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Application of Panel Co-integration Approach to Verify Ricardian Equivalence Hypothesis in G8 and SAARC Countries

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Abstract

This study investigates the validity of Ricardian Equivalence Hypothesis in case of G8 and SAARC countries by using fourteen year annual panel data from 2001 to 2014. We used seven variables; household final consumption expenditure, disposable income, government budget deficit, general government gross debt, general government total expenditure, general government revenue, and wealth for this analysis. The results of Unit Root tests (IPS, Fisher and Choi base ADF and PP) suggest that all variables are I(1). Johansen Base Panel Co-integration approach verifies the existence of long run relationship among variables for all three cases; G8 and SAARC combine, G8 and SAARC individually. Short run relationship also exists in G8 and SAARC, and individual SAARC case but not in G8 case.

Keywords

Vector error correction model, Unit root, Johansen co-integration

1. Introduction

Fiscal deficit becomes a major problem in these days. Some developed and mostly developing countries are facing fiscal deficits. When government expenditure exceeds from its revenue, deficit occurs in fiscal policies. Government has three ways to finance this deficit; through increase tax rate, borrowing, and printing money (Gumus, 2003).

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Every source has its own consequences on the economy. Increase in tax rate or levying new taxes are hard to implement because people don't admire it (Bird and Zolt, 2003). That's why only option left for government is to finance its deficit through borrowing. There are two schools of thoughts; Ricardian and Keynesian. They explain the impact of borrowing on other macroeconomic variables.

Ricardian Equalance Hypothesis (REH) states that a debt financed tax cut would not increase private consumption as well as aggregate demand because consumers know that they have to pay higher taxes in future after the maturity of the debt. They save this extra tax cut and buy government's bounds because they know that after the majority of debt they would be able to pay higher taxes. So, fiscal policy is ineffective in this case. REH is basically equivalence between taxes and debt. REH holds in the presence of following assumptions; consumers are infinitely lived and behave like they will live forever, consumers are rational and their consumption decision does not change due to government policies, consumers are perfectly informed about their future income, taxes and legacy, consumers face no liquidity constraints because markets are perfect, taxes are lump-sum and tax rates remain constant (Malengier and Pozzi, 2004).

According to Keynesian school of thought, a debt financed tax cut would increase consumption and aggregate demand because consumers assume this tax cut as a blessing and don't think about their future generations. They prefer present on future. Government does not force new taxes so consumers increase their private consumption while private saving remains unchanged because they do not consider government's bonds as a net wealth. Hence fiscal policy is effective in Keynesian case (Tcherneva, 2011).

The objectives of my study are to find out the existence of Error Correction Model (ECM), long run and short run relationships among variables, short run associations running towards Household Consumption) in G8 and SAARC combine and individual cases.

2. Literature review

Barro (1974) investigated the effect of government debt on household's net wealth. The study explored the impact of finite lives, private imperfect capital markets, government monopoly in liquidity services and risk property of government debt and tax collections on bound value and tax capitalization. This paper concluded that when government is more effective at margin than private markets, bounds increase net wealth when private capital markets were imperfect and government has monopoly in creation of bounds. At last increase in public debt, increase the uncertainty about future tax and disturb the household budget and decease their wealth.

Haque and Montiel (1987) checked the practical importance of Ricardian Equivalence and explain the significance of fiscal policy in stabilizing the economy. This paper also checked the existence of necessary conditions for Ricardian Equivalence in developing countries. Generalized instrumental variable method was used for estimation. Results rejected the existence of full Ricardian Equivalence in 15 developing countries out of 16.

Barro (1989) criticized the Ricardian approach to budget deficit. The study made five theoretical objections to Ricardian equivalence; people do not care about future taxes, presence of imperfect capital markets, there is uncertainty about future income and taxes of people, taxes depends upon income and spending and the final objection was that the dependence of Ricardian equivalence on full employment.

Kazmi (1994) checked the validity of REH in Pakistan in relation with Kormendi-Feldstein-Modigliani controversy. First of all a set of consumption functions are estimated using variables in level form and then in differenced form. The data was used for the period 1960-88. Variables included in these models were wealth, taxes, per capita income, government interest payments, government purchases, social security wealth, public debt held by private sector, retained earnings and subsidies. 2SLS was used for Level form estimations and simple OLS technique is used for differenced form estimations. The results rejected the existence of debt neutrality in Pakistan. The estimated consumption function of Pakistan favored the Kormendi-Feldstein and non-Ricardian opinion rather than Modigliani and Ricardian opinion.

