19,463,009.42	3,431,083.88

Source: Computed by the author from CBN statistical Bulletin 2011

Evident from table 2 is the rapid growth of private and government consumption over the years. Growth rate of private consumption expenditure averaged 274.3%, while government spending was 354.9% between 1982 and 2011 respectively. Also worth noting is the sharp rise in both variables between 1987-1991 and 1992-1996. Within this period, government and private consumption grew by 1,152.3% and 621.3% respectively.

Figure 1 further shows a tandem movement between the growth of private and government spending from 1987-1991 to 1997-2001. This clearly points out an existing relationship between these variables. In the 1987-1991 period, growth rate of private consumption exceeded government spending. By 1992-1996, growth of government consumption expenditure had surpassed private consumption. The trend was reversed in 1997-2001 and 2002-2006, as shown in figure 1, with growth of private consumption above that of government spending. In 2007-20011, growth of government consumption rose faster and continued on an upward path.

Similarly, figure 1 also points out that domestic debt which is a critical variable in the debt-neutrality hypothesis has a relationship with private consumption, except in 2007-2011 when we observed a divergent trend. It is clear that the growth of private consumption rose faster than the growth of domestic debt, except in 2007-2011. A major inference from this relationship is that domestic debt possibly influences household consumption pattern in Nigeria either negatively or positively.

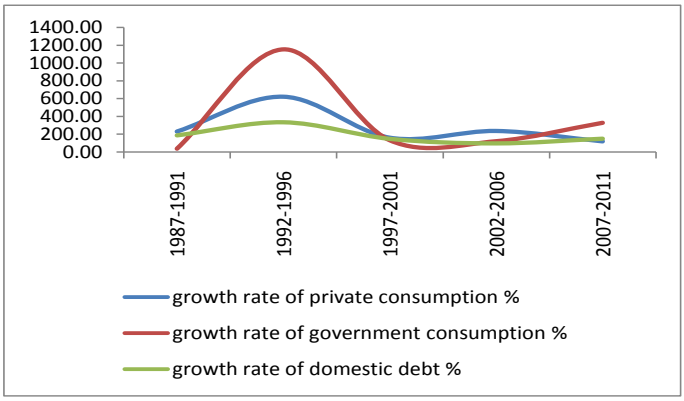

Figure 1. Growth Rate of Government and Private Consumption Expenditure and Domestic Debt in Nigeria %.

Source: Author's computation from CBN Statistical Bulletin 2011 and Data from Debt Management Office.

3 The Literature

The literature on testing the equivalence of debt and taxes in deficit-financing has grown significantly in the last three decades. Ever since the classic work of (Barro, 1974) several papers have evolved in the developed countries, while few developing-countries studies are available.[iv] Regardless of the volume of literature in the advanced countries, opinions of authors differ about the effect of the substitution of debt for taxes on private consumption or savings. Mixed results have mainly been attributed to varying sample periods, econometric techniques, model specification, and measurement of variables (Liederman and Blejer, 1988).

Testing the RE has centred on two methods; the consumption function approach and the interest rate method. The former is divided into two

approaches; the reduced-form consumption functions and Euler equation specification. The interest rate approach involves testing the effects of deficits on interest rate. For comprehensive notes on these methods, see (Kazmi, 1994), (Marinheiro, 2001), and (Adji, 2007). With respect to the measurement of variables, some authors have argued that the use of ratios of explanatory variables, for example tax-deficit ratio is more appropriate (Dalamagas, 1994). Others such as Kormendi (1983) had preference for the use of regressors either in level or first difference forms.

The Ricardian proposition or debt-neutrality is premised on the fulfilment of some theoretical assumptions. These are; absence of borrowing constraints, non-distortionary taxes, certainty about future taxes, myopic individuals, and infinite horizons for individuals and the government. Deviations from one of these assumptions could invalidate the Ricardian proposition. The requirement of infinite horizon for household has come under strong criticism. As pointed out by Liederman and Blejer (1988), these assumptions do not actually hold. Seater (1993) however argued that although true equivalence may not hold, it may be used as a close approximation to reality.

