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How has FDI influenced Current Account Balance In India? Time Series Results in presence of Endogenous Structural Breaks

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Abstract

In 1991 as par the recommendations of the IMF, India followed a structural adjustment programme. The new economic philosophy shifted towards export-oriented growth model, where augmenting competition in the domestic market through reforms in licensing provisions and adoption of better technological capabilities through FDI collaborations have played an extremely important role. Over the last decade, the high economic growth in India resulting from the reforms has motivated massive FDI inflow in the country. The continuous inflow has caused India's share in global FDI inward stock to increase from 0.08 percent in 1990 to 0.22 percent and 1.03 percent in 2000 and 2010 respectively. However, the improved FDI scenario in India has simultaneously witnessed a decline in the current account balance (CAB) of the country. In this background, the current paper attempts to explore the underlying long term co-integrated relationship between FDI inflow in India and CAB by analyzing quarterly data over 1990-91:Q1 to 2010-11:Q4. Our result indicates that there exists a unique long-run relationship among FDI and CAB with two endogenous structural breaks. The analysis also reveals a unidirectional causality from India's FDI to CAB at 5 percent level. The findings imply that although FDI may seem beneficial as a source of financing for the current account deficit, it may eventually lead to balance of payments problems due to adverse effects on current account. In this respect, even the role of FDI on economic growth can be questioned. Secondly, the huge outflow of foreign exchange from the country in recent years in the form of profit remittances raises the concerns over the optimality of allowing hundred percent profit repatriation.

JEL Classification: F21, F31, F32

Keywords: International Capital Movements, Foreign Exchange, Current Account Adjustment

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1. Introduction

The deepening wave of globalization over the last decade has considerably influenced cross-border foreign direct investment (FDI) flows, which stood at $1.52 trillion in 2011 (UNCTAD, 2012). The direction of FDI has undergone a transformation over the last two decades. While during the twentieth century, FDI flows from the developed countries both to their developed and developing counterparts has been the norm, now-a-days investment flows across developing countries is being witnessed more frequently. This recent phenomenon can be explained by the prevailing higher growth rate in these economies, especially in the post-2009 recession period. The growing attraction of the developing and transition economies is reflected from the fact that for the first time in 2010 these countries jointly accounted for more than fifty percent of global FDI flows (UNCTAD, 2011).

The existence of the growing North-South and South-South FDI flows have motivated considerable research interest on the interrelationship between FDI and economic growth. However, the empirical evidence does not indicate an unambiguous relationship between the two series. One branch of the empirical literature reveals a positive relationship between FDI and economic growth (Tang et al, 2008; Katircioglu, 2009; Ayanwale, 2007). On the other hand, another segment of the literature suggests that FDI inflow may not significantly influence economic growth of the recipient country (Braunstein and Epstein, 2002; Katerina et al, 2004). The stark contrast between the findings of the two schools could be explained by a third branch of literature which indicates that to benefit from FDI inflow a country must reach a minimum threshold level in terms of efficiency, human capital stock and factor endowment (Alfaro et al, 2006; Borensztein et al, 1998).

In addition to the growth consequences, the FDI inflows can also play a crucial role in determining external balance stability. FDI is a major component of capital account of the balance of payments (BOP), and it may in short run compensate an existing current account deficit caused by import of consumption or capital goods (Krkoska, 2001; Yalta, 2011). However, in long run, the FDI repercussions on current account balance (CAB) might occur through several channels. First, FDI inflow generally boosts exports through gross capital formation, transfer of technology, enhanced productivity and competitiveness, introduction of newer production methods and products, better managerial techniques, greater access to new markets etc. (Borensztein et al, 1998; Dunning and Rugman, 1985; Krkoska, 2001; UNCTAD, 2002), which improves the CAB. Secondly, the foreign firms entering the recipient country may decide to import key inputs from their established global suppliers or pay royalties to the parent corporation for technical know-how, leading to an increase in imports (Onwuka and Zoral, 2009; Williams and Williams, 1998). As a result, the CAB is likely to worsen. Finally, the profit repatriation of foreign investors appears in the current account of BOP and greater outflow on this front also worsens the CAB (Yalta, 2011). The overall impact of FDI

inflow on the CAB of a particular country is therefore a function of the relative strengths of these three effects.

After its independence in 1947, India adopted the policy of import-substitution led growth model for securing economic growth. The adverse experience during foreign rule led to a strong 'self-reliance' focus on Indian growth model, as a result of which the economic development in early phase was guided by the ideology of nationalism and democratic socialism (Tendulkar and Bhavani, 2007; Bandyopadhyaya, 2006). Given the lack of importance attached to the need to promote exports during sixties and seventies, no special emphasis was laid on attracting FDI in that period. The inadequacy of the aforesaid policy however became apparent in eighties and several reform measures were undertaken (Tendulkar and Bhavani, 2007). The need for reform intensified in the post Gulf war period, with continuous worsening of the CAB. While the break-up of the Soviet Bloc countries adversely affected Indian exports in the short run, the growing oil import bill simultaneously put tremendous upward pressure on imports. Macroeconomic mismanagement during late eighties further aggravated the problems (Bajpai, 2002; Joshi and Little, 1996). Finally in 1991 as per the recommendations of the IMF, India followed a structural adjustment programme. The new economic philosophy shifted towards export-oriented growth model, where concerns on augmenting competition in the domestic market through reforms in licensing provisions and adoption of better technological capabilities through FDI collaborations played crucial roles (Tendulkar and Bhavani, 2007).

