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Budget Deficit and Economic Growth in Sri Lanka: An Econometric Dynamic Analysis

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ABSTRACT

Budget deficit is a debating word in developing countries; it maintains a relationship with economic growth of countries in different aspects. The objective of this study was to test the dynamic relationship between the budget deficit and the economic growth of Sri Lanka using annual time series data from 1959 to 2013.To test this objective, the budget deficit of Sri Lanka was used as main independent variable and the gross domestic product in constant price was utilized as dependent variable. The exports earnings, exchange rate, inflation rate were used supportive independent variables of this study. The Johansen cointegration technique and Vector Error Correction Model were employed to test the long and short - run dynamic relationship between the budget deficit and the economic growth of Sri Lanka. This study found that all variables were cointegrated at 1st difference form. In the meantime the budget deficit and economic growth of Sri Lanka had preserved a long- run dynamic relationship during the study period but no short- run dynamic relationship. In addition, the budget deficit had positive relationship with economic growth of Sri Lanka.

Keywords: Dynamic relationship; Budget deficit; Economic growth; Export earnings; Exchange rate and Inflation

1. INTRODUCTION

When the developed and developing countries prepare their budget, they concern three types of budgets such as balance budget, surplus budget and deficit budget. The balance

budget means the government revenue and expenditures are same, the surplus budget means the government revenue is exceeded the expenditure, and if the government revenue is less than the expenditure it is called deficit budget. Most of developing countries prepare the deficit budget because they think whether this type of budget is helping to promote economic welfares and economic growth in macro level [1,2,5].

The budget deficit is a serious economic issues in developing countries because the criticizers of the developing countries argue that the budget deficit impact on economic growth negatively. On the other hand the developing thinkers promote and support the deficit budget of the countries; they argue that this type of budget promotes the economic growth of countries.In theoretical view of economics, there are three concepts regarding the relationship between budget deficit and economic growth such as Neo – classical, Recardian and Keynesian concepts [4,6,10].

The neo – classical economists declare that there is inverse relationship between the budget deficit and economic growth. On the other hand, the Keynesian economists argue that the budget deficit maintains the positive relationship with economic growth, while the Recardian economists state that there is neutral relationship between the budget deficit and the economic growth [10].

According to [3] the economic growth of Sri Lanka was recorded as 1.5 percent in 1959 and it increased as 8.2% in 1968, then it was decreased -1.5% in 2001 due to the ethnic conflict of Sri Lanka. However it recorded as 7.3% in 2013. Likewise, the budget deficit of Sri Lanka in 1959 was recorded 0.03% to gross domestic product and it was increased as 23% to GDP in 2009. However, the budget deficit was declined to 13% in 2013.

In the real world, the relationship between the budget deficit and economic growth were studied by [Kormendi and Meguire, 1985; Al- Khedair, 1996; Ghali, 1997; Fatima et. al., 2011; Abd Rahman, 2012; Fathima et. al., 2012; Ahmed 2013; Edame and Okoi, 2015]. In these studies, they found the mixed results about the relationship between budget deficit and economic growth. Temporarily, In Sri Lankan context there is no empirical study regarding the dynamic relationship between the budget deficit and economic growth of Sri Lanka. Therefore, this study is going to fill the study gap to help for the fiscal policy makers of Sri Lanka. This study is divided the following sub section introduction, objective of the study, Literature reviews, research methods, results and discussion, finally conclusion and recommendation.

Objectives of the study

The objective of this study is to investigate the dynamic association between the budget deficit and the economic growth in Sri Lanka

Review of literature

As already mention in the introduction part, there are number of empirical studies on the topic of the relationship among the budget deficit and economic growth. These studies clearly discuss in this part.

[12] studied the relationship between the budget deficit and key macroeconomic variables of the major industrials countries. In this study the time series data were used and multiple regression method was employed to test the relationship between the dependent and

independent variables. This study found that the budget deficit had negative relations with trade balance and positive associations with economic growth of the industrials countries.

