A Granger Causality Analysis Between External Debt and the Deficits: Evidence from the Indian Economy

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Abstract: The external debt burden of India is mounting when the country's external debt to GDP ratio reached about 19.8 percent during 2019-20. The study uses the Granger Causality analysis to bring out the causal relationship between external debt and the three deficit which takes the form of three gaps. About six pairs of hypotheses are formulated to detect the nature of causation between the saving-investment gap, fiscal gap, foreign exchange gap on the one hand and the annual flows of external debt in India on the other. The conclusions emerging from the Granger's tests of causality are significant. Surprisingly, the theoretical relationship between the saving-investment gap and the foreign exchange gap is not supported in the Indian context.

1. INTRODUCTION

To embark on the road to development developing countries are dependent on foreign assistance of capital to some extent. However, the degree of dependence varies with the eco-nomic conditions of a country in relation to the mobilisation of domestic resources. We can-not deny the fact that foreign debt or external debt has contributed in many ways to the process of economic growth and industrialisation of Indian economy. It is because domestic resources remained inadequate to meet the requirements of rapid economic growth during the past. India, like any other typical developing country has also emerged as one of the largest borrowers among the developing countries. External debt serves as an important source for financing the investment and imports and for achieving higher economic growth. After the economic reforms of 1991, the Government of India has achieved various types of long term infrastructure development such as roads, electricity, irrigation, health, rural development etc. The role of external debt for these types of development projects is important and most of the projects are financed by the external assistance.

The external debt component is an integral part of balance of payments and macroeconomic management and has a direct interface with macroeconomic variables, like, aggregate de-mand, aggregate output, price levels, exchange rate, etc., because they impinge on borrowing requirements, capacity to borrow and debt servicing capabilities (Ministry of finance, GoI.2019). As of now, the aggregate external borrowing scarcely leaves little re- source after meeting the total debt servicing payments for developmental needs. Here is an analysis to examine the various dimensions of India's external debt problems.

2. TRENDS IN EXTERNAL DEBT IN INDIA

In this section we examine the performance of India's external debt from 1980's in order to assess whether the growth in external indebtedness has decelerated the economic development or not. India's total external debt was $US 20.7 billion in 1980-1981 which kept on increasing at an annual average growth rate of 13.75 percent throughout pre-reform period reaching the level of $ US 85.4 billion in the crisis year 1991-1992. However, in the post reform period there was a remarkable improvement in India's external debt position as it grew at an annual average growth rate of 6.56 percent per annum only due to prudent external debt policies adopted by the government. The government incurred huge expenditures in the decade of 1980's particularly after mid 1980's in an attempt to move the economy on the path of market led growth. Some economic reforms stressing on pro-business orientation, greater role of market and incentives to exporters were introduced in early eighties. This was followed by reforms in field of Services sector, Science and

technology in the post 1985. This led to a surge in economic growth rate to 5.6 percent in 1980's thereby bringing economy out of 'Hindu Rate of Growth' of 3.5 percent. However, this turned out to be a 'debt led growth'. The huge spending led to growing fiscal imbalances throughout 1980's which inturn led to borrowings from Reserve Bank of India (RBI) thereby having an expansionary impact on prices. Fiscal deficits were also the prime cause of rising current account deficits that aggravated the external debt problem in eighties.
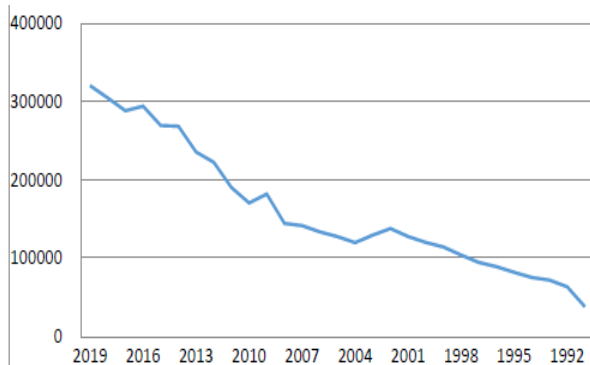

Figure 1: External Debt in India.

The average growth rate of external debt was US $ 27.4 billion during 1980-1981 to 1984-1985 but it increased to US $ 56.13 billion during second half of 1980's or 1985-1986 to 1989-1990 deteriorating balance of payments and putting excessive burden on foreign exchange reserves and Gross Domestic Product (GDP). However, the slowdown in India's external debt was not steady throughout the post reform period. The external debt kept on increasing till 1994-1995 on account of fragile economic situation which called for borrowing to initiate the programme of industrialisation along with covering up of deficits on government accounts. After 1994-1995 external debt had a downward trend on account of favourable economic indicators till 1999-2000 but witnessed fluctuating trends thereafter. In 2002-2003 India's external debt crossed the US$ 100 billion mark. The external debt during 2004-2005 increased to US$ 123.2 billion from US$ 113.4 billion in 2003-2004 due to the impact of fall of the dollar against other world currencies. In2005-2006 external debt fell down by $US 3 billion due to redemption of India Millennium Deposits worth $US 5.5 billion. During 2006-2007 the percent change in external debt over preceding year was highest at 31.86 percent when it reached to $US158.5 billion due to huge corporate borrowings over-seas by way by external commercial borrowings and foreign

