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Sri Lankan Debt Crisis: The Role of Fiscal Deficit and Current Account Deficit

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Abstract - **This paper examines the relationship between the debt-GDP ratio and twin deficits during 1971-2021 in the context of the present economic crisis in Sri Lanka using the techniques of cointegration and error correction model. The results of the study indicate the existence of a long run relationship among these variables. A fiscal deficit tends to increase the debt-GDP ratio in the long run, whereas in the short run, there is no evidence of any impact of fiscal deficit on the debt-GDP ratio. A current account deficit is expected to raise the debt-GDP ratio in the short run; but in the long run, it seems to have a significant negative impact. Similar results are obtained when the relationship among debt-GDP ratio, fiscal deficit and trade deficit is investigated. Hence, the view that opines persistent high fiscal deficit as the main cause behind the crisis, is supported by the present study. The results advocate for utilizing a country's own resource generating methods like taxation rather than using external debt as a source to finance deficits. JEL Classification Numbers: F14, F34**
Keywords: **External Debt, Sri Lankan Crisis, Cointegration, Error Correction Model, Current Account Deficit, Fiscal Deficit**

I. INTRODUCTION

On 21 April 2019, the incident of Easter terror blasts in Sri Lanka shook the country and the world severely. Subsequently, Sri Lanka recurrently came into the world news for the unprecedented economic crisis and consequent political crisis faced by the country since her independence in 1948 causing severe distress to the citizens of the country. Per capita GNI fell substantially turning the country into a lower middle-income country in 2020 again that was promoted to the upper middle-income group just one year before [World Bank], the food inflation rate rose to a record figure of 46.6 per cent in 2022 and external debt obligations attained the value of USD 50.7 billion in 2021 [1].

The condition of the economy was so bad that the government of the country declared a temporary suspension of all external debt servicing in April 2022. Ultimately, Sri Lanka became an example to show how the economic policies taken by the government can be the reason behind political conflicts in an economy whereas most of the existing studies described political conflicts as the cause of poor performance in economic development [2].

Sri Lanka was a promising country at the time of its independence. The country was considered as, "an oasis of stability, peace and order" [3]. Even in 2019, the country was categorized as a High Development country with a human development index (HDI) of 0.78, which was the highest among the South Asian Countries [UNDP].

In contrast, at that time the country's total government debt was 86 per cent of GDP, the fiscal deficit was SL Rs. 1439.1 billion and the trade deficit was SL Rs.1430.232 billion [CBSL Annual Reports]. The present study focuses on the causes of the economic crisis emphasizing the role of fiscal deficit and current account deficit in generating the external debt problem. The study is both important and interesting for two reasons. First, it is a significant area of academic interest that would analyze how a country, that "appeared to possess the essential ingredients for rapid development" [4], over the decades succumbed to the present undesirable situation of economic as well as political turmoil. Second, for policy making also the study would be important as it might provide some lessons for other countries.

It is known that many countries used foreign borrowing to supplement domestic investment. The literature on international debt tried to explain how the obligation of foreign debt servicing became a financial burden on some borrowing countries hampering the process of economic development although foreign debts were supposed to support the process of development (for a survey of the literature on the relationship between debt and economic growth see [5]). The factors which contributed to the debt servicing problems of developing countries were classified as the external factors, which were related to the world economy, viz., increases in the prices of non-compressible imports, decreases in the prices of major exportable commodities of the debtor countries, export demand slumps etc., and the internal factors like macroeconomic mismanagement of the domestic economy, shocks to the productive capacity from weather, social unrest, unsustainable growth targets and development plans, speculation, capital flight and the size of the outstanding debt [6].

The exact causes behind the debt servicing problems varied across countries, but in general, a country faced debt servicing problems if it were unable to raise revenue from its own resource-generating methods like taxation and/or was unable to find foreign exchange to make repayment of foreign loans. In short, external debt was essentially used to finance the fiscal deficit and/or current account deficit of the debtor countries, and therefore, the levels of these two deficits would affect the external debt positions of the countries.

On the other hand, there is another strand of literature called the twin deficit hypothesis. This hypothesis advocates for a relationship between the fiscal deficit and the current account deficit (or trade deficit) of a country. The empirical studies that examined the twin deficit hypothesis for different countries provided mixed results. Some studies indicated that there was no relationship between fiscal deficit and trade deficit or current account deficit, while others noted that budget deficit might cause trade deficit.

Sri Lanka is a classic example of the persistent existence of twin deficits [7]. During 1950-2021 Sri Lanka's fiscal balances were positive only in 1954 and 1955, and in the same period the current account balances were found to be positive in a few years in 1950s; but from 1957 till 2021 current account balances were observed to be positive in 1965 and 1977 only [CBSL Annual Reports 2020, 2021]. A long run relationship was found between budget deficits and current account deficits in Sri Lanka during 1970-2003 where the direction of causality was expected to be from budget deficits to current account deficits indicating that any attempt to reduce the budget deficit would reduce the current deficit also [8].

For the period 1959-2013 a long-term positive relationship was found between budget deficit and economic growth measured by GDP at constant prices [9] whereas fiscal deficit as a percentage of GDP had a significant negative impact on economic growth measured by the GDP growth rate during 1970-2015 [10].

Studies on the Sri Lankan crisis that began in 2019 assessed the role of the major causes of the crisis, viz. tax cuts leading to an increase in fiscal deficits, money creation followed by high inflation, agricultural crisis due to the government's decision to implement green farming, shortages of foreign exchange reserves due to a fall in earnings from tourism and exports, degradation of the country in credit rating leading to inability to finance deficits by borrowing from the international institutions further etc. [11], [12], [13], [14].

The literature described the existence of high levels of fiscal deficits, current account deficits and external debt as stylized facts about the Sri Lankan economy and studied the relationship between the two kinds of deficits. The relationship between deficits and economic growth was also examined. The relationship between deficits and external debts is not explored explicitly. The present paper aims at that objective.

The purpose of the present study is to examine the relationship among external debt-GDP ratio, fiscal deficit and current account deficit using time series data during the period 1971-2021. Applying the techniques of cointegration and error correction model we attempt to analyze the short-run and long-run effects of fiscal and current account deficits on the debt-GDP ratio.

The rest of the paper is organized as follows. The methodology of the study is described in section II. A brief overview of the Sri Lankan economy is presented in Section III which describes the trends in major development indicators and various indicators of debt and deficits. Section IVA examines the relationship among debt-GDP ratio, fiscal deficit and current account deficit, and Section IVB investigates that among debt-GDP ratio, fiscal deficit and trade deficit. Some concluding remarks are made in Section V.

II. METHODOLOGY

The trends in various indicators of economic development, deficits and debts are revealed by line diagrams. The time periods for the Figures are determined by the availability of data. For conducting the regression analysis with time series data, we first determine the order of integration of each variable using DF-GLS, Augmented Dickey Fuller (ADF) and Phillips- Perron (PP) tests where the optimum lag length is chosen using Akaike criterion. We estimate two alternative models. Using the study period 1971-2021 in model 1 we study the relationship among debt-GDP ratio (debt), fiscal deficit (fd) and current account deficit (cad); model 2 examines the relationship among debt-GDP ratio, fiscal deficit and trade deficit (td). As the variables are found to be non-stationary at level and stationary at first difference we conduct Johansen test for co-integration in order to examine whether a long term relationship exists among them. When the variables are found to be co-integrated an error correction model (ECM) is estimated to analyze the short run and long run relationship.

