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TAX REVENUE AND GOVERNMENT EXPENDITURE IN SRI LANKA: AN ECONOMETRIC AEG TESTING APPROACH

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Abstract. In the global economic administration, tax revenue has been identified as the engine of the government expenditure, but the relationship of them was not investigated econometrically, this situation formulated a research gap for tasting the relationship of them. The aim of this study was to examine the Cointegration relationship among the tax revenue and the government expenditure in Sri Lanka. This study considered two time series variables such as the tax revenue and the government expenditure. The tax revenue was considered as the independent variable and the government expenditure was considered as the dependent variable. The sample period of this study was from 1950 to 2013.The Cointegration technique was used to check the long run relationship and the Error Correction Mechanism was employed to investigate the short run behavior of the tax revenue on the government expenditure. According to the empirical results, the R- squared of the estimated model was 0.99. In the meantime, the Durbin Watson statistics was 0.828. However, this model did not suffer from the spurious problem because the residual of this model was stationary. The tax revenue has sustained positive relationship with government expenditure. And also, the partial coefficients of tax revenue and its probability values in the estimated model were 0.695 (0.000) in short run and 1.031 (0.000) in long run periods. Therefore, the tax revenue and government expenditure had cointegrated at level form I(0) and maintained the long and short run relationship between them.

1. Introduction

In the global economic administration, fiscal policy of the government considers the following things such as revenue (tax and non tax), government expenditure, and deficit or surpluses which are the fundamental elements of fiscal policy of any states. It is observed as an instrument that can be used to minimize short run fluctuations in output and employment in many debates of macroeconomic policy [3, 9].

The tax is a major source for a country's income which is used to develop the economy of nations [1, 10].There two types of taxes such as direct and indirect tax. The direct tax is divided into five types: income tax, economic service charges, customs duties, remittances tax and other social responsibility levy [1, 6 and 11]. The indirect tax is classified into three types such as Value Added Tax, Turn over tax and National Budget Tax. The direct and indirect taxes are usually defined on the basis of the effects and expectations or intentions [6].

The government expenditure consists of expenses which a government incurs in protecting its citizens and in increasing their economic and social welfare. Moreover, the expenditure incurred by the government to help other countries is also a part of the total government expenditure [7 and 6]. Till the 19th century, the economists held that the government should spend the minimum amount. They were of the view that the smaller government public expenditure is kept, the better it is [4]. According to them, the best planning of expenditure is to spend the minimum. However, it is felt that the government can no longer remain a silent spectator of the miseries of the people. Therefore, the economists like J. M. Keynes have argued that government expenditure and its increases are the only way to fight unemployment and depression in the economy [9 and 10].

There are several studies conducting internationally [Al – Quadir 2005; Ali and Shah 2012; Craigwell et al.1994; Elyasi and Rahimi 2012; Mitani and Khoon 1999; Moalusi 2004; Mohamed Aslam, 2015; Owoye1995; and Saeed and Somaye 2012] regarding the relationship between tax revenue and government expenditure, these all studies used different approaches. In the meantime any of them did not use the cointegration technique to get the results of their study. Hence, this study is indispensable in Sri Lankan experience. Therefore; this is organized keen on the following sub sections: introduction, objective of the study, research methods, results and discussions, finally conclusion and recommendation.

2. Objective of the study

The objective of this study is to examine the Cointegration relationship among the tax revenue and the government expenditure in Sri Lanka.

3. Research Methods

This study considered two types of variables such as the tax revenue and the government expenditure. The tax revenue was deemed as independent variable and the government expenditure was considered as dependent variable. The data for these variables were collected from the annual reports of the Central Bank of Sri Lanka during the period of 1950 to 2013.

- **Econometric Model Specification**

The relationship between the government expenditure and the tax revenue can be related in the following function (1) and this relationship was extended into the following econometric equation (2).

$$GE_t = f(TR_t) \tag{1}$$

$$GE_t = \gamma_0 + \gamma_1 TR_t + U_t \tag{2}$$

Where; the dependent variable was GE_t, the independent variable wasTR_t, U_t was error term and γ_0, γ_1 were coefficient of the equation.

- **Unit Root Test**

In time series analysis, all time series variables should be checked in confirmation with the properties of the stationarity in the pre requesting of analysis. There are several methods to check the unit root of the time series variables. However, one of the popular unit root testing method in economics was the Augmented Dickey Fuller (ADF). This method was used in this study to check the stationary of the variables. The ADF (3) was expressed:

$$\Delta Y_t = \beta + \gamma_t + \rho Y_{t-1} + \sum_{i=1}^{k} \Delta Y_{t-i} + U_t \tag{3}$$

Where; $Y_t$was individual time series, Δ is the first difference operator, k is the lag order, twas the time trend, βwas constant and U_t is the serially uncorrelated random error term with zero mean and constant variance. The ADFtesting guide line was saying that the time series had a unit root if ρ was not significantly different from zero, and it was stationary if ρ was significantly different from zero.

