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REASSESSMENT OF SUSTAINABILITY OF CURRENT ACCOUNT DEFICIT IN INDIA

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Abstract
In this study, we examined the long-run relationship between oil and non-oil exports and imports, in order to see whether the current account deficit in India is sustainable. To achieve our objective we have carried out cointegration analysis with structural breaks (as unit root analysis of both variables shows that these variables have been subject to structural changes). Interestingly, we found that there is a strong evidence of a long-run relationship between non-oil exports and imports and no evidence in the case of oil exports and imports. This implies that a foreign trade deficit is sustainable in the Indian context for non-oil commodities but not for oil commodities.

JEL Classification: C12, C13, C22, E31, G11
Keywords: Oil and non-oil exports, oil and non-oil imports, unit root, structural breaks, cointegration.

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1. Introduction

One of the major indicators of a country's external performance is its trade account in general and current account in particular. Imbalance in the current account might predict future changes in a managed foreign exchange regime, therefore sustainability of the current account has become the major concern of not only the policy makers, but also the central banks and the market analysts of the emerging economies. Husted (1992) demonstrated that the existence of a cointegrating relationship between exports and imports implies that countries do not violate their International Budget Constraint (IBC) and therefore supports the effectiveness of their macroeconomic policies in preserving the long-run equilibrium. There are a number of empirical studies which attempted to identify the causes of external imbalances by linking the external accounts (measured by either trade or current or capital account) to major macroeconomic variables like government spending, private consumption, income etc. (for example Sachs, 1981; Ahmed, 1987; Razin, 1995; Elliott and Fatas, 1996). However, some authors for example, Artis and Bayoumi (1989) argue that in a number of countries fiscal and monetary policies have played a major role in reducing the size of external imbalances. Further, Summers (1988) and Husted (1992) argue that evidence of external imbalance in the 1980s in the USA was the outcome of 'bad policy'. Irandoust and Sjöö (2000) argue that as long as there are no policy distortions and/or productivity shocks in the domestic market, the current account will be sustainable. Herzer and Nowak-Lehmann (2006) and Erbaykal and Karaca (2008) argue that a trade deficit is only a short-term phenomenon, provided, there is evidence of existence of a cointegration relationship between exports and imports, since in a well-functioning economy, deficits will be balanced by future surpluses.

For a fast growing country like India, the current account deficit occupies the centre stage in policy discussions, as persistent discrepancies in the current account and rising levels of trade deficit pose risks to the sustainability of high economic growth and macroeconomic stability. The Indian macro-economy has been prone to frequent and continuing shocks and regime shifts in recent decades. A macroeconomic crisis in India has usually been dominated by balance of payments difficulties and has forced the country to devalue its currency either by external or internal factors in 1965-67, the early 1980s and 1991. Further, it is worth noting that oil price shocks that occurred outside India have affected India badly and that has been one of the major factors causing balance of payments difficulties and resulting in devaluation of the rupee against the US dollar. Hence, fluctuations in India's current account are mainly results of the fluctuations in the trade of oil. It is also evident from Figure 1 that there are more fluctuations in the series of the oil-exports and oil-import vis-à-vis non-oil-exports and non-oil-imports. Hence, the present study is an attempt to test sustainability of the current account at a disaggregated level of oil and non-oil exports and imports. This attempt would be helpful for policymakers in India to understand whether the Indian economy is functioning well after eliminating the impact of oil-price shocks[1].

