PRIVATE SAVING BEHAVIOUR AND RICARDIAN EQUIVALENCE THEOREM: THE CASE OF TANZANIA

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ABSTRACT

The determinants of private savings in Tanzania for the period 1970-2005 are investigated, with emphasis on how the Ricardian Equivalence Theorem explains private saving behaviour in Tanzania. The relevance of this theorem was examined using two different empirical models. In Model 1, the theorem was tested using government budget deficit; in Model 2, the net revenue from the sale of bonds was used. The results varied between the two models. In Model 2, the theorem was found to hold both in the short run and long run; whereas for Model 1, it was found not to hold. Thus, based on the results of Model 2, the main determinants of private saving include budget deficit, inflation, liberalization of the financial sector and per capita income; however, liberalization of the financial sector was found to be statistically significant only in the long run.

Key Words: Private Saving, Ricardian Equivalence Theorem, Budget Deficit, long run, short run.

INTRODUCTION

In many developing countries, the fiscal deficit has become their characterizing feature. This problem is addressed differently by governments of these countries: some resort to printing money; others decide to sell bonds; and yet others choose to raise taxes. Financing deficits by printing money is a risky consideration in view of the attendant inflationary consequences. As a result, most governments concentrate on the rational alternatives, which is to choose between raising taxes and issuing debt.

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From a theoretical perspective, the consequences of postponing taxation are viewed differently by Keynesians and neoclassical theorists. The Keynesians examine the budget deficits from the short run perspective and posit that budget deficits are expansionary. Thus in the short run, postponing taxation would lead to stimulating the economy, thereby creating wealth. The untaxed amount (or tax cuts) would filter into increasing consumption, leading to increasing aggregate demand. The increase in aggregate demand, in addition to generating its own saving, would lead to higher capacity utilization, more employment and increased output; all these outcomes are realized as a result of putting to use unemployed resources (in the short run). The classical view is the opposite, arguing that in the long run postponing taxation is detrimental to capital accumulation, as it "crowds out" saving. This happens so because private saving is channelled to either investment or financing budget deficits. Thus at full employment (in the long run), if the budget deficits are increased by permanently cutting taxes, it would lead a reduction in the supply of capital to the economy, with the concomitant outcome being a fall in the standards of living.

As for public debt, Robert Barro questioned in 1974 whether government bonds are net wealth or not (Barro, 1974). He argued that if the government bonds are not net wealth, then changes in the composition of government expenditure finance will have no real effect on consumption. This neutrality of debt with respect to consumption has come to be popularly known as "Ricardian Equivalence", a term which refers to Buchanan's (1976) coinage to mean that "*debt and taxes have the same effect on private consumption (or private saving)".* Buchanan (1976) proposed that term, noting the closeness between Barro's (1974) proposition and the work of Ricardo in the nineteenth century which discussed whether it was preferable to finance a war via new government debt or via a temporary tax. Ricardo had concluded that there was no choice between them, since he considered debt as deferred tax to the future (Ricardo, 1820). Barro's (1974) question continues to be a subject of exploration in the literature, both theoretically and empirically.

This paper analyses the determinants of private saving in Tanzania for the period 1970-2005[i] and examines whether the Ricardian-Barro Equivalence is relevant for Tanzania. The two objectives are linked, since the understanding of the former is pertinent to the examining of the latter. The main argument of the Ricardian-Barro Equivalence Theorem, as already hinted at, is that increased government borrowing may not influence consumer spending, as is advocated by Keynesians[ii] because consumers expect that the tax cuts and higher spending in the current period will translate to equivalent future tax increases to pay back the borrowed debt. Thus, based on rational expectations hypothesis and income life cycle hypothesis[iii], consumers would decide to

save the amount equivalent to the tax cut with a view to meet future tax increases. Consequently, from a theoretical perspective, a decrease in government saving (indicated by current budget deficit) would lead to an offsetting increase in desired private savings; with the implication that it would lead to no change in desired national savings. Hence in theory, the existence of the Ricardian Equivalence implies eschewing from expansionary fiscal policy for stimulating aggregate demand (Barro, 1989). However, in practice, it is not certain as to whether this is the case.

Empirical studies with regard to the evidence on the applicability of the Ricardian Equivalence Theorem have utilized models of private saving behaviour; for example, by invoking the life cycle and permanent income hypotheses (Modigliani and Blumberg, 1954); and Friedman, 1957); or the theory of the infinitely-lived agent or the altruistically-linked consumers[iv] and use econometric techniques to test the theorem and explain the determinants of savings.