III. A BRIEF OVERVIEW OF THE SRI LANKAN ECONOMY

In this section we present the trends in various indicators of economic development viz., growth rates of GDP, per capita GDP and population, life expectancy, infant mortality rates, literacy rate, school enrolment, human development index and Gini coefficient. It is observed that the rates of growth of GDP and per capita GDP both fluctuated during the period being negative in early 1970s, early 2000s and in 2020. However, in 2020 the rates attained the lowest values of around minus four per cent, and that too while attaining the highest rate of nine per cent in 2012 [Figure 1].

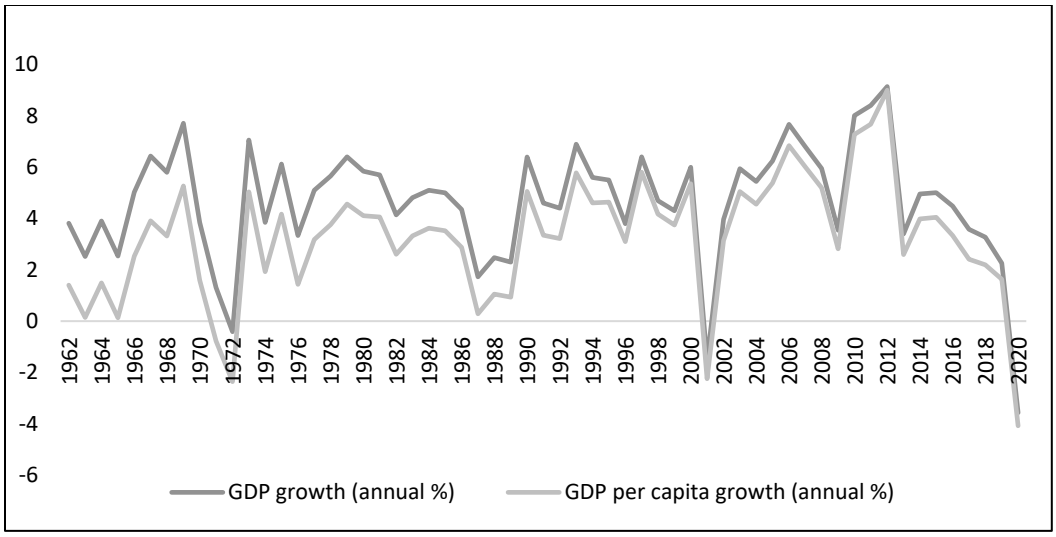

Fig. 1 Trends in Growth Rates(%) of GDP and Per Capita GDP

It can be said that Sri Lanka performed satisfactorily according to most of the other indicators. Population growth rate decreased till 1999; from 2000 some fluctuations were noted reaching the all-time lowest rate of 0.1 per cent in 2012. In 2020 the rate was 0.5 per cent again. Life expectancy at birth, adult literacy rate increased continuously, primary school enrolment rates were around ninety nine per cent during 2001-2018 except in 2004-2014. The country was characterized by a moderate degree of inequality in income [Figures 2-7].

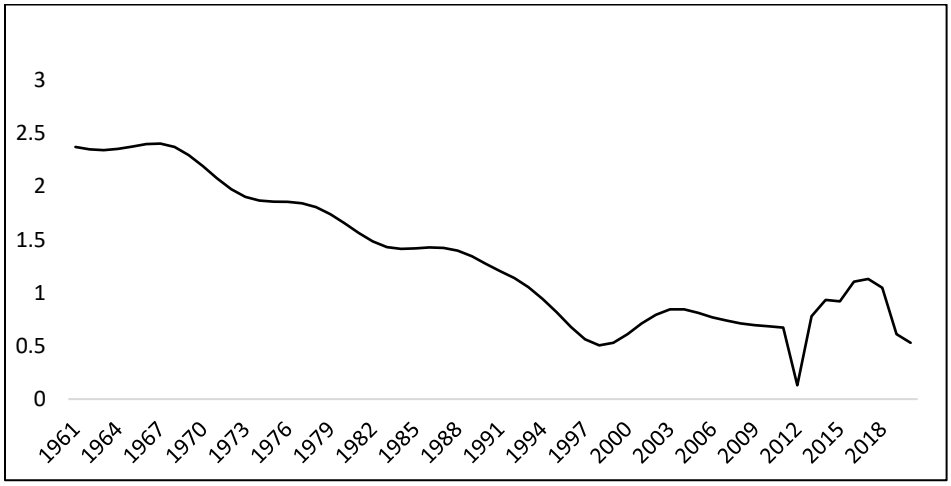

Fig. 2 Population growth (annual %)

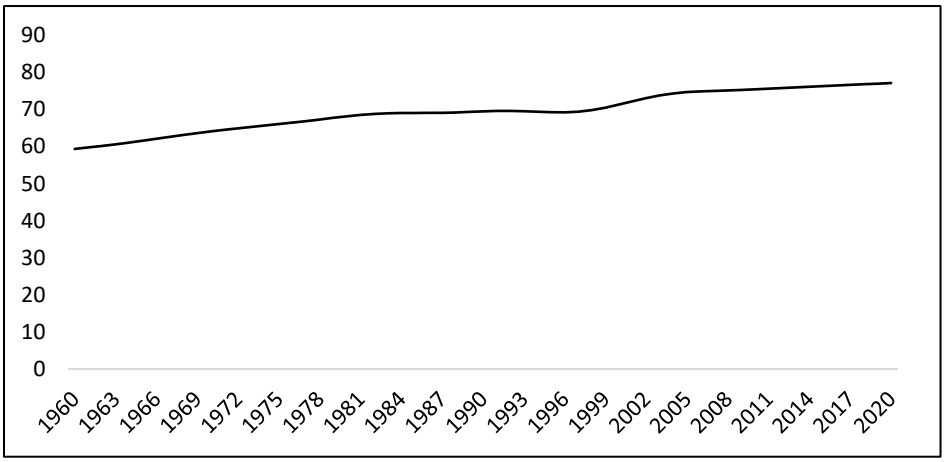

Fig. 3 Life expectancy at birth (years)

