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Is India's Trade Balance Sensitive to Real Exchange Rates? A Bilateral Trade Data Analysis

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India's considerable current account is characterised by large merchandise trade deficit even though invisibles account has been in surplus. In this context, this study analysed the effect of real exchange rate on India's bilateral trade balance with her trading partner countries. This is the first attempt to examine the long-run effects of bilateral real exchange rate on bilateral trade balance of India with her 89 trading partner countries. The study uses Fully Modified Ordinary Least Square (FMOLS) method, a non-parametric heterogeneous panel cointegration technique, for removing the endogeneity problem among regressors. The result shows an existence of a long-run relationship between India's trade balance and real exchange rate. India's trade balance would improve with the real depreciation of exchange rate in the long run but deteriorate with the rise of India's real income.

JEL Classification : F31, F41, C33

Keywords : Trade balance, Real depreciation, Exchange rate, Panel Cointegration, Panel FMOLS

Introduction:

India has been experiencing the current account deficit (CAD) with intermittent changes. In 1991, it reached a high of 3 percent of GDP and forex reserves were almost depleted to the level that the import bill could not be financed even for three weeks leading to major balance of payments (BoP) crisis. To overcome this problem, government took several policy initiatives to improve the BoP crisis including acceptance of the chapter VIII of the International Monetary Fund (IMF) thereby making the current account transactions convertible. Accordingly, under the exchange rate management system, the unified exchange rate was accepted and initiatives were taken for promoting the export, attracting non-resident deposits, *etc.*

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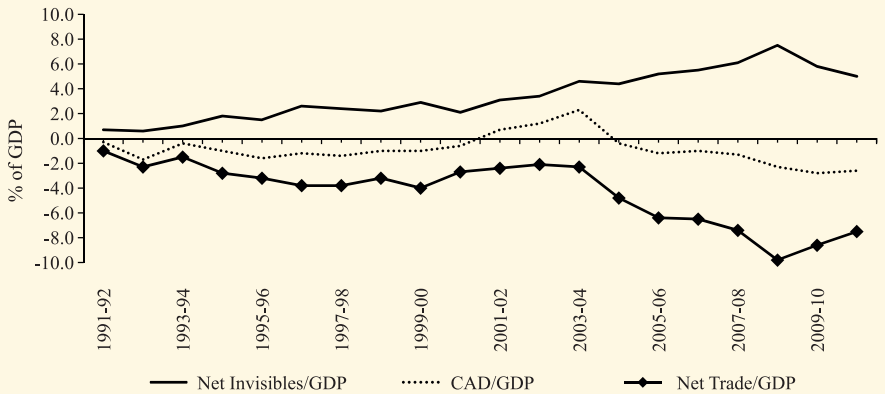
Due to these initiatives, the CAD moderated in the range of 1 to 2 percent of GDP till the period 2007-08 including brief surplus period during 2001-02 to 2003-04. In the recent period, large CAD posed a serious concern for the policy makers as it reached to 2.6 percent of GDP in 2010-11 and has remained higher than that level in the subsequent period. Large trade deficit has been the main driver for the CAD even though the invisibles account has remained in a surplus for a long time (Chart 1).

The reason for the merchandise trade deficit in recent years is continuous higher growth in imports as compared to exports. There are two approaches namely internal approach and external approach, which help to reduce trade deficit through increasing country's competitiveness. The internal approach depends on the supply-side policies like curbing inflation, improving labour market conditions, increasing labour productivity, etc., whereas external approach depends on depreciating the local currency.

On the presumption that a simple relationship exists among the exchange rate, the price of imports and exports and the subsequent demand for imports and exports. However, the outcome depends on the price elasticity of demand for both imports and exports. When the exchange rate appreciates or depreciates, the relative prices of imports and exports change. As per the Marshall-Lerner conditions, devaluation/ depreciation of currencies will be effective to correct the adverse trade

Chart 1: Major components of Current Account as percentage of GDP



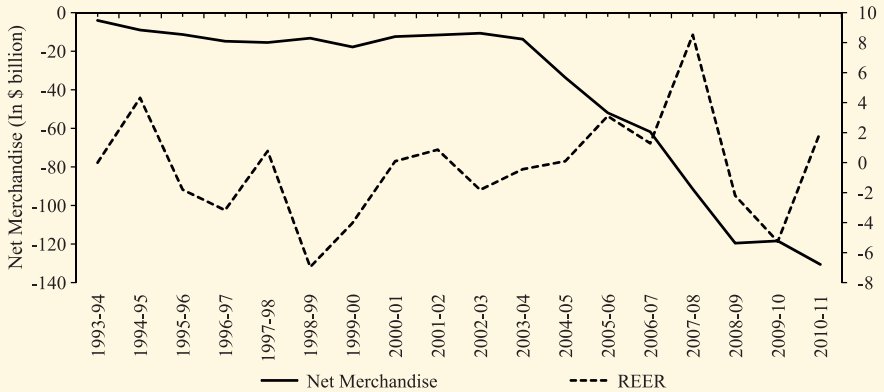
Source: Handbook of Statistics on the Indian Economy.

balance if the sum of elasticity of import and exports is more than unity. Empirical studies show that Marshall-Lerner condition holds in the industrialised countries in the long run even though trade balance would deteriorate in the short run in the event of currency depreciation. For export and import contract made before the depreciation of currency, post-devaluation would increase the import bill which would deteriorate the trade balance in the short run. However, in the long run, imports begin to decline and exports pick up with depreciation of currency. Consequently, deterioration in the trade balance is halted and trade balance condition starts to improve. Such phenomenon is also known as J-curve effect.

The movement of India's trade balance *vis-a-vis* the percentage change in real effective exchange rate based on 36-currency bilateral trade is shown below in Chart 2. It may be observed that depreciation of real exchange rate has impact on improving the bilateral trade for the period 1993-94 to 2003-04 and 2008-09 to 2009-10.

The remainder of the paper is organised as follows: Section II presents a brief overview of studies undertaken on the impact of exchange rate on the trade balance. Section III describes the econometric methodology. Section IV presents the theoretical model used here. Data sources and definitions are provided in the section V along with the empirical results. Section VI, the final section, provides the summary and conclusions.

Chart 2: Movement of Net Merchandise *vis-a-vis* Real Effective Exchange Rate



Source: Handbook of Statistics on the Indian Economy.

Section II
A Brief Literature Review

A number of empirical studies investigate the effects of real exchange rate on India's trade balance. Most of them employ an aggregate approach (see Bahmani-Oskooee (1991), Bahmani-Oskooee and Alse (1994), Buluswar *et al.* (1996), Tarlok Singh (2002) for more details). While these traditional studies use aggregate trade data to investigate export and import demand elasticities in order to establish whether the so-called Marshall-Lerner condition holds, they suffer from an aggregation bias. They overlook significant elasticities with some trading partners, it can be more than offset by insignificant elasticities with other trading partners in the process of aggregation. If the responses to changes in exchange rates differ across trading partners, the aggregate trade flow approach could provide misleading results.

Junz and Rhomberg (1973), Magee (1973), Miles (1979), Levin (1983), Meade (1988), Noland (1989), Rose (1990), Bahmani-Oskooee and Malixi (1992), Boyd et al. (2001), Lee and Chinn (2002), Lal and Lowinger (2002), Hacker and Hatemi-J (2003), and others have a major contribution in the study for aggregate trade data for countries other than India. A number of studies also had been carried out based on bilateral trade to avoid the aggregation base errors. A pioneer work relating to bilateral trade includes Rose and Yellen (1989), Marquez (1990),Bahmani-Oskooee and Brooks (1999), Gupta-Kapoor and Ramakrishnan (1999), Wilson (2001), Bahmani-Oskooee and Kanitpong (2001), Hacker and Hatemi-J (2003, 2004), Bahmani-Oskooee and Goswami (2003), Onafowora (2003), Bahmani-Oskooee and Ratha (2004, 2007). For detailed review of previous studies on bilateral trade, we refer Bahmani-Oskooee and Ratha (2004a). In their study, Bahmani-Oskooee and Ratha (2004a) found that real depreciation of currency has different impact on trade balance in the short run while in the long run the real depreciation of the currency improves the trade balance.

