Vol 4 Issue 2 Mar 2014 ISSN No : 2230-7850

International Multidisciplinary Research Journal

Indian Streams Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2230-7850**

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Indian Streams Research Journal
ISSN 2230-7850
Volume-4 | Issue-2 | March-2014
DOI : 10.9780/2230-7850/422014/4360
Available online at www.isrj.net

SUSTAINABILITY OF TRADE DEFICITS: A PANEL DATA ANALYSIS OF BRICS

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Abstract:-The emerging economies such as BRICS excluding China are experiencing trade as well as current account deficits in the recent years. The countries such as India, Brazil, Russia and South Africa are facing persistingdeficits while China hassurpluses mainly because of its export performance and capital inflows. BRICS as a group has experienced deficits in its trade surplus during the study period, 1990-2011. Sustaining trade deficits is important in sustaining the phenomenal economic growth in these countries. This is possible only when exports and imports of these countries are cointegrated and the causal connection runs between exports and imports. The present paper is an attempt to verify the cointegrated relationship between exports and imports ofBRICS. The empirical results based on panel data unit root testsand cointegration testsuggest that the exports and imports of BRICS as a group are cointegratedsupporting the sustainable trade deficits hypothesis.The results based on cointergration regressionusing FMOLS and DOLS methods suggest that Husted's (1992)hypothesis has been proved.This implies the adjustmentbehaviour of exports towards imports in these countries in the long run. In view of this empirical findingit may be concluded that the present macro and trade policies have been effective in attainingthe equilibrium between exports and imports andBRICS as a group should continue with itspresenttradeand macroeconomic policies.

Keywords: BRICS, Exports, Imports, Trade deficit, Panel unit root test, Panel Cointegration, FMOLS Model, DOLS Model.

JEL Classification: F 14,C23

I. INTRODUCTION

BRICS(an acronym for Brazil, Russia, India, China and South Africa)has been one of the fastest growing groups of countries in the recent past.As a group it accounts for almost 25% of the world's GDP and is expected to surpass the economic performanceof the rich developed counties in near future. With sizeable domestic markets and a liberal trade, exchange rate and foreign investment policies these countries have integrated themselves with the global economy significantly.With China and India growingat faster rates and these countries with sustained economic reforms and improved macroeconomic fundamentals along with a buoyant macroeconomic environment contributed to the improved growth performanceinthe current decade (Finance Ministry of India, 2012). These countries are the members of WTO and following active globalization and liberalization policies with significant cuts on tariff rates and quota restrictions. The strong growth performance of the BRICS has been assisted by the high savings and investment rates, even though Brazil and South Africa still have room to increase these rates. The share of the BRICS in global trade has grown rapidlyas their share in world exports increased substantially over the past decade. This was mainly due to the broad-based diversificationin commodities and regions of trade and the rise in importswas due to an increased investment and consumption demand led by the increasing purchasing power of these economies. With the shares in world trade (15%), exports (11.2%), imports (14.8%), FDI flows (17.8%)BRICS presents a robust growth performance. With smaller Intra-industry trade among these countries, there is a scope for improving trade among these countries. However, except China,these countries are facingpersistenttrade deficitsin recent years (see table-1).Thus sustaining trade balances has become an important policy debate among these countries. Of late, there has been an increasing interest among the economists to study the long run relation between exports and imports as it reflects the sustainability of the trade and current account deficits. The knowledge of cointegration between these variables is of paramount importance to policy framing as it is vital to formulate trade policies with special reference to sustaining trade balance of a country. If the estimated coefficient between exports and imports is equal to one, it implies that the country in question satisfies international budget constraint (Husted 1992). After the publication of seminal work by Husted, several researchers have tried to verify this relationship. The present paper is an attempt in this direction and tries to empirically verify the relationship between exports and imports of BRICSusing panel data.