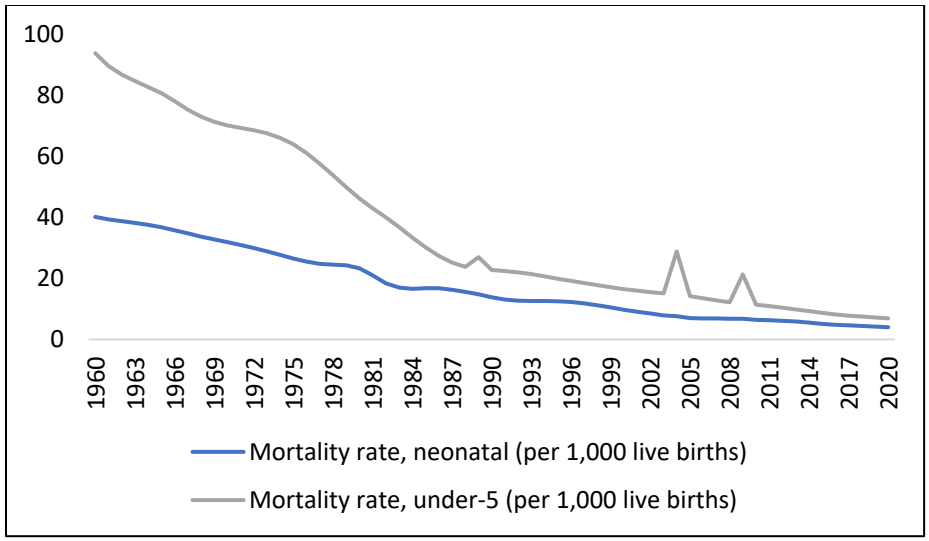

Fig. 4 Infant Mortality Rates

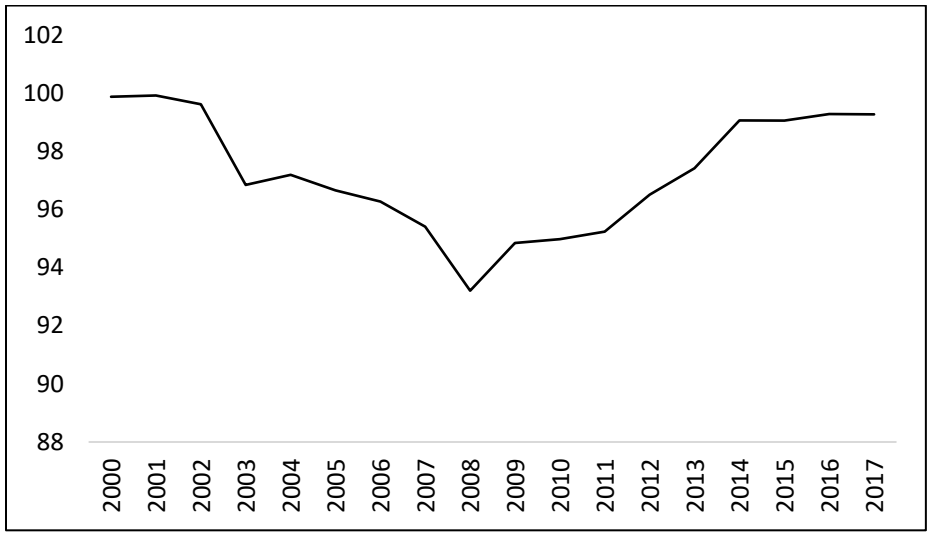

Fig. 5 Adjusted net enrolment rate, primary (% of primary school age children)

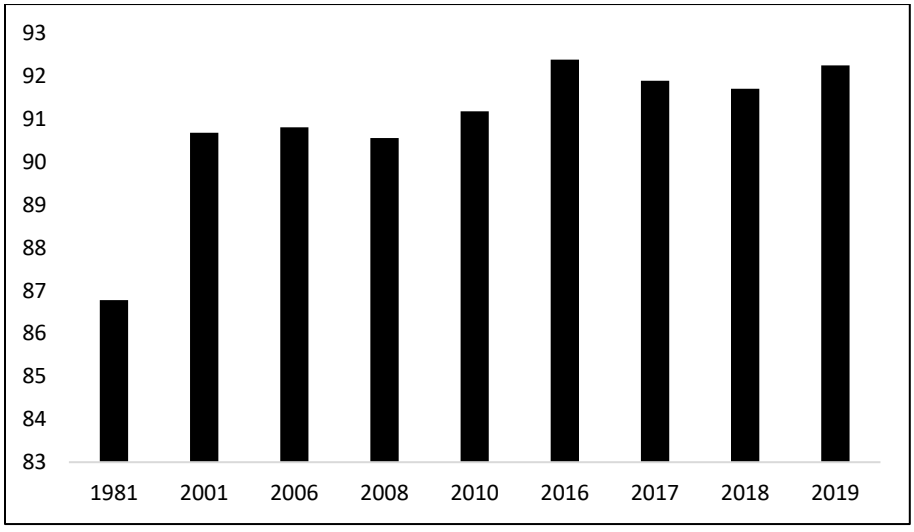

Fig. 6 Literacy Rates (%)

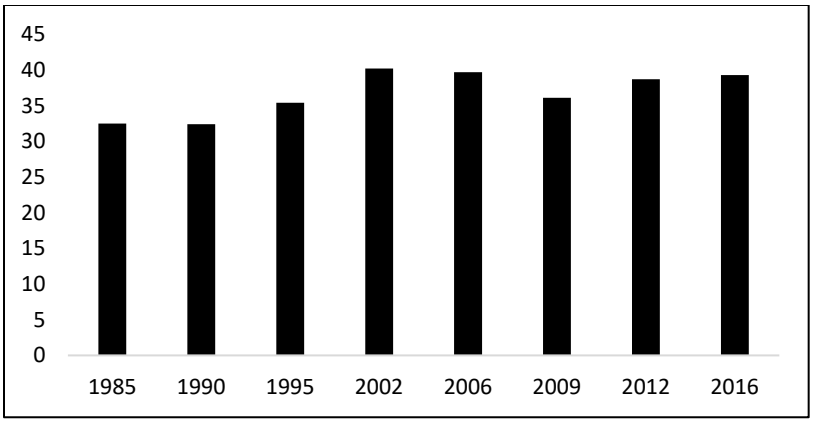

Fig. 7 Gini Coefficient (%)

Further, since the first publication of the Human Development Report in 1990 by UNDP, HDI of Sri Lanka continuously increased till 2019 and always it was more than that of all South Asian countries as a whole. Further, from 2002 Sri Lanka was categorized as high development country [Figure 8].

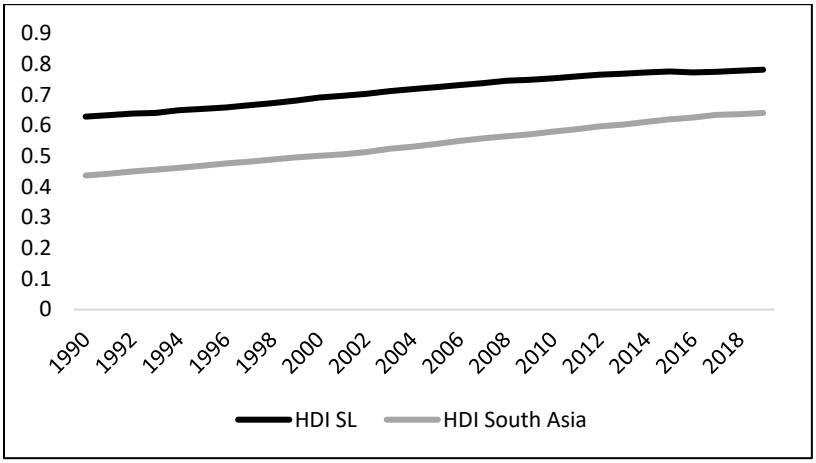

Fig. 8 Trends in Human Development Index for Sri Lanka and South Asia

In order to throw some light on the performance of the external and public sectors, we consider the indicators like import-GDP and export-GDP ratios, the annual growth rates of imports and exports, and the external and internal deficits. Finally, the trends in various debt indicators are also observed. During 1960 – 2020 Sri Lanka's imports as a ratio of GDP were always more than exports as a ratio of GDP except only in 1965 and 1977 [Figure 9]. The annual growth rates of imports and exports both, however, fluctuated during this period and no general observations regarding their relative magnitudes are evident [Figure 10].

