Are Pakistani Consumers Ricardian?

Muhammad Waqas and Masood Sarwar Awan

Department of Economics, University of Sargodha, Pakistan

2011

Are Pakistani Consumers Ricardian?

Muhammad Waqas, Masood Sarwar Awan[1]

Abstract

The purpose of this study is to check the Ricardian Equivalence Hypothesis in case of Pakistan by using annual data for the period of 1973-2009. Government expenditure, private consumption expenditure, tax revenue, government debt, disposable income, government budget deficit and wealth are the variables which are used for analysis. Cointegration results show a long run relationship among the variables. Results of structural form consumption function invalidate the Ricardian Equivalence Hypothesis in case of Pakistan. These results draw attention towards the significance of fiscal policies in boosting private consumption and controlling budget deficits, which are the prime goals of stabilization policies in Pakistan.

Key words: Fiscal policy, Ricardian Equivalence, Government debt.

JEL Classification: E62, E21.

1. Introduction

In last decades most of the developing and developed economies are plagued by the budget deficits and government debt. These issues have fascinated the attention of public and politicians towards the minimization of government debt and reduction of budget deficit. In case of budget deficit government can finance its spending by three alternative ways; print new money, raising taxes and borrowing. Every option has its own consequences. Assume that government preferred borrowing to fulfill their needs instead of printing money and raising taxes. There are two schools of thought, regarding the relationship between government debt and private consumption.

Two centuries ago David Ricardo (1772-1823) introduced a theory regarding the relationship between public deficit and private savings which has been invigorated by Robert Barro (1974) and hence called Ricardian Equivalence Hypothesis (REH). The REH

1 |Authors are the Graduate Student and Assistant Professor at Department of Economics, University of Sargodha Pakistan, respectively.
E-mail: economist147@hotmail.com

states that consumer deals government debt as future tax liabilities. Thus they are of view that reduction in taxes will not increase their consumption expenditure (aggregate demand will unaffected) but that will increase their savings because they believe that present borrowing will increase future tax on their generations. Consumers do this because after the maturity of borrowing government has to pay borrowing amount plus rate of interest so government imposes new taxes on their generation. Thus in order to protect new generation from these taxes consumers buys bonds and does not consider them as a net wealth. Hence private savings increase by same amount as budget deficit and national savings remain unaffected and there will be no crowding out of private investment[2]. Opponents of this theory, the Keynesians, are of view that consumers do not treat government bonds as a net wealth. On the response of tax cut consumers private consumption will increase (aggregate demand increases) and private saving will remain unaffected because consumers prefer present on past and does not consider the welfare of their generations in their mind. Hence fiscal policy can affect the national output. These two approaches actually tell about the effectiveness of fiscal policy. If consumers are Ricardian fiscal policy is ineffective and if they behave like Keynesian fiscal policy is effective, but all this influence depends how consumer treat government debt in the context of net wealth. Therefore in order to design stabilization program a comprehensive research on the issue of REH is very essential. Few studies highlight this issue in case of Pakistan and each of them has own limitations. This paper serves as an attempt to extend the existing area of this research. Emphasizes is given to the use of less restrictive model for the investigation of REH.

The rest balance of paper is designed as: part two explains the specification of the model, part three explains the variables and data sources, part four discuss the empirical methodology, part five investigates and interprets the empirical results. Finally, part six presents the conclusions of the study and also provides some policy implications.

---

2 REH holds number of assumptions that must be satisfied for its validity (Giorgioni and Holden, 2001). Like taxes and bonds must be perfect substitute, taxes must be used to pay interest on the debt, consumer invest same rate as government invest and consumer have perfect information about future and taxes are lump sum.

Diamond (1965) said that this will be only possible if consumer lives forever, if consumer realizes that government will collect the tax after his death his consumption pattern definitely will changed.

Bernheim (1987), King's (1983) and Con and Jappeli (1990) results showed that consumer's behavior is changed due to liquidity constraints. Feldstein (1988) said that uncertainty in parent's future income fails REH.

2. Specification of the Model

There are two types of consumption function, discussed in the literature, to check the validity of REH. After discussing those studies that extended the consumption function models, methodology for the present is discussed. REH can be checked by using two forms of consumption functions, Structural consumption function and Euler equation consumption function. Several studies validate REH[3] and several invalidate[4] it. For now structural consumption function is use to check the validity of REH and Euler equation consumption is on future agenda for researcher.

2.1 Structural Consumption Function

Ricardian equivalence is rejected by Feldstein (1982) by using following equation;

$$C_t = a_0 + a_1 Y_t + a_2 W_t + a_3 SSW_t + a_4 G_t + a_5 T_t + a_6 TR_t + a_7 D_t + e_t$$

Where C stands for total consumer expenditure, Y is current income, W indicates market value of privately owned wealth, SSW is value of future social security benefits, T symbolizes total tax revenue, TR shows government transfers to individuals,D is total government debt and e_t is error term.

To check the validity of REH this function requires certain restrictions that must be fulfilled. $a_4 < 0, a_5 = 0, a_6 = 0, a_3 = 0, a_2 = a_7$

Aschauer (1985) criticized Feldstein model and argued that the use of current income as endogenous variable was the reason of endogenity in this model. No doubt, Feldstein used one lagged values of income and taxes as instrumental variable to remove endogenity but this problem may not be removed by using these instruments. Seater (1993) criticized the inconsistent criteria used by Feldstein for inferring the results. Along with some weakness Feldstein work provides sound simplification about REH.