Table 1: Growth rates of Exports,Imports and Trade deficits (1990-2011)

Country	Exports	Imports	Balance of Trade
Brazil	6.71	7.06	-0.35
Russia	5.00	6.33	-1.33
India	13.02	13.18	-0.16
China	17.50	16.23	1.27
South Africa	3.66	5.87	-2.21
BRICS as a group	10.84	10.95	-0.11

Note: the growth rates are computed using semi log trend growth model.
Source: World Development Indicators (WDI), 2013.

The empirical work in this paper involves estimating the cointegrated relationship between exports and imports using recently developed FMOLS and DOLS methods.To this end panel unit root tests and panel cointegration test have been performed. The remaining paper is structured as follows: The second section deals with the review of empirical literature. The third section is on data and econometric methods. The fourth section discusses the empirical findings and the final section is on conclusion and policy suggestion.

II REVIEW OF LITERATURE

Basing on budget constraint, Husted(1992) proposes a theoretical relationship between exports and imports as follows:

$$C_t = Y_t + B_t - I_t - (1 + r)B_{t-1}$$

Where Ct is the aggregate consumption,Yt is the aggregate income, It is the aggregate domestic investment, r is the international rate of interest and Bt is the international borrowing. Under several restrictions he derives the final equation which brings in the relationship between exports and imports as follows:

$$X_t = a_0 + a_1 Mt + e_t$$

Alternatively Arize (2002) proposed an alternative model,

$$M_t = a_0 + a_1 Xt + e_t$$

In both the models the coefficient (a1) represents budget constraint and remains stable if exports and imports are cointegrated. Cointegrating relationship between exports and imports implies that countries do not violate their international budget constraint and therefore supports the effectiveness of their macroeconomic policies in attaining the long-run equilibrium. Otherwise, it is unstable and the economy cannot meet its foreign debt liability.Several researchers have tried to analyze the long-run or cointegrating relationship between exportsand imports. Using quarterly US trade data for the period 1967–1989, Husted (1992) has shown that exportsand imports are cointegrated in the long run and therefore supports the effectiveness of their macroeconomicpolicies in attaining the long-run equilibrium. In another study, Herzer and Nowak-Lehmann (2006) and ErbaykalandKaraca (2008) have shown the existence of a cointegrated relationship between exports andimports, which suggest that trade deficits are only short-term phenomenon therefore, sustainablein the long-term. Similarly, Peder (2007) examined the cointegration of imports and exports in India and found the cointegrating relation between these variables. Using similar methods, Lehman (2005) found cointegrating relation between exports and imports in Chile in spite of its balance of payments problems. There are several other studies which concluded the same thing. For instance,Bahmani-Oskooee and Rhee (1997) and Apergis (2000) have found cointegration between exports and imports for Korea and Greece respectively.Using Engel- Granger two step procedures, Ramakrishna (2013) has concluded that South Africa's exports and imports are cointegrated.There are some studies which produced nixed results also.Using ARDL bounds test, Narayan and Narayan (2005) studied the relationship for 21 least developed countries and concluded that exportsand imports are cointegrated only for six out of the 22 countries, and the coefficient of exports isless than one. Arize (2002)used quarterly data for the period 1973–1998 from 50 OCED and developing countries toexamine the same question. He found that for 35 of the 50 countries, there was evidence ofcointegration between exports and imports; and 31 of the 35 countries had a positive exportcoefficient. There are several other studies which used different methods of cointegration using time series data (see Konya and Singh2008). Most of these empirical studies used time series data and used the methods suggested by several authors such as Engle and Granger (1987), Johansen (1991) and Philips and Ouliaris (1990) etc.However, these methods ignore the heterogeneity across countries and cannot handle panel data sets. In recent times several testing procedures have been made available due to the contributions from Pedroni (1995), Kao and Chiang (1998) and Kao (1999), which study the cointegration tests using panel data. Using these methods, Lin Wu et al (2001) applied panel cointegration tests to examine the cointegration between exports and imports usingthe data of G7 countries for the period 1973 Q2 TO 1998 Q4 and concluded that the trade deficits are sustainable. The review of the empirical studies reveals the fact that there are not many panel data based studies on the cointegrated relationship between exports and imports and more soon BRICS countries. The present study is an attempt in this direction.

