THE EVALUATİON OF RİCARDİAN EQUİVALENCE IN THE CASE OF TURKİSH ECONOMY

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Özet: Bu makale Ricardo Eþitliði teorisinin kalkýnan bir ülke olan Türkiye için 1960-1994 dönemi içiu geçerliliðini analiz eder. Ricardo Eþitliði teorisi borçlanmanýn sadece vergiyi ertelediðini ileri sürer. Verginin zamanlamasýnýý kiþinin hayatboyu bütçe kýsýtlamasýnýý erkileyemiyeceðinden bireyin tüketim kararýnýý da etkilemeyecektir. Rasyonel ekonomik birimler bugünün borçlanmasýnýý yarýnýn vergilendirilmesi olarak görürler. Uygulamalar ve tahminler Türkiye için Ricardo Eþitliðinin geçersizliðini ortaya koyuyor. Ricardo Eþitliðinin reddedilmesi ''crowding-out'' etkisinin varlýðýnýn bir iþaretidir.

I.Introduction

The reason and consequences of increasing government deficits have received a lot of attention in both developed and less developed countries. One school of thought, which associated with Keynes states that deficit financed tax cuts raise disposable income and stimulate aggregate demand. In turn deficit lead to high real interest rates and crowds out private capital formation. Second school of thought states that tax payers realize that the present taxes depends only upon real government spending not only timing of taxes. (Bernheim, 1987)

Ricardian equivalence holds that it is inconsequential whether a government budget deficit is financed by debt issue or by tax increases, because under the certain conditions the affects of government purchases on aggregate demand is impervious to the mode of financing fiscal deficits. Equivalence will appear because economic agents will be aware of the future fiscal policies consider today's deficit financing as tomorrow's tax payments. Ricardian equivalence will be valid if;

a)capital markets are perfect and consumers do not face any borrowing constraints

b) private and public sectors have the same planning horizons and

c) taxes are non-distortionary (Barro, 1974,1978)

On the other hand empirical evidence from developing countries is not always supporting the Ricardian equivalence. In India, for example, Ghatak and Ghatak (1996) have found that Ricardian equivalence theorem cannot be expected to be validated as imperfect capital and credit markets exist in the country. This suggest that an increase in the rising deficit financed by issuing bonds instead of taxation will increase the private consumption.

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In this paper Ricardian equivalence theorem and crowding-out hypothesis, is being tested with the time series analysis of the data, which to my knowledge has not been studied yet.

II.Symbols and Sorces of Data

In this study, the following symbols are used: C, private consumption; Y, income; G, government expenditure; T, taxes; B, government bonds; W, private wealth defined as money and bond holdings; G2, government spending including interest payment on bonds; d, total government deficit; RB, interest payment on bonds, and I, investment, all measured in per capita term; r, is the long-term real interest rate, t, is the time subscript. The time series of all fiscal variables are obtained from Financial Statistical Yearbook 1960-1994.

III.Ricardian Equivalence Theorem and the Crowding -Out Hypotheses

In the analysis below we will see different equations to test the Ricardian and crowding -out theorems which was used in the literature:

$$C_t = a_0 + a_1 Y_t + a_2 G_t + a_3 T_d + a_4 W_t \tag{1}$$

$$C_t = a(Y_t - T_t - d_t), \quad 0\langle a\langle 1 \tag{2}$$

$$d_t = G_t + RB_t - T_t \tag{3}$$

$$d_t = G2_t - T_t \tag{4}$$

Equation 3 and 4 show that total government deficit is primary deficit plus interest payments on bonds and primary deficit is non-interest payments minus total revenue.

