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INTERACTION BETWEEN TWIN DEFICITS: INDIAN EXPERIENCE IN THE MACROECONOMIC REFORM PERIOD

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Hrushikesh Mallick*

Abstract

The study investigates the interaction between twin deficits in the context of India during the macroeconomic reform period from 1994: II to 2001: I. Using the vector autoregression (VAR) model, it shows that there exists one-way interaction between the two deficits. The increase in fiscal deficit reduces the current account deficit, which contradicts most of the studies carried out in the context of other countries. This indicates a need to reinvestigate the determinants which could explain such inverse relationship.

Introduction

The subject of interaction of twin deficits has received a great deal of attention over the years. Most of the theoretical and empirical literature explaining the underlying relationship between fiscal deficit and current account deficit point to the fact that an unprecedented increase of fiscal deficit is one of the major factors that generates economic crisis in the external sector. Krugman (1979) emphasising the relationship between the two argued that crises occur because a country finances its fiscal deficit by printing money to the extent that excessive credit growth leads to the external collapse in a fixed exchange rate regime (Kamensky and Reinhart, 2001). Many of the developing countries have witnessed similar experiences under different regimes. Countries increase their fiscal deficits with the expectation that an increase in fiscal deficit would result in expansion of output, employment, growth and hence deficit in the external account would shrink over time. This notion is based on the fact that, given the level of domestic demand for goods and services, the increase in fiscal deficit generates more domestic output, keeps the prices of domestic products low and promotes exports of domestic goods to foreign markets. Given the import demand, an increase in exports relative to imports improves the trade balance, hence if there exists any imbalance in the external sector it offsets them. In reality however developing countries have continued to face imbalances in their external sector and in many cases it has worsened.

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Although there are some common points of agreement among different schools of thought regarding the relationship between fiscal performance and current account performance, there are also controversies as to the extent to which fiscal imbalance can cause predictable developments in an open economy's performance especially in the current account balance. Viewed from a Keynesian perspective, it is argued that fiscal expansion, irrespective of the ways of financing, leads to an increase in aggregate demand. Hence, an increase in aggregate demand would have expansionary impact on an economy which is undergoing recession. In this context, Modigliani (1961) stated that while an increase in monetisation of deficit leads to increase in absorption through increase in money income, a bond financed deficit also results in increase in absorption through its net wealth impact. If the domestic output does not expand simultaneously to the extent of increase in fiscal deficit, the rise in money supply results only in increase in domestic absorption, and consequently the demand for net imports increases. Given the supply of foreign products, when the demand for imports increases in relation to exports, the prices of importable products would relatively rise. If prices of importable products rise against that of non-tradable domestic products, it would affect the real exchange rate, thereby it would impact on the country's external balance, depending on whether the government spends more on tradable than on non-tradable goods (Khan and Lizondo,1987). Expansionary fiscal policy not only affects the current account balance in an economy through the real exchange rate but also by affecting the nominal exchange rate (Corden, 1997).

In the Monetarists framework, the widening of government deficits, resulting from excess of increased government expenditures over the government revenues, if it is partly financed through external borrowings, directly leads to appreciation of exchange rate and an increase in the current account deficits (Easterly and Schmidt-Hebbel, 1994). In tune with the monetarist approach, Sargent and Wallace (1981) opined that when there is persistent deficit in the government budget, government can not continue to resort to bond financing as the only option for financing its deficit. At some point of time, it requires to be monetised. As a consequence this leads to increase in the money supply and a rise in the domestic price level. Thereby, the deficit affects the net imports and hence the current account in the balance of payments gets affected.

In contrast to the above theoretical perspectives, in a Ricardian world, the means of financing the government deficit does not matter, whether tax-financed or bond-financed. On the basis of the Ricardian fiscal policy neutrality argument, the New Classical economist, Barro (1974, 1989), assuming that there is a perfect capital market and an infinite horizon of individuals, argued that a tax reduction bond-financed increase in deficit does not produce any real economic impact. When there is a tax

cut increase in bond-financed deficit it induces people to save more in the current period in order to be able to pay taxes in the future. The increase in private savings is offset by the initial value of government dissavings, leaving the aggregate national savings unaltered. In this framework, deficit-financed expenditure policy has no consequences on the current account balance of the BOP, because every fiscal expansion is offset by an equal responses by the private sector (Bortoli, 1989). When aggregate savings and consumption remain unchanged, it does not affect the interest rate, the real investment and output in the economy. Thereby, current account balance in the balance of payment (BOP), which reflects the difference between aggregate savings and investment in both the private and the government sectors, does not get affected (Enders & Lee, 1990). However, the empirical validity of the Ricardian equivalence is inconclusive (Rodríguez, 1994) and depends on several factors like market imperfections and distortionary taxes.