[4] prepared a research to find out the effects of budget deficit on economic growth of Pakistan. To test this objective, this study utilized the time series data from the period of 1978 to 2009 and employed the multivariate equation including the following variables: gross domestic product, inflation, real exchange rate, real interest rate, budget deficit, and gross investment. Here, the gross domestic product was treated as dependent variable and other variables were considered as independent variables. Meanwhile, this model was constructed based on the Ordinary Least Squares method. Finally, this study found that the budget deficit had negative relationship on economic growth of Pakistan during the sample period.

[8] studied the role of budget deficit in the economic growth of Pakistan using the time series annual data from the period of 1971 to 2007. In this study the gross domestic product of Pakistan was considered as dependent variable and the budget deficit and foreign direct investment were used as independent variables. In the meantime the Augmented Dickey Fuller test was employed to test the stationarity of the variables and the Granger Causality Test was used to test the causality between the variables. At last, this study concluded that the budget deficit had maintained positive insignificant relationship on the economic growth of Pakistan and there was bi- directional causality relationship between the variables.

[9] investigated the relationship between budget deficit and economic growth based on the Malaysia's perspective using ARDL approach. To test the relationship this study used the quarterly data from 2000 to 2011 and considered four variables including dependent variables: growth of real gross domestic product, growth of federal government's debt, growth of productive expenditure and growth of non – productive expenditure. Here, the growth of real gross domestic product was deemed as dependent variable and other variables were reflected as independent variables.

[5] investigated the impact of fiscal deficit on investment and GDP growth of Pakistan. In this study the time series data were used during the period of 1980 to2009 and the simultaneous equation model was used to attain the objective. The two – stage least squares method was used to estimate the simultaneous equation models. In this study the GDP per capita income, exports, imports, fiscal deficit, interest rate, inflation, and population growth were used to explore the impact of budget deficit on investment and economic growth of Pakistan separately. Eventually, this study concluded that the budget deficit had impacted positive and significantly on economic growth and investment of Pakistan.

[6] studied the fiscal deficit and economic growth of Nigeria using the Chow testing approach. In this study, the annual time series data were used from 1986 to 2013 and four variables were used such as gross domestic product, Fiscal deficit, interest rate, gross fixed capital formation. To test the objective of this study, the Chow endogenous break test, unit root test and cointegration test were utilized. Finally this study found that the budget deficit of Nigeria significantly impacted on economic growth.

[7] scrutinized the relationship among the government spending and economic growth in Saudi Arabia. To test this relationship this study used the annual time series data and employed the multiple regression method. This study found that there was no relationship between the budget deficit and economic growth of Saudi Arabia. In the meantime [11] studied the macroeconomic determinants of growth: cross – country evidence. To achieve this objective this study used the multiple regression method with support of cross sectional data.

This study explored that the budget deficit did not impact on economic growth during the sample study period.

Based on the above literature, most of the researches were made to test the impact of budget deficit on economic growth. But any of them did not investigate the dynamic relationship between the budget deficit and economic growth. Especially in Sri Lankan experience there was no research done properly in similar to the dynamic relationship among the budget deficit and economic growth. Therefore, this research gap will be reached through this study.

2. RESEARCH METHODS

In this section the defining of variables, data and data collection methods, the techniques of econometric estimation are reversed:

- **Defining of variables**

In this study, the budget deficit, exports earnings, exchange rate, inflation rate, and Gross domestic product were considered as variables. The gross domestic product was deemed as dependent variable and the budget deficit was considered as main independent variable. In the meantime, the exports earnings, the exchange rate and the inflation were used as supportive independent variables for the budget deficit.

- **Data and data collection**

In this study the time series data were utilized to achieve the objective, which were collected from the annual report of the Central Bank of Sri Lanka during the sample period from 1959 to 2013.

- **Techniques of econometric estimation**

In the techniques of econometric estimation procedure, the unit root test, analytical methods were covered:

- ➢ **unit root test**

To test the unit root of the variable, the Augmented Dickey Fuller and The Phillips Perron testing approaches were considered.