- **Cointegration test**

To test the cointegration relationship between the government expenditure and the tax revenue, the Augmented Engel – Granger testing approach was employed in this study. This test was introduced by Engel and Granger (1987), and this approach considered the following steps:

- The first step was to test the stationarity of the variables individually
- The second step was to regress the independent variable on dependent variable

- The third step was that, if the R – squared of the estimated model is greater than Durbin Watson statistics, this study has to conclude that the estimated model is suffering from spurious problem. To detect this problem the residuals of the estimated model should be checked whether it was stationary not.
- The final step was that, if the residual of the estimated model is stationary there is no spurious problem in the estimated model. If not, to expunge the spurious problem, the variables of the study will be differentiated to reduce the spurious problem of the estimated model.

- **Error Correction Mechanism**

The cointegration test was employed to test the long run equilibrium of the dependent and the independent variables but these variables may be in disequilibrium in short run period. So, the Error Correction Mechanism (ECM) was considered in this study to check the short run behavior of the variables.

4. Results and discussions

In this section, the following items: the descriptive statistics of the variables, unit root test, long run relationship between the variables and short run disequilibrium of the variables are conversed.

- **Descriptive statistics of the variables**

The tax revenue and the government expenditure are considered in this study as variables. Therefore, the descriptive positions of the variables are very imperative in statistical analysis. The following table shows the descriptive position of the variables.

Table 1: The descriptive statistics of the variables

Variables	Mean value	Median	Maximum	Minimum	Std. Deviation
GE	231073.9	30950	1669396	786	2.178
TR	133267.0	14216.5	1005895	544	2.226

Source: calculated from secondary data

According to the table 1, the mean value of the tax revenue is 133267.0 and the mean value of the government expenditure is 231073.9. In the meantime the standard deviation of the tax revenue is 2.22 and the standard deviation of the government expenditure is 2.17. The standard deviations of both variables are moving into same value.

- **Stationarity of the variables**

This study tests the stationarity of the variables through the unit root test. To test the unit root of the variables, the Augmented Dickey fuller (ADF) and Philips Perron tests were used in this study. The table 2 and 3 show the details of the unit root test of the variables.

Table 2: The unit root details of the government expenditure

Level form			1^{st} difference	
Test equation	ADF	Critical values	ADF	Critical values
Intercept	7.26*	2.91	5.06*	2.91
T and I	7.19*	3.49	4.07*	3.49
None	7.15*	1.94	5.48*	1.94

Source: Estimated from secondary data

* denotes the values are significant at 5% level.

Table 3: The unit root test results for the tax revenue

Level form			1st difference	
Test equation	ADF	Critical values	ADF	Critical values
Intercept	10.49*	2.91	4.48*	2.91
T and I	8.85*	3.49	3.24*	3.49
None	10.98*	1.94	4.94*	1.94

Source: Estimated from secondary data
* denotes the values are significant at 5% level.

Tables (table 2 and table 3) illustrate both ADF and Philips Perron unit root testing results of the variable at level and 1st difference forms. According to the results of unit root test, both the tax revenue and the expenditure of government are stationary at level form.

- **Estimated model and Cointegration testing**

This study attempts to test the cointegration relationship between dependent variable and independent variable, this relationship is called as the long run equilibrium of the variables. The results of long run equilibrium show in table 4 and the econometric model connecting the dependent and independent variables is as follows:

$$GE_t = 0.187365 + 1.0311767TR_t$$

Table 4: Cointegration results of variables

Variable	Coefficient	Std. Error	t - statistic	P- value
C	0.187365	0.059723	3.137242	0.0026
Log(Tax)	1.0311767	0.005959	173.1344	0.0000

R^2= 0.99 Durbin Watson stat = 0.827685 F- statistic = 29975.52
Source: calculated from secondary data

According to the estimated model, the tax revenue has significantly positive relationship with the government expenditure. In the meantime, the cointegration testing results show that, the dependent and independent variables are cointegrated at level form I(0). But the R – squared of the cointegrated model is 0.99 and Durbin Watson test statistic is 0.82. Therefore, the R – squared is higher than Durbin Watson test statistic. Some time, this model is suffering from spurious problem because the R – squared is higher than Durbin Watson test statistic. To confirm the spurious problem, this study checks the stationarity of residuals of the estimated model. The following table shows the results of the stationarity of the residuals (see appendix – 01).

Table 5: The unit root results of the residuals

Unit root testing method		t – statistics	p- value
ADF – test statistics		-3.925414	0.0033
Test critical values	1%	-3.538362	
	5%	-2.908420	
	10%	-2.591799	

Source: calculated from secondary data

Here, the absolute value of the ADF test statistic is 3.925 and the absolute value of the critical value is 2.90 at 5% significance level. So, this ADF test statistic is greater than the critical value of the residual at 5% significance level. Therefore, the residuals are stationary at 5% significance level. So, this study concluded that, the fitted model does not suffer from the spurious problem (see appendix- 02).

- **Error Correction Mechanism**

The ECM results show the disequilibrium of the considered variables or short run behavior of the variables. The following table indicates the results for the ECM between the government expenditure and the tax revenue.

