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Impact of Exchange Rate on Economic Growth in Sri Lanka

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ABSTRACT

Exchange rate is identified as a factor for turning vector of the economic growth of countries which was empirically confirmed by several related studies. But in Sri Lankan context it was not confirmed. Therefore, the objective of this study was to test the impact of exchange rate on the economic growth in Sri Lanka. To achieve this objective, the annual time series data from 1970 to 2015 were used and the variables such as gross domestic product, exchange rate, inflation rate, and interest rate were considered and the multiple regressions model using Ordinary Least squared method was employed. Based on the outcome of the multiple regression model, this study confirmed that the exchange rate positively influenced on the economic growth in Sri Lanka at one percent significant level.

Keywords: Exchange rate; Economic growth; Interest rate; Colombo Consumer Price Index

1. INTRODUCTION

Exchange rate plays an important role in countries' economy which relates on the economies through international relationships. In the view of macroeconomics aspect, the exchange rate means that the price of a country's currency in terms of another country's currency. The exchange rate is classified into both real and nominal exchange rates which formulates the inflation rate. In the exchange rate, if the inflation rate is excluded, it is called real exchange rate. In the meantime, if the inflation rate is included into the exchange rate, which is called nominal exchange rate.

Sri Lanka historically maintains the relationship with foreign countries. By this reason, Sri Lanka earns much of foreign exchange from those countries. In Sri Lanka, the government and monetary policy makers follow the American dollar as common exchange currency. In 1970, an American dollar was transacted for Rs.5.95 Sri Lankan rupees which increased as Rs. 40 after two decades from 1970. Likewise in 2014, it was increased by Rs. 130.56. In economic view, the exchange rate is determined by the demand and supply curve for the exchange which is like the general commodity market system. The exchange rate is affected by the factors such as relative prices of the commodities, rate of inflation, and interest rates.

As mentioned in the Para one, the exchange rate is connected with the economy of the countries. This connection is gotten the mixed results which means, some empirical studies confirmed that the exchange rate positively affected on the economic growth. In the meantime, some study revealed that the exchange rate negatively affected on the economic growth. But in Sri Lankan context it was not confirmed.

To test the impact of the exchange rate on the economic growth in Sri Lankan context, this study is divided as the sub sections such as introduction, literature review, objective of the study, research methods, results and discussion, finally conclusion and recommendation.

2. REVIEW OF LITERATURES

Exchange rate is widely related with the economic growth of countries which is empirically well documented. In this study, the following sound researches in this field are considered as literatures.

Positive relationship

[11] studied the relationship between the exchange rate and economic growth using the Bangladesh data from the period of 1981 to 2013. To test this relationship in this study, the exchange rate and the export income was considered as independent variable and the gross domestic product in constant price was deemed as dependent variable and the multiple regressions model was employed. This study concluded that the exchange rate positively impacted on the economic growth of Bangladesh during the sample periods. [7] investigated the long - run effect of exchange rates on the economic growth in Malaysia. In this study the annual time series data were used from the periods of 1971 to 2009. And also, to test the objective of this study the ARDL technique was employed. Based on the results of this technique this study concluded that the exchange rate in Malaysia positively maintained long run relationship on the economic growth. In the meantime, [4] investigated the impact of exchange rate on the trade and gross domestic product in India using annual time series data from 1970 to 2011. To test this impact in this study the Johansson cointegration technique was employed. This study found that the exchange rate positively and significantly impacted on the economic growth in the long run periods. But this variable was not insignificantly impacted on the economic growth in the short run periods. [8] examined the impact of exchange rate on the economic growth in Nigeria during the annual time series data from the periods of 1980 to 2010. In this study the multiple regressions model was used to test the objective of this study. This study found that the exchange rate positively impacted on the economic growth. [10] investigated the relationship between the exchange rate and economic growth in the experience of Nigeria. In this study, the annual time series data during the

period of 1970 to 2010 were employed and also ordinary least squared method was used. This study concluded that the exchange rate promotes the economic growth during the sample periods. In the meantime [2] investigated the effect of exchange rate on macroeconomic performance in Nigeria using annual time series data during the period of 1986 to 2010. In this study, the multiple regressions model was used and this study found that the exchange rate positively impacted on the economic growth. In the intervening time, [6] investigated the relationship between the exchange rate and economic growth in Nigeria using the annual time series data from the period of 1970 to 2006. In this study, the Error Correction Model was used to test the relationship. This study found that the exchange rate positively impacted on the economic growth at one percent significant level.