In 1974, Barro examined the effect of finite lives within the context of an overlapping generation model of the economy. He argued that if families can transfer bequests to the next generation, they would act as if they live infinitely and thus there would be no net wealth effect arising from government bond accumulation.

Kormendi (1983) presented a classic paper testing the Ricardian proposition in the American economy. He proffered a generalised consumption function approach which nests both the consolidated and standard methods. He argued against the use of the standard consumption function which assumes that consumers are non-rational and myopic, hence do not account for the effects of government debt accumulation on future taxes. This implies that households ignore government spending. In contrast, under the consolidated approach, households rationally account for government fiscal policy effects. Testing both the consolidated and standard approaches for the American economy on time-series data from 1929 to 1976, the author adopted the ordinary least squares (OLS) technique. The explanatory variables adopted are real income, its lag of one year, government transfers, tax revenue, wealth, and government spending on goods and services, while private consumption is the dependent variable. The critical variable; government spending had a negative sign, indicating that it negatively affects private consumption. Also, tax revenue was not significantly different from zero, which suggested that the choice of tax or debt in deficit financing does not affect private consumption. Hence, the empirical results validated the consolidated approach and the Ricardian proposition for the American economy.

Kormendi's results came under fierce criticism from Modigliani and Sterling (1986). It was faulted for the use of inappropriate deflators, misspecification of the consumption function, use of differenced data, and non-exclusion of the Second World War period and the great depression from the sample period. The huge and significant coefficient value of transfer variable was also queried. They argued that since government transfers is a negative tax, then for Ricardian equivalence to hold, the coefficient must be almost zero. Correcting for these errors using the Ordinary Least Squares method on post-war data from 1952-1976, Modigliani and Sterling found contrary to Kormendi's that American consumers were non-Ricardian during the period.

Evans (1988) further investigated the Ricardian equivalence for the United States. Unlike Kormendi, he used quarterly post-war data from 1947 to 1985. The study tested the Ricardian equivalence against an alternative Blanchard's model, using real expenditure on non-durable goods and services instead of consumption as the dependent variable. Other variables introduced are real federal interest-bearing debt and assets. Adopting the Generalised Method of Moments (GMM), he found that tax cut during President Reagan's administration did not raise consumption, thus conforming to the Ricardian equivalence hypothesis.

Other country empirical evidences on debt-neutrality also show mixed results. In 1994, Kazmi adopted the two-stage least squares (2SLS) method in testing the Ricardian equivalence theorem in Pakistan. His choice of econometric technique, as he argued was based on the exogeneity problems often associated with fiscal variables such as tax, debt, deficit, and government spending thus making estimates obtained from the Ordinary Least Squares method to be biased. Time-series data from 1960-1988 were collected on variables such as subsidies, taxes, government purchases, private consumption, and wealth. Estimates from the 2SLS method show that although the coefficient of government spending was negative and significant (-0.048), it was much less than the required value (i.e. 1) for perfect debt-neutrality to hold. Also, the signs of the coefficients of taxes and debt stock were consistent with the Ricardian proposition. However, the large positive and significant coefficient for subsidies invalidated the expectations of debt neutrality. The author went ahead to test the Ricardian hypothesis using OLS method and found that the results were contrary to the debt-neutrality hypothesis. He therefore concluded that Pakistani consumers are non-Ricardian.

Drakos (2001) explored the long-run relationship between government public debt and private savings in Greece. Using the Vector Error Correction Method (VECM) and quarterly data from Q1, 1981 to Q3, 1996. A major contribution of the study was controlling for the effects of political regimes on savings' decision in Greece. The findings revealed that although rise in household savings was associated with increases in government debt, the relationship was not on a one-to-one basis. This suggests that households partially perceive government bonds as net wealth.

