

External Debt and Twin Deficits in India (1970-71 – 2018-19): An Econometric Analysis

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Abstract

The present paper applies co-integration, error correction model and Granger causality to examine the relationship among external debt, fiscal deficit and current account deficit for the Indian economy during the period from 1970-71 to 2018-19. It is found that for trend (trend) specification there is a long-term relationship among them and both fiscal deficit and current account balance have significant and negative impact on debt-GDP ratio. Further, the ceteris paribus impact of current account balance on debt-GDP ratio is negative in the short as well as long run. However, fiscal deficit affects debt-GDP ratio positively in the short run, whereas negatively in the long run.

Debt-GDP ratio, fiscal deficit and current account balance are not co-integrated for trend (constant) and trend (restricted constant) specifications. Conducting Granger causality test for the first differences of the variables our study indicates unidirectional causalities running from fiscal deficit to debt-GDP ratio, from current account balance to debt-GDP ratio and from fiscal deficit to current account balance.

Our study thus empirically supports the idea that fiscal deficit and current account deficit affect external debt of a country. Regarding the twin deficit hypothesis the analysis indicates a unidirectional Granger causality running from fiscal deficit to current account deficit in the short run.

Key Words: *External Debt, Twin Deficits, Co-integration, Error Correction Model, Granger Causality*

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I. Introduction

The issue of international debt problem is one of the major concerns of the policy makers and academicians in the world. The World Bank data show that in 2019 for the low income and middle income countries external debt stocks as percentages of GNI were 32.9 and 25.8 respectively. The empirical literature on international debt noted that historically many countries in the world used foreign borrowing to supplement domestic investment needed for economic development.¹ Some of the borrowing countries successfully utilized foreign borrowing and repaid the loan amount in time, whereas some other countries became defaulter and often faced debt crisis. Naturally, the studies on international debt tried to find the reasons behind it and suggested various ways out. In fact, a wide range of factors could contribute to the debt servicing problems of developing countries. McFadden et al. (1985) identified three sets of factors. The external factors were related to the world economy and were largely beyond the control of the developing countries and their creditors. Among these were increases in the prices of non-compressible imports like energy prices, decreases in the prices of major exportable commodities of the developing countries, export demand slumps because of recessions in the industrialized countries and competition in the world markets and increase in volatility in trade. The second set of factors, reflecting the macroeconomic and development policies of the developing countries, were shocks to the productive capacity from weather, social unrest etc., poor economic management like unsustainable debt or exchange rates, financing of consumption or government operations, severe domestic inflation, unemployment or price distortions, inefficient investment programmes, unsustainable growth targets and development plans, speculation, capital flight and the size of the outstanding debt. The third set of factors affected the supply of credit; for example, increased interest payments because of higher interest rates in industrialized countries, increased amortization because of the decline in maturities and a larger proportion of short-term debt, crowding out of developing countries' credit by competition from industrialized nations and oil exporters etc. In general, from the debtor' point of view the problem is to raise revenues for repayment of the debts. A country faces debt servicing problem if it is unable to raise revenue from its own resource generating methods like taxation and / or if it is unable to find foreign exchange to make repayment. Auernheimer (1990) viewed the debt problem as a

¹ For a survey of the literature on relationship between debt and economic growth see Rahman, Ismail and Ridzuan (2019).

government budget problem. In his paper it is assumed that debt is used to finance government budget deficits. Hence, it is established that policies aimed at only improving the balance of payments do not necessarily improve the debt situation of a country unless they affect the government budget. Cooper and Sachs (1985), Eaton, Gersovitz and Stiglitz (1986), Eaton and Taylor (1986) also pointed out that the debt servicing capacity of a country depends not only on national wealth but also on the government's ability to tax that wealth. It is also argued that since external debt is to be repaid in terms of foreign currencies, debtor countries should opt for raising foreign exchange reserves. However, some economists argue that current account deficit need not be an indicator of mis-management of the domestic economy. Davies (1990) from his study on UK economy pointed out that if current account deficit is generated for financing consumption rather than investment then it may affect domestic economy adversely. In short, it can then be stated that foreign borrowing is used to finance fiscal deficit and /or current account deficit of the borrowing countries.