currency convertible bonds showing a surge in domestic investment activity. During 2007-2008 external debt again had a second largest increase when it increased by 28.01 percent in comparison to preceding period reaching US$ 202.9 billion due to weakening of US dollar against major international currencies and the rupee. This was exaggerated by the highest share of short term debt in total external debt which was 15.84 percent at $US 25.1 billion in 2006-2007 along with highest increase of 57 percent in commercial borrowings to $US 41443million ($US 41.4 billion) in 2007. This was followed up by highest increase in export credit by 44% when it reached to $US10328 million ($US10.3 billion) in 2008 accompanied by highest rise in bi-lateral debt by 23% to US$19708 (US$ 19.7 billion) in 2008. All this significantly con-tributed to ballooning of external debt in 2008-2009 and 2009-2010. In March 2010 India emerged as the major debt-ridden economy in the world. Ever since 2010, India continues to accumulate external debt and the trend still continues upto 2019.At end-June 2020, India's external debt was placed at US$ 554.5 billion, recording a decrease of US$ 3.9 billion over its level at end-March 2020. The external debt to GDP ratio increased to 21.8 per cent at end-June 2020 from 20.6 per cent at end-March 2020.

3. DETERMINANTS OF EXTERNAL DEBT IN INDIA.

The aggregate stock of India's external debt which stood at US $ 7936 million in 1970 increased to US $ 20581 mn in 1980 and reached the peak level of US $ 10264 mn in 1994, the highest level ever attained in Indian history. India!s external debt stock as a ratio of GNP was 11.9 per cent in 1980 and rose to 28.5 percent in 1990 and further to 37.6 per cent in 1992 (World Debt Tables 1997-98, p.280) India's external debt stock as a ratio of exports had also gone up from 136 per cent in 1980 to 335 per cent in 1992. As these indicators far exceeded the World Bank's yardstick. India was labelled as one of the heavily indebted countries (World Debt Tables 1988-89, p.21). India's external debt stock has grown at 15.66 per cent per annum during 1980!s and 1990!s. Short term debt and commercial borrowings recorded substantial growth during the period under review and in the

debt structure, the proportion of these two components had increased considerably. Around this period, India has also negotiated for a loan of 5 bn SDR from IMF under Extended Fund Facility (The Economic Survey, Government of India, 1985-86, p.73). As a consequence of extensive borrowings from commercial sources at harder terms, the aggregate debt service obligations has grown at 14 per cent per annum and the debt servicing of commercial creditors has registered a much higher growth rate of 31.6 per cent per annum during this period. The bunching of repayments to IMF appropriated around 24 per cent of the total debt service payments. Gulf war (1989), mounting debt service obligations, low foreign exchange reserves and withdrawal of foreign currency deposits by NRI's prompted the international credit rating agencies to downgrade India!s credit rating (Sunanda Sen, 1994), India had to face severe external liquidity crisis and was forced to ship out gold for mortgaging at Bank of England, for temporary accommodation. India, for tire first time began to feel the heavy burden of unsustainable levels of external indebtedness and the need to contain the growing external debt was felt at every level *viz.* Government, RBI, academic circles, research institutes and policy forums. Extensive researches were undertaken to identify the determinants of India's external debt stock.

Studies such as Varghese and Varghese (1988), Malati Anagol (1991), Nirupam Bajpai (1994) and Sunanda Sen (1994) have concluded that everwidening trade deficit was the principal factor behind India's external debt build up. However, the basic weakness of these studies is that they have not tested their hypothesis empirically.

Sunjib Pohit (1991) was the first study to empirically analyse the growth, structure and determinants of India's stock of external debt. His study pointed out that event though the re-serve accumulation and debt servicing, significantly influence the growth of external debt stock, the prime determinant was the method of financing current account deficit. Pohit used Bacha's (1983) decomposition model to decompose the current account components to identify the different sources of current account deficits. The conclusions that can be deduced from the analysis are: The significant determinants of India's external debt stock are: ex-ternal trade gap, the reserve build-up, the total debt servicing

obligations, the inflow of NRI remittances, India's terms of trade and gross domestic investment of all the factors, the largest proportion of India's external debt stock is accounted for India's declining terms of trade (522.11) followed by total debt servicing (5.15) and trade balance (4.62). The problem is that these two factors *viz.* terms of trade and debt servicing obligations are exogenously determined and therefore India can do very little to contain them. Measures to derive a favourable terms of trade for India itself will be an another area of study and hence it is suggested for further research. Debt servicing is a committed obligation which cannot be reduced and so long as these two factors are dominant, India's external debt stock may not come down. External trade gap, reserve accumulation for precautionary purposes and GDI are the other significant determinants of India's external debt stock. In recent times, India!s exports are growing much faster than imports which may reduce the trade gap. External re-sources supplement domestic investment in the high-tech industries which is exported again, trade gap and GDI are not expected to mount much pressure on the external debt stock in future.