Given the above broader theoretical perspectives, in India the twin-deficit relationship assumes overriding importance especially in the aftermath of the external crisis in the early 1990's, as during this period the economy witnessed several policy measures in respect of fiscal and trade fronts. A large current account deficit in 1990-91 was accompanied with high government deficit. Substantiating the reasons, Joshi and Little (1994) and Buiter and Patel (1997) have attributed the rise in the external imbalances largely to the rise in fiscal deficit. This argument is based on the fact that an unwarranted increase of fiscal deficit leads to an increase in aggregate absorption relative to the expansion of output in the economy. This leads to more imports in relation to exports, and greater demand for imports affects the relative prices of imports in relation to exports. To the extent that the nominal exchange rate deviates from its full purchasing parity and given the world prices, fiscal deficit financed by money creation leads to appreciation of real exchange rate, leading to increase in imports and decline in competitiveness of exports. The resulting current account deficit creates financing needs and increases the stock of external debt and interest payments on it, and as a feedback effect it reinforces a gap in the fiscal deficit and further results in deterioration in current account balance (Rangarajan and Mohanty, 1997).

In this context, this study examines the twin-deficit relationship in the regime of economic reforms during which a number of stabilisation and structural adjustment measures have been undertaken for achieving fiscal prudence in government finances and improving the current account performance in the external sector. The following section brings out a national income identity in order to bring some insight into the relationship between fiscal balance and current account balance of an economy.

Fundamental Relationship between Fiscal Balance and Current Account (CA) Balance

The relationship between current account balance and government deficit can be established from the following national income accounting identities. We assume that the goods and service market comprises three sectors: private (domestic) sector, public (domestic) sector and foreign sector. Then,

$$Y \equiv C + I + G + (X-M) \qquad (1)$$

Accounting for taxes on the private sector, the above identity can be expressed in the following form:

$$S + (T-G) \equiv I + (X-M)$$

where, Y= gross domestic product, C = private consumption expenditure, S = private savings, T= tax revenue receipts of the government, I = private investment, G = government expenditure on both consumption and investment, X= total export of goods and services and factor income from abroad and M= total import of goods and services and factor income paid to foreign nationals.

The identity states that the current account balance is equal to the sum of the private sector surpluses (or deficits) and the government surpluses (or deficits):

$$(M - X) \equiv (I - S) + (G - T) \qquad (2)$$

Assuming that an autonomous change in the fiscal policy leaves the private sector surplus or deficit unchanged, from the above identity the current account balance of the balance of payment (BOP) can be written in form of the gap between national savings and investment or the gap between aggregate domestic income and expenditures of both government and private sectors. This gives

$$M - X \equiv I - S \qquad (3)$$

Where, I = national investment, and S = national savings. From identity (2), if we write $(S-I)_g$ equals to (G-T), then the current account balance can be written as:

$$M-X \equiv (I-S)_p + (I-S)_g \qquad (4)$$

where,

$(I-S)_p = I_p - S_p$ and $(I-S)_g = I_g - S_g$,

$S_p = Y_p - T - C_p$,

$FD_g = (C+I-T)_g = (G-T) = (I-S)_g$, and $CAD \equiv (I-S)_p + FD_g$,

where, FD and CAD denote fiscal deficit and current account deficit respectively and p and g subscripts indicate private and government sector

respectively. The first term on the right hand side of the identity (4) indicates the resources gap arising from the private sector. The second term indicates the resources gap arising from the government sector. Any imbalance in the current account reflects the aggregate absorption in the economy in excess of domestically produced goods and services. Excess absorption can originate either from the private or the public sector or from both. However, given the private sector demand, it is the increase in fiscal deficit of the public sector that is associated with excess demand and the consequent deterioration in the current account balance of the BOP. Moreover, this expression shows that the overall balance of payment outcome is equal to the net domestic financing of the government and private sectors. This highlights the fact that apart from the private sector saving and investment decision, the domestically financed government deficit is one of the most significant macroeconomic fiscal targets or determinants which influences the current account and the overall BOP of a country. In a situation of external crisis, the identity implies that *ceteris paribus* serious policy measures should be aimed at curtailing the domestic absorption through reduction of government deficit. It implies that the overall government deficit is an important macroeconomic target upon which policy-makers should attach greater importance in order to have a better policy prescription for achieving faster growth rates and minimising internal and external economic distortions. In this context, it is necessary to outline the overall historical trends of the key macroeconomic aggregates in relation to twin deficits, which would form the background of examining the relationship between twin deficits and in understanding about working of the economy.

A Brief Historical Account of Fiscal Performance and Current Account Performance of the Indian Economy

It can be seen that although in the 1960's, the current account balance position was under severe strain, from the worsening position of 1960's it turned to a better position in the 1970's (Table 1). Both the fiscal and the current account performance indicators started deteriorating during the 1980-85 period. The current account deficit which averaged around at 0.90 per cent of the GDP in the 1970's, surprisingly averaged around 1.61 per cent of the GDP in the 1980's but in the 1990's there was a marginal fall in its level averaging around at 1.12 percent of the GDP which is still higher than that of the 1970's. These deficits were covered by heavy borrowings from the International Monetary Fund (IMF) and from other commercial sources. On the other hand, if we see the fiscal performance indicator of the country in the 1980's and 1990's as reflected in the fiscal deficit, it is also at a higher level than the level of the 1970's. It implies that both the fiscal and the current account positions in India were not so

much under strain during the 1970's as compared to the later two decades. Thus, the questions that arise are: (a) what is the reason for such soaring of fiscal and current account deficits in India, and (b) whether one deficit leads to the other?