There is also another strand of literature that explains the twin deficit hypothesis. According to this hypothesis there is a relationship between fiscal deficit and current account deficit of a country. Results of empirical studies are mixed. Some studies note that fiscal deficit does not affect trade deficit or current account deficit; others find that budget deficit causes trade deficit.²

In the context of the Indian economy it was noted that India's external debt position compared to other indebted countries was within manageable limits according to various key indicators like debt service ratio, debt-GNI ratio, Short-term debt to total external debt ratio.³ Taylor (1988) constructed a macro model for explaining the roles of various factors in determining the economic growth of India. The study also analysed the aspects of internal and external balances in generating the debt situation of the Indian economy during 1980s. Bala Subhramanya (2014), Dhar and Rao (2014) etc. suggested various policies to reduce India's trade deficit, and hence, current account deficit. Sen and Chandrasekhar (1991), Mohanty (1997), Karnik (2002), Sheel (2013) analysed the policies and suggestions for correcting the internal and external deficits in the context of the Indian economy.

Bhandari, Ul Haque and Turnovsky (1990) constructed a dynamic model that showed that when government budget deficit is financed by debt, in the short run, current account deficit increases and that causes increase in debt; but in the long run, the increased level of output generated by additional capital can lead to current account surplus and thus leading to a fall in debt accumulation.

Khanna (1992) described the balance of payments position and external debt positions of India during 1980s. Dhar and Rao (2014) analysed the reasons behind deteriorating current account deficit situation of India during the period 2005-06 – 2013-14. Ghosh (1993) explained the connection between external debt and balance of payments position in the context of the Indian economy and prescribed policies to arrest the problem. Rangarajan and Srivastava (2005) theoretically explained and empirically examined the impact of fiscal deficit on various macroeconomic variables like savings, investment, economic growth, debt in the context of the Indian economy during 1990s and early 2000s.

Against this backdrop of theoretical and empirical relationships among external debt, fiscal deficit and current account deficit of countries the present paper attempts to study the impact of fiscal deficit and current account deficit on the debt-GDP ratio for the Indian economy during the period from 1970-71 to 2018-19 using econometric methods.

The rest of the paper is organized as follows. Section 2 presents a brief review of the literature. Data and methodology of the study are mentioned in Section 3. Section 4 overviews the trends in various indicators of debt, fiscal deficit, trade balance and current account balance in India during the study period. The relationship among debt-GDP ratio, fiscal deficit and trade balance and that among debt-GDP ratio, fiscal deficit and current account balance are analyzed in Section 5. Some concluding remarks are made in Section 6.

II. A Brief Review of the Literature

In this section we present a survey of the studies that put emphasis on the role of internal and external balances on the external debt and the studies which examined the validity of the twin deficit hypothesis.

First, we focus on the studies which analyzed the impacts of internal and external balances on external debt of countries. Giraldo and Mann (1989) examined the impacts of several determining factors on external debt of Latin American countries during 1973-84. Current account deficit was used as a proxy for external debt arguing that external debt is used to finance current account deficit. The results indicated that excessive fiscal deficit was one of the factors behind huge external debt accumulation. Cuddington and Asilis (1990) described the role of internal and external balances in generating external debt problem for Dominican Republic since 1970. Chaudhary and Anjum (1996) advocated for sustainable fiscal deficit because on the basis of their study

² For surveys of theoretical studies on the twin deficit analysis see Aqeel, Nishat and Qayyum (2000) and Javid, Javid and Arif (2010). For survey on empirical studies see Javid, Javid and Arif (2010) and Sakyi and Opoku (2016).

³ Government of India, Ministry of Finance, (2016), India's external debt, a Status Report 2015-16, Department of Economic affairs, External Debt Management Unit.

on Pakistan economy they concluded that fiscal deficit could affect macroeconomic variables like inflation, unemployment, debt stocks and debt-servicing of a country. Ishfaq and Chaudhary (1999) constructed a theoretical model and estimated it to show that during 1973-81 fiscal deficit and debt acted as ‘cause and effect of each other’ in the Pakistan economy. Rangarajan and Srivastava (2003) from their study found that cumulated primary deficit and cumulated difference between growth rate and interest rate contributed in the accumulation of outstanding liabilities of India during 1951-52 – 2001-02. Based on a theoretical model Liu, Fung and Wang (2005) examined the relationship between fiscal deficit-GDP ratio and debt-GDP ratio for the Chinese economy empirically. Mahmood, Rauf and Ahmad (2009) constructed a theoretical model applicable for the economy of Pakistan and found that during 1970s to 2000s mainly huge fiscal deficits and current account deficits were responsible for the unsustainable debt situation of the country. It was believed that a rising current account deficit leads to increase in indebtedness of a country. Mukhtar and Khan (2016) emphasized on the sustainability of current account deficit studying on the Pakistan economy during 1960-2012. Durkalik, Savicevic and Dimitrijevic (2016) addressed the role of trade deficit in the evolution of huge external debt of the Republic of Serbia during 2009-2015.