The inflow of NRI remittances has been the prime factor in arresting the growth of external debt build up. Had it not been tapped, India's outstanding external liability would have been much higher. But it is to be borne in mind that the inflow of NRI remittances is also a kind of borrowing in disguise. The inflow of the externally borrowed resources does supplement the domestic savings in financing the domestic investment. The resource flows simply do not mean the financial flows alone, but represent the physical flows in high tech areas that had gone into capital formation also. However, the magnitude of investment parameter in all the three models shows that the role of external debt in investment has not been dynamic enough as suggested by the dual gap theories.

4. THEORIES OF EXTERNAL BORROWING

The theoretical framework for analysing the external indebtedness is provided by dual gap theories of Mckinnon (1964), Avromovic (1964), Gerald M. Alter (1968) and Chenery and Strout (1966).

According to these theories, a developing country resorts to external borrowing due to the saving - investment gap or domestic gap and the foreign exchange gap or external gap. A typical developing country which is characterised by low levels of savings in the initial stages of development seeks more capital to finance her investments. The inadequacy of domestic savings to meet the required investment expenditure gives rise to domestic gap. Further, because of paucity of adequate capital goods with poor exports base, the import of capital goods, critical raw materials and intermediate goods become inevitable for her developmental commitments. Therefore, the demand for foreign exchange exceeds the avail-ability resulting in foreign exchange gap. Hence a developing country is forced to seek foreign exchange through borrowings to bridge these two gaps.

The emergence of dual gaps can be explained as follows with tire following macro economic accounting frame work for an open economy:

$$GDP = C+I+(X-M) \qquad (1)$$

or alternatively, the same equation can be written as

$$GDP = C+S \qquad (2)$$

To deduce saving and investment from these two equations, we can rewrite the equations (1) and (2) and we get

$$I = GDP-C-(X-M) \qquad (3)$$

$$S = GDP-C \qquad (4)$$

To determine the gaps, equation (4) is to be subtracted from equation (3) and we get

$$I-S = M-X \qquad (5)$$

where

GDP = Gross Domestic Product

C= Aggregate consumption

S= Aggregate savings

I = Aggregate Investment

X =Exports

M =Imports

The left side of the equation (5) represents the saving - investment gap and the right side of the equation (5) refers to the foreign exchange gap. The theoretical implication of this accounting relationship is the equality between these two gaps. But in practice, it is not so because the factors that determine the saving-investment gap are different from the factors that determine foreign exchange gap. Therefore, the magnitude of these two gaps determine the quantum of external indebtedness. Higher the quantum of the gap, *ceteris paribus*, high-er will be the magnitude of external borrowing and *vice versa.*

The saving-investment gap is determined by the rate of savings and the rate of investment. Given the magnitude of domestic savings, the required level of external capital is deter-mined by the excess of investment over the domestic savings. Thus the level of investment is one of the determinants of external borrowing.

The foreign exchange gap is represented by the excess of aggregate demand for foreign exchange over its availability. The demand for foreign exchange is to meet the imports. The main source to earn foreign exchange is exports. For a developing economy, her imports are bound to be larger than her exports because of weak export sector and the need for more capital goods, etc. The excess of imports over the exports namely trade balance is the major factor which determines the size and magnitude of foreign exchange gap. Another source of demand for and supply of foreign exchange is the import and export of services. The component private transfers in current account refers to the remittances from emigrant workers to their countries of origin. In Indian context, NRI remittances constitute a substantial quantum of foreign exchange, providing a cushion in adjusting the current account deficits. The implication of this source is that higher the remittances, *paripasu,* lower will be the foreign exchange gap and lower will be the need for external borrowing.

Another determinant of foreign exchange gap is the accumulation of reserves. A developing country is always keen in maintaining a particular critical minimum level of international purchasing power as reserves in order to meet any unforeseen exigencies. Hence, the need to maintain adequate stock of reserves is yet another determinant of foreign exchange gap.

Yet another factor which determines the foreign exchange gap is the outflow of foreign ex-change towards debt servicing obligations. Amortization and interest payments are the compulsory components of debt servicing which in turn determine the size and magnitude of foreign

exchange gap. Thus, there are many factors both endogenously as well as exogenously acting each other in determining the size and magnitude of foreign exchange gap. That is why the saving investment gap does not match with the foreign exchange gap.

