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INTRODUCTION
REVIEW OF LITERATURE
NEED/IMPORTANCE OF THE STUDY
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RESULTS & DISCUSSION
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IMPORT-EXPORT DEMAND FUNCTIONS AND BALANCE OF PAYMENT STABILITY IN INDIA: A CO-INTEGRATION AND VECTOR ERROR CORRECTION MODEL (1974-75 TO 2012-13)

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ABSTRACT

This research assesses the determinants of imports and exports demand functions and how they directly affect balance of payment stability in India. The research focuses on empirically measuring the relative strength and weaknesses of both imports and exports demand functions and to examine using Marshal – Lerner hypothesis the condition under which balance of payments adjustment work in India's economy. The analytical framework employed is an econometric methodology which encompasses wide range of tests for stationarity, Johansen cointegration, and specification of vector error correction mechanism, results of vector error correction model shows significant causational relationship in one model. Specifically, from the values of exchange rate coefficients in the two models, the paper knots balance of payment adjustment to regime of exchange rate stability in India. The paper therefore recommends exchange rate adjustment as a potent instrument of achieving balance of payment stability in India.

KEYWORDS

Balance of Payments, Co-integration, Exports, Imports, and Stationarity**.**

INTRODUCTION

Macroeconomic policy aims to maintain equilibrium in the balance of payment condition over a long period of time. Because, it is recognized that deficit in balance of payment condition automatically retards the attainments of other macroeconomic objectives. Disequilibrium in India's balance of trade will significantly affect the way resources are domestically allocated just as disequilibrium in internal sector is translated into unemployment or inflation among others, likewise the external sector used to be affected. The use of economic fine-tuning measures via expenditure-changing and expenditure-switching monetary and fiscal policies to affect prices, interest rate, and exchange rate can be a potent way to put an economy on a right path to growth and development.

Available evidence generally reveals that, most developing economics including India have suffered from foreign exchange earnings decline in the early 1980's. This follows largely a collapsed in their export prices and given that most of them specialized in limited line of exports. Exports growth in India remarkably slows down partly due to Asian crisis. (N. K Chandra 2012)

The comfortable balance of payments witnessed during the First Plan period was short-lived. Rapid industrial growth involves large imports of capital goods and large foreign exchange expenditure. Apart from this, the country's balance of payments was burdened by sizeable food imports and the import-dependent consumer tastes of its elite. Thus, India ran into foreign exchange difficulties hardly a year into the Second Plan. This led to some *ad hoc* attempts at rationing foreign exchange 'aid' much of it tied to imports from the 'aid'-givers. Since that time, there has always been a strong undercurrent of balance of payment difficulties, surfacing periodically in the form of crises.

REVIEW OF LITERATURE

In relation to the immense significance of international trade as a veritable way to achieve economic growth and development particularly in emerging economies, a number of empirical studies on the determinants of exports and imports demand functions have been carried out. The objective here is to review some of those already undertaken studies as a guide to the choice of appropriate variables used in this study. The models that explain the determinants of exports and imports include those by Olayide (1968), Rhomberg (1968), Maizels (1968), H*outhakker* and *Magee* (1974*),* Ajay*i* (1975), Ajakaiye (1985), *Goldstein and Khan* (1978), and Goldar (1989). Rano (2007)

Sahadevan (1999) analyzed the impact of monetary policy on the behavior of rupee exchange rate and international reserve during the period of 1992:04 to 1999:03. The study analyzed how the RBI offsets the pressure that monetary shocks exerts on exchange rate and reserves. Based on the estimates on Girton-Roper model of exchange market pressure the study examined the RBI's policy of maintaining exchange rate and reserves over the study period. The values of the offset coefficient ranging between -0.81 to -0.93 signify that pressure on exchange rate is not completely offset by the domestic monetary expansion (contraction) either by depreciation (appreciation) of rupee or by running down (accumulating) foreign exchange reserves or by some combination of both, but is partially being naturalized by some other means. The controls of international trade and capital flows do provide significant insulation from exchange market pressure. When exchange rate and reserve level are considered to be indicators of government's performance and when they are being maintained at 'politically correct' levels, the economic reasoning underlying the model becomes irrelevant. The statistically significant intercept term as against the postulation of the model is a manifestation of these institutional realities.