Now we focus on some of the studies that examined the twin deficit hypothesis, that is, the relationship between fiscal and current account deficits. Darrat (1988) noted bi-directional Granger causality between trade deficit and budget deficit of the US economy during 1960-1984. Enders and Lee (1990) from their study noted that increased government spending innovation led to larger current account deficit during the period from 1947 to 1987 and Latif-Zaman and DaCosta (1990) found evidence of Granger-causality running from budget deficit to trade deficit during 1971-1989 for the US economy. Applying econometric method Aqeel, Nishat and Qayyum (2000) observed a positive long run impact of fiscal deficit on current account deficit for the economy of Pakistan. Basu and Datta (2005) incorporated additional variables viz., money supply, income, exchange rate and interest rate to study the relationship between fiscal deficit and trade deficit for the Indian economy and found no relation between them. The econometric analysis done by Chaudhary and Shabbir (2005) for the economy of Pakistan indicated that budget deficit was to be reduced to improve trade balance. Fleegeer (2006) examined the relationship between fiscal deficit and current account deficit for a number of countries and noted that a country’s development status, trading regions, composition of exports and imports also influence the relationship. Onafowora and Owoye (2006) examined the relationship between trade deficit and fiscal deficit both in the short run and long run for the Nigerian economy during 1970-2001. The results of the study indicated a unidirectional causality from trade deficit to fiscal deficit. Bluedorn and Leigh (2011) noted a strong evidence of support to the twin deficit hypothesis in case of seventeen OECD countries during 1978-2009. Sakyi and Opoku (2016) found significant negative relation between fiscal deficit and current account deficit for the economy of Ghana during 1960-2012. Furceri and Zdzienicko (2018) noted support of twin deficit hypothesis for one hundred and fourteen developing countries during 1990-2015. The study made by Behara and Yadav (2019) came to different results for different study periods. It was observed that for the Indian economy fiscal deficit Granger caused current account balance during 1980-2012 and 1991-2012, whereas there was no evidence of any such causation during 1950-2012 and 1950-1990. The study made by Banday and Aneja (2019) supported a long term positive relationship between fiscal deficit and current account deficit for the economy of China.

So, it is found that on the one hand external debt of a country may be affected by fiscal and current account deficits; on the other there may be a relationship between fiscal and current account deficits. It is then important and interesting to study the relationship among external debt, fiscal deficit and current account deficit. Bader (2006) studied the impact of twin deficits on foreign debt of Jordan during 1977-2004 and noted significant impacts of budget deficit and current account deficit on external debt of the country. Gupta and Jadhav (2012) set up a model where external debt of a country depends upon fiscal deficit, trade deficit and foreign exchange reserves. Applying an impact analysis for the Indian economy the study inferred that one per cent increase in fiscal deficit would lead to .92 per cent increase in external debt and one per cent increase in trade deficit would lead to .49 per cent increase in external debt.

III. Data and Methodology

Using the study period 1970-71 – 2018-19 we examine the relationship among external debt to GDP ratio, fiscal deficit and trade balance for the Indian economy (Model 1). The relationship among debt-GDP ratio, fiscal deficit and current account balance is also examined (Model 2). Table 1 presents the list of variables and the sources of data on them.

Variable	Source of data
External Debt Stocks (current US\$)	World Bank, World Development Indicators
GDP (current US\$)	World Bank, World Development Indicators
GDP Deflator	World Bank, World Development Indicators

Fiscal Deficit (Rs. Crore)	Reserve Bank of India, Handbook of Statistics on the Indian Economy
Trade Balance (Rs. Crore)	Reserve Bank of India, Handbook of Statistics on the Indian Economy
Current Account Balance (Rs. Crore)	Reserve Bank of India, Handbook of Statistics on the Indian Economy

Using GDP deflator we first convert the variables from current prices to constant prices. Then, we determine the order of integration of the variables using Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test where the optimum lag length is chosen using Akaike criterion. We estimate two alternative models. In model 1 we study the relationship among debt-GDP ratio (debt), real fiscal deficit (fd) and real trade balance (tb); model 2 examines the relationship among debt-GDP ratio, real fiscal deficit and real current account balance (cab). Since 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 analyse the short run and long run relationship. When the variables are not found to be co-integrated, a vector autoregressive (VAR) in first differences of the variables is estimated and Granger causality test is performed to determine the direction of causality, if there is any.