The findings across the studies differ markedly, which indicates that the applicability of the theorem is still moot and inconclusive. Whereas some studies support, though not fully, the existence of Ricardian Equivalence (for example, Drakos 2001; Loazya*et al*. 2000;Bandiera*et al.* 1999; Cardenas and Escobar, 1997);Raut and Arvind, 1989), others indicate the inexistence of Ricardian Equivalence (for example, Nwachukwu and Egwaikhide, 2007; Lopez-Majia and Ortega 1998; Haque, 1988). Moreover, with respect to the methodology, most of these studies have tested the theorem using cross-country data, mostly from the developed countries. Hence, their results do not easily compare with Tanzania, one of the Least Developed Countries (LDCs).

In Tanzania, for several years now the government has been borrowing increasingly from the private sector to finance the budget deficit[v], with the trend persistently increasing (Osoro, 1997). Parallel with increased government borrowing in both nominal and real terms has been an increase in private sector savings (BOT, various issues). The observed trend of private saving in Tanzania could be accounted to either the Ricardian Equivalence (that is, for offsetting future rises in taxes) or to other reasons, such as getting interest payments as a return on savings. Additionally, an understanding of factors that determine savings may contribute to the country's growth agenda, particularly if the factors involved are addressed, as to increase the rate of saving (Aghion*et al*, 2009; Levine and Renelt ,1992; and Solow,1956).

A search in the literature within our reach, with the objective of reviewing the applicability of the Ricardian Equivalence Theorem in Tanzania, did not show any study; hence, the paper is geared at reducing the gap in the analysis and slicing into the paucity of the studies on Tanzania in this regard. The determinants of saving and the

relevance of Ricardian Equivalence Theorem in Tanzania were examined using econometric methods, with two models. In Model 1, the theorem was tested using the government budget deficit; in Model 2, the net revenue from sale of bonds was used. The findings were different between the two models. The estimates were statistically significant mainly in Model 2, for which reason the model was adopted, and its estimates constitute the basis of the discussion of the results.

The paper is organized as follows: Section 2 describes the methodology for the study. Section 3 presents and discusses the results from the estimations. Section 4 provides concluding remarks.

Theoretical Framework: Saving and Ricardian Equivalence Theorem

Savings is defined as a portion of a person's current income (or household's income) that is not spent on current consumption (Raut and Arvind, 1989). Theoretically, saving behaviour is analysed in the broader context of household's behaviour, which strikes a balance between current and future consumption. Hence the determinants of saving are a component of the determinants of households' consumption behaviour.

In analysing households' consumption behaviour, three theoretical approaches have been widely used. These include the Keynesian consumption theory, the life-cycle-permanent-income hypothesis (with extensions; namely, the random walk hypothesis and the theory of the infinitely lived agent or altruistically linked consumers)[vi]. These theories differ in two aspects: one is in the extent to which they explain the observed consumer behaviour as well as their predictions regarding the effects of government policies on an individual's (or a household's) saving behaviour. The second is with regard to the effects of the government budget deficit on savings, and how the budget deficit is financed (Raut and Arvind, 1989).

In analyzing the saving (consumption) model, the infinitely lived agent (or altruistically linked consumers) accommodates directly the Ricardian Equivalence Theorem; whereas the Keynesian consumption theory and the life-cycle-permanent-income hypothesis do so implicitly (Evans 1988). Thus, this study adopts the former, following the model developed by Blanchard (1985), and modified for discrete terms by Evans (1988).

Blanchard (1985) and Evans (1988) assume that households face perfect capital and insurance markets, but have finite horizons, whereby a fraction μ of household members dies in every period. Thus, the aggregate consumption function is given as,

$$C_t = \alpha\left[(1+R_t)A_{t-1} + \sum_{i=0}^{\infty}(1-\mu)^i \beta_{it} E_t W_{t+i}\right] \text{,……………………………}(1)$$

where C_t is aggregate consumption during period t, A_{t-1} is the stock of assets at the end of period $t-1$ (or the market value of accumulated assets), R_t is the period t yield on real holding for assets carried over from period $t-1$, W_t is aggregate disposable wage income during period t, $W_t + R_t A_{t-1}$ is current disposable income, E_t is the expectation operator, conditional on the information known by households during period t, hence $\sum_{i=0}^{\alpha}(1-\mu)^i \beta_{it} E_t W_{t+i}$ is the expected present value of the future disposable wage income that will be received by current households, $\beta_{ot} \equiv 1$,

$$\beta_{it} \equiv \frac{1}{\prod_{j=1}^{i}(1+F_{jt})},\ i.>0 \text{,………………………………………………}(2)$$

F_{jt} is the forward real interest rate in period t on bonds, to be issued in period $t+j-1$ and that will mature in period $t+j$, and α is the marginal propensity to consume with respect to total wealth and satisfying $0<\alpha<1$ and μ, $0 \le \mu < 1$ is as explained before. If in Equation 1, $\mu > 0$, households discount taxes at a higher rate than they discount future interest income; that is to say, one unit of taxes in period $t+i$ has the present value $(1-\mu)^i \beta_{it}$, which is smaller than β_{it}, the present value of one unit of interest income. Then the aggregate budget constraint is given as,

$$W_t + R_t A_{t-1} = C_t + \Delta A_t \text{ ……………………………………………...…}(3)$$

where Δ is the difference operator.

