Validity of Twin Deficit Hypothesis in Indian Case : A Myth or Reality?

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Abaract

In recent times, the twin-deficit hypothesis that there is a strong link between Fiscal Deficits (FD) and Current Account Deficits (CAD) is in the forefront of the policy debate. For most of the last thirty years, India has faced a 'twin deficit' situation viz. simultaneous Fiscal Deficits and Current Account Deficits. This empirical exercise is undertaken with a view to examine the linkages between the two deficits in India from 1980-1981 to 2012-2013. First, we have applied Johensen cointegration test in order to investigate the long run relationship between CAD and FD. Further, we have tested the stability of the equilibrium using VECM along with Granger Causality test to find evidence and direction of long-run causality between Current Account Deficits to Fiscal Deficits and vice versa. The study found evidence of a long-run cointegrating relation between CAD and FD, while in the short run our evidence favours the hypothesis that there exists a uni-directional Granger Causality between CAD and FD in India. It is only the Fiscal Deficits which adjusts to the external deficit. The study found evidence of unidirectional reverse causality between the Current Account Deficits and the Fiscal Deficits.

Key words : *CAD, FD, Granger Casualty, twin deficits.*

Introduction

In recent years, the twin-deficit hypothesis that there is a strong link between Fiscal Deficits and Current Account Deficits has returned to the forefront of the policy debate. After the recent global crisis, it is notice that not only USA but other developed and developing countries have the same macroeconomic problem. India's twin deficits too have been a cause for worry in recent years for a host of domestic and international factors.

The term 'twin deficits' was initially coined to describe the co- movement between the budget deficits and the Current Account Deficits witnessed during the early 1980s in the US. The link between the U.S. budget deficits and trade deficits in the 1980s was so clear that the two were popularly labelled as the twin deficits. According to this hypothesis, larger Fiscal Deficits lead to expanded Current Account Deficits by its effect on national saving and consumption (Bartolini & Labiri, 2006, p. 6). This implies that any fiscal excess of a Government is reflected in the Current Account Management by that economy. Fiscal Deficits relates to a situation in a country by which government spending exceeds its revenues. It

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represents a negative value in national savings and reduce national savings . This makes domestic goods and services more expensive relative to foreign goods through demand pull inflationary pressure . So the country imports more and exports less increasing the trade deficit.

Two perspectives have been adopted in interpreting the relationship between the two deficits :

1. Conventional View / Keynesian View (Mundell Fleming Framework)

Based on the Mundell-Fleming framework, Keynesian proposition argues that the budget deficits does have a significant impact on the Current Account Deficits. According to this model, an increase in budget deficits induces upward pressure on interest rates causing capital inflows and appreciation of the exchange rate. The rise in interest rate makes it attractive for investors