Beig et *al* (1999*)* using a similar monetary model to Weymer (1995) estimated exchange market pressure, and index of intervention activity for India over a period 1975-98 using annual data. The findings show that during the study period the exchange market pressure has fluctuated with positive negative values indicating upward (downward) pressure from the US dollar. The RBI was found to counter this pressure by intervening extensively in the in the foreign exchange market as indicated by large index of intervention values. From 1991 onwards, when the exchange market is supposedly free from control, the RBI has been intervening even more in the foreign exchange market as indicated by higher index of intervention activity values. It is reasoned that with the removal of controls from foreign exchange market RBI has had to intervene strongly to counter the speculations in the market, and protect rupee from appreciation because of large inflows. A cross check was also carried out by calculating a monetary conditions index for this period. The values of the monetary conditions index suggest that monetary authorities tend to intervene in the market through monetary policy in response to exchange market pressure.

Arize (2002) and Upender (2007) considered this issue in relation to India. Using the system approach of Johansen (1995) and the robust single equation approaches of Phillips and Hansen (1990) and Stock and Watson (1993), Arize (2002) found evidence in favor of cointegration over the period 1973-1998 in 35 out of 50 countries, including India. The results *of* Upende*r* (2007) based on the augmented Dickey-Fuller (ADF) and the Phillips- Perron (PP) tests on India's nominal exports and imports from 1949/50 to 2004/05, and also on the residuals from the cointegration regressions, indicated that India's exports and imports were cointegrated.

Dilip Dutta and Nasiruddin *Ahmed* (2006) in the aggregate import demand function for India, import volume is found to be cointegrated with relative import price and real GDP. In all, the authors argued that growth spurt prior to 1999 was fragile and volatile. They concluded that 1980s' reforms and their success provided crucial first-hand evidence to policymakers that gradual liberalization can deliver faster growth without causing disruption.

IMPOTANCE OF THE STUDY

The 'structural adjustment' of the early nineties was supposed once more to make India internationally competitive, and thus repair the perennial balance of payments problem. m. The trade deficit did shrink for a few years, but began by the mid-nineties to expand once more, as industrial production, particularly the production of import-intensive consumer durables, boomed. The boom petered out quickly, however, and by the early 2000s the average rates of growth of GDP and industrial production in the post-1991 period were in fact no better than in the eighties. The study will help in contributing to the existing literature on balance of payment in Indian context, as well as policy formulation and implementation aim at attaining sustainable balance of payment stability.

STATEMENT OF RESEARCH PROBLEM

In the year 1991, India experienced the worst ever BOP crisis since independence. The year 1990-91 witnessed three major developments which contributed to this crisis-(i) substantial increase in oil price following Gulf war that led to substantial increase in the import's bill of the country. Further the remittances from Indian workers employed in Kuwait also stopped, (ii) decline in exports due to disintegration of USSR and (iii) problems on the domestic front (like fiscal imbalance, double digit inflation, political uncertainty etc.). India's credit rating got downgraded and was denied access to external commercial credit markets. The net balance on invisibles account turned negative, trade deficit reached new peak and a net outflow of Non-Resident Indian (NRI) deposits occurred in 1990. All these led to a dwindling of India's foreign exchange reserves from a level of Rs. 5480 crore at the end of August 1990 to Rs. 1666 crore on 16th January 1991. Though emergency borrowings from the I.M.F. provided some temporary relief, the decline in reserves continued. By June 1991, the level of foreign exchange reserves dropped to the extent that they were barely sufficient to finance imports for a fortnight. The Government of India was on the verge of default on payment of external borrowings in June1991.