In the context of India, no study on the effect of exchange rate on the bilateral trade has been done except the study by Arora *et al.* (2003) and Dhasmana (2012). Arora *et al.* (2003) have investigated the short-run and the long-run effects of real depreciation of the rupee on India's' trade balance with her seven largest trade partners for quarterly

data of the period 1977-1998. They used the ARDL (Pesaran and Shin 1995, Pesaran *et al.* 1996) technique to investigate the impact of currency depreciation on improving trade balance against seven largest merchandise trade partners. They found a positive impact of real depreciation of currency on India's trade balance with Australia, Germany, Italy and Japan in the long run. Recently, Dhasmana (2012) has supported the finding of Arora *et al.* (2003) and found that real exchange rate volatility depreciation is associated with an improvement in India's trade balance in the long run.

In addition to the limitations of aggregated data, the results of above cited studies suffered from the problem of endogeneity among each variable. Rose and Yellen (1989), Summary (1989) and Bahmani-Oskooee and Wang (2006) showed in their respective studies that trade balance, income, and real exchange rate are endogenous. To avoid this problem of endogeneity, Chiu *et al.* (2010) utilises the fully modified ordinary least squares (FMOLS) approach proposed by Phillips and Hansen (1990) and extended by Pedroni (2000) to investigate the effect of real exchange rate changes on the U.S. trade balance. They found that geographical structure and income per capita of the partner countries may also affect the bilateral trade balance.

In this paper, we follow the Chiu *et al.* (2010) study to examine the effects of bilateral real exchange rates on bilateral trade balance for India *vis-a-vis* eighty nine of her trading partners (see Appendix 2 for the list of countries) for the period 1991-2010. We have considered the data since 1991 due to change in the exchange rate policy from fixed exchange rate regime to floating exchange rate regime. Trade with partner countries can be influenced by many factors like the geographical location of the partner countries, income level of the partner countries, international treaty with the partner country and member of international organisation. Thus, this study classifies the sample data into ten sub-samples to explore whether the locations, international treaty and levels of the real income of the India's trading partners exhibit different impacts on the relationship between currency depreciation and the India's bilateral trade balance. In addition to the ten sub-sample groups, we have also considered one more group of ten

major partner countries which constituted around 55 per cent of India's total trade.

Section III
Empirical methodology

III.1. Panel unit root tests

In this study, we have used the panel unit root tests given by Maddala and Wu (1999, hereafter MW) and Im et al. (2003, hereafter IPS) for testing the level of integration of all the variables. The ability of these tests to allow for heterogeneity in the autoregressive coefficient makes them more powerful than the tests developed by Levin and Lin (1993) and Levin et al. (2002). The IPS tests solved the serial correlation problem of Levin and Lin's tests by assuming the heterogeneity between units in a dynamic panel framework. In IPS test, a separate ADF regression has been specified for each cross section as:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p} \phi_{ij} \Delta y_{i,t-j} + \varepsilon_{i,t}; i = 1, 2, ..., N; t = 1, 2, ..., T, \qquad (3.1)$$

where y_i is the variable under consideration, α_i is the individual fixed effect, and p lag period need to be specified for making residuals uncorrelated over time. It tests the null hypothesis that each series in the panel contains a unit root, *i.e.,* $H_0: \rho_i = 0$ for all i against the alternative hypothesis that at least one of the individual series in the panel is stationary, *i.e.*, $\rho_i < 0$ for at least one i.

Im *et al.* (2003) formulated their model under the restrictive assumption that T should be the same for all cross-sections, requiring a balanced panel to compute the $\bar{t}$-test statistic.

The $\bar{t}$ statistic is based on averaging individual Augmented Dickey-Fuller (ADF, hereinafter) statistics and can be written as follows:

$$\bar{t} = \frac{1}{N} \sum_{i=1}^{N} t_{iT}, \qquad (3.2)$$

where t_{iT} is the ADF t-statistic for country i based on the country specific ADF regression, as in Eq. (3.1). IPS showed that under the null hypothesis of non-stationary in panel data framework, the $\bar{t}$ statistic follows the standard normal distribution asymptotically. The standardised statistic t_{IPS} is expressed as:

$$t_{IPS} = \frac{\sqrt{n}\left(\bar{t} - \frac{1}{N}\sum_{i=1}^{N} E[t_{iT}|\rho_i = 0]\right)}{\sqrt{\frac{1}{N}\sum_{i=1}^{N} Var[t_{iT}|\rho_i = 0]}}. \tag{3.3}$$

One can reject the null hypothesis as given above when the t_{IPS} statistic is smaller than a critical value from the lower tail of a standard normal distribution.

MW attempted to provide unit root test statistics, based on Fisher-type non-parametric test (1932), for unbalanced panel. Assuming that there are *N* unit root tests, the *MW* test takes the following form:

$$\lambda = -2\sum_{i=1}^{N} \ln\pi_i \tag{3.4}$$

Where π_i is the probability limit values from regular DF (or ADF) unit root tests for each cross-section *i*. The MW test statistic is distributed as Chi-squared with 2N degrees of freedom under the hypothesis of cross-sectional independence. In order to consider the dependence between cross-sections, MW propose obtaining the π_i -values by using bootstrap procedures by arguing that correlations between groups can induce significant size distortions for the test. MW also propose that the methodology can be applied to panel cointegration tests, whether they are tests using no cointegration as null, or cointegration as null (for more details, see Chapter 6 of Maddala and Kim (1998)).

Breitung (2000) found that the IPS test is more sensitive to the specification of deterministic trends as compared to the MW test. Moreover, the advantage of MW test over IPS test is that the former is robust to the different lag lengths in the individual ADF regressions.

III.2. Panel cointegration tests

Once it is confirmed that all the variables are stationary at first difference, the next step is to test for the cointegration among these variables. For this, we used the panel cointegration tests proposed by Pedroni (1999). Like IPS and MW unit root tests, Pedroni's cointegration methodology (see Pedroni (1999, 2004) for details) also takes into account the heterogeneity by allowing specific parameters to vary across individual members of the sample. The advantage of taking into account of such heterogeneity is that it helps us in relaxing

the unrealistic assumption of identical vectors of cointegration among individuals in the panel.

The implementation of Pedroni's cointegration test requires estimating first the following long-run relationship:

$$y_{it} = \alpha_i + \delta_t + \sum_m \beta_{mi}\, x_{mit} + \varepsilon_{it}, \tag{3.5}$$

for $i = 1, 2,\ldots,N$; $t = 1, 2,\ldots,T$; where N refers to the number of individual members in the panel and T refers to the number of observations over time. The structure of estimated residuals is as follows:

$$\hat{\varepsilon}_{it} = \hat{\rho}_i\, \varepsilon_{it-1} + \hat{u}_{it}\,. \tag{3.6}$$

Pedroni (2004) presents seven tests that can be divided into two groups. The test statistics in the first group (that Pedroni terms the 'within-dimension' or 'panel statistics' test) are averages of the cointegration test statistics across cross-sections. The alternative hypothesis for those tests is $p_i = p < 1$ for all i. The test statistics in the second group (referred to as the 'between-dimension' or 'group statistics' test) are based on averaging the individual estimated values of p_i for each cross-section unit i. The alternative hypothesis for those tests is $p_i < 1$ for all i. For both groups, Pedroni constructs two non-parametric and one parametric test statistics that take autocorrelation into consideration: (i) A Phillips-Perron (1988) type p statistic, (ii) a Phillips-Perron (1988) type t-statistic, and (iii) a Dickey-Fuller (1979) type t-statistic. Pedroni also develops a non-parametric panel variance ratio test statistic.