Augmented Dickey Fuller (ADF) testing approach

The Augmented Dickey Fuller testing approach was introduced by Dickey and Fuller to test the stationarity of the time series variables. The ADF testing method uses the following equation to test the stationarity of variables:

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

where:
Y_t: Individual time series, Δ: First difference operator, k: the lag order, t: the time trend, β: the coefficient of constant and U_t: the serially uncorrelated random error term with zero mean and constant variance.

The guide line of ADF testing approach says that, if ρ is not significantly different from zero the time series has a unit root, otherwise not.

Phillips Perron testing approach

Phillips and Perron (1988) developed a number of unit root testing approaches that have become popular in the analysis of financial time series, The Phillips – Perron (PP) unit root testing approach differ from the ADF testing approach. The Phillips – Perron (PP) testing approach uses the following equation to test the stationarity of variables:

$$\Delta y_t = \beta' D_t + \pi y_{t-1} + u_t \quad \text{............................ (2)}$$

where:
u_t: I(0) and may be heteroscedasticity.

➢ **Analytical Method**
In the analytical part of this study, econometric model specification, Johnson cointegration procedures are discussed:

• **Econometric Model Specification**
To test the dynamic association between the dependent and independent variables, the following econometric regression model was employed.

$$Y_t = \beta_0 + \beta_n \sum_{i=1}^{n} x_{nt} + u_t \quad \text{......................... (3)}$$

where:
Y_t: Gross domestic product, x_{nt}: [Budget deficit, Exports earnings, Exchange rate, and Inflation rate], β_0: Coefficient of constant, β_n: Coefficient of independent variables

• **Johansen Cointegration techniques**
In this study, the Johansen Cointegration technique was used to test the long run dynamic relationship between the budget deficit and economic growth of Sri Lanka. The Johansen Cointegration technique says that if the variables [dependent and independent] have to be cointegrated they must be in the same order.

3. RESULTS AND DISCUSSIONS

In the results and discussion part, descriptive statistics of the variables, graphical relationships of the variables, results of Johansen Cointegration test, results of vector error correction mechanism and results of causality analysis are discussed

➢ **Descriptive statistics**
Descriptive statistics describe the position of the variables which statistics contain the following items such as mean value, median value, value of maximum, value of minimum

and value of standard deviation. The following table illustrates the descriptive statistics of the variables.

Table 1. Descriptive status of the variables.

Variables	Mean value	Median	Maximum	Minimum	Std. De
Ln(GDP)	3.1541	3.0367	4.5864	2.7054	0.4764
Ln(BD)	4.094	4.214	5.713	2.558	1.053
Ln(Ee)	3.1832	3.1448	4.0236	2.5023	0.5193
Ln(ER)	1.4051	1.4691	2.1158	0.6776	0.5271
Ln(Inflation)	2.6669	2.5027	3.7337	2.0149	0.5518