Illustration below shows different perspectives on FD & CAD

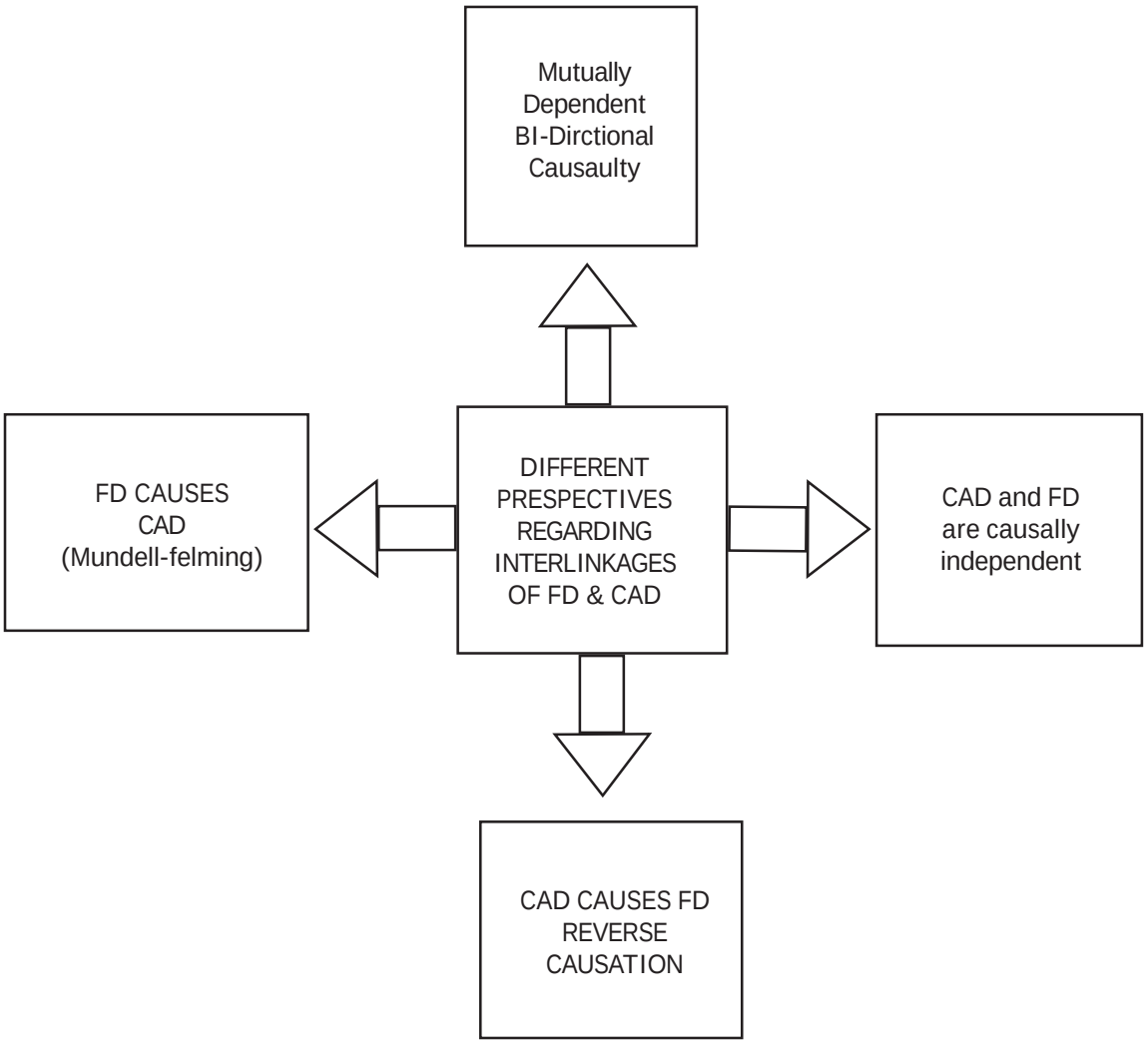


Figure1: Different Perspectives regarding inter linkages of FD & CAD

to investments in that country's financial market. This raises the demand for the country's currency causing it to appreciate. Hence, the appreciation of domestic currency will make exports less attractive and imports more attractive. Subsequently, in the long run worsening the trade balance which is the major component in the Current Account Deficits.

2. Ricardian Equivalence hypothesis (REH).

The second prominent view on the effect of Fiscal Deficits on private saving and investment is the so-called Ricardian view. The Ricardian Equivalence Hypothesis (REH) claims an absence of any relationship between the Current Account Deficits and Budget Deficits. Therefore, the deficits are not twins (Barro, 1974 and 1989). The central Ricardian observation is that deficits merely postpone taxes. Since people are rational, they know that the reduction in taxes is temporal and to prepare for future tax increases, residents save all the cash freed by the tax cut. The decrease of public saving will be compensated for by an equal increase of private saving and hence the national saving will not be affected. Consequently, the equilibrium levels of interest rates, investment, consumption and current account will not be affected by the changes in the level of budget deficits. The validity of the Equivalence hypothesis depends on some powerful assumptions such as public purchases remain unchanged.