The finite sample distribution for the seven statistics has been tabulated by Pedroni through Monte Carlo simulations. The calculated test statistic must be smaller than the tabulated critical value to reject the null hypothesis.

III.3. Panel Cointegration estimations

Although Pedroni's methodology allows us to test the presence of cointegration, it cannot provide an estimate of the long-run relationship. For panel frameworks, several estimators are proposed in the presence of cointegration: Ordinary Least Square (OLS), Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS). Chen *et al.* (1999) analysed the properties of the OLS estimator and found that the bias-corrected OLS estimator generally does not improve over the OLS estimator.

These results suggest that alternatives such as the FMOLS estimator or the DOLS estimator may be more promising in cointegrated panel regressions.

In this paper, we have considered FMOLS to examine the effect of exchange rate on India's trade balance. The FMOLS is popular in conventional time series econometrics, for it is believed to eliminate endogeneity in the regressors and serial correlation in the errors. Pedroni (2000, 2001) proposes two methods to apply the fully modified method to panel cointegration regression: the pooled (or within group) panel FMOLS estimator and the group-mean (between-group) FMOLS estimator. We use the between-group FMOLS estimator as it permits greater flexibility in the presence of the heterogeneity of cointegrating vectors.

The group-mean panel FMOLS estimator can be written as:

$$\hat{\beta}^{*}_{GFM} = \frac{1}{N}\sum_{i=1}^{N}\left[\frac{\sum_{t=1}^{T}(x_{it}-\bar{x}_i)y^{*}_{it} - T\hat{\gamma}_i}{\sum_{t=1}^{T}(x_{it}-\bar{x}_i)^2}\right] \tag{3.7}$$

where $y^{*}_{it} = (y_{it}-\bar{y}_i) - \frac{\hat{\Omega}_{21,i}}{\Omega_{22,i}}\Delta x_{it}$ and $\hat{\gamma}_i = \Gamma_{21,i} + \hat{\Omega}^{0}_{21,i} - \frac{\hat{\Omega}_{21,i}}{\Omega_{22,i}}(\Gamma_{22,i} + \hat{\Omega}^{0}_{22,i})$.

Here, $\hat{\Omega}_i = \hat{\Omega}^{0}_i + \hat{\Gamma}_i + \hat{\Gamma}'_i$ is the estimated long-run covariance matrix of the stationary vector consisting of the estimated residuals from the co-integration regression and the deference in independent variables. $\hat{\Omega}^{0}_{21,i}$is the long-run covariance between the stationary error terms (ε_{it} in Eq. (3.5)) and the unit root autoregressive disturbances. $\hat{\Omega}^{0}_{22,i}$ is the long-run covariance among the deference in independent variables. $\hat{\Gamma}_i$ is a weighted sum of the autocovariance and a bar over these letters denotes the mean for *i* members.

As the expression following the summation over the *i* is identical to the conventional time series FMOLS estimator, we see that the between-group estimator can be constructed simply as $\hat{\beta}^{*}_{GFM} = \frac{1}{N}\sum_{i=1}^{N}\hat{\beta}^{*}_{FM,i}$, where $\hat{\beta}^{*}_{FM,i}$ is the conventional FMOLS estimator applied to the ith member of the panel. Likewise, the associated t-statistic for the between-group FMOLS estimator can be constructed as:

$$t_{\beta^*_{GFM}} = \frac{1}{\sqrt{n}} \sum_{i=1}^{N} \left(\hat{\beta}^*_{FM,i} - \beta \right) \left(\hat{\Omega}^{-1}_{11,i} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2 \right)^{1/2} \quad (3.8)$$

where β is a value under the null hypothesis. The above t-statistic is standard normal as T and N approach infinity.

Section IV
The Trade Balance Model

The international trade between the countries depends on the relative competitiveness in producing the goods and the national income of the country. In this model, the real exchange rate as proxy of competitiveness of producing goods and real GDP as the proxy for the national income are considered as influencing factors affecting the bilateral trade balance. Therefore, the model is specified as follows:

$$\text{In } TB_{it} = \alpha_i + \beta_1 \ln GDP_{IN,t} + \beta_2 \ln GDP^*_{it} + \beta_3 \ln RER_{it} + \varepsilon_{it} \text{ i=1,2,...,N; t=1,2,...,T} \quad (4.1)$$

where TB_{it} is a measure of trade balance defined as the ratio of India's exports to country i over her imports from country i; GDP_{IN} and GDP_i is real income of India and her ith partner country respectively at constant price of year 2000; $RER_i = E_i \text{ x } CPI_N / CPI_i$ denotes the bilateral real exchange rate between India and her trading partner i where E_i is the nominal exchange rate measured as one unit of INR in terms of the currency of her trading partners i. Here CPI_{IN} and CPI_i is the consumer price index of the India and her trading partners i at constant 2005 price. The real effective exchange rate based on CPI is often regarded as measures of a country's competitiveness. The CPI contains information of prices on final traded and non-traded goods, including imports. Since labor input is often priced in line with CPI growth, one could regard it as a useful indicator for the cost of production (Marsh and Tokarick, 1994). Furthermore, α_i is an unobserved country-specific effect and ε_{it} is the error term. Also, all variable are expressed in natural logarithm.

The volume of exports (imports) to a foreign country (domestic country) ought to increase as the real income and purchasing power of the trading partner (domestic economy) rises, and vice versa. So we expect $\beta_1 < 0$ and $\beta_2 > 0$. However, if the rise in real income is due to an increase in the production of import-substitute goods, imports may decline as income increases in which case $\beta_1 > 0$ and $\beta_2 < 0$. The impact of exchange rate changes on trade balance is ambiguous, that is, β_3 could

be positive or negative. If there is a real depreciation or devaluation of the domestic currency, that is RER decreases, then the increased competitiveness in prices for the domestic country should result in it exporting more and importing less (the "volume effect"). However, the lower RER also increases the value of each unit of import (the "import value effect"), which would tend to diminish the trade balance. Krugman and Obstfeld (2001) argued that in the short run import value effects prevail, whereas the volume effects dominate in the longer run.

Section V
Data and empirical results

V.1 *Data*

The annual data used in this study cover the period from 1991 to 2010. To explore the possible impact of international treaty, locations and the income levels of the India trading partners on the relationship between trade balance and real exchange rate, we classify the 89 trading partners into 11 groups (3 International treaty group, 4 regional group, 3 Income group and a group of Major trade partner countries, see Annex 2 for further details). The first three groups are International treaty group which includes Oil exporting countries, SAARC countries and ASEAN countries. The four regional groups include Africa, America, Europe and Asia and Oceania, and the three income groups based on 2008 gross national income (GNI) per capita (the World Bank Atlas method) are low income (US$975-3,855), middle income (US$3856–$11,905), and high income (US$11,906 or more). The data of exports and imports are taken from the Direction of Trade statistics published by the International Monetary Fund. The domestic and foreign real gross domestic product (GDP), CPI, and nominal exchange rate come from World Development Indicators. In the wake of the European Union and the new currency 'Euro', the nominal exchange rates are defined as one unit of INR in terms of Euros. We convert their nominal exchange rates into one unit of INR in terms of Austrian schilling, Belgian franc, Cypriot pound, Dutch guilder, Estonian kroon, Finnish markka, French franc, German Mark, Greek drachma, Irish pound, Italian lira, Luxembourgish franc, Maltese lira, Monegasque franc, Portuguese escudo, Sammarinese lira, Slovak koruna, Slovenian tolar, Spanish peseta, Vatican lira by multiplying the fixed converted ratios: 13.7603, 40.3399, 0.585274,

2.20371, 15.6466, 5.94573, 6.55957, 1.95583, 340.75, 0.787564, 1936.27, 40.3399, 0.4293, 6.55957, 200.482, 1936.27, 30.126, 239.64, 166.386, 1936.27 respectively.