Negative relationship

[5] studied the impact of exchange rate on the Nigerian economic growth using annual time series data from 1986 to 2013. To test this impact in this study the multiple regressions model and correlation techniques were employed. At last this study found that the exchange rate negatively influenced on the economic growth but this variable was not significant. The relationship between the exchange rate and economic growth was studied in Pakistan by [1] using annual time series data from the period of 1975 to 2015. In this study, to test the relationship the multiple regressions method was used based on the Ordinary Least Square test. They found that the exchange rate negatively impacted on the economic growth. Likewise, [3] investigated the relationship between the exchange rate and the economic growth in Nigeria using the annual time series data from 1970 – 2009. In this study, the multiple regressions model was employed to test this relationship. They found that the exchange rate negatively maintained the relationship on the economic growth. Likewise, [7] in their study confirmed the negative relationship between the exchange rate and economic growth. To confirm this relationship, the annual time series data of some selected countries from 1970 to 2008 were used in this study and also, the multiple regression method was employed. Internationally the relationship between the exchange rate and the economic growth is well documented and got mixed [positive and negative] results which are confirmed in the literatures of this study, but in Sri Lankan context it was not studied. In this circumstance, a research gap about the relationship between the exchange rate and economic growth in Sri Lankan context is formulated. Therefore, this study fills the gap using annual time series data of Sri Lanka from 1971 to 2015.

3. OBJECTIVE

The objective of this research is to test the impact of exchange rate on the economic growth in Sri Lanka.

4. RESEARCH METHODS

In this study, the variables such as gross domestic product, exchange rate, interest rate, and inflation rate were considered to test the objectives, and also annual time series data of the mentioned variables from 1950 to 2015 were used. In these variables the gross domestic

product was considered as dependent variable and the exchange rate was employed as key independent variables. In the meantime, others were as controlled variables. The relationship between the variables is defined as follows:

$$GDP_t = f(EXR_t, INT_t, CCPI_t) \dots\dots\dots (1)$$

$$GDP_t = \beta_0 + \beta_1 EXR_t + \beta_2 INT_t + \beta_3 CCPI_t + \varepsilon_t \dots\dots\dots (2)$$

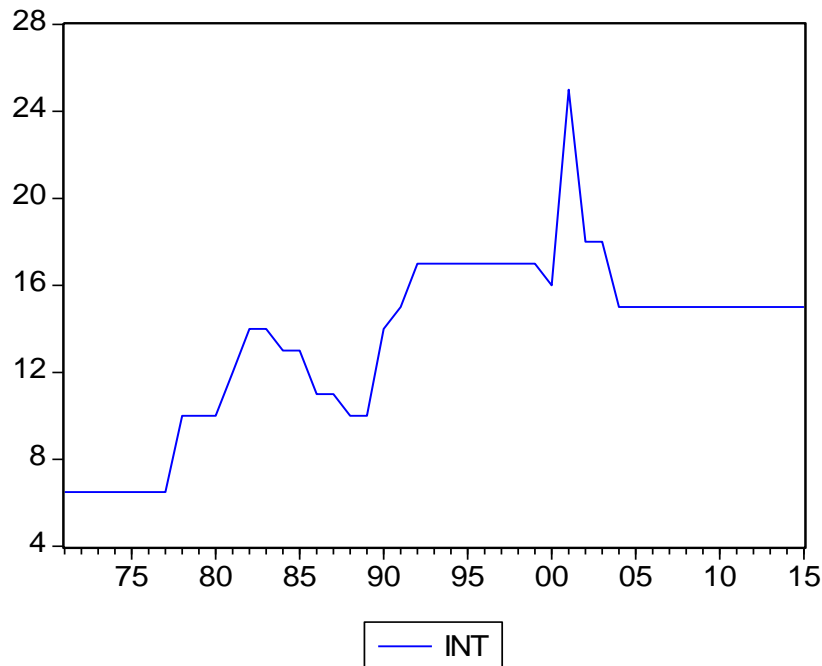
where:

GDP_t : Gross domestic product in constant price which was proxied to economic growth, EXR_t : Exchange rate, INT_t : Interest rate, $CCPI_t$: Colombo Consumer Price Index which proxied to the inflation, β : Coefficients, ε_t : error term.