IV. Trends in Various Indicators of Debt, Fiscal Deficit, Trade Balance and Current Account Balance

Charts 1 and 2 reveal the trends in various indicators of external debt during the period from 1970-71 to 2018-19. It is observed that in every year since 1970-71 external debt stocks as percentages of GDP and GNI both had been around 13-14 per cent. The increasing trend were noted from 1982-83 till 1993-94 when those figures reached the peak of 33 per cent. After that the decreasing trend continued till 2005-06. In the next few years those remained around 19 per cent. During 2012-13 – 2016-17 the percentages crossed 20 and in 2018-19 again it came down to 19 per cent. In most of the years during our study period debt service had been 1-2 per cent of GNI only. However, debt service as a percentage of exports increased during the period from early 1980s to early 1990s.

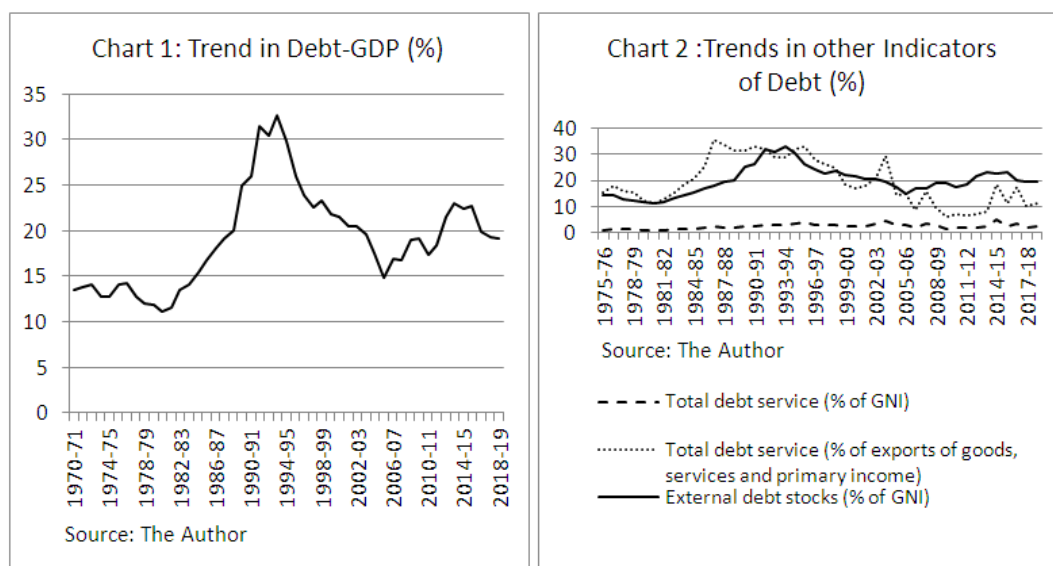


Chart 3 presents the trends in fiscal and current account deficits during our study period. The graphs do not necessarily provide support for twin deficit hypothesis for the entire period although we note similar patterns in their movements for some periods.

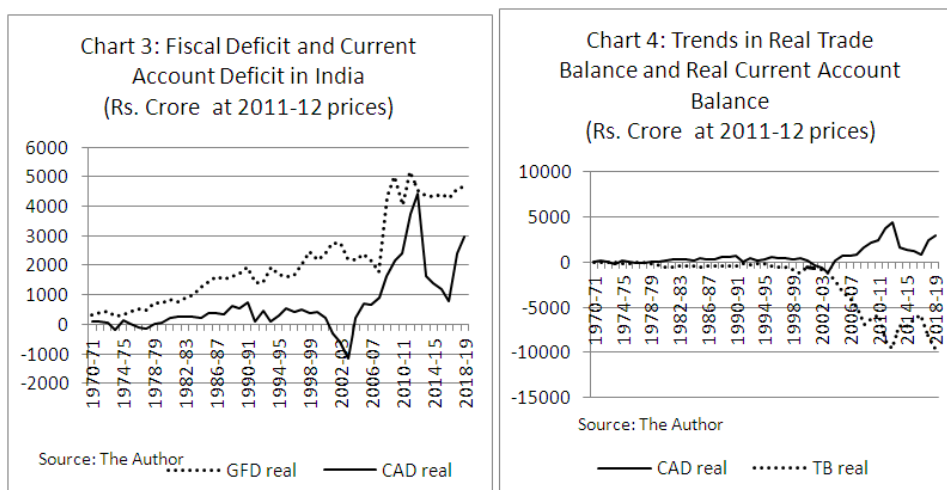


Chart 4 reveals that except for the years 1972-73 and 1976-77, Indian economy had been suffering from trade deficits. In recent years, huge trade deficits have been one of the characteristics of the economy. Current account balance position was not satisfactory also. Only in a few years in 1970s and early 2000s current account balances were positive; otherwise, during the entire period current account balances were negative.