Limitation of the data: As per guidelines of International Monetary Fund (IMF) or World trade organization (WTO), the data on merchandise trade has been compiled based on the physical movement of goods crossings the boundary of compiling economy. Those goods which do not cross the boundary of the compiling economy will not be recorded in the merchandise trade statistics. As per the guidelines of IMF, the goods exported/imported by the subsidiaries of the Indian companies should be counted in the statistics of those countries where the subsidiaries are incorporated. We have used the Consumer Price Index (CPI) to convert the nominal GDP and nominal exchange rate to real one. As in the case of India, Wholesale Price Index (WPI) is considered as a better price index, but making the data comparable with other countries, we have used CPI.

V.2 *The unit root tests*

The outcome of the two panel unit roots test: IPS and MW are given below. It may be seen that both the tests fails to reject the null hypothesis of unit root for all the groups (Table 1), *i.e.*, the panel data series for the entire four variables at level are non-stationary. Hence, we test for stationary of the variables at first difference and both the IPS and MU test results indicate that variables at first difference are stationary (Table 2). This implies that all the variables under consideration follows an I (1) process.

V.3 Panel Co-integration tests

Since all the variables are stationary at first difference, we employ panel cointegration test (Pedroni, 1999) to test the existence of cointegration among the variables. The results of the tests are given in Table 3. We use four within-group tests and three between-group tests to check whether the panel data are cointegrated. All the tests reject the null hypothesis of no cointegration between the variable at 1 per cent level of significance for the group of all the countries, Africa, America, Europe, Asia & Oceania, HL, ML, and LI whereas for other groups, the null hypothesis is rejected at 5 per cent or 10 per cent level of

Table 1: Panel Unit roots test-At Level

Test	Groups	ln TB		ln GDP_{IN}		ln GDP*		ln RERi	
		Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend
IPS	Oil Exporting Countries	-0.39 (0.34)	2.25 (0.98)	-2.25*** (0.01)	-0.43 (0.33)	-1.06 (0.14)	-0.54 (0.30)	-1.07 (0.14)	-2.17*** (0.01)
	SAARC	-1.60 ** (0.05)	-0.94 (0.18)	-1.66** (0.04)	-1.06 (0.14)	-2.14** (0.02)	-0.32 (0.37)	1.05 (0.85)	-1.05 (0.14)
	ASEAN	0.01 (0.50)	0.56 (0.71)	-1.66 (0.14)	-1.06 (0.14)	-3.34*** (0.00)	-3.69*** (0.00)	0.69 (0.75)	-1.43* (0.07)
	Africa	-2.83*** (0.00)	-0.46 (0.32)	-0.68 (0.24)	-0.23 (0.40)	-1.07 (0.15)	1.30 (0.90)	-1.35* (0.08)	-1.96** (0.02)
	America	-1.24 (0.10)	0.24 (0.60)	-2.71*** (0.00)	-1.87** (0.03)	-5.09*** (0.00)	-0.29 (0.38)	-1.05 (0.14)	-0.45 (0.32)
	Europe	-1.27 (0.10)	-1.00 (0.15)	-3.41*** (0.00)	-2.02** (0.02)	-7.07*** (0.00)	4.82 (1.00)	-1.83** (0.03)	-1.04 (0.15)
	Asia & Oceania	-1.47* (0.07)	0.77 (0.78)	-4.92*** (0.00)	-0.64 (0.26)	-5.32*** (0.00)	-0.45 (0.32)	1.15 (0.87)	-3.44*** (0.00)
	HL	-0.54 (0.29)	-0.11 (0.45)	-5.46*** (0.00)	-1.47* (0.07)	-9.09*** (0.00)	4.16 (1.00)	0.34 (0.64)	-1.43* (0.07)
	ML	-2.26*** (0.01)	0.37 (0.64)	-2.20*** (0.01)	-1.52** (0.06)	-5.56 (1.00)	-0.96 (0.16)	-1.84** (0.03)	-2.55 (0.18)
	LI	-3.19*** (0.00)	-1.51* (0.06)	-2.71*** (0.00)	-0.31 (0.37)	0.11 (0.54)	1.64 (0.95)	-1.09 (0.13)	-3.43*** (0.00)
	Major Countries	-2.06*** (0.01)	-0.72 (0.23)	-3.94*** (0.00)	-1.84** (0.03)	-7.44*** (0.00)	-0.23 (0.40)	0.56 (0.71)	-1.40* (0.07)
	All Countries 1991-2010	-3.27 (1.00)	-0.47 (0.31)	-6.05 (0.12)	-2.03 (0.22)	-9.03 (0.20)	2.43 (0.99)	-1.44* (0.07)	0.45 (0.66)
MW	Oil Exporting Countries	14.79 (0.54)	4.60 (0.99)	27.04** (0.04)	18.08 (0.32)	19.35 (0.25)	18.73 (0.28)	29.29** (0.02)	34.10*** (0.00)
	SAARC	17.67* (0.06)	15.95 (0.10)	16.02* (0.09)	12.90 (0.22)	19.74** (0.03)	9.22 (0.51)	10.45 (0.40)	14.22 (0.16)
	ASEAN	8.36 (0.59)	5.73 (0.83)	16.02* (0.09)	12.90 (0.22)	29.30*** (0.00)	31.33*** (0.00)	4.90 (0.90)	16.52* (0.08)
	Africa	90.85*** (0.00)	59.40 (0.35)	69.17 (0.11)	52.55 (0.60)	74.86** (0.04)	35.97 (0.98)	78.90** (0.02)	91.22*** (0.00)
	America	40.17 (0.10)	31.36 (0.40)	46.80** (0.02)	39.47 (0.11)	80.8*** (0.00)	33.50 (0.30)	41.47* (0.07)	32.24 (0.35)
	Europe	48.81 (0.16)	51.43 (0.10)	65.50*** (0.00)	50.82 (0.11)	122.49*** (0.00)	7.30 (1.00)	48.30 (0.17)	46.80 (0.21)
	Asia & Oceania	72.98* (0.06)	52.72 (0.59)	108.64*** (0.00)	57.21 (0.42)	136.25*** (0.00)	67.24 (0.14)	59.03 (0.36)	100.26*** (0.00)
	HL#	75.26 (0.31)	79.64 (0.20)	133.88*** (0.00)	77.65 (0.24)	211.64*** (0.00)	32.02 (1.00)	65.07 (0.64)	86.90** (0.09)
	ML	89.36** (0.02)	57.50 (0.76)	90.57** (0.02)	78.24 (0.14)	145.57*** (0.00)	84.28** (0.06)	98.72 (0.12)	108.29 (0.16)
	LI	76.80*** (0.00)	56.54* (0.07)	64.54*** (0.01)	40.30 (0.54)	53.37 (0.11)	27.11 (0.95)	60.80** (0.03)	75.08* (0.09)
	Major countries	32.68** (0.04)	25.35 (0.18)	46.90*** (0.00)	27.52 (0.12)	89.57*** (0.00)	19.15 (0.51)	20.40 (0.43)	39.43*** (0.00)
	All Countries 1991-2010	241.44*** (0.00)	193.68 (0.19)	289.00*** (0.00)	196.22 (0.16)	410.59*** (0.00)	143.41 (0.97)	224.60*** (0.01)	140.08 (0.98)

Notes: P-values are given in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significant levels, respectively.
In the Sequel High income group countries will be denoted as HL, Middle income group countries as ML and Low income countries with LI.