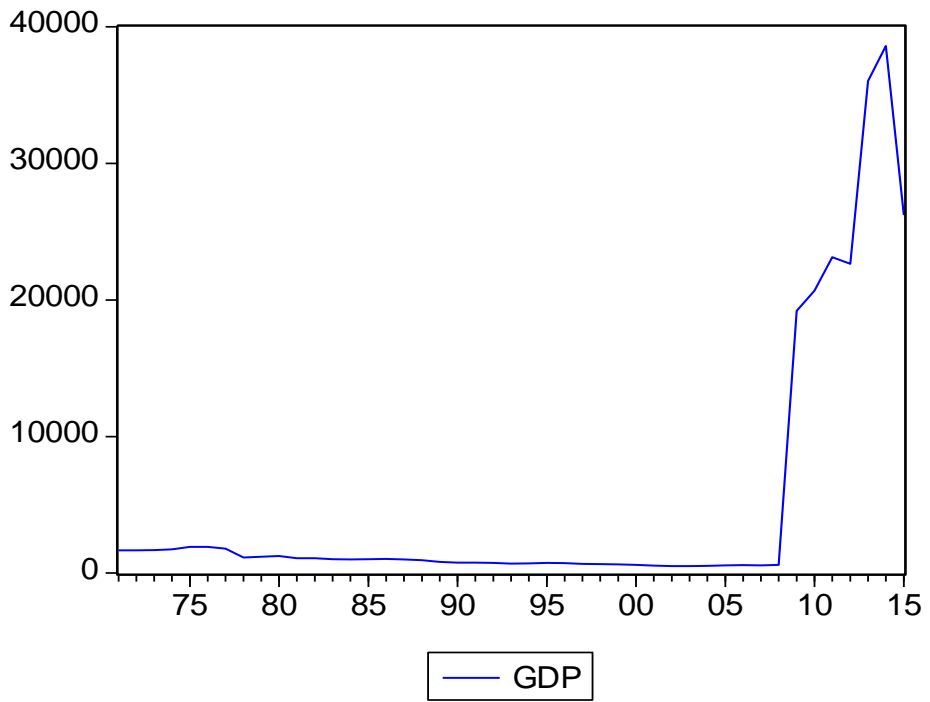
In this study, the graphical analysis (scatter plot, line graph) was used to identify the basic features of the variables and to identify the relationship between selected variables. ADF test was used to test the unit root characteristics of the time series variables. To test the serial correlation effect of the selected model, the Breusch – Godfrey serial correlation LM test was used. To select the appropriate model of this study the F- statistic and R- squared of each model were considered and to examine the impact of each independent variable, the probability values of the each variable and coefficient sign in the multiple regressions model (2) were considered.

5. EMPIRICAL RESULTS

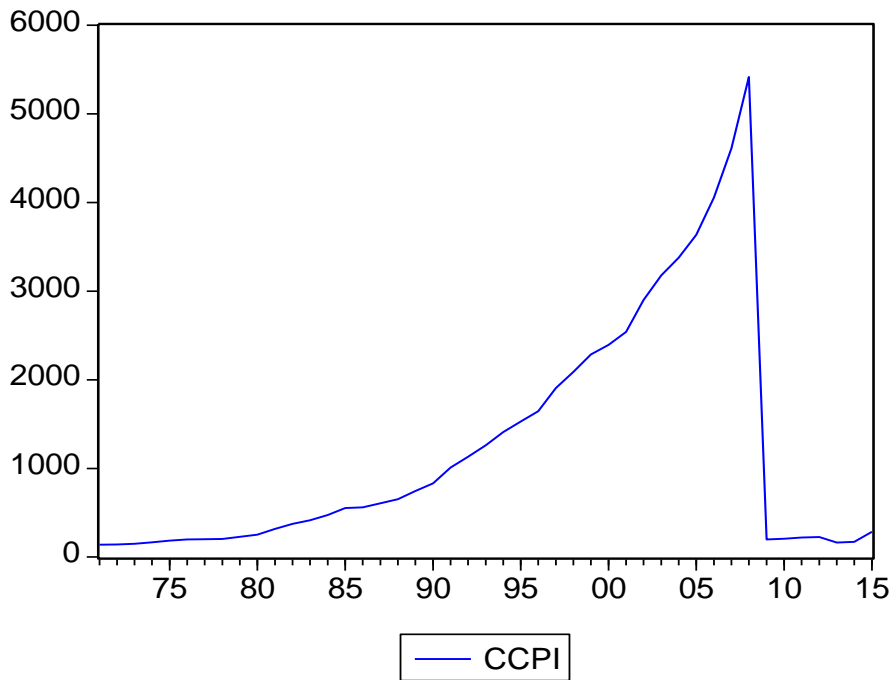
As mentioned in the research methods, the following figure shows the basic features of variables in this study.



