

How budget deficit and current account deficit are interrelated in Indian economy

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Abstract. *The development in Indian economy brings the question of validity of the twin deficit hypothesis. The main aim of the article is theoretical and empirical analysis of the causal relationship between the budget deficit and the current account deficit in the Indian economy from the period 1990-2013. A co-integration test suggests that both the variables have a long run association between each other and move with each other for a long period of time. The Granger causality test clearly finds the existence of bidirectional relationship between the twin deficit variables. The results indicate that twin deficit hypothesis exists in India as opposed by direction between budget deficit and current account deficit. The study finds the government need to find adequate monetary and fiscal policy for policy variables.*

Keywords: current account deficit, budget deficit, co-integration, granger causality.

JEL Classification: H62, F32, C23.

1. Introduction

Like most developing countries a steady fiscal deficit in India is the foremost cause of all primary ills of the economy. It has varied between 5.1 to 9.6 percent during last two decades. On the other hand the current account deficit varied between 0.4 to 4.7 percent during the same period. The alteration in fiscal policy can lead foreseeable developments in the open economy's rendition of current account deficit, remains a contentious issue. An important aspect of this issue distress what is called as twin deficit examination, according to which fiscal deficit and current account deficit are very closely related so that reduction in both are necessary and adequate to obtain enhancement in the future.

Theoretical relationship that exists between variation in fiscal policy and the current account deficit has been based on two models. These models purport to describe how the economy works in aggregate without explaining the behavior of economic agents. The twin deficit hypothesis can be explained using the Keynesian income-expenditure framework and the Mundell Flemming framework. According to the former, an expansionary budget leads to increased income ultimately resulting in increase in aggregate demand for domestic and imported goods. The increase in imports leads to a worsening of the current account balance. According to Mundell Flemming, an increase in budget deficit causes an upward rise in interest rates if government borrows domestically to finance the deficit. This rise in interest rate leads to capital inflows and consequently an appreciation of the exchange rates. This means exports become less attractive while imports become attractive ending up worsening the current account. This approach however depends on the openness of the economy and the exchange rate regime. In a fixed exchange rate regime expansionary fiscal policy would lead to increased income a process that would still worsen the current account. There however exists contradicting views whereby some scholars believe there exists no relationship between the variables while others believe the relationship exists and its bi directional. Various researchers support the evidence of bi-directional causality while reverse causality was confirmed for Indonesia.

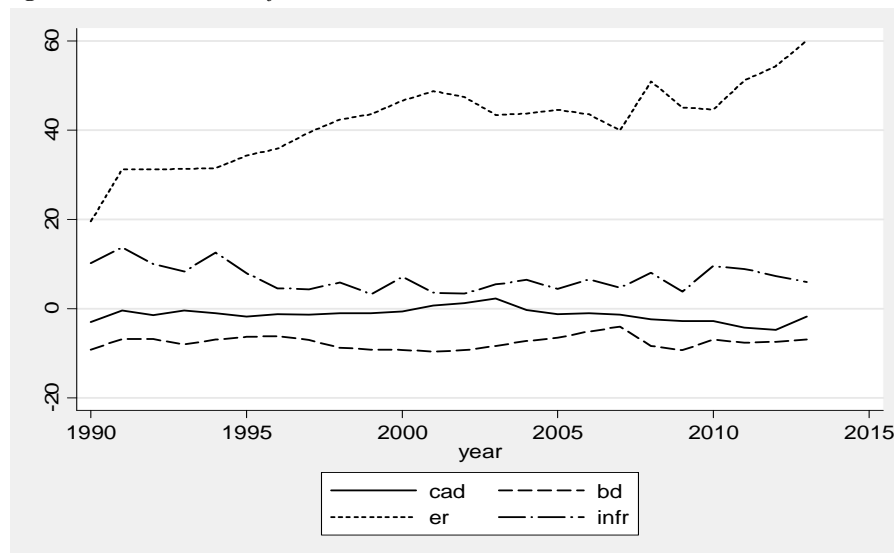
The more conducive export environment with the introduction of export promoting schemes, which include also devaluation of rupee in 1966 as rupee got devaluated from 4.7 Rs to 7.5 Rs per dollar. This improvement in trade facilities improved export performance's by promoting export incentives which boasts Indian current account during 1960 and early 1970. But the situation turned different aftermath of oil shock (Gulf war crises) which generates low exports for the country.

After late 1970s the increase in inflation, large fiscal deficit and hike in oil prices and pegged exchange rate generates low exports, ore imports, increase in current account deficit and Indian reserves fall critically low. However in 1990s the balance of payment (BOP) crises also hit badly the Indian economy in which oil led crises increase rapidly,

the increase in oil prices the huge current account deficit (CAD) which affects budget deficit (BD).