Equation 3 states that, the aggregate disposable income $W_t + R_t A_{t-1}$ is spent either on consumption or on accumulation of assets[vii]. Solving for W_t in Equation 3 and substituting the derived expression in Equation 1, Equation 1 can thus be re-written as,

$$C_t = \alpha \sum_{i=0}^{\infty}(1-\mu)^i \beta_{it} E_t (C_{t+i} + \mu A_{t+i}) \text{……………………………………… }(4)$$

Consumption is therefore increasing in $E_t A_t, E_t A_{t+1}, E_t A_{t+2}, ...$, unless Ricardian Equivalence holds, which implies that $\mu = 0$. Otherwise, if $\mu > 0$, that is, the expected life of an agent is finite, the agent considers debt as net wealth; thus, the higher the households expect the future path of the government debt to be, *ceteris paribus*, the higher are $E_t A_t, E_t A_{t+1}, E_t A_{t+2}, ...$, and hence, the more the households will commit their incomes to consumption and the less they will save. It is implicitly assumed that in Tanzania, despite the absence of financial markets for some years within the period of the study, the sale of securities and bonds reflected the behaviour of the perfect capital market.

Empirical Model

To examine the determinants of saving in Tanzania and to test for the existence of Ricardian Equivalence Theorem, two different econometric models were specified and tested[viii]. Model 1 was specified as follows:

$$S = f(S_{t-1}, y_t, g, \pi, BD, LIB) \quad \text{.....(5)}$$

where,

S is private saving, measured as gross national disposable income less household consumption;

S_{t-1} is a measure of persistence. Evidence shows that private saving is highly serially correlated; thus, the effects of a change in any determinant of saving are fully realized only after a number of years (Loayza*et al.* 2000). The lagged private saving rate is intended to capture the long-term policy effects;

y_t is a measure of income; in this paper it is the level of real per capita income that is used. Empirical evidence shows that the relationship between income and the saving rate is positive (Denizer and Wolf, 1998)) and that the impact is greater in the developing countries than in the developed countries (Nwachukwu and Egwaikhide, 2007).

g is a measure of growth. Evidence from the empirical literature with regard to the effect of growth on saving is not conclusive. Some studies have found the relationship to be negative; that is to say, growth implies higher future incomes, hence a reduction in saving (Nwachukwu and Egwaikhide, 2007). Others have found the effect to be ambiguous, depending on who benefits the most from income growth; how large are their earnings; and on the extent of the borrowing constraint (Bandiera*et al*. 1999; Deaton, 1991). Yet other studies show a negative relationship (Cardenas and Escobar, 1997). In addition, it is possible to have a reverse causation in that saving

could be a cause for higher growth (Loayza*et al.* 2000). To control for the simultaneity problem, Loayza*et al.* 2000) use the Instrumental Variables method. However, Edwards (1995) cautions about the difficulties of obtaining appropriate instruments to control for the problem.

$\inf$ is a measure of uncertainty, which in this paper is proxied by the inflation rate. It is theoretically predicted that the greater the uncertainty, the higher will be the saving, through the precautionary motive (Nwachukwu and Egwaikhide, 2007). However, the reviewed empirical evidence points to the inconclusiveness of the findings. Whereas some studies have found a positive relationship (Nwachukwu and Egwaikhide, 2007), others have found a negative relationship (Denizer and Wolf 1998; Cardenas and Escobar (1997; Corbo and Schimidt-Hebbel, 1991).

BD is a measure of fiscal policy and government saving, which in this study is proxied by the budget deficit. The budget deficit has widely been used in empirical studies as a measure of the existence of the Ricardian Equivalence Theorem. The variable BD combines intertemporal budget constraints for both the consumers and the government. From the definition of Ricardian Equivalence Theorem, it is expected that a permanent rise in government saving (i.e., budget deficit) will be fully offset by a corresponding reduction in private saving, as discussed in Section 1.

LIB is a measure of the liberalization of the financial sector. The literature points to two effects of financial liberalization on private saving. The first is the short-run impact, which is generally negative; the second is the long run impact, which is generally positive (Loayza*et al.* 2000). However Bandiera*et al.* (1999) found in their cross country analysis the relationship to be ambiguous. In this paper, financial liberalization was proxied by credit to the private sector, for lack of appropriate information to represent the variable.

As for Model 2, following Drakos (2001), it is specified as follows:

$$sav = f(borr) \qquad \text{……………………………………………….(6)}$$

where sav is private savings, which is proxied by private sector bank deposits (i.e., saving deposits, time deposits and foreign currency deposits) and $borr$ is the government deficit, which is proxied by domestic government borrowing; this is estimated by the amount collected from sale of bonds to non-bank agents. According to Drakos (2001), domestic government borrowing helps the analysis to focus on the exact saving behaviour of domestic households. This is because domestic borrowing ignores external borrowing.