Drakos (2001) investigated the significance of REH in Greece. This paper inspected the long run relationship among private saving and government domestic borrowing using quarterly time series data for the period 1981:1 to 1996:3. ADF test depicted that order of integration of variables are not same. Johansen Co-integration approach was used for long run relationship and ECM was estimated for short run relationship. The paper rejected the existence of REH in Greece due to liquidity constraint and uncertainty about future taxes.

Afonso (2008) checked the private consumer response to government indebtedness in EU countries. The objective of the paper was to test the existence of debt neutrality hypothesis in EU countries. Debt neutrality hypothesis refer to ineffectiveness of private consumption in response of government debt polices. The study used panel data onto the period 1970-2006 and estimated Euler equation. The paper rejected the existence of debt neutrality hypothesis in EU countries and concluded that private consumption decreased due to high government indebtedness.

Waqas and Awan (2011) explored the validity of Ricardian Equivalence proposition using annual data of Pakistan. A Structural consumption function was estimated for the period 1973-2009. The variables used in this paper were government expenditure, government budget deficit, private consumption expenditure, disposable income, tax revenue, government debt and wealth. All variables were stationary at 1st difference. As a result Johansen Co-integration approach was applied and finds long run relationships among variables. This paper also rejected the existence of REH because fiscal policy is quite efficient in Pakistan.

Rehman et al. (2013) used Giorgioni and Holden (2003) model which is based on Bernheim (1987) modifications, to test the REH on the basis of government debt and government spending on private consumption in Malaysian economy. They get short run and long run results through Autoregressive Distributed Lag (ARDL) Cointegration approach. They showed that the existence of REH was rejected in both cases. They concluded that the fiscal policy is a good tool for encouraging Malaysian economic growth.

3. Data and methodology

3.1 Variables and data source: We have used data from two clusters; Group of Eight (G8) which is an organization of developed countries and South Asian Association for Regional Cooperation (SAARC) which is an organization of developing countries. We used seven variables for analysis and these are government budget deficit, disposable income (A proxy variable of gross national income), money and quasi money (M2) (A proxy variable computed by adding government debt and M2 (Garcia and Ramajo, 2003), household final consumption expenditure (private consumption), general government gross debt, general government total expenditure and general government revenue (tax revenue). These variables contains fourteen years (2001-2014) annual panel data of fifteen countries; Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka Canada, France, Germany, Italy, Japan, Russia, Uni1ted Kingdom, Unites States of America, from both clusters excluding Afghanistan from SAARC because its data is missing due to war and other circumstances. We can distribute this data into three groups; G8 and SAARC (combine data), G8, and SAARC. Data has collected from International Financial Statistics (IFS) and its different economic surveys.

3.2 Co-integration: Trended time series are non-stationary and may contain Unit Root. Co-integration avoids the problem of non stationarity. If we have two non-stationary variables and we know that their cumulated error process will also be a non-stationary process but in a special case, their cumulated error process becomes stationary, and they will be called co-integrated. For example if we have two stationary variables Z_t and V_t, then they have a long relationship between them. Linear combination of Z_t and V_t can be obtained from following model:

$$Z_t = a_1 + a_2 V_t + u_t \tag{3.2.1}$$

And by obtaining the residual

$$u_t = Z_t - a_1 - a_2 V_t \tag{3.2.2}$$

Z_t and V_t have a long run relationship or said to be cointegrated if $u_t \sim I(0)$, with the order g,h while $g \geq h \geq 0$ and written as $Z_t, V_t \sim C.I(g,h)$, if

- Both series; Z_t and V_t, are integrated of order g.
- Both variables; Z_t and V_t, has a stationary linear combination.

ECM can provides both results; long run and short run, between Z_t and V_t. The specifications of ECM are,

$$\Delta Z_t = a_0 + b_1 \Delta V_t - \pi u_{t-1} + w_t \tag{3.2.3}$$

where,

b_1 is impact multiplier which measures the instant change in Z_t due to change in V_t. It only explains the short run effect. π is an adjustment or feedback effect which explains how much time dependent variable value obtain to converge. where,

$$u_{t-1} = Z_{t-1} - a_1 - a_2 V_{t-1} \tag{3.2.4}$$

where,

a_2 explains the long run effects.