Source: calculated from secondary data

> ➤ **Graphical relationship between the variables**

In this study, four independent variables were considered to test the dynamic relationship among the variables. The following figures show the relationship between the independents and dependent variables individually.
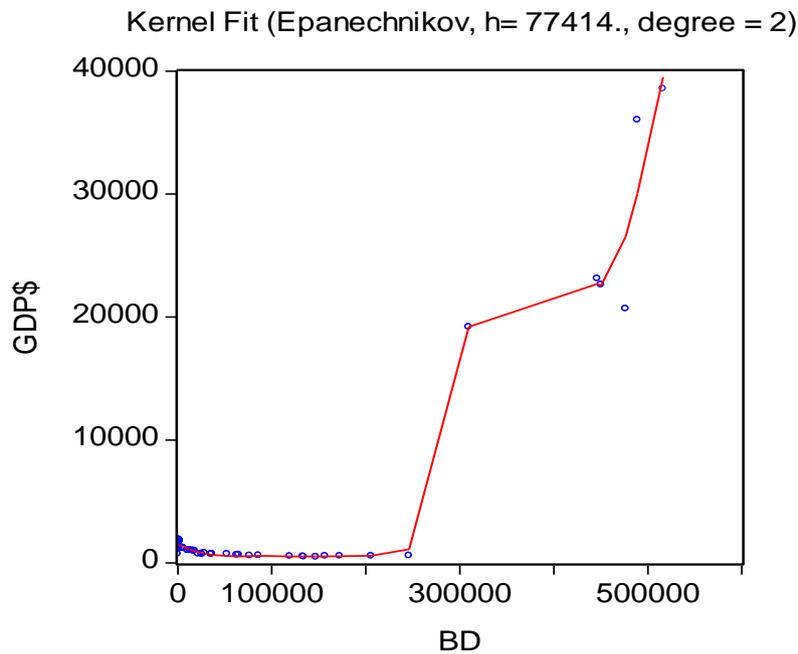
Figure 1. Budget deficit and GDP
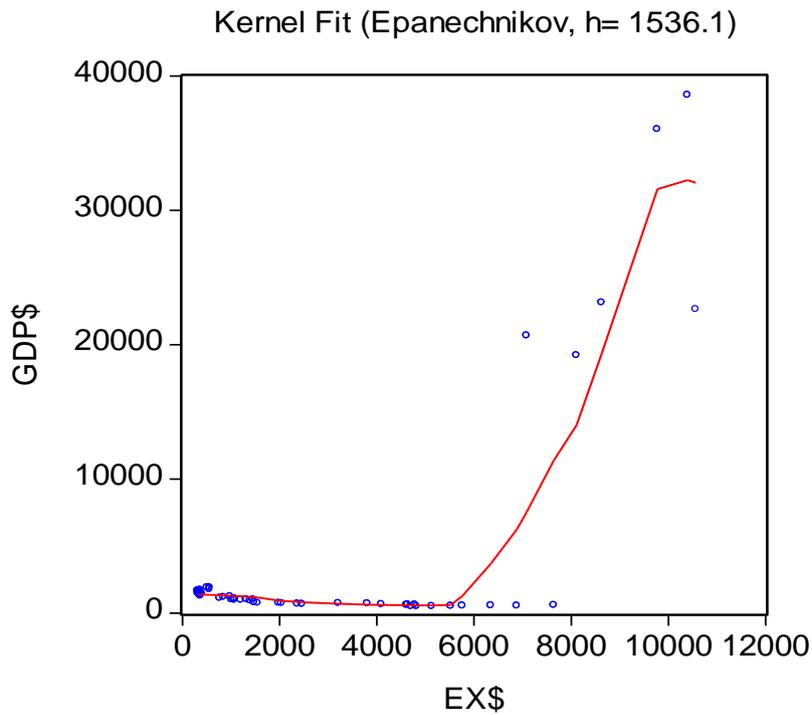
Figure 2. Exports earnings and GDP
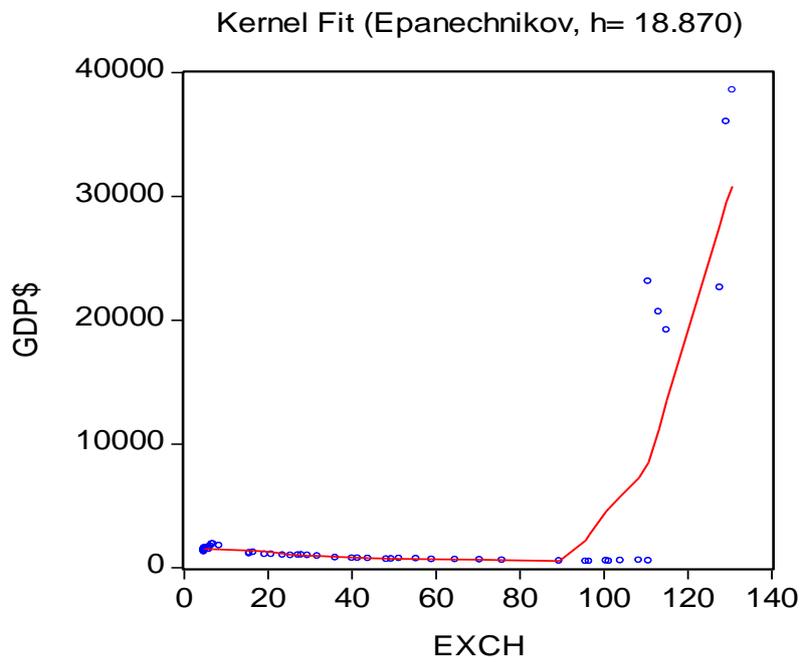
Figure 3. Exchange rate and GDP
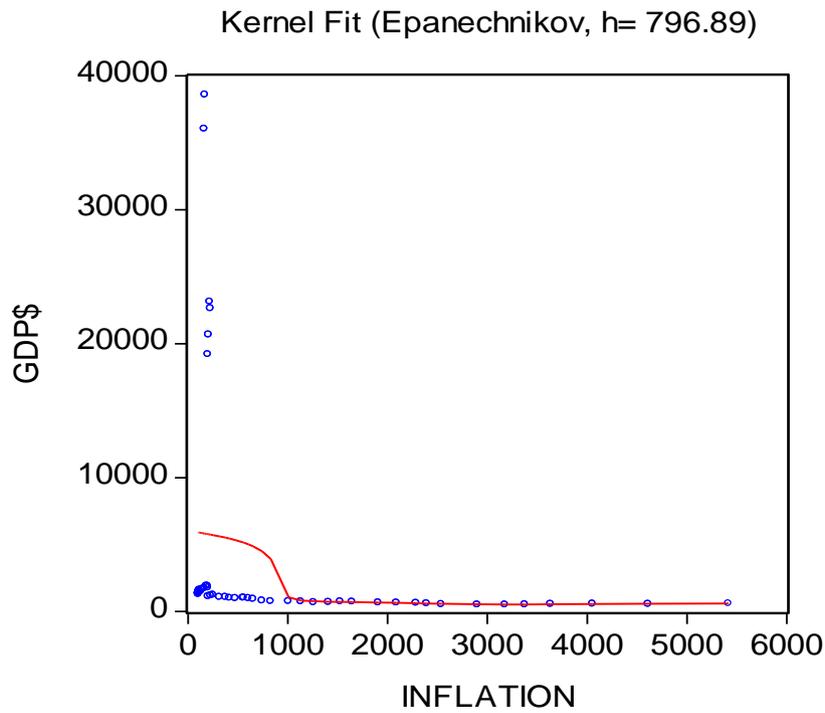
Figure 4. Inflation and GDP