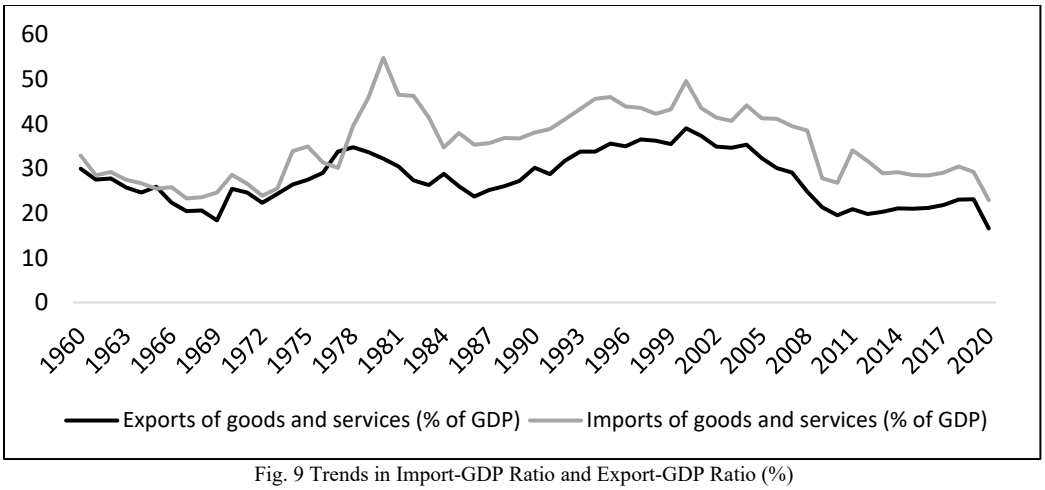

Fig. 9 Trends in Import-GDP Ratio and Export-GDP Ratio (%)

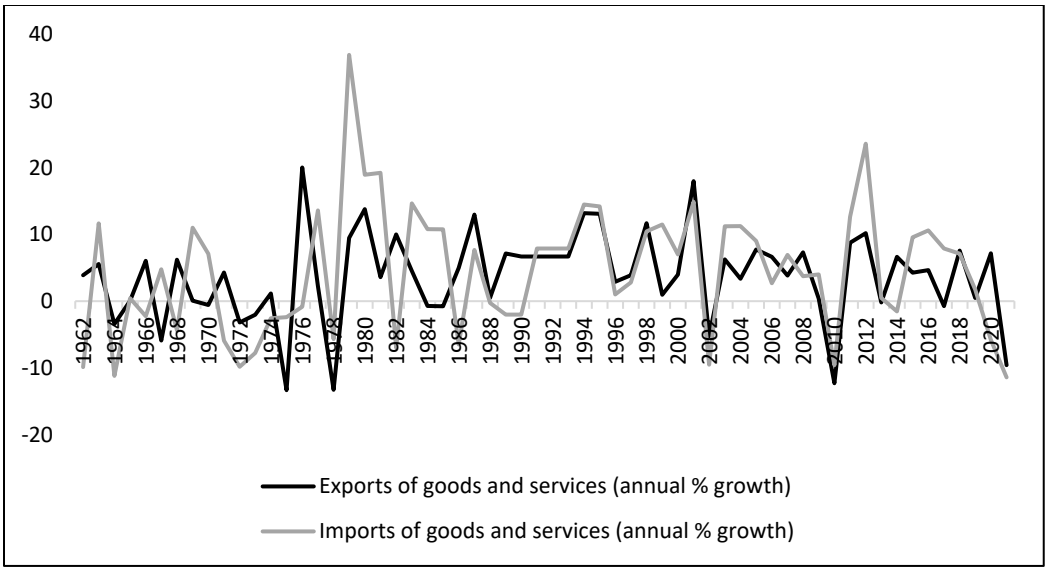

Fig. 10 Trends in Annual Growth Rates of Exports and Imports

During 1971 - 2021 the current account balance and trade balance of Sri Lanka were positive only in 1977 and fiscal deficit had been a general phenomenon in the country. From 2000 the deficits increased significantly. In 2021 the fiscal deficit, current account deficit and trade deficit attained the figures of SLRs. 2071.826 bn, SLRs. 667.951 bn and SLRs. 1617.274 bn respectively [Figure 11]. These huge amounts of deficits consequently increased the debt-GDP ratios in the country. Domestic debt, foreign debt and total government debt as percentages of GDP had been rising since 1950. It is found that in 2021 total debt of Sri Lanka became 104 per cent of GDP reflecting that the country borrowed more than the amount it produced [Figure 12].

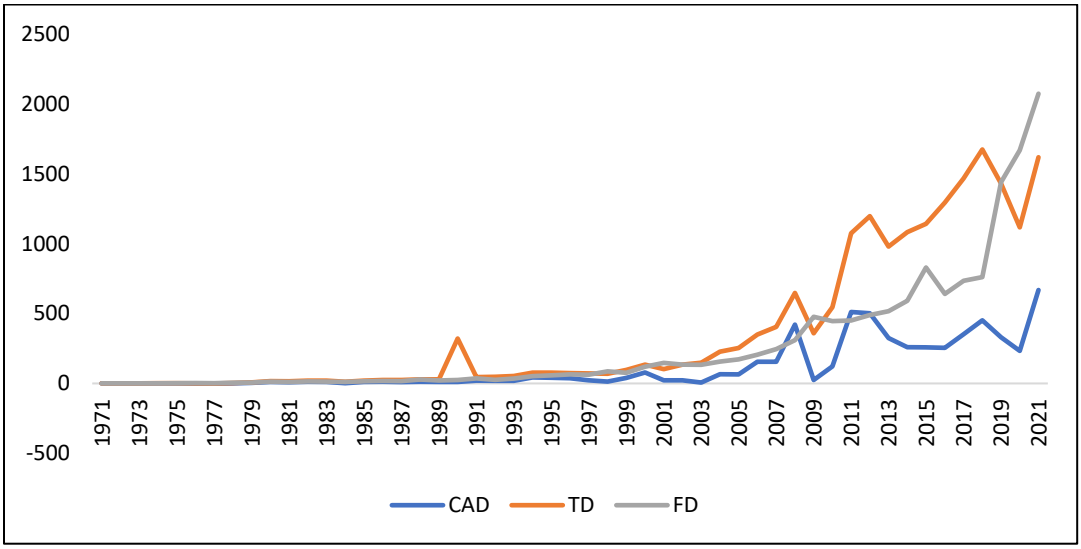

Fig. 11 Trends in Current Account Deficit, Trade Deficit and Fiscal Deficit (Rs. Billion)

The studies made on the Sri Lankan economy noted some stylized facts about the country [4], [12], [14]. The average import-GDP ratio of Sri Lanka during 1960-2020 was 35.20 per cent which showed the dependence of the economy on imports (World Bank, World Development Indicators). Further, the major items of imports of Sri Lanka had been essential goods including intermediate goods. In the last five years (2017-2021) the average percentage of imports of intermediate goods in total imports was 56.5 and that for fuel imports was 17.68 (CBSL Annual Report 2021, Vol. I, Statistical). These two facts reflected the extent of the country's dependence on the availability of foreign exchanges.

On the other hand, foreign exchange reserves were earned through exports of goods like tea and textiles, tourism, the remittance by workers abroad etc. It was noted that the import-GDP ratio in Sri Lanka was more than export-GDP ratio throughout the period from 1960 to 2020 except in 1965, 1967 and 1977 [Figure 9]. Consequently, negative trade and current account balances were a feature of the economy during this period except in 1977 [Figure 11]. On the

domestic side, the tax-revenue- GDP ratio had been very low, and the existence of a fiscal deficit was another feature of the Sri Lankan economy [Figure 11]. These deficits were often financed by debt, which led to an increase in demand for foreign exchange, and printing money leading to a rising inflationary trend in the economy.