3 Khalid (1996), Rockerbie (1997), Cardia (1997), Lucke (1999), Drakos (2001, 2003), Sachsida & Carneiro (2001), Giorgioni & Holden (2001), Walker (2002), Kaadu & Usukula (2004), Safa & Siddiq (2005), Cuaresma & Reitschuler (2007).

4 Haq & Montiel (1987), Whelan (1991), Kazmi (1992, 1994), Ghatak & Ghatak (1996), Abimanyu (1998), Carlos (2001), Khan & Ashraf (2003), Ricciuti & Laurea (2003), Malengier & Pozzi (2004), Gray & Stone (2005), Gracia & Ramajo (2005), Nipple (2006), Apergis & Lyroudi (2006), Afonso (2008), Siddiki (2008), Waqas et al. (2011).

In 1983 Kormendi introduced "consolidated approach" which has a plus point that this model is based on permanent income hypothesis.

$$PC_t = a_0 + a_1 Y_t + a_2 GS_t + a_3 W_t + a_4 TR_t + a_5 TX_t + a_6 RE_t + a_7 GINT_t + a_8 GB_t + U_t$$

Where PC is private consumption, Y stands for current total income, GS represents total government spending on goods and services, W symbolizes total wealth, TR is transfers, TX is tax revenue, REH is corporate retained earnings, GINT is government interest payment on outstanding debt, GB demonstrates market value of outstanding government debt and U_t is error term. Following restrictions must be fulfilled for the validity of REH.

$$a_2 < 0, a_4 = a_5 = a_6 = a_7 = a_8 = 0$$

After "Consolidated approach" Kormendi introduced a "Standard approach" which considers that consumption is determined by disposable income (Yd), total wealth plus government debt (W+GB) and U_t is error term. The standard approach considers consumption as a function of disposable income via concept of private wealth.

$$PC_t = a_0 + a_1 YD_t + a_2 (W_t + GB_t) + a_3 W_t + a_4 TR_t + a_5 TX_t + a_6 RE_t + a_7 GINT_t + a_8 GB_t + U_t$$

For REH subsequent conditions must be hold.

$$a_2 = 0, a_4 = -a_5 = a_6 = a_7 = a_8 > 0$$

Modigliani and Sterling (1986) criticized the low value of coefficient of income and high value of transfers variable in Kormendi's approach. They claimed that a raise in transfers may be negative tax; therefore according to REH transfers should not have any effect on private consumption. Secondly, he used an unsuitable deflator (all variables were deflated by implicit price deflator for Net National Product). Thirdly they claimed that that Second World War period must be debarred from the sample during the analysis done by Kormendi.

Feldstein and Elmendorf (1990) suggested that Kormendi must use of ratio specification to diminish co linearity among Net National Product (NNP) and fiscal variables. Secondly, they suggested the use of instrumental variables in order to reduce the endogenity among NNP and fiscal variables. By using the model of Kormendi and past values of the endogenous variables lagged 2, 3 and 4 years, Feldstein and Elmendorf results rejected REH.

In 1986 Modigliani and Sterling introduced a consumption function by putting the accent on life cycle theory and assumed the expectations as distributed lag of past variables.

$$C_t = a + b_0 W_t + b_1 GB_t + \sum_{i=1}^{L} C_i (Y_{t-i} - TL_{t-1}) + \sum_{i=1}^{L} d_1 DEF_{t-i} + U_t$$

Where L is equal to 5, TL indicates taxes net of transfers plus government net real ex-post domestic interest payments. DEF shows government budget deficits and for REH $b_1 = -b_0$ and $\sum d_i = \sum c_i$ must be hold.

In 1987 Bernheim introduced two models to test REH, where C is real per capita consumption, X is vector of other exogenous variables, r is interest rate, Y-TX is disposable income, TX-G-rGB is government surplus and e_t is error term.

$$C_t = \alpha_0 + \alpha_1 (Y_t - TX_t) + \alpha_2 (TX_t - G_t - r_r GB_t) + \alpha_3 G_t + \alpha_4 GB_t + \alpha_5 W_t + X_t \bar{\alpha} + e_t$$

$$C_t = \beta_0 + \beta_1 Y_t + \beta_2 (TX_t - G_t - r_r GB_t) + \beta_3 G_t + \beta_4 GB_t + \beta_5 W_t + X_t \bar{\beta} + e_t$$

In second equation he deals disposable income without subtracting for taxes, for REH $\alpha_2 = \alpha_1 \; and \; (\beta_2 = 0)$ and for Keynesian view $\alpha_2 = 0$ and $\beta_2 = -\beta_1$ must be hold. For international comparison Bernheim introduced following equation, where Y is real gross domestic growth, Pop is population growth and GB is domestically held government debt.

$$C/Y = \beta_1 + \beta_2 \, def/Y + \beta_3 \, G/Y + \beta_4 \, GB/Y + \beta_5 \, W/Y + \beta_6 Y + \beta_7 Pop + e$$

Pereleman and Pestieau (1993) used disposable income, government budget deficit, wealth and government debt in order to check the validity of REH. For REH, restrictions $\alpha_1 + \alpha_2 = 0$ and $\alpha_4 = 0$ must be hold and for Keynesian view $\alpha_2 = 0$ must be fulfilled.

$$C = \alpha_0 + \alpha_1 (Y - TX) + \alpha_2 DEF + \alpha_3 W + \alpha_4 GB + e$$

Study rejected both pure Ricardian and Keynesian view because coefficient of deficit is negative.