(Source: Eviews software)

The Figure 1 illustrates the positive relationship between the budget deficit and economic growth of Sri Lanka, the Figure 2 indicates the positive relationship among the export earnings and economic growth of Sri Lanka. Likewise, the Figure 3 demonstrates the positive relationship between exchange rate and economic growth of Sri Lanka. At last, the Figure 4 shows the negative relationship among the inflation and economic growth of Sri Lanka.

> **Unit root test**

As mentioned earlier, this study uses the ADF and Philips Perron testing approach to test the stationarity of the variables. The following tables show the results of stationarity of the variables.

Table 2. ADF unit root test results.

Variables	ADF test			Critical values – level			Critical values 1st difference		
	Leg	Level	1st difference	1%	5%	10%	1%	5%	10%

lnGDP		-0278	-4.790*	-3.560	-2.917	-2.596	-3.562	-2.918	-2.597
lnBD		-0.037	-10.286*	-3.568	-2.921	-2.598	-3.568	-2.921	-2.598
lnEx	1	0.504	-7.320*	-3.557	-2.916	-2.596	-3.560	2.917	-2.596
lnExch		-0360	-6253*	-3557	-2916	-2.596	-3.560	-2.917	-2.596
lnInf		-1488	-7317*	-3.557	-2.916	-2.596	-3.560	-2.917	-2.596

Source: calculated from secondary data

Table 3. Phillips Perron unit root test results

Variables	Phillips Peron test			Critical values – level			Critical values 1st difference		
	Leg	Level	1st difference	1%	5%	10%	1%	5%	10%
lnGDP		-0.227	-6.957*	-3.557	-2.916	-2.596	-3.560	-2.917	-2.596
lnBD		-0.106	-10.305*	-3.562	-2.918	-2.597	-3.568	-2.921	-2.598
lnEx	1	0.525	-7.320*	-3.557	-2.916	-2.596	-3.560	-2.917	-2.596
lnExch		-0.374	-6.251*	-3.557	-2.916	-2.596	-3.560	-2.917	-2.596
lnInf		-1.492	-7.317*	-3.557	-2.916	-2.596	-3.560	-2.917	-2.596

Source: calculated from secondary data
* Significant at 1%, 5% and 10% level

Based on the above Tables 2 and 3, all variables of this study are non-stationary at level form. However, these variables are stationary after the 1stdifferentiation of them. Therefore, the variables of this study cointegrated in 1st difference form.