Model 2 follows from the argument by Nickel and Vansteenkiste (2008) that Ricardian or Keynesian behaviour is partly explained by the government debt to GDP ratio. They contend that if the debt ratio is high, and the fiscal situation becomes increasingly unsustainable, then it would lead to further increases. In view of this situation, consumers are incentivized to save more if the government dis-saves, so as to be able to meet likely future tax increases. Thus, a fiscal stimulus is offset or even overcompensated by higher private savings. This study hypothesizes that a positive relationship between government domestic borrowing and private saving provides evidence of the existence of Ricardian Equivalence Theorem (as in Drakos, 2001).

It should be noted that the appropriateness of measuring Ricardian Equivalence using the budget deficit is predicated on examining the effects from the perspective of government saving. However, it does not give a clear relationship of private saving and household behaviour, particularly with regard to the purchase of debt instruments from the government. In this model, private sector bank deposits are used as a proxy on the assumption that the households that are able to save their money in banks are not financially ignorant. Hence, they are assumed to participate also in the bonds market.

Data

The study used annual secondary data on the variables included in the estimated models. These variables were presented and explained in the previous section. The analysis spans the period 1970–2005; hence the data on these variables cover the same period. They were obtained from three sources, since the researchers could not find a single source that constitutes all the data on the utilized variables. These sources include the following.

1. International Monetary Fund's *International Financial Statistics* (IFS) 2009 CD-ROM: The IFS is a compilation of financial data collected from various sources, covering over 200 countries worldwide, Tanzania inclusive. The compilations are published monthly by the International Monetary Fund (IMF). The data obtained from IFS for this study include gross national disposable income and household consumption.

2. The Bank of Tanzania, *Annual Operations Report* (1980, 1985, 1990, 2000, 2012): This series of reports is published annually by the central bank, the Bank of Tanzania (BOT), and contains data on many macroeconomic variables for the economy. Thus, the study obtained from the reports annual data on inflation, budget deficit, private sector credit, bank deposits, and domestic borrowing.

3. United Republic of Tanzania, *Economic Survey* (1975, 1983, 1990, 1998, 2000, 2005, 2009) was the final source, for the per capita income data.

The summary statistics of the variables are presented and discussed in Section 6.1 and Section 6.2; whereas correlation coefficients of the variables are shown in the Appendix, in Table A1 and Table A2. The correlation coefficients did not indicate any preliminary threat of multicollinearity.

ESTIMATION OF THE MODELS AND ANALYSIS OF RESULTS

Since the models involved utilized time series data, this section presents the results and analysis of the estimations of the econometric models as well as results from analysis of the time series properties of the variables. As a caveat, the interpretation of these results should be seen in light of the variables included (and the chosen proxies), the model themselves (including their mathematical formulations), the state of the economy, and the quality of the data used, as is generally the case with any model.

Results of Properties of Time Series Data

The properties of time series data were ascertained prior to estimating the two models. The order of integration of the variables was determined using the Augmented Dickey Fuller (ADF)[ix] test and the Phillip-Perron (PP) test. The unit root results show that all the variables are cointegrated of order one[x]. The results of Unit root tests of the variables in log levels are presented in the Appendix in Table A4. Also, Granger causality test results indicated that there was no reverse causation, hence justifying using normal Ordinary Least Squares (OLS) estimation technique. The results of the unit root test[xi] allow for the direct estimation of the cointegration regression. The Engle-Granger (two-step) single[xii] equation procedure for cointegration analysis was used; as it was deemed appropriate for preserving the degrees of freedom. In addition, the Johansen (1988, 1991 and 1995) procedure is used, though its interpretation has been taken with caution, in view of the small sample size.A summary of the results for cointegration tests on the residuals of the determinants of private savings is presented in Table 1. Overall, the results of the computed Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test support cointegration between private savings and its fundamentals. The results of the Johansen Procedure on Model 1 (Table A3 in Appendix) show existence of cointegration and one cointegrating vector, thereby justifying the use of Engle-Granger single equation procedure. The presence of cointegration implies that the regression of non-stationary series in their levels yields meaningful (i.e., not spurious)[xiii] results and can be interpreted directly as long-run relationship between private saving and the explanatory variables. In addition, the Error Correction Model (ECM) was estimated for *ls* Model (Equation 5), with a view to capture the effect of the variables on short run saving behaviour.

Table 1: Results of Cointegration Tests between Private Saving and Explanatory Variables

Engle-Granger Test for Cointegration				
	Model 1 'a'		Model 3 'b'	
ADF Test on residuals	-4.178*	I(0)	-3.369	I(0)
Phillip-Perron Test on residuals	-21.787*	I(0)	-17.373	I(0)

Note: * denotes significance at the 1 percent levels
'a' uses Equation 5.
'b' uses Equation 6.