III DATAAND ECONOMETRIC METHODS

The data for the present study have been collected from World Bank, World Development Indicators (WDI) for the period 1990-2011. The data on exports and imports (in 2005 constant prices)are culled in dollar terms andhave been measured as percentageshares of GDP. A bivariate cointegration methodology has been used to investigate the hypothesized equilibrium relationship between exports and imports of BRICS countriesusing panel data for the period 1990-2011. Panel data are chosen as the panel models help in capturingthe dynamic behaviour of the parameters and provide more efficient estimation of the parameters. Panel data techniques have advantages over cross-section and time series in using all the information available, which are not detectable either in pure cross-sections or in pure time series [Baltagi and Kao (2000)]. There are several types of panel data models: The first one is pooled panel OLS method which is based on the assumption that there are no differences among the data sets of the cross sectional dimension. The second method is the fixed effects method which treats the constant as group specific, i.e. it allows for different constants for each group. This method is also known as the Least Squares Dummy Variables (LSDV) method. The fixed effect model may be presented as:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + v_{it} (1)$$

Where, μ_i and v_{it} are decomposition of the disturbance term. μ_i represents individual specific effect and v_{it} represents 'remainder disturbance', that varies over time and entities. The third method is called the random effects method. It is an alternative method of estimation which handles the constants for each section as random parameters rather than fixed. Under this model, the intercepts for each cross-sectional unit are assumed to arise from a common intercept a (which is the same for all cross-sectional units and over time), plus a random variable ϵi that varies cross-sectionally but is constant over time. ϵi measures the random deviation of each entity's intercept term from the 'global' intercept term α. The random effects panel model may be presented as:

$$y_{it} = \alpha + \beta x_{it} + \omega_{it} (2)$$

Where,

$\omega it = \epsilon i + vit$

Here x_{it} is a vector of explanatory variables, but unlike the fixed effects model, there are no dummy variables to capture the heterogeneity in the cross-sectional dimension. Instead, this occurs via the ϵi terms. However, similar to time series data the pooled panel data can also exhibit time trends and therefore the variables may exhibit non statioarity. As Engle and Granger [1987] put it,the directapplication of OLS or GLS methods to such data can produce misspecified and spurious regressions. Thus in the Panel data analysis, the stationary of the serieshave to be verifiedusing panel unit root tests and then the type of individual and time effects should be identified.Several authors, notably Levin, Lin and Chu (2002), Breitung(2000), Hadri (1999), and Im, Pesaran and Shin (2003) have developed panel-based unit root teststhat are similar to tests carried out on a single series. These authors have shown that panel unit root tests are more powerful than the unit root tests applied to individual series. In this paper we have tested for unit roots in the variables using Levin, Lin and Chu(2002), Im, Pesaran and Shin (2003)and Fisher-type tests using ADF and PP tests. It is accepted that the panel unit root tests which regard the information about both time and cross section dimension of the data are statistically stronger than the time series unit root tests which regard the information only about the time dimension because the variability in the data increases when the cross section dimension is included to the analysis. The first problem in panel unit root test is whether the cross sections building the panel are independent or not.Levin, Lin, and Chu (LLC), Breitung, and Hadri tests all assume that there is a common unit root process. The first two tests employ a null hypothesis of a unit root while the Hadri test uses a null of no unit root.An alternative approach to panel unit root tests uses Fisher's (1992) results to derive tests that combine the p-values from individual unit root tests.The LLC and Breitung testsemploy a null hypothesis of a unit root using the following basic Augmented Dickey Fuller(ADF) specification:

$$\Delta y_{it} = a\, y_{it-1} + S\beta_{ij}є\, y_{it-j} + X_{it}d + є_{it} \qquad (3)$$

Where y_{it} refers to the pooled variable, X_{it} represents exogenous variables in the model such ascountry fixed effects and individual time trends, and v_{it} refers to the error terms which areassumed to be mutually independent disturbances. As indicated above, it is also assumed thata=є-1 is identical across the three cross-sections, but the lag order for the difference terms acrossthe three sectors is allowed to vary. By contrast, the less restrictive IPS test (and other widelyused tests such as the ADF Fisher Chi-square estimates a separate ADF regression for each ofthe three cross sections to allow for individual unit root processes; i.e., єi may vary across crosssections.The present study uses Im, Pesaran and Shin (IPS), Levin, Lin and Chu (LLC) and Fisher-type tests using ADF and PP tests unit root tests.