3.3 *The Johansen approach to co-integration:* Johnson introduced this approach in 1988. If we have to estimate more than two time series, this approach is very useful for that problem. It is an advance approach and it can covers all the weaknesses of Engle Granger approach (1987). Johnson converted single equation ECM into multivariate VECM. Suppose there are three endogenous series Z_t, W_t and V_t. This can be written in matrix form as follow:

$$Q_t = [Z_t, W_t, V_t] \tag{3.3.1}$$

$$Q_t = \gamma_1 Q_{t-1} + \gamma_2 Q_{t-2} + \cdots\cdots\cdots + \gamma_k Q_{t-k} + u_t \tag{3.3.2}$$

This is univariate ECM, which can be converted in to Multivariate Vector Error Correction Model (VECM) as:

$$\Delta Q_t = \phi_1 \Delta Q_{t-1} + \phi_2 \Delta Q_{t-2} + \cdots\cdots\cdots + \phi_k \Delta Q_{t-k} + \Pi Q_{t-1} + u_t \tag{3.3.3}$$

While,

$$\phi_i = 1 - \gamma_1 + \gamma_2 + \cdots\cdots\cdots + \gamma_k \tag{3.3.4}$$

where,

$i = 1, 2, 3, \cdots\cdots\cdots, k-1$,

and

$$\Pi = -(1 - \gamma_1 + \gamma_2 + \cdots\cdots\cdots \gamma_k) \tag{3.3.5}$$

$Q_t = [Z_t, W_t, V_t]$ Indicates that Π is 3×3 matrix due to the inclusion of three variables. Π explains the long run relationship between variables.

Let,

$\Pi = \varphi \beta'$, where φ explains the speed of adjustment towards equilibrium and β' shows the long run coefficient matrix. Univariate case has error correction term is $\beta' C_{t-1}$ but now in multivariate case it consists of more than $(n-1)$ vectors. Suppose there are only two lagged terms $k = 2$, then model is as follow:

$$\begin{bmatrix} \Delta Z_t \\ \Delta W_t \\ \Delta V_t \end{bmatrix} = \phi_1 \begin{bmatrix} \Delta Z_{t-1} \\ \Delta W_{t-1} \\ \Delta V_{t-1} \end{bmatrix} + \Pi \begin{bmatrix} \Delta Z_{t-1} \\ \Delta W_{t-1} \\ \Delta V_{t-1} \end{bmatrix} + e_t \tag{3.3.6}$$

Or it can be written as:

$$\begin{bmatrix} \Delta Z_t \\ \Delta W_t \\ \Delta V_t \end{bmatrix} = \phi_1 \begin{bmatrix} \Delta Z_{t-1} \\ \Delta W_{t-1} \\ \Delta V_{t-1} \end{bmatrix} + \begin{bmatrix} \rho_{11} & \rho_{12} \\ \rho_{21} & \rho_{22} \\ \rho_{31} & \rho_{32} \end{bmatrix} \begin{bmatrix} \gamma_{11} & \gamma_{21} & \gamma_{31} \\ \gamma_{12} & \gamma_{22} & \gamma_{32} \end{bmatrix} \begin{bmatrix} Z_{t-1} \\ W_{t-1} \\ V_{t-1} \end{bmatrix} + e_t \quad (3.3.7)$$

Now take only error correction part of first row Π_1 of Π matrix, which presents:

$$\Pi_1 Q_{t-1} = [\rho_{11}\gamma_{11} + \rho_{12}\gamma_{12}][\rho_{11}\gamma_{21} + \rho_{12}\gamma_{22}][\rho_{11}\gamma_{31} + \rho_{12}\gamma_{32}] \begin{bmatrix} Z_{t-1} \\ W_{t-1} \\ V_{t-1} \end{bmatrix} \quad (3.3.8)$$

Or it can be written as:

$$\Pi_1 Q_{t-1} = \rho_{11}(\gamma_{11} Z_{t-1} + \gamma_{21} W_{t-1} + \gamma_{31} V_{t-1}) + \rho_{12}(\gamma_{12} Z_{t-1} + \gamma_{22} W_{t-1} + \gamma_{32} V_{t-1}) \quad (3.3.9)$$

So we can say that eq. (3.3.9) has two co-integrating vectors and their adjustment terms ρ_{11} and ρ_{12} respectively.

