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Ricardian Equivalence and Nigerian Economy: An Empirical Investigation

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Abstract

The Ricardian equivalence proposition posits that no relationship exist between the private consumption and the government deficit finance. That is private consumption will remain unchanged if the government finances its out lays by debt substitution. This paper examines how relevant this proposition is to the Nigerian economy. The unit root and cointegration tests were carried out to determine the order of integration of the time series data and the existence of long-run relationship between the variables. The regression results show that substitution of debt for tax to finance government budget deficit affect private consumption and national saving. The paper therefore, concludes that Ricardian equivalence does not hold for the Nigerian economy, probably due to implausibility of assumptions required for equivalence.

Keywords: Ricardian equivalence, Private consumption, Deficit finance, Saving, Growth

Introduction

Growth and persistence of fiscal deficits is a common macroeconomic features characterizing many advanced and developing countries in recent years. In most of these countries, government spending is usually financed by the revenue generated from taxation and other charges. Contrary to this is spending financed by debt which implies reduction in tax now, which could be increased in future to settle the debt. Thus, the public debt in the current period is usually accompanied by future increase in tax, which would be needed to service the debt. The central proposition of the Ricardian equivalence states that: it is economically equivalent to maintain a balanced budget or to run a debt-financed deficit, since the substitution of debt for taxes does not affect private sector wealth and consumption (Ricardo, 1951). In other words, if government finances its expenditure by debt, the private wealth and hence private consumption will not be affected because debt financing is perceived only as a change in the timing of taxation. It suggests that government spending finances by taxes or debt will have the same effect on private spending. This is because as government gets more indebted, individuals would save more money in expectation of higher taxes in the future (Grennes and Strazds, 2013). If consumers are

"Ricardian" they will save more now to compensate for the higher taxes they expect to face in the future, since government must pay back its debt. The increased government spending is exactly offset by demand consumption on the part of the public, so aggregate demand does not change (Quinn, 2009).

Under this same proposition, Ricardo also asserts that government spending financed by debt will affect government saving negatively and private saving positively in the same proportion, which however leave national saving unchanged. This is because cut in tax will increase the private saving as the excess income is saved to meet future increase in tax, while government saving will fall. The increase in private saving is equal to the decrease in government saving, and since the national saving is the sum of private saving and government saving therefore, national saving remains constant as debt is substituted for tax to finance government spending.

Since the inception of this proposition, its relevance has become area of concern as scholars and policy makers began to establish the empirical link between debt and private consumption (Quinn, 2009; and Grennes and Strazds, 2013 for recent literature). While some of the empirical studies reject the proposition (Jesus and Gerhard, 2007; and Vamvoukas and Gargala, 2008), others provide support for the proposition (Cheng, 1998; and Gianluigi and Ken, 2003). This shows that the survey of empirical tests of Ricardian Equivalence Proposition (REP) has demonstrated that the results are inconclusive. Also, most of these empirical evidences did not pay attention to the neutrality of substitution of debt for tax on national saving but rather concentrated more on private wealth and consumption. Therefore, there is need to re-assess the empirical analysis of the REP in Nigeria by examining the effect of substitution of debt for tax not only on private consumption but also on national saving. The remaining part of this paper is divided into four sections. Section two reviews the relevant literature and empirical studies; section three presents the model specification and methodology adopted for testing the Ricardian equivalence; section four deals with analysis and discussion of results; and the last section concludes the findings.

Literature Review and Empirical Studies

The phrase "deficit finance" means any public expenditure that is in excess of current revenues. It is used to describe the financing of a deliberately created gap between expenditure and revenue (Jhingan, 2001). Large fiscal deficits could be dangerous to financial system and macroeconomic variables. In some cases fiscal deficits can lead to inflation. Though central bank can make move to prevent such inflationary effects, but other unfavourable "real" effects cannot be avoided. It is also necessary to point out that deficit financing could still lead to high inflation, even if central bank pursue a sound monetary policy (Feldstein, 2004). To Feldstein, fiscal deficits are like obesity, the more severe the problem, the harder it becomes to correct the problem. This is because a large deficit and debt accumulated from increasing interest payment will trap the economy. Therefore, budget deficits need immediate attention even when their adverse effects are not obvious.