After discussing the different structural consumption functions, their weaknesses their contributions in the literature, the present study estimates following structural consumption function. Dependant variable is private consumption (PC), while independent variables are disposable income (YD), government expenditure (GE), total wealth (W), tax revenue (TR), government debt (GD), government budget deficit (GBD) and U_t is error term. This model is more familiar with Kormendi's (1983) and Pereleman and Pestieau's (1993) models. Keeping in the views of Modigliani and Sterling (1986) a transfer variable is not included in our model because they argued that transfers may be treated as negative tax.

$$PC_t = \alpha_0 + \alpha_1 YD_t + \alpha_2 GE_t + \alpha_3 W_t + \alpha_4 TR_t + \alpha_5 GD_t + \alpha_6 GBD_t + U_t$$

To hold REH following restrictions must be fulfilled.

$$\alpha_2 < 0, \quad \alpha_4 = 0, \quad \alpha_5 = 0, \quad \alpha_1 + \alpha_6 = 0, \quad \alpha_3 = \alpha_5$$

First restriction states that government expenditure must be less than zero which depicts that as government expenditure increases private consumption will decrease. Second restriction demonstrates that tax revenue must be equal to zero which means that deficit financing has no affect on private consumption. Third restriction shows that government debt must be equal to zero which affirms that government debt has no impact on private consumption. Fourth restriction states that disposable income plus government budget deficit must be equal to zero. Moreover, wealth must be equal to government debt which describes that consumers purchase same amount of bonds as government do deficit financing. This restriction also depicts that in response to tax cut consumers not increase their consumption but increase their savings.

3. Variables and Data Sources

The study used time series data of Pakistan for the period of 1973-2009, collected from International Financial Statistics (IFS) and different Economic Surveys of Pakistan. Government expenditure, private consumption expenditure, tax revenue, government debt, disposable income[5,] government budget deficit and wealth[6] are the variables used in this analysis. All the variables are transformed into real per capita.

---

5 A proxy variable of Gross National Income.

4. Empirical Methodology

It is very important to check the long run and short run dynamics among the variables, before the estimation of any time series model. In econometric literature there are lots of uni-variate[7] and multi-variate[8] techniques to check the cointegration among the variables. Before applying any cointegration technique, firstly we have to detect order of integration. Mostly time series data is non-stationary and in order to beware spurious regression results researchers used different unit root test.

4.1 Unit Root Test

4.1.1 Augmented Dickey Fuller (ADF) unit root test

Dickey and Fuller, after Dicky Fuller unit root test, suggested a new test to check unit root, ADF. In order to remove the autocorrelation this test includes additional lagged terms of the dependent variable as a one of the independent variable. Mostly the time series data have a trend, but ADF test give following three possibilities.

$$\Delta Z_t = \phi Z_{t-1} + \sum \gamma_i \Delta Z_{t-1} + e_t \quad \ldots\ldots(1)$$

$$\Delta Z_t = \alpha_0 + \phi Z_{t-1} + \sum \gamma_i \Delta Z_{t-1} + e_t \quad \ldots\ldots(2)$$

$$\Delta Z_t = \alpha_0 + \phi Z_{t-1} + a_2 t + \sum \gamma_i \Delta Z_{t-1} + e_t \ldots\ldots(3)$$

Equation 1 states the possibility when no trend and no intercept found in the data, equations 2 states the possibility when data has intercept only 3 states the possibility when data has both intercept and trend. Deterministic elements α_0 and $a_2 t$ differentiate the above three equation form each other. While using ADF test there are two important things which a researcher has to keep in his mind. Specify the lagged first difference terms. If we select zero lagged difference this will be DF test. In ADF, in order to remove serial correlation among residuals, sufficient lags are included. Secondly, when we choose the different possibilities of ADF, discussed above, their critical values also changed. McKinnon (1991) table of critical values is used to check the acceptance or rejection of null hypothesis.

---

6 By following Garcia and Ramajo (2003) this is a proxy variable computed by adding Government debt and M2.

7 Engle&Granger, (1987) and Phillips& Hansen's FMOLS procedures (1990).

8 Johansen, (1988), Johansen & Juselius, (1990),and Johansen's (1995) and Auto-Regressive Distributed Lag (ARDL), proposed by Pesaran& Shin, (1995, 1998), Pesaran et.al., (1996), and Pesaran et.al., (2001)

4.1.2 The Phillips-Perron Unit Root Test.

The Dickey-Fuller test is based on the assumption that the error terms are statistically independent and have a constant variance. Phillips and Perron (1988) introduced a new test of unit root in which they used mild assumptions as compared to Dickey and Fuller.

Consider AR(1) process;

$$\Delta Z_{t-1} = \alpha_0 + \gamma Z_{t-1} + e_t \ldots\ldots(4)$$

PP test is the modification of ADF test it just make a correction of the t-statistic of Z's coefficient by using comparatively less restrictions than ADF, in order to remove serial correlation. McKinnon (1991) critical values are also used for this test. Moreover, this test also has the same three possibilities which ADF has; intercept, intercept and trend and no intercept and no trend.

4.1.3 The Kwiatkowski, Phillips, Schmidt, and Shin test (KPSS).

This test is different from other unit root tests because it is based on the residuals obtain from ordinary least square method. Suppose we have endogenous variable z_t and an exogenous variable w_t.

$$z_t = w_t'\delta + u_t \quad \ldots\ldots(5)$$

The LM statistic is;

$$LM = \sum_t S(t)^2 / T^2 f_0 \quad \ldots\ldots(6)$$

Where at zero frequency f_0 is an estimator of the residual spectrum and S(t) shows the cumulative residual function;

$S(t) = \sum_{r=1}^{t} \hat{u}_r$, which is based on the residuals $\hat{u}_t = z_t - w_t'\hat{\delta}(0)$.