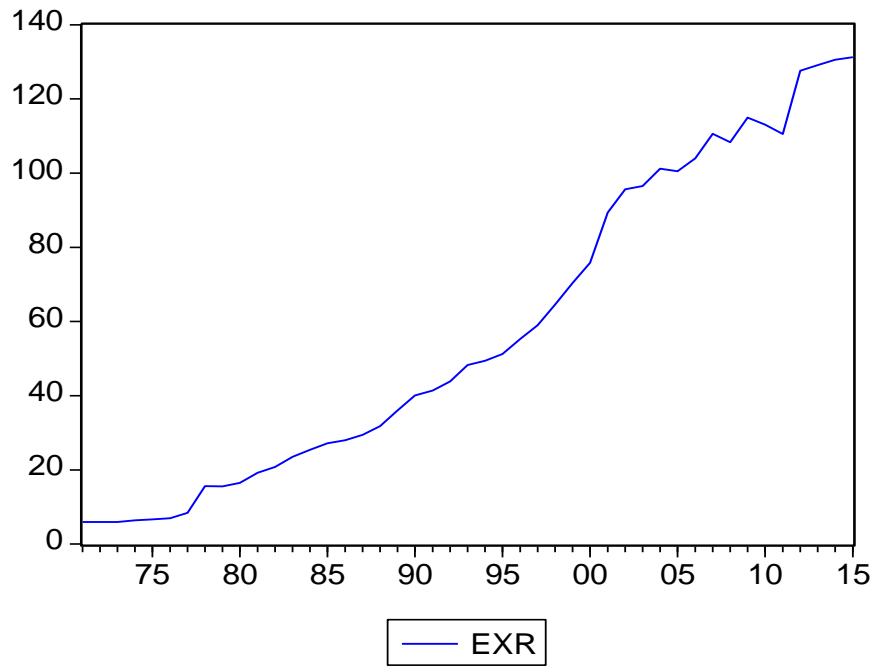
(a)



(b)



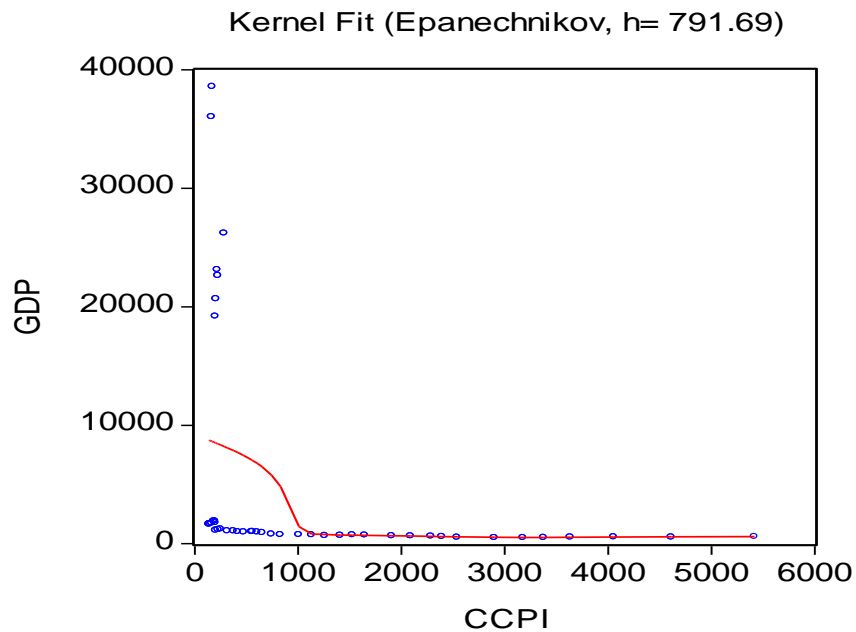
(c)



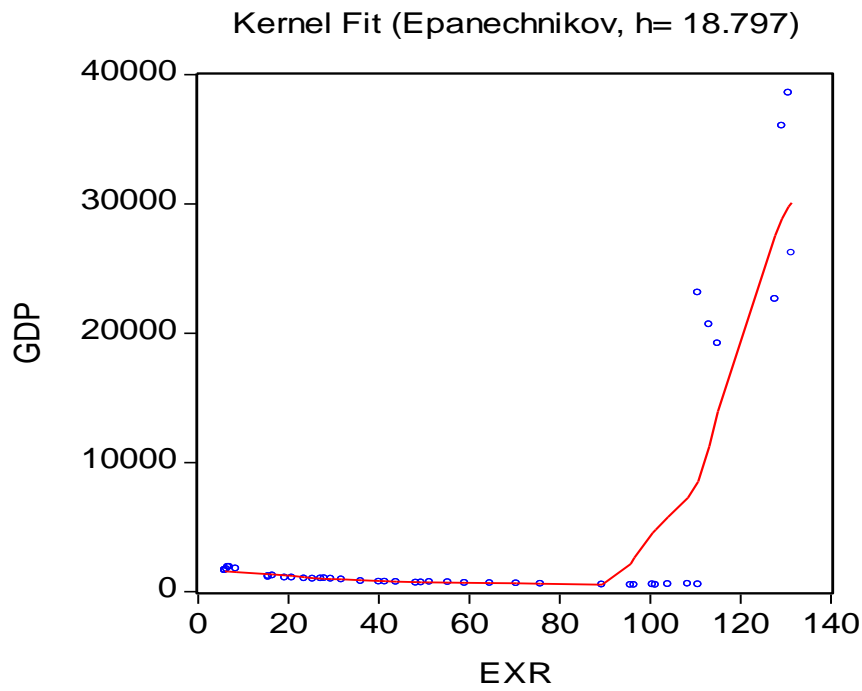
(d)

Figure 1(a-d). Variable dynamic with time.