It may be observed that according to the theory, the foreign exchange gap is the major determinant of external borrowing. Since the foreign exchange gap, theoretically happen to merge with the saving-investment gap, the earlier studies have considered the current ac-count deficits as the best proxy for the foreign exchange gap. But few studies *viz:* (Varghese and Varghese, (1988), Malati Anagol (1991), Nirupam Bajpai (1994), Sunanda Sen (1994) have identified reserve build-up, and debt servicing commitments determine the external borrowings. Pohit (1991) having decomposed the current account, pointed out that India's declining terms of trade was also contributing to current account deficits.

5. SPECIFICATION OF THE MODEL

Given the theoretical framework of the annual flows, three variables are identified that might cause the external debt flows. The variables are operationalize into three gaps analogous to the theory. The gaps are: saving-investment gaps, fiscal gap and the foreign exchange gap. The familiar concept of causality tests as proposed by Granger (1969) are employed to detect the nature of causation between the saving-investment gap, fiscal gap and the foreign exchange gap on the one hand and the annual flows of external debt in India on the other.

The saving-investment gap (SIG) is defined as the excess of gross domestic investment over the gross domestic savings of the relevant years. The logical implication of saving-investment gap is that the paucity of domestic savings in meeting the domestic investment is expected to be financed by the external borrowings. Thus, the supplementary role of external resources in augmenting the domestic savings in development finance is being ascertained. Theoretically the saving-investment gap would get reflected in the foreign exchange gap which, in turn, would determine the annual borrowing needs.

Therefore it is hypothesized that

H1: Saving-Investment gap causes the foreign exchange gap. To confirm this theoretical relationship, another hypothesis to detect the presence of reverse relationship.

H2: Foreign exchange gap causes the saving-investment gap is also attempted.

Ho: The null hypotheses (Ho) for both Hi and H2 are as follows:

Saving investment gap does not cause the foreign exchange gap and the Foreign exchange gap does not cause the saving-investment gap.

The next relationship to be tested is the nature of causation between the saving investment gap and the fiscal gap. The fiscal gap (FG) is the overall budgetary deficits comprising of both central as well as federal governments. The overall budgetary deficits are arrived at the excess of government expenditure net of tax and nontax revenue including the resources mobilised through borrowings both internally as well as externally. Conceptually, the fiscal gap arises due to the excess of pubic expenditure over the public revenue. The public expenditure, in the Indian context, largely consists of developmental and non-developmental expenditure. The developmental expenditure refers to the expenditure incurred on public investment projects. Because of the constraints to mobilise domestic savings adequate enough to meet the required investment, the gap between the domestic investment and savings gives birth to fiscal gap.

It is, therefore, hypothesized that

H1: Saving investment gap that causes the fiscal gap but not *vice versa*. However, the manner with which the budgetary deficits are met and the sources through which the deficit finance is spent are critical of significance in detecting the causal relationship between saving investment gap and fiscal gap. Hence, the hypothesis to test the reverse relationship is conceptualised as

H2: Fiscal gap causes the saving investment gap

Ho: The null hypothesis (Ho) for Hi and H2 are the saving investment gap does not cause, the fiscal gap and the fiscal gap does not cause the saving-investment gap respectively.

Yet another plausible relationship associated with the saving investment gap is the annual flows of external debt. Theoretically it is the saving investment gap that causes the foreign exchange

gap which, in turn, leads to external borrowings. But in reality, the foreign exchange gap does not go hand in hand with the saving-investment gap. The foreign exchange gap is the culmination of accumulation of foreign exchange reserves, the movements in net barter terms of trade, the flow of remittances from non resident Indians, debt servicing commitments and the trade balance. It need not necessarily arise just to bridge the gap between the domestic savings and investment. A substantial portion of India's external borrowings happened to be tied with the project and technical assistance. Thus the investment role of imports may directly be related with the annual flows of external debt. Therefore, the third set of hypothesis is that

Hi: Saving-investment gap causes the annual flows of external debt and for the converse causal relationship

H2: The annual flows of external debt do cause the saving investment gap.

Ever since the recognition of fiscal gap as one of the causes for the foreign exchange gap, the analysis on the impact of fiscal deficit over the current account deficit has increasingly been attempted to in the recent studies which is popularly referred to as "twin deficit analysis". The theoretical framework of Mundel and Fleming (1962, 1963) established the link between fiscal deficit and the current account deficit through the movements of exchange rate and real interest rate. The expansionary fiscal policy, under the fixed exchange rate regime, generates higher real income which leads to higher imports and so higher trade deficits. Similarly, the increasing fiscal deficit under the flexible exchange rate regime, in-duces the real interest rate to move up. thus creating an avenue to attract foreign capital. The increased flow of foreign capital increases the external value of domestic currency which, in turn, culminates in reduction of exports and expansion of imports reflecting a higher trade deficits. Thus, conceptually, there is a strong casual relationship between the fiscal deficits and the current account deficits. The fourth set of hypotheses, is therefore, conceptualised as