The calculation of the estimator δ is based on the OLS method.

4.2 Johansen Co-Integration approach

After the pioneer work of Granger (1981) about cointegration, many studies[9] elaborated this concept. Johansen (1988) introduced a new approach of checking the cointegration between more than two series. It removes all the drawbacks, which Engle-Granger approach has. In case of Johansen approach the ECM also extended into Vector Error Correction Model (VECM). Now suppose that we have three endogenous variables, L, M and N. In matrix form this can be written as;

$$Y_t = \left[L_t, M_t, N_t\right] \quad \ldots\ldots(7)$$

$$Y_t = \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots\ldots + \beta_k Y_{t-k} + \mu_t \ldots(8)$$

In the context of VECM we can written as

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots\ldots + \Gamma_{k-1} \Delta Y_{t-k-1} + \Pi Y_{t-1} + \mu_t \ldots(9)$$

Whereas,

$$\Gamma_i = (1 - \beta_1 - \beta_2 - \ldots\ldots\ldots - \beta_k)(i = 1, 2, \ldots.., k-1)\ldots(10)$$

and $\Pi = -(1 - \beta_1 - \beta_2 - \ldots\ldots\ldots - \beta_k)\ldots\ldots(11)$

Π shows the 3×3 matrix, which depicts the true long run relationship between $Y_t = \left[L_t, M_t, N_t\right]$. The $\Pi = \phi\chi'$, in which ϕ shows the speed of adjustment towards equilibrium and long run coefficients matrix is χ'. In single equation case $\chi' Y_{t-1}$ is error correction term. To find out for multivariate case now assumes $k = 2$. So the model is

$$\begin{bmatrix} \Delta L_{\mathrm{t}} \\ \Delta M_{\mathrm{t}} \\ \Delta N_{\mathrm{t}} \end{bmatrix} = \Gamma_1 \begin{bmatrix} \Delta L_{\mathrm{t-1}} \\ \Delta M_{\mathrm{t-1}} \\ \Delta N_{\mathrm{t-1}} \end{bmatrix} + \Pi \begin{bmatrix} \Delta L_{\mathrm{t-1}} \\ \Delta M_{\mathrm{t-1}} \\ \Delta N_{\mathrm{t-1}} \end{bmatrix} + e_t \quad \ldots\ldots(12)$$

or we can say that;

$$\begin{bmatrix} \Delta L_{\mathrm{t}} \\ \Delta M_{\mathrm{t}} \\ \Delta N_{\mathrm{t}} \end{bmatrix} = \Gamma_1 \begin{bmatrix} \Delta L_{\mathrm{t-1}} \\ \Delta M_{\mathrm{t-1}} \\ \Delta N_{\mathrm{t-1}} \end{bmatrix} + \begin{bmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \\ \phi_{31} & \phi_{32} \end{bmatrix} \begin{bmatrix} \chi_{11} & \chi_{21} & \chi_{31} \\ \chi_{12} & \chi_{22} & \chi_{32} \end{bmatrix} \begin{bmatrix} L_{\mathrm{t-1}} \\ M_{\mathrm{t-1}} \\ N_{\mathrm{t-1}} \end{bmatrix} + e_t \quad \ldots(13)$$

For simplicity just analyze the first equation's error correction part. The first row of Π matrix is;

---

9 Engle and Granger (1987), Engle and Yoo (1987), Stock and Watson (1988), Phillips (1986& 1987), Phillips and Ouliaris (1990) and Johansen (1988, 1991, 1995)

$$\Pi_1 Y_{t-1} = ([\phi_{11}\chi_{11} + \phi_{12}\chi_{12}][\phi_{11}\chi_{21} + \phi_{12}\chi_{22}][\phi_{11}\chi_{31} + \phi_{12}\chi_{32}])\begin{bmatrix} L_{t-1} \\ M_{t-1} \\ N_{t-1} \end{bmatrix} + e_t \quad \ldots(14)$$

This can also be written as;

$$\Pi_1 Y_{t-1} = \phi_{11}(\chi_{11}L_{t-1} + \chi_{21}M_{t-1} + \chi_{31}N_{t-1}) + \phi_{12}(\chi_{12}L_{t-1} + \chi_{22}M_{t-1} + \chi_{32}N_{t-1}) \quad \ldots(15)$$

Equation clearly express the two cointegrating vectors and the terms of their speed of adjustment ϕ_{11} and ϕ_{12}.

Regarding the rank of matrix, there are three cases which are as follow;

i. The variables in Y_t are I(0), if Π has a full rank.
ii. There are no cointegrating relationships, when the Π is zero.
iii. There are $r \le (n-1)$ cointegrating relationships, when Π has a reduced rank.

To check the goodness of fit, diagnostic test like Serial correlation, functional form, normality and heteroskedasticity tests and stability test like Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMsq.) are performed.

5. Empirical Findings

5.1 Unit root results

To ward off the spurious results the study tested the variables for unit root. Three methods of unit root are adopted, ADF, PP, and KPSS. The study check the stationarity of the variables under two models, with intercept and trend and secondly with intercept and no trend. All the variables are I(1) under ADF test, except government expenditure. PP test result indicates that all the variables are I(1). This time government expenditure is stationary at first difference. In the next model, which considers no trend in data, all the variables are I(1) under ADF and PP tests. Under KPSS in the first model, with intercept and trend, all the variables are stationary I(1). In the second model, with intercept but no trend, government expenditures, debt, budget deficit and wealth are stationary at I(1).