Equation 2 can be written again with respect to equation 3 and 4, and some restrictions on coefficients:

$$C_t = a_1 Y_t + a_2 T_t + a_3 d_t \tag{5}$$

where,

$$0\langle a_1\langle 1, \quad a_2\langle 0, \quad a_3\langle 0 \quad a_1 = |a_2| \tag{6}$$

and $a_2 = a_3$

Equation 5 was estimated by Buiter and Tobin (1974) and suggested that if the three coefficients are statistically significant and restrictions in the (6) are provided then Ricardian equivalence theorem holds. Kormendi (1983) has used the definition 4 and solved the below equation:

$$C_t = a_1 Y_t + a_2 T_t + a_3 G2_t \qquad (7)$$

In equation 7 Ricardian equivalence theorem is supported if a2 is statistically insignificant. The following equation has been used by Boskins (1988) to test Ricardian equivalence:

$$C_t = a_1 (Y_t - G2_t) + a_2 d_t \qquad (8)$$

Ricardian equivalence invalidated if a2 is positive and statistically significant. For Ricardian equivalence and crowding -out hypotheses the equation 2 can be written as below:

$$C_t = a_1 Y_t + a_2 G_t + a_3 RB_t \qquad (9)$$

and

$$C_t = a_1 Y_t + a_2 G2_{t0\langle a_1\langle 1} \qquad (10)$$

If $a_2 \langle 0$ is statistically significant then government consumption crowds out private consumption. In other words, crowding out will appear when an increase in government expenditure leads to a reduction in private consumption, private investment or in net exports. Deficit financing raises real interest rates which, in turn, reduce private investment or only other interest-sensitive form of private spending. Apart from equation 10 the following equation is also used to test crowding out hypotheses. This equation is

$$I_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 r_t + \alpha_3 G2_t \qquad (11)$$

and the expected sign in the coeffients are $\alpha_1 \rangle 0$ and $\alpha_2, \alpha_3 \langle 0$.

IV.Adaptation of The Models for Turkish Case

While estimating the equation in the above I have added an extra variable which is the amount of the Black Economy. Black economy is inevitable part of Turkish economy. Without black economy the estimation results would not be correct. In order to have real amount of economy we must include the amount of black economy. Black economy closely related to consumption level. Consumer might be having his/her income from black economy. Thus the size of black economy will effect the size of consumption of consumer. The expected sign is positive for black economy on consumption level. The higher the black economy the higher the consumption level would be.

V.Analyzing The Time Series of the Data

A.Non stationary time series data : a short background

It is well known that when the variables under consideration are not stationary the regression results could be meaningless. In other words, having a non-stationary time series data is an important problem for the empirical studies. As Charemza and Deadman (1997) mentioned "...if series are non-stationary one is likely to finish up with a model showing promising diagnostic test statistics even in the case where there is no sense in the regression analysis" (: 92). Another way of expressing this would be to say that the statistical indicators, t statistics and R^2 will no longer be valid for the equation.

There are different ways of modeling a non stationary series: one of the suggestions is to difference the series until stationarity has been achieved. It should be mentioned that differencing might be required more than once, depending on the " order of integration" of the series.[1] The most common method (the" unit root test") for testing the level of integration was introduced by Dickey and Fuller (1979). The main idea behind it can be shown as below:

Consider a simple model;

$$y_t = \delta y_{t-1} + \mu_t \qquad (12)$$

where μ_t is an uncorrelated stationary error term with a zero mean and a constant variance. y_t will be stationary if $|\delta| < 1$ and nonstatonary if $|\delta| = 1$(Charemza and Deadman (1997), Banerjee, (1993). The null hypothesis would be $H_0: \delta = 1$ against $H_1: \delta < 1$. And for testing the order of integration the equation becomes

$$\Delta y_t = \varphi y_{t-1} + \mu_t \qquad (13)$$

[1] For the explanation of the term see Charemza and Deadman (1997,1992),

$$y_t = (1+\varphi) y_{t-1} + \mu t \qquad (14)$$

Where the DF test is a test of the negativity of φ in the OLS regression of (13). Rejection of $\varphi = 0$, in favour of $\varphi < 0$ means

$\delta < 1$, that is y_t is integrated of order zero; i.e. I(0). If the null hypothesis can not be rejected then testing the integration of order one, I(1), would be necessary. In this case the new equation is;

$$\Delta \Delta y_t = \varphi \Delta y_{t-1} + \mu_t \qquad (15)$$

Again the test would be about the negativity of φ. The test is repeated until the integration level has been determined or the conclusion is reached that the series can not be made stationary by any degree of differencing.