Many researchers have characterised the reason for the large deficit in current account as being due to the stagnation in export growth and surge in import growth. It can be seen from the Table: 1 that while the average value of export to GDP ratio in the 1980's was nearly 4.13 per cent, imports were around 6.96 per cent of GDP during the same period. While the value of exports in the 1990's accounted for 7.04 per cent of the GDP, the value of imports accounted for 9.55 per cent of GDP in the same period. This shows a large deficit in the trade account. It is argued that this situation was partly due to the result of an inappropriate exchange rate policy.

Examining the overall trends of the Indian economy Joshi and Little (1996), state that while exchange rate policy must take part of the blame for the lack of current account adjustment, the heart of the problem lies in achieving fiscal prudence. The fiscal deficit of the central government which had averaged around 4.0 per cent of the GDP in the second half of the 1970s had averaged around 5.94 per cent of the GDP during 1980-90 and it slide down marginally to 5.21 per cent of the GDP in 1990-2000, indicating the unhealthy financial position of the central government. The increase in fiscal deficit also led to an increase in the monetised deficit. The increase in the monetised deficit led to an unwarranted increase in the base money growth which causes an inflationary spiral in the economy. According to Joshi and Little (1996), the marked deterioration in public finances was responsible both for the persistence of current account deficits and for the inflationary upsurge at the end of the 1980's. All this led to a full-blown crisis in the early 1990's in terms of inflation culminating to a peak level of 12 percent, foreign reserve dwindling down to a meagre amount which could only have supported only two weeks import of foreign goods, accompanied by a distressed fiscal situation.

A prime requirement of macroeconomic stability in the medium and long term is the sustainability of fiscal deficit by the government. In response to the macroeconomic crises of 1990, the government embarked on a process of stabilisation combined with fiscal adjustment and structural reforms. The fiscal reform process carried out in India since 1991 had strong underpinning for achieving macroeconomic stability. Macroeconomic stabilisation policy, among other things, encompasses the trade and fiscal policies i.e. maintaining the external balance along with maintaining fiscal balance for both internal and external stabilities. Given the greater degree of integration between the domestic and world economies in the last decade (with gradual removal of trade barriers in terms of withdrawal of tariff on imports on varieties of goods), fiscal policy assumed a great deal of significance as a policy instrument for maintaining viability of the external

sector. In 1991-92, fiscal retrenchment and a credit squeeze were undertaken, combined with a 19 per cent devaluation of the rupee and reduction of imports supported by a standby credit from the IMF. The 1993 budget made the rupee fully convertible, which amounted to a further 9.2 per cent devaluation. Following this there was sharp reduction in import tariffs on a range of goods (John, 2001). In the latter half of the 1990's, the fiscal adjustment process underwent positive change. With a decline in the ratio of fiscal deficit to GDP of the Centre from about 8.4 per cent in 1990-91 to 6 per cent in 1995-96, there was a change in the composition of financing the deficit with a substantial reduction in monetised financing and reduction in statutory liquidity ratio (SLR) brought about by deregulation in interest rates in the government security market. Along with these, a comprehensive programme to reform the tax structure, policies to restructure and divest public enterprises and several other measures were undertaken to reduce the Central government expenditure (Mohanty, 1997).

Despite several policy reform packages, inadequate fiscal adjustment continues to be the most intractable problem confronting the economy with the fiscal burden high on government investment outlays, particularly on infrastructure heads, which acts as a supplementing factor for boosting the level of private investment and exports in a developing country like India. It can be observed from the fiscal scenario of India that it is still dominated by the high level of current expenditures. Table 1 reveals that as an increasing share of capital receipt goes for incurring current expenditures, less is available for capital expenditure. The decline of the share of capital expenditure in the total government expenditure is reflected in the declining path of capital expenditure as a percentage of total expenditure as well as from capital expenditure as a percentage of total capital receipts. The capital expenditure as a percentage of capital receipts, which stood at around 67.54 per cent in 1960-70, increased to 129.40 per cent in the 1970-75 period and attained its peak level of 123.48 per cent during 1975-80. Since then it has recorded a declining trend. In 1995-2000 it constituted about 52 per cent of capital receipts. This implies that capital receipts, which should have been utilised for capital expenditure, are being diverted for the use of current unproductive expenditures. The capital receipts mainly emanating from borrowings bearing interest rates are being usurped in the revenue budget to meet current expenditures like interest payments, defence, subsidies and other administrative expenses. These are the underlying causes of higher level of fiscal deficits in India. Here, the important question is, if such is the fiscal position of the economy, what is the implication of the level of fiscal deficits towards the current account balance of the external sector. The next section surveys the existing empirical literature analysing the relationship between the two deficits.

Table 1: Major Key Macroeconomic Aggregates in India

Period	Exports /GDP%	Import /GDP%	Current Account Deficit /GDP%	Fiscal Deficit / GDP%	M_3/ GDP%	Capital Expen-diture / Capital Rece-ipts%	Capital Expen-diture / Total Expendi-ture%	Average Nominal Ex-change Rates (Per unit U.S.$)
1960-70	3.08	4.87	1.58	2.89	19.6	67.54	26.20	6.36
1970-75	3.15	3.98	0.40	2.88	21.54	129.40	42.55	7.69
1975-80	4.74	6.01	-0.22	-3.93	27.28	123.48	40.55	8.51
1980-85	4.14	7.22	1.34	5.19	32.06	112.80	40.72	9.75
1985-90	4.12	6.70	1.89	6.70	36.70	100.91	34.98	13.82
1990-95	6.32	8.14	1.14	5.43	39.40	81.16	28.05	27.17
1995-00	7.77	10.96	1.11	5.00	46.74	51.96	19.46	38.30

Source: Computed from the "Handbook of Statistics on Indian Economy", RBI (2001) and various issues of Report on Currency and Finance, RBI.