H1: Fiscal gap causes the foreign exchange gap and to detect the presence of reverse relationship, the hypothesis is that

H2: The foreign exchange gap causes the fiscal gap

Table 1: Model Specification for Granger's Tests of Casuality

No.	Hypothesis to detect the casual relationship H_1 between	Model specification to test the Hypothesis H_1	No.	Hypothesis to detect the casual relationship H_2 between	Model specification to test the Hypothesis H_2
1	a SIG→FEF	SIG_t $= \sum_{j=1}^{n} ajSIG_{t-j}$ $+ \sum_{l=1}^{m} bjFEG_{t-j} + v_t$	1	b FEG→SIG	FEG_t $= \sum_{j=1}^{n} cjSIG_{t-j}$ $+ \sum_{l=1}^{m} djFEG_{t-j} + v_t$
2	a SIG→FG	SIG_t $= \sum_{j=1}^{n} ajSIG_{t-j}$ $+ \sum_{l=1}^{m} bjFG_{t-j} + u_t$	2	b FG→SIG	FG_t $= \sum_{j=1}^{n} cjSIG_{t-j}$ $+ \sum_{l=1}^{m} djFEG_{t-j} + v_t$

3	a	SIG→AFED	$SIG_t = \sum_{j=1}^{n} ajSIG_{t-j} + \sum_{l=1}^{m} bjAFED_{t-j} + u_t$	3	b	AFED→SIG	$AFED_t = \sum_{j=1}^{n} cjSIG_{t-j} + \sum_{l=1}^{m} djAFED_{t-j} + v_t$
4	a	FG→FEG	$FG_t = \sum_{j=1}^{n} ajFG_{t-j} + \sum_{l=1}^{m} bjFEG_{t-j} + v_t$	4	b	FEG→FG	$FEG_t = \sum_{j=1}^{n} cjFG_{t-j} + \sum_{l=1}^{m} djFEG_{t-j} + v_t$
5	a	FG→AFED	$FG_t = \sum_{j=1}^{n} ajFG_{t-j} + \sum_{l=1}^{m} bjAFED_{t-j} + u_t$	5	b	AFED→FG	$AFED_t = \sum_{j=1}^{n} cjFG_{t-j} + \sum_{l=1}^{m} djAFED_{t-j} + v_t$
6	a	FEG→AFED	$FEG_t = \sum_{j=1}^{n} ajFEG_{t-j} + \sum_{l=1}^{m} bjAFED_{t-j} + u_t$	6	b	AFED→FEG	$AFED_t = \sum_{j=1}^{n} cjFEG_{t-j} + \sum_{l=1}^{m} djAFED_{t-j} + v_t$

SIG-Saving investment gap   FEG-Foreign exchange gap   FG-Fiscal gap   AFED-Annual flow of external debt

u_t and v_t are uncorrelated

The next set of hypotheses is to examine the nature of causation between fiscal gap and the annual flows of external debt. The resources that are contracted every year are found to be higher than the current account deficits. This is because, the borrowed resources are being utilised not only to finance the current account deficits but also to accumulate reserves as well as to meet the debt servicing obligations on schedule. Besides, the excess of investment over domestic savings is also expected to be financed by the external borrowings. But. at the same time, the excess of investment over the domestic saving would have been concurrently reflected in budgetary deficits. So, the simultaneous existence of saving investment gap and the fiscal gap is leading to external borrowings. Therefore, an element of ambiguity is shrouded around the nature of causation between the saving-investment gap as well as fiscal gap on the one hand and the annual flows of external borrowing on the other. To remove this ambiguity, it is hypothesized that

H1: The fiscal gap causes the annual flows of external debt and a reverse hypothesis that

H2: Annual flows of external debt do cause the fiscal gap

The final test of causality is to explore the nature of causation between the foreign exchange gap and the annual flows of external debt. Conceptually, it is the foreign exchange gap that would cause the annual flows of external debt because both saving- investment gap and the fiscal gap are theoretically expected to culminate in foreign exchange gap. Therefore, to detect the hidden nature of causation between the foreign exchange gap and the annual flows of external debt, a set of hypothesis is formulated. They are:

H1: The foreign exchange gap causes the annual flows of external debt and

H2: Annual flows of external debt are the cause for foreign exchange gap

The data for these variables have been obtained from Economic Survey, Ministry of Finance, Government of India. The annual average exchange rate is used to convert the rupee value of the variables into dollar values. The data on annual flow of external debt are taken from the World Debt Tables (Global Development Finance) World Bank, Washington. The period of coverage for the analysis is from 1990 to 2019.