B-Test For Unit Roots And Cointegration Analysis

DF/ADF tests for unit roots variable are as follows:

(table 1)

DF and ADF t-values at 95% critical value of -2.95 suggest that

i-all but 2 series reject unit root hypothesis in their first differences and they are integrated order one at I % or 5 % level of significance

ii-real interest rate and real per capita government bonds are stationary at level.

The DF t- values to test for cointegration are given in table 2 for variables in equations (1)-(11). Engle and Granger (1987) cointegration test (EGC) checks the stationary of residuals from cointegrations like (1) or (5) or (7), etc.

(table 2)

As is clear from the table 2 the equations are not cointegrated at 95 % critical value for DF statistic -4.86. Therefor I have taken the series' first differences except government bonds and real interest rate as they are stationary at the level. The estimation results of Ricardian Equivalence and crowding- out hypotheses for Turkey are shown in the table below:

(Table 3)

VI. Interpretation of The Results of The Ricardian Equivalence Theorem and The Crowding-Out hypothesis for Turkey: 1960-1994

Equation (1a) shows a negatively insignificant coefficient of per capita real wealth and tax variable. The insignificance might be due to multicollinearity between income and wealth variables. Equation (1b) rejects the Ricardian Equivalence theorem because tax variable shows a negative and statistically significant influence on real per-capita consumption.

The estimation of all Buiter-Tobin type equations (eq.5) subject to the restrictions on coefficients refute the Ricardian Equivalence theorem. Because although income and Black economy variables has the required positive sign, tax and deficit variables have not got the negative sign, and the restrictions a2=a3 cannot be satisfied. Equation (7) rejects the Ricardian Equivalence as the coefficient of tax is positive and statistically significant. Equations (8a) and (8b) show that government deficit's coefficients are positive and statistically significant, and therefore they reject the Ricardian Equivalence theorem. It should be mentioned that according to Ricardian Equivalence theorem deficit has no effect on current consumption as ''rational consumers'' make consumption decision on lifetime income which based on the present value of government expenditures and not on the timing of tax collections. Equation (9) with and without intercept also reject the theorem:first of all a3 is not significantly negative in the eq. (9b); and a3 is positive and insignificant in the eq. (9a) which suggests the positive wealth effects on private consumption. Also, a2=a3 is not satisfied in both equations , and a2 has not got the required negative sign. The estimates of coefficient of eq (10) also refute the theorem as the restriction that the coefficient of Y is not equal to the absolute value of the coefficient of G2.

Rejection of the Ricardian Equivalence theorem imply the existence of the crowding-out effect. But the test of the crowding-out hypothesis by equation (11a) and (11b) give a positive and statistically insignificant coefficient of G2 and negative and statistically insignificant Black economy coefficient. As is known crowding-out effect of private investment appear via the real interest rate increased by government spending. Thus, the negative and statistically significant real interest rate likely to include the negative investment.

VII.Conclusion

The time series data for Turkey 1960-1994 refute the Ricardian Equivalence theorem and provide evidence that tax cuts increase consumption level. The conclusion is based on static short time analysis of the data. The data are used after making them stationary. The reason for rejection of the Ricardian Equivalence theorem is due to the imperfect money markets, liquidity constraints and differential borrowing rates. As a result the Ricardian Equivalence invalidated for Turkey between 1960-1994.

Abstract: This paper analyzes the validity of the Ricardian equivalence theorem for a developing country, Turkey for the period 1960-1994. The Ricardian theorem states that deficits only postpone taxes. Since the timing of taxes does not affect an individnal's lifetime bndget constraint it cannot change his consumption decisions. Rational economic agents consider today's deficit financing as tomorrow's tax liabilities. The estimations of the models invalidate Ricardian equivalence in Turkey. Rejection of the Ricardian Equivalence theorem imply the existence of the ''crowding-out.