Keeping in view the results of three unit roots tests the study deals the variable at I(1). (See table 5.1)

Prior to the estimation of the main model it is necessary to check that whether the said variables have long run or short relationship or not? For this purpose different cointegration techniques are used in literature[10]. After checking the stationarity of data we come to know that all the variables are I(1), so Johansen and Juselius (1990) cointegration technique is applied. In JJ approach the first step is to identify the order of VAR. On the basis of AIC and SBC lag length of VAR is selected. Both criterions selected three lag length of VAR (See table 5.2)

10 However, not in case of Pakistan.

Table 5.1: Unit root results

Variables	ADF				PP				KPSS			
With trend												
	Level	**P***	**Difference**	**P***	**Level**	**Q***	**Difference**	**Q***	**Level**	**K***	**Difference**	**K***
PC	-0.858	1	-4.515***	1	-0.584	4	-5.147***	3	0.406	4	0.128***	0
GE	-1.342	2	-2.784	3	-2.304	3	-8.870***	2	0.250	4	0.078***	6
YD	-2.747	2	-4.522***	3	-3.218*	4	-7.297***	3	0.216	3	0.040***	3
TR	-1.271	1	-3.659**	1	-1.561	1	-6.420***	1	0.271	5	0.096***	2
DEF	-2.683	2	-4.230***	3	-2.983	2	-7.110***	3	0.234	3	0.130***	9
DEBT	-1.613	1	-4.518***	2	-1.588	4	-4.795***	2	0.217	4	0.129***	5
WEALTH	-1.650	2	-4.727***	3	-1.654	3	-4.813***	3	0.229	4	0.143***	5
Without trend												
PC	1.184	2	-4.054***	1	1.284	5	-4.820***	3	0.705	5	0.282	2
GE	-1.632	1	-2.744**	3	-2.240	3	-8.875***	2	0.343	4	0.136***	5
YD	-1.958	3	-4.583***	2	-2.465	4	-7.396***	3	0.501	4	0.521	3
TR	-1.899	2	-3.380***	3	-2.053	1	-6.235***	1	0.382	5	0.273	3
DEF	-2.727	3	-4.291***	1	-3.033	3	-7.226***	4	0.167***	3	0.139***	9
DEBT	-1.223	1	-4.414***	3	-0.891	1	-4.857***	3	0.564	5	0.133***	5
WEALTH	-1.180	2	-4.545***	4	-0.766	4	-4.837***	4	0.631	5	0.146***	4

Notes: PC is real per capita private consumption; GE is real per capita Government expenditure; YD is real per capita disposable income; TR is real per capita tax revenue; DEF is real per capita budget deficit; DEBT is real per capita debt; WEALTH is real per capita wealth. P* shows the maximum lag length, as determined by using AIC. Under PP test Q* and K* in KPSS test shows Newey-West Bandwith, as determined by Bartlett-Kernel.

*** shows 1% significance level; ** shows 5% significance level and * represents 10% significance level.

Table 5.2: Lag length selection criterion

Order	LL	AIC	SBC	LR test	Adjusted LR
0	-928.22	-935.22	-940.57	757.90[0.00]	267.49[0.00]
1	-746.28	-802.28	-845.02	394.01[0.00]	139.06[0.00]
2	-673.59	-778.59	-858.02	248.64[0.00]	87.75[0.00]
3	-549.27	-703.27	-802.80	------	------

By using Pantula Principal the model with unrestricted intercept and no trend is selected, among the five cointegration models. Both Eigen value and Trace statistic reject the null hypothesis of no cointegration because the value of trace test (207.10) is grater then 5% and 1% critical values. Result reveals that there is one cointegrating vector, based on the Eigen values and Trace statistics.

Table 5.3: Johansen Maximum Likelihood Test for cointegration

Hypotheses	Trace test	5% critical values	10% critical values	Hypotheses	Max-Eigen Statistic	5% critical value	10% critical values
$R = 0$	207.10	124.62	119.68	$R = 0$	92.76	45.63	42.700
$R \leq 1$	114.34	95.87	91.40	$R = 1$	48.33	39.83	36.84
$R \leq 2$	66.00	70.49	66.23	$R = 2$	28.53	33.64	31.02
$R \leq 3$	37.47	48.88	45.70	$R = 3$	20.14	27.42	24.99
$R \leq 4$	17.32	31.54	28.78	$R = 4$	10.71	21.12	19.02
$R \leq 5$	6.61	17.86	15.75	$R = 5$	5.52	14.88	12.98
$R \leq 6$	1.08	8.07	6.50	$R = 6$	1.08	8.07	6.50

After investigating the long run relationship among variables, it is important to investigate the short run dynamics. Error correction term shows the speed of convergence towards equilibrium. It is significant and negative in sign. The speed of correction towards equilibrium depends upon the value of error correction term.