Many analysts suspect that the Fiscal Deficits and Current Account balance are closely and perhaps even causally, related. Theoretically, there are four possibilities about the relationship between budget deficit and trade deficit such as 1) Fiscal Deficits causes Current Account Deficits (Twin Deficit Hypothesis) (2) Current Account Deficits causes Fiscal Deficits (3) Fiscal Deficits and Current Account Deficits are causally independent 4) both Current Account deficit are mutually causal.

Theroetical Foundations of the "Twin Deficits Phenomenon"

National accounts provide for a clear relationship between budget deficits and the current account trade deficits. To understand the relationship between the two deficits, we can use the macroeconomic identity of income and output.

$$Y = C + I + G + (EX - IM) \quad (1)$$

Where ,
Y = National Income,
C- Private Plus Government Consumption
I=Real investment spending in the economy such as spending on building, plant, equipment etc.,
G= Government expenditure on final goods and services,

EX = export goods services
IM = import goods and services.
We define current account (CA) as

$$CA = EX - IM + NET \quad (2)$$

where "Net" stands for net income and transfer flows. here we assume that unilateral transfers and net income from abroad are not large items in the current account.
The current account shows the size and direction of international borrowing. When a country imports more than its exports, it has CA deficit, which is financed by borrowing from foreigners.
One can easily rewrite this identity

$$Y=C+G+I+CA \quad (3)$$

According to National Income Identity, National savings is defined as income less private and public consumption

$$S=Y-C-T \quad (4)$$

where T is tax revenue
From (3) and (4) , Current account balance can be written as:

$$CA = (S - I) + (T - G) \quad (5)$$

Hence, any change in the fiscal balance i.e. T-G will be reflected in the current account balance unless there is a change in the saving investment gap. Thus, there exists a positive and strong correlation between the fiscal and Current Account Deficits which is the conventional view of twin deficit relationship .

Literature Review

The question of relationship between Budget Deficits and Current Account Deficits started to draw researcher's attention in the 1980's. Empirical research has led to ambiguous results. Some empirical studies find that higher budget deficits lead to higher Current Account Deficits, others show no significant impact at all.

Aqeel and Nishat (2000) carried out an empirical analysis for twin deficits in the case of Pakistan. They used time series data for the period 1973-1998 and applied co-integration and ECM and Granger causality techniques to check the relationship between them. The results suggested that there was positive and long run relationship between Budget Deficits and Trade Deficits in Pakistan.

Kulkarni and Ericsson (2001), used data over comparable time-period (viz. 1969-1996) and found that the budget deficit causes trade deficit in India.

Lau and Baharumshah (2004) discussed the on-going debates about twin deficits existence in Malaysia for the period (1975-2000). The empirical result reveals the presence of bi-directional causality between the two deficits in Malaysia. Kouassi, et al (2004) found no casual relationship between the two on Indian data over the 1975-97 time-period and suggested including some additional macro-variables in the model.

Baharumshah, Lau and Khalid (2006) examined the twin deficits hypothesis in Indonesia, Malaysia, the Philippines and Thailand (ASEAN-4 countries). The major finding of this paper is that Long run relationships are detected between Budget and Current Account Deficits. It was found that the Keynesian reasoning fits well for Thailand as a unidirectional relationship found to exist between Budget Deficits to Current Account Deficits. For Indonesia, the reverse causation (Current Account targeting) is detected while the empirical results indicate that a bidirectional pattern of causality exists for Malaysia and the Philippines.

Hakro (2009) used multivariate time series on data from Pakistan. The estimates of vector autoregressive (VAR) model demonstrate that causality link of deficits is flowing from budget deficits to prices to interest rate to capital flows to exchange rates and to trade deficits.

Ratha (2011) used the bounds-testing approach to cointegration and error-correction modelling on monthly and quarterly data over 1998-2009. The results suggested that the twin-deficits theory holds for India in the short-run (validating the Keynesian channel) but not in the long run (validating the REH).