The current account deficit narrowed down in the year 2000-01 to about 0.5 percent GDP. India witnessed surplus in the current account for three consecutive years i.e. 2001-02, 2002-03, and 2003-04**.** This surplus was accompanied by strong net capital inflows. The current account recorded deficit since 2004-05 that is increasing. The deficit was caused by a burgeoning excess of merchandise imports over exports, which was left uncompensated by the net surplus in invisibles. The increase in imports occurs due to increase in the international price of crude and other major items of imports like gold.

OBJECTIVES

Against the above overview, the broad objective of the research is to focus on empirically assessing the determinants of imports and exports demand functions and how they affect balance of payments favorability in India using Johansen cointegration and vector error correction mechanism. Other specific objectives include:

1. to estimate the income, exchange rate elasticities and other elasticities in both imports and exports demand functions.
2. to ascertain the speed of adjustment in India's balance of payment situation by testing the *Marshall- Lerner* adjustment condition in the balance of payment.
3. to offer, based on research findings, concrete recommendations.

RESEARCH METHODOLOGY

The theoretical foundation on which the model was constructed is simple linear relationship between exports and imports as dependent variables on the one hand and on the other hand, the independent variables include, among others: gross domestic product, exchange rate, index of openness, employment level, level of foreign reserves, among others with the particular reference to India using vector error correction mechanism which made it strikingly different from previous studies.

The theoretical foundation of the import and export demand models here is rooted in the works of Khan (1074), Narasimhan & Princhett (1993) and Thirlwall (1999) which were modified and used by Yekini (1999), Aliyu (2001) Okoh (2002) and Rano (2007).

VECTOR AUTOREGRESSIVE MODEL

Vector autoregressive model (VEC) originates from reduced form VAR model. The unrestricted VAR stated each variable is a linear function of its own past values and past values of all other variables. A reduced form VAR of order *p* in levels of the variables can be expressed as follows:

$y_t = \Omega + \Phi_1 y_{t-1} + \Phi_2 y_{t-2} \ldots\ldots \Phi_p y_{t-p} + B\mu_t$ (3.1)

Where y_t is an (n x 1) vector of endogenous variables such that $y_t = (y_{1t,} y_{2t,} \ldots\ldots y_{nt})$; Ω is the vector constant; Φ_i is an (n x n) matrix of coefficients of lagged endogenous variables ($\forall$ i = 1, 2, 3,….,p) ; B is an (n x n) matrix whose non-zero off–diagonal elements allow for direct effects of some shocks on more than one endogenous variable in the system; and μ_t are uncorrelated or orthogonal white-noise structural disturbances i.e. the covariance matrix of μ_t is an identity matrix (μ_t, μ_t') = 1. Equation (3.1) can be rewritten in compact form as:

$y_t = \Omega + \Phi(L)\, y_{t-i} + B\mu_t$ (3.2)

Where Φ(*L*) is an (n x n) finite order matrix polynomial in the lag operator *L*. It should be noted that there exist a two method of identification in VAR framework, one among the method is to use variance-covariance matrix of the VAR framework by applying triangular process this can be done by applying Cholesky decomposition to the variance covariance matrix of the reduced form residuals μ_t Aliyu (2009).

The equation 3.1 in VAR model can be re-written in VEC approach as;

$\Delta y_t = \lambda_1 + \sum P^{-1} \Gamma_i y_{t-1} + \prod y_{t-p} + \varepsilon_t$ (3.3)

Δ is first difference lag operator, y_t denotes (n × 1) matrix of the random variables included in the model having stationarity properties of I(1). While λ_1 is the vector constant coefficient and ε_t is the vector of white noise process and contains information regarding the short-run relationships among the variables. The matrix $\prod$ denotes the long-run information contained in the data. It is the rank of $\prod = \psi\beta$, β the matrix of cointegrating vectors; the elements of ψ are known as the adjustment parameters in the vector error correction model. The rank implies that variables are cointegrated using the maximum eigenvalues and trace statistics test which are both adopted in this research.