Empirical Literature

In the literature, the following are the major attempts made to examine the twin deficit relationship i.e. whether it is the fiscal deficit that influences the current account deficit (or trade deficit) or it is the other way round, both in the context of India and other countries.

Using the data for the time period 1970 to 1982, Mansur (1989) tried to establish the relationship between budget deficits and current account deficits in Philippines. Testing the direction of causality between the two, he found that there exists a unidirectional causality. The causality runs from budget deficits to current account deficits. Increase in budget deficit widens the deficit in the current account of the balance of payment but does not hold the reverse.

For examining the linkages between the federal budget deficits and the merchandise trade deficits for the US economy from the period 1979 to 1985, Abell (1990), applying the vector autoregression (VAR) time-series model, found that a budget deficit indirectly influences the trade deficits through the transmission mechanism of interest rates and exchange rates. The model indicates that reduction of budget deficits may prove to be at least as effective as exchange rate intervention for the purpose of reduction of the size of merchandise trade deficits. Applying the same time-series technique, Enders and Lee (1990) tried to examine the inter-relationships of the fiscal variables such as federal government

spending, tax and debt, real consumption, with the current account of the USA economy for the period 1947 to 1987. Applying the vector autoregression (VAR) technique within an infinite horizon framework, they found that Ricardian equivalence hypotheses (REH) does not hold for the USA economy. The study concluded that although the substitution of taxes for government debt does not result in a current account deficit but temporary increase in government spending, regardless of the means used to finance the spending, results in current account deficit. Darrat (1988) showed the existence of a bi-directional causality between the twin deficits for the US economy.

Examining quarterly data for eight developed countries, Australia, Britain, Canada, France, Germany, Ireland, Italy and United States, Kearney and Monadjemi (1990) tried to demonstrate whether the current account performance could be attributed to any changes in the stance of the fiscal policy during a floating exchange rate regime from the period 1972:I to 1987:IV. Using the vector autoregression (VAR) technique, they found that there is no persistent relationship between the twin deficits and if there is at all any temporary relationship, current account deficit is not invariant to the government's financing decision. However, the study, finding that there existed a strong feedback effect of current account performance on the stance of fiscal policy, concluded that tighter fiscal policy should not be relied upon in isolation to deliver sustained improvement in current account performance.

In another study, Chu (1989) investigated the impact on fiscal balances of eighteen developing countries in response to the fluctuations in their external trade balances during the period 1962 to 1982. The countries were non-oil primary commodity exporters. They relied heavily on taxation of international transactions as the major source of their central government revenues. Observing that there was deterioration in their fiscal balances in some periods accompanied with increased fluctuations in revenues, foreign financing and external trade, Chu tried to empirically estimate the relationship between revenues and external trade accounts through the application of the ordinary least square (OLS) technique. From the regression result, he found that in most of the countries, trade instability impacts on the revenue instability of the government and hence there exists synchronisation of fiscal cycles among the sample countries in relation to the world trade cycles, indicating the importance of external developments in affecting fiscal cycles and fiscal crises. A major limitation of the study is that although it gave importance to the analysis of fluctuations in government revenues arising out of international trade transactions, it ignored the analysis of fluctuations in government expenditure, and yet draw conclusions about the impacts of trade balances on the overall budgetary position of the countries. There are also many other studies carried out both in the context of developing as well as developed countries which resulted divergent results.

In the context of India, there are very few empirical studies examining the relationship between fiscal deficit and current account balance of BOP. A study by Mohanty and Joshi (1992) investigated the extent of linkage between the fiscal deficit and the external balance in the merchandise trade account, and evaluated the effectiveness of fiscal policy in restoring the external balances during the period 1970 to 1991. Using ordinary least square estimation procedure, the study found that a programmed reduction of fiscal deficit would lead to a reduction of trade deficit in the medium term even though this comes at the cost of recession. In another study, Rangarajan and Mohanty (1997) examined macroeconomic impacts of fiscal deficit on external balance and monetary growth during the period from 1971-72 to 1993-94. From their policy simulations, they found that fiscal deficits in general result in widening of the current account deficit, although this outcome depends on the way the deficit is financed. The monetary financing scenario showed that the price and income effect reinforce each other, leading to deterioration in the external balance. Hence, the study reached the conclusion that to maintain a sustainable external position, an appropriate combination of both the fiscal policy and monetary policy is required in order to maintain appropriate absorption and price levels in the economy.