In the case of India, Arize (2002) provided evidence of a long-run equilibrium relationship between exports and imports for the Indian economy by employing data for the period 1973 to 1998. Upender (2007) showed that India's nominal exports and imports were cointegrated by employing data for the period 1949-50 to 2004-05. Konya and Singh (2008), by employing data for the period 1949-50 to 2004-05 and allowing for a one-time structural break in 1992-93, have found no evidences of a cointegrating relationship between India's exports and imports. The exogenously determined structural break in 1992-93 incorporated the potential impact of the March 1993 switch from a fixed exchange rate regime to a free floating exchange rate policy. Sharma and Panagiotidis (2005) examined the export led growth hypothesis for the period 1971-2001 for India. They investigated, in particular, three hypotheses: (i) whether exports, imports and GDP are cointegrated; (ii) whether export growth Granger-cause GDP growth; (iii) and whether export growth Granger-cause investment. Holmes et al. (2011) conducted an investigation into the sustainability of the Indian current account using data for 1950-2003. The authors employed a unit root test that incorporates a structural break and used parametric and non-parametric tests for cointegration. For parametric cointegration they used Johansen (1995) and Saikkonen and Lutkepohl (2000a, b, c) test and for nonparametric cointegration they used a cointegration test developed by Breitung (2002) and Breitung and Taylor (2003). Evidence in favour of a sustainable current account emerges in the late 1990s, which is the time period following the 1991 liberalisation of the Indian economy. However, there is evidence against sustainability (cointegration) for the period prior to this. Tiwari (2011) examined the long-run relationship between exports and imports for the Chinese and Indian economies using monthly data from 1992 to 2010. Using recent time series econometric methods, Tiwari (2011) has shown that a trade deficit is sustainable in the case of India but not in the case of China. Tiwari and Pandey (2011)

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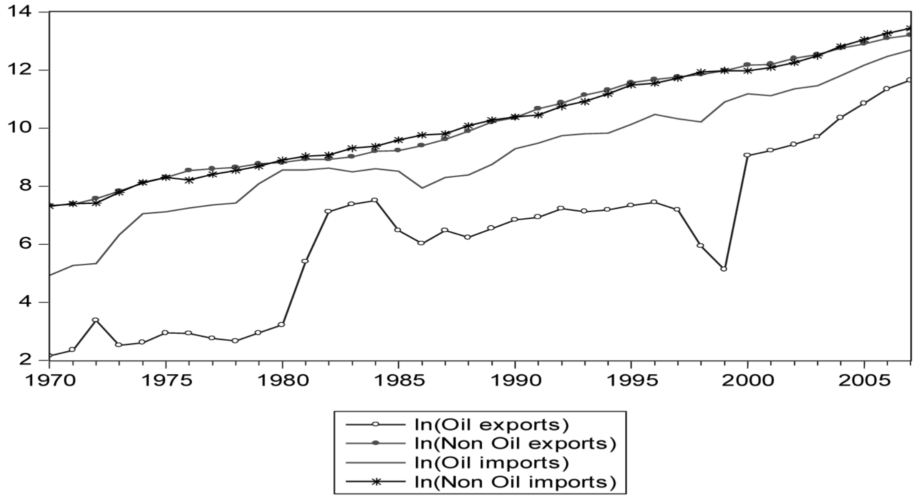
1. It is important to mention that as one anonymous referee of this journal pointed out "it is conceivable that a country could have both trade balances as not cointegrated and therefore not-sustainable, but the overall current account (i.e. a linear combination of the disaggregated trade balances) is stationary thereby indicating sustainability. This caveat might be worth reflecting on and pointing out because it suggests that non-sustainability across the disaggregated levels does not necessarily imply non-sustainability at the aggregated level." However, in our case we are interested in looking into the sustainability of the current account at the disaggregate level. Even if a country has a sustainable overall current account and an unsustainable current account at the disaggregate level, analysis at the disaggregate level might be more helpful for planning trade policies. Further, our concern is not to show that non-sustainability at the disaggregate level implies non-sustainability at the aggregate level, nevertheless here we are concerned only with disaggregate trade as various studies in this regard for India show that an overall current account deficit is sustainable.

by analyzing Indian data for the period April-1984-85 to March-2009-10 found that, in all the cases, there is a long-run relationship between exports and imports. This implies that a foreign trade deficit is sustainable in the Indian context.