Marinheiro (2001) in an application to the Portugese economy tested the validity of the Ricardian equivalence adopting both the Structural and Euler consumption functions approaches. He specified the Kormendi (1983) consumption function, although using the Error Correction Method. The estimates show that consumers do not conceive government debt as net wealth. However, when government transfer is included as an explanatory variable, the Ricardian proposition is rejected. This corroborates Modigliani and sterling's faulting of the government transfer variable. The Euler equation approach however produced inconclusive evidence on the Ricardian proposition.

Fang *et al* (2010) conducted an empirical test on the validity of the Ricardian equivalence proposition in China using monthly data from January 1992 to June 2009. The study was carried out using Structural Vector Autoregressive (SVAR) estimation technique. The variables adopted are gross domestic product, fiscal expenditure, and taxes; all expressed in real terms. Their finding was that the Ricardian equivalence was untenable in China's economy and thus expanding government expenditure has stable and lasting stimulating effects in China.

The literature on the Ricardian proposition in Nigeria is scanty. The few studies that have explored this topic, however reached a consensus. One of the earliest papers was Okpanachi (1998). The work, which was not empirical, focused on the relevance of the Ricardian proposition in Nigeria. He stressed that the differential borrowing rates which exists between the government and individuals or between the formal and informal sector invalidates the Ricardian proposition in the economy. He argued further that due to the low-income level and high marginal propensity to consume in Nigeria, consumers conceive tax cuts as reliefs and therefore would increase their consumption. The study had no empirical evidence and was largely subjective.

In 2006, Onafowora and Owoye extended the literature by examining the nexus between trade deficit and budget deficit in Nigeria using time-series data from 1970 to 2001. The variables considered are; trade deficit, budget deficit, broad money supply as a share of gross domestic product, exchange rate, and industrial production. Adopting granger causality test and Vector Error Correction Method (VECM), they found a one-way relationship between budget deficit and trade deficit and that trade deficit causes budget deficit. Similarly, the estimates

rejected the Ricardian equivalence for the Nigerian economy.

Onyeiwu (2012) sought to find out whether domestic debt accumulation has a crowding-out effect on private investments in Nigeria. In doing so, the author adopted the Ordinary Least Squares (OLS) and Error Correction Method (ECM). Quarterly time-series data from 1994 to 2008 was used and the variables adopted are; gross domestic product, domestic debt, private sector credit, foreign exchange rate, and fiscal deficit. The OLS results show that domestic debt crowds-out private investment and retards economic growth. This suggests that Nigerian households are non-Ricardian. Estimates from the ECM test corroborate the OLS, thus pointing to the growth-inhibiting feature of domestic debt in Nigeria. The study however appears flawed in some ways and hence the findings may not be relied upon. Firstly, the co-integration results presented by the author in table 8 show that there exists no long-run relationship among the variables. Nevertheless, the author went ahead to carry out an ECM test. Secondly, the OLS result revealed the presence of serial correlation, with a Durbin Watson of 0.54. The author also kept silent about it. The R-square was 0.69. Since the DW is less than the R-square, there are strong indications that the findings from the study are spurious and unreliable.

Very recently, Odianye and Ebi (2013) investigated the link between budget deficit and interest rate in Nigeria adopting Vector Error Correction Model (VECM) and quarterly time-series data from Q1 1970 to Q4 2010. The variables used are; interest rate, budget deficit, inflation, and money supply. The empirical findings show that budget deficit drives up interest rate in Nigeria. This result therefore refutes the Ricardian proposition in the Nigerian economy.

It is apparent from the review of literature that empirical findings from developed countries on the validity or otherwise of the Ricardian proposition are inconclusive. The few studies on Nigeria have however reached a consensus that the debt-neutrality does not hold in Nigeria. A peculiar feature among these studies is that they all adopted the interest rate approach, in which the effect of deficit on interest rate is examined. As noted by Liederman and Blejer (1988), different specifications and econometric approaches have been known to produce mixed results in the developed countries. Okpanachi (1998) recommended the consumption-based approach due to the prevalent practice of financial repression and hidden taxation of financial assets in Nigeria. It is therefore essential to adopt the aggregate consumption function approach to verify the existing evidences about the Ricardian proposition in Nigeria.