The continuous stream of economic reforms has improved the outward-orientation of Indian economy in considerable manner. While in 1991-92 the outward-orientation of the economy (expressed as percentage of export plus import as a percentage of GDP) stood at 8.36 percent, the same has improved to 51.24 percent in 2011-12. Over 1990-2010 Indian merchandise exports and imports have grown at annual average growth rate of 14.03 percent and 15.34 percent respectively. As a result, India's share in global merchandise export has increased from 0.50 percent in 1991 to 1.44 percent in 2010, while the corresponding figures for imports stood at 0.56 percent and 2.12 percent in that order. The service trade has witnessed a similar growth paradigm, with India's service exports and imports witnessing an average annual growth rate of 18.58 percent and 16.22 percent respectively. India's share in global commercial services export and import currently stand at 3.34 percent and 3.31 percent respectively, vis-a-vis the corresponding figures of 0.60 percent and 0.69 percent in 1991 in that order (calculated from ITS data, WTO).

Over the last decade, the high economic growth in India resulting from the reforms has motivated massive FDI inflow in the country (Chakraborty and Mukherjee, 2012). The continuous inflow has caused India's share in global FDI inward stock to increase from 0.08 percent in 1990 to 0.22 percent and 1.03 percent in 2000 and 2010 respectively. It is observed that the FDI flows expressed as percentage of Gross Fixed Capital Formation (GFCF) in India has increased from 3.0 percent to 9.6 percent over 2002-08 (UNCTAD, 2011).

However, the improved FDI scenario in India has simultaneously witnessed a decline in CAB. While in 1991-92 the CAB expressed as a percentage of GDP stood at – 0.35 percent, the same has declined to – 12.00 percent in 2011-12. In this background, the current paper attempts to explore the underlying long term relationship between FDI inflow in India and its performance on CAB front.

The present paper is arranged along the following lines. First, a literature review on the interrelationship between FDI and CAB has been undertaken. The FDI inflow pattern in India has been briefly analyzed next. Third, the CAB scenario in India has been briefly discussed. In the subsequent section, an empirical analysis has been conducted to understand the FDI-CAB relationship and causality pattern in the Indian context. Finally, on the basis of the discussions, certain policy conclusions are drawn.

2. FDI and its Impact on Current Account: Evidence from Literature

Before moving to analyze the effect of FDI on CAB, a brief discussion on the influence of foreign capital on the three sub-components discussed earlier will not be irrelevant here. First, the evidence of FDI on exports is mixed. A section of literature has reported a positive influence of FDI on boosting exports from the recipient countries (Dritsaki et al., 2004; Hossain, 2008; Pfaffermayer, 1994; Yamawaki, 1991; Vural and Zortuk, 2011; Chavez and Dupuy, 2012). Conversely, the other branch of the literature reports that FDI-export relationship may not necessarily be positive (Jeon, 1992; Svensson, 1996; Türkan, 2006). The difference in the findings of the literature can be explained by quality of FDI. FDI can be either vertical or horizontal. In case of horizontal FDI, the operation of the subsidiaries in recipient countries are geared for servicing the local markets and hence export promotion is not facilitated. Moreover, transfer of low-level technologies by the MNC, with the domestic market of the recipient country inefficiencies and lead to lower exports (Zhang, 1999). However, vertical FDI leads to specialization in particular stages of production in different countries in line with their comparative advantages and hence export to the partners of integrated production network (IPN) partners can be promoted (Lipsey, 2004).

The CAB might also get adversely affected through augmentation of imports in the post-FDI period (Onwuka and Zoral, 2009; Williams and Williams, 1998), though the strength of the effect may vary depending on the motivation. For instance, if the MNC insists on importing specialized machineries and materials for production on the ground of their non-availability in host countries, then imports increase as a result of FDI (Alguacil and Orts, 2003). However, local production might contain the adverse effect (Blonigen, 2001). Kinoshita (2011) has noted that during 2000-07, FDI inflow in fifteen Eastern European countries has majorly entered into non-tradable sector, as a result of which domestic demand rather than supply increased at a considerable pace. The development led to huge imports, and consequently to high level of CAB.

Finally, remittances influence CAB scenario in considerable manner (Salisu, 2005). It has been observed that outflow of profit remittances on FDI flows leads to worsening of CAB (Yalta, 2011). The effect may get stronger in the time of economic crisis (Doraisami, 2007).