This paper attempts to analyze the sustainability of the current account balance in the context of India but unlike others we have sub-grouped total exports and imports into oil and non-oil exports and imports. This is done in order to provide an in-depth analysis. We found that there exists a strong cointegrating relationship between non-oil exports and non-oil imports and no cointegrating relationship between oil-exports and oil-imports. In other words, we found evidence of sustainability of the current account for the non-oil commodities of India and non-sustainability of the current account for oil-commodities.

The rest of the paper is organized as follows. The second section presents objectives, data source and methodology adopted in this paper followed by data analysis and results interpretation in the third section and finally, the conclusion has been presented in the fourth section.

Figure 1. India's exports and imports (expressed in natural log) in Rupees crore)



2. Objectives, Data source and estimation methodology

2.1. Objectives

The basic objective of the study is to examine the long-run relationship between exports and imports for the Indian economy by sub-grouping the total exports and imports into oil and non-oil exports and imports. To the best of our knowledge, there is no such study in respect of India. Hence, we contribute to the existing literature in two ways. First, we incorporate two structural breaks into the cointegration process and second, we provide evidence of the decomposed form of total exports and imports in order to have more insights.

2.2. Basic Model

Based on Husted (1992), Arize (2002) and Irandoust and Ericsson (2004), we examine the IBC to analyse the dynamics of the trade balance. Following Hakkio and Rush (1991), Husted (1992) provides a simple framework that implies a long-run relationship between exports and imports. The individual current-period budget constraint is:

$$C_0 = Y_0 + B_0 - I_0 - (1+r)B_{-1}$$

where, C_0 , I_0, Y_0 , B and r are current consumption, investment, output, international borrowing, and a one-period interest rate, respectively. $(1+r)B_{-1}$ is the initial debt size. After making quite a few assumptions, Husted (1992) derives a testable model:

$$EX_t = \beta_0 + \beta_1 IM_t + u_t$$

where EX_t, IM_t and u_t are the exports of goods and services, the imports of goods and services plus net interest payments and net transfer payments and disturbance at time t, respectively. Under the null hypothesis, in the economy that satisfies its IBC (i.e., for a sustainable current account deficit), it is expected that β_1=1 and u_t is a stationary process. In other words, if exports and imports are nonstationary variables (i.e., I(1)), then under the null hypothesis, they are cointegrated with a cointegrating vector (1, -1). Nonetheless, the condition β_1=1 is not, strictly speaking, an essential condition for the IBC to hold. Hakkio and Rush (1991) showed that when EX_t and IM_t are in levels, as opposed to a percentage of GDP or in per capita terms, $0< \beta_1<1$ is a sufficient condition for the budget constraint to be obeyed, entailing current account sustainability.

2.3. Data source and variables description

The data is obtained from the Hand Book of Statistics of the Indian Economy (HBSIE) published by the Reserve Bank of India (RBI). The period of the analysis is 1970-2007. Both variables are measured in levels only and transformed in natural log form in order to minimize fluctuations in the series.

2.4. Estimation methodology

Unit root analysis has been carried out by following Saikkonen and Lütkepohl (2002) and Lanne et al. (2002) of variables for Equation 1 as follows:

$$y = \mu_0 + \mu_1 t + f_t(\theta)'\gamma + x \tag{1}$$

where $f_t(\theta)'\gamma$ is a shift function and θ and γ are unknown parameters or parameter vectors and x_t is generated by AR(p) process with possible unit root. We used a simple shift dummy variable with shift date

TB. $f_t' = d_{1t} : \begin{cases} 0, t < T_B \\ 1, \geq T_B \end{cases}$ the function does not involve any parameter θ in the shift term $f_t(\theta)'\gamma$, the parameter γ is scalar. Dates of structural breaks have been determined by following Lanne et al. (2001). They recommend to choose a reasonably large Autoregressive (AR) order in the first step and then pick the break date that minimizes the GLS objective function used to estimate the parameters of the deterministic part.