V. Relationship among Debt-GDP Ratio, Fiscal Deficit and Current Account (or Trade) Balance

In order to study the relationship among the variables using time series data first we need to determine the order of integration of the variables. Table 2 presents the relevant ADF and PP statistics and the critical values. It is evident from Table 2 that all the variables are non-stationary at level but stationary at first difference.

Variable	Model	ADF Statistic (5% critical value)	PP Statistic (5% critical value)
Debt	Intercept and Trend	-1.888 (-3.520)	-1.566 (-3.508)
Ddebt	Intercept	-3.251 (-2.944)	-5.347 (-2.938)
Ddebt	No intercept	-3.257 (-1.950)	-5.386 (-1.950)
Fd	Intercept and Trend	-2.983 (-3.520)	-3.369 (-3.508)
Dfd	Intercept	-3.872 (-2.944)	-8.145 (-2.938)
Dfd	No intercept	-3.495 (-1.950)	-7.805 (-1.950)
Tb	Intercept and Trend	-0.954 (-3.524)	-1.177 (-3.508)
Dtb	Intercept	-2.697 (-2.950)*	-5.664 (-2.938)
Dtb	No intercept	-2.224 (-1.950)	-5.443 (-2.625)
Cab	Intercept and Trend	-2.848 (-3.512)	-2.711 (-3.508)
Dcab	Intercept	-6.498 (-2.938)	-6.498 (-2.938)
Dcab	No intercept	-6.510 (-1.950)	-6.510 (-1.950)

*10% critical value is -2.608.
Source: The Author

5.1 Relationship among Debt-GDP Ratio, Fiscal Deficit and Trade Balance

Model 1: $Debt_t = \alpha_0 + \alpha_1 fd_t + \alpha_2 tb_t + error$

The three variables are stationary at first difference. We conduct Johansen co-integration test to examine whether there is a long term relationship among them. Table 3 presents the co-integration test results.

Model	Maximum rank	Trace statistic	5% critical value	Result
Trend (Constant)	0	14.2956*	29.68	$H_0: r = 0$ is not rejected
	1	4.4425	15.41	
	2	0.0505	3.76	
	3			
Trend (Restricted constant)	0	17.1839*	34.91	$H_0: r = 0$ is not rejected

	1	6.9144	19.96	
	2	2.4817	9.42	
	3			
Trend (Trend)	0	41.6507	34.55	H ₀ : r = 0 is rejected and H ₀ : r = 1 is not rejected
	1	8.0070*	18.17	
	2	2.1596	3.74	
	3			
Source: The Author				

Table 3 reveals that the null hypothesis H₀: r = 0 (i.e. no co-integration among the variables) is not rejected for trend (constant) and trend (restricted constant) specifications. Thus, there may not exist any long term relationship among the variables. However, for trend (trend) specification H₀: r = 0 is rejected and H₀: r = 1 (i.e. there is one co-integrating) is not rejected. So, under this specification there is a long term relationship among debt-GDP ratio, fiscal deficit and trade balance.

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

Long run relationship:

$$ECT_t = debt_t - 0.24fd_t - 0.04tb_t + 16.70t + 27.65$$

(.00) (.00)

Short run relationships:

$$Ddebt_t = -0.006ECT_{t-1} + 0.23Ddebt_{t-1} + 0.40Ddebt_{t-2} - 0.21Ddebt_{t-3} - 0.001Dfd_{t-1} - 0.001Dfd_{t-2} + 0.001Dfd_{t-3} - 0.001Dtb_{t-1} - 0.0001Dtb_{t-2} - 0.0005Dtb_{t-3} - 0.019t + 0.402$$

(.212) (.170) (.009) (.214) (.327) (.121)
 (.898) (.005) (.847) (.297) (.346) (.438)

$$Dfd_t = 5.02ECT_{t-1} + 22.17Ddebt_{t-1} + 51.39Ddebt_{t-2} - 22.10Ddebt_{t-3} + 0.567Dfd_{t-1} + 0.27Dfd_{t-2} + 0.51Dfd_{t-3} - 0.08Dtb_{t-1} + 0.19Dtb_{t-2} + 0.06Dtb_{t-3} - 4.63t + 150.11$$