➢ **Johansen cointegration test**
To test the long run dynamic relationship between budget deficit and economic growth of Sri Lanka, this study uses the Johansson cointegration techniques. This technique considers the Trace and maximum Eigen value to verify the cointegration. The following tables illustrate the outcome oftrace and maximum Eigen value statistics.

Table 4. The results of Trace statistic

Hypothesized No of cointegration equation	Trace statistics	0.5% critical value	Probability value
None*	81.15550	69.81889	0.0047
At most 1	41.26630	47.85613	0.1803
At most 2	22.82912	29.79707	0.2546
At most 3	9.304458	15.49471	0.3380
At most	2.750378	3.841466	0.0972

Source: calculated from secondary data

Table 5. The maximum Eigen value statistics

Hypothesized No of cointegration equation	Maximum Eigen statistics	0.5% critical value	Probability value
None*	39.88920	33.87687	0.0085
At most 1	18.43718	27.58434	0.4592
At most 2	13.52466	21.13162	0. 4052
At most 3	6.554080	14.26460	0.5432
At most 4	2.750378	3.841466	0.0972

Source: calculated from secondary data

Based on the Table 4 and 5, one cointegration equation is identified at 5% critical value, because in trace and maximum Eigen statistics, At most 1 is greater than probability value.

So,there is long run dynamic relationship among the budget deficit and economic growth of Sri Lanka.

> **Results of estimated model**

In this study, the multivariate regression model is used to test the dynamic relationship among the economic growth and the budget deficit. The following table demonstrates the results of estimated model.

Table 6. The results of multivariate regression model

Independent Variables	Coefficients of variables	Std. Error	t-Statistics	P-value
Budget deficit	0.4275	0.1034	4.13	0.000
Exports earnings	0.8199	0.1413	5.80	0.000
Exchange rate	-0.6891	0.2513	-2.74	0.008
Inflation	-1.07733	0.0400	-26.88	0.000
Constant value	2.6316			
R – squared	96.9%			
Adj – R- squared	6.6%			
F – statistics	379.08			

Source: calculated from secondary data

In the Table 6, all independent variables impact significantly at 1% level on the economic growth of Sri Lanka. The budget deficit impacts positively on the economic growth of Sri Lanka with the coefficient of 0.4275. This means, that if the budget deficit increase by one unit the economic growth of Sri Lanka will be increased by 0.4275 units. On the other hand if the budget deficit decreases by one unit the economic growth of Sri Lanka will be decreased by 0.4275 units.

> **Vector Error Correction Model (VECM)**

To test the short – run dynamic relationship between the budget deficit and the economic growth of Sri Lanka, the vector error correction model is employed. The following table shows the results of short run dynamic relationship between the budget deficit and the economic growth of Sri Lanka VECM.