SOURCE OF DATA

The research utilizes annual data for the period of 1974-75 to 2013-14. The data was sourced from one independent source: handbook of statistics on the Indian economy published by Reserve Bank of India, 2014.

MODEL SPECIFICATION

The functional Imports and Exports demand functions can be expressed in a Log-Linear form as:

$\mathbf{lnMP_t = \alpha_1 + \alpha_2 lnGDP + \alpha_3 lnEXR + \alpha_4 lnFRV + \alpha_5 lnIOP + \alpha_6 lnDlib + u_t}$ **(i)**

$\mathbf{lnEX_t = \beta_1 + \beta_2 lnGCF + \beta_3 lnEXR + \beta_4 lnGDP + \beta_5 lnEMP + \beta_6 lnDlib + u_t}$ **(ii)**

Where:

MP_t= Total Imports Volume
EX_t= Total Exports Volume
GDP = Gross Domestic Product
EXR = Exchange Rate
FRV = Foreign Exchange Reserve
IOP = Index of Openness
GCF = Gross Capital Formation
EMP = Employment Level
D*lib* = Dummy Variable
U_i= Error Term

The coefficients of imports equation α_2,α_3,α_4, α_5, and α_6, are the elasticities of income, exchange rate, foreign reserve, index of openness, and liberalization policy variables of Indian economy. On a priori expectations, only α_3 is < 0; while α_2, α_4, α_5, and α_6> 0. On the other hand, coefficients of exports equation that is: β_2, β_3, β_4, β_5, and β_6 are the elasticities of gross capital formation, exchange rate, income, employment, and liberalization policy variables. On a priori expectations, however, β_4< 0: while β_2, β_3, β_5, and β_6> 0.

Two dummy variables were included, one each in the import and export demand models to capture the period before and after the introduction of liberalization policy in the country during 1990. Both imports and exports were liberalized and the liberalization was further facilitated by the success many Asian countries have had owing to it. The dummies are binary 0, 1 variable. 1 is for post liberalization and 0 for pre –liberalization. Their coefficients are expected to assume any value between greater than or less than zero.

RESULTS AND DISCUSSION

The study uses descriptive and analytical tools analyzing the data. These includes statistical test of stationarity as a precondition for any time series analysis, Johansen cointegration, vector error correction model, impulse response functions and variance decomposition applies to each of the two models.

UNIT ROOT TEST

The Augmented Dickey Fuller Unit root test is to establish the order of integration of the time series variable hand in hand with Kwiatkowski-Philips-Schmidt-Shin (KPSS) test. The aim of any statistical analysis is to draw inference regarding the configuration of the population using sample observations. Most time series variables are non-stationary, and to obtain the level of stationary, they need to be differenced *d* time(s), expressed as I*(d).Egwaikhide* (1999) states that regression analysis in which one or more non-stationary variables are used in the model produces biased estimates or spurious results first discovered by Yule. Yule showed that (spurious) correlation could persist in nonstationary time series even if the sample is very large. According to Granger and Newbold, *an R^2>d is a good rule of thumb to suspect that the estimated regression is spurious*. Gujarati D N (2012)

There are many ways of testing for unit roots; the earliest was Augmented Dickey Fuller (ADF) Test. Others include Philips-Perron (PP), Test, and Kwiatkowski-Philips-Schmidt-Shin (KPSS) test. In this study we employ both the ADF and the KPSS tests. In ADF methods, the null hypothesis is that the time series have a unit root, that is, they are non-stationary. If the calculated test-statistics for our variables in their level forms are more negative than the critical values, the null hypothesis is rejected, suggesting that the variables are stationary in their level forms, i.e. they are I(0). In case where the variable is not stationary at levels, as it is so far, it has to be differenced. If the calculated test-statistics for our variables in their first differenced form are more negative than the critical values, the null hypothesis can be rejected, suggesting that our variables are stationary after differencing, which is denoted as I(1). However, in KPSS test the null hypothesis is that the time series has no unit root; that is they are stationary. If the t-statistics is insignificant, we accept the null hypothesis otherwise we reject it. The results of Augmented Dickey Fuller and Kwiatkowski-Philips-Schmidt-Shin unit root test are presented below:

TABLE 1: UNIT ROOT TEST (WITH INTERCEPT)

LEVEL FORM

Variables	ADF	KPSS
***Ln*MP**	-0.656878	0.166943
***Ln*GDP**	-1.181458	0.193271
***Ln*EXR**	-0.710185	0.133070
***Ln*FRV**	-1.494168	0.149126
***Ln*IOP**	-0.804558	0.175057
***Ln*EX**	-0.804684	0.175055
***Ln*GCF**	-1.898223	0.132058
***Ln*EMP**	-2.697996	0.194231

FIRST DIFFERENCE

Variables	ADF	KPSS
***Ln*MP**	-4.644461*	0.088713*
***Ln*GDP**	-7.176577*	0.046535*
***Ln*EXR**	-4.061313*	0.132694**
***Ln*FRV**	-4.202026*	0.080741*
***Ln*IOP**	-4.806496*	0.072719*
***Ln*EX**	-4.806656*	0.072713*
***Ln*GCF**	-6.730458*	0.152585*
***Ln*EMP**	-4.188390*	0.167652*

Source: E-views version 8, user work, 2015

Note * indicates significance at 1% and ** at 5%

The Mackinnon (1996) 1% critical value is -3.485 and the KPSS (1992) 1% critical value is 0.739 thus, denotes the rejection null hypothesis of unit root in ADF test and the acceptance of same null hypothesis of stationarity in KPSS test.

The results of the ADF, and KPSS tests in table (3) show that none of the series is stationary at their levels. Since their test statistics are smaller than Mackinnon 1% critical value of -3.485. When the test is apply to first difference of the series, they all become stationary. i.e, they are integrated order of I(1). Results based on the KPSS deviate partly from those of the ADF. The KPSS test applied in the level variables fails to reject null hypothesis of stationary and accept stationary in their first difference. It seems the results from KPSS and ADF are same. Therefore it can be concluded that the series are integrated of order I(1) and they have a long run relationship.

JOHANSEN TEST OF COINTEGRATION

The Johansen test is a test for cointegration that allows for more than one cointegrating relationship, but unlike the Engle-Granger method, but this test is subject to asymptotic properties, i.e. large samples. If the sample is too small then the results will not be reliable and one should use Auto Regressive Distributed Lags (ARDL).

TABLE 2: JOHANSEN TEST OF COINTEGRATION OF IMPORT DEMAND

Hypothesised No of CE(s)	Trace Statistics	0.05 C.V	Max-Eigen value Statistics	0.05 C.V
None*	124.5937	95.75366	47.91470	40.07757
At most 1*	76.67901	29.92620	29.92620	33.87687
At most	46.75281	47.85613	20.56781	27.58434
At most 3	26.18499	29.79707	16.63082	21.13162
At most 4	9.554173	15.49471	5.961230	14.26460

Source: E-views version 8, user work, 2015

The result from trace statistics above indicates two cointegrating equations whereas the maximum eigenvalue suggest the existence of only two cointegrating equations at 5 percent level of significance.

As the speed of adjustment coefficients provide additional base for inferring short run dynamic among these variables. If we select r =1 and normalize the cointegrating vector with respect to import, then the long run equilibrium relationship can be shown as:

TABLE 3: IMPORT DEMAND COINTEGRATED COEFFICIENTS (EQUATION 1 AND 2)

$lnMP_t$	lnGDP	lnEXR	lnFRV	lnIOP	lnDlib
1.0000	-6.9354	3.44516	-1.4916	3.3473	-2.0299
	(1.7309)	(0.6025)	(0.2124)	(0.3823)	(0.4149)
1.0000	1.0000	-0.1289	-0.7860	-0.2067	0.6541
		(0.1849)	(0.1317)	(0.1729)	(0.2146)

Note: standard errors are included in the bracket

From the tabular presentation above we derived the cointegrated equations of import demand and its determinants. The normalized equations and the value of vector cointegration can be represented as:

$lnMP_t$= -6.9354GDP + 3.44516EXR –1.4916 FRV + 3.3473IOP -2.0299Dlib + u_t (iii)

$lnMP_t$ = -0.1289EXR - 0.7860FRV – 0.2067IOP +0.6541Dlib + u_t (iv)

Although equation (iv) has some important implications as well but we restricted the analysis on equation (iii) because it corresponds greatly with theoretical expectations. The cointegrating parameters on the above equation (iii) shows that the explanatory variables have great impact on import volume. All the explanatory variables are statistically highly significant at 5% level. However, the explanatory variables have theoretically consistent signs apart from exchange rate which is incorrectly signed. All things being equal, higher import will reduce gross domestic production significantly and also leads to decline in foreign reserve of India. The results also show that liberalization policy help India in curtailing import level significantly.

VECTOR ERROR CORRECTION MODEL (VECM)

In time series analysis a variables exhibit long run relationship is expected to have an error-correction component, showing how equilibrium will converge towards short run adjustments. Therefore, we aimed to identify the effects of the estimated long-run equilibrium on the short-run dynamics. This implies whether the parameter of the error correction term is correctly sign and significantly different from zero, (vector of import demand function). The VEC is presented as follows:

TABLE 4: VECM OF IMPORT DEMAND

Variables	Coefficients	t-value	p-value
ECM(-1))	-0.860602	-4.738579	0.0001
D($lnMP_t$(-1))	0.349343	1.657616	0.1116
D(lnGDP(-1))	0.897814	1.377072	0.1823
D(lnEXR(-1))	0.592489	2.51784	0.0208
D(lnFRV(-1))	-0.172491	-1.393068	0.1775
D(lnIOP(-1))	0.147808	0.637281	0.5305
D(Dlib(-1))	0.421326	3.366055	0.0028

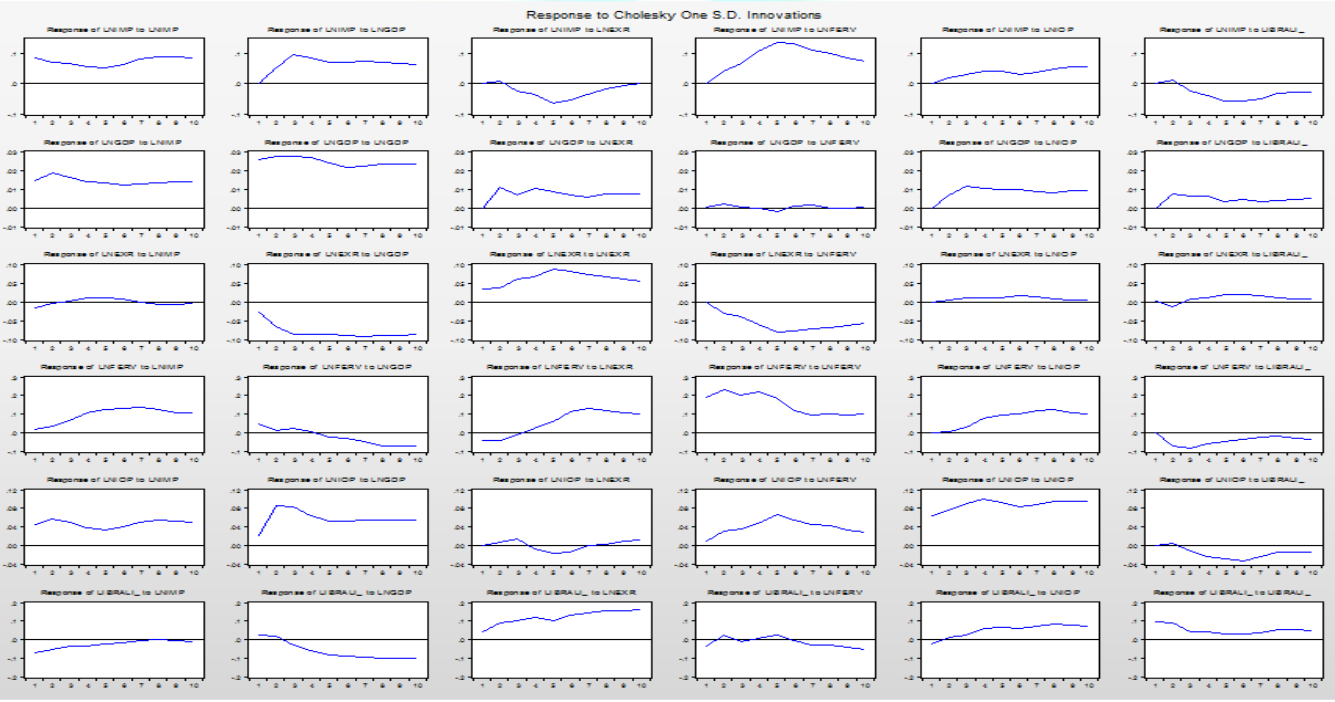
R^2 = 0.74 Adj R^2 = 0.58 D.W. = 2.27 F = 4.85