Table 2: Panel Unit roots test-At first difference

Test	Groups	ln TB		ln GDP_{IN}		ln GDP*		ln RERi	
		Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend
IPS	Oil Exporting Countries	-2.60*** (0.00)	-1.20*** (0.11)	-6.19*** (0.00)	-5.53*** (0.00)	-7.02*** (0.00)	-5.73*** (0.00)	-7.29*** (0.00)	-5.18*** (0.00)
	SAARC	-4.08*** (0.00)	-2.61*** (0.00)	-5.58*** (0.00)	-4.65*** (0.00)	-5.04*** (0.00)	-4.33*** (0.00)	-5.16*** (0.00)	-3.99*** (0.00)
	ASEAN	-4.32*** (0.00)	-3.37 *** (0.00)	-5.58*** (0.00)	-4.65*** (0.00)	-5.30*** (0.00)	-3.91*** (0.00)	-4.74*** (0.00)	-3.00*** (0.00)
	Africa	-9.00*** (0.00)	-5.18*** (0.00)	-9.42*** (0.00)	-6.34*** (0.00)	-7.38*** (0.00)	-4.88*** (0.00)	-10.17*** (0.00)	-5.62*** (0.00)
	America	-8.47*** (0.00)	-5.96*** (0.00)	-8.94*** (0.00)	-6.73*** (0.00)	-7.22*** (0.00)	-5.88*** (0.00)	-6.48*** (0.00)	-4.53*** (0.00)
	Europe	-9.76*** (0.00)	-6.34*** (0.00)	-10.64*** (0.00)	-8.08*** (0.00)	-4.28*** (0.00)	-4.73*** (0.00)	-5.98*** (0.00)	-2.29*** (0.01)
	Asia & Oceania	-7.87*** (0.00)	-5.84*** (0.00)	-11.04*** (0.00)	-9.98*** (0.00)	-10.0*** (0.00)	-9.50*** (0.00)	-10.97*** (0.00)	-7.28*** (0.00)
	HL	-10.24*** (0.00)	-6.53*** (0.00)	-12.75*** (0.00)	-10.70*** (0.00)	-7.40*** (0.00)	-7.62*** (0.00)	-8.72*** (0.00)	-4.48*** (0.00)
	ML	-11.02*** (0.00)	-6.54*** (0.00)	-12.35*** (0.00)	-7.97*** (0.00)	-10.48*** (0.00)	-6.54*** (0.00)	-11.18*** (0.00)	-5.92*** (0.00)
	LI	-8.97*** (0.00)	-6.39*** (0.00)	-9.57*** (0.00)	-8.11*** (0.00)	-8.37*** (0.00)	-7.54*** (0.00)	-10.37*** (0.00)	-9.10*** (0.00)
	Major Countries	-10.07*** (0.00)	-8.53*** (0.00)	-8.21*** (0.00)	-8.41*** (0.00)	-5.63*** (0.00)	-7.20*** (0.00)	-6.35*** (0.00)	-5.31*** (0.00)
	All Countries 1991-2010	-17.49*** (0.00)	-11.02 *** (0.00)	-20.16*** (0.00)	-15.02*** (0.00)	-15.11*** (0.00)	-12.13*** (0.00)	-17.30*** (0.00)	-9.91*** (0.00)
MW	Oil Exporting Countries	33.18*** (0.00)	23.71*** (0.09)	68.58*** (0.00)	58.11*** (0.00)	76.84*** (0.00)	64.50*** (0.00)	80.61*** (0.00)	56.5*** (0.00)
	SAARC	35.72*** (0.00)	24.04*** (0.00)	47.71*** (0.00)	38.01*** (0.00)	43.11*** (0.00)	35.74*** (0.00)	44.07*** (0.00)	33.14*** (0.00)
	ASEAN	37.15*** (0.00)	28.99*** (0.00)	47.79*** (0.00)	38.02*** (0.00)	45.34*** (0.00)	32.81*** (0.00)	40.41*** (0.00)	25.87*** (0.00)
	Africa	203.98*** (0.00)	154.77*** (0.00)	210.8*** (0.00)	175.42*** (0.00)	176.72*** (0.00)	148.56*** (0.00)	229.51*** (0.00)	172.35*** (0.00)
	America	126.09*** (0.00)	96.56*** (0.00)	134.37*** (0.00)	105.54*** (0.00)	110.42*** (0.00)	94.27*** (0.00)	98.04*** (0.00)	76.42*** (0.00)
	Europe	171.31*** (0.00)	125.04*** (0.00)	185.6*** (0.00)	149.68*** (0.00)	81.99*** (0.00)	94.92*** (0.00)	109.8*** (0.00)	62.52*** (0.01)
	Asia & Oceania	172.01*** (0.00)	138.38*** (0.00)	228.77*** (0.00)	205.67*** (0.00)	215.16*** (0.00)	201.12*** (0.00)	227.26 *** (0.00)	160.45*** (0.00)
	HL	247.55*** (0.00)	185.56*** (0.00)	297.22*** (0.00)	264.09*** (0.00)	181.18*** (0.00)	201.81*** (0.00)	207.57*** (0.00)	137.74*** (0.00)
	ML	257.74*** (0.00)	201.85*** (0.00)	286.78*** (0.00)	230.34*** (0.00)	246.43*** (0.00)	199.45*** (0.00)	267.05*** (0.00)	192.02*** (0.00)
	LI	160.38*** (0.00)	116.91*** (0.00)	170.02*** (0.00)	141.36*** (0.00)	154.32*** (0.00)	135.58*** (0.00)	182.64*** (0.00)	162.85*** (0.00)
	Major Countries	119.72*** (0.00)	94.05*** (0.00)	96.07*** (0.00)	91.47*** (0.00)	66.23*** (0.00)	79.32*** (0.00)	76.73*** (0.00)	61.88*** (0.00)
	All Countries 1991-2010	-4.08*** (0.00)	-2.61*** (0.00)	-5.58*** (0.00)	-4.65*** (0.00)	-5.04*** (0.00)	-4.33*** (0.00)	-5.16*** (0.00)	-3.99*** (0.00)

Notes: P-values are given in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significant levels, respectively.