A number of studies have analyzed the influence of FDI on balance of payment in general and CAB in particular. A negative influence of FDI on CAB has been reported by several studies (Bosworth et al, 1999; Doraisami, 2007; Jansen, 1995; Mencinger, 2008; Seabra and Flach, 2005; Siddiqui and Ahmad, 2012). Interestingly, a number of studies report profit remittances and higher import intensity as the major underlying factors for the decline in CAB. Analyzing the data for Turkey, Yalta (2011) noted that while FDI lead to decline in exports, they result in increase in imports and profit remittances outflow, as a result of which CAB is de-stabilized. Analyzing the scenario in Barbados, Campbell (2003) also noted that the possible gains derived from FDI might get eroded by import of goods and services from abroad and investment income payments to non-residents. The analysis of Muwanga-Zake and Katamba (2005) on Uganda explained the decline in CAB with faster growth in imports vis-a-vis exports, which in long run may lead to chronic imbalance. A similar conclusion has been reached by Higgins et al (2005), who have noted the adverse implications of US net income payments and CAB scenario.

However, positive influence of FDI on CAB has been reported by the other side of the literature. Fry et al. (1995) has noted that FDI is independent of current account, and the neutrality increases with rise in openness of the exchange system. The analysis of Ehimare (2011) with data for Nigeria reported a positive relationship between FDI and CAB, given its abundance in natural resources and large population, which signifies a large market. Fry (1996) has reported a positive relationship between FDI and CAB for six Pacific Basin economies, and explained the result in terms of their effects on national savings and accelerated growth.

3. FDI Scenario in India: Inflow and Effect

The process of liberalization slowed down in late nineties, but deepened again in the new millennium. The FDI inflow in India suitably reflects the gaining of pace of the reform measures. Rao and Dhar (2011) noted that average reported FDI equity inflows during 1991-92 to 1999-00 was US $ 1.72 billion, but the same increased to US $ 2.85 billion during 2000-01 to 2004-05. In line with further economic reforms and emergence of the Indo-centric regional trade agreements (RTAs), an unprecedented level of FDI inflow has been observed afterwards, taking the corresponding figure to US $ 19.73 billion during 2005-06 to 2009-10. A number of capital account reform measures have been undertaken over the period, which considerably liberalized FDI inflow in the country. However, owing to Indian indirect taxes and transportation infrastructure FDI flows has been lower vis-à-vis the Chinese experience (Shah and Patnaik, 2007).

Table 1 depicts sectoral distribution of FDI inflow in India in percent terms for the last one decade (2000-2011). It is observed that primary sector consistently shows a very meagre share in total FDI inflow, coming down from 1.06 percent in 2000-08 to 0.79 percent in 2011. Mining has been the most prominent subsector within primary sector in terms of drawing FDI, though the proportional contribution has come down in recent years.

In comparison with the primary sector, manufacturing sector has enjoyed a better FDI-attractiveness. The percentage share for this segment stood at 32.08 percent in 2000-08, but declined to 22.31 percent in 2009. However, a reversal has been witnessed in 2011 with the contribution of the sector increasing to 38.3 percent in 2011. Within manufacturing sector automobile industry attracted most of the FDIs (as a single industry), with a share of 4.05 percent in 2000-2008, which increased to 7.14 percent in 2011. Metallurgical industry has been the other sector attracting most of the FDIs in manufacturing sector. Proportional FDI inflow in other manufacturing sectors like electrical equipments and textiles has been erratic in recent years.

However keeping at par with the past trends service and the related sector remains the most attractive destination for FDI inflow in India, with its share of 66.92 percent during the time span of 2000-08. Although the proportional inflow in this sector increased to 76.26 percent in 2009, the global recession limited the FDI flow in this segment from then on and the corresponding figure has come down to 60.55 percent in 2011. Computer software and hardware, telecommunication and real estate are among the largest recipients of FDI on this front. But notwithstanding the expectation the proportional share of FDI is computer software and hardware industry has declined considerably from 11.56 percent in 2000-08 to 3.39 percent in 2011. Real estate sector also shows major fluctuation in its FDI share whereas telecommunication has been one of the relatively stable destinations of FDI.

Table 1: Sectoral Distribution of FDI Inflow in India (2000-2011)

(Percent Share)

Sector	2000-08	2009	2010	2011	Jan 2000– Dec 2011 (Cumulative)
1. *Primary*	1.06	0.93	0.93	0.79	1.00
A. Mining	0.65	0.66	0.49	0.25	0.61
2. *Manufacturing*	32.08	22.31	35.09	38.30	30.54
A. Miscellaneous Industries	5.63	3.06	7.67	7.14	5.43
B. Automobile Industry	4.05	4.98	5.93	7.76	4.66
C. Metallurgical Industries	3.26	1.78	5.12	3.90	3.25
D. Petroleum & Natural Gas	2.72	1.44	2.90	1.02	2.42
E. Chemicals (other than Fertilizers)	2.51	1.67	2.12	1.32	2.23
F. Electrical Equipments	1.73	2.88	0.52	2.86	1.82
G. Cement and Gypsum Products	2.09	0.31	2.96	0.91	1.80
H. Drugs & Pharmaceuticals	1.90	0.75	1.05	0.90	1.47
I. Industrial Machinery	0.39	0.71	3.34	1.13	0.96
J. Food Processing Industries	1.00	0.72	0.99	1.68	0.95
K. Textiles (including Dyed, Printed)	0.78	0.77	0.39	1.61	0.73
3. *Service*	66.92	76.26	63.90	60.55	68.35
A. Services sector	21.62	21.13	17.63	16.03	20.71
B. Computer software & hardware	11.56	2.66	4.77	3.39	8.23

Table 1: Sectoral Distribution of FDI Inflow in India (2000-2011) (contd.)