(.00) (.557) (.146) (.573) (.006) (.128) (.002)
 (.397) (.078) (.554) (.330) (.207)

$$Dtb_t = -4.43ECT_{t-1} - 0.23Ddebt_{t-1} + 90.51Ddebt_{t-2} + 21.89Ddebt_{t-3} - 0.42Dfd_{t-1} - 0.56Dfd_{t-2} - 1.06Dfd_{t-3} - 0.03Dtb_{t-1} - 0.47Dtb_{t-2} + 0.01Dtb_{t-3} - 5.25t + 1.22$$

(.004) (.998) (.089) (.711) (.179) (.037) (.00)
 (.852) (.003) (.963) (.463) (.995)

The results can be interpreted as follows. In the long run both fiscal deficit and trade balance have significant and positive impact on external debt. Given trade balance when fiscal deficit increases external debt is expected to increase; however, the impact of increase in fiscal deficit on GDP is uncertain.⁴ So, the impact of increase in fiscal deficit on debt-GDP ratio is also uncertain.

In India for most of the years during our study period, trade balance decreases. Given fiscal deficit when trade balance decreases, external debt is expected to rise. However, the impact of fall in trade balance on GDP is uncertain. In India external debt and GDP both increased, but GDP increased more than proportionately. Consequently, trade balance affected debt-GDP ratio positively.

The short run relationships show that the error correction term has expected signs, but it is insignificant when Ddebt the dependent variable. The estimated coefficient of ECT implies that previous year's error or any deviation of debt-GDP ratio from its long run equilibrium value is corrected for within the current year at a speed of adjustment of 0.6 per cent. Debt-GDP ratio of any year depends positively and significantly upon the previous year's debt-GDP ratio; impacts of other lagged values are not significant. The coefficient of only Dfd_{t-3} has expected sign and it is significant also. The coefficients of lagged values of trade balance have expected signs; but those are statistically insignificant.

When Dfd is the dependent variable we find positive and significant impact of past values of fiscal deficit on its current value. All other coefficients are statistically insignificant.

When Dtb is the dependent variable it is observed that past values of fiscal deficit negatively affect trade balance; however, only the coefficient of Dfd_{t-3} is significant. The short run impacts of past values of trade balance on its current value is negative till lag 2 (which is expected) and it is significant for lag 2. For lag 3 the sign of the coefficient is not anticipated and it is statistically insignificant.

⁴ Taylor, Proano, de Carvalho and Barbosa (2012) set up a theoretical model and empirically tested it for the US economy during 1961-2011. They found the evidence of a strong positive impact of primary deficit on economic growth. Lau, Wee-Yeap and Yip (2019) examined the role of fiscal deficit on economic growth using panel data for ASEAN countries during 2001-2015 separately for pre and post global financial crisis in 2008. The study revealed that fiscal deficit affected economic growth negatively before the crisis whereas affected positively after the crisis.

It is observed that debt-GDP ratio, fiscal deficit and trade balance are not co-integrated for trend (constant) and trend (restricted constant) specifications. The vector autoregressive model in first differences of the variables is estimated and the Granger causality results are presented in Table 4.

Null Hypothesis (H ₀)	Chi2	df	p-value	Decision
Dfd does not Granger cause Ddebt	4.8493	4	0.303	H ₀ is not rejected
Dtb does not Granger cause Ddebt	2.2308	4	0.693	H ₀ is not rejected
Dfd and Dtb do not Granger cause Ddebt	16.375	8	0.037	H ₀ is rejected
Ddebt does not Granger cause Dfd	1.8447	4	0.764	H ₀ is not rejected
Dtb does not Granger cause Dfd	4.3982	4	0.355	H ₀ is not rejected
Ddebt and Dtb do not Granger cause Dfd	9.3194	8	0.316	H ₀ is not rejected
Ddebt does not Granger cause Dtb	8.8502	4	0.065	H ₀ is rejected (at 10% level)
Dfd does not Granger cause Dtb	28.373	4	0.000	H ₀ is rejected
Ddebt and Dfd do not Granger cause Dtb	39.902	8	0.000	H ₀ is rejected

Source: The Author

Table 4 indicates that Dfd and Dtb together Granger cause Ddebt whereas individually they do not. Ddebt and Dfd Granger cause Dtb individually as well as jointly.