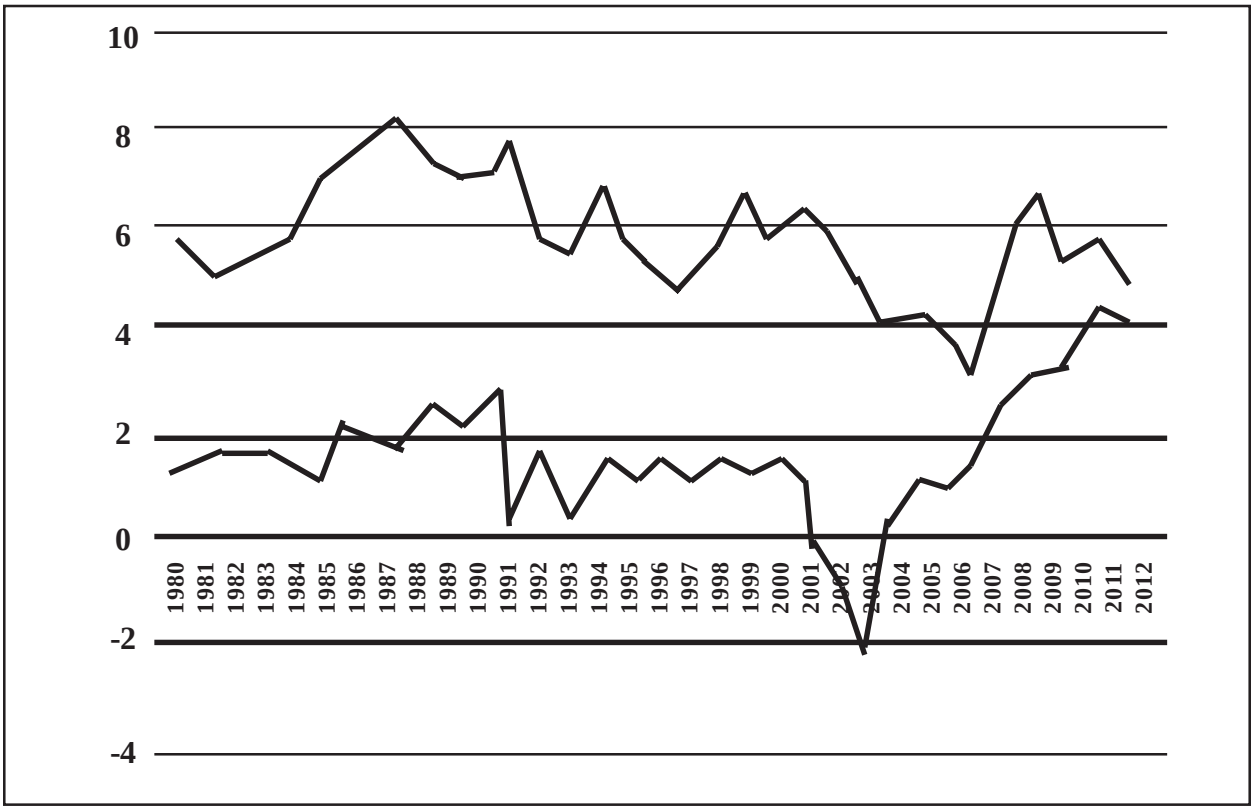
Merza , Alawin & Bashayreh (2012) examined the twin deficits hypothesis for Kuwait for the quarterly period (1993:4 - 2010:4). The causality test suggested that the direction of causality goes from Current Account to Budget Balance. The other direction was not confirmed for this study. In addition, the results of this paper found a negative long-run relationship between current account and budget balance e.g. an increase in current account causes a decrease in the government budget surplus or an increase in budget deficit. The paper reached to a conclusion that the twin deficit hypothesis was not confirmed for the Kuwaiti case.

Saeed and Khan (2012) in their study checked the validity of Ricardian Equivalence hypothesis in Pakistan. They used time series data for the period of 1972-2008 and applied co-integration technique. The results of co-integration strongly favored the positive and long run relationship between budget deficit and Current Account Deficits in Pakistan. But the results of causality test suggested that there is uni-directional causality between these two deficits.