After confirming that all variables are nonstationary with incorporation of the potential structural breaks the next step is to go for cointegration. There are two different tests proposed by Johansen et al. (2000) and Saikkonen and Lütkepohl (SL) (2000a,b,c) which allows for potential structural breaks. However, the SL approach has a limitation in the sense that if we are using this approach we can test for cointegration in the presence of only one structural break. In addition to that it does not allow for structural breaks in the trend while, Johansen et al. (2000) have suggested a model of cointegration in which we can test for cointegration among the set of variables in the presence of two structural breaks (either in the level only or in level and trend both). Therefore, in this study we have preferred the Johansen et al. (2000) test and the results of the Johansen et al. (2000) test will be presented in the paper. The Johansen et al. (2000)[2] test can be described as follows:

Consider a Vector Autoregressive (VAR) model of the form Johansen and Juselius (1990):

$$Y_t = \eta + \sum_{i=1}^{p} \Pi Y_{t-i} + \varepsilon_t \tag{2}$$

where $Y = [EX_t, IM_t]'$,η is a 2x1 vector of deterministic variables, Π is a 2x2 coefficient matrix and ε is a 2x1 vector of disturbances with normal properties. If there exists a cointegrating relationship between real exports and real imports, then Equation 2 may be reparameterized into a Vector Error Correction Model (VECM):

$$\Delta Y_t = \eta + \sum_{i=1}^{p-1} \Phi_i \Delta Y_{t-i} + \Pi Y_{t-1} + \varepsilon_t \tag{3}$$

where Δ is the first difference operator and Φ is a 2x2 coefficient matrix. The rank, r, of Π determines the number of cointegrating relationships. If the matrix Π is of full rank or zero, the VAR is estimated in levels or in first differences, respectively, since there is no cointegration amongst the variables. However, if the rank of Π is less than n then there exist 2xr matrices β (the cointegrating parameters) and α (the adjustment matrix, which describes the weights with which each variable enters the equation) such that $\Pi = \alpha\beta$ and Equation 3 provides the more appropriate framework. The Π matrix is estimated as an unrestricted VAR and tested to see whether the restriction implied by the reduced rank of Π can be rejected. The test statistics for determining the cointegrating rank of the Π matrix are the trace statistic given by

2. This part of the paper is heavily based on Greenidge *et al.* (2011).

$Q_t = -T\sum_{i=T-1}^{k}\log(1-\lambda_i)$, for $r = 0, 1, \ldots,$ k-1 and λ_i = the i-th largest eigenvalue and

the maximum eigenvalue statistic, which is given by $Q_t = -T\log(1-\lambda_{T-1}) = Q_T - Q_{T+1}$. If the data and unit root analyses suggest structural breaks then we employ the test specification and procedure detailed in Johansen *et al*. (2000). The authors generalized the multivariate likelihood procedure of Johansen (1988) by allowing up to two structural breaks, either in levels only or in levels and trend jointly, to be added to the specification. Assume there are two breaks, in which case the sample can be split into three periods (q=3) and Equation 3 is specified as:

$$\Delta Y_t = \eta E_t + \sum_{i=1}^{p}\sum_{j=1}^{q} K_{j,i} D_{j,t-1} + \sum_{i=1}^{p-1}\Phi_i \Delta Y_{t-i} + \alpha \begin{pmatrix}\beta\\ \mu\end{pmatrix}' \begin{pmatrix}Y_{t-1}\\ tE_t\end{pmatrix} + \varepsilon_t \tag{4}$$

where E_t is a vector of q dummy variables $E_t = (E_{1,t},...,E_{q,t})'$ with $E_{j,t} = 1(j=1,2,...,q)$ if observation t belongs to the j-th period and zero otherwise, with the first p observations set to zero; and $D_{j,t} = 1(j = 2,...,q$ and $i = 1,...,p)$ is a dummy that equals unity if observation t is the i-th observation of the j-th period. The hypothesis for determining the cointegration rank is formulated as before except that the asymptotic distribution now depends on the number of nonstationary relationships, the location of the break points and the trend specification. In this regard, the critical values as well as the p-values of all Johansen trace tests are obtained by computing the respective response surface according to Johansen *et al*. (2000)[3].