When we deal with rank of Π, there exists three possible cases:

- In case of full ranked Π matrix, all variables in vector Q are stationary.
- There exists no co-integration among variables in case of zero ranked Π matrix.
- There exists co-integration when rank is less than full or positive.

Johansen and Juselius (1990) derived two statistics; maximum eigenvalue and Trace statistic. Both are used to check the rank of Π matrix or number of co-integrating relationships.

First method has the statistic:

$$\lambda_{\max}(r, r+1) = -F \ln(1 - \lambda r + 1) \quad (3.3.10)$$

It has null hypothesis; full rank, against the alternative; $r+1$. Its value based on maximum eigenvalue. Trace statistic can be test against the null hypothesis; $cointegrating\ vectors \leq r$, and it is based on the Likelihood Ratio Test.

$$\lambda_{trace}(r) = -F \sum_{i=r+1}^{n} \ln(1 - \lambda r + 1) \quad (3.3.11)$$

This method also done further addition after r_{th} eigenvalue in eigenvalues which improves the trace. Maddala and Wu (1999) used Fisher's technique and by using its results they derives a new alternative co-integration approach for panel data. They proposed a single test statistic for the full panel by combining tests from individual cross-sections. So if cross section i has $p-value$ π_i for an individual cointegration test, then1

$$-2\sum_{i=1}^{N}\log\left(\pi_i\right)\rightarrow\chi_{2N}^{2} \quad (3.3.12)$$

4. Results and discussion

4.1 Unit Root: Time series data is non-stationary in nature which provides spurious results (Asteriou and Hall, 2011). This study have used five different individual Unit Root tests; Im, Pesaran and Shin (1997), Fisher base Augmented Dickey Fuller (1979) and Phillips (1987), Choi base Augmented Dickey Fuller (1979), Phillips (1987), to check the stationarity of variables. Normally every time series has intercept and trend. That is why we test the data with trend. Table 1 is showing that the variables; GBD, DI, W, GD, TR, are not stationary at their level in all five tests. But when we apply first difference they become stationary. But in the case of other two variables; GTE, HC, they are stationary at their level in only Choi base ADF test but in case of other four tests these variables are not stationary at their level. So when apply first difference they become stationary. Hence, we can conclude that all variables have same order of integration. These results fulfill the assumption for co-integration test that all variables should be I(1).

4.2 Lag Order: First of all we have to decide the appropriate lag order before apply co-integration test. Therefore, we used Vector Auto Regression (VAR) technique to select the lag order. There are five tests in this technique; Likelihood Ratio, Final Prediction Error, Akaike Information Criteria, Schwarz Information Criteria, and Hannan-Quinn Information Criteria. Table 2 shows the results of VAR which are recommending us to select lag order 2 as a maximum lag order for case 1, 2 and 3 respectively.

4.3 Johansen base Panel Cointegration: After selecting the appropriate lag order we can move to co-integration test. We chose Johnson Base Panel Co-integration approach to investigate long run and short run relationship among variables because results of Unit Root tests have showed that all variables have same order of integration. The Johnson's approach relies on two tests; trace and maximum eigenvalue. We can use any of one from Trace or maximum eigenvalue test (Luutkepohl et al., 2001). We are considering here only maximum eigenvalue results. Table 2 has only one co-integration which means there exists only one long run relationship in G8 and SAARC and individual SAARC case because only one maximum eigenvalue is greater than critical value in both cases. But when we see individual G8 case, there exists two co-integrated relationships which means there are more than one economic relationships.