Table 6: The ECM results of the variables

Variable	Coefficient	Std. error	t- statistic	p- value
C	0.039176	0.016535	2.369255	0.0211
D(log tax)	0.695344	0.105186	60610613	0.0000
ER(-1)	-0.315277	0.102499	-3.075905	0.0032

F – Statistic = 22.53556

Source: calculated from secondary data

In the table 6, the ECM model is adequate because, the F statistic of this model is 22.53 and its probability value is (0.000) less than 1%. Hence, the adjusted coefficient of the error correction in lag one is (0.0032) and it is statistically significant at 1% level. In the meantime the table 6 demonstrates that the coefficient of short run behavior of the tax revenue on the government expenditure is 0.69 and its' probability value is 0.000 which is less than 1 percent significant level (see appendix -03).

5. Conclusion and recommendation

This study discovered that the tax revenue has been maintaining the long run and short run relationship with government expenditure. This relationship was confirmed by the cointegration and the ECM techniques. Therefore, when the policy makers of Sri Lankan government plan the policies of taxes, they have to recommend for suitable taxes as which in the engine of the government expenditure in Sri Lanka.

Appendices

Appendix – 01:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.187365	0.059723	3.137242	0.0026
LOG(TAX)	1.031767	0.005959	173.1344	0.0000
R-squared	0.997936	Mean dependent var		10.23690
Adjusted R-squared	0.997903	S.D. dependent var		2.455709
S.E. of regression	0.112464	Akaike info criterion		-1.501608
Sum squared resid	0.784191	Schwarz criterion		-1.434143
Log likelihood	50.05147	F-statistic		29975.52
Durbin-Watson stat	0.827685	Prob(F-statistic)		0.000000

Appendix – 02:

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.925414	0.0033
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER(-1)	-0.412355	0.105048	-3.925414	0.0002
C	-0.000809	0.011612	-0.069673	0.9447

R-squared	0.201663	Mean dependent var	-0.001594
Adjusted R-squared	0.188576	S.D. dependent var	0.102304
S.E. of regression	0.092155	Akaike info criterion	-1.899462
Sum squared resid	0.518043	Schwarz criterion	-1.831426
Log likelihood	61.83305	F-statistic	15.40888
Durbin-Watson stat	1.991204	Prob(F-statistic)	0.000223

Appendix – 03:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.039176	0.016535	2.369255	0.0211
D(LOG(TAX))	0.695344	0.105186	6.610613	0.0000
ER(-1)	-0.315277	0.102499	-3.075905	0.0032

R-squared	0.428958	Mean dependent var	0.121603
Adjusted R-squared	0.409923	S.D. dependent var	0.111807
S.E. of regression	0.085886	Akaike info criterion	-2.025140
Sum squared resid	0.442586	Schwarz criterion	-1.923086
Log likelihood	66.79191	F-statistic	22.53556
Durbin-Watson stat	2.076935	Prob(F-statistic)	0.000000

References

[1] HL. Ahuja, Macroeconomic: theory and application. S. Chand & Company Ltd, New Delhi, India, (2002).

[2] KHA. Al – Quadir, The relationship between government expenditure and revenue in the Kingdom of Saudi Arabia: Testing for Co – integration and causality. JKAU: Econ &Adm, 191(1) (2005) 31 – 43.

[3] R. Ali, M. Shah, The causal relationship between government expenditure and revenue in Pakistan. Interdisciplinary Journal of Contemporary research in Business. 3(12) (2012) 323 – 329.

[4] RCH. Craigwell , H. Leon, C. Mascoll, Government revenue and expenditure causality in the presence of seasonality in Barados, Social and Economic studies. 43(4) (1994) 197 – 218.

[5] Y. Elyasi, M. Rahimi, The causality between government revenue and government expenditure in Iran, International Journal of Economic Sciences and Applied Research, 5(1) (2012) 129 – 145.

[6] ML.Jingan, Public Finance & International Trade. Varinda Publication (P) Ltd, New Delhi, India, (2004).

[7] DM. Mitani, GS. Khoon, Causality between government expenditure and revenue in Malaysia: A seasonal cointegration test. ASEAN economic Bulletin. 16(1) (1999) 68 -79.

[8] D.Moalusi, Causal link between government spending and revenue: A case study of Botswana, Fordham Economic Discussion Paper Series, Number. (2004) 2007 – 07.

[9] A.L. Mohamed Aslam, A case study of Cointegration relationship between Tax Revenue and Foreign Direct Investment: Evidence from Sri Lanka, 2nd International Symposium, Faculty of Faculty of Islamic Studies and Arabic Language, South Eastern University of Sri Lanka. (2015) 241 -251.

[10] O. Owoye, The causal relationship between taxes and expenditures in the G7 countries: cointegration and error – correction models, Applied Economic Letters, 2 (1995).

[11] KP Saeed, S. Somaye, Relationship between government spending and revenue: Evidence from oil exporting countries. International Journal of Economics and Management Engineering. 2(2) (2012) 33 -35.