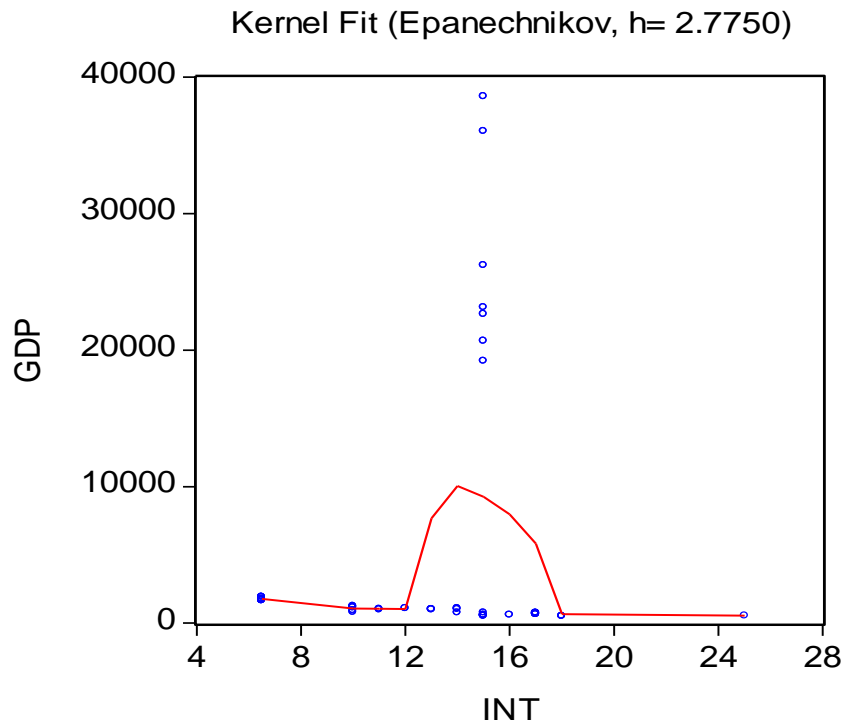
In the Figure 1, the variables in this study such as interest rate, gross domestic product, Colombo consumer price index, and exchange rate maintain a trend with time. In the meantime the following figures show the relationship between all the independent and dependent variables separately.



(a)



(b)



(c)

Figure 2(a-c). The relationship between the independent and dependent variables.

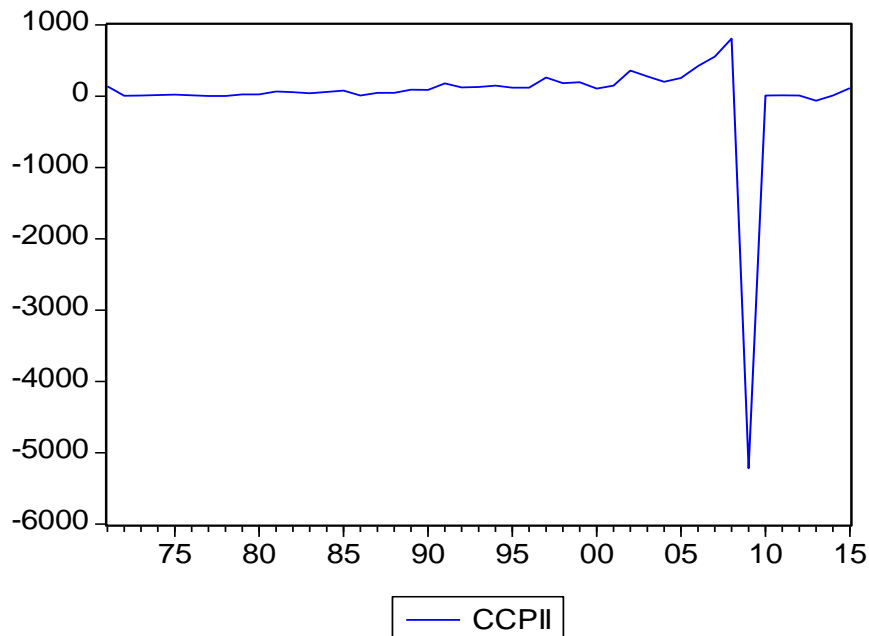
In the Figure 2, the relationship between the independent variable (gross domestic product) and dependent variable is shown separately. Based on the figure, the mixed (positive and negative) relationship between the dependant and independent variables (see Figure 2) is found. In this study, to test the stationarity of the variables the ADF test is considered. The following table shows the results of stationarity of the variables.