Recently Indian economy from 1990 to 2013 was hit by the balance the balance of payment crises, Asian crises, FRMB Act and financial crises. In 1990s the budget deficit (BD) was 9.1 percent and current account deficit (CAD) was 3 percent at the percentage of GDP. But due to some policies in 2001 to 2004 the CAD was in surplus. The Indian economy is being characterized at twin deficit economy same from 1990 to 2013, the economy has 7 percent of budget deficit (BD) and 4.7 percent of current account deficit (CAD) at the percentage of GDP in year 2013. It is therefore instructive to investigate whether it is a current account deficit or budget deficit which brings the economy in deficit and what are the directions between the two deficits.

Figure 1. Shows behavior of B.D AND C.A.D and other macroeconomic variables



Source: Author's computation with Stata 12.0.

Baharumshah et al. (2006) examining the twin deficit hypothesis for (ASEAN-4 Countries) using Quarterly data from (1975:1-2000:4) for analysis and sampling period differs from country to country due the availability of data. He has used cointegration and there vectors is based on two likelihood ratio test statistic. Toda and Yamamoto modified WALD method for testing Granger Causality that conducts inferences in the level VAR and needs to determine the true lag length of the model and at the end he used variance decomposition and impulse response function to find relationship between current account deficit and budget deficit in the long run. The paper find long run relationship between the twin variables and Keynesian proposition fits for ASEAN countries. The results find direct causal link from budget deficit to current account deficit

and find it is the interest rate which appreciates the exchange rate and this leads the widening of current account deficit.

Bose and Jha (2011) investigated the twin deficits hypothesis in the Indian context. Jha tried to find out the existence of any such causal relationship between the two deficits within a multi-dimensional system with interest rate and exchange rate acting as interlinking variables. However, the results claimed that the causal linkage could be established between fiscal deficit and interest rate and exchange rate. However, none of the variables statistically significantly cause the current account deficit. The direction of causality is seen to run unambiguously from oil prices to the current account deficit to fiscal deficit. Moreover, oil price is seen to cause significant influence in short run on all other variables in the system.

Osoro et al. (2014) the paper test the twin deficit hypothesis and empirical relationship between current account balance and budget deficit while including other important macroeconomic variables such as growth, interest rates, money supply (M3) in Kenya from 1963-2012. The study was based on co integration analysis and error correction model (ECM). The results showed a positive and significant relationship between budget deficit and current account. The signs of the normalized co integrating coefficients suggest that there is also a positive relationship between current account deficit and interest rates, GDP and negatively related to money supply. In other words, current account deficit tends to increase along with the increase in fiscal deficit, GDP, interest rates and decrease with money supply in the long run. This means, a rise in budget deficit would be followed by an increase in external balance. We find the causal relationship works through two channels: first is the direct causal link from budget deficit to current account deficit, and the second is the indirect channel that runs from budget deficit to higher interest rate; which lead to appreciation of the currency, in turn worsening the current account deficit.

Ratha (2011) finds that twin deficit theory hold true for India in the short-term, but not in the long run. Using monthly and quarterly data for the 1998-2009 periods and employed bound testing approach to cointegration, she finds evidence that by exercising Fiscal Discipline, Indian government should be able to mitigate the country's trade deficit in the short run. However in the long run, the importance of austerity measures as a trade deficit reduction tool becomes weak. His conclusion is supporting the Ricardian Equivalence Hypothesis (REH) which negates any relationship between these variables and the Keynesian view prevails in the short run.

Basu and Datta (2005) undertakes econometrics analysis to study the impact of fiscal deficit (FD) and trade deficit (TD), and finds both in the percentage of GDP are not found to be twin in the Indian economy.

The rest of the study is organized as follows. Section 2 specifies the theoretical models to support the existence of a long-run relationship between exports and imports and macroeconomic variables explaining CAD. The empirical methodology used for investigating the sustainability of current account deficit and its determinants is presented in Section 3. Section 4 reports and discusses the empirical results. Final Section summarizes the main findings and draws their policy implications to preserve India's current account sustainability.

2. Theoretical framework

The relationship between budget deficit and current account deficit could be written as:

$$CA = SPvt - I - (G - T). \quad (1)$$

Where, CA stands for current account balance, Spvt for private saving; I for investment, G for government purchases; and T for direct taxes collected from household firms by the government. The government deficit is given by G-T. A rise in the government deficit will increase the current account deficit if the rise in government deficit decreases total national saving. If the current taxes are held constant and (Spvt-I) remains the same or stable, an increase in temporary purchase will raise the government deficit (G-T) which affects the current account positively. In this way a government deficit resulting from increased purchases reduces the nations' current account surplus or widens the nation's current account deficit.