The lag length of one in the over parameterized model[xiv] was used, and the preferred model was achieved using Hendry's procedure of "General-to-Specific modelling" by dropping the variables that were mostly not significant and not consistent with the theory; as well, the diagnostic tests on the estimated equations were conducted. The specified equations were estimated by Ordinary Least Squares (OLS), using STATA 11.

Results and Analysis of the Empirical Models

The results for all the three models estimated; namely, the ls Model (Equation 5), the Dls Model (the ECM for ls Model), and the $lsav$ Model (Equation 6) are summarized in Table 2. As shown in Table 2, the variables (taken together) explain 98.9 percent, 61 percent and 89.2 percent of the variation in private savings, for ls Model, Dls Model and $lsav$ Model, respectively. Furthermore, the results in ls Model tend to not lend support to the existence of the Ricardian Equivalence Theorem in Tanzania. The coefficient on the variable BD (i.e., budget deficit) is positive and statistical significant at 5 percent level, which implies that people in Tanzania do not consider substitutability between private savings and government savings. These findings tend to reflect the reality of countries like Tanzania, where very few people consider their consumption decisions based on government policy direction. Similar results were obtained with the Dls Model, which implies that even with consideration of the short-run effects, the Ricardian Equivalence Theorem does not hold. Other studies in Africa, for example, Nwachukwu and Egwaikhide (2007) using Nigerian data found similar results.

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Table 2: Different Estimated Models of Private Saving in Tanzania

Variable	ls	Dls	lsav
s(L1)	5.196e-07		
inf	-0.0303***		
bd	9.072e-07		
llib	1.079***		
g	-0.0069		
yt	-0.00039		
inf(D1)		-0.0133	
bd(D1)		5.359e-07***	
llib(LD)		0.1141	
g(LD)		0.016	
yt(D1)		0.00038**	
resid1(L1)		-0.3033*	
lborr			1.232***
cons	1.326	0.199***	0.513
r2	0.991	0.6813	0.8959
r2_a	0.9891	0.6104	0.8928
rmse	0.2408	0.1213	0.8762
F	515	20.28	168.93
N	35	34	35
legend	*p<0.05	**p<0.01	***p<0.001

In countries where a large segment of households are considered to be financially literate, the results tend to support the existence of Ricardian Equivalence Theorem. However, in the *lsav* Model, the rate of change of borrowing variable is greater than 100 percent, which may imply that people are not only influenced by government policy action, but also by other fundamental issues such as current family obligations. Yet it can still be concluded that government bonds are net wealth.

Other statistically significant determinants of private saving in the long run (i.e., *ls* Model) are inflation, liberalization, and income per capita. In the short-run, however, the variable for the liberalization of the financial sector, llib, is not statistically significant, whereas inflation and income per capita remain statistically significant. Inflation was found to be negatively related to private saving in both the long-run and the short-run. These findings may be interpreted to mean that Tanzanian people care less about precautionary saving; and with regard to inflation, the results are not exceptional, as they share commonality with Denizer and Wolf 1998, Cardenas and Escobar, 1997; and Corbo and Schimidt-Hebbel, 1991).

Income per capita was found to be negatively related to private savings in the long-run, and positively related to it in the short-run. The long-run results with respect to income per capita imply that when income increases, people care less about saving, despite the expanded income base. This may partly be explained by the long-run influence of inflation on private savings, especially through the channels explained in Nwachukwu and Egwaikhide (2007). In general, the results indicate that people in Tanzania tend to care less about saving, particularly when they gauge a high likelihood of higher income flows. However, in the short-run, the results show that people tend to save, perhaps because of uncertainty about future incomes. The positive coefficient on income per capita was also obtained by Nwachukwu and Egwaikhide (2007).

Liberalization of the financial sector variable was found to be statistically significant and positive in the long run, as would be expected from theory; that is, a reduction of financial constraints may lead to increase in private savings in the long-run since financial products such as M-PESA and other different modalities of saving will be readily available. For the short-run effects, the variable is not statistically significant. This is not surprising, especially when we consider the short span of financial liberalization in Tanzania. The coefficient of lagged saving rate also show that the long-run effects of the determinants of private saving have no significant difference with their respective short-run effects. Finally, GDP growth was found to be statistically insignificant, implying that it tends to be not important in influencing saving behaviour in Tanzania.

The error correction term (in the *Dls* Model (Table 2) is highly statistically significant and negative, which implies that any deviation of saving from the long-run equilibrium is corrected and the equilibrium maintained.

Post estimation model specification tests were considered, and none of the diagnostic tests conducted suggested misspecification of the models. The F statistics for the three models are all statistically significant, implying that the models are correctly specified. Finally, the robust errors were estimated for *ls* Model to correct for heteroskedaticity.