Aggarwal (2014) examined the relationship between Current Account Deficits and Fiscal Deficits in India from 2000-01 to 2012-13.Quarterly data had been taken to test the stationarity of two variables by using ADF unit root test and cointegration regression and also applied VAR techniques to test the existence and direction of causality. The study revealed the presence of stationary linear combination between CAD and FD. Impulse response showed the positive impact of Fiscal Deficits to CAD whereas causality test revealed the unidirectional relationship i.e. FD as a granger cause of CAD but not vice-versa.

The India's Current Account Balance & Fiscal Deficits : A Review

The figure 2 shows that the Current Account Deficits has been widening especially after 2004 and consistently faces the situation of growing the deficit with several fluctuations. Fiscal Deficits has remained at an average of 5.8% for the period 1980-2012.



India's Current Account has been impacted by several shocks and events over the last few decades. The country weathered a series of crises, including the devaluation of the rupee in 1966, oil shocks in 1973 and 1980, external payments crisis of 1991, the East Asian crisis of 1997 and the global financial crisis of 2008. Moreover, India has been unable in these years to stem its Fiscal Deficits despite the FRBM Act. The Prime Minister's Economic Advisory Council in its economic outlook report (2009-10) explained that the deficit was high more on account of structural factors viz. subsidies, pay revision, loan waiver and less on account of cyclical factors. Fiscal Deficits in 2012-13 still remains higher than 3% FRBM target which was to be achieved in 2008-09.

The earlier research on the 1991 crisis said it was basically a result of high Current Account Deficits and inability to finance it via capital inflows. The capital inflows mainly constituted commercial borrowings, external assistance and NRI deposits. The crisis not only led to a deterioration in the Current Account balance as India's exports declined more than imports, it adversely affected the Fiscal Deficits as well because of the necessity to provide effective fiscal stimulus during the peak crisis period. The Fiscal Deficits was "estimated at more than 8% of GDP in 1990-91. The deficit widened to 5.4 percent of gross domestic product (GDP) in the September quarter, driven by falling exports. The gap, the widest in absolute terms since 1949, has weakened the rupee currency and exposed the economy to costlier imports.

The Current Account Deficits were estimated to be "more than 2.5% of gross domestic product in 1990-91. Since the balance of payments (BoP) crisis in 1991, policymakers, however, have managed to keep the Current Account Deficits within a range of 0.5-2 % of GDP considering the macro stability aspect. But in recent years, the deficit has ballooned to 1991-like levels, thanks partly to higher imports and more recently lower exports. The dynamics of current account have changed over the past few years. In 2008-09 ,for the first time since the 1991 BOP crisis, India's Current Account Deficits widened to more than 2% of GDP (2.4%). Both oil and non-oil imports surged leading to larger Current Account Deficits. The deficit declined in the crisis to touch 1.7% levels in Q4 2009-10 but has increased since then to touch 3.9% in Q2 2010-11. Moreover, The CAD to GDP ratio reached a

highest ever level of 5.4% in Q2 of 2012-13, heightening concerns about the sustainability and financing of trade.

Research Methodology & Design

Objective

To examine the relationship between Current Account Deficits and Fiscal Deficits in India over a period of1980-1981 to 2012-2013..

Hypothesis

For the purpose of this study, the following null hypothesis is formed:
Ho: The current account imbalance or deficit and Fiscal Deficits in India are independent of each other.

Research Methodology

Following the recent literature, we investigate the twin deficits hypothesis by employing a number of econometric techniques. First, we test the stationary of the variables using Augmented Dickey Fuller (ADF) test. Second, we test cointegration of the variables using Johansen method. Then, we go further with the Vector Autoregression (VAR) methodology to estimate the relationship between the variables. Finally, we will determine the Granger-causality directions.

Data

The analysis uses yearly data of CAD and the FD from 1980-1981 to 2012-2013. Data of CAD and FD are taken from various issues of Reserve bank of India, Handbook of Statistics on Indian Economy.

Empirical Tests and Results

Unit Root Test

Time series data used in the econometric analysis, must be stationary. If the data are not stationary then, we can face the problem of spurious regression which is the indications to fallacious results. So it is essential to inspect the time series data to avoid the problem of non stationarity in data and for reliable results. In this study, we use the Augmented Dickey – Fuller (ADF) to test for the stationary proeperty of the time series.