6. TESTS OF CAUSALITY

Granger (1969) proposed, for a pair of linear covariance-stationary time series x and y: x causes y if the past values of x can be used to predict y more accurately than simply using the past values of y. Using the Granger's Tests of causality about six pairs of hypotheses are formulated to detect the nature of causation between the saving-investment gap, fiscal gap, foreign exchange gap on the one hand and the annual flows of external debt in India on the other. In the frame work of Granger's Tests for causality, if the estimated coefficients on the lagged variables of all the H2 equations are significantly different from zero and the estimated coefficients on the lagged variables of the respective Hi equations as a group are not significantly different from zero, then unidirectional causality is said to exist as stated in the respective six pairs of hypotheses.

The determination of appropriate lag length for the two causal variables is of critical significance in the Granger's causality Tests. The usual practice is to choose a lag length that ensures white noise residuals, which is a prerequisite for Granger's causality tests. Thornton and Batten (1985) have demonstrated that the rejection of null hypotheses of no Granger-causality is highly sensitive to lag length selection. Therefore, the present tests of causality employed different lag length ranging from one year to five years to each of the gap variables and the annual flows of external debt so as to determine the optimal lag length. Of the estimated coefficients up to five years lags in each

causal variable, the optimal lag length is chosen such that the calculated F statistic reflected the highest level of significance in each equation. It was also observed that of different lag length ranging from one year to five years, the estimated F statistic reflected highest level of significance only at one year lag. Therefore, in ail the six pairs of equations, only one year lag was given in the casual variables. All the tests of causality for each hypothesis are tested through the conventional joint F test for which the equation is estimated both in terms of restricted and unrestricted form. The F value is given

$$F = RSS(R) - RSS(UR)/r \quad / \quad RSS(UR)/n-k$$

RSS (R)=Residual sum of squares of Restricted equations

RSS(VR) =Residual sum of squares of unrestricted equations Number of restrictions

r=Number of restrictions

n=Number of observations

K=Number of independent variables in the unrestricted equations.

The Problem of using F statistic is that it is biased by the sample size. Maddala (1992: pp 500-502) argues that the critical F value is inversely related to sample size which implies that we must accept (reject) H0 as the sample size decreases (increases). But in our analysis the sample size is sufficiently large (n-k =23) enough to avoid this problem. Although controversy pervades over the methodological issues of the causality, direct test of Granger causality has been most efficient (Guilikey and Salemi, 1982).

7. Conclusions from Granger's Tests of Casuality

The results of the six pairs of hypotheses tested, their respective F values, the levels of significance, statistical inference and the direction of causation detected through Granger's tests of causality are presented in the Table that follows.

Table 2: Results of Granger's Tests of Causality

NO.			Causal Relationship from x to y	F Value	Levels of Significance	Statistical Inference	Direction of Causality
1	a	H_1	SIG causes FEG	2.764	Not significant	Accept H_0	SI gap does not cause the FE gap
	b	H_2	FEG causes SIG	1.493	at 5% level	Accept H_0	FE gap does not cause the SI gap

2	a	H_1	SIG causes FG	6.097	5% level	Reject H_0	SI gap causes the fiscal gap
	b	H_2	FG causes SIG	2.615	Not significant	Accept H_0	Fiscal gap does not cause SI gap
3	a	H_1	SIG causes AFED	5.854	5% level	Reject H_0	SI gap causes the annaual flows of debt
	b	H_2	AFED causes SIG	23.523	1% level	Reject H_0	Annual flows of ext.debt causes the SI gap
4	a	H_1	FG causes FEG	8.698	1% level	Reject H_0	Fiscal gap causes the FE gap
	b…	H_2	FEG causes FG	5.014	5% level	Reject H_0	FE gap causes the fiscal gap
5	a	H_1	FG causes AFED	6.962	5% level	Reject H_0	Fiscal gap causes the annaual flows of debt
	b…	H_2	AFED causes FG	8.936	1% level	Reject H_0	Annual flows of ext.debt causes the fiscsal gap
6	a	H_1	FEG causes AFED	5.067	5% level	Reject H_0	FE gap causes the annaual flows of debt
	b	H_2	AFED causes FEG	18.186	1% level	Reject H_0	Annual flows of ext.debt causes the FE gap

SIG: Saving Investment Gap   FEG: Foreign Exchange Gap   FG: Fiscal Gap   AFED: Annual Flow of External Debt
The Null Hypothesis (H0) is that x does not causes y

The conclusions emerging from the Granger's tests of causality are significant. Surprisingly, the theoretical relationship between the saving-investment gap and the foreign exchange gap is not supported in the Indian context, a conclusion Sunjib Pohit (1991) also arrived at. The results of Hi and H2 of first part showed that each gap is independent rather than interdependent. The absence of causation is due to the fact that the foreign exchange gap need not reflect the paucity of domestic savings over domestic investment.

Besides, there are causes also. Therefore the impact of saving-investment gap on foreign exchange gap and *vice versa* is insignificant.