To verify the cointegration among the variables Kao residual cointegration test has been used. In order to estimate the cointegrated regression between exports and imports Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) models have been used.Phillips and Hansen (1990) propose an estimator which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the cointegrating equation and stochastic regressors innovations. The resulting Fully Modified OLS (FMOLS) estimator is asymptotically unbiased and has fully efficient mixture normal asymptotics allowing for standard Wald tests using asymptotic Chi-square statistical inference.Wehave estimated the regression model based on Husted equation using both FMOLS and DLS methods.Having established that there is a linear combination that keeps the pooled variables inproportion to one another in the long run, we can proceed to generate individual long-runestimates for equation (3). In view of the fact that the OLS estimator is a biased andinconsistent estimator when applied to cointegrated panels, we utilize the "group-mean" panelfully modified OLS estimator (FMOLS) and DOLS methods. The FMOLS estimator not only generates consistent estimates of the β parameters inrelatively small samples, but it controls for the likely endogeneity of the regressors and serialcorrelation.Formally, the FMOLS estimator for the i-th panel member is given by,

$$\beta i^* = (Xi'Xi)\text{-}1\,(Xi'yi^* - Td) \qquad (4)$$

Where y* is the transformed endogenous variable, δ is a parameter for autocorrelation.A simple approach to constructing an asymptotically efficient estimator that eliminates the feedback in the cointegrating system has been advocated by Saikkonen (1992) and Stock and Watson (1993). Termed as Dynamic OLS (DOLS), the method involves augmenting the cointegrating regression with lags and leads that the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations.In this study we use the Dynamic Ordinary LeastSquare (DOLS) model is employed toverify long-run relationship between exports and imports. The DOLS estimator may be shown as:

$$Y_{it} = \alpha_i + X^{/}{}_{it}\beta + \sum_{j=-q1}^{j=q2} Cij\Delta X_{it+j} + V_{it} \text{ .... } (5)$$

Where $c_{ij}$is the coefficient of a lead or lag of the first differenced variables. The The estimated coefficient of DOLS is β.This method is superior to a number of other estimators as it can beapplied to system of variables with different orders of integration. Kao andChiang in a comparison of finite sample properties of alternative estimatorsfound that (1) the Ordinary Least Square OLS estimator has a non −negligiblebias in finite samples (2) the Fully Modified OLS (FM -OLS) estimator does notimprove over the OLS estimator in general, and (3) the DOLS estimator may bemore promising than OLS or FM estimators in estimating the co integrated panelregressions. Including lead and lag terms, DOLS correct the nuisance parameter in order to obtain coefficient estimates with nice limiting distribution properties.While the pooled mean group estimation include only lag terms as explanatoryvariables. Therefore, in DOLS method it would desirable to choose the numberof leads and lags; such a way so that beyond this lag and lead the coefficients ofthe lags and leads of the first difference of the explanatory variables iseffectively zero. Thus the endogeniety of the repressors can be removedandthe DOLS equation can be estimated.In this study we have used one lead and one lag in DOLS model.

IV. EMPIRICAL FINDINGS

In this paper an attempt is made to verify the relationship between exports and imports of BRICS using panel data. This is important because thetrade deficits would be sustainable only when exports and imports are cointegrated.The cointegration between exports and imports has been conventionally examined using the methods suggested by Engle and

Granger (1987), Philips and Ouliaris (1990) and Johansen (1991).These tests fail to take advantage of information across countries, which lead to loss of efficiency in estimation.Recently, Pedroni (1999) and Kao and Chiang (1998) have provided a series of tests of cointegration in panels that can be viewed as extensions of these single equation tests. In this article, we employ the cointegration test proposed by Kao (1999) to test whether the cointegration relationship exists in the estimated equation.