Null Hypothesis: CAD and FD has Unit root

Table 1: Unit Root Results (With Intercept)

	ADF(LEVEL)	P VALUE	ADF IST DIFFERENCE	P-VALUE
CAD	-2.526523	0.1189	-7.106665	0.0000
FD	-2.628937	0.0978	-4.04193	0.0046

Table 1 shows that at the 5% significance level, the hypothesis of no unit root for the variables is rejected in levels but accepted in first difference, indicating that all variables are integrated of order one.

Cointegration Test Results

Cointegration test is used to know the stationary of a linear combination of two or more time series despite being individually nonstationary. The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship among the variables.

Cointegration rank (rank of matrix) is estimated using Johansen methodology. Johansen's approach derives two likelihood estimators for the CI rank: a trace test and a maximum Eigen value test.

Null Hypothesis- CAD and FD has no Cointegration

Table 2 : Results Of Johansen Cointegration

Sample (adjusted 1983 2012
Included observations : 30 after adjustments
Trend assumption Linear deterministic trend
Series : CAD FD
Lags interval (in first differences) : 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.342369	16.49471	15.49471	0.0405
At most 1	0.111031	3.530772	3.841466	0.0602

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
*** denotes rejection of the hypothesis at the 0.05 level**
****MacKinnon-Haug-Michelis (1999) p-values**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Egenvalue	Max-Elgen Statistic	0.05 Critical Value	Prob**
None	0.342369	12.57332	14.26460	0.0909
At most 1	0.111031	3.530772	3.841466	0.0602

Max-eigenvalue est indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Table 2 shows Johansen co-integration test results. As it can be seen, results of Trace statistics shows one cointegrating vector that determines the long term relationship. The trace statistic either rejects the null hypothesis of no co-integration among the variables or does not reject the null hypothesis that there is one co-integration relation between the variables. Start by testing H0: CE= 0. If it rejects, repeat for H0: CE = 1. When a test is not rejected, stop testing there and that value of CE is the commonly-used estimate of the number of cointegrating relations. In this test, H0: CE= 1 is not rejected at the 5% level ((0.0602>0.05). In other words, this trace test result does not reject the null hypothesis that these two variables are co-integrated.

Results of trace statistics and maximum Eigen value statistics produce little contradiction which is related to the lag interval. However, one should give more importance to trace statistics as trace statistics consider all of the smallest Eigen values, it holds more power than the maximum Eigen value statistic (Kasa,

1992; Serletis and King, 1997) . Moreover, Johansen and Juselius (1990) recommend the use of the trace statistic when these two statistics provide conflicting results.

Vector Error Correction Model:

Engle and Granger (1969) suggest that if co-integration exists between two variables, then proper statistical inference is obtained only by analysing causality based on error correction model (ECM). Having established that both the variables in the model are *I(1)* cointegrated, a VECM with one cointegrating relation has been established. The VECM is employed to determine the short run and long-run causality between CAD and FD. The VECM estimation is performed by following VAR framework.

The VECM allows the long run behaviour of the variables coverning to their long run equilibrium relationship while allowing a wide range of short run dynamics. Error correction parameter balances the model dynamic and forces the variables for a long-run equilibrium. A statistically significant coefficient of the error correction parameter indicates a variation. The size of the coefficient shows the moving rate of long-run equilibrium value. In practice, the error correction parameter is expected to be negative and statistically significant. This expresses that variables will move to long-term equilibrium value. Short-run variations from equilibrium will be corrected according to the size of the error correction parameter coefficient.