CONCLUSION

This study investigated the determinants of private savings, with a view to establish the existence (or inexistence) of Ricardian Equivalence Theorem in Tanzania for the period 1970-2005, by utilizing two empirical models, estimated by Ordinary Least Squares (OLS). It was found that cointergration existed among the variables in the estimated equations; that the main determinants of private saving in the long run include budget deficit, inflation, liberalization of financial sector, and income per capita. In the short run, the same variables, except liberalization of the financial sector were again found to be statistically significant. The findings with regard to the existence of Ricardian Equivalence Theorem differed between the two models. The theorem was found not hold with respect to the budget deficit model (ls Model), whereas it was found to hold with the savings model (*lsav* Model) in the long-run specification.

The results of the study were found to share commonality with those conducted elsewhere under more-or-less similar settings; for example, in other Sub-Saharan Africa countries, as already discussed in the analysis. Based on theories of consumption and saving, it was expected *a priori* that the government taxation and borrowing behaviour in Tanzania should impact on current and future saving and consumption decisions. However, the evidence from this study indicates that there is no trade-off between private saving and government saving; which implies that peoples' consumption behaviour in Tanzania is not influenced by government policy direction with respect to taxes and debt, both in short run and long run. Thus, the precautionary motive of saving seems not to influence the saving behaviour of the Tanzanian people. Hence, the Ricardian Equivalence Theorem is indicated not hold. In view of these findings, it is recommended that the government should take a cautious approach if it has to use fiscal policies for stimulating private consumption or saving, as they may not deliver on the expected outcome.

Due some deficiencies in the data set, the length of the period covered and proxies used, these findings should be interpreted with caution. Future research should attempt to address these limitations, which may lead to some improvement in the findings.

To enhance the findings, this study recommends that future research should attempt to use varied approaches to test the Ricardian Equivalence and compare and contrast the results, for robustness. Other models that could be examined include, for example the Keynesian approach (e.g., Modigliani et al. 1985, 1989) or the Bayesian Approach (Croda, 1992). Secondly, future studies may need to re-examine the effect of financial literacy on the Ricardian Equivalence with updated data, in view of the developments that have occurred in the financial sector in Tanzania in the recent years. It is evidenced from the empirical literature that the Ricardian Equivalence proposition tends to be ascertained when the proportion of the population that is financially literate is large. In Tanzania, the financial sector reforms from the 1990s are likely to have impacted positively on the reach and level of financial literacy as to reflect on the Ricardian Equivalence.

REFERENCES

Aghion, P, C. Diego, P. Howitt, and I. Tecu (2009), "When Does Domestic Saving Matter for Economic Growth?", Harvard Business School Working Paper Series, No 80.

Bandiera, O, Gerard. C, Jr., Patrick. H and Schiantarelli, F (1999), "Does Financial Reform Increase or Reduce Saving?, Policy Research Working Paper, No. 2062. World Bank

Barro, R. (1974), "Are Government Bonds Net Wealth?" Journal of Political Economy, Vol.82, pp. 1095-1117.

Barro, R. (1989), "The Ricardian Approach to Budget Deficits," Journal of Economic Perspectives, Vol. 3, No. 2, pp. 37-54.

Blanchard, O. (1985), "Debt, Deficits and Finite Horizons," Journal of Political Economy, Vol. 93, 223-247.

Blanchard, O and S. Fisher (1989), Lectures on Macroeconomics, MIT Press, Cambridge, Chapter 2.

Buchanan, J.M. (1976),"Barro on the Ricardian Equivalence Theorem", Journal of Political Economy 84:337 – 342.

Burnside. C (1998), "Private Saving in Mexico, 1980-95" A draft paper completed by author as National Fellow at Hoover Institution, Stanford University. September.

Cárdenas, M and Andrés, E (1997), "Determinants of Savings in Colombia 1925-1994" Inter-American Development Bank Series, No 310

Corbo, V and Schmidt-Hebbel, K (1991), "Public Policies and Saving in Developing Countries" Policy Research Working Paper, No. 574, World Bank, January

Croda, E. (1992). "The Impact of Fiscal Policy and Inflation on National Saving: A Bayesian Analysis of the Italian Case", *RicercheEconomiche*, 46, 191-220.

Deaton, A. (1991), "Saving and Liquidity Constraints" Econometrica, Vol. 59, No. 5, pp. 1221-1248

Denizer, C., and Wolf, H.C. (1998), "Aggregate Savings in the Transition" Saving Across the World Project Paper, World Bank, December

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

Edwards, S. (1995), "Why are Saving Rates so Different across Countries: An International Comparative Analysis" NBER Working Paper Series, No. 5097, April

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

Friedman, M. (1957), "The Permanent Income Hypothesis" in M. Friedman (Ed), A Theory of Consumption Function, Princeton University Press, pp.20 – 37.