Table 5.4: ECM regression results

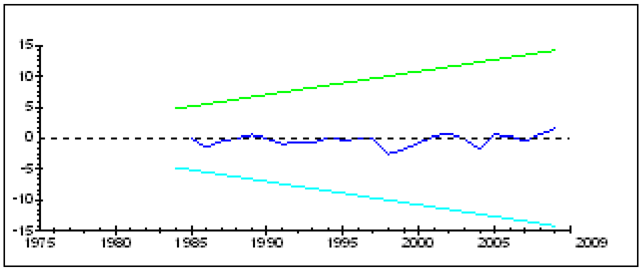
Variables	Coefficients	t-values	Prob-value
Constant	28.82	5.045	0.000
ΔYD	-0.0157	-1.983	0.001
ΔGE	0.0291	0.092	0.366
ΔDEF	0.112	0.383	0.704
ΔWEALTH	-0.032	-1.095	0.283
ΔTR	-0.033	-0.605	0.550
ΔDEBT	0.044	2.268	0.000
ΔECM(-1)	-0.812	-2.583	0.000
R-Squared	0.681	Adjusted R-Squared	0.583
S.E. of Regression	5.040	DW-statistic	2.15
Log-likelihood	731.8864	F-stat	6.948 [0.000]

Notes: ΔPC is dependant variable.

Brown et al. (1975) proposed two tests Cumulative Sum and Cumulative Sum of Square, to check the structural stability. CUSUM test captured the systematic changes in regression coefficients, while CUSUMSQ detain the departure of parameters from constancy. Hence, parameter consistency is checked by using these two tests. Following graphs shows the stability of model for whole sample because the residuals are within 5% critical bonds.

Fig 5.1: Cumulative Sum of Recursive Residual

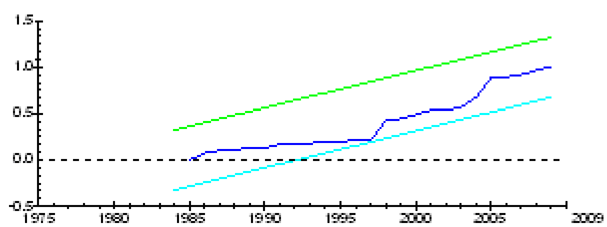
Plot of Cumulative Sum of Recursive Residual



The straight line represent critical bonds at 5% significance level

Fig 5.2: Cumulative Sum of Square Recursive Residual

Plot of Cumulative Sum of Square Recursive Residual



The straight line represent critical bonds at 5% significance level

Under structural consumption function we want to test that government expenditures are negatively effect private consumption; taxes, deficit financing, and debt has no impact on private consumption; budget deficit and disposable are equal; and wealth is equal to government debt. These restriction are reject by the data so, there is no evidence in favor of REH in case of Pakistan. Restrictions are rejected by the Wald test.

According to REH government expenditures and private consumption must inversely related to each other but in results government expenditure is positively related with private consumption, hence we reject REH. Moreover, results depict that taxes and debt is negatively related with private consumption. Disposable income is positively effect private consumption, which means that when person's disposable income increases he increases his consumption expenditures. These results are contradictory with the theory of REH. The theory states that when disposable income increases a person will decrease its consumption expenditures and save more in order to protect his children. The results are in line with the existing literature of REH in case of developing countries. In case of Pakistan Kazmi (1992, 1994) rejected the REH and concluded that REH is a rough and oversimplified approximation of consumer behavior.

Table 5.5: Results of REH

Variables	Coefficients	t-value	Prob-value
Constant	3.574	2.836	0.000
ΔYD	0.047	3.916	0.000
ΔGE	0.105	2.100	0.000
ΔWEALTH	0.882	3.785	0.000
ΔTR	-1.190	1.931	0.021
ΔDEBT	-1.000	3.597	0.000
ΔDEF	0.355	1.082	0.285
$\alpha_2 < 0, \quad \alpha_4 = 0, \quad \alpha_5 = 0, \quad \alpha_1 + \alpha_6 = 0, \quad \alpha_3 = \alpha_5$ $\lambda^2(5)$ = 16.36 [0.005]			
R-square	0.520	D.W	2.046
Adjusted R-square	0.495	F-statistic	2.98 [0.018]
SER	5.838		

The correlation matrix in table 5.6 describes the degree of association between the variables. It is assumed that two variables will be highly correlated if the correlation coefficient is greater than 0.5, or it lies between 0.3 and 0.49. Moreover, if this value lies 0.2 to 0.29 than it is moderate correlation and if it lies 0.1 to 0.10 it is weak correlation.

Table 5.6: Results of Correlation Matrix

Variables	DEBT	DEF	GE	PC	TR	WEALTH	YD
DEBT	1.0000						
DEF	0.3789	1.0000					
GE	0.6582***	0.4782**	1.0000				
PC	0.6660***	0.3792**	0.4431**	1.0000			
TR	0.5893***	0.4572**	0.8606***	0.4739**	1.0000		
WEALTH	0.3429**	0.0450*	0.0389*	0.6057***	0.0702*	1.0000	
YD	0.0975*	0.3683**	0.5616***	0.5726***	0.6868***	0.4361*	1.0000

Note: *** Strong Correlation
** Moderate Correlation
*Weak Correlation

6. Summary and Conclusion

The aim of this study is to examine the REH by using the annual data of Pakistan from 1973-2009. The study used variables, government expenditure, private consumption expenditure, tax revenue, government debt, disposable income, government budget deficit and wealth to meet the objectives of the study. Results of ADF, PP and KPSS unit root tests show that all the variables are I(1). JJ approach of cointegration shows a long run relation among the variables. Under the results of Structural consumption function there is no evidence in favor of REH in case of Pakistan. Restrictions are significantly rejected by the Wald test.