Sector	2000-08	2009	2010	2011	Jan 2000– Dec 2011 (Cumulative)
3.Service	66.92	76.26	63.90	60.55	68.35
C. Telecommunications	7.86	9.34	7.08	9.76	8.12
D. Housing & real estate (including Cineplex, multiplex, integrated townships & commercial complexes etc.)	5.82	12.18	7.06	3.05	7.38
E. Construction activities	6.18	9.02	7.46	6.36	7.03
F. Power	3.58	6.02	5.68	6.56	4.55
G. Trading	1.88	2.51	2.67	1.47	2.14
H. Hotel & tourism	1.50	2.18	2.35	2.49	1.82
I. Information & broadcasting (including print media)	1.15	2.79	1.93	1.80	1.66
J. Consultancy services	1.38	1.53	1.20	1.86	1.40

Source: SIA Newsletter (April 2011)

The impact of the FDI inflow on India's growth and exports has however been mixed so far. Chakraborty and Nunnenkamp (2008) reported that while the growth effects of FDI are strong and moderate in the manufacturing sector and services sector respectively, no causal relationship is observed in the primary sector. Sharma (2000) noted a statistically non-significant relationship between FDI and export performance although the coefficient of FDI has a positive sign. Nevertheless, FDI in India has been able to create significant backward and forward linkages. NCAER (2010) noted that the sectors with both strong backward and forward linkages include construction, fuels, chemicals, metallurgical industries etc. The sectors with strong backward linkages are electrical equipment, drugs and pharmaceuticals, food processing, textiles etc., while telecommunications, consultancy services etc. exhibit strong forward linkages.

The weak linkage between FDI and trade in India can be explained on two counts. First, the secondary data analysis of Singh (2007) observed that FDI has come in the most capital-intensive sectors with the consequent limited growth repercussions in the economy. The home market effect might have dominated in this setting. Second, Banga (2003) noted that while FDI has a significant effect on the export-intensity of industries in the non-traditional export sector, the same for traditional export sector has been missing. Moreover, while FDI from the US bear a positive and significant effect on export-intensity of industries in non-traditional export sector, a similar effect for Japanese FDI was not observed. The characteristic difference in horizontal and vertical FDI may have led to such outcome.

The recent Indo-centric RTAs have played a favourable role in ensuring FDI inflows in the country, with obvious trade repercussions (Chaisse et al, 2011; Chakraborty and Sengupta, 2010). For instance, towards the end of the Indo-ASEAN FTA negotiations Honda Motors expressed their interest in sourcing components from India for its manufacturing sites at other locations, especially within the ASEAN market (Economic Times, 2008a). The proposal was soon followed by Mitsubishi Motors' expression of interest in starting production in India to make it an export hub and to link the operations with existing ASEAN bases (Economic Times, 2008b). Many investment proposals from Southeast and East Asian partners have materialized since then. However, export promotion from these initiatives is still below expectation as India's integration with international production networks (IPNs) is still at the nascent stage (Anukoonwattaka and Mikic, 2011).

4. Movements in Current Account Balance: Indian Experience

Given the emergence of inefficient industrial structure resulting from the import-competing development strategy, India almost always experienced a negative CAB in the pre-liberalization period. Table 2 illustrates India's current account scenario for the last two decade (in Rs crores). While both merchandise import and export shows steady growth over the period, the import growth rate has been higher vis-a-vis the corresponding export growth rate. Consequently, trade balance has steadily and increasingly ran in higher deficit. While India's trade deficit was Rs 16934 Crores in 1990-91, the same increased to Rs. 56737 Crores in a decade's time in 2000-01. Eventually the figure has magnified to Rs. 595600 Crores in 2010-11.

On the other hand, the country also faced an invisible deficit in 1990-91, which soon changed in the post-liberalization period. India has witnessed a steady rise in service exports since late nineties, which continued in new millennium as well (Acharya, 2001). After the recent global recession, the service sector export growth rate has declined resulting into lower invisible surplus on 2010-11. Though India's net invisible remains positive but the huge trade deficit prompted the over CAB to stay perennially at deficit. The total current account deficit in India was Rs. 17366 Crores in 1990-91, which declined to Rs. 11598 Crores in 2000-01 but reached a staggering Rs. 210100 Crores in 2010-11.