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

Model 2: $Debt_t = \beta_0 + \beta_1 fd_t + \beta_2 cab_t + error$

The three variables are stationary at first difference. We conduct Johansen co-integration test to examine whether there is a long term relationship among them. Table 5 presents the co-integration test results.

Model	Maximum rank	Trace statistic	5% critical value	Result
Trend (Constant)	0	22.9837*	29.68	H ₀ : r = 0 is not rejected
	1	3.8317	15.41	
	2	0.5804	3.76	
Trend (Restricted constant)	0	24.8413*	34.91	H ₀ : r = 0 is not rejected
	1	5.6568	19.96	
	2	1.7804	9.42	
Trend (Trend)	0	38.8411	34.55	H ₀ : r = 0 is rejected and H ₀ : r = 1 is not rejected
	1	16.7387*	18.17	
	2	3.2276	3.74	

Source: The Author

Table 5 reveals that for trend (trend) specification debt-GDP ratio, fiscal deficit and current account balance are co-integrated, i.e., there is a long-term relationship among them. The error correction model for the three variables is estimated to get the short-run and long run relationship among them which are given below.

Long run relationship: $ECT_t = debt_t + 0.09fd_t + 0.06cab_t - 6.03t - 27.51$
 (0.0) (0.0)

Short run relationships:

$Ddebt_{t-1} = - 0.02ECT_{t-1} + 0.23Ddebt_{t-1} + 0.0006Dfd_{t-1} - 0.0002Dcab_{t-1} - 0.01t + 0.35$
 (.050) (.121) (.38) (.635) (.474) (.508)

$Dfd_{t-1} = - 7.5ECT_{t-1} - 48.60Ddebt_{t-1} + 0.16Dfd_{t-1} + 0.20Dcab_{t-1} + 1.71t + 52.40$
 (.00) (.195) (.351) (.130) (.725) (.696)

$Dcab_{t-1} = - 3.87ECT_{t-1} + 84.18Ddebt_{t-1} + 0.03Dfd_{t-1} + 0.07Dcab_{t-1} - 3.32t + 9.38$
 (.189) (.110) (.893) (.688) (.626) (.960)

In the long run both fiscal deficit and current account balance have significant and negative impact on debt-GDP ratio. In the short run for the Ddebt equation ECT has the correct sign and it is statistically significant also. The speed of adjustment of debt-GDP ratio is 5 per cent per year. All other coefficients are statistically insignificant. However, in the short run, the marginal impact of past values of debt-GDP ratio on current value of it is positive, the marginal impact of fiscal deficit on debt-GDP ratio is positive and the marginal impact of current account balance on debt-GDP ratio is negative, which are anticipated.

Comparing the short run and long run impacts of fiscal deficit and current account balance on debt-GDP ratio we find that the ceteris paribus impact of current account balance on debt-GDP ratio is negative in the short as well as long run. That is, if current account balance position improves debt-GDP ratio is expected to fall. The impact can be explained as follows. When current account deficit increases (i.e. current account balance falls) external debt increases if external debt is used to finance current account deficit. But the impact of increase in current account deficit on GDP is uncertain.⁵ If GDP increases then debt-GDP ratio would fall.

However, fiscal deficit affects debt-GDP ratio positively in the short run, whereas negatively in the long run. That is, the results indicate that due to increase in fiscal deficit debt-GDP ratio is expected to increase in the short run but it is expected to decrease in the long run.

We have noted that debt-GDP ratio, fiscal deficit and current account deficit are not co-integrated for trend (constant) and trend (restricted constant) specifications. So, for such models we conduct Granger causality test following the vector autoregressive model for first differences of the variables and present the results in Table 6.

Null Hypothesis (H ₀)	Chi2	df	p-value	Decision
Dfd does not Granger cause Ddebt	10.569	4	0.032	H ₀ is rejected
Dcab does not Granger cause Ddebt	8.669	4	0.070	H ₀ is rejected (at 10% level)
Dfd and Dcab do not Granger cause Ddebt	24.783	8	0.002	H ₀ is rejected
Ddebt does not Granger cause Dfd	3.3278	4	0.505	H ₀ is not rejected
Dcab does not Granger cause Dfd	6.7852	4	0.148	H ₀ is not rejected
Ddebt and Dcab do not Granger cause Dfd	11.949	8	0.153	H ₀ is not rejected
Ddebt does not Granger cause Dcab	1.6495	4	0.800	H ₀ is not rejected
Dfd does not Granger cause Dcab	17.307	4	0.002	H ₀ is rejected
Ddebt and Dfd do not Granger cause Dcab	24.995	8	0.002	H ₀ is rejected