Unit root Tests

The unit-root test helps to identify whether a variable is stationary or not. The test also helps in finding the order of integration at which the variables become stationary. These tests are necessary to avoid spurious correlation between variables. Testing for the presence of unit root in the variables is the primary task before attempting cointegration. The Levin, Lin and Chu (LIC),Im, Pesaran and Shin (IPS) ad Fisher type of ADF and PPunit root test values of the variables (both at levels and at their first difference) are presented in tables 2 and 3.

Table 2: LIC and IPS UnitRoot tests

	Levin, Lin and Chu (LIC)		(Im, Pesaran and Shin) IPS	
Variable	With constant	With constant and trend	With constant	With constant and trend
Exports (X)	-0,83049 (0.2031)	-1.68575 (0.0459)	-0.74364 (0.2285)	-4.19729* (0.000)
Δ exports (ΔX)	-12.7771* (0.000)	-8.72102* (0.000)	9.56681* (0.000)	-6.04293* (0.000)
Imports(M)	0.41703 (0.6617)	-5.98230* (0.000)	0.22307 (0.5885)	-5.86955* (0.000)
Δ imports (ΔM)	-16.8362* (0.000)	-14.6288* (0.000)	-12.6073* (0.000)	-11.8760* (0.000)

Note: *denotes rejection of the null hypothesis of non-stationarity at 1% significance level.

Table 3: ADF - Fisher and PP - FisherUnit Root tests

	ADF - Fisher Chi-square		PP - Fisher Chi-square	
Variable	With constant	With constant and trend	With constant	With constant and trend
Exports (X)	13.1007 (0.2181)	35.7156* (0.0001)	11.3349 (0.3320)	28.1070* (0.0017)
Δ exports (ΔX)	127.714* (0.000)	60.5899* (0.000)	125.152* (0.000)	87.8407* (0.000)
Imports(M)	7.0171 (0.7858)	26.2626* (0.0034)	10.4399 (0.4028)	27.9256* (0.0019)
Δ imports (ΔM)	54.8974* (0.000)	42.5503* (0.000)	168.671* (0.000)	142.225* (0.000)

Note: *denotes rejection of the null hypothesis of non-stationarity at 1% significance level.

The unit root tests based on Levin, Lin and Chu(LLC),Im, Pesaran and Shin(IPS) indicate that both exports and imports are stationary at the first difference level i.e. they are I(1). Similarly, ADF – Fisher and PP – Fisher tests indicate the same thing. After testing for the unit root in the variables, we have tested the cointegration of the level variables using Kao's residual cointegration test.

Test for Cointegration

In this study, we have employed OLS procedure to estimate the regression model involving exports and imports of BRICS.

$$Exports_{it}=\alpha_0+a_1 Imports_{it}+e_{it} \qquad (6)$$

To verify the cointegration among the variables Kao residual cointegration test has been used. The results are presented in the table-4.

Table4: Kao Residual Cointegration Test

Included observations 110 Trend assumption: No Deterministic Trend Null Hypothesis: No cointegration Automatic lag length selection based on SIC with a maximum lag of 5 Newey-West automatic bandwidth and Bartlett Kernel		
ADF	t-stat -2.92192*	prob 0.0017
Residual variance	5.071123	
Hac variance	5.063639	

Note: *denotes significance at 1% level

The test result based on ADF statistic indicates that the null hypothesis of no cointegration has been rejected. Hence exports and imports of BRICS are cointegrated.

Relationship between Exports and Imports

We have used the panel data on exports and imports for the BRICS countries to verify the relation between these variables for the study period, 1990-2011. For this purpose, pooled regression, fixed coefficients and random coefficients models have been used. All the models indicate that $\alpha 1$ coefficient is statistically different from zero and not different from one.To choose between fixed coefficients and random coefficients models, the Hausman cross-section random effects test has been conducted. The Chi square value of the test is 0.21191 with a significance level of 0.6453, which is not statistically significant. Hence, random coefficients model may be preferred over fixed coefficients model.