Table 2: Current Account Balance Scenario in India

(Rs. Crores)

Category	1990-91	2000-01	2006-07	2008-09	2010-11
Imports	50086	264589	862833	1405400	1735100
Exports	33153	207852	582871	858000	1139500
Trade Balance	-16934	-56737	-279962	-547400	-595600
Invisible Receipts	13396	147778	517146	770400	902500
Invisible Payments	13829	102639	281567	350600	517000
Net Invisible	-433	45139	235579	419800	385500
Current Account Balance	-17366	-11598	-44383	-127600	-210100

Source: Economic Survey (2012)

Mohan (1996) noted that for sustainability of India's current account deficit at a further lower level, a wider export growth rate is required. India's export growth rate in the early years of new millennium was high, which resulted a current account surplus in 2003-04. However, Shah and Patnaik (2007) noted that in the Indian case a current account deficit scenario has been considered more favourable for long term growth vis-à-vis current account surplus, with obvious capital inflow considerations. In this context, the study observed that, 'Many economists argued that the current account surplus in 2003–4, of 1.7 percent of GDP, implied a significant opportunity cost in terms of investment forgone and thus lower GDP growth (Lal, Bery, and Pant 2003)'. In this background, the present paper attempt to understand to what extent the FDI inflow in India influence the CAB series.

5. Data and Methodology

Data

Quarterly data over the period 1990-91:Q1 to 2010-11:Q4[1] are used to examine the long run equilibrium or cointegrated relationship between CAB and FDI for the Indian economy. The data has been compiled from Handbook of Statistics on Indian Economy

[1] The financial year for the Indian economy ranges from April (of the current calendar year) to March (of the next calendar year).

(2011-12), published by Reserve Bank of India. All the variables are calculated in home currency price (Rupees Crores).

Unit Root Test

Traditionally, the stationary properties of variables are examined by using Augmented Dickey Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) unit root tests. However, as suggested by Perron (1989), the standard unit root tests are biased towards the non-rejection of null hypothesis in the presence of structural breaks. 'Most macroeconomic time series are not characterized by the presence of a unit root. Fluctuations are indeed stationary around a deterministic trend function. The only 'shocks' which have had persistent effects are the 1929 crash and the 1973 oil price shock' (Perron, 1989, p. 1361). This is an important finding, especially because the span of time series in any empirical work is usually long enough to have had structural breaks.

A plot of the data on CAB and FDI indicates that there is a possible break in both the individual time-series, clustered around 2005-06 (Figure 1). Determining the accurate sequence of such break dates is a major task for researchers analyzing time-series data on FDI and current account balance. If the analysis is done oblivious of the existence of possible structural breaks, empirical study using standard unit root may yield confusing and spurious results. In other words, given the strong likelihood that the series under consideration are subject to structural breaks, the standard unit root tests for stationarity are likely to yield misleading conclusions.

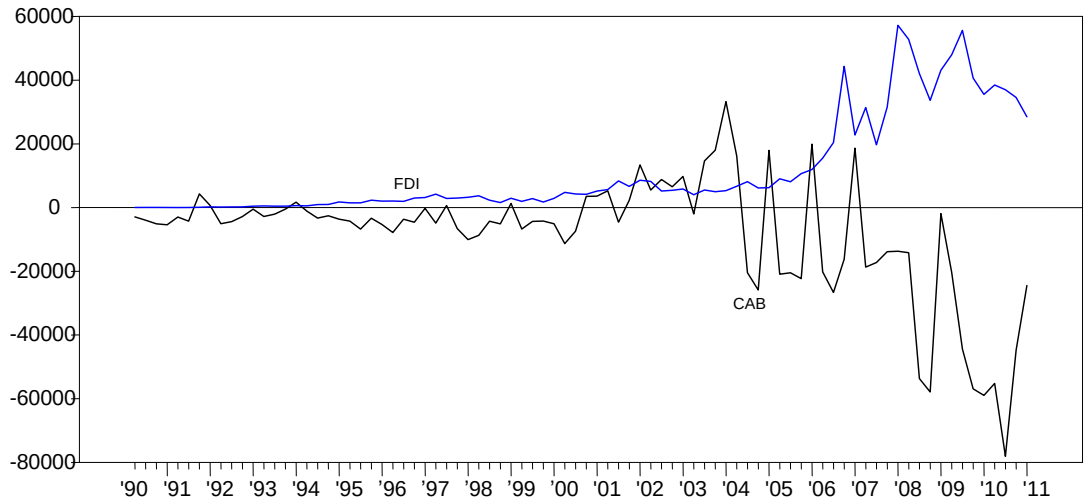

Fig.1 Current Account Balance and FDI for Indian economy (in Rs. Crores)

There are a plethora of unit root tests in the presence of structural breaks to choose from. Perron's (1989) method of exogenous break point treatment has been criticized by Christiano (1992) and later by Zivot and Andrews (1992) on the ground that the choice of break point is based on pre-test examination of the data and hence is subject to the

problem of "data-mining". Unit root test against a single-break stationary alternative was proposed by Zivot and Andrews (1992). Their test on endogenous structural break is a sequential test that uses a different dummy variable for each possible break date. It was extended to a two-break stationary alternative by Lumsdaine and Papell (1997) and up to five-break alternative, with an a priori unknown number of breaks, by Kapetianos (2005). However, these tests maintain the linearity assumption under the unit root null hypothesis and exhibit size distortions (over rejection of the null) as well as the wrong estimation of the break point (Nunes, Newbold and Kuan, 1997, Altinay, 2005, Bec and Bassil, 2009, etc.). To overcome these problems, Lee and Strazicich (2003, 2004) have proposed a Lagrange Multiplier (LM) test statistics based unit root test that allows for (at most two) endogenous breaks both under the null and the alternative hypothesis. Thus, any conclusion on the rejection of unit root null based on this LM test provides quite strong evidence of stationarity.