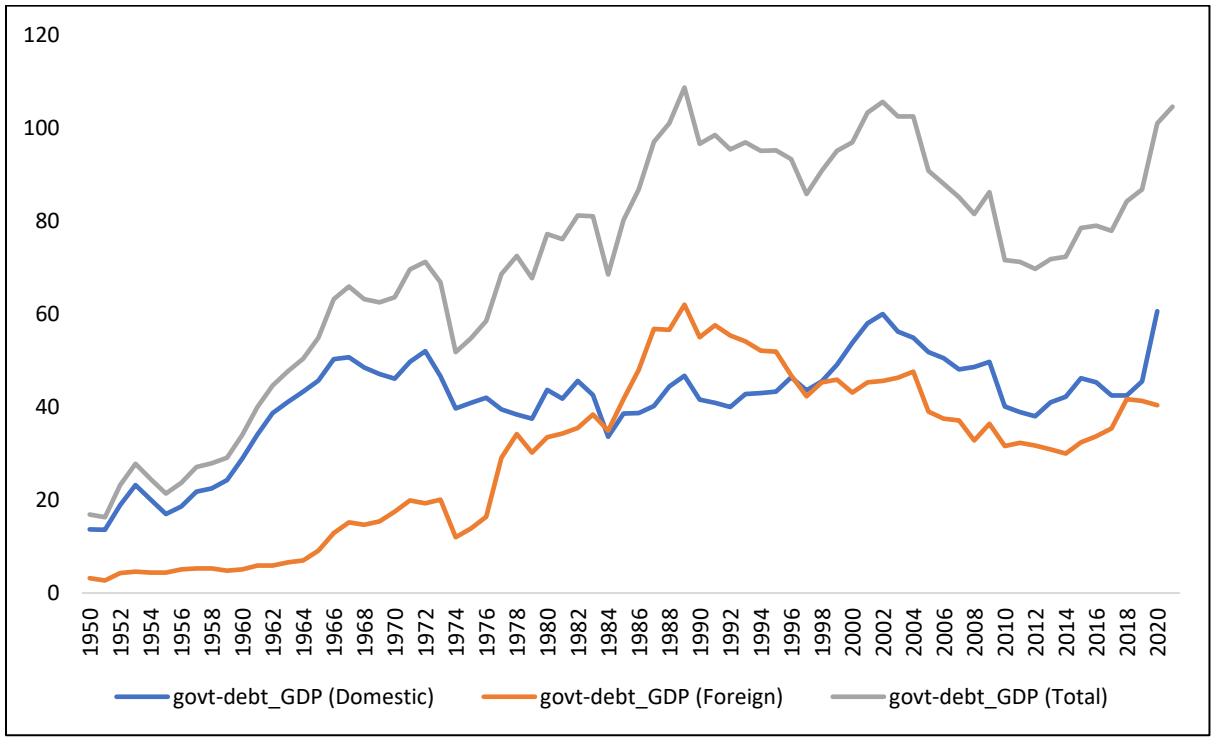

Fig. 12 Trends in Government Debts

Against this backdrop, in 2019 two major events affected the supply of foreign exchange adversely. One was the Easter Sunday bombing, and the other was the spread of COVID-19 throughout the world. For both incidents, the tourism sector was badly affected; on the other hand, COVID-19 was responsible for a fall in global demand for Sri Lanka's major export items like tea and textiles.

TABLE I VALUE OF EXPORTS, INFLOW OF FDI AND WORKERS' REMITTANCE (IN US$ MILLION) AND THE NUMBER OF TOURIST ARRIVAL IN THE LAST FIVE YEARS

Year	Value of Exports	Inflow of FDI	Workers Remittance	Number of Tourist Arrival
2017	11360	1373	7164	2116,407
2018	11890	1614	7015	2333,796
2019	11940	743	6717	1913,702
2020	10047	434	7104	507,704
2021	12499	598	5491	194,495

Source: Central Bank of Sri Lanka, Annual Report 2021

As a result, the supply of foreign exchange fell substantially. The earnings from the export sector, inflow of foreign direct investment and workers' remittance also changed in the last five years [Table I].

The disruption of earnings and employment in the domestic economy reduced the investment opportunities and the policies undertaken to support the vulnerable group of people during pandemic put additional pressure on the government budget; whereas the implementation of election promise of tax-cut in 2021 reduced government revenues. Naturally, fiscal deficits increased further; again, degrading of the Sri Lankan economy in credit rating by various institutions led to limited scope of borrowing from the international market anymore. The remittance by the workers also decreased significantly.

Further, the sudden implementation of the policy of shifting to organic farming in April 2021 was followed by negative impacts on the supply of essential consumer goods and export goods. The idea of organic farming was, no doubt, appreciable for at least for two reasons. First, it was environmentally friendly and second, it would help to improve the current account balance position of the country

by reducing its import bill for chemical fertilizers. However, it was pointed out by many researchers that yields of many agricultural products were much less for this technology compared to the traditional one and that was responsible for the decrease in the supply of those crops leading to a rising inflationary trend. For instance, rice production was reduced by 20 per cent and the country was compelled to import rice [13] and tea production was hampered causing a fall in export earnings. Ultimately, in November 2021 the government withdrew the policy.

All these factors, discussed above, contributed to an acute shortage of foreign exchange in the country. Since, Sri Lanka was a country that was highly dependent on the import of essential goods including fuel (in 2021 the percentage of imports of intermediate goods in total imports was 59.6 and fuel import constituted 18.1 per cent of total imports [CBSL Annual Report 2021]), due to a shortage of foreign exchange the country faced a shortage of fuel and other essential goods and that led to the disruption of all the economic activities in the country and unparalleled sufferings of the citizens.

IV. RELATIONSHIP AMONG DEBT-GDP RATIO, FISCAL DEFICIT AND CURRENT ACCOUNT (OR TRADE) DEFICIT

In order to study the relationship among the variables using time series data, first we determine the order of integration of the variables. The relevant DF-GLS, PP and ADF statistics and the critical values at five per cent level of significance show that all the variables are non-stationary at level but stationary at first difference [Table II].

TABLE II UNIT ROOT TEST RESULTS

Variable	Lag	DF-GLS Test Statistic	PP Test Statistic	ADF Test Statistic
debt_gdp	1	-1.245 (-3.171)	-1.970 (-2.930)	-2.105 (-2.933)
Ddebt_gdp	0	-7.443 (-3.201)	-7.286 (-2.933)	-7.286 (-2.933)
fd	4	-0 .723 (-3.048)	7.373 (-2.930)	4.208 (-2.941)
Dfd	2	-3.378 (-3.153)	-4.852 (-2.933)	-2.974 (-2.938)
cad	4	-1.231 (-3.048)	-0.766 (-2.930)	0.864 (-2.941)
Dcad	1	-6.358 (-3.189)	-7.696 (-2.933)	-8.640 (-2.936)
td	3	-0.531 (-3.097)	1.370 (-2.930)	1.989 (-2.938)
Dtd	1	-7.195 (-3.183)	-7.266 (-2.933)	-7.547 (-2.936)

Note: Figures within brackets represent 5% critical values

A Relationship among Debt-GDP Ratio, Fiscal Deficit and Current Account Deficit

For examining the relationship among debt-GDP ratio, fiscal deficit and current account deficit we consider the following model.