4 Methodology and the Data

Methodology

Two broad approaches have been adopted extensively in the literature to test the Ricardian equivalence; the consumption function-based test, and the test of the effects of deficit on interest rate. As earlier mentioned, the interest rate approach to testing the REH may not be appropriate for the Nigerian economy as a result of differential interest rates which exist among agents in the formal sector, and between the formal and informal sectors. This method may readily bias the empirical investigation, since interest rates are not uniform. Similarly, the non-uniform interest rate negates one of the conditions for the existence of the REH, which is that the government and individual must borrow at the same rate.

The two prominent methods for testing the Ricardian equivalence proposition using consumption function are the Euler approach and the aggregate consumption function method. This study adopted the latter approach, because one major disadvantage of the Euler method is that, it requires the researcher to make some restrictive assumptions so as to derive an aggregate consumption function in terms of observable variables from the original optimisation problem (Marinheiro, 2001). Such assumptions may include the imposition of a constant uniform real rate of return for individuals and the government, and lump sum tax which often prevents the likelihood of rejecting the Ricardian theorem.

In this respect, this paper adopts the aggregate consumption function approach. Based on the existing literature on the aggregate consumption function test of Ricardian equivalence, this study estimates the following empirical model.

$$PCON_t = \alpha_0 + \alpha_1 GEXP_t + \alpha_2 PDEBT_t + \alpha_3 PCRED_t + \alpha_4 Y_t + \alpha_4 FDEF_t + \varepsilon_t$$

$PCON_t$ - Private Consumption at time t
Y_t - National Income at time t
$PDEBT_t$ - Domestic Debt holding by non-bank public
$FDEF_t$ - Fiscal Deficit as a percentage of GDP
$GEXP_t$ - Government Expenditure at time t
$PCRED_t$ - Private Sector Credit
ε_t - White noise error

Some variables were dropped from the original consumption function specification for testing REH due to data unavailability for Nigeria. Following (Adji, 2007), I introduced private sector credit to proxy the impact of liquidity constraints on private consumption in Nigeria. The model is estimated using the Ordinary Least Squares (OLS) method. Within the aggregate consumption function specified above, the equivalence proposition is validated or refuted based on the signs and magnitude of the parameter estimate of certain key explanatory variables. In the extreme case of debt-neutrality, α_1 = -1 and statistically significant. In the less extreme situation, α_1 must be less than 1. Similarly, α_2 =0.

Data Issues

The study employed time-series data on private consumption, government consumption expenditure, privately held domestic debt, fiscal deficit, private sector credit, and national income. Liquidity was proxied by real private sector credit. Due to unavailability and incomplete data on government transfers and tax revenue, we have decided to exclude the variables from the model. The data span yearly observations from 1981 to 2012, and were taken exclusively from the Central Bank of Nigeria statistical bulletin.

5 Empirical Results and Analysis

Stationary Tests

It is widely documented in the literature that time series data are often characterized by non-stationary trends. In view of this, the first tests conducted are the Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root test, which examine the stationary property of the individual series. The ADF test result which is presented in table 3 shows that all the variables, except credit to the private sector (PCRED) and privately-held domestic debt (PDEBT) are stationary at levels. However, all the variables are stationary at first difference. In table 4, the Phillips-Perron test shows that all the variables are stationary at levels. Further tests reveal that PCRED becomes non- stationary at first difference. A major observation from both tests is that all the variables are either stationary at levels or first difference. In order to allow for a higher degree of freedom, variables that are integrated at order one in at least one of the tests are treated as I(1). Thus, the variables were combined as I(1).