Table5: Relationshipbetween Exports and Imports: Panel Models

Model	Constant	Coefficient	R^2	Adj-R^2	F
Pooled Regression	2.381234 (1.6027) [0.1199]	0.992938* (13.8568) [0.000)	0.640	0.636	192.01 [0.000]
Fixed Coefficients	3.795154* (3.5274) [0.000]	0.918189* (17.3234) [0.000]	0.857	0.850	124.91 [0.000]
Random Coefficients	3.757884 (1.27917) [0.2036]	0.920159* (17.4144) [0.000]	0.739	0.736	305.59 [0.000]

Note: *denotes significance at 1% level
Cointegration between Exports and Imports

However, if the level variables are not stationary, the panel regression models can produce spurious results. This can be avoided through searching for stationarity and testing for cointegration. The unit root tests we have performed in this study have indicated that both exports and imports are difference stationary and the relevant procedure to verify the relation between exports and imports is the panel cointegration method. We have used Kao's cointegration test and found that both exports and imports are cointegrated. And to verify the Husted's hypothesis of sustainable deficits, we have estimated the equation (6)using FMOLS and DOLS procedures.Both the models indicate that α1 coefficient is statistically different from zero and not different from one. The results are presented in the following table:

Table6: Cointegration between Exports and Imports: FMOLS and DOLS Models

Model	Coefficient	R^2	Adj- R^2
FMOLS	0.938171* (11.6827) [0.000]	0.863	0.856
DOLS	0.997598* (10.2351) [0.000]	0.911	0.900

Note: *denotes significance at 1% level

V. CONCLUSION AND POLICY SUGGESTIONS

The present paper aimed at studying the equilibrium relationship between exports and imports ofBRICS countries in order to verify the Husted (1992) hypothesis.Based on the panel cointegration, we find that exports and imports are cointegrated and the cointegrating coefficient is significantly different from zero, but not significantly different from one. These findings suggest that the trade deficits among BRICS countries are sustainable.The empirical results based on panel data unit root tests and cointegration models suggest that the exports and imports of BRICS as a group are cointegrated supporting the sustainable trade deficits hypothesis. The estimates based on cointegration using FMOLS and DOLS methods suggest that Husted's (1992) hypothesis has been proved. This implies the adjustment behaviour of exports towards imports in these countries. In view of this empirical finding it may be concluded that the present macro and trade policies have been effective in attaining the equilibrium between exports and imports and BRICS as a group should continue with its present trade and macroeconomic policies.

REFERENCES

1.Ahmad, Z. B., Lau, E., &Fountas, S. (2003), "On the sustainability of current account deficits: evidence from four ASEAN countries. Journal of Asian Economics, 14, 465–487.
2.Arize, A.C. (2002), "Imports and exports in 50 countries: Tests of cointegration and structural breaks"International Review of Economics and Finance, 11: 101-115.
3.Bahmani-Oskooee, M. and H-J, Rhee (1997), "Are Exports and Imports of Korea Cointegratedє" International Economic Journal11, 109–114.
4.Baltagi B. H. (2001), Econometric Analysis of Panel Data. (2nd ed). New York: John Wiley & Sons.
5.Choi I. (2001, Unit Roots Tests for Panel Data, Journal of International Money and Finance, 20, 229–272.
6.Dickey, D.A., D. P. Hasza and W. A. Fuller (1984), "Testing for unit roots in seasonal time series."Journal of the American Statistical Association79, 355-367.
7.Erbaykal, E. and O. Karaca (2008), "Is Turkey's foreign deficit sustainableєCointegrationrelationshipbetween exports and imports."International Research Journal of Finance and Economics14, 177-181.
8.Engel.R.F., and C.W.J.Granger (1986), "Cointegration and Error Correction :Representation,Estimation and Testing", Econometrica,55(2).
9.Finance Ministry, (2012),Government of India, The BRICS Report, Oxford University Press.
10.Gregory, A. W., & Hansen, B. E. (1996), Residual-based tests for cointegration in models with regime shifts. Journal of