Source: The Author

Table 6 indicates the following results. First, Dfd and Dcab individually and jointly Granger cause Ddebt. That is they are useful for predicting Ddebt. Second, neither Ddebt nor Dcab Granger cause Dfd. Third, Dfd Granger causes Dcab, and, Ddebt and Dfd jointly Granger cause Dcab. Thus, our study indicates unidirectional causalities running from Dfd to Ddebt, from Dcab to Ddebt and from Dfd to Dcab.

VI. Concluding Remarks

The theoretical and empirical literature on external debt suggests a wide range of factors that may contribute to the origin of debt crisis of the borrowing countries. It is often noted that countries borrow to finance their fiscal deficits and current account deficits. There is another strand of literature that emphasizes on the relationship between fiscal deficit and current account deficit of countries. The present paper attempts to combine these two strands of literature. External debt of a country may be affected by the amounts of fiscal and current account deficits whereas there may be a relationship between these two kinds of deficits. It is thus both important and interesting to examine the relationship among these three variables. In this paper we intend to study this relationship for the Indian economy during the period 1970-71 – 2018-19.

In the first model we examine the relationship among debt-GDP ratio, fiscal deficit and trade balance. The results indicate that for trend (constant) and trend (restricted constant) specifications there may not exist any long term relationship among the variables. However, for trend (trend) specification there is a long term relationship among them.

Using error correction model we find that in the long run both fiscal deficit and trade balance have significant and positive impact on debt-GDP ratio. The short run relationships show that the error correction term has expected signs, but it is insignificant when Ddebt the dependent variable. Debt-GDP ratio of any year depends positively and significantly upon the previous year's debt-GDP ratio. We find positive and significant impact of past values of fiscal deficit on its current value. All other coefficients are statistically insignificant. Past values of fiscal deficit negatively affect change in trade balance; however, only the coefficient of Dfd_{t-3} is significant. The short run impacts of past values of trade balance on its current value is negative till lag 2 (which is expected) and it is significant for lag 2.

It is observed that debt-GDP ratio, fiscal deficit and trade balance are not co-integrated for trend (constant) and trend (restricted constant) specifications. The vector autoregressive model in first differences of

⁵ For example, Ozer, Zugic and Tomas-Miskin (2018) from their study on the economy of Montenegro found that during 2011 – 2016 CAD-GDP ratio has a significant and positive long run relationship with GDP growth rate. In the short run current CAD-GDP ratio positively affected GDP growth rate but previous years' CAD-GDP ratios have negative impact on GDP growth rate.

the variables is estimated and the Granger causality results indicate that Dfd and Dtb together Granger cause Ddebt whereas individually they do not. Ddebt and Dfd Granger cause Dtb individually as well as jointly.

For the second model we study the relationship among debt-GDP ratio, fiscal deficit and current account balance. In this case also it is found that for trend (trend) specification there is a long-term relationship among them. The error correction model for these three variables indicates that in the long run both fiscal deficit and current account balance have significant and negative impact on debt-GDP ratio. In the short run for the Ddebt equation ECT has the correct sign and it is statistically significant also. Comparing the short run and long run impacts of fiscal deficit and current account balance on debt-GDP ratio we find that the ceteris paribus impact of current account balance on debt-GDP ratio is negative in the short as well as long run. However, fiscal deficit affects debt-GDP ratio positively in the short run, whereas negatively in the long run. That is, the results indicate that due to increase in fiscal deficit debt-GDP ratio is expected to increase in the short run but it is expected to decrease in the long run.

Debt-GDP ratio, fiscal deficit and current account deficit are not co-integrated for trend (constant) and trend (restricted constant) specifications. Conducting Granger causality test it is noted that Dfd and Dcab individually and jointly Granger cause Ddebt. Dfd Granger causes Dcab, and, Ddebt and Dfd jointly Granger cause Dcab. Thus, our study indicates unidirectional causalities running from Dfd to Ddebt, from Dcab to Ddebt and from Dfd to Dcab.

Our study thus empirically supports the idea that fiscal deficit and current account deficit or trade deficit affect external debt of a country. Regarding the twin deficit hypothesis the analysis indicates a unidirectional Granger causality running from fiscal deficit to current account deficit in the short run.

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