Let us consider the following data generating process (DGP):

$$y_t = \delta' Z_t + e_t, \qquad e_t = \beta e_{t-1} + \varepsilon_t \qquad \text{.....} \qquad (1)$$

where Z_t is a vector of exogenous variables, δ' is a vector of parameters and ε_t is a white noise process, such that $\varepsilon_t \sim$NIID (0, σ2). *First*, the test with only one structural break is considered (Lee and Strazicich, 2004). The *crash* model that allows shift in level only is described by $Z_t = [1, t, D_t]'$, and the *break* model that allows for changes in both level and trend is described as $Z_t = [1, t, D_t\ DT_t]'$, where $D_t \text{ and } DT_t$ are the two dummies defined as

$$D_t = 1, \ if\ t \geq T_B + 1;$$
$$= 0, \ otherwise$$

and

$$DT_t = t - T_B, \ if\ t \geq T_B + 1;$$
$$= 0, \ otherwise$$

where T_B is the time period of the break date.

Secondly, the framework that allows for two structural breaks are considered (Lee and Strazicich, 2003). The *crash* model that allows two shifts in levels only is described by $Z_t = [1, t, D_{1t}\ D_{2t}]'$, and the *break* model that allows for two changes in both level and trend is described as $Z_t = [1, t, D_{1t}\ DT_{1t}\ D_{2t}\ DT_{2t}]'$, where $D_{jt} \text{ and } DT_{jt} \ for\ j = 1, 2$ are the appropriate dummies defined as above, viz.,

$$D_{jt} = 1, \; if \; t \geq T_{Bj} + 1;$$
$$= 0, \; otherwise$$

and

$$DT_{tj} = t - T_{Bj}, \; if \; t \geq T_{Bj} + 1;$$
$$= 0, \; otherwise$$

where T_{Bj} denotes the j[th] break date.

This method estimates the following regression to obtain the LM unit root test statistics:

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta \tilde{S}_{t-j} + u_t \qquad \text{..... (2)}$$

where $\tilde{S}_t = y_t - \tilde{\Psi}_t - Z_t \tilde{\delta}, \; t = 2, ..., T$; $\tilde{\delta}$ denotes the regression coefficients of $\Delta y_t \; on \; \Delta Z_t$ and $\tilde{\Psi}_t = y_1 - Z_1 \tilde{\delta}$, y_1 and Z_1 being the first observations of y_t and Z_t respectively. The lagged terms $\Delta \tilde{S}_{t-j}$ are included to correct for likely serial correlation in errors. The null hypothesis of unit root (ϕ = 0) is tested by the LM t-statistic using equation (2). The lag length *k* is selected by employing a general to specific (GTS) approach in all a priori unknown break unit root tests[2]. The critical values are tabulated in Lee and Strazicich (2003, 2004) for the two-break and single-break cases respectively.

6. Empirical Results

Tables 3, 4 and 5 contain the results for the LM test with one and two endogenous break(s) at level and first differences. The results suggest that the null hypothesis of a unit root can be rejected for both the series in levels for the *crash* model with both one and two endogenous structural breaks. In other words, both the CAB and FDI series are stationary for the *crash* model in the presence of endogenous structural break at 5% level of significance. For the *break* model, the null hypothesis of a unit root can be rejected *only* with two structural breaks. However, if we take the first difference for the *break* model with one structural break, the unit root null for both the CAB and FDI series can be rejected, suggesting thereby that they are integrated of order 1. The results are in sharp contrast to the mixed orders of integration for the two series in the absence of endogenous structural breaks (Table A1 in the Appendix). As is evident from Tables 3 - 5, the break dates for both the series are concentrated around 2005-06.

[2] The lag length is also counter-checked using different lag selection criteria, like AIC, BIC etc.