Model 1: $\text{debt\_gdp}_t = \alpha_0 + \alpha_1 \text{fd}_t + \alpha_2 \text{cad}_t + \text{error}_t$

The three variables are stationary at first difference according to the PP test. We conduct Johansen co-integration test to examine whether there exists a long-run relationship among them. The co-integration test results for various specifications indicate that for trend (restricted constant) and trend (trend) specifications the null hypothesis H_0: r = 0 (i.e., no co-integration among the variables) is rejected and the null hypothesis H_0: r = 1 (i.e., there exists one cointegrating equation among them) is not rejected. Thus, there may exist a long-run relationship among the variables [Table III].

TABLE III CO-INTEGRATION TEST RESULTS FOR DEBT-GDP RATIO, FISCAL DEFICIT AND CURRENT ACCOUNT DEFICIT

Model Specification	Maximum Rank	Trace Statistic	5% Critical Value	Result
Trend (Constant)	0	46.6259	29.68	??
	1	16.3575	15.41	
	2	7.4857	3.76	
Trend (Restricted constant)	0	49.5530	34.91	H_0: r = 0 is rejected and H_0: r = 1 is not rejected
	1	17.4040*	19.96	
	2	8.4218	9.42	
Trend (Trend)	0	39.8942	34.55	H_0: r = 0 is rejected and H_0: r = 1 is not rejected
	1	16.8347*	18.17	
	2	3.3723	3.74	

Using error correction models for trend (restricted constant) and trend (trend) specifications we get the following short-run and long-run relationship among them, where the figures within brackets are the p-values.

1. Trend (Restricted Constant) Specification

a. Long-Run Relationship

$$\begin{array}{lll} ECT_t = & debt\_gdp_t - 2.312fd_t + 2.160cad_t & - 49.665 \\ & (.000) \quad (.013) & (.284) \end{array}$$

b. Short-Run Relationships

$$\begin{array}{l} Ddebt\_gdp_t = - 0.001ECT_{t-1} + 0.088Ddebt\_gdp_{t-1} + 0.198Ddebt\_gdp_{t-2} + 0.060Ddebt_{t-3} - 0.007Dfd_{t-1} \\ \quad (.725) \quad (.603) \quad (.213) \quad (.698) \quad (.597) \\ \quad - 0.003Dfd_{t-2} - 0.007Dfd_{t-3} + 0.017Dcad_{t-1} - 0.010Dcad_{t-2} + 0.006Dcad_{t-3} \\ \quad (.868) \quad (.712) \quad (.069) \quad (.245) \quad (.518) \end{array}$$

$$\begin{array}{l} Dfd_t = - 0.293ECT_{t-1} + 0.880Ddebt\_gdp_{t-1} - 2.596Ddebt\_gdp_{t-2} + 1.908Ddebt_{t-3} - 0.572Dfd_{t-1} \\ \quad (.000) \quad (.726) \quad (.270) \quad (.408) \quad (.005) \\ \quad - 0.490Dfd_{t-2} - 1.551Dfd_{t-3} + 0.817Dcad_{t-1} + 0.310Dcad_{t-2} + 0.346Dcad_{t-3} \\ \quad (.030) \quad (.000) \quad (.000) \quad (.020) \quad (.017) \end{array}$$

$$\begin{array}{l} Dcadt_t = - 0.750ECT_{t-1} + 1.011Ddebt\_gdp_{t-1} - 0.417Ddebt\_gdp_{t-2} - 3.579Ddebt_{t-3} - 0.478Dfd_{t-1} \\ \quad (.200) \quad (.714) \quad (.872) \quad (.159) \quad (.035) \\ \quad + 0.233Dfd_{t-2} + 0.524Dfd_{t-3} - 0.430Dcad_{t-1} - 0.412Dcad_{t-2} - 0.186Dcad_{t-3} \\ \quad (.350) \quad (.080) \quad (.006) \quad (.005) \quad (.244) \end{array}$$

For the restricted constant trend specification, the results indicate that in the long run, fiscal deficit and current account deficit are expected to have significant partial impacts on the debt-GDP ratio. It is observed that the increase in fiscal deficits tends to increase the debt-GDP ratio whereas increase in current account deficits tends to decrease the ratio. In the short run, however, there is no indication of any impact of fiscal deficit on the debt-GDP ratio; on the other hand, an increase in current account deficit in any period is expected to have a significant positive impact on the debt-GDP ratio. For fiscal deficits and current account deficits each, the past changes in various periods tend to affect their present changes negatively. The past changes in current account deficits may have significant positive impact on the fiscal deficit [as the coefficients of Dcad for different lags are all positive and significant]. Also, an increase in fiscal deficits in any period may decrease present change in current account deficit. The error correction term is negative for all three equations although significant for Dfd equation only.

a. Long Run Relationship

$$\begin{array}{lll} ECT_t = & debt\_gdp_t - 2.618fd_t + 1.891cad_t & + 4.821t - 119.257 \\ & (.000) \quad (.061) & \end{array}$$

b. Short Run Relationships

$$\begin{array}{l} Ddebt\_gdp_t = - 0.005ECT_{t-1} - 0.002Ddebt\_gdp_{t-1} + 0.085Ddebt\_gdp_{t-2} - 0.008Ddebt_{t-3} - 0.018Dfd_{t-1} \\ \quad (.211) \quad (.990) \quad (.611) \quad (.958) \quad (.233) \\ \quad - 0.013Dfd_{t-2} - 0.009Dfd_{t-3} + 0.022cad_{t-1} - 0.006Dcad_{t-2} + 0.009Dcad_{t-3} - 0.142t + 3.310 \\ \quad (.415) \quad (.600) \quad (.032) \quad (.554) \quad (.356) \quad (.127) \quad (.085) \end{array}$$

$$\begin{array}{l} Dfd_t = - 0.247ECT_{t-1} + 0.457Ddebt\_gdp_{t-1} - 2.928Ddebt\_gdp_{t-2} + 1.507Ddebt_{t-3} - 0.559Dfd_{t-1} \\ \quad (.000) \quad (.862) \quad (.250) \quad (.526) \quad (.013) \\ \quad - 0.471Dfd_{t-2} - 1.544Dfd_{t-3} + 0.689Dcad_{t-1} + 0.228Dcad_{t-2} + 0.294Dcad_{t-3} + 0.443t - 9.941 \\ \quad (.048) \quad (.000) \quad (.000) \quad (.128) \quad (.057) \quad (.756) \quad (.735) \end{array}$$

$$\begin{array}{l} Dcadt_t = - 0.084ECT_{t-1} + 0.224Ddebt\_gdp_{t-1} - 1.328Ddebt\_gdp_{t-2} - 4.113Ddebt_{t-3} - 0.505Dfd_{t-1} \\ \quad (.213) \quad (.939) \quad (.640) \quad (.121) \quad (.045) \\ \quad + 0.223Dfd_{t-2} + 0.578Dfd_{t-3} - 0.408Dcad_{t-1} - 0.375Dcad_{t-2} - 0.158Dcad_{t-3} - 1.294t + 25.133 \\ \quad (.400) \quad (.055) \quad (.019) \quad (.025) \quad (.358) \quad (.415) \quad (.443) \end{array}$$

2. Trend (Trend) Specification

For trend (trend) specification also the results of the error correction model are similar to those obtained for the previous specification. It is indicated that fiscal deficits and current account deficits have significant positive and negative impacts on the debt-GDP ratio respectively. In the short run fiscal deficit seems to have no impact on the ratio whereas a change in current account deficit affects the change in the ratio in the next period. The past changes in fiscal and current account deficits tend to affect their present changes. Changes in fiscal deficits and current account deficits seem to be affected by each other. The error correction terms are all negative but significant for Dfd equation only.