Greene, W. H. (2002), Econometric Analysis, Fifth Edition, Prentice Hall: New Jersey

Gutiérrez, M. (2007), "Savings in Latin America after the mid-1990s: Determinants, Constraints and Policies", Economic Development Division, Series 57

Haque, N. U. (1988), "Fiscal Policy and Private Sector Saving Behaviour in Developing Economies" IMF Staff Papers, Vol. 35, No. 2, pp. 316-335, (June)

Johansen, S (1995), "A Statistical Analysis of Cointegration for I(2) Variables" Econometric Theory, Vol 11, pp. 25-59.

Johansen, S (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models" Econometrica, Vol 59, pp. 1551-1580

Johansen, S (1988), "The Mathematical Structure of Error Correction Models" Contemporary Mathematics, Vol. 80, pp. 359-386

Levine, R. and D. Renelt (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions", American Economic Review, Vol. 82, pp. 942-963

Loayza, N., Klaus S., and Luis S (2000), "Saving in Developing Countries: An Overview" The World Bank Economic Review, Vol. 14, No. 3: pp. 393–414

Loayza, N. and Shankar, R (2000), "Private Saving in India" The World Bank Economic Review, Vol. 14, No. 3: pp. 571-94

Lopez-Majia.A, and J.R. Ortega (1998) "Private Saving in Colombia" IMF Working Paper, No. 171, December

Modigliani, F and R. Brumberg (1954), "Utility Analysis and Consumption Function: an Interpretation of Cross Section Data" in Kurihara, K. K., editor, Post Keynesian Economics, New Brunswick: Rutgers University Press.

Modigliani, F. and Jappelli, T. (1987), "Fiscal Policy and Saving in Italy", in Boskin, M.J., Flemming, J.S. and Gorini, S. (eds.), *Private Saving and Public Debt*, Basil Blackwell, Oxford.

Modigliani, F., Jappelli, T. and Pagano, M. (1985), "The Impact of Fiscal Policy and Inflation on National Savings: The Italian Case", *BancaNazionaledelLavoro Quarterly Review*, 153, 91 - 126.

Nwachukwu, T. E., and Egwaikhide, F. O. (2007), "An Error-Correction Model of the Determinants of Private Saving in Nigeria", A Paper presented at the African Economic Society (AES) Conference, Cape Town, South Africa, July

Nickel C. and I. Vansteenkiste (2008), "Fiscal Policies, the Current Account and Ricardian Equivalence", European Central Bank, Working Paper Series No. 935/September

Osoro, N. (1997),"Public Spending, Taxation and Deficit" AERC Research Paper, No. 62.

Phillips, P.C.B and P. Perron (1988), "Testing for a Unit Root in Time Series Regression", Biometrika, Vol. 75, 335–346

Raut .L. K. and Arvind .V (1989), "Determinants of Consumption and Savings Behaviour in Developing Countries" The World Bank Economic Review, Vol. 3, No. 3 (Sep.), pp. 379-393

Ricardo, D. (1820). "Funding System", in *The Works and Correspondence of David Ricardo*, in Sraffa, P. (ed.) (1951), Cambridge University Press, Cambridge.

Romer, D (2005), "Advanced Macroeconomics", Mcgraw-Hill Higher Education

Solow, R.M (1956), "A Contribution to the Theory of Economic Growth" Quarterly Journal of Economics, Vol. 70, pp. 65-94.

APPENDIX

Table A1: Summary Statistics

Variable	Obs	Mean	Standard deviation	Min	Max
ls	36	11.38	2.35	7.91	14.94
lsav	36	10.31	2.66	6.29	14.59
bd	36	-224836.1	443543.3	-1968362	-100
lborr	36	7.93	2.03	5.03	12.83
llib	36	10.61	2.15	7.2	14.15
inf	36	18.91	11.33	1.4	35.8
g	36	3.88	2.09	-2.4	6.8
lyt	36	7.63	0.21	7.13	8.05

Table A2: Correlation Coefficients

Variables	ls	lsav	bd	Lborr	llib	inf	g	lyt
ls	1							
lsav	0.99	1						
bd	-0.67	-0.69	1					
lborr	0.94	0.94	-0.81	1				
llib	0.98	0.98	-0.66	0.93	1			
inf	-0.14	-0.13	0.52	-0.2	-0.45	1		
g	0.37	0.32	-0.46	0.38	0.35	-0.43	1	
lyt	0.36	0.31	-0.6	0.4	0.34	-0.64	0.48	1

Table A3: Cointegration Test using Johansen Procedure (Model 1

Johansen Tests for Cointegration

Trend: Constant				No. of Obs: 34	
Sample: 1972-2005				Lags: 1	
Max Rank	Parm	LL	Eigen Value	Trace Statistic	1% Critical Value
0	7	-1272.7	.	170.3	133.5
1	20	-1231.9	0.9092	88.79*	103.1
2	31	-1215.8	0.6125	56.56	76.1
3	40	-1201.1	0.5794	27.11	54.5
4	47	-1193.5	0.3615	11.85	35.7
5	52	-1189.8	0.1964	4.42	20
6	55	-1187.6	0.1178	0.16	6.65
7	56	-1187.5	0.0048		