Table 3: Long run causality from CAD to FD tested by Vector error correction Model

Dependent Variable : D(FD)
Method : Least Squares
Date : 04/19/14 Time : 21:46
Sample (Adjusted) 1983 2012
Included observations : 30 after adjustments
D(FD)=C(1)*(FD)(-1)-0720335608225*CAD(-1)-0.71521293206) +
c(2)*D(FD)(-1))+C(3)*D(FD)(-2)+C(4)*D(CAD)(-1))+C(5)*D(CAD)(-2)+C(6)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.464409	0.137176	-/3.385507	0.0024
C(2)	-0.008285	0.165074	-0.050191	0.9604
C(3)	-0271108	0.162179	-1.671659	0.1076
C(4)	-0.255508	0.124190	-2.057388	0.0507
C(5)	-0.252989	0.107285	-2.358098	0.0269
C(6)	0.000953	0.033713	0.028259	0.9777

R-squared	0.441603	Mean dependent var	-0.003718
Adjusted R-squared	0.325270	S.D. dependent var	0.224271
S.E. of regression	0.184221	Akaike info criterion	-0.368508
Sum squared resid	0.814494	Schwarz criterion	-0.088268
Log likelihood	11.52762	Hannan-Quinn criter	-0.278857
F-statistic	3.796036	Durbin-Watson stat	2.236460
Prob (F-statistic)	0.011269		

FIRST MODEL : Testing Long run causality from CAD to FD

D(FD) = C(1)*(FD(-1) - 0.720335608225*CAD(-1) - 0.715212932046) + C(2)*D(FD(-1)) + C(3)*D(FD(-2)) + C(4)*D(CAD(-1)) + C(5)*D(CAD(-2)) + C(6)

Firstly, we conducted vector error correction model to check the long run causality from CAD to FD . In this study, as the error correction term is negative and statistically significant, the error correction mechanism works. Non-equilibrium in a certain period can be corrected in subsequent periods. Hence, the long-run relationship in the model is consistent for the relevant period. In the analysis, vector error correction term is negative, which means that a variation will re-equilibrate in the long run. The result of long run causality from Current Account Deficits to GDP is given in Table 3 which shows the coefficient of Error correction term carries the correct sign and it is statistically significant at 5% , with the speed of convergence to equilibrium of 46%. It depicts stablility of the system and convergence towards equilibrium in case of any disturbance in the system. So the negative coefficient suggests that there is long run causality from CAD to FD.

Table 4: : Long run Causality from FD to CAD tested by Vector Error Correction Model

Dependent Variable : D(CAD)
Method : Least Squares
Date : 04/28/14 Time : 21:23
Sample (Adjusted) 1983 2012
Included observations : 30 after adjustments
D(CAD)=C(7)*(FD)(-1)-0720335608225*CAD(-1)-0.715212932046) + C(8)*D(FD)(-1))+C(9)*D(FD)(-2)+C(10)*D(CAD)(-1))+C(11)*D(CAD)(-2)+C(12)

	Coefficient	Std. Error	t-Statistic	Prob.
C(7)	-0.137506	0.301766	0.455670	0.6527
C(8)	-0.442777	0.363139	-1.219306	0.2345
C(9)	-0.209356	0.356770	-0.586810	0.5628
C(10)	-0.192110	0.273200	-0.703186	0.4887
C(11)	0.050560	0.236012	0.214228	0.8322
C(12)	0.020578	0.074164	0.277441	0.7838

R-squared	0.135578	Mean dependent var	0.016885
Adjusted R-squared	-0.044510	S.D. dependent var	0.396529
S.E. of regression	0.405258	Akaike info criterion	1.208270
Sum squared resid	3.941615	Schwarz criterion	1.488510
Log likelihood	-12.12405	Hannan-Quinn criter	1.297921
F-statistic	0.752841	Durbin-Watson stat	1.989182
Prob (F-statistic)	0.592243		

SECOND MODEL : Testing Long run causality from FD to CAD

D(CAD) = C(7)*(FD(-1) - 0.720335608225* CAD(-1) - 0.715212932046) + C(8)*D(FD(-1)) + C(9)*D(FD(-2)) + C(10)*D(CAD(-1)) + C(11)*D(CAD(-2)) + C(12)

The result of long run causality from FD to CAD is given in table 4 which gives C(7) coefficient of 0.13 which is significant. The non negative coefficient suggests that there is no long run casualty from FD to CAD.