3. Data analysis and results interpretation

Table 1. SL Unit root analysis

Variables	Models		Test
	time trend (shift dummy and used break date is 2000)	time trend (shift dummy and used break date is 2001)	Saikkonen and Lütkepohl (k)
Ln(OE)	Yes	------	-2.2289 (1)
Ln(NOE)	------	Yes	-2.7710 (2)
	time trend (shift dummy and used break date is 1986)	time trend (shift dummy and used break date is 2000)	
Ln(OM)	Yes	------	-2.1661 (1)
Ln(NOM)	------	Yes	-2.2214 (0)

Note: (1) "k" Denotes lag length. (2) Critical values -3.55, -3.03 and -2.76 are obtained from Lanne et al. (2002) at 1%, 5%, and 10% respectively.

Source: JMulti's calculation

3. It is important to note that since the present study relied on unit root and cointegration testing, evidence of stationarity of the current account balance is not necessary for the sustainability of external debts (Bohn 2007).

It is evident from Table 1 that all variables are non-stationary at 5 percentage level of significance in their level form. Further, all series are transformed into first difference form and unit root analysis has been conducted for the transformed series. Results of unit root analysis of transformed series shows that all variables are stationary[4]. This implies that all variables are first order autoregressive i.e., *AR*(1) therefore, we can proceed for cointegration analysis. Further, cointegration is affected by lag incorporated and trend assumption in the cointegration process therefore, lags to be incorporated are determined on the basis of SIC as Kennedy (2003) has shown that *SIC* has performed better in Monte Carlo simulations and model selection (i.e., trend assumption) is based on the Pantula Principle. The results of the cointegration analysis are presented in Table 2. First, we presented results of cointegration analysis without structural breaks of Johansen's type, and later we incorporated structural breaks in the analysis. As the Pantula Principle gives the same preference for the trend assumption of linear deterministic trend (restricted) and linear deterministic trend therefore, results of both models are presented in Table 2. Under the null hypothesis of no cointegration (in absence of structural breaks), the trace test statistic and its *p*-values for oil exports and oil imports for the linear deterministic trend specification are 8.14637 and 0.4499 respectively, when the lag length is equal to (1, 1). Under the null hypothesis of no cointegration (in absence of structural breaks), the trace test statistic and its *p*-values for oil exports and oil imports for the linear deterministic trend (restricted) specification are 16.91422 and 0.4214 respectively, when the lag length is equal to (1, 1). The trace test statistic and its *p*-values for non-oil exports and non-oil imports for the linear deterministic trend are 10.93787 and 0.2153 respectively, when the lag length is equal to (1, 3). The trace test statistic and its *p*-values for non-oil exports and non-oil imports for the linear deterministic trend (restricted) are 24.56553 and 0.0721 respectively, when the lag length is equal to (1, 3). As Table 2 shows that the null hypothesis may be rejected only for non-oil exports and non-oil imports at 10% level of significance. Thus, there is likely to be a cointegrating relationship between non-oil exports and non-oil imports.

Further, in the cointegration analysis we have tested cointegration relationship when structural breaks occur only in levels and when it occurs in trend and level jointly. However, results of cointegration relationship when a structural break occurs in trend and level jointly has been presented[5]. Further, we have analyzed the case when there is evidence of one structural break and the case when two structural breaks occur in the cointegration process[6].

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4. Results of transformed series has not been presented but can be accessed from the author.
5. Other results are available upon request to the author.
6. Results of the analysis of when structural breaks occur in level only can be obtained by the request to the author.