The upward shift in budget deficit and current account deficit could be the feature of twin deficit phenomenon. Other features would lead a positive effect of budget deficit on interest rates. The upward shift in interest rates entices investments from abroad, that lead increase in demand of domestic currency and leads appreciation of its value, which implicit inexpensive imports and expensive exports, and leads economy in deficit.

The deficit due to governmental purchase will reduce and both desired consumption and national savings and increase in current account deficit. The Ricardians and Keynesians have different views over the effects of budget deficit caused by tax cut or tax increase. According to Ricardian the tax cut will not lead people to consume more if the planned and future government remains unchanged. If the tax cut in present would be balanced by the increase in future tax, and the tax payers don not fell well off due to decrease in current tax though their income will be increased. Thus, national savings, current account balance, consumption, interest rates and investment remain unaffected. On the other side Keynes argue that consumers respond to the current tax cut by increasing their consumption patterns due to the change in tax rate because they expect higher deficit will lead higher tax rates in future and will create an impact on national savings, increases current account deficit and will affect the transmission mechanism between the macroeconomic variables. This leads twin deficit hypothesis. Moreover there is another

link between budget deficit and current account deficit. The government will increase its borrowings due to increase in budget deficit, this increase the rate of interest and will increase foreign capital inflow. This results cheaper imports and expensive exports. This would lead merchandise trade deficit. There are other channels through which these two deficits are interlinked. Some researchers used four important macro variables like economic growth, rate of inflation, exchange rate and money supply as directly affecting these deficits in U.S. Rapid economic growth boost investments by higher interest rates and attract foreign capital. This leads increase in foreign imports which worsens trade deficit. The rate of inflation also is another factor which affects the desirability of internationally traded goods and leads trade balance. The change in deficits cause change in trade deficit not only by exchange rate linkage but also by interest rate linkage.

3. Econometrics methodology

The cointegration test of the variables needs all the series of variables should be stationary. To avoid the spurious relationship we need to check stationarity of variables when the variables are non-stationarity at the level form we employ Augmented Dickey Fuller Test (ADF) which takes the following form:

$$\Delta y_t = \alpha + \beta t + \rho Y_t - 1 + \sum_{i=1}^p \delta_i \Delta Y_t - j + \epsilon_t. \quad (2)$$

Moreover if the variables are stationary at level then we can apply VAR analysis, if the variables are non-stationary at level then we can apply cointegration test. This can be defined after unit Root test. This test helps us to find out the long run relationship among the variables. If the variables are nonstationary we need to difference them before we can apply regression at level without leading the spurious relationship. There are many tests in the literature for cointegration investigation that were acknowledged in the literature for cointegration analysis such as the *Engle-Granger Cointegration test* and *Johansen Cointegration test*, *Cointegrating regression Durbin- Watson test*. We will apply Johansen test for cointegration among the variables because it has advantages to consider the possibility of multiple cointegration vectors Johansen (1991).

The regression model indicates only the statistical relationships between the dependent variable of concern and other independent "explanatory" variables, but it does not indicate the causal relationship and the direction of it. There might be a unidirectional causality relationship running from one variable to the other one, a bidirectional relationship, also independence may exist. We will use the *Granger causality test* to know the direction of the causal relationship among the variables in our empirical model. The intuition behind Granger causality tests can be expressed using the following equations:

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{i=1}^p \beta_i X_{t-i} + \epsilon_{1t}. \quad (3)$$

$$X_t = \mu + \sum_{i=1}^p \delta_1, i X_{t-i} + \sum_{i=1}^p \theta_2, i Y_{t-i} + \varepsilon_{2t}. \quad (4)$$

4. Data

The data for study covers the period from 1990-13 for India. The data for Budget Deficit (BD), Current Account Deficit (CAD), Inflation (INF) and Exchange Rate (ER) has been taken from Reserve Bank of India (RBI). Moreover, figures for current account balance (CAD) and Budget Deficit (BD) at the percentage of GDP have been taken from Indian statistic (both RBI). However interest rate has been calculated on the basis Call Money Rate of and Exchange rate on the basis U.S. Dollar.

5. Estimation of results

To check the stationarity of variables we first applied Unit Root test for all the time series variables because cointegration test requires all series of variables should be stationary. Therefore, Augmented Dickey fuller (ADF) will be employed to check the stationarity and non-stationarity of variables the results are presented in Table 1a and Table 1b.

Table 1a. Augmented Dickey fuller (ADF) Unit Root Test

Series	t statistic	ADF at 1% Level	ADF at 5% Level
CAD	-2.737323	-3.75296	-2.998064
BD	-2.118445	-3.752946	-2.998064
ER	-1.804653	-3.752946	-2.998064
INF	-2.965073	-3.752946	-2.998064

Table 1b. Augmented Dickey fuller (ADF) Unit Root Test at First Difference

Series	t statistic	ADF at 1% Level	ADF at 5% Level
CAD	-4.820096	-3.769597	-3.004861
BD	-4.769597	-3.769597	-3.004861
ER	-6.237862	-3.769597	-3.004861
INF	-8.120664	-3.769597	-3.004861

Source: Author's computation with Stata 12.0.