The findings of the study validate the effectiveness of fiscal policy because consumers treat government debt as a net wealth. Thus fiscal policies should be used as major policy instruments in order to boost private consumption and control trade deficits, which are prime goal of stabilization policies in Pakistan.

References

Abimanyu, Y., 1998, "Using Indonesia's Real Exchange Rate to Test Ricardian Equivalence". International Economic Journal,12:17-29.

Apergis, N., and Lyroudi, K., 2008, "Private and Government Consumption in Transitional Economies: A Panel Data Analysis". Journal of Economic Development, 33.17-27.

Aschauer, D., 1985, "Fiscal Policy and Aggregate Demand". The American Economic Review, 75:117-127.

Aschauer, D., 1988, "The Equilibrium Approach to Fiscal Policy". Journal of Money, Credit and Banking, 20:41-62.

Aschauer, D., 1989, "Is Public Expenditure Productive?" Journal of Monetary Economics, 23:177-200.

Aschauer, D., 1993, "Fiscal Policy and Aggregate Demand: Reply". The American Economic Review, 83:667-669.

Barro, R., 1974, "Are Government Bonds Net Wealth?" The Journal of Political Economy, 82:1095-1117.

Barro, R., 1979, "On the Determination of the Public Debt". The Journal of Political Economy, 87:940-971.

Barro, R., 1980, "Federal Deficit Policy and the Effects of Public Debt Shocks". Journal of Money, Credit, and Banking, 12:747–761.

Barro, R., 1989, "The Ricardian Approach to Budget Deficits". The Journal of Economic Perspectives, 3:37-54.

Bernheim, D., 1987, "Ricardian Equivalence: An Evaluation of Theory and Evidence". NBER, Macroeconomics Annual. 263-315.

Cardia, E., 1997, "Replicating Ricardian equivalence Tests with Simulated Series". The American Economic Review, 87:65-79.

Cuaresma, J., C., and Reitschuler, G., 2007, "Is Ricardian Equivalence Ricardian Proposition an 'Aerie Fairy Theory for Europe?" Economica, 74:682-694.

Diamond, P., 1965, "National Debt in a Neoclassical Growth Model". The American Economic Review, 55:1126-1150.

Drakos, K., 2001, “Testing Ricardian Equivalence Theorem: Time Series Evidence From Greece”. Journal of Economic Development, 26:1-12.

Drakos, K., 2003, “Testing the Ricardian equivalence proposition: Panel data Evidence From the EU”. Working Paper, Department of Economics. University of Rome.

Eisner, E., 1989, “Budget Deficits: Rhetoric and Realities”. The Journal of Economic Prespectives, 3:73-93.

Evans, P., 1985, “Do Large Deficits Produce High Interest Rates?” The American Economic Review, 75:66-87.

Evans, P., 1988, “Are Consumers Ricardian? Evidence for the United States”. The Journal of Political Economy, 96:583-1004.

Evans, P., 1993, “Consumers are not Ricardian: Evidence from Nineteen Countries”. Economic Inquiry, 31:534–548.

Evans, P., 2001, “Consumer Behaviour in the United States: Implications for Social Security Reform”. Economic Inquiry, 39:568–582.

Feldstein, M., 1982, “Government Deficits and Aggregate Demand”. Journal of Monetary Economics, 9:1-20.

Feldstein, M., 1988, “The Effects of Fiscal Policies When Incomes Are Uncertain : A Contradiction to Ricardian Equivalence”. The American Economic Review, 78:14-23.

Feldstein, M., and Douglas, E., 1990, “Government Debt, Government Spending, and Private-Sector Behavior Revisited: Comment”. The American Economic Review, 80:589-599.

Garcia, A., and Ramajo, J., 2003, “Fiscal Policy and Private Consumption Behaviour: The Spanish Case”. Empirical Economics, 30:115–135.

Ghatak, A., and Ghatak, S., 1996, “Budgetary Deficits and Ricardian Equivalence: The Case of India”. Journal of Public Economics, 60:267-282.

Giorioni, G., and Holden, K., 2001, “Does the Ricardian Equivalence Proposition Hold in Less Developed Countries”. International Review of Applied Economics, 17:209-221.

Giorioni, G., and Holden, K., 2001, “Some Further International Evidence on Ricardian equivalence: A VECM Approach”. Working Paper, Center for International Banking, Economics and Finance.

Graham, F., and Himarios, D., 1993, “Consumption, Wealth, and Finite Horizons: Tests of Ricardian Equivalence”. _Economic Inquiry, 34:527-544.

Graham, F., 1993, “Fiscal Policy and Aggregate Demand: Comment”. The American Economic Review, 83:659-666.

Graham, F., 1995, “Government Debt, Government Spending, and Private-Sector Behavior: Comment”. The American Economic Review, 85:1348-1356.

Gray, J., and Stone, J., A., 2005, “Ricardian equivalence For Sub National States”. University of Oregon Eugene.

Hall, R., 1978, “Stochastic Implications of the Life Cycle/Permanent Income Hypothesis: Theory and Evidence”. Journal of Political Economy, 86:971 987.

Haug, A., 1996, “Blanchard’s Model of Consumption: An Empirical Study”. Journal of Business and Economic Statistics,14:169–177.

Haque, N., U., and Montiel, P., 1987, “Ricardian Equivalence, Liquidity Constraints, and the Yari-Blanchard Effect: Tests for Developing Countries”. IMF Working Paper.

Haque, N., U., and Montiel, P., 1989, “Consumption in Developing Countries: Tests for Liquidity Constraints and Finite Horizons”. The Review of Economics and Statistics, 71:408-415.