The Ricardian equivalence is based on some assumptions about the economic environment and the behaviours of economic agents. The assumptions are: full certainty about the path of future taxes and government budget policies, perfect capital market with no borrowing constraints, and equal planning horizon for private and public sectors (Leonardo and Mario, 1988). Given these assumptions, substitution of debt for tax to finance budget deficit will not affect private wealth and consumption. However, some scholars had advanced reasons why most developing countries might not be able to meet these pre-requisites, and as such any test of the Ricardian Equivalence Proposition (REP) for such countries might be expected to result in rejection.

Tobin (1980) among others argued that Ricardian equivalence is not likely to hold because of the implausibility of its assumptions. For instance, the absence of perfect capital market in developing countries is one of the reasons why REP could not hold. Consumers are expected to be credit rationed and governments are assumed to be better at producing credit services by borrowing from the rich and lending to the poor (Gianluigi and Ken, 2001). But this might not true for developing countries with capital market imperfection. Lopez, Schmidt-Hebbel and Serven (2000) argued that distortionary taxation gives rise to further effects of budget deficit on consumption and national saving. Changes in the time profile of distorting taxes can affect the consumption plans of forward-looking agents, even when the present value of taxes is left unchanged.

Tax payers and the economy respond to tax imposition and collection. Such responses can be of great variety and can profoundly affect the workings of the economy in terms of saving, investment, choice of techniques of production, growth, regional imbalances, inequalities of income and wealth (Bhatia, 1982). Thus, financing government expenditure through deficit (debt) will increase total demand in the market, prices will go up and the public will be able to buy less with the same money balances. Some individuals might not be able to leave positive bequest to their successors because of their prevailing low standard of living. Such individuals are likely to favour any tax cuts that increase their lifetime income at the expense of their descendants, and any such tax cuts will affect the consumption (Cukierman and Meltzer, 1986). Krugman (2011) argued that the doctrine is dubious because many people are liquidity constrained and that very few people have the knowledge of estimating the impact of current government budgets on their tax liability. Thus, any decrease in tax will affect level of consumption.

Concerning the assumption of full certainty about the future taxes, although it is possible to associate current tax cuts with future increase in taxes, but the type of tax to be increased, the exact timing, and the incidence of the tax across individuals are not certain (Leonardo and Mario, 1988). This uncertainty may lead to deviations from equivalence.

However, economists have divergent opinions on the effects of government debt and deficits on the economy, because there is element of controversy on the empirical evidence rejecting the REP. Some of the reasons for this controversy as

pointed out by seater (1993) are related to three limitations of the empirical evidence. First, low statistical power of some results were caused by the reduced sample period analyzed, simply because most large budget deficits were concentrated in the eighties and nineties. Second, the presence of some contemporaneous correlations does not imply the rejection of REP, if private agents take into account government actions in the long-run but not in the short-run due to some information problems. Third, it is possible that the reaction of private saving to public dissaving could be offset by different types of shocks.

David (2009) argued that failure of some of these theories arise from what economists call "inconsistencies". For Ricardian equivalence to have a chance, there must be homogeneity among the agents and policy makers in the economy which in actual fact does not exist. Therefore in real life situation, individuals are uncertain about their future lifetime and any cut in tax will lead to increase in individuals wealth and consumption. Thereby shifting future tax liabilities to later generation whose welfare is assumed not to affect that of the current generation (Leonardo and Mario, 1988). In this case the assumption of equal planning horizon for private and public is violated. Banzhat and Oates (2007) observed that Ricardian equivalence is more stronger in the setting of local public finance than in the national context. In the national setting, the equivalence between tax and debt finance depends upon intergenerational altruism as well as some quite strong information on assumptions. In the formal setting, the usual sorts of utility-maximizing behaviour in the context of mobile households are all that are required.