The hypothesis that saving-investment gap causes the fiscal gap is empirically established (Theory holds good). The hypothesis of the reverse relationship is rejected. The acceptance of H1 and H0 in suggests that it is the excess of investment over the domestic savings is re-sponsible for the budgetary deficits in India. Thus, it is empirically established that the constraints in raising the domestic savings adequate enough to meet the requisite levels of in-vestment are the contributing sources of budgetary deficit in India. The casual relationship between the saving-investment gap and the current flows of India's external borrowings is established directly but not through the foreign exchange gap as conceptualised in the theory of dual gap. The acceptance of this hypothesis implies that it was the saving investment inequality that is hidden behind Indias external borrowings. The

hypothesis for the reverse relationship *viz:* the annual flows of external debt in India had been the cause for the past domestic resource gaps is strongly supported. Thus, the investment role of external re-sources in supplementing the domestic savings in India is strongly supported a fact which is reflected in the regression analysis also.

The nature of causation between the fiscal gap (budgetary deficits) and the foreign exchange gap (current account deficits) in the Indian context is found to be bidirectional. But the level of significance for accepting the hypothesis that it is the fiscal gap that causes the foreign exchange gap is more convincing than by accepting the hypothesis for reverse causation. Besides a number of empirical studies (Iqbal zaidi (1985), Hakkio and Higgins (1985), Laney (1986), Cheng (1987) Miller and Russek (1989) and Resenweig and Tallman (1991) came to similar conclusion that it was the fiscal gap that caused the current account deficits of many developing countries. Manjappa and Hegde (1995) who captured the direction of causation between fiscal deficits and the current account deficits in the Indian economy also came to similar conclusion. Therefore, in our test of causality, the strong association between the fiscal gap and the current account deficits is found to be not only in accordance with the theory but also supports the conclusions of earlier empirical studies. The acceptance of the hypothesis of the reverse relationship in the present analysis that current account deficits cause the budgetary

deficit is also supported by the study of Emmanuel Anoruo and Sunjay Rama Chander (1998). Therefore, the nature of causation between the fiscal gap and foreign exchange gap was found to be bidirectional.

An element of ambiguity was prevailing while hypothesising the nature of causation be-tween fiscal gap and annual flows of external debt. The ambiguity is resolved by the results of the hypotheses H1 and H2 (at 1 per cent level). The results suggest that there exists a two way causation between fiscal gap and external borrowings. The explanation for this both way causation is sought through logical exercise.

Fiscal gap causes the foreign exchange gap and foreign exchange gap causes the annual flows of debt. Therefore, by deductive reasoning, the fiscal gap is expected to cause the annual flows of external debt which is accepted as per Granger's test of causality. Therefore, it may be interpreted that the fiscal gap causes the annual flows of debt disguisedly through the foreign exchange gap. Similarly, the acceptance of the hypothesis that the annual flows of external debt do cause the fiscal gap is sought to be obtained logically again. The flows of external borrowings are the causes for the saving investment gaps and the saving investment gap causes the fiscal gap and therefore, by deductive reasoning it may be inferred that the flows of external borrowings are expected to cause the fiscal gap which is a statistically accepted. Thus it is now established that the annual flows of external resources do create fiscal deficits disguisedly through saving- investment inequality. The direction of causation be-tween the fiscal deficits and flow of external resources and *vice versa* is caused by foreign exchange gap as well as saving investment gap. However, the impact of saving-investment gap is found to be relatively more than by the foreign exchange gap in determining the fiscal deficits.

The sixth pair of Granger's test of causality suggests that there exists a bidirectional causa-tion between the foreign exchange gap and the flows of external borrowings. Theoretically the foreign exchange gap is expected to be the cause for external borrowings. The hypothesis reflecting such a relationship is statistically significant and therefore accepted. But the hypothesis for the reverse causation which is also found to be significant at a higher level of significance seems to be quite contrary to the theoretical relationship. The plausible explanation for the reverse causation may be due to the simultaneous operation of saving-investment gap and fiscal gap for which the annual flows of external borrowings are the cause. Evidently both the hypothesis are found to be significant at higher levels of significance.

The general conclusion from the Granger's tests of causality is that the resource gaps namely the saving-investment gap, fiscal gap and the foreign exchange gap which are conceptualised as the causes for India's external debt flows are significantly established. But, on the contrary, the reverse causal relationship *viz:* the annual flows of external debt have been the cause for these resource gaps is found to be more significant. The direction of causation from the annual flows of external debt to these resource gaps suggests that the externally borrowed resources would have been utilised to fill up these resource gaps. The causality tests to detect the direction of causation both undirectional and bidirectional between the saving investment gap and the foreign exchange gap is quite contradictory to the dual gap theory. Secondly, it is the saving-investment gap that causes the budgetary deficits in India since 1970 whereas it does not lead to current account deficits. Thirdly, the evidence on the direction of causation of budgetary deficits to current account deficits is found to be relatively more significant than the *vice versa* causation and in confirmity with the theory. Fourthly, the argument that domestic savings are supplemented by external borrowings to meet the required levels of investment in India's development strategy is empirically sup-ported. On the whole, the externally borrowed resources have been found to have played a positive and dynamic role in India's economic development.