Table 2. Results of cointegration analysis

<table>
<tr><td colspan="6">Johansen Trace Test without structural change</td></tr>
<tr><td colspan="6">Cointegration: Oil exports and oil imports</td></tr>
<tr><td colspan="3">Trend assumption: Linear deterministic trend (Lags interval (in first differences): 1 to 1)</td><td colspan="3">Trend assumption: Linear deterministic trend (restricted) (Lags interval (in first differences): 1 to 1)</td></tr>
<tr><td>r</td><td>LR</td><td>P-value</td><td>r</td><td>LR</td><td>P-value</td></tr>
<tr><td>0</td><td>8.14637</td><td>0.4499</td><td>0</td><td>16.91422</td><td>0.4214</td></tr>
<tr><td>1</td><td>0.73869</td><td>0.3901</td><td>1</td><td>7.056034</td><td>0.3387</td></tr>
</table>

<table>
<tr><td colspan="9">Johansen Trace Test: Trend, intercept included, and structural change occur in level and trend</td></tr>
<tr><td colspan="3">Restricted and Unrestricted dummies: 1986 and 2000 (1)</td><td colspan="3">Restricted and Unrestricted dummies: 1986 (1)</td><td colspan="3">Restricted and Unrestricted dummies: 2000 (1)</td></tr>
<tr><td>r</td><td>LR</td><td>P-value</td><td>r</td><td>LR</td><td>P-value</td><td>r</td><td>LR</td><td>P-value</td></tr>
<tr><td>0</td><td>33.07</td><td>0.5369</td><td>0</td><td>22.29</td><td>0.6775</td><td>0</td><td>24.13</td><td>0.4076</td></tr>
<tr><td>1</td><td>12.58</td><td>0.6664</td><td>1</td><td>8.49</td><td>0.6888</td><td>1</td><td>7.95</td><td>0.5939</td></tr>
</table>

<table>
<tr><td colspan="6">Cointegration: Non-oil exports and non-oil imports</td></tr>
<tr><td colspan="3">Trend assumption: Linear deterministic trend (Lags interval (in first differences): 1 to 4)</td><td colspan="3">Trend assumption: Linear deterministic trend (restricted) (Lags interval (in first differences): 1 to 4)</td></tr>
<tr><td>r</td><td>LR</td><td>P-value</td><td>r</td><td>LR</td><td>P-value</td></tr>
<tr><td>0</td><td>16.43862</td><td>0.0360</td><td>0</td><td>31.94356</td><td>0.0077</td></tr>
<tr><td>1</td><td>2.167730</td><td>0.1409</td><td>1</td><td>13.85462</td><td>0.0297</td></tr>
<tr><td colspan="6">Johansen Trace Test: Trend, intercept included, and structural change occur in level and trend</td></tr>
<tr><td colspan="3">Restricted and Unrestricted dummies: 2000 ((Lags interval (in first differences): 1 to 4))</td><td colspan="3">Restricted and Unrestricted dummies: 2001 (Lags interval (in first differences): 1 to 4)</td></tr>
<tr><td>r</td><td>LR</td><td>P-value</td><td>r</td><td>LR</td><td>P-value</td></tr>
<tr><td>0</td><td>33.36</td><td>0.0649</td><td>0</td><td>25.61</td><td>0.2953</td></tr>
<tr><td>1</td><td>11.77</td><td>0.2596</td><td>1</td><td>3.29</td><td>0.9628</td></tr>
</table>

Note: (1) “r” and “LR” denotes number of cointegrating relations/vectors and log likelihood ratio respectively. (2) Values in ( ) denotes the number of lag length used in cointegration analysis.