Table 1. ADF test results of variables

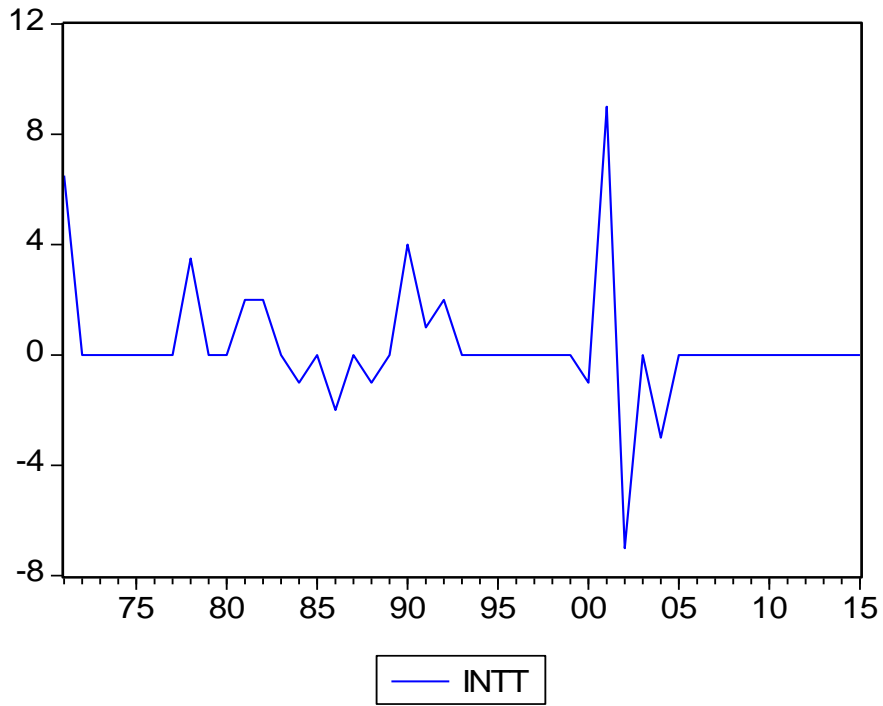
Variables	Level form				1 st difference form			
	Critical value			ADF	Critical value			ADF
	1%	5%	10%		1%	5%	10%	
GDP	-3.61	-2.93	-2.60	-4.26	-3.61	-2.94	-2.60	-3.163
CCPI	-3.59	-2.92	-2.60	-2.045	-3.59	-2.93	-2.60	-7.077
EXR	-3.58	-2.92	-2.60	1.115	-3.61	-2.93	-2.60	-2.113
INT	-3.58	-2.92	-2.60	-2.16	-3.59	-2.93	-2.60	-9.156

Source: Calculated from secondary data from 1971 - 2015

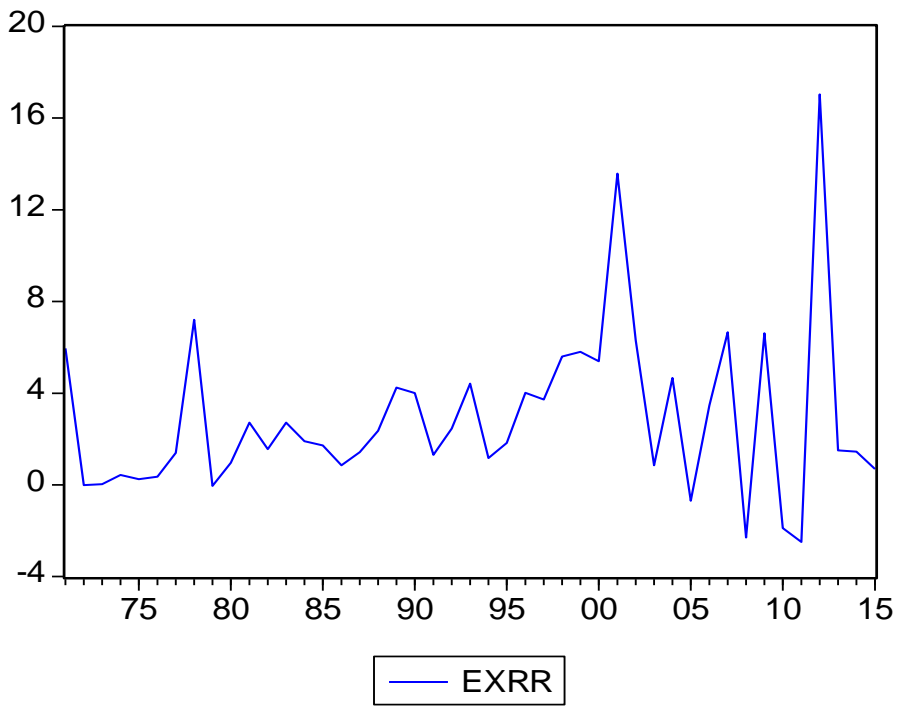
In this study, the GDP is stationary both at level and 1st difference form in 5% significant level. In the meantime, the CCPI is not stationary at level form but which is stationary at 1st difference form. Likewise, the EXR is not stationary at any significant level. But the INT is significant at 1st difference form but not at level form which is illustrated in the following figure.