Table 7. The results of short run dynamic relationship between the variables

Error correction	D(LNGDP)	D(LNBD)	D(LNEX)	D(LNEXCH)	D(LNINF)
CointEq1	-9.779329 (-1.73318)	1.283408 (0.63796)	-1.118080 (-1.27108)	1.653396 (2.43373)	7.812119 (1.42714)
D(LNBD(-1))	-4.628738 (-1.72249)	0.066277 (0.06917)	-0.518488 (-1.23764)	1.090649 (3.37085)	3.413711 (1.30943)
D(LNBD(-2))	-2.879130 (-1.19557)	0.325628 (0.37925)	-0.477953 (-1.27310)	0.939891 (3.24154)	1.969391 (0.84296)
D(LNBD(-3))	-2.227692 (-1.06020)	0.344899 (0.46038)	-0.282984 (-0.86389)	0.58106 (2.29678)	1.744588 (0.85582)
D(LNBD(-4))	-2.056354 (-1.35932)	-0.166395 (-0.30850)	0.105640 (0.44974)	0.409008 (2.24552)	1.801830 (122772)
D(LNBD(-5))	-0.429249 (-061802)	-0.218608 (-0.88277)	0.001420 (0.01312)	0.015800 (0.18893)	0.477561 (0.70873)
C	-1.721392 (-1.75734)	0.304013 (0.87506)	-0.179115 (-1.17910)	0.266943 (227527)	1.430692 (1.51343)
R – squared	0.410198	0.766075	0.713977	0.762669	0.409047
Adj – R^2	-0.612126	0.360604	0.218204	0.351296	-0.615272
F- statistics	0.401240	1.889348	1.440128	1.853958	0.399355

Source: calculated from secondary data

In Table 7, the probability value of the budget deficit is more than 5% and but not significant. Therefore, the budget deficit has not maintained the short- run dynamic relationship on the economic growth of Sri Lanka during the sample period.

4. CONCLUSION AND POLICY RECOMMENDATIONS

The aim of this study is to investigate the dynamic association between budget deficit and economic growth of Sri Lanka. To achieve this objective the time series data are used from 1959 to 2013. Furthermore, the budget deficit is key independent variable and the economic growth of Sri Lanka is considered as dependent variable and the Johansen cointegration technique is employed to test the cointegration among the variables. According to the analytical results, this study found that budget deficit has the long run dynamic relationship onthe economic growth of Sri Lanka but it has no short - run relationship with the economic growth. Therefore, this study recommends to policy makers, when they formulate the budget; the policy makers have to tolerate the budget deficit because the budget deficit is accelerating the sustainable economic growth in long – run period in Sri Lankan economy.

References

[1]   A.L. Mohamed Aslam, Tax revenue and government expenditure in Sri Lanka: An econometric AEG testing approach, *International Letters of Social and Humanistic Sciences,* 66 (2016) 31-37.

[2]   A.L. Mohamed Aslam, A case study of cointegration relationship between tax revenue and foreign direct investment: evidence from Sri Lanka, 2nd International Symposium, FIA, South Eastern University of Sri Lanka, (2015) 241-251.

[3]   Central Bank Annual Report, Sri Lanka, 2013.

[4]   G. Fatima, M. Ahamed, W. Rehman, Consequential effects of budget deficit on economic growth of Pakistan, *International Journal of Business and Social Sciences*, 3(7) (2012) 203-208.

[5]   G. Fatima, A.M. Ahmed, W.U. Rehman, Fiscal Deficit and Economic Growth: An Analysis of Pakistan's Economy, *International Journal of Trade, Economics and Finance,* 2(6) (2011) 501-504.

[6]   G.E. Edame, O.B. Okoi, Fiscal Deficit and Economic Growth in Nigeria: A Chow Test Approach, *International Journal of Economics and Financial Issues,* 5(3) (2015) 748-752.

[7]   K.H. Ghali, Government spending and economic growth in Saudi Arabia, *Journal of Economic Development*, 22(2) (1997) 165-172.

[8]   N. Ahmad, The role of Budget Deficit in the Economic Growth of Pakistan, *Global Journal of Management and Business Research Economics and Commerce,* 13(5) (2013).

[9]   N. H. A. Rahaman, the relationship between budget deficit and economic growth from Malaysia's perspective: An ARDL approach, *International Conference on Economics, Business Innovation*, 38 (2012) 54-58.

[10] M.G. Briotti, Economic reactions to public finance consolidation: A survey of the literature occasional paper series, European Central Bank, 38 (2005).

[11] R.C. Kormendi, P.G. Meguire, Macroeconomic determinants of growth: Cross- country evidence, *Journal of Monetary Economics,* 16 (1985) 141-163.

[12] S.I. Al- Khedair, The impact of the budget deficit on key macroeconomic variables in the major industrial countries, Florida Atlantic University, (1996).