Source: JMulti’s calculation

It is evident from Table 2 that in all cases (whether we incorporate structural breaks in the cointegration process or not and whatever trend assumption is made) there is strong evidence for the absence of cointegration between oil exports and oil imports. However, when we analyzed the case of non-oil exports and non-oil imports without structural breaks in the cointegration system we find the evidence of one cointegration relationship, when unrestricted linear deterministic trend is assumed. Further, when we assume restricted linear deterministic trend in the cointegration model we find evidence of two cointegration relations. However, it is worth noting that this is the case of full rank (as in the cointegration system we have only two variables) and it is well known that this type of situation arises due to misspecification of the model. Hence, we go ahead with the unrestricted linear deterministic trend assumption and when we incorporate structural breaks in the cointegration system we find similar results. Therefore, we conclude that there is evidence of cointegration relationship between non-oil exports and imports of India and since both variables are *I*(1) sustainability of the current account of these commodities is implied.

However, to test for strong sustainability we need to estimate long-run coefficient of imports and therefore, to derive the long-run estimates, an exact identification in sequential order is imposed. Since there is only one cointegrating vector, this entails first normalizing on *IM*, then checking the significance of the error correction-term (*ECT*) in the two resulting dynamic equations, then repeating the process by normalizing *EX*. This procedure indicates that the normalization either on *EX* or *IM* produces an error-correction model in which the *ECT* is significant only in the *EX* equation. Hence, we proceed by normalizing on *EX* and the results are presented in Table 3. The estimated long-run relationship is thus *EX*= 0.865*IM*, which is insignificant with a t-statistic of 1.299. Note that this implies that *IM* is not weakly exogenous in the cointegrating system with *EX* responding to equilibrium. In other words, short-run deviations from the equilibrium relationship result in real exports adjusting to restore equilibrium. This is consistent with the stylized facts in India where, in times of large current account deficits, policy measures are usually directed at curbing imports in the short-run while various incentives are given to boost exports in the medium to long term.

Table 3. Results of cointegrating VAR regression (T-Value in parenthesis)

Estimation of equation 4
$\begin{bmatrix} \Delta(\ln NOE)_t \\ \Delta(\ln NOIM)_t \end{bmatrix} = \begin{bmatrix} \underset{(-5.171)}{-0.228^{a}} \\ \underset{(-0.127)}{-0.009} \end{bmatrix} \begin{bmatrix} \underset{(...)}{1.000} & \underset{(1.299)}{0.865} \end{bmatrix} \begin{bmatrix} \ln NOE_{t-1} \\ \ln NOIM_{t-1} \end{bmatrix} + \begin{bmatrix} \underset{(-0.087)}{-0.011} & \underset{(3.916)}{0.410^{a}} \\ \underset{(1.567)}{0.308} & \underset{(-0.586)}{-0.097} \end{bmatrix} \begin{bmatrix} \Delta(\ln NOE)_{t-1} \\ \Delta(\ln NOIM)_{t-1} \end{bmatrix} + \begin{bmatrix} \underset{(3.373)}{0.410^{a}} & \underset{(0.762)}{0.079} \\ \underset{(0.213)}{0.041} & \underset{(-1.324)}{-0.215} \end{bmatrix} \begin{bmatrix} \Delta(\ln NOE)_{t-2} \\ \Delta\ln(NOIM)_{t-2} \end{bmatrix}$ $+ \begin{bmatrix} \underset{(2.617)}{0.343^{a}} & \underset{(0.513)}{0.046} \\ \underset{(-1.174)}{-0.242} & \underset{(-0.559)}{-0.079} \end{bmatrix} \begin{bmatrix} \Delta(\ln NOE)_{t-3} \\ \Delta(\ln NOIM)_{t-3} \end{bmatrix} + \begin{bmatrix} \underset{(1.766)}{0.212^{c}} & \underset{(0.762)}{-0.083} \\ \underset{(1.154)}{0.219} & \underset{(-1.245)}{-0.190} \end{bmatrix} \begin{bmatrix} \Delta(\ln NOE)_{t-4} \\ \Delta(\ln NOIM)_{t-4} \end{bmatrix} + \begin{bmatrix} \underset{(3.266)}{0.174^{a}} & \underset{(5.300}{2.858^{a}} & \underset{(5.197)}{0.069^{a}} \\ \underset{(-2.591)}{-0.218^{c}} & \underset{(0.306)}{0.260} & \underset{(0.272)}{0.006} \end{bmatrix} \begin{bmatrix} D_{2000,t} \\ Constant \\ Trend_t \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix}$
Implied cointegrating vector is *EX*= 0.865*IM* with *ECT*= -0.228.