Now we can run the Vector Error Correction Model (VECM) because we have our all variables are co-integrated in all three cases. Table 4 is showing the results of VECM which we derive from co-integrated equation where HC is a dependent variable. ECM is a speed of adjustment or strength of the series towards its long run equilibrium after affecting any disturbance. In G8 and SAARC combine case we can see that the ECM has a significant and negative value (-0.00205) which means that there is a long run causality running from GBD, DI, GD, GTE, TR, W to dependent variable HC. Small value of Error correction term shows low speed of convergence to equilibrium. Table 4 has also results of short run causalities. We run Wald test individually for every variable to check the short run causality among variables. We find out only one significant short run result (chi-square = 12.17778, p-value = 0.0023) which exists GD to HC. In G8 individual case we have no any short run relation and has insignificant ECM. ECM is negative and significant in SAARC case which means it has long run causality running from GBD, DI, GD, GTE, TR, W to HC and has short run relationship among them. We find further one marginally significant and two significant short run causalities running from GBD (Chi-square = 3.48188, p-value = 0.0620), DI (Chi-square = 4.740656, p-value = 0.0295) and W (Chi-square = 4.304985, p-value = 0.0380) to HC respectively through Wald test in Table 4.

The value of R-square showing that how much OLS explains our model which value is smart in our all three cases. The value of F-statistic is also significant. Durbin-Watson shows that there is no autocorrelation problem because its value is near to 2 in all three cases and it is a good sign.

5. Conclusion

This study used VAR Lag Order Criteria to select the lag order for all three cases. The results of Unit Root tests; IPS, Fisher and Choi base ADF and PP, explores that all variables have same order of integration and these results fulfill the basic assumption for running co-integration test that all the variables should be I(1). Hence, we use Johnson Base Panel Co-integration approach to investigate the both relationships; long run and short run, between the variables. The results verify the existence of long run relationship among variables in individual and combine cases. We also find short run relationship in combine and SAARC case while G8 has no any short run relationship. This show that the both clusters; developed and developing, have different behavior regarding to tax cut. So fiscal policy should be effective in both cases but its behavior will change.

Table 1: Unit Root

Variable Name		Govt. Budget Deficit	Disposable Income	Money and Quasi Money (M2)	Household Final Consumption Expenditure	General Govt. Gross Debt	General Govt. Total Expenditure	General Govt. Revenue
Notation		**GBD**	**DI**	**W**	**HC**	**GD**	**GTE**	**TR**
Im, Pesaran and Shin W-stat	Level	-0.22334	2.62427	3.0256	0.46048	6.66165	2.79532	3.51851
	1^{st} Diff.	-7.60744*	-5.97463*	-5.35665*	-6.02813*	-3.32694*	-4.67933*	-5.3474*
ADF - Fisher Chi-square	Level	32.4927	21.6985	16.6554	24.6643	11.2505	20.3488	14.8274
	1^{st} Diff.	107.929*	88.1616*	81.5362*	88.3696*	65.4875*	72.2364*	83.7903*
PP - Fisher Chi-square	Level	-0.19042	2.56424	2.98996	0.56723	6.75134	2.67185	3.48288
	1^{st} Diff.	-6.92677*	-6.0018*	-5.68256*	-6.11977*	-3.17486*	-4.72315*	-5.303*
ADF - Choi Z-statistic	Level	23.3481	43.1276	27.3153	44.9861*	26.0235	56.7187*	35.1797
	1^{st} Diff.	104.76*	101.883*	87.3279*	97.7628*	66.3042*	67.068*	88.7494*
PP - Choi Z-statistic	Level	0.57004	1.85544	3.31773	0.03875	6.73786	1.15682	3.04671
	1^{st} Diff.	-6.33275*	-6.54641*	-5.60627*	-6.12066*	-3.42364*	-4.34278*	-5.3328*

* Indicates significant value at 5% level of significance ($p < 0.05$)

Table 2: Lag Order

Lag	LogL	LR	FPE	AIC	SC	HQ
G8 and SAARC						
0	-2455.79	NA	6450.508	28.63705	28.76515	28.68902
1	316.9808	5287.603	1.13E-10	-3.03466	-2.009895*	-2.618887*
2	380.0034	115.0528*	9.67e-11*	-3.197714*	-1.27628	-2.418137
G8						
0	-864.85	NA	0.612199	19.37443	19.56886	19.45284
1	473.4782	2438.731	2.21E-13	-9.27729	-7.721856*	-8.650050*
2	539.8852	110.6784*	1.53e-13*	-9.664116*	-6.74767	-8.48803
SAARC						
0	-766.804	NA	0.370881	18.87326	19.07871	18.95574
1	310.9606	1945.233	4.72e-12	-6.218550	-4.574937*	-5.558665*
2	358.9246	78.38025*	4.96E-12*	-6.19328*	-3.11151	-4.956
* Indicates lag order selected by the criterion ($p < 0.05$)						