As seen from the above empirical review, there are few studies in the context of India in establishing the linkage between the fiscal policies with the current account in the balance of payment. Especially, when it comes to the post liberalisation economic scenario or a period where India has experienced a number of macroeconomic policy changes, except the study by Rangarajan and Mohanty (1997) for the period 1971-94, no other research effort has been made to establish the relationship between the fiscal deficit and the current account deficit of the balance of payment (BOP). In the light of the above, the present study makes an attempt to examine the relationship between the fiscal performances of the central government with the current account performance in the BOP of India by establishing a relationship between fiscal deficit and current account deficit. Our main focus here is to examine whether effects of the fiscal deficit on the current account deficit can be explained through the transmission mechanism of money supply and exchange rates. Money supply affects the relative prices of exports and imports. Thereby, it exerts its influence on the real exchange rate which is assumed to be implicit here, and then it affects the current account balance of the BOP. Instead of the real exchange rate, we have brought in the nominal exchange rate variable, because the fiscal gap bridged by external borrowing gets affected by the nominal exchange rate, which in turn affects the current account balance. The following section discusses the methodology adopted in this study to establish the relationship between the two deficits.

Methodology and Data Description

The theoretical work on open economy stabilization policy lays far more emphasis on government fiscal policy as the main proximate determinant of external balances. Fiscal deficit is one of the major indicators of fiscal policy and current account deficit is one of the indicators of external balance. The interaction between the twin deficits works through the transmission mechanism of money supply, income, exchange rates (or relative prices), rates of interest and so on. Here, in our case, the money supply is assumed to be the main transmission channel or an intermediate variable to establish the link between the twin deficits. The changes in fiscal deficit affecting the money supply affect the relative price level of the domestic economy in relation to the prices of foreign economy. Thereby, it affects the real exchange rate and the current account balance. The nominal exchange rate is considered as another important transmitting variable through which there could be a feedback interaction between the current account deficit and the fiscal deficit. When an imbalance takes place in the current account, it is likely to affect the nominal exchange rate. Once the exchange rate gets disturbed, it may affect the fiscal balance, assuming that the government might have borrowed funds earlier from abroad to adjust its fiscal imbalances. If the value of domestic currency depreciates, the domestic country being the borrower has to pay more in terms of the domestic currency. The rise in exchange rate now reinforces imbalances in the fiscal balance position of the country. The model adopted here explicitly incorporates all these relevant factors in the empirical testing. The real exchange rate is implicit in the model. It could have been taken explicitly as a transmitting channel variable but that would complicate the estimation procedure because it would require data on the prices of exports of different foreign countries and the price of non-tradeable domestic goods, which is not easily available. The model adopted explicitly incorporates these factors in the empirical testing. The study utilizes the vector autoregression (VAR) technique. The suitability of this approach in the current context stems from the fact that a VAR model constitutes an unrestricted reduced form of some unknown structural system of equations without assuming beforehand that any of the variables included are exogenous. It tries to explain the interrelationships among the estimated variables through their dynamic interactions in the system. This procedure facilitates examination of the extent to which the emergence of a twin deficit interaction can take place directly as well as indirectly through the operation of the transmission mechanism. In our case, the transmission mechanism is assumed to operate through the money supply and the nominal exchange rate. The VAR model is specified in the following form.

$$A(L)\, Y_t = U_t ,$$

where,

$$A(L) = I - A_1 L - A_2 L^2 \ldots - A_p L^p ,$$

$E(U_t) = 0,$

$E(U_t U_t^1) = \Sigma((E(U_t U_s^1))=0 \qquad \text{for } t \neq s,$

$E(Y_t U_s^1)=0 \qquad \text{for } t \neq s,$

$Y_t=(FD_t, M_{3t}, ER_t, CAD_t).$

This is a standard VAR representation in which (1xn) vector of variables, A is an (nxn) vector matrix of coefficients, U is an (nx1) vector of white noise disturbance terms, and L denotes the lag operator (for example, $L^1 Y_t=Y_{t-1}$). The variables that appear in the Y_t vector are government fiscal deficits (FD), broad money supply (M3), nominal exchange rates (ER) and current account deficits (CAD) in the balance of payment (BOP). The study examines the twin-deficit relationship in the context of undergoing macroeconomic reform scenario in India. The reform initiatives undertaken under the New Economic Policy (NEP) in the early1990's is supposed to have some impact with a time lag. To examine this, the study examines quarterly data from 1994:II - 2001:I. Quarterly data are considered for this purpose due to their high frequency. The study could have considered the data from 1991-92 onwards, to take into account the exchange rate devaluation in 1992. But this could not be done due to the unavailability of quarterly/monthly fiscal deficit data before the year 1994. As a result, the coverage period is restricted to the period from 1994: II to 2001: I. Quarterly data on fiscal deficit (FD), broad money supply (M_3) and the exchange rates of Indian currency in terms of per unit dollar of US currency are compiled from monthly data on an average basis by summing the data over three consecutive months and taking the average for each quarter. All the data including quarterly data on current account deficit (CAD) are collected from the "*Handbook of Statistics on Indian Economy*", RBI (2001) and various issues of *RBI monthly bulletins*.