Hayashi, F., 1985, “The Effect of Liquidity Constraints on Consumption: A Croos-Sectional Analysis”. Quarterly Journal of Economics, 100:183-206.

Hayashi, F., 1985, “Tests for Liquidity Constraints: A Critical Survey”. NBER, Working Paper, No. w1720.1-46.

Himarios, D., 1995, “Euler Equations Test of Ricardian Equivalence”. Economic Letters, 48:165–171.

Kaadu, H., and Uuskula, L., 2004, “Liquidity Constraints and Ricardian Equivalence in Estonia”. Working Papers of Eesti Pank, No.7.

Kazmi,A., A., 1991, “Saving, Consumption and Ricardian equivalence: A Macro Econometric Analysis of Pakistan”. Ph.D. Dissertation, Boston University, Boston, U.S.A.

Kazmi, A., A., 1992, “Ricardian equivalence: Some Macro Econometric Tests For Pakistan”. The Pakistan Development Review, 31:743-758.

Kazmi, A., A., 2001, "Ricardian Equivalence Hypothesis: Some Empirical Tests for Pakistan Based on Blanchard-Evans Models". The Lahore Journal of Economics, 6:75-92.

Khalid, A., M., 1996, "Ricardian Equivalence: Empirical Evidence from Developing Economies". Journal of Development Economics, 51:413-432.

Kormendi, R., 1983, "Fiscal Policy and Aggregate Demand". The American Economic Review, 73:994-1010.

Kormendi, R., and Meguire, P., 1986, "Government Debt, Government Spending, and Private Sector Behaviour: Reply". American Economic Review, 76:1180–1187.

Kormendi, R., and Meguire, P., 1990, "Government Debt, Government Spending, and Private Sector Behaviour: Reply and Update". American Economic Review, 80:604–617.

Kormendi, R., and Meguire, P., 1986, "Government Debt, Government Spending, and Private Sector Behaviour: Reply". American Economic Review, 85:1357–1361.

Lucke, B., 1999, "Econometric Tests of Ricardian Equivalence: Results for Germany". Universität Hamburg. Fachbereich Wirtschaftswissenschaft. Institut für Wachstum und Konjunktur.

Leiderman, L., 1987, "Testing Ricardian Neutrality with an Intertemporal Stochastic Model". NBER, Working Paper No. 2258.

Marinheiro, C., F., 2001, "Ricardian equivalence:An Empirical Application to Portuguese Economy". Katholieke University Leuven Workshop in International Economics.

Modigliani, F., and Sterling, A., 1986, "Government Debt, Government Spending, and Private Sector Behaviour: Comment". American Economic Review, 76:1168–1179.

Modigliani, F., and Arlie, S., 1990, "Government Debt, Government Spending, and Private Sector Behavior: A Further Comment". The American Economic Review, 80:600-603.

Malengier, G,. and Poozi, L., 2004, "Examining Ricardian Equivalence by Estimating and Bootstrapping a Non-linear Dynamic Panel Model". Money Macro and Finance Research Group Confrence.

Niple, K., 2006, "Are We Ricardian? Evidence from U.S Countries". Issues in Political Economy, 15:1-10.

Pemberton, J., 2004, "Ricardian Consumers with Non-Keynesian (and possible Ricardian) Propensities". Scottish Journal of Political Economy, 51:95-104.

Reitschuler, G., and Jesús, C., C., 2004, "Ricardian Equivalence Revisited: Evidence from OECD countries". Economics Bulletin, 5:1−10.

Ricciuti, R., and Laurea, D., D., 2003, "An Experimental Analysis of Two Departures Form Ricardian equivalence". Eonomic Bulletin, 8:1-11.

Robert, R., B., Mankiw, N., G., and Zeldes, S., P., 1987, "Ricardian Consumer with Keynesian Propensities". American Economic Review, 76:676-691.

Rockerbie, D., W., 1997, "Are Consumers Ricardian When Some Are Liquidity Constrianed?" Applied Economics, 29:821-827.

Sachsida, A., and Carneiro, P., E., 2001, "Capital Stock, Saving and Public Debt: Are Brazilians Ricardian?" Catholic University of Brasilia; Institute for Applied Economic Research.

Safa, M., F., and Siddiq, F., K., 2005. "Assessment of the Canadian Experience". Third Annual Meeting of The Atlantic Canada Economic Association.

Seater, J., 1993, "Ricardian Equivalence". Journal of Economic Literature, 31:142-190.

Seater, J., and Roberto, M., 1985, "New Tests of the Life Cycle and Tax Discounting Hypotheses". Journal of Monetary Economics, 15:198-215.

Siddiki, J., U., 2008, "The Ricardian Equivalence Hypothesis: Evidence from Bangaldesh". Applied Economics, 42:1419–1435.

Vamvoukas, A., G., and Gargalas, N., V., 2008, "Testing Keynesian Proposition and Ricardian Equivalence: More Evidence on the Debate". Journal of Business and Economics Research, 6:67-76.

Walker, W., C., 2002, "Ricardian Equivalence and Fiscal Policy Effectiveness in Japan". Asian Economic Journal, 16:285-302.

Whelan, K., 1991, "Ricardian Equivalence and the Irish Consumption Function: The Evidence Re-examined". The Economic and Social Review, 22:229-238.

Waqas, M., Awan, M. S., Aslam, M. A., 2011, "We Are Living on the Cost of our Children". Interdisciplinary Journal of Contemporary Research in Business, 2:607-623.