Table 3. Results of Augmented Dickey Fuller Unit Root Test

Variable	ADF Statistics I(0)	ADF Statistics I(1)	ADF order of Integration
PCRED	-0.8072	7.2217***	I(1)
FDEF	-2.5869**	-10.8885***	I(0) & I(1)
Y	4.8586***	3.3003***	I(0) & I(1)
GEXP	2.6010**	-3.7343***	I(0) & I(1)
PCON	2.2265**	-2.9830***	I(0) & I(1)
PDEBT	1.2487	2.0520**	I(1)

****, **,* significant at 1%, 5%, and 10% respectively*

Table 4. Results of Phillips-Perron Unit Root Test

Variable	Phillips-Perron I(0)	Phillips-Perron I(1)	PP order of Integration
PCRED	10.9567***	-0.7762	I(0)
FDEF	-2.6263**	-18.8110***	I(0) & I(1)
Y	11.2778***	-2.5683**	I(0) & I(1)
GEXP	4.1416***	-2.2077**	I(0) & I(1)
PCON	1.9583**	-2.9302***	I(0) & I(1)
PDEBT	8.5149***	-6.7054***	I(0) & I(1)

****, **,* significant at 1%, 5%, and 10% respectively*

Co-integration Test Result

The study then proceeded to establish if there exists a long run relationship among the variables using Johansen co-integration test. The results of the cointegration test are highlighted in table 5. Both the Trace and Maximum Eigen statistics rejected the null of no cointegration at the 5 per cent level. Similarly, both tests indicated four cointegrating equations at the 5 per cent level. The implication of this is that there is a stable long-run relationship among the variables of the model.

Table 5. Cointegration Test Result

Maximum Eigenvalue Test				**Trace Test**		
Null Hypothesis	**Alternative Hypothesis**	**Eigen-value**	**Critical value 95%**	**Alternative Hypothesis**	**LR Ratio**	**Critical value 95%**
r=0	r=1	97.85*	40.07	r≥1	243.73*	95.75
r≤1	r=2	59.50*	33.87	r≥2	145.88*	69.81
r≤2	r=3	44.46*	27.58	r≥3	86.37*	47.85
r≤3	r=4	28.52*	21.13	r≥4	41.90*	29.79
r≤4	r=5	13.22	14.26	r≥5	13.38	15.49
r≤5	r=6	0.16	3.84	r≥6	0.16	3.84

** denotes significant at the 5% level*

After the preliminary tests have been carried out, we have ascertained that the series are stationary either at levels or first difference and that a stable long-run relationship exists among the variables. These tests are necessary to ensure that the consequent findings from our regression estimation are not spurious or baseless.

Chow Structural Break Test

One major deviation of this study from earlier studies in Nigeria is that we tested for an exogenous structural break in the aggregate consumption function. A major policy change occurred in the Nigerian economy in 1987, when the nation fully adopted the structural adjustment programme (SAP). It is therefore essential to find out if this regime switch significantly altered households' consumption behaviour.

We conducted Chow stability test by splitting the sample into 1981-1986 and 1987-2012 and found no evidence of parameter instability as shown by the insignificance of the dummy variable at the 5 per cent level in table 6.

Table 6. Chow Stability Test

Dependent variable: PCON Variables	Coefficient	t-statistic	Probability
PCRED			-1.2289
-2.08	0.048		
PDEBT			0.6944
0.30	0.768		
GEXP			2.7260
1.65	0.111		
FDEF			-534.37
-0.01	0.994		
Y			0.6412
4.53	0.000		
DUMMY			-20396
-0.27	0.789		
CONS			-50367.5
-0.07	0.943		
R-SQUARE	0.9697		
ADJ R-SQUARE	0.9625		
PROB>F	0.0000		

The Problem of endogeneity of independent variables in the consumption function specification has been stressed in the literature. Kazmi (1994) ascertained that variables such as consumption, income, government spending, debt and public debt may be determined simultaneously. The Ordinary Least Squares estimation technique therefore gives

inconsistent estimates in the presence of simultaneity bias. In this respect, we compared the two-stage least squares method with the OLS technique using Hausman test. The regression result shows that Y, GEXP, and FDEF in our model are weakly endogenous, since purging these variables of endogeneity does not yield different results from that of OLS.[v] As a result of this we have adopted the OLS technique. Table 7 shows the result of the Ordinary Least Squares (OLS) regression estimation.