There are various procedures involved in the estimation of the VAR model. To begin with, the first step is to choose a proper ordering of variables in the model. The study arranges the order of the variables in the following manner: fiscal deficit (FD), then broad money supply (M_3), nominal exchange rate (ER, Indian currency per unit of dollar) and the last variable is current account deficit (CAD). Based upon the economic rationality, variables included are selected in such a way that the change in one variable gives rise to the sequence of effects on the other variables. According to this principle, the policy variable comes first and then the intermediate and target variables. Since both fiscal deficit and current account deficit can be target as well as instrument variables, they are placed on both sides to see the feedback effect of one on the other. It has also been estimated that if the above variables are specified the other way round, it does not significantly affect the estimated results. In the

next step it is assumed that all the relevant variables included in the system should be stationary. To verify whether variables possess unit roots or not, both Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) unit root tests are conducted. The third step is to fix an optimum lag length of variables in the system. Using Akaike Information Criteria (AIC) and Schwarz-Bayesian Criteria (SBC) lag length is fixed at one. It may be noted that the coefficients obtained from the estimation of VAR model cannot be interpreted directly. To overcome such problems econometricians suggested the use of the innovation accounting technique, which consists of both impulse response functions (IRFs) and variance decompositions (VDs) in a VAR model. This innovation technique is applied to estimate and to analyse the results in the VAR model. While, impulse response functions are used to assess the response of a temporary one standard deviation shock in each variable on the system itself, variance decomposition is used to detect the causality among the variables. In other words, the variance decomposition method explains the extent to which variation in a variable is explained by the shocks in all other variables in the system.

Empirical Result Analysis

Before estimating the VAR model, which requires all the variables to be stationary, Dickey-Fuller and Augmented-Dickey Fuller's unit root tests are employed to check for stationarity. From Table:2, it can be seen that the DF and ADF tests reject the null hypothesis of unit root in most of the variables when we consider the respective series without their trends by using the p-values of 0.10, 0.05 and 0.01. When we consider the series with their trends, although DF does not reject the null hypothesis of the unit root the ADF test rejects the null hypothesis, except in one situation. However, Table 3 reports that all the series become stationary at their first differences, both with and without their trends. Hence, confirming variables are integrated of order one, i.e. I(1), the VAR model is employed later to estimate the relationship by taking all the considered variables at their first differences in order to get a meaningful picture about the economy.

Table 2: Unit Root Test at the Level of the Series

Variables	Without Trend		With Trend	
	DF	ADF	DF	ADF
FD	-3.581	-4.556(2)	-4.701	-4.374(2)
M_3	-1.103	.561(4)	-4.521	-2.304(4)
ER	-1.47	-1.049(4)	-3.605	-2.268(4)
CAD	-4.521	-2.152(4)	-4.419	-2.027(4)

Note: The critical values for unit root tests at 1%, 5% and 10% levels are -3.75, -3.00 and -2.62 without trend and -4.38, -3.60 and -3.24 with trend respectively.

Table 3: Unit Root Test at the First Difference of the Series

Variables	Without Trend		With Trend	
	DF	ADF	DF	ADF
FD	-5.309	-8.107(1)	-5.171	-7.849(1)
M_3	-7.767	-5.270(1)	-7.621	-5.22(1)
ER	-6.847	-4.602(1)	-6.718	-4.539(1)
CAD	-7.302	-5.314(1)	-7.127	-5.189(1)

Note: The critical values for unit root tests at 1%, 5% and 10% levels are -3.75, -3.00 and -2.62 without trend and -4.38, -3.60 and -3.24 with trend respectively.

The VAR analysis here includes the computation of 12-steps ahead horizon impulse response and forecast error variance decomposition. The result of the impulse response function is reported in table 4 and the result of the variance decomposition is reported in Table 5. As far as the impulse response of FD is concerned (as shown in Table 4), it can be seen that when a shock is given to FD, it has a positive contemporaneous relationship with M_3 and ER, while it has an inverse relationship with CAD. While the effect of shock of FD on money supply quickly dies off, the effect of shock on ER and CAD lasts until the 7th quarter. Moreover, it shows that when there is an increase in fiscal deficit, surprisingly there is a decrease in current account deficit. The error variance decomposition of FD shows that variation in FD is largely explained by itself (see Table 5). Other variables do not play any significant role in explaining the variation in fiscal deficit. This implies that current account deficit does not impact on fiscal deficit.

As far as the impulse response of M_3 is concerned (see Table 4), it shows that although a one standard deviation shock to M_3 induces a decrease in ER and CAD but the effect of shock on CAD dies off quickly, and the effect of shock on ER lasts up to the 7th quarter. The effect of shocks of M_3 on FD indicates that after the 1st step ahead horizon, money supply has a positive relationship with the fiscal deficit but the negative shocks in the later quarters dominate over the positive shock in FD implying that a negative relationship exists between M_3 and FD. The error variance decomposition of M_3 (as shown in Table 5) shows that the variation in M_3 is largely explained by the innovation in itself and then by CAD. This indicates that the current account deficit explains some extent of variation in the broad money supply rather than FD and ER variables. This might be due to the fact that when the current account deficit increases, the monetary authority resorts to taking some action on money supply of the economy.

As seen from Table 4, the impulse response analysis of ER shows that the effect of shock of ER positively induces CAD and FD in the first quarter, but in the 3rd quarter the shock in ER has a positive influence on FD and M_3 but a negative influence on CAD. Thereafter, the effect of shock dies off. In Table 5, the error variance decomposition of ER reveals

that the variation in ER is largely explained by the innovation in M_3 and CAD and then to some extent by itself.