However, in developing countries like Nigeria, consumption reacts more strongly to current income than forward-looking theories predict. One of the major reasons for this is borrowing constraints usually faced by the consumers, which force them to a corner solution to their intertemporal optimization problem (Lopez, et al. 2000). As a result, consumers react to higher current disposable income by raising their consumption significantly.

Various empirical studies have been carried out on the relevance of Ricardian proposition both in the developed and developing countries. For example, Lopez et al. (2000) for developed countries rejected the proposition. Kaadu and Uuskula (2004) examined the relevance of the Ricardian equivalence in Estonia. They used Instrumental Variable Technique and Full Information Maximum Likelihood Method to estimate consumption equation and system of equation respectively. Their results could neither reject nor confirm the existence of Ricardian equivalence. Jessus and Gerhard (2007) tested REP for the EU – 15 countries using a theoretical model based on dynamic optimizing agents and an end-of-sample cointegration breakdown test, found that the proposition does not hold for those countries. Also Gerhard (2008) empirically tested REP for eleven New EU-member states and found that it cannot be rejected for four member states. In the extended model the relevance of the REP changes for six countries which implies that development of government debt and long-term sustainability of public finance matters with regard to the validity of the REP. Vamvoukas and Gargala (2008) tested Ricardian equivalence proposition by

examined the causal links between government deficits and interest rate in Greece. The results show that budget deficits exert positive effects on interest rate and inflation which is contrary to Ricardian equivalence proposition.

In the case of developing countries, Dalamagas (1992) rejected the REP for a sample of developing and developed economies. The results of the empirical test carried out by Ghatak and Ghatak (1996) show that REP did not hold in one developing country (India). Khalid (1996) was unable to reject the REP in 12 out of 17 developing countries included in his sample. In year 2003, Gianluigi and Ken assessed whether the Ricardian equivalence proposition holds in developing countries. They used panel data for ten developing countries including Nigeria, the results provide some tentative support for the REP. Onafowora and Owoye (2006) empirically investigated "twin deficit" phenomenon in Nigeria using cointegration and vector error correction techniques, Granger causality tests and generalized impulse response analysis. Their results reveal a positive relationship between trade and budget deficits in both short-run and long-run. The results also indicate unidirectional causality from trade deficits to budget deficits for Nigeria. The paper supports the conventional Keynesian twin deficits proposition and refute the Ricardian equivalence hypothesis.

3. Data Source, Model And Estimation Technique

3.1 Data Source

Time series data covering the period of 1978 to 2012 on some key macroeconomic variables are used in this study. These variables include: income, consumption, government debt, government tax, national saving and interest rate. The data for these variables were obtained from Central Bank of Nigeria Statistical Bulletin 2011 and 2012 editions.

3.2 Model and Estimation Technique

Theoretically, in Keynesian absolute income hypothesis, consumption is assumed to be partly autonomous and partly related to current income.

$$Conp_t = \alpha_0 + \alpha_1 y_t \quad \dots\dots\dots (1)$$

Where $Conp_t$ is consumption at time t and y_t is current income at time t .

Government spending can also affect consumption. It is usually financed by: either tax, debt or both. This means that the total government spending is equal to the sum of changes in government debt and tax revenue.

$$gs = govdt + govtx \quad \dots\dots\dots (2)$$

Where gs , $govdt$ and $govtx$ are government spending, change in government debt and government tax respectively. If equation 2 is incorporated into equation 1, we have

$$Conp_t = \alpha_0 + \alpha_1 y_t + \alpha_2 govdt_t + \alpha_3 govtx_t + u_t \quad \dots\dots\dots (3)$$

Equation 3 can be augmented by lagged real income, y_{t-1} , to reflect any incremental information, thus

$$Conp_t = \alpha_0 + \alpha_1 y_t + \alpha_{12} y_{t-1} + \alpha_2 govdt_t + \alpha_3 govtx_t + u_t \quad \dots\dots\dots (4)$$