Table 3: Unit Root Tests with One Structural Break (at Level)[1]

Series	Model	Break Point	Optimal Lags	T-Statistic	Critical Values at 1%	Critical Values at 5%	Result
CAB	Crash (Intercept Only)	2005-06:Q4	8	-3.92	-4.24	-3.57	Reject null hypothesis of unit root at 5% level
CAB	Break (Intercept & Trend)	2005-06:Q4	8	-3.78	(-5.05 to -5.11)	(-4.45 to -4.51)	Do not reject null hypothesis of unit root
FDI	Crash (Intercept Only)	2008-09:Q2	7	-3.59	-4.24	-3.57	Reject null hypothesis of unit root at 5% level
FDI	Break (Intercept & Trend)	2006-07:Q1	6	-4.05	(-5.05 to -5.11)	(-4.45 to -4.51)	Do not reject null hypothesis of unit root

Note: Method applied is Lee and Strazicich's (2004)

Table 4: Unit Root Tests with One Structural Break (at First Difference)[1]

Series	Model	Break Point	Optimal Lags	T-Statistic	Critical Values at 1%	Critical Values at 5%	Result
CAB	Break (Intercept & Trend)	2008-09:Q3	6	-9.85	(-5.05 to -5.11)	(-4.45 to -4.51)	Reject null hypothesis of unit root at 1% level
FDI	Break (Intercept & Trend)	2005-06:Q3	8	-4.52	(-5.05 to -5.11)	(-4.45 to -4.51)	Reject null hypothesis of unit root at 5% level

Note: Method applied is Lee and Strazicich's (2004)

Table 5: Unit Root Tests with Two Structural Breaks (at Level)[2]

Series	Model	Break Point (1)	Break Point (2)	Optimal Lags	T-Statistic	Critical Values at 1%	Critical Values at 5%	Result
CAB	Crash (Intercept)	2005-06:Q4	2007-08:Q4	8	-4.27	-4.55	-3.84	Reject null hypothesis of unit root at 5% level
CAB	Break (Intercept & Trend)	2002-03:Q4	2006-07:Q3	1	-7.66	(-6.16 to -6.45)	(-5.59 to -5.74)	Reject null hypothesis of unit root at 1% level
FDI	Crash (Intercept)	2006-07:Q1	2007-08:Q4	7	-3.88	-4.55	-3.84	Reject null hypothesis of unit root at 5% level
FDI	Break (Intercept & Trend)	2005-06:Q3	2007-08:Q3	7	-7.54	(-6.16 to -6.45)	(-5.59 to -5.74)	Reject null hypothesis of unit root at 1% level

Note: Method applied is Lee and Strazicich's (2003)

Cointegration

The tests for cointegration between two time-series can be conducted using a vector autoregressive model (VAR) based framework. Under the Johansen (1988) approach, there are two tests. The first is the *trace test* which is a joint test where the null is that the number of cointegrating vectors is less than or equal to *r* against an unspecified alternative that they are greater than *r*. The test statistic is formulated as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \ln(1-\hat{\lambda}_i) \qquad \text{..... (3)}$$

where *r* is the number of cointegrating vectors under the null hypothesis and $\hat{\lambda}_i$ is the estimated value for the *i*-th ordered Eigen value. Intuitively, the larger is $\hat{\lambda}_i$, the more large and negative will be $\ln(1-\hat{\lambda}_i)$ and hence larger will be the test statistic. The second is the *maximum Eigen value test* for cointegration which conducts separate tests on each Eigen value, and has as its null that the number of cointegrating vectors is *r* against an alternative of *r+1*. The test statistic is formulated as:

$$\lambda_{\max}(r \mid r+1) = -T \ln(1-\hat{\lambda}_{r+1}) \qquad \text{..... (4)}$$

for *r* = 0, 1… *k*-1. The critical values for the two statistics were provided by Johansen and Jesulius (1990).

In the present analysis, the cointegration test is performed to investigate whether the long-run equilibrium relationships among the two variables CAB and FDI exist. For the cointegration analysis, we consider the findings of the unit root test in the presence of two endogenous structural breaks, whereby the null hypothesis of a unit root has been rejected both for the *crash* and *break* models. The computed *trace* and *maximum Eigen value* statistics, as defined in equations (3) and (4), are reported in Table 6, which indicates the presence of one cointegrating vector at 5 per cent level of significance (i.e., the null hypotheses of no cointegration is rejected for rank of zero only)[3]. The result implies that there exists a unique long-run relationship among the two variables.

[3] The current analysis has considered the intercept and trend in cointegration test specification, i.e., a linear trend in VAR.

Table 6: Results for Johansen Test for Cointegration

Test	Hypothesized No. of CE(s)	Eigen value	Test Statistics	0.05 Critical Value	Prob.**
Trace test	None *	0.18	17.53	15.49	0.02
	At most 1	0.01	1.08	3.84	0.30
Maximum Eigen value test	None *	0.18	16.46	14.26	0.02
	At most 1	0.01	1.08	3.84	0.30

Notes: (1) Trace test and Max-Eigen value test indicate 1 cointegrating equation at 0.05 level

(2) * denotes rejection of the hypothesis at the 0.05 level

(3) **MacKinnon-Haug-Michelis (1999) p-values

Granger Causality Test

Granger (1969) causality technique is commonly applied for identifying the direction of causal relationship between two variables.[4] The results of Granger causality test are depicted in Table 7. The analysis reveals a unidirectional causality from India's FDI to current account balance at 5 percent level. Our results are in conformity with similar findings for emerging countries (for example, study by Siddiqui and Ahmed, 2012 for Pakistan). Such one-way causality has important implications in the sense that FDI inflows may not necessarily contribute towards income generating activities. On the contrary, they may increase conspicuous import based consumption and repatriate the proceeds back home in the form of high returns. This has the potential to deteriorate the country's balance of payments in the long-run.