Short Run Causality

After studying long-run relationships among series, short-run relationships can be examined now using Wald Test.Firstly it is tested that CAD of lag 4 and 5 can jointly influence FD or not.

D(FD) = C(1)*(FD(-1) - 0.720335608225*CAD(-1) - 0.715212932046) + C(2)*D(FD(-1)) + C(3)*D(FD(-2)) + C(4)*D(CAD(-1)) + C(5)*D(CAD(-2)) + C(6)

NULL HYPOTHESIS: C(4)=C(5)=0 ie CAD of lag 4 and 5 can jointly influence FD

Table 5 : Testing Short run Causality from CAD to FD

Wald Test

Equation Untified

Test Statistic	Value	df	Probability
F-statistic	3.252077	(2.24)	0.0563
Chi-square	6.504153	2	0.0387

Null Hypothesis C(4)=C(5)=0

Null Hypothesis Summary :

Normalized Restriction (=0)	Value	Std. Err.
C(4)	-0.255508	0.124190
C(5)	-0.252989	0.107285

Restrictions are linear in coefficients

The results are shown in Table 5. Probability of Chi square statistic is less than 5% which means null hypothesis is rejected. Thus it can be said that the lag 4 and lag 5 of CAD jointly affect the FD in short run. The above results can be validated using Granger Causality –VECM Model.

Table 6 : VECM Granger Causality Test

VEC Granger Causality / Block Exogeneity Wald Tests
Date ; 01/19/14 Time : 21:46
Sample : 1980 2012
Included observations : 30

Dependent variable D(FD)

Excluded	Chi-sq	df	Prob.
D(CAD)	6.504153	2	0.0387
All	6.504153	2	0.0387

Dependent variable : D(CAD)

Excluded	Chi-sq	df	Prob.
D(FD)	1.655755	2	0.4370
All	1.655755	2	0.4370

Table 6 validates our finding on short run causality from CAD to FD.Moreover the estimated results show that FD has no short run causal effect on cad.Since Probability of Chi square statistic is greater than 5% which means null hypothesis is accepted that is there is no short run causality from FD to CAD. So , there exists a uni-directional Granger causality between Cad and Fd in India.This result is consistent with Suchismita Bose(2011) who have provided the same evidence for India.

Conclusion :

The main purpose of this empirical exercise was to examine the causal linkages between the Current Account Deficits and Fiscal Deficits in India. We have used annual data of CAD and FD (as % of GDP) for the period of 1980 to 2012. The results of the ADF unit root tests demonstrate that all series are non-stationary at their levels but stationary at their first difference i.e. they are integrated of order one *I(1).* Then, we move forward by applying Johensen cointegration test in order to investigate the long run relationship between CAD and FD.The results indicate the existence of one cointegrating vector among these variables. Further, we have tested the stability of the equilibrium using VECM along with Granger Causality test.

Our first-stage results show a long-run cointegrating relation between CAD and FD, while in the short run, our evidence favours the hypothesis that it is only the Fiscal Deficits which adjusts to the external deficit. It appears that the Fiscal Deficits has no short-run impact on the Current Account Deficits. The study found evidence of unidirectional reverse causality from the Current Account Deficits to the Fiscal Deficits. This result is consistent with Suchismita Bose(2011) who have provided the same evidence for India.

The two deficits show clear evidence of co-movement over time along with reverse causation and oil prices can be considered to be a factor behind the heightening of both the external and domestic deficits. There is clear evidence of causality running from oil price and the CAD to the Fiscal Deficits. Bringing in oil prices helps complete the chain of reverse causation in the twindeficit hypothesis for India as the direction of causation is unambiguouslyseen to run from oil prices to the external deficit to the Fiscal Deficits. (Suchismita Bose, 2011). According to the IMF (IMF, 2011), in an economy with rapid import growth and a rising Current Account Deficits, the government might raise taxes or cut government spending to restrain domestic demand and help unwind the current account imbalance; such a discretionary fiscal policy response to developments affecting the current account would be a case of reverse causality.

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