*, ** denote significant at 1% and 5% level respectively

National saving is expected to respond to changes in level of income and rate of interest.

$$Nsav_t = f(y, intr) \dots\dots\dots(5)$$

Increase in level of income and interest rate is expected to have positive effect on the level of saving. If we include change in government debt and government tax into equation 5 as explanatory variables to test the neutrality of substitution of debt on national saving, our equation becomes:

$$Nsav_t = \beta_0 + \beta_1 y_t + \beta_2 intr_t + \beta_3 govdt_t + \beta_4 govtx_t + v_t \dots\dots\dots(6)$$

The regression results of equation 4 and 6 using non-stationary time series data may give spurious results and any policy made from such results might not be reliable. To avoid this problem, unit root test is employed to test the stationarity of the time series data used in this study. Cointegration test is also employed to test for the long run equilibrium relationship between the dependent variable and the independent variables. The existence of cointegration between the dependent variable and independent variables is a sufficient condition for the specification of a model that includes error correction factor (ecm). Thus the estimated equations are as follow:

$$\Delta Comp_t = \alpha_0 + \alpha_1 \Delta y_t + \alpha_{12} \Delta y_{t-1} + \alpha_2 \Delta govdt_t + \alpha_3 \Delta govtx_t + \alpha_4 ecm_{t-1} + u_t \dots\dots(7)$$

Where Δ denotes first difference, *Comp* is private consumption, *y* is current income proxy by real GDP, *govdt* is change in government debt, *govtx* is government tax, *ecm_{t-1}* is error correction factor and *u_t* is error term.

The estimated equation for saving function is:

$$Nsav_t = \beta_0 + \beta_1 \Delta y_t + \beta_2 \Delta intr_t + \beta_3 \Delta govdt_t + \beta_4 \Delta govtx_t + \beta_5 ecm_{t-1} + v_t \dots\dots\dots(8)$$

Where *Nsav* and *intr* denote national saving and interest rate. Others are as defined above.

For the Ricardian proposition to hold, we expect $\alpha_1, \alpha_{12} > 0$; $\alpha_2, \alpha_3 = 0$; and $\alpha_4 < 0$ for equation 7. It is expected that $\beta_1, \beta_2 > 0$; $\beta_3, \beta_4 = 0$ and $\beta_5 < 0$ for equation 8. Apart from the coefficient of *ecm_{t-1}* which is expected to be negative (-) and statistically significant to support the existence of cointegration, its magnitude defines the feedback mechanism among the cointegration variables. It also measures speed of adjustment toward the long-run equilibrium position.

Analysis and Discussion of Results

Analysis of Results

The result of the stationary test presented in table 1 reveals that all the variables employed were not stationary at levels, but stationary at their first difference. This implies that the variables were integrated of the same order I(1). The ADF and PP values of all the first difference variables are greater than the critical value at either 1 percent (-3.64) or 5 percent (-2.95) levels.

Table 1: Test for Order of Integration of Variables.

Variable	ADF		PP	
	Level	1 st Difference	Level	1 st
<i>Comp</i>	-0.065	-4.919*	0.140	-
4.930*				
<i>y</i>	-1.464	-3.812*	-1.521	-
3.810*				
<i>govdt</i>	5.738	-3.211**	6.357	-
3.027**				
<i>govtx</i>	-0.402	-11.078*	0.624	-
10.473*				
<i>nsav</i>	0.088	-6.663*	0.316	-
6.697*				
<i>intr</i>	-2.555	-6.511*	-2.412	-8.061*

*, ** denote significant at 1% and 5% level respectively

Table 2: Cointegration Test for Equation 7

Variable	ADF	Decision
<i>Comp on</i> <i>y, govbt & govtx</i>	-3.773*	Accepted

*, ** denote significant at 1% and 5% level respectively

The results of the cointegration test support the long-run relationship between the dependent variable (*comp*) and independent variables (*y*, *govdt* and *govtx*). As shown in table 2, the ADF value (-3.773) is statistically significant because it is greater than the critical value (-3.76). Thus private consumption and its explanatory variables are cointegrated. The results, as presented in Table 3, also reveal that cointegration exists between the national saving and its explanatory variables. It can be observed that ADF value (-4.709) is greater than the critical value (-3.76) which indicates that there is long-run relationship between the dependent variable (*nsav*) and the independent variables (*y*, *intr*, *govdt* and *govtx*).