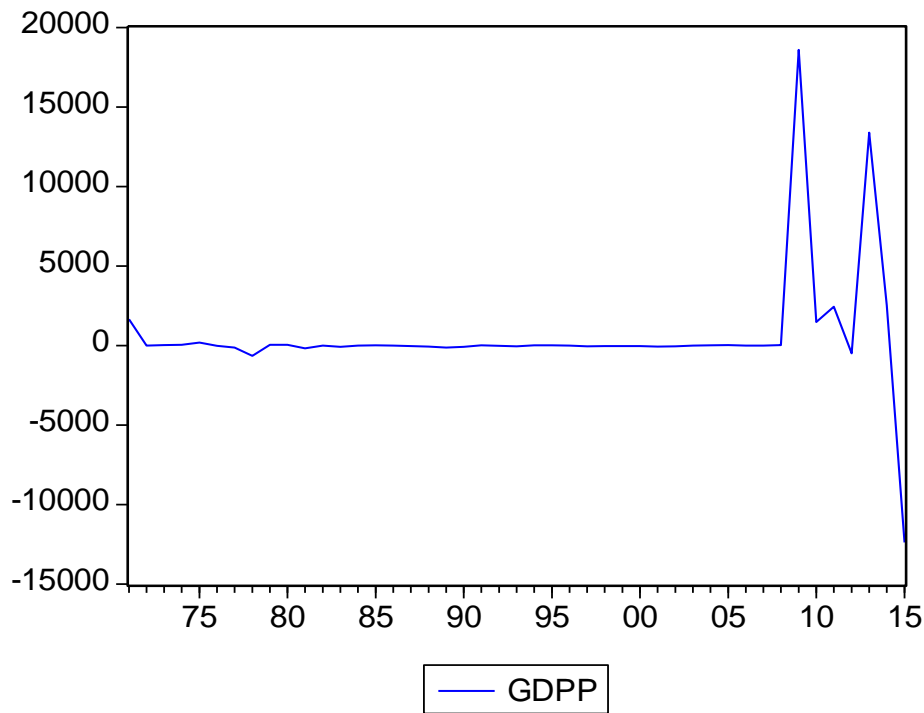
(a)



(b)



(c)



(d)

Figure 3(a-d). Position of the variables at 1st difference

As mentioned in the research method, the linear regressions model is considered to interpret the impact of exchange rate on the economic growth. The regression outcomes are shown in the following table.

Table 2. Regression outcomes of the variables.

$GDP_t = 3970.8 - 5.319CCPI_t + 261.24EXR_t - 561.39INT_t$				
Variables	Coefficients	Std. Error	t- statistic	p- value
CCPI	-5.318911	0.364580	-14.58913	0.0000
EXR	261.2419	13.39012	19.51004	0.0000
INT	-561.3951	144.6828	-3.880177	0.0004
R- squared: 0.92		DW: 1.69		F- statistic: 170.49

Source: Outcomes from E-views software

In the regression outcomes, the independents variables in the fitted model of this study are significant at one percent level. The Colombo Consumer Price Index (CCPI) and Interest rate (INT) are negatively related with the economic growth. But, the relationship between the Exchange Rate (EXR) and the economic growth is positive.

The coefficient of the CCPI in the estimated model is (-5.319) which means if the CCPI increases by one unit, the GDP will be decreased by 5.319 units. On the other hand, if the CCPI decreases by one unit, GDP will be declined by 5.319 units. Likewise, the coefficient of EXR in the estimated model is 261.24 which means, if the EXR increases by one unit, the GDP will be increased by 261.24. Conversely, if the EXR declines by one unit, the GDP will be declined by 261.24 units., the coefficient of INT is (-561.39) which means if the INT increases by one unit, the GDP will be declined by 561.39 units. On the other hand, if the INT decreases by one unit, the GDP will be increased by 561.39 units.

To test the serial correlation effect of the estimated model in this study, the Breusch – Godfrey serial correlation LM test is used, which is shown in the following table.

Table 3. Breusch – Godfrey Serial Correlation LM test.