Table 3: Panel cointegration test

Countries	Within-dimension (panel)				Between-dimension (group)		
	v-Stat	ρ-Stat	PP-Stat	ADF-Stat	ρ-Stat	PP-Stat	ADF-Stat
Oil Exporting Countries	0.20 (0.39)	1.51 (0.12)	-1.90* (0.06)	-2.30** (0.02)	2.29** (0.02)	-2.80*** (0.00)	-3.60*** (0.00)
SAARC	-2.15** (0.03)	1.583 (0.11)	-0.64 (0.32)	-3.73*** (0.00)	2.25** (0.03)	-0.66 (0.32)	-5.43*** (0.00)
ASEAN	0.34 (0.37)	-0.43 (0.36)	-3.47*** (0.00)	-3.46*** (0.00)	0.287 (0.38)	-3.58*** (0.00)	-3.58*** (0.00)
Africa	-5.25*** (0.00)	5.99*** (0.00)	-5.58*** (0.00)	-8.72*** (0.00)	7.72*** (0.00)	-8.20*** (0.00)	-8.52*** (0.00)
America	-3.50*** (0.00)	2.67*** (0.01)	-7.26*** (0.00)	-6.07*** (0.00)	4.25*** (0.00)	-11.10*** (0.00)	-6.75*** (0.00)
Europe	-3.26*** (0.00)	4.46*** (0.00)	-7.21*** (0.00)	-8.69*** (0.00)	5.97*** (0.00)	-11.3*** (0.00)	-8.49*** (0.00)
Asia & Oceania	-2.54*** (0.01)	4.14*** (0.00)	-5.10*** (0.00)	-8.06*** (0.00)	5.72*** (0.00)	-6.54*** (0.00)	-9.16*** (0.00)
HL	-3.62*** (0.00)	5.33*** (0.00)	-8.53*** (0.00)	-10.10*** (0.00)	7.35*** (0.00)	-15.00*** (0.00)	-11.10*** (0.00)
ML	-4.70*** (0.00)	6.50*** (0.00)	-7.78*** (0.00)	-8.68*** (0.00)	8.49*** (0.00)	-8.60*** (0.00)	-7.47*** (0.00)
LI	-4.63*** (0.00)	3.42*** (0.00)	-4.11*** (0.00)	-7.91*** (0.00)	4.83*** (0.00)	-5.97*** (0.00)	-9.32*** (0.00)
Major countries	-1.38 (0.15)	1.73* (0.08)	-1.96** (0.05)	-4.03*** (0.00)	2.21** (0.03)	-2.92*** (0.00)	-4.49*** (0.00)
All Countries 1991-2010	-7.63*** (0.00)	10.71*** (0.00)	-11.60*** (0.00)	-15.30*** (0.00)	14.00*** (0.00)	-17.5*** (0.00)	-16.00*** (0.00)

Notes: P-values are given in parentheses. ***, **, and * indicate the 1%, 5%, and 10% significant levels, respectively.

significance. It suggests that there is a long run relationship between the trade balance, exchange rate, GDP of India and GDP of partner country.

V.4. FMOLS Results

The estimation based on the FMOLS for the Groups of countries has been provided in the Table 4. The FMOLS estimates are obtained using the RATS code provided by Peter Pedroni. The coefficient of India's real Income ($lnGDP_{IN}$) and real exchange rate ($lnRER_i$) is negative and statistically significant at 1 per cent level and 5 per cent level respectively for the group of all the countries which indicates that the trade balance will deteriorate with the increase of India's income and the depreciation of the Indian rupees will improve the trade balance

Table 4: Panel Co-integration Estimation for the Group of the Countries

Countries	FMOLS		
	ln GDP_{IN}	ln GDP*	ln RERi
Oil Exporting Countries (including Indonesia)	-3.60*** (-2.67)	4.87** (2.52)	-2.88*** (-3.50)
Oil Exporting Countries (excluding Indonesia)	-4.31*** (-3.82)	5.96*** (4.04)	-3.07 (-0.76)
SAARC	-3.08*** (-2.63)	2.93** (2.42)	0.43 (0.57)
ASEAN	1.06** (2.06)	-1.38*** (-2.92)	-1.49*** (-8.23)
Africa	-0.93*** (-2.59)	0.62** (2.25)	-0.90 (-1.29)
America	-2.57*** (-9.63)	3.70*** (9.28)	-3.33 (-1.44)
Europe	-0.66*** (-10.17)	0.84*** (8.49)	0.32 (1.36)
Asia & Oceania	-2.56*** (-5.38)	3.71*** (4.62)	-1.09*** (-4.30)
HL	-0.91*** (-13.23)	1.67*** (11.62)	-1.55 (-0.86)
ML	-3.47*** (-7.88)	4.79*** (6.66)	-0.89*** (-4.69)
LI	-0.19 (-0.30)	0.97 (0.67)	-1.14 (-0.40)
Major Countries	-0.21*** (-3.81)	1.08** (2.36)	-0.15 (-1.25)
All Countries 1991-2010	-2.35*** (-14.28)	2.88*** (13.13)	-0.74** (-2.22)

Notes: 1. Dependence variable is log TB and t-values are in parentheses.
2. ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively.

in the long run, respectively. Also, the coefficient of partner country's real income ($lnGDP_i$) is positive and statistically significant at 1 per cent level of significance and is greater than the coefficient of $lnGDP_{IN}$ indicating that the increase in the partner country's real income in comparison to India's real income will improve India's trade balance more effectively.

The empirical results for the three different international treaty groups reveal that the India's bilateral trade balances with her trading partners in SAARC countries become worse if India's real income rises. When the real income rises in SAARC countries, the demand for India's

goods and services increases and the India's trade balance improves. The depreciation of the exchange rate has no impact on improving the India's trade balances with the SAARC countries. In case of the SAARC countries, the income level of the partner countries have the major role in fostering the trade between these countries rather than the exchange rate because of the probable advantage of the proximities of countries in mitigating the transport costs. However, the coefficient of real exchange rate ($lnRER_i$) of ASEAN group is found to be negative and statistically significant which implies that the depreciation of the Indian rupees can improve the bilateral trade balance with ASEAN countries. The real income of India and her trading partners in ASEAN countries has also significant effect on India's trade balance.

In case of the Oil exporting countries, the coefficient of real exchange rate is found to be negative and statistically significant indicating that the depreciation of the real exchange rate would improve the trade balance with the oil countries which is counter-intuitive given the high dependency of India on oil imports. However, on further examination, it was found that the Indonesia has very little share of around 2 per cent of oil export in its total export to India. We therefore, re-estimated the coefficient of the variables for the oil exporting countries excluding Indonesia and not surprisingly found that the real exchange rate is the insignificant factor for improving the trade balance in case of the oil exporting countries.

Like SAARC and ASEAN groups, the real income of India and her partner countries belonging to four regional groups, *i.e.*, Africa, America, Europe and Asia & Oceania, are found to be significant factors affecting the bilateral trade balance of India. The results reveal that the rise in the real income of these countries will improve the trade balance of India. On the other hand, the increase in the India's real income will deteriorate the bilateral trade balance of India with these countries. The coefficient of real exchange rate is statistically significant and carries correct negative signs in case of Asia & Oceania. It implies that the depreciation of the Indian rupee can improve the bilateral trade balance with this group of countries.

Turning to the empirical results for the three income groups, the estimated coefficient of the real exchange rate is found to be negative and statistically significant only in the case of middle income group

countries revealing that depreciation of Indian rupee can improve the bilateral trade balance of India with these countries. The rise in the real income of High income and Middle income group countries can improve the trade balance of India with these countries. In case of Low income group countries, neither the real income nor the real exchange rate has any impact on the India's trade balance with this group. Depreciation of real exchange rate has no impact on improving the trade balance with the major countries whereas the real income of the major countries have a significant effect on improving its trade balance with major partner countries.

In case of ASEAN and Asia & Oceania countries, the coefficient of the exchange rate is less than -1 and statistically significant which fulfils the Marshall-Learner condition of the J-curve. In the long run, therefore, there is a positive impact of the exchange rate depreciation in improving the trade balance with the countries of these groups.