Table 3: Cointegration Test for Equation 8

Variable	ADF	Decision
<i>nsav on</i> <i>y, intr, govdt & govtx</i>	-4.709*	Accepted

*, ** denote significant at 1% and 5% level respectively

Table 4: Long-run Regression Results for Equation 7

Variable	Coefficient and t-value
Constant	-34998.91 (-0.332)
y_t	1.07811 (4.018)*
y_{t-1}	1.76547 (8.117)*
$govdt_t$	-0.28809 (-1.029)
$govtx_t$	-0.566696 (-2.278)**
R^2	0.91
F	69.24

*, ** denote significant at 1% and 5% level respectively
t-values are in parentheses

The estimated coefficients of the long-run analysis of equation 7 is presented in table 4. The income (y_t) and lagged income (y_{t-1}) came out with expected signs and both are statistically significant. This indicates that increase in income increases consumption level. Government debt ($govdt_t$) is negatively related to consumption but statistically insignificant. Contrary to expectation, government tax ($govtx_t$) came out with negative sign and statistically significant at 5 percent level.

The results for the Error Correction Models (ECM) presented in table 5 shows that level of income (Δy_t) and lagged income (Δy_{t-1}) are positively related to consumption and both are statistically significant at 1 percent level. Government debt ($\Delta govdt_t$) is also positively related to consumption but statistically insignificant. Government tax ($\Delta govtx_t$) came out with negative sign and statistically significant at 5 percent level. This implies that an increase in government tax leads to decrease in consumption. The lagged ecm coefficient which is the most important component in the model, came out with expected sign and statistically significant at 5 percent level. This confirms the existence of a long-run relationship in the specified model.

Table 5: Short-run Regression Results for Equation 7

Variable	Coefficient and t-value
Constant	-50465.11 (-0.525)
Δy_t	0.686942 (3.728)*
Δy_{t-1}	1.368142 (5.217)*
$\Delta govdt_t$	0.079984 (0.323)
$\Delta govtx_t$	-0.098979 (-2.206)**
ecm_{t-1}	-0.365102 (-2.278)**
R^2	0.66
F	10.66

*, ** denote significant at 1% and 5% level respectively
t-values are in parentheses

The long-run estimated coefficients of equation 8 presented in table 6 shows that income (y_t) is positively related to national saving but statistically insignificant. The sign of interest rate variable ($intr_t$) does not conform with a-priori expectation. It came out with negative sign and statistically insignificant. Government debt ($govdt_t$) is positively related to national saving and also not statistically significant. Government tax ($govtx_t$) is negatively related to national saving and statistically significant at 5 percent level. This implies that increase in government tax leads to decrease in saving.

Table 6: Long-run Regression Results for Equation 8

Variable	Coefficient and standard
error	
Constant	1024639 (2.125)
y_t	1.4544 (1.196)
$intr_t$	-2844.088 (-0.661)
$govdt_t$	0.784291 (0.703)
$govtx_t$	-2.048415 (-2.093)**
R^2	0.45
F	2.9

*, ** denote significant at 1% and 5% level respectively
t-values are in parentheses

The short-run estimated results, as presented in table 7, reveal the existence of positive relationship between income (Δy_t) and national saving ($nsav_t$) but not significant. Interest rate ($\Delta intr_t$), government debt ($\Delta govdt_t$) and government tax ($\Delta govtx_t$) came out with negative signs. While interest rate and government debt are not significant, government tax is statistically significant at 5 percent level. The sign of the coefficient of ecm variable came out with negative sign as expected and the magnitude of its coefficient suggests a higher speed of adjustment towards long-run equilibrium.