REFERENCES

[1]   Abell, J.D. (1990). Twin Deficits During the 1980s: An Empirical Investigation. *Journal of Macroeconomics*, *12*(6), 81-96. https://doi.org/10.1016/0164-0704(90)90057-h

[2]   Akaike, H. (1973). Information Theory and the Extension of the Maximum Likelihood Principle, in B.N. Petov and F. Caski, eds. *Second International Symposium on Informational Theory,* Budapest.

[3]   Anoruo, Emmanuel and Sunjay Ramchander (1998). Current account and fiscal deficits: Evidence from India, *Indian Economic Journal*, *45*(3), 66-80.

[4]   Bacha L. Edmar (1984). Growth with Limited Supplies of Foreign Exchange: A Reappraisal of Two Gap Model. *Economic structure and performance*, 263-280. Academic Press. https://doi.org/10.1016/b978-0-12-680060-9.50020-9

[5]   Bacha L. Edmar (1990). A three Gap model of foreign Transfers and the GDP Growth Rate in developing countries, *Journal of Development Economics*, *32*(2), 279-296. https://doi.org/10.1016/0304-3878(90)90039-e

[6]   Darrat, A.F. (1988). Have large deficits caused rising trade deficits? *Southern Economic Journal, 54*(4), 879-87. https://doi.org/10.2307/1059523

[7]   Dickey, D.A. and W.A. Fuller (1979). Distribution of Estimates of Autoregressive Time Series with Unit Root, *Journal of the American Statistical Association, 74*, 427-431. https://doi.org/10.1080/01621459.1979.10482531

[8]   Enders, W. and B.S. Lee. (1990). Current account and budget deficits twins or distant cousins? *Review of Economics and Statistics, 72*(3), 373-81. https://doi.org/10.2307/2109344

[9]   Evans, P. (1989). Do budget deficit affect the current account? Ohio State University, Working Paper, (July).

[10]   Faruqee, Hamid (1995). Long-Run Determinants of Real Exchange Rate: A Stock- Flow Perspective. *Staff Papers*, *42*(1), 80-107. https://doi.org/10.2307/3867341

[11]   Granger, C.W.J. (1969). Investigating causal Relationship by economic models and cross spectral models, *Econometrical*, *37*, 427-438.

[12]   Granger, C.W.J. (1986). Developments in the Study of Cointegrated Economic Variables, *Oxford Bulletin of Economics and Statistics, 48*, 213-27.

[13]   Granger, C.W.J. (1988). Some Recent Developments in a Concept of Causality, *Journal of Econometrics, 39*(1-2), 199-211. https://doi.org/10.1016/0304-4076(88)90045-0

[14]   Hakkio, C. S., & Higgins, B. (1985). Is the United States too dependent on foreign capital? *Economic Review, Federal Reserve Bank of Kansas City*, 23-36.

[15]   Iqbal Mezdi Zaidi (1985). Savings, Investments, Fiscal Deficits and the External Indebtedness of Developing Countries, *World Development*, *13*(5), 573-588. https://doi.org/10.1016/0305-750x(85)90022-1

[16]   Khan, M.S. and N. Haque (1985). Foreign Borrowing and Capital Flight: A Formal Analysis. *Staff Papers*, *32*(4), 605-28. https://doi.org/10.2307/3866741

[17]   Miller, S.M. and F.S. Russek (1989). Are the deficits really related? *Contemporary Policy Issues, 7*(4), 91-115. https://doi.org/10.1111/j.1465-7287.1989.tb00577.x

[18]   Mundell, RA (1962). The appropriate use of monetary and fiscal policy for internal and external stability. *Staff Papers* , *9*(1), 70-79.

[19]   Mustafa, Mohammad and Matior Rahman (1997). Dynamic linkages between Exchange Rate and Foreign Debt: The case of India and Nepal, *Indian Economic Journal*, *44*(3), 181-189.

[20]   Pohit, Sunjib (1991). India's External Debt: Growth, Determinants and Impact, (Indian Sta-tistical Institute, New Delhi), Unpublished Ph.D thesis.

[21]   Rosensweig, J.A. and E.W. Tallman (1991). Fiscal policy and trade adjustments: are tire deficits really twins? *Federal Reserve Bank of Atlanta Working Paper,* 91-2.

[22]   Sachs, J. (1986). Managing the LDC Debt Crisis. *Brookings Papers on Economic Activity*, 2, 397-440. https://doi.org/10.2307/2534478