Table 7. Tests for Debt-Neutrality. Private Consumption Function for Nigeria: 1981-2012 using Ordinary Least Squares (OLS).

Dependent variable: DPCON Variables	Coefficient	t-statistic	Probability
DPCRED		1.7589	2.5951
0.0156			
DPDEBT		8.4932	3.6786
0.0011			
DGEXP		12.6968	5.5772
0.0000			
DFDEF		-68287.6	-0.7615
0.4534			
DY		1.2318	3.6927
0.0011			
CONS		693041.9	1.2707
0.2155			
R-SQUARE		0.9148	
D.W 2.1358			
ADJ R-SQUARE		0.8978	
F-Stat. 53.729			
PROB>F		0.0000	

The result shows that the regression has a good fit with the estimated model. This is indicated by the overall significance of the F-statistic. Four variables are statistically significant, while one is not. The independent variables jointly explain about 91% of the variations in private consumption expenditure as suggested by the R-square estimate. After adjusting the R-square, it yields 0.89, which indicates that we did not include irrelevant explanatory variables in the model. The Durbin-Watson statistic of 2.13 suggests the absence of serial correlation among the error terms. The intercept term does not carry any information about the dependent term, since it is not statistically significant.

All the explanatory variables are significant at either 1% or 5% except fiscal deficit which is not statistically significant. The two key variables in testing the validity or otherwise of the Ricardian proposition as widely used in the literature are privately-held domestic debts (PDEBT) and government spending on goods and services (GEXP). For Ricardian equivalence to hold, GEXP must be statistically significant, its coefficient negative and approaching one (-1). Similarly, PDEBT should be insignificant thus indicating that increases in government domestic borrowing does not matter to private consumption behaviour.

Estimates of GEXP and PDEBT in the above results are contrary to the REH. For instance, GEXP is statistically significant and positive, with magnitude far above one. The coefficient of 12.696 for GEXP indicates that a unit increase in government spending on goods and services will increase private consumption spending by about N12.69k per person. This clearly invalidates the REH or debt-neutrality proposition that government spending depresses private consumption expenditure. This result of a positive relationship between private and government expenditure is unsurprising, as the trend correlation shown in figure 1 corroborates it.

The positive and statistically significant coefficient of the PDEBT is also inconsistent with the debt-neutrality hypothesis. A unit increase in non-bank public holding of domestic debt will increase private consumption by N8.49k per person. This result is further buttressed by the trend relationship between domestic debt and private consumption in figure 1.

The significant and positive coefficient of the credit to the private sector (PCRED) variable shows that consumption spending responds positively to increases in private sector credit. Thus, a Naira increase in loan disbursement to the private sector will stimulate consumption by N1.75k. This indicates the potential role of credit in spurring output growth and employment opportunities in Nigeria. Similarly,

the coefficient of national income (Y) is positive and statistically significant. This matches our apriori expectation of the relationship between private consumption and income. A Naira increase in income will increase consumption expenditure by N1.23k. In sum, the above result fails to support the debt-neutrality case for the Nigerian economy. Our empirical findings lend credence to Onafowora and Owoye (2006) and Odiaye and Ebi (2013) which refute the REH for Nigeria using different specification and econometric techniques.

6 Concluding Comments

The choice of fiscal instruments for deficit financing is an important decision particularly in developing countries where the public sector spending is relied upon to stimulate the desired output growth. The preference for domestic debt accumulation as against taxes according to the proponents of the Ricardian Equivalence does not matter for economic growth. The Nigerian government in recent years have substantially increased her accumulation of domestic debt to fund the revenue-expenditure gap.

This study therefore re-examined the debt neutrality case in Nigeria. Stationarity, cointegration, structural stability test and ordinary least squares estimation were conducted on annual time-series data spanning 1982 to 2012. However, unlike earlier studies in Nigeria, the consumption function approach was adopted.