CAD = Current Account Deficit;

BD = Budget Deficit;

ER = Exchange Rate;

INF = Inflation Rate.

Subsequently, we applied Johansen cointegration (1987) test to check the long Run Relationship between the variables. The test is more suitable when we use more than two variables in the equation and can make use of 1(0) variable also. We check the cointegration among all the four variables CAD, BD, ER and INF. There are two values one is Trace statistic and another Max statistic. The results of Table 2a and Table 2b shows all the variable are cointegrated and have a common stochastic trend, both the test clarifies that all the four variables are having long run association among the variables and have a one cointegration vector demonstrated by both tests.

After finding the variables are cointegrated and have a long run relationship between the variables, we employ Granger Casualty to find out the direction and causality among the variables, test and can find out that variable which is creating an imbalance in the economy. We take all the variables like CAD, BD, ER and INF to find out the direction and causality among variables. We first make BD as a dependent variable and other three variables independent variables and find all the variables are creating impact on the dependent variables at lag 4. When we take CAD as a dependent variable we also find all the independent variables are creating a significant impact on the dependent variable that means the relationship is bidirectional. When we check direction and causality among other variables like ER and INF the relationship was notable. That means if in an economy there is a disturbance in any of the variable CAD, BD, ER and INF the economy will be affected in Indian scenario. Anoruo and Ramchander (1998) finds that the direction of causality is seen to run unambiguously from oil prices to the current account deficit to fiscal deficit. Moreover, oil price is seen to cause significant influence in short run on all other variables in the system. It could also be possible that the expansion in the fiscal deficit due to the small pass-through of oil price shocks appears akin to current account targeting in the case of India, but rather the two deficits are closely related to each other.

Our all models say that Budget deficit have a significant long run effect on Current account deficit and also Current account deficit have a significant long run impact on Budget deficit. The results of Granger causality show the bidirectional results among all the four variables. However other policy variables like INF and ER have a strong causality relation between the CAD and BD in Indian Scenario.

Table 2a. *Johansen Co-integration Test (For Trace Value stat)*

Maximum Ranks	Eigen Value	Trace Statistic	5% Critical Value
0	0.808581	64.03466	47.85
1	0.565973	29.31559	29.90
2	0.380640	11.78797	15.49
3	0.078971	1.727533	3.84

Table 2b. *Johansen Co-integration Test (For Max-Eigen Value stat)*

Maximum Ranks	Eigen Value	Max Statistic	5% Critical Value
0	0.808581	34.71907	27.58434
1	0.565973	17.52761	21.13162
2	0.380640	10.06044	14.26460
3	0.078971	1.727533	3.841466

Source: Author's computation with Stata 12.0.

Max-Eigen stats indicate 1 co-integrating equation at 0.05 level.

Granger causality Wald tests**Table 3a.** *Dependent Variable; D (BD)*

Excluded	Chi-Square	Df	Prob
D(CAD)	61.925	4	0.000
D(ER)	15.652	4	0.004
D(INF)	22.485	4	0.000
D(ALL)	106.12	12	0.000

Table 3b. *Dependent Variable; D (CAD)*

Excluded	Chi-Square	Df	Prob
D(BD)	56.333	4	0.000
D(ER)	117.83	4	0.000
D(INF)	12.295	4	0.015
D(ALL)	233.53	12	0.000

Table 3c. *Dependent Variable; D (ER)*

Excluded	Chi-Square	Df	Prob
D(BD)	97.705	4	0.000
D(CAD)	143.03	4	0.000
D(INF)	63.863	4	0.000
D(ALL)	298.27	12	0.000

Table 3d. *Dependent Variable; D (INF)*

Excluded	Chi-Square	Df	Prob
D(BD)	32.428	4	0.000
D(CAD)	31.156	4	0.000
D(ER)	79.164	4	0.000
D(ALL)	131.45	12	0.000

Note: when probability value is more than 0.05% we accept null hypothesis.

Source: Author's computation with Stata 12.0.

6. Conclusion

The study is based on Johansen co-integration analysis and Granger causality Wald tests. The empirical results indicate that budget deficit and current account deficit have significant long run relationship in India. However looking to the Granger causality relationship between budget deficit and current account deficit, it is both current account deficit and budget deficit which have a bidirectional causality relationship between each other. The other variables like exchange rate and inflation do affect the budget deficit and current account deficit in India. It is important for the policy makers to use those policy variables to be used in an effectively in India to reduce twin deficit problem.

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