Table 7: Short-run Regression Results for Equation 8

Variable	Coefficient and t-value
Constant	331491.3 (1.087)
Δy_t	0.402917 (0.659)
$\Delta intr_t$	-549.5582 (-0.703)
$\Delta govdt_t$	-0.176914 (-0.410)
$\Delta govtx_t$	-0.345610 (-2.681)**
ecm_{t-1}	-0.10873 (-2.845)**
R^2	0.63
F	3.74

*, ** denote significant at 1% and 5% level respectively
t-values are in parentheses

Discussion of Results

The above results show that level of income is a major determinant of consumption in Nigeria. The positive relationship indicates that increase in income increases consumption which conform with the Absolute Income Hypothesis propounded by Keynes. The negative relationship between government tax and consumption implies that an increase in government tax, will reduce the consumption level. This is because majority of Nigerians are low income earners with high marginal propensity to consume, therefore any change in tax will lead to change in the level of consumption.

The insignificance of income on national saving may be attributed to the fact that majority of Nigerians are poor. Their level of income is not enough to take care of their basic needs, as a result of this, increase in their level of income goes to consumption and little or none goes to saving. The negative impact of government

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tax on national saving does not support the Ricardian equivalence proposition, simply because of the implausibility of the assumptions required for the equivalence. The policy implication is that an increase in government tax will affect both consumption and national saving which is contrary to the Ricardian equivalence proposition.

Concluding Remarks and Recommendations

The evidence from this study reveals that substitution of debt for tax affect private consumption and national saving. This may be as a result of deviations from Ricardian equivalence assumptions. These deviations need not be attributed to irrationality or lack of full discounting of future tax liabilities by the public. The public may be rational, but due to the fact that majority of Nigerians are low-income earners couple with the stringent assumptions, change(s) in the tax will affect private behaviours and result in non-equivalence as far as Nigerian economy is concerned.

These findings have some relevance for fiscal policy. The existence of negative relationship between the tax and private consumption implies that government can adjust tax to influence private consumption in desired direction, most especially by decreasing the tax rate to encourage more consumption, aggregate demand, investment, output and income. It is therefore recommended that government should impose lower tax to encourage more consumption which in turn increases level of output as well as income due to rise in aggregate demand. Government should also look for other ways or sources of financing fiscal deficit instead of relying heavily on foreign debt, which however affects economy adversely. Foreign aids, grants, internal revenues etc are good examples.

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Abstract

Nigeria Demographic and Health Surveys (NDHS) have indicated that more than 15% of Nigerian girls become sexually active by the age of 15 and by 24 years of age, almost all live in Nigeria are sexually active. Incidentally, the majority of the adolescents are concentrated in secondary or high schools. This study provides a sociological account of adolescents' sexual and health preventive behaviours in non-proportionally selected secondary schools in Ilorin. Questionnaire was used to gather data from a total of 150 respondents. Data were analysed using descriptive and inferential statistics. The study found that more than half of the respondents (58.7%) were sexually active. 30.7% of them became sexually active before the age of 20 years. All sexually active respondents (100%) were carrying out sexual activities without the knowledge of parents and guardians, a clear indication of lack of or inadequate parent-child parent-child communication regarding reproductive health. The study found evidence of relationship between peer pressure and sexual initiation (χ^2 value: 34.916; critical value: 5.99 at 5% level of significance) as well as socio-economic status (SES) and sexual behaviour (moderator χ^2 value: 12.3; critical value: 2.65 at 5% level of significance). A significant number of the respondents (59.3%) were aware of the term STIs and how they can be contracted and controlled. However, 78% of the respondents were not aware of the immediate and long term health consequences of STIs. Nevertheless, a positive relationship was found between education and knowledge of STIs where the calculated chi square (17.6) was found to be greater than the critical value (3.84) at 0.01 level of significance and 2 degrees of freedom. The study has provided some guide for reproductive health leadership and governance in Secondary schools in Ilorin and Nigeria as a whole.

Keywords: Adolescents; Awareness; Behaviour; Sexually transmitted infections