Table A4: Unit Root Test

	1. TEST FOR UNIT ROOT ON THE LEVEL SERIES					
	Model 1		**Model 2**		**Model 3**	
	Constant& Trend		Constant& No Trend		No Constant& No Trend	
Variable	ADF	PP	ADF	PP	ADF	PP
lsav	-1.656	-5.686	-0.035	0.130	1.471	0.773
lborr	-2.777	-24.320	0.317	-0.071	1.983	0.919
lsav	-2.222	-8.778	-0.310	-0.072	3.416	0.595
lyt	-2.265	-6.360	-2.055	-5.294	0.414	0.052
g	-2.732	-20.819	-2.223	-18.135	-0.647	-2.774
llib	-2.199	-5.974	-0.434	-0.103	2.618	0.633
inf	-1.752	-5.327	-1.526	-5.386	-0.703	-1.145
bd	2.942	11.247	3.869	11.399	4.187	11.364

	2. TEST FOR UNIT ROOT ON THE FIRST DIFFERENCE SERIES					
	Model 1		**Model 2**		**Model 3**	
	Constant& Trend		Constant& No Trend		No Constant& No Trend	
	ADF	PP	ADF	PP	ADF	PP
lsav	-1.981	-25.886	-2.009	-25.818	-0.357	-1.083
lborr	-5.583	-41.125	-5.358	-40.450	-4.237	-37.940
lsav	-3.970	-30.731	-4.066	-30.757	-1.998	-12.789
lyt	-3.445	-23.751	-3.352	-22.858	-3.370	-22.568
g	-6.882	-46.017	-6.602	-45.769	-6.708	-45.754
llib	-3.198	-21.810	-3.250	-21.817	-1.753	-9.455
inf	-5.236	-39.069	-4.625	-36.390	-4.701	-36.390
bd	-1.855	-13.100	-0.748	-5.663	-0.348	-3.185

End Notes

[i] The choice of the period was influenced by the availability of data.

[ii] For the details of the Ricardian Equivalence, see Romer (2005).

[iii] See Romer (2005).

[iv] See Blanchard and Fisher (1989).

[v] Prior 1994, due to absence of financial markets, government borrowing from the private sector was through non-market debt instruments, mainly stocks and special bonds. Following liberalization of the financial sector from the early 1990s onwards, the government resorted to issuing bonds.

[vi] For details of these theories, see Romer (2005).

[vii] When assets are accumulated, they can be regarded as savings or could be bequeathed to the next generation.

[viii] The empirical literature is awash with determinants of private savings. However, the choice of the variables for this paper was dictated by pragmatism with regard to the available data. The sample size in this paper contains 36 observations only, which is not large enough to support the estimation of a large number of parameters without a compromise in terms of the loss of the degrees of freedom. This limited the choice to few explanatory variables. The choice of the variables in the models was guided by the reviewed literature; and the sample period depended on the availability of data.

[ix]The ADF (see Green, 2002 for details) and PP (Phillip and Perron, 1988) tests are estimated using three models, the models are presented as $\Delta Y_t = \alpha + \lambda t + \delta y_{t-1} + \sum_{i=1}^{i} \phi_i \Delta y_{t-i} + \varepsilon_t$, with Model 1 estimated with Constant and Trend, Model 2 estimated with Constant but no Trend and Model 3 estimated with no Constant and No Trend. The lag length i is set to ensure that any autocorrelation in ΔY_t is absorbed. This augmented specification is then used to test the hypothesis that: $H_0 : \delta = 0, H_1 : \delta < 0$. In order to reflect the additional dynamics of the data and to ensure that the error term is white noise, and given the few observations, the ADF test was run on two lags and insignificant lags were systematically eliminated using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) to finally establish the optimal lag length. The optimal lag length was found to be one in most of the variables in their levels and their differences.

[x] A further look at the graphical trend of the data, all the variables show a non-stationary trend despite the fact that the ADF and PP show that some variables are stationary at levels, in some models. We decided to pick the results of the first difference basing on that reason. In cases of contradicting results we decided to base on PP results since the PP takes care of structural breaks.

[xi] That the variables are Integrated in the same order

[xii]The test advocates the use of ADF and PP tests of the following kind: $\Delta\varepsilon_t = \mu\varepsilon_{t-1} + \sum \mu_i \Delta\varepsilon_{t-1} + \mu + \delta_t + \omega_t$ where $\omega_t \sim IID(0, \sigma^2)$, if the residual is stationary (I(0)) then the variables are cointegrated.

[xiii] Results are termed "Spurious" results if the conventional t-test tend to indicate a relationship between the variables when there is none.

[xiv] The preferred lag length was decided using the AIC criterion (Ref.) and it passed the lag reduction. Given limited observations, we started with lag 1.