Table 3: Panel co-integration maximum eigenvalue rank test

Number of Co-integrations	Eigenvalue	Max-Eigen Statistic	Critical Value 0.05	Prob.**
G8 and SAARC				
None *	0.35996	70.0573	46.23142	0
At most 1	0.175099	30.22123	40.07757	0.4095
At most 2	0.112683	18.76986	33.87687	0.8357
At most 3	0.051463	8.295064	27.58434	0.9979
At most 4	0.041875	6.715939	21.13162	0.9642
At most 5	0.004101	0.645207	14.2646	1
At most 6	3.25E-06	0.000511	3.841466	0.984
Max-eigenvalue test indicates 1 co-integrating eq. (s) at the 0.05 level				
G8				
None *	0.4676	51.68946	46.23142	0.0119
At most 1 *	0.421439	44.87131	40.07757	0.0134
At most 2	0.233758	21.83305	33.87687	0.6206
At most 3	0.128683	11.29545	27.58434	0.9573
At most 4	0.028088	2.336183	21.13162	1
At most 5	0.007939	0.65357	14.2646	1
At most 6	0.000943	0.077379	3.841466	0.7809
Max-eigenvalue test indicates 2 co-integrating eq. (s) at the 0.05 level				
SAARC				
None *	0.487099	50.07546	46.23142	0.0185
At most 1	0.319149	28.83085	40.07757	0.5032
At most 2	0.242784	20.85797	33.87687	0.6948
At most 3	0.169211	13.9035	27.58434	0.8292

At most 4	0.042449	3.253251	21.13162	0.9999
At most 5	0.008305	0.625471	14.2646	1
At most 6	0.006679	0.502631	3.841466	0.4783
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

Table 4: Vector Error Correction Estimates

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
G8 & SAARC				
ECM	-0.00205	0.000899	-2.2809	0.024
C	0.134292	0.030721	4.371399	0
D(GBD)	-4.97E-05	0.000111	-0.44704	0.6555
D(DI)	0.207717	0.334647	0.620706	0.5358
D(GD)	-0.33188	0.210429	-1.57716	0.117
D(GTE)	-0.16097	0.203519	-0.79093	0.4303
D(TR)	0.054537	0.175952	0.309957	0.757
D(W)	-0.0406	0.138686	-0.29277	0.7701
R-squared	0.175875	Adjusted R-squared		0.088202
F-statistic	2.006038	Prob. (F-statistic)		0.014878
Durbin-Watson stat	2.042126	Sum squared residuals		2.425082
G8				
ECM	0.008725	0.005161	1.690434	0.0956
C	0.150761	0.05107	2.952057	0.0043
D(GBD)	0.00016	0.000189	0.843754	0.4018
D(GDI)	0.17294	1.492292	0.115889	0.9081
D(GD)	-1.22003	0.401475	-3.03887	0.0034
D(GTE)	1.124066	1.008857	1.114197	0.2692
D(TR)	-0.92824	1.016254	-0.91339	0.3643
D(W)	0.233853	0.277024	0.844159	0.4016
R-squared	0.353019	Adjusted R-squared		0.208172
F-statistic	2.437189	Prob. (F-statistic)		0.006753
Durbin-Watson stat	2.049446	Sum squared residuals		1.247458
SAARC				
ECM	-0.016524	0.018957	0.871674	0.0386
C	0.109755	0.043006	2.552108	0.0133
D(GBD)	0.001196	0.00159	0.752496	0.4547
D(DI)	0.275876	0.36203	0.762025	0.4491
D(GD)	0.133129	0.251209	0.529956	0.5981

D(GTE)	0.080266	0.204649	0.392214	0.6963
D(TR)	0.037116	0.196692	0.1887	0.851
D(W))	-0.25642	0.179941	-1.42504	0.1594
R-squared	0.228167	Adjusted R-squared		0.031939
F-statistic	2.162764	Prob. (F-statistic)		0.032543
Durbin-Watson stat	2.096891	Sum squared residuals		0.789513
All results are significant at ($p < 0.05$)				

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