The estimates of the government spending (GEXP) and domestic debt (PDEBT) which are the key variables in testing the validity of the REH did not support the debt neutrality case in Nigeria. These variables positively drive private consumption expenditure. This is in line with the findings in the existing studies on Nigeria. An important intuition from this result is that the increasing rate of debt accumulation in Nigeria may stimulate output growth in the short-term through its effect on consumption. In the longer term however, these growth benefits may be eroded as higher interest rates crowd-out private sector investment. Future research on this topic could explore the incorporation of tax as an explanatory variable as a means of investigating the effect of tax-debt substitution on consumption.

References

Adji, A. (2007). Essays on Ricardian Equivalence: Economic dissertations; Department of Economics Georgia State University.

Barro, R.J. (1974). Are Government Bonds Net Wealth? *Journal of Political Economy*, Vol.82, No.6, pp. 1095-1117.

CBN, (2011, 2012). Central Bank of Nigeria Statistical Bulletin and Statement of Account, Abuja.

Dalamagas, B. (1994). Testing the Debt-Illusion Hypothesis. *Revue economique*, Vol. 45, No.4, pp. 1079-1094.

Drakos, K. (2001). 'Testing the Ricardian Equivalence Theorem: Time Series Evidence from Greece'. *Journal of Economic Development*. Volume 26, No 1, June 2001.

Evans, P. (1988). Are Consumers Ricardian? Evidence for the United States. *The Journal of Political Economy*, Vol. 96, No 5 pp 983-1004.

Fang, W., J. Ma, and Y. Sheng (2010). 'An Empirical Test on the validity of China's Fiscal Policy based on the Ricardian Equivalence Proposition'. *International Journal of Business and Management*, Vol. 5, No 8.

Kazmi, A. (1994). 'Private Consumption, Government Spending, Debt Neutrality: Resolving Kormendi-Feldstein-Modigliani Controversy'. *The Pakistan Development Review*. 33:4 Part II (Winter 1994), pp 1055-1071.

Kormendi, R.C. (1983). 'Government debt, Government spending, and Private sector Behaviour'. *American Economic Review*, vol. 73, No 5, pp 994-1010.

Leiderman, L. and M. Blajer (1988). Modelling and Testing Ricardian Equivalence: A survey. Staff Papers, International Monetary Fund, Vol. 35, No 1 pp 1-35.

Marinheiro, C.F. (2001). Ricardian Equivalence: An Empirical Approach to the Portugese Economy. A Paper presented at the Katholieke Universitiet Leuven Workshop in International Economics.

Modiglliani, F. and A. Sterling (1986). 'Government Debt, Government Spending and Private Sector Behaviour: Comment'. *The American Economic Review*, Vol. 76, No. 5, pp. 1168-1179.

Nigeria Debt Management Office, www.dmo.gov.ng

Odianye, J.C and U.K. Ebi (2013). 'The Relationship between Budget Deficit and Interest Rate: Evidence from Nigeria'. *European Journal of Business and Social Sciences*, Vol.2, No.1, pp 158-167.

Okpanachi, U.M (1998). "Ricardian Equivalence: A Survey of Literature and Relevance in Nigeria". Department of Economics Publication, University of Jos, Vol.1, No.1

Onafowora, A.O and O. Owoye(2006). 'An Empirical Investigation of Budget Deficit and Trade Deficit: The Case of Nigeria'. *Journal of Developing Areas*, Vol.39, No 2 pp 153-174.

Onyeiwu, C. (2012). 'Domestic Debt and the Growth of Nigerian Economy'. *Research Journal of Finance and Accounting*. Vol.3, No5.

Seater, J. (1993). 'Ricardian Equivalence'. *Journal of Economic Literature*, Vol. 31, No1 pp142-190.

[i] High risk in the Nigerian economy seems to be one major factor that has made floating international bond undesirable.

[ii] See Okpanachi (1998) for an explicit discussion.
[iii] This is not shown in table 1.
[iv] The original work on Debt-Neutrality is traced to David Ricardo (Kazmi, 1994).

[v] The regression result comparing the OLS and Two-stage least squares was not included in the paper for brevity. Readers who are interested in the results may request from it from the author.