The estimation based on the FMOLS for the 89 individual partner countries is given in the Annex1. The empirical results reveal that real exchange rate is statistically significant at 5 per cent level in 36 countries, out of which, 22 partners countries have the negative sign indicating that real depreciation of Indian rupee can improve the bilateral trade balance of India with these countries. The coefficient of India's real income are statistically significant for 39 partner countries with negative sign at 5 per cent level of significance, indicating that rise in India's real income will deteriorate the bilateral trade balance of India with these countries due to an increase in the imports from these countries. The coefficient of the foreign real income is statistically significant with positive sign in 36 cases whereas 13 cases are found to be statistically significant with a negative sign. The countries with positive sign of coefficient of foreign real income indicate that the rise in the income of these countries will improve the India's trade balance due to increase in the demand for goods and services of India in these countries.

In case of individual trade partner countries, it is observed that there is no impact of real exchange rate depreciation in improving the trade balance with the USA which is in agreement with the study due to Arora *et al.* (2003). However, the effect of exchange rate with Australia, Italy and Japan is found to be insignificant whereas it is significant in

case of UK for improving the trade balance of India contradicting the findings of Arora *et al.* (2003). Also, our empirical findings for India and China are consistent with Arunachalaramanan and Golait (2011) whereby the trade deficit with China can be improved by a depreciation of the real exchange rate. In case of the USA and Australia the national income of the partner countries has a positive impact on India's trade balance as the income of these partner countries increase there will be more demand of the Indian goods. In case of United Kingdom and China, the co-efficient of their real income is negative and significant at 10 per cent level which shows that the rise of their national income would not create the demand for the Indian goods, one of the reasons might be the producing of the same at their home.

In case of some of major partner countries such as with Canada, Norway, Denmark, France, Germany and Sweden, the real exchange rate is positively significant indicating the value effects of real exchange rate with these countries. With the depreciation of the real bilateral exchange rate with these countries, India's trade balance will deteriorate.

Section VI
Conclusion

In the long run, real depreciation of rupee has a negative relation with India's trade deficit *i.e.*, real depreciation of currency is effective in correcting the adverse trade balance through increased competitiveness. In case of trade with the Asia & Oceania and ASEAN countries, the elasticity of import and exports is less than -1 and validates the Marshall-Lerner condition. In the long-run, the real depreciation of INR will improve the trade balance with these groups of the countries. In case of Africa, SAARC, High-income and low income group countries, depreciation of real exchange rate would not improve the trade balance, and more structural measures may be necessary to improve trade balance. India's trade with the oil exporting countries is relatively inelastic due to large oil imports and the effect of real exchange rate on trade deficit is found to be statistically insignificant in these countries excluding Indonesia. In the case of the groups of all countries, the Marshall- Lerner condition (J-curve effect) does not hold due to the aggregation bias. However, the J-curve effect has been observed in the 17 trading partner countries of India where the major countries are Belgium, Indonesia, Malaysia and UAE.

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Annex 1: Panel Co-integration Estimation for the partner Countries

Country	$lnGDP_{IN}$	lnGDP*	lnRER	Country	$lnGDP_{IN}$	lnGDP*	lnRER
Argentina	-6.04***	6.87***	2.00***	Costa Rica	0.03	-1.44	-10.01***
	(-4.08)	(3.57)	(3.80)		(0.02)	(-0.63)	(-5.54)
Algeria	-14.52***	22.61***	-4.24	Côte D'ivoire	-0.44	2.17**	-1.82**
	(-3.09)	(3.49)	(-0.99)		(-0.97)	(2.23)	(-2.46)
Australia	-2.16***	2.32***	0.55	Cyprus	-20.11***	26.04***	-0.71
	(-4.65)	(3.46)	(1.11)		(-3.08)	(3.00)	(-0.13)
Austria	-0.88	0.08	1.68*	Denmark	-0.32	0.67	1.60***
	(-1.28)	(0.06)	(1.65)		(-1.26)	(1.35)	(2.86)
Bahamas	22.23***	-23.57***	-33.53***	Dominican	-17.46***	18.47***	-2.93**
	(3.62)	(-2.89)	(-4.08)	Republic	(-5.50)	(5.18)	(-2.06)
Bahrain	1.36	-0.09	-0.22	Egypt	-5.18*	6.44*	0.55
	(0.16)	(-0.01)	(-0.06)		(-1.74)	(1.75)	(0.65)
Bangladesh	-10.97***	11.27***	3.74***	Ethiopia	-6.75	6.24	-0.36
	(-5.21)	(4.89)	(3.73)		(-0.99)	(0.91)	(-0.13)
Belgium	1.06***	-1.35***	-1.35***	Fiji	-9.77***	11.29***	22.57***
	(4.10)	(-2.66)	(-3.19)		(-3.55)	(2.71)	(4.44)
Benin	4.40***	-5.47***	-1.34*	Finland	-1.50***	1.70***	-1.03*
	(4.30)	(-4.11)	(-1.89)		(-4.29)	(3.14)	(-1.88)
Bhutan	-6.89	5.73	5.83	France	-0.82*	0.90	1.89**
	(-1.56)	(1.36)	(1.00)		(-1.89)	(1.06)	(2.43)
Botswana	-50.49***	51.32***	44.09***	Gabon	-1.39*	-1.38	5.98***
	(-8.23)	(8.33)	(6.59)		(-1.89)	(-0.76)	(5.27)
Brazil	-2.79**	6.46***	-0.05	Germany	-1.16***	1.81***	0.69***
	(-2.40)	(3.46)	(-0.14)		(-11.5)	(8.06)	(3.41)
Brunei Darussalam	-10.09***	16.39***	-9.66***	Ghana	-9.51**	13.03**	-3.15***
	(-2.90)	(3.19)	(-2.81)		(-2.27)	(2.50)	(-3.61)
Bulgaria	2.06	-1.59	-0.51	Greece	-1.18***	2.53***	-0.94**
	(1.12)	(-0.51)	(-0.34)		(-3.14)	(4.40)	(-2.07)
Cameroon	-3.06**	5.21***	-9.77***	Guatemala	-3.89**	5.66*	-5.83**
	(-2.34)	(2.72)	(-10.00)		(-2.03)	(1.92)	(-2.10)
Canada	-2.40***	3.60***	1.24***	Hungary	-2.41**	3.90***	0.19
	(-14.00)	(13.15)	(3.61)		(-2.53)	(2.85)	(0.17)
Chile	-4.66***	4.87**	0.35	Iceland	1.97	-3.88**	1.74*
	(-2.76)	(2.43)	(0.25)		(1.32)	(-1.96)	(1.68)
China Mainland	8.11*	-6.43*	-0.15**	Indonesia	1.41**	-2.75***	-1.51***
	(1.79)	(-1.85)	(-2.13)		(2.55)	(-3.56)	(-7.89)
China: Honk Kong	-3.19*	3.23	-0.37	Iran	-17.64***	22.96***	0.44**
	(-1.89)	(1.39)	(-0.77)		(-5.79)	(5.80)	(2.04)
China: Macao	-5.24*	7.33	-9.86	Ireland	-0.3	0.07	-0.45
	(-1.68)	(1.55)	(-0.95)		(-0.59)	(0.13)	(-0.66)
Colombia	-19.28***	31.87***	4.42*	Israel	-0.78	1.38	0.77
	(-2.92)	(3.04)	(1.68)		(-0.83)	(1.27)	(0.8)
Congo, Dem. Rep.	12.63***	-35.78***	-0.22	Italy	-0.69***	1.53***	-0.14
	(3.70)	(-3.22)	(-0.14)		(-2.91)	(2.83)	(-0.25)
Congo: Republic	-5.94	8.28	3.17	Jamaica	-2.41	3.23	-1.63
	(-1.11)	(0.97)	(0.97)		(-0.93)	(0.43)	(-0.34)