Econometrics, Vol.70.
11.Hadri K. (2000), Testing for Stationarity in Heterogeneous Panels. Econometrics Journal, 3,148-161.
12.Herzer, D. and Nowak-Lehmann D. Felicitas (2006), "Is there a Long-run Relationship between Exports, and Imports in Chile€" Applied Economics Letters13, 981–986,
13.Husted, S. (1992),"The emerging US current account deficit in the 1980s: a cointegrationanalysis"Review of Economics and Statistics74, 159-166.
14.Im K., Pesaran H. and Shin Y. (1997), Testing For Unit Roots in Heterogenous Panels. Mimeo, Department of Applied Economics, University of Cambridge.
15.Im K., Pesaran H. and Shin Y. (2003), Testing For Unit Roots in Heterogeneous Panels. Journal of Econometrics, 115, 53–74.
16.Jain, Vipin and Janesh Sami (2012), "Understanding Trade balance in Singapore: empirical Evidence from Cointegration Analysis", View Point,3, 1, 3-9, Jan-June.
17.Johansen, S. (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Autoregressive Models, Econometrica, 59, 1551-80.
18.Johansen, S., and Juselius, K. (1990), Maximum Likelihood Estimation and Inference on Cointegration - With Application to the Demand for Money, Oxford Bulletin of Economics and Statistics, 52, 169-210.
19.Kao, C., (1999), Spurious regression and residual-based tests for cointegration in panel data. Journal of Econometrics 90, 1–44.
20.Kao, C., Chiang, M.-H., (1998), On the Estimation and Inference of a Cointegrated Regression in Panel Data, Working Paper, Centre for Policy Research, Syracuse University
21.Konya, L. and J. P. Singh (2008), "Are Indian Exports and Imports Cointegrated€" Applied Econometrics and International Development 8, 177-186.
22.Levin A. Lin C. and Chu J. (2002). Unit Roots Tests in Panel Data: Asymptotic and Finite Sample Properties. Journal of Econometrics, 108, 1: 24
23.Maddala, G.S. and S. Wu, (1999), "A Comparative Study of Unit Root Tests with Panel Data and A New Simple Test," Oxford Bulletin of Economics and Statistics, Vol. 61, 631-52.
24.Mallick S K (1996) "Causality Between Exports And Economic Growth In India: Evidence From Cointegration Based On Error Correction Model" The Indian Journal Of Economics, Vol. LXXVI, No.302.
25.Narayan,Paresh Kumar and Seema Narayan (2005),"Are Exports and Imports Cointegrated€ Evidence from 22 Least Developed Countries," Applied Economics Letters12, 375–378.
26.Pedroni, P., (1995), Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an application to the PPP Hypothesis, Indiana University Working Papers in Economics, No. 95-103.
27.Pedroni, Peter, (1999), "Critical Values for Cointegration Tests in Heterogeneous Panels with MultipleRegressors," Working Paper, Indiana University, July 25, 1-19.
28.Perron, P., (1989),The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis, Econometrica, 57, 1361-1401.
29.Phillips, P. C. B. and B. E. Hansen, (1990), Statistical inference in instrumental variablesregression with I(1) processes, Review of Economic Studies 57, 99-125
30.Philips, P, Ouliaris, S,(1990), Asymptotic properties of residual based tests for cointegration. Econometrica 58, 165–193.
31.Ramakrishna, G. (2013), Long run relationship between Exports and Imports of South Africa: are they cointegrated€ OUCIP International Journal of Social Sciences, vol.1, No.1, 37-48, July-December.
32.Saikkonen, P.,(1992), Asymptotically efficient estimation of cointegration regressions,Econometric Theory 7, 1-21.
33.Stock, J. H. and M. W. Watson, 1993, A simple estimator of cointegrating vectors inhigher order integrated systems, Econometrica 61, 783-820.
34.Tiwari, A.K. (2011),Are exports and imports cointegrated in India and China€ An empirical analysis, Economics Bulletin, 31(1): 1-11.
35.Wu, J.-L.(2000), Mean reversion of the current account: evidence from the panel data unit-root test. Economics Letters 66, 215–222.