Table 7: Results of Granger Causality Test Procedure

Null Hypothesis	F-Statistic	p-values
CAB does not Granger Cause FDI	1.21	0.30
FDI does not Granger Cause CAB	14.46	0.000*

Notes: (1) Asterisk (*) denote statistically significant at 1% level

[4] Hsiao's (1981)[4] optimal lag length criteria for each variable in an equation based on a systematic autoregressive method has been applied in the analysis. This method combines Granger causality test and Akaike's Final Prediction Error (FPE), defined as the (asymptotic) mean square prediction error.

7. Policy Implications

The present analysis has identified the financial year 2005-06 as the structural break year, which bears some significant implications vis-a-vis CAB and FDI due to several reasons. Firstly, in 2005-06 capital flows more than made up for the current account deficits of US$ 9.2 billion and resulted in reserve accretion. Secondly, India's impressive export growth in the first half of last decade mainly resulted from favorable external developments and domestic policy initiatives. Improved global growth and recovery in world trade since 2001 augmented the growth of Indian exports, while the gradual opening up of the economy and corporate restructuring strengthened the competitiveness of Indian industry. Thirdly, improved domestic economic activity and the improvement of manufacturing sector provided a supporting base for strong sector-specific exports. Finally, the nominal effective exchange rate (NEER) measuring the value of country's currency relative to the currencies of principal trading partners depreciated on a yearly basis till 2004-05 but appreciated in 2005-06.

Overall, in 2005-06, current receipts (including grants) grew by 27.6 per cent to US$ 197.4 billion. But, such receipts fell short of current payments (including grants) which grew by 31.4 per cent to US$ 206.6 billion. Current receipts covered 95.6 per cent of current payments in 2005-06. During 2005-06, for exports, while volume increased by a record 45.4 percent (mainly in items like petroleum products, chemicals & related products and machinery & transport equipment), the unit value increased by 20.4 per cent (mainly in petroleum products, minerals & ores, machinery & transport equipment and footwear). The stable capital flows seamlessly financing the moderate levels of current account deficit caused primarily by the rise in international oil prices. On the other hand, merchandise imports grew by 33.8 per cent to US$ 149.2 billion in 2005-06. Also remittances outflow increased as all investments in India are freely repatriable after payment of applicable taxes. Thus despite the tremendous growth in export trade deficit reached a record high of US$ 46 billion in 2005-06.

On the capital flow front it is observed that external assistance and external commercial borrowing (ECBs), the two major debt-creating flows picked up in 2004-05. These debt flows, as a proportion of total capital flows, were 25 per cent in 2004-05 and 18 per cent in 2005-06. FDI inflows (net), which had declined from US$ 4.7 billion in 2001-02 to US$ 2.4 billion in 2003-04, continued its growth for the second consecutive year in 2005-06 to climb back to US$ 4.7 billion again. FDI on a comparative net basis, year-on-year, exhibited a growth of 27.4 per cent in 2005-06 reflecting the improved investment climate. FDI (net) in April-September 2006 at US$ 4.2 billion was almost twice its level in April-September 2005. Thus the year 2005-06 has been a trend-breaking one in terms of both current account scenario and FDI flow, thus supporting the obtained structural break result.

The empirical result raises serious concerns regarding the sustainability of the current account deficit in India. The adverse effect of FDI on CAB, as observed from the empirical results implies that the export opportunities arising out of the foreign

investment are being outweighed by the rising import volume and remittance payments leakages. This has adverse implications in the event of depreciation of home currency, as it impairs investor confidence. The fact is indicative of two major shortcomings of Indian economy: one, lesser competitiveness of Indian exports leading to failure to enhance the same in the world market and two, lower technological plane, which affects export prospects on one hand and inflates import bill on the other. There is a strong need to enhance the competitiveness as well as technology spillover effect in both manufacturing and service sector. In a country such as India with historically high tariffs and large domestic market, FDI might move in merely to produce behind tariff walls for the domestic market. Such FDI becomes virtually indistinguishable from the domestic investment. FDI becomes attractive for its own sake when it makes a net contribution to the economic development of the host country. Policy should target FDI with potential for effects on technology progress, productivity spillovers, human capital formation etc. rather than *any* FDI, *per se*. The recent policy measures being implemented (NMCC, 2006, 2011; Prasad and Satish, 2010) needs to be further strengthened in light of the present findings.

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Appendix: Analysis without Structural Breaks

Table A1: Unit Root Tests

Variables	ADF[1]		PP[2]	
	Level	First Difference	Level	First Difference
CAB	-1.23	-10.75*	-4.59*	----------
FDI	-4.31*	----------	-3.13	-14.93*

Note: 1. Augmented Dickey-Fuller test. 2. Philips-Perron test. 3. Asterisk (*) denotes statistically significant at 1% level. 4. Results reported are those with drift and trend.

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