B. Relationship among Debt-GDP Ratio, Fiscal Deficit and Trade Deficit

For studying the relationship among debt-GDP ratio, fiscal deficit and trade deficit we consider the following model.

Model 2: $debt\_gdp_t = \beta_0 + \beta_1 fd_t + \beta_2 td_t + error_t$

The three variables are stationary at first difference. We conduct Johansen co-integration test to examine whether there is a long run relationship among them. The results reveal that for each specification there is evidence of long run relationship among the variables [Table IV].

TABLE IV CO-INTEGRATION TEST RESULTS FOR DEBT-GDP RATIO, FISCAL DEFICIT AND TRADE DEFICIT

Model	Maximum Rank	Trace Statistic	5% Critical Value	Result
Trend (Constant)	0	46.6938	29.68	H_0: r = 0 is rejected and H_0: r = 1 is not rejected
	1	9.5359*	15.41	
	2	1.3580	3.76	
Trend (Restricted constant)	0	49.5791	34.91	H_0: r = 0 is rejected and H_0: r = 1 is not rejected
	1	11.0963*	19.96	
	2	1.9401	9.42	
Trend (Trend)	0	38.9959	34.55	H_0: r = 0 is rejected and H_0: r = 1 is not rejected
	1	10.9007*	18.17	
	2	3.8299	3.74	

Using error correction models, we get the following short run and long run relationship among them, where the figures within brackets are the p-values.

1. Trend (Constant) Specification

a. Long Run Relationship

$$ECT_t = debt\_gdp_t - 7.013fd_t + 2.435td_t - 69.331$$
$$(.000) \quad (.002)$$

b. Short Run Relationships

$$Ddebt\_gdp_t = 0.001ECT_{t-1} + 0.023Ddebt\_gdp_{t-1} + 0.193Ddebt\_gdp_{t-2} + 0.078Ddebt_{t-3} + 0.004Dfd_{t-1}$$
$$(.776) \quad (.890) \quad (.220) \quad (.626) \quad (.866)$$
$$+ 0.008Dfd_{t-2} - .0002Dfd_{t-3} + 0.011Dtd_{t-1} - 0.008Dtd_{t-2} + 0.005Dtd_{t-3} + 0.690$$
$$(.780) \quad (.993) \quad (.088) \quad (.224) \quad (.523) \quad (.494)$$

$$Dfd_t = -0.156ECT_{t-1} + 0.965Ddebt\_gdp_{t-1} - 2.093Ddebt\_gdp_{t-2} + 2.093Ddebt_{t-3} - 0.867Dfd_{t-1}$$
$$(.000) \quad (.698) \quad (.375) \quad (.380) \quad (.015)$$
$$- 0.992Dfd_{t-2} - 1.904Dfd_{t-3} + 0.457Dtd_{t-1} - 0.022Dtd_{t-2} + 0.211Dtd_{t-3} - 12.690$$
$$(.015) \quad (.000) \quad (.000) \quad (.823) \quad (.053) \quad (.400)$$

$$Dtdt_t = -0.149ECT_{t-1} + 0.500Ddebt\_gdp_{t-1} - 1.410Ddebt\_gdp_{t-2} - 0.662Ddebt_{t-3} - 1.843Dfd_{t-1}$$
$$(.006) \quad (.881) \quad (.657) \quad (.837) \quad (.000)$$
$$- 0.760Dfd_{t-2} + 0.633Dfd_{t-3} - 0.329Dtd_{t-1} - 0.288Dtd_{t-2} - 0.205Dtd_{t-3} + 13.257$$
$$(.165) \quad (.160) \quad (.014) \quad (.033) \quad (.163) \quad (.514)$$

When we incorporate trade deficit in place of current account deficit then we obtain similar results. In the long run, fiscal deficit and trade deficit are expected to have significant positive and negative marginal impacts respectively on the

debt-GDP ratio. In the short run, however, there is no evidence of any impact of fiscal deficit on the debt-GDP ratio; although trade deficit is expected to have a significant positive impact. Past changes in fiscal deficits and trade deficits are expected to affect the present changes in the respective deficits negatively. The results indicate that the past change in trade deficit affects the present change in fiscal deficit positively whereas the past change in fiscal deficit in any period affects the present change in trade deficit negatively in the next period. In this specification, the error correction term is positive and insignificant for the Ddebt_gdp equation and it is negative and significant for the other two equations.

2. Trend (Restricted Constant) Specification

The estimated error correction model for restricted constant specification is estimated which gives us the following results.

a. Long Run Relationship

$$ECT_t = \underset{}{debt\_gdp_t} - \underset{(.000)}{5.334fd_t} + \underset{(.002)}{1.852td_t} - \underset{(.209)}{54.139}$$

b. Short Run Relationships

$$Ddebt\_gdp_t = \underset{(.920)}{0.0003ECT_{t-1}} + \underset{(.834)}{0.035Ddebt\_gdp_{t-1}} + \underset{(.194)}{0.206Ddebt\_gdp_{t-2}} + \underset{(.560)}{0.093Ddebt_{t-3}} + \underset{(.974)}{0.001Dfd_{t-1}}$$
$$+ \underset{(.872)}{0.004Dfd_{t-2}} - \underset{(.947)}{0.001Dfd_{t-3}} + \underset{(.046)}{0.013Dtd_{t-1}} - \underset{(.261)}{0.007Dtd_{t-2}} + \underset{(.465)}{0.005Dtd_{t-3}}$$

$$Dfd_t = \underset{(.000)}{-0.197ECT_{t-1}} + \underset{(.755)}{0.777Ddebt\_gdp_{t-1}} - \underset{(.338)}{2.268Ddebt\_gdp_{t-2}} + \underset{(.431)}{1.873Ddebt_{t-3}} - \underset{(.020)}{0.826Dfd_{t-1}}$$
$$- \underset{(.019)}{0.954Dfd_{t-2}} - \underset{(.000)}{1.891Dfd_{t-3}} + \underset{(.000)}{0.436Dtd_{t-1}} - \underset{(.739)}{0.033Dtd_{t-2}} + \underset{(.066)}{0.199Dtd_{t-3}}$$

$$Dtdt_t = \underset{(.003)}{-0.210ECT_{t-1}} + \underset{(.818)}{0.771Ddebt\_gdp_{t-1}} - \underset{(.721)}{1.138Ddebt\_gdp_{t-2}} - \underset{(.926)}{0.299Ddebt_{t-3}} - \underset{(.000)}{1.905Dfd_{t-1}}$$
$$- \underset{(.134)}{0.820Dfd_{t-2}} + \underset{(.177)}{0.611Dfd_{t-3}} - \underset{(.020)}{0.297Dtd_{t-1}} - \underset{(.043)}{0.271Dtd_{t-2}} - \underset{(.196)}{0.189Dtd_{t-3}}$$

For this specification also we get similar results.