Annex 1: Panel Co-integration Estimation for the partner Countries *(Concld.)*

Country	$lnGDP_{IN}$	lnGDP*	lnRER	Country	$lnGDP_{IN}$	lnGDP*	lnRER
Japan	-0.58***	0.56	-0.29	Seychelles	-7.62***	12.3***	-0.19
	(-2.93)	(1.51)	(-1.19)		(-6.54)	(4.51)	(-0.20)
Jordan	-2.41	2.58	1.39	Singapore	3.21	-3.01	-0.37
	(-0.96)	(0.88)	(1.34)		(1.01)	(-0.97)	(-0.17)
Kenya	4.49**	-7.12***	-2.25***	South Africa	4.19**	-6.97*	-1.82
	(2.38)	(-2.64)	(-3.09)		(1.98)	(-1.88)	(-1.61)
Korea	0.88	-0.95	-0.94**	Spain	-2.27***	3.72***	-0.10
	(1.41)	(-1.31)	(-2.24)		(-12.6)	(13.22)	(-0.50)
Kuwait	1.62	0.99	-15.25**	Sri Lanka	-3.65**	3.57*	-1.69
	(0.29)	(0.14)	(-2.01)		(-2.30)	(1.85)	(-1.57)
Madagascar	-3.04**	5.20***	-1.61*	Sudan	-13.25***	13.89***	3.20***
	(-2.39)	(2.62)	(-1.70)		(-3.57)	(3.64)	(2.87)
Malawi	13.88**	-13.23*	-14.69***	Swaziland	-6.38**	8.87**	1.79
	(2.43)	(-1.89)	(-3.35)		(-2.51)	(2.05)	(0.72)
Malaysia	3.44***	-2.99***	-3.13***	Sweden	-1.28***	0.10	2.54***
	(4.19)	(-3.5)	(-4.54)		(-2.71)	(0.14)	(3.64)
Malta	-0.56	-3.22	-33.51*	Switzerland	-3.06***	3.37**	0.15
	(-0.08)	(-0.32)	(-1.83)		(-3.99)	(2.14)	(0.12)
Mauritius	2.94**	-4.85***	2.75	Tanzania	0.22	0.16	2.74***
	(2.11)	(-2.88)	(1.44)		(0.15)	(0.10)	(6.92)
Mexico	-4.45**	6.90**	-0.08	Thailand	-1.68**	0.91	-0.21
	(-2.04)	(1.99)	(-0.05)		(-2.17)	(0.88)	(-0.32)
Morocco	-0.69	2.84	0.45	Togo	-0.91	0.39	-0.88
	(-0.25)	(0.78)	(0.20)		(-1.62)	(0.43)	(-1.14)
Nepal	5.15***	-7.34***	-2.13	Trinidad And	3.96	-4.62	-0.19
	(2.92)	(-3.01)	(-0.43)	Tobago	(0.70)	(-0.73)	(-0.03)
Netherlands	0.91***	-0.56**	-0.16	Tunisia	0.04	1.26	2.3
	(7.25)	(-2.56)	(-0.79)		(0.01)	(0.34)	(1.03)
New Zealand	-1.64***	2.73***	-0.65***	Turkey	-4.29*	6.53**	1.26
	(-4.45)	(5.08)	(-2.46)		(-1.95)	(2.12)	(1.08)
Nigeria	5.10	-7.11	1.24	UAE	1.38	-1.97	-2.39**
	(0.34)	(-0.36)	(1.12)		(0.65)	(-0.91)	(-2.29)
Norway	-3.08***	2.66***	2.72***	United	1.55***	-2.29***	-0.72**
	(-11.3)	(5.90)	(4.89)	Kingdom	(6.21)	(-5.61)	(-2.15)
Pakistan	0.96	1.43	-3.56	United States	-2.09***	3.08***	0.40
	(0.27)	(0.31)	(-1.46)	of America	(-4.07)	(4.16)	(0.55)
Philippines	-1.09	0.94	-2.22***	Uruguay	-3.66**	6.95**	-0.25
	(-0.97)	(0.63)	(-5.48)		(-1.67)	(1.93)	(-0.18)
Portugal	-1.13***	2.54***	-1.73***	Zimbabwe	0.11	1.76***	0.29*
	(-4.16)	(5.02)	(-3.12)		(0.59)	(4.39)	(1.73)
Saudi Arabia	-10.52***	17.02***	2.52	Venezuela	4.40	-12.78	-3.83
	(-3.24)	(3.58)	(1.07)		(0.75)	(-1.07)	(-0.95)
Senegal	8.87***	-11.79***	2.04				
	(3.44)	(-3.27)	(1.63)				

Annex 2: List of the India's trading partners classified into Eleven groups (3 International treaty groups, 4 regional groups, 3 Income groups and major countries group)

Oil Exporting Countries	Saarc	Asean	African	America	Europe	Asia & Oceania	High Income	Middle Income	Low Income	Major Countries
Algeria	Bangla Desh	Indonesia	Algeria	Argentina	Austria	Australia	Australia	Argentina	Bangla Desh	China mainland
Indonesia	Bhutan	Malaysia	Benin	Bahamas	Belgium	Bahrain	Austria	Algeria	Benin	Germany
Iran	Nepal	Philippines	Cameroon	Brazil	Bulgaria	Bangla Desh	Bahamas	Brazil	Bhutan	Japan
Kuwait	Pakistan	Singapore	Congo,dem.Rep.	Canada	Denmark	Bhutan	Bahrain	Bulgaria	China :Macao	Saudi Arabia
Nigeria	Sri Lanka	Thailand	Côte d'Ivoire	Chile	Finland	Brunei Darussalam	Belgium	Cameroon	Congo, Dem. Rep.	Singapore
Saudi Arabia			Egypt	Colombia	France	Cambodia	Brunei Darussalam	Chile	Côte d'Ivoire	UAE
UAE			Ethiopia	Costa Rica	Germany	China Mainland	Canada	China Mainland	Ethiopia	United kingdom
Venezuela			Gabon	Dominican Republic	Greece	China: Macao	China: Honk Kong	Colombia	Ghana	United states
			Ghana	Guatemala	Hungary	China: Honk Kong	Cyprus	Costa Rica	Jordan	Belgium
			Jordan	Jamaica	Iceland	Cyprus	Denmark	Dominican Republic	Kenya	Switzerland
			Kenya	Mexico	Ireland	Indonesia	Finland	Egypt	Madagascar	
			Madagascar	Trinidad and Tobago	Italy	Iran	France	Gabon	Malawi	
			Malawi	USA	Netherlands	Israel	Germany	Guatemala	Nepal	
			Morocco	Uruguay	Norway	Japan	Greece	Hungary	Nigeria	
			Nigeria	Venezuela	Portugal	Korea	Iceland	Indonesia	Pakistan	
			Senegal		Spain	Kuwait	Ireland	Iran	Senegal	
			Seychelles		Sweden	Malaysia	Israel	Jamaica	Sudan	
			South Africa		Switzerland	Mauritius	Italy	Malaysia	Tanzania	
			Sudan		UK	Nepal	Japan	Mauritius	Togo	
			Swaziland			New Zealand	Korea	Mexico		
			Tanzania			Pakistan	Kuwait	Morocco		
			Togo			Philippines	Netherlands	Philippines		
			Tunisia			Saudi Arabia	New Zealand	Seychelles		
						Singapore	Norway	South Africa		
						Sri Lanka	Portugal	Sri Lanka		
						Thailand	Saudi Arabia	Swaziland		
						Turkey	Singapore	Thailand		
						UAE	Spain	Tunisia		
							Sweden	Turkey		
							Switzerland	Uruguay		
							Trinidad and Tobago	Venezuela		
							UAE			
							UK			
							USA			