F- statistic	1.501137	Probability	0.235473
R- squared	3.216547	Probability	0.200233

Source: Outcomes from E-views software

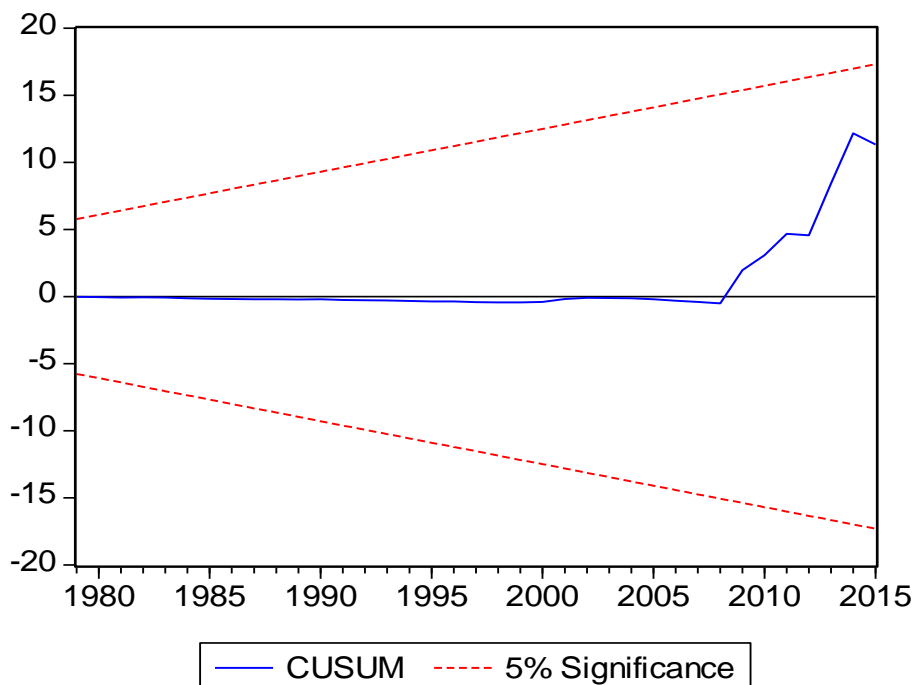


Figure 3. The CUSUM plot for fitted model.

In the Table 3, the F- statistic in the Breusch – Godfrey serial correlation test is 1.5 and its probability value is 0.23. In the meantime, the R- squared of this test is 3.2 and its probability value is 0.20. Both probability values of the F- statistic and R- squared are greater than 5% significant level. Therefore, according to the guide line of the serial correlation, the fitted model is not suffering from the serial correlation effect. In the meantime, to test the stability of the fitted model in this study the CUSUM plot is considered, which is shown as follows Figure 3.

In the Figure 3, the CUSUM line is situated within the two (upper and lower) red grid lines. Based on the guide line of the CUSUM theory, if the CUSUM plot is situated within the grid line the fitted model is stable, otherwise not. In this study the CUSUM plot is situated within the grid line. Therefore, the fitted model is stable.

6. CONCLUSION

In this study, to test the impact of exchange rate on the economic growth in Sri Lanka the multiple regression model is used. In this model, the gross domestic product is considered as dependent variable and exchange rate, and inflation rate, interest rate are used as independent variables. Based on the multiple regressions model, this study concludes that the exchange rate positively influenced on the economic growth in Sri Lanka at one percent level. Therefore, this result confirms the theory of exchange rate that the high exchange rate promotes the economic growth of countries.

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APPENDICES

Appendix 1. Regression outcomes of the variables

Dependent Variable: GDP
 Method: Least Squares
 Date: 08/02/16 Time: 17:59
 Sample: 1971 2015
 Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3970.819	1550.634	2.560771	0.0142
CCPI	-5.318911	0.364580	-14.58913	0.0000
EXR	261.2419	13.39012	19.51004	0.0000
INT	-561.3951	144.6828	-3.880177	0.0004
R-squared	0.925788	Mean dependent var		4971.078
Adjusted R-squared	0.920358	S.D. dependent var		9826.608
S.E. of regression	2773.157	Akaike info criterion		18.77805
Sum squared resid	3.15E+08	Schwarz criterion		18.93864
Log likelihood	-418.5061	F-statistic		170.4910
Durbin-Watson stat	1.690361	Prob(F-statistic)		0.000000

Appendix 2. Serial Correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.501137	Probability	0.235473
Obs*R-squared	3.216547	Probability	0.200233

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 08/02/16 Time: 19:31

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-116.1570	1533.488	-0.075747	0.9400
CCPI	0.010349	0.373596	0.027700	0.9780
EXR	-4.286854	13.46751	-0.318311	0.7519
INT	21.70822	143.6097	0.151161	0.8806
RESID(-1)	0.216371	0.165438	1.307866	0.1986
RESID(-2)	-0.283621	0.199740	-1.419949	0.1636

R-squared	0.071479	Mean dependent var	1.20E-12
Adjusted R-squared	-0.047562	S.D. dependent var	2676.948
S.E. of regression	2739.870	Akaike info criterion	18.79277
Sum squared resid	2.93E+08	Schwarz criterion	19.03366
Log likelihood	-416.8374	F-statistic	0.600455
Durbin-Watson stat	1.962249	Prob(F-statistic)	0.699789