In Table 4, the impulse response analysis of CAD reveals that the effect of shock of CAD has a negative influence on M_3 and ER until 3rd quarter. But its effect on FD is positive in the 1st quarter and thereafter it is negative until 7th quarter, dominating over the initial positive influence. In Table 5, the error variance decomposition of CAD shows that the variation in CAD is largely explained by its own innovation and then is due to the innovation in FD. It implies that fiscal deficit has some influence on the current account deficit but M_3 and ER do not play any role in influencing the CAD. It clearly reveals that among the variables, fiscal deficit largely influences the current account deficit of the balance of payment in India. Although the causal relationship runs from the fiscal deficit to the current account deficit, the relationship between them is inverse as the impulse response analysis of FD suggests.

Table 4: Impulse Responses

Impulse response of FD				
Horizon	FD	M_3	ER	CAD
1	-0.090	-0.005	-0.006	0.065
3	-0.004	0.000	-0.015	0.008
7	-0.001	0.000	-0.001	0.001
12	0.000	0.000	0.000	0.000
Impulse response of M_3				
1	-0.061	0.022	-0.022	-0.023
3	0.020	0.006	-0.003	0.000
7	0.003	0.001	-0.001	0.000
12	0.000	0.000	0.000	0.000
Impulse response of ER				
1	-0.061	0.000	-0.007	-0.002
3	-0.003	-0.001	0.000	0.002
7	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
Impulse response of CAD				
1	-0.010	0.039	0.028	-0.063
3	0.063	0.010	0.008	-0.011
7	0.006	0.001	0.000	-0.001
12	0.000	0.000	0.000	0.000

Table 5: Variance Decompositions

Variance Decomposition of FD				
Horizon	FD	M_3	ER	CAD
1	98.90	0.05	0.05	0.00
2	98.10	1.30	0.60	0.00
3	97.50	1.30	0.60	0.60
8	97.30	1.40	0.60	0.70
12	97.30	1.40	0.60	0.70
Variance decomposition of M_3				
1	3.60	43.80	0.00	52.60
2	8.80	42.50	0.00	48.70
3	8.40	41.90	0.00	49.70
8	8.60	41.80	0.00	49.60
12	8.60	41.80	0.00	49.60
Variance decomposition of ER				
1	0.50	64.70	23.50	11.30
2	3.00	53.20	18.80	25.00
3	5.50	51.50	18.20	24.80
8	5.90	50.90	18.00	25.20
12	5.90	50.90	18.00	25.20
Variance decomposition of CAD				
1	25.00	4.80	0.60	69.60
2	26.70	4.80	0.60	67.90
3	.26.70	4.80	0.60	67.90
8	26.80	4.80	0.60	67.80
12	26.80	4.80	0.60	67.80

From the above discussion, it can be noted that while the analysis of impulse response technique plausibly suggests that the current account deficit responds inversely to the shocks in fiscal deficit, the dynamic causal relationship established from the variance decomposition analysis confirms it. It suggests that the fiscal deficit have some degree of influence on the current account deficit. The most interesting result emerging from the above analysis is that while the result of variance decomposition reveals CAD is influenced by FD but contrary to the impulse response outcome none of the intermediate variable such as money supply, and ER seems to play any significant role in establishing the relationship between the twin deficits. Further, although the impulse response analysis reveals that the fiscal deficit sometimes responds positively and sometimes negatively

to the shocks in current account deficit, the variance decomposition analysis is inconsistent with such outcome, as FD is not influenced by any of the variables in the system. As a result although there does exist some impact of CAD on M3 and ER it is not being transmitted to the FD.

Summary & Concluding Remarks

In response to the macroeconomic crisis of early 1990's the government of India had initiated stabilisation measures in combination with fiscal adjustment and structural adjustment measures in the economy. In addition to implementation of above measures, in recent periods India has experienced a number of similar policy measures for ensuring fiscal prudence in government finances and for improving external sector balances. Given the economic scenario, the present study examined the interaction between twin deficits in the regime of macroeconomic reform period considering the quarterly data over the time period 1994: II to 2001: I. Using VAR analysis, the study found that the current account deficit responds inversely to the shocks in fiscal deficit but the causal relation does not run in the reverse direction implying that there is a one-way interaction between the twin deficits, i.e fiscal deficit interacts with current account deficit. Further it found that neither of the two intermediate variables, money supply and exchange rate, can serve as an establishing link in such twin-deficit relationship, implying the need to search for other intermediate determinants which could explain such inverse relationship. Moreover, the finding suggests that it is the increase in fiscal deficit that reduces the current account deficit, which is contradictory to other major findings and the empirical reality in the context of most of the developing countries. But the study predicts that this result might support the theoretical argument that a tax-financed increase in government expenditure in the later period resulting from debt-financed past government expenditures might restrain the private sector absorption by the way of reducing consumption and investment expenditure. As a result, the private consumption expenditure declines by an amount that is greater than the fiscal expansion because the private sector saves more in order to attain higher levels of income as well as to meet taxes in the future. The increased savings generate current account surpluses. Notwithstanding the fact that the results found might be a mere statistical abstraction, which needs further re-examination, we could still assume with some conviction that a moderate increase in fiscal deficit corresponding to a sustainable current account deficit may be desirable for a developing country like India, provided the increase in deficit is used productively. This would result in augmenting capital formation, and hence a reduction of imbalances in the external sector. However, a mere sustained increase in fiscal deficit without corresponding increase in productivity and overall growth of the economy would lead merely to an unsustainable economic environment resulting in economic crisis.