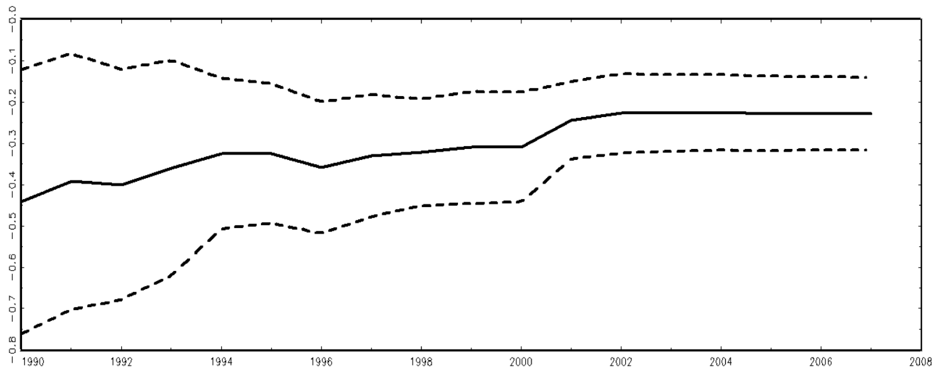
Note: Superscripts a,b and c denotes significance at 1%, 5% and 10% level of significance respectively.

Source: JMulti's calculation

For a sustainable relation, β_1 should be more than zero and less than 1 (i.e., 0< β_1 <1) (as discussed earlier, this condition is sufficient when exports and imports are measured in levels, not as the ratio of GDP or in per capita terms) and the results here suggest that it is in the range of zero to one only (in our case β_1=0.865). Furthermore, testing the restriction of the null hypothesis that the long-run coefficient parameter β=1, gives *t-statistic*(df=30) = -0.2027. This is a very small value of t-statistic and it is highly insignificant, which implies that the current account deficit of non-oil exportable of India is sustainable.

Moreover, recursive estimation[7] of the cointegration relationship indicates that it is quite stable over the sample period (Figure 2). Thus, the evidence from the Johansen procedure points to the long-run sustainability of the current account for non-oil commodities for India.

Figure 2. Recursive estimates of the cointegrating relationship



4. Conclusion

The present study examines the nature of the long-run relationship between oil and non-oil exports and oil and non-oil imports for the Indian economy from the period 1970 to 2007. The study employs unit root test in the presence of endogenous structural breaks and cointegration techniques that allow for two structural breaks for the analysis.

The results suggest that, individually, exports and imports (evaluated in million $ and expressed in logarithms) have multiple breaks in the years of 1986, 2000 and 2001. Based on the test of multiple and individual break points that occurred either in trend and level jointly or in level only, we can conclude that there is strong evidence for the presence of cointegration between non-oil exports and non-oil imports and no evidence for a cointegrating relationship between oil exports and oil imports. This implies that there is strong evidence for sustainability of current account deficits which arises due to non-oil exports and non-oil imports but evidence for non-sustainability of current deficits arises due to oil exports and oil imports. Therefore, we suggest that Indian policy makers pay more attention to the issues related to the exports and imports of oil commodities while designing external policies.

7. See Greenidge et al. (2006) for an exposition of this procedure as it relates to the sustainability of fiscal deficit.

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