Kaynakça

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Table1: *DF/ADF Tests for unit roots*

VARIABLES	*LEVEL*		*IST DIFFERENCE*	
	DF	ADF	DF	ADF
C	0.96	1.36	-5.24	-3.88
Y	-0.36	0.25	-5.84	-5.05
T	0.57	0.75	-5.81	-3.41
B	-3.0	-3.48		
W	1.14	1.05	-5.18	-3.89
d (G+RB-T)	-2.20	-0.44	-9.19	-4.40
d (G2-T)	-1.61	1.11	-10.41	-4.43
I	-2.30	-2.24	-4.70	-3.93
r	-6.69	-5.24		
RB	-1.75	-1.6	-6.11	-3.92
G	-0.74	0.91	-7.41	-2.85
G2	-0.13	2.27	-7.92	-2.28

comment to table: The corresponding McKinnon critical values with intercept for 35 observations at 1 %, 5 % and 10 % significance level are -3.64, -2.95,-2.61 respectively.

Table 2: *DF t- values for EGC tests*

Cointegratýon regressions with constant	*Df t-values for residuals from regressions*
Eq. (1)	-3.64
Eq.(5)	-3.50
Eq.(7)	-3.35
Eq.(8)	-3.51
Eq.(9)	-3.52
Eq.(10)	-3.21
Eq.(11)	-3.36

Table 3: *Results of testing the Ricardian Equivalence theorem and the crowding -out hypotheses for Turkey 1960-1994*

Estimation no. and variable	*Estimated coefficient*	*st.error*	*t-values*	R^2, *DWS. respectively*
(1a) constant	0.26	0.31	0.82	0.59
Y	0.19	0.07	2.49	2.12
G	0.49	0.21	2.25	
T	0.36	0.46	0.79	
W	-0.12	0.19	-0.12	
BE	0.05	0.05	0.97	
(1b) without intercept				
Y	0.22	0.05	4.14	0.73
G	0.70	0.17	3.92	2.14
T	-0.35	0.08	-4.18	
W	0.15	0.14	1.01	
BE	0.11	0.04	2.62	
(5a) constant	0.20	0.28	0.72	0.62
Y	0.17	0.07	2.38	2.17
T	0.83	0.45	1.84	
d	0.57	0.20	2.88	
BE	1.22	0.05	1.22	
(5b) Without intercept				
Y	0.18	0.07	2.53	0.62
T	0.89	0.44	2.06	2.18
d	0.59	0.19	2.97	
BE	0.07	0.05	1.41	
(7) Without intercept				
Y	0.19	0.07	2.59	0.58

table 3 (cohtinued)

Estimation no. and variable	*Estimated coefficient*	*st.error*	*t-values*	R^2, *DWS. respectively*
T	0.47	0.43	1.09	2.14
G2	0.10	0.08	1.22	
BE	0.51	0.21	2.40	
(8a) constant	0.41	0.29	1.40	0.54
(Y-G2)	0.25	0.07	3.63	2.12
d	0.76	0.19	3.95	
BE	0.15	0.08	1.76	
(8b) Without intercept				
(Y-G2)	0.28	0.068	4.14	0.51
d	0.79	0.19	4.10	2.07
BE	0.17	0.086	2.02	
(9a) constant	0.77	0.49	1.57	0.60
Y	0.25	0.07	3.54	2.20
G	0.44	0.21	2.06	
BE	0.06	0.05	1.32	
RB	-0.45	0.37	-1.32	
(9b)Without intercept				
Y	0.24	0.07	3.29	0.57
G	0.51	0.21	2.41	2.16
RB	0.19	0.22	0.08	
BE	0.08	0.05	1.61	
(10a) Constant	0.22	0.27	0.82	0.62
Y	0.19	0.06	2.91	2.18
G2	0.59	0.19	3.06	
BE	0.07	0.05	1.55	
(10b) Without intercept				
Y	0.21	0.06	3.21	0.61
G2	0.61	0.19	3.18	2 19
BE	0.08	0.04	1.86	
(11a) Constant	-0.05	0.06	-0.75	0.38
Y	0.03	0.01	2.51	1.92
r	-0.0068	0.03	-0.22	
G2	0.033	0.04	0.80	
BE	0.007	0.01	0.70	
(11b) Without intercept				
Y	0.03	0.014	2.48	0.38
r	-0.29	-0.28	-1.03	1.92
G2	0.30	0.041	0.75	
BE	-0.016	0.01	-0.62	