3. Trend (Trend) Specification

a. Long Run Relationship

$$ECT_t = \underset{}{debt\_gdp_t} - \underset{(.000)}{3.518fd_t} + \underset{(.009)}{1.144td_t} + .114t - 52.9525$$

b. Short Run Relationships

$$Ddebt\_gdp_t = \underset{(.250)}{-0.007ECT_{t-1}} - \underset{(.578)}{0.093Ddebt\_gdp_{t-1}} + \underset{(.808)}{0.041Ddebt\_gdp_{t-2}} + \underset{(.930)}{0.014Ddebt_{t-3}} - \underset{(.379)}{0.021Dfd_{t-1}}$$
$$- \underset{(.503)}{0.018Dfd_{t-2}} - \underset{(.616)}{0.011Dfd_{t-3}} + \underset{(.007)}{0.021Dtd_{t-1}} - \underset{(.926)}{0.001Dtd_{t-2}} + \underset{(.164)}{0.011Dtd_{t-3}} - \underset{(.030)}{0.260t} + \underset{(.025)}{4.851}$$

$$Dfd_t = \underset{(.000)}{-0.330ECT_{t-1}} + \underset{(.935)}{0.215Ddebt\_gdp_{t-1}} - \underset{(.255)}{2.978Ddebt\_gdp_{t-2}} + \underset{(.507)}{1.616Ddebt_{t-3}} - \underset{(.013)}{0.933Dfd_{t-1}}$$
$$- \underset{(.012)}{1.049Dfd_{t-2}} - \underset{(.000)}{1.910Dfd_{t-3}} + \underset{(.000)}{0.467Dtd_{t-1}} - \underset{(.969)}{0.004Dtd_{t-2}} + \underset{(.063)}{0.223Dtd_{t-3}} - \underset{(.417)}{1.525t} + \underset{(.658)}{15.024}$$

$$Dtdt_t = \underset{(.112)}{-0.194ECT_{t-1}} + \underset{(.650)}{1.607Ddebt\_gdp_{t-1}} + \underset{(.966)}{0.151Ddebt\_gdp_{t-2}} - \underset{(.973)}{0.112Ddebt_{t-3}} - \underset{(.002)}{1.534Dfd_{t-1}}$$
$$- \underset{(.437)}{0.438Dfd_{t-2}} + \underset{(.082)}{0.776Dfd_{t-3}} - \underset{(.004)}{0.471Dtd_{t-1}} - \underset{(.013)}{0.387Dtd_{t-2}} - \underset{(.076)}{0.287Dtd_{t-3}} + \underset{(.303)}{2.607t} - \underset{(.572)}{25.854}$$

The results of the error correction model are the same as other specifications.

All results of the study are summarized to focus on the signs of the significant coefficients [Table V].

TABLE V SUMMARY OF RESULTS

Model 1: $debt\_gdp_t = \alpha_0 + \alpha_1 fd_t + \alpha_2 cad_t + error$											
Dept variable	Coefficients of										
	ECT_{t-1}	$Ddebt_{t-1}$	$Ddebt_{t-2}$	$Ddebt_{t-3}$	Dfd_{t-1}	Dfd_{t-2}	Dfd_{t-3}	$Dcad_{t-1}$	$Dcad_{t-2}$	$Dcad_{t-3}$	t
Specification: Trend (restricted constant) Estimated Long-run Relationship: $ECT_t = debt\_gdp_t - 2.312fd_t + 2.160cad_t - 49.665$ (.000) (.013) (.284)											
$Ddebt\_gdp_t$								+ #			
Dfd_t	–				–	–	–	+	+	+	
$Dcad_t$					–		+ #	–	–		
Specification: Trend (trend) Long run relationship: $ECT_t = debt\_gdp_t - 2.618fd_t + 1.891cad_t + 4.821t - 119.257$ (.000) (.061)											
$Ddebt\_gdp_t$								+			
Dfd_t	–				–	–	–	+		+ #	
$Dcad_t$					–		+ #	–	–		
Model 2: $debt\_gdp_t = \beta_0 + \beta_1 fd_t + \beta_2 td_t + error$											
Dept variable	Coefficients of										
	ECT_{t-1}	$Ddebt_{t-1}$	$Ddebt_{t-2}$	$Ddebt_{t-3}$	Dfd_{t-1}	Dfd_{t-2}	Dfd_{t-3}	Dtd_{t-1}	Dtd_{t-2}	Dtd_{t-3}	t
Specification: Trend (constant) Estimated Long run relationship: $ECT_t = debt\_gdp_t - 7.013fd_t + 2.435td_t - 69.331$ (.000) (.002)											
$Ddebt\_gdp_t$								+ #			
Dfd_t	–				–	–	–	+		+ #	
Dtd_t	–				–			–	–		
Specification: Trend (restricted constant) Estimated long run relationship: $ECT_t = debt\_gdp_t - 5.334fd_t + 1.852td_t - 54.139$ (.000) (.002) (.209)											
$Ddebt\_gdp_t$								+			
Dfd_t	–				–	–	–	+		+ #	
Dtd_t	–				–			–	–		
Specification: Trend (trend) Estimated Long run relationship: $ECT_t = debt\_gdp_t - 3.518fd_t + 1.144td_t + .114t - 52.9525$ (.000) (.009)											
$Ddebt\_gdp_t$								+			-
Dfd_t	-				–	–	–	+		+ #	
Dtd_t					–		+ #	–	–	- #	
# Significant at 10 per cent level of significance											

V. CONCLUSION

This paper attempted to analyze the causes behind the present economic crisis faced by the Sri Lankan economy emphasizing the roles of twin deficits in generating the debt servicing problem. The overview of the economy for the last few decades revealed some stylized facts about the country. At the time of independence, the country had enough potential for prosperity. However, over time it was noted that the country is very much dependent upon the external sector; foreign exchanges were highly demanded to pay for the imports of essential consumer and intermediate goods, whereas those were earned through exports of goods, receipts from tourism etc. This, in turn, made the country vulnerable to any external shock. On the other hand, the country's domestic resource generating potentials were not properly utilized which was reflected in the existence of high fiscal deficits over decades. Sri Lanka's tax revenue as a percentage of GDP decreased continuously from 19.02 per cent in 1990 to 8.1 per cent in 2020 [World Bank, WDI] whereas 15 per cent tax-GDP ratio was suggested as the desirable ratio [15], and, at present, it is one of the countries with lowest tax-GDP ratio [16]. Thus, a country already characterized by high levels of current account and fiscal deficits faced a severe problem of shortages of foreign exchange earnings caused by the incidents of Easter bombing and COVID-19. These factors, accompanied by other internal macroeconomic mismanagement, contributed to the crisis. The econometric

analysis was based on time series data covering the period 1971-2021. We estimated two alternative models. The first model tried to investigate the relationship among debt-GDP, fiscal deficit and current account deficit, and the second was among debt-GDP, fiscal deficit and trade deficit. The results of regression analysis of both models indicated that for all types of specifications there was a long-run relationship among the variables where fiscal deficits affected debt-GDP ratio positively and current account deficits or trade deficits were expected to have a negative impact on debt-GDP ratio in the long run. In the short run, however, current account deficits or trade deficits were expected to have a positive impact on the debt-GDP ratio. There was no evidence of any short-run impact of fiscal deficits on the Debt-GDP ratio. The positive long run impact of fiscal deficit on debt-GDP ratio is expected; the negative impact of current account deficit on debt-GDP ratio can be interpreted in the following way. When the current account deficit rises, debt is expected to rise, but the impact on GDP is uncertain. If GDP increases and the proportion of the increase is more than that for the increase in debt, then the ratio may fall. In general, the results support the view that the persistent huge amount of twin deficits contributed to the present crisis in Sri Lanka. The results thus advocate for utilizing a country's own resource-generating methods like taxation rather than using external debt as a source to finance deficits.

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