References

Abell, J. D. (1990). Twin Deficits during the 1980s: An Empirical Investigation. *Journal of Macroeconomics,* Vol. 12, Pp.81-96.

Barro, R. (1974). Are Government Bonds Net Wealth? *Journal of Political Economy,* Vol. 82, Pp.1095-118.

Barro, R.J. (1989). The Ricardian Approach to Budget Deficits. *Journal of Economic Perspectives,* 3, Pp.37-54.

Bortoli, G. (1989). Fiscal Expansion and External Amount Account Imbalances. In Mario I. Blejer and Ke-Young Chu (eds.), *Fiscal Policy, Stabilisation, and Growth in Developing Countries,* IMF Publications.

Buiter, W. H. and U.R. Patel (1997). Budgetary Aspects of Stabilisation and Structural Adjustment in India: The Painful Road to a Sustainable Fiscal-Financial-Monetary Plan. In Mario, I. Blejer and Teresa Ter-Minassian (eds.), *Macroeconomic Dimensions of Public Finance,* Routledge studies in the modern world economy, Routledge, London and New York.

Chu, K.Y. (1989). External Shocks and Fiscal Adjustments in Developing Countries. In Mario I. Blejer and Ke-Young Chu (eds.), *Fiscal Policy, Stabilisation, and Growth in Developing Countries,* IMF Publications.

Corden, W. M. (1997). How Would a Fiscal Expansion Affect the Exchange Rate?. In Mario, I. Blejer and Teresa Ter-Minassian (eds.), *Macroeconomic Dimensions of Public Finance,* Routledge studies in the modern world economy, Routledge, London and New York.

Darrat, A. F. (1988). Have Large Budget Deficits Caused Rising Trade Deficits?. *Southern Economic Journal,* Vol.10, Pp.879-87.

Easterly, W. & K. Schmidt-Hebbel (1994). Fiscal Adjustment and Macroeconomic Performance. In William Easterly, Carlos Alfredo Rodríguez (eds.), *Public Sector Deficits and Macroeconomic Performance,* A World Bank Publication.

Enders, W. and B. S. Lee (1990). Current Account and Budget Deficits: Twins or Distant Cousins?. *The Review of Economics and Statistics,* Vol. 72.

Handbook of Statistics on Indian Economy (2001), RBI, Mumbai.

John, T. (2001). Sequencing and the Sustainability of Economic Reform in India. In Wahiduddin Mahmud (eds.), *Adjustment and Beyond: The Reform Experience in South Asia,* Proceedings of the IEA Conference held in Dhaka, Palgrave, New York.

Joshi, V. & Little, I.M.D.(1994). India: Macroeconomics and Political Economy, 1964-1991. *World Bank and Oxford University Press,* Washington.

Joshi, V. & Little, I.M.D.(1996). India's Economic Reforms:1991-2001. *Oxford University Press,* New Delhi.

Kamensky, G. L & C.M. Reinhart (2001). The Twin Crises: The Causes of Banking and Balance of Payments Problems, *Global Financial Crises and Reforms: Cases and Caveats.* In B. N. Ghosh (eds.), Routledge Studies in the Modern World Economy, Routledge, London and New York.

Kearney, C. and M. Monadjemi (1990). Fiscal Policy and Current Account Performance: International Evidence on the Twin Deficits. *Journal of Macroeconomics*, Vol.12, No.2, Pp.197-19.

Khan, M, and S. Lizondo (1987). Devaluation, Fiscal Deficits and the Exchange Rate. *World Bank Economic Review*,1(2), Pp.357-74.

Mansur, A. H. (1989). Effects of a Budget Deficit on Current Account Balance: The Case of Philippines. In Mario, I. Blejer and Ke-Young Chu(eds.), *Fiscal Policy, Stabilisation, and Growth in developing Countries*, IMF Publications (1989).

Modigliani, F (1961). Long-Run Implications of Alternative Fiscal Policies and the Burden of the National Debt. *The Economic Journal*, Vol. LXXI, Pp.730-55.

Mohanty, M.S. & H. Joshi (1992). The Dynamic Interrelationship between Fiscal and Trade Deficits in India:1970-71 to 1990-91. *RBI Occasional Paper*, Vol.13, No.3.

Mohanty, M.S. (1997). Macro-Economic Stability, Growth and Fiscal Reforms-The Indian Perspective, *Economic and Political Weekly*, Vol.32, No.6, Pp. 289-98.

Rangarajan, C & M.S. Mohanty (1997). Fiscal Deficits, External Balance, and Monetary Growth - A Study of Indian Economy. *RBI Occasional Paper*, Vol. 18, No.4, PP.584-641.

Rodríguez, C.A. (1994). The External Effects of Public Sector Deficits. In William Easterly and Carlos Alfredo Rodriguez (eds.),*Public Sector Deficits and Macroeconomic Performance*, A World Bank Publication.

Sargent, T. J. and W. Wallace (1981). Some Unpleasant Monetarist Arithmetic. In T.J. Sargent (eds.), *Rational Expectations and Inflation*, Harper and Row, New York, Pp.158-90.

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