The error correction model results is correctly sign and statistically highly significant at 1 percent level. This implies that the coefficient of -0.86 is suggesting that about 86 percent disequilibrium in import demand is corrected within the year under study. Therefore, when imports are below or above equilibrium level it adjusts approximately by 86 percent to restore the equilibrium within first year. The sign of the coefficient of vector error correction must be negative and significance for us to conclude that there is cointegration in the model; by implication it means convergence towards equilibrium level in the future. The value of R^2 which gives the overall fitness of the model has a higher value; hence reveals a strong explanatory power of the independent variables in the model. The F-statistics shows that the coefficients of the independent variables in the model are all non-zero. D.W statistics shows an element of positive autocorrelation.

IMPULSE RESPOSE FUNCTION OF IMPORT DEMAND

The impulse response function of import demand is developed tracing the effect of innovations from the vector endogenous variables in the VECM model. Figure 4.3 below shows the responses of endogenous variables to its own shock and that of others variables. For instance, the responses of imports level on its own in the short run and long run are both positive 0.05 percent, and 0.08 percent respectively. While the response of import on income is also positive in both short run and long run as 0.07 percent and 0.07 respectively. The responses of import on exchange rate are totally negative in both periods which are -0.07 percent in the short run and -0.00 percent in the long run. Import responses to foreign reserves are totally positive in short run and long run as 0.14 percent and 0.07 percent. Import response on index of openness is also totally positive in short run and long run as 0.04 percent and 0.05 percent respectively. And lastly, the responses of import on liberalization are totally negative in both short run and long run as -0.06 and -0.03 respectively. This implies 1 percent of depreciation in exchange rates will lead to 7 percent increases in import and 7 percent rise in income.

FIGURE 1: IMPULSE RESPONSES OF IMPORT DEMAND



VARIANCE DECOMPOSITIONS OF IMPORT DEMAND

The variance decomposition helps break down the forecast variance of imports level into component that can be attributed to each of the various shocks tracing the relative importance of the various fluctuations. The findings from variance decomposition of import level account for 100 percent for its own shock, it further decline to 22.47 percent after five years and 23.91 percent after ten years. While income account for 25.04 percent fluctuations in 5 years and slightly decrease to 21.17 percent in long run, it can also be shown the effect of exchange rate on the import fluctuation is less than that of income, as it account for 6.23 and 4.55 percent in both short run and long run respectively. Foreign reserve on import has the greatest effect in both short run and long run, as it accounts for 36.21 and 37.88 percent respectively. While trade openness has least effect on import, as it accounts for 4.56 and 6.52 percent in short run and long run respectively. Lastly, policy variable proxied as dummy variable accounts for 5.48 and 5.96 percent respectively in both short and long run periods. The result of variance decomposition is depicted below:

TABLE 5 VARIANCE DECOMPOSITION OF IMPORT

Time	$lnMP_t$	lnGDP	lnEXR	lnFRV	lnFRV	lnDlib
1	100.0	0.00	0.00	0.00	0.00	0.00
5	22.4	25.0	6.23	36.2	4.56	5.48
10	23.9	12.2	4.55	37.9	6.53	5.96

Source: E-views version 8, user work, 2015

TABLE 6: JOHANSEN TEST OF COINTEGRATION OF EXPORT DEMAND

Hypothesised No of CE(s)	Trace Statistics	0.05 C.V	Max-Eigen value Statistics	0.05 C.V
None*	129.6541	95.75366	36.70034	40.07757
At most 1*	92.95378	29.92620	33.88739	33.87687
At most	58.06639	47.85613	28.16311	27.58434
At most 3	29.90328	29.79707	20.66497	21.13162
At most 4	9.238315	15.49471	9.198765	14.26460
At most 5	0.039550	3.841466	0.039550	3.841466

Source: E-views version 8, user work, 2015

The result from trace statistics above indicates four cointegrating equations whereas the maximum eigenvalue suggest the existence of no cointegrating equations at 5 percent level of significance respectively.

TABLE 7: EXPORT DEMAND COINTEGRATED COEFFICIENTS (EQUATION 1 AND 2)

$lnEX_t$	lnGCF	lnEXR	lnGDP	lnEMP	lnDlib
1.0000	1.7835 (0.6261)	2.2701 (0.5225)	-5.2298 (0.9343)	-2.2124 (0.7265)	-2.3845 (0.4677)
1.0000	1.0000	2.6800 (0.5604)	-3.2478 (0.3944)	1.0086 (0.3882)	-1.9892 (-1.9892)

Note: standard errors are included in the bracket

From the tabular presentation above we derived the cointegrated equations of export demand and its determinants. The normalized equations and the value of vector cointegration can be represented as:

$lnEX_t$= 1.7835GCF + 2.2701EXR – 5.2298GDP - 2.2124EMP – 2.3845Dlib + u_t (v)

$lnEX_t$ = 2.6800EXR - 3.2478GDP + 0.2081EMP – 1.9892 Dlib + u_t (vi)

Although equation (vi) has some important implications as well but we restricted the analysis on equation (v) because it corresponds more with theoretical expectations as far as the signs are concerned. The cointegrating parameters on the above equation (v) shows that the explanatory variables have great impact on export volume. Exchange rate, employment, income and liberalization policy are all overwhelmingly statistically significant at 1% whereas gross capital formation is statistically significant at 5%. However, only exchange rate, and capital formation have theoretically consistent sign while income, employment and liberalization policy instruments were incorrectly signed. Higher value of exchange rate and capital formation will stimulate export demand whereas rising income is and employment are likely to reduce it which contradicts the theory. The results also show that liberalization policy in India does not favor export demand function within the period under review.

VECTOR ERROR CORRECTION MODEL (VECM)

In time series analysis a variables exhibit long run relationship is expected to have an error-correction component, showing how equilibrium will converge towards short run adjustments. Therefore, we aimed to identify the effects of the estimated long-run equilibrium on the short-run dynamics. This implies whether the parameter of the error correction term is correctly sing and is significantly different from zero, (vector of export demand function). The VEC is presented as follow:

TABLE 8: VECM OF EXPORT DEMAND

Variables	Coefficients	t-value	p-value
ECM(-1))	-0.017027	-0.393248	0.6979
D($lnEX_t$(-1))	0.263922	1.071901	0.2954
D(lnGCF(-1))	0.058137	0.356332	0.7250
D(lnEMP(-1))	-0.225933	-0.531468	0.6004
D(lnGDP(-1))	0.468355	0.576855	0.5699
D(lnEXR(-1))	-0.031469	-0.088431	0.9303
D(Dlib(-1))	0.117576	1.039002	0.3101

R^2 = 0.51 Adj R^2 = 0.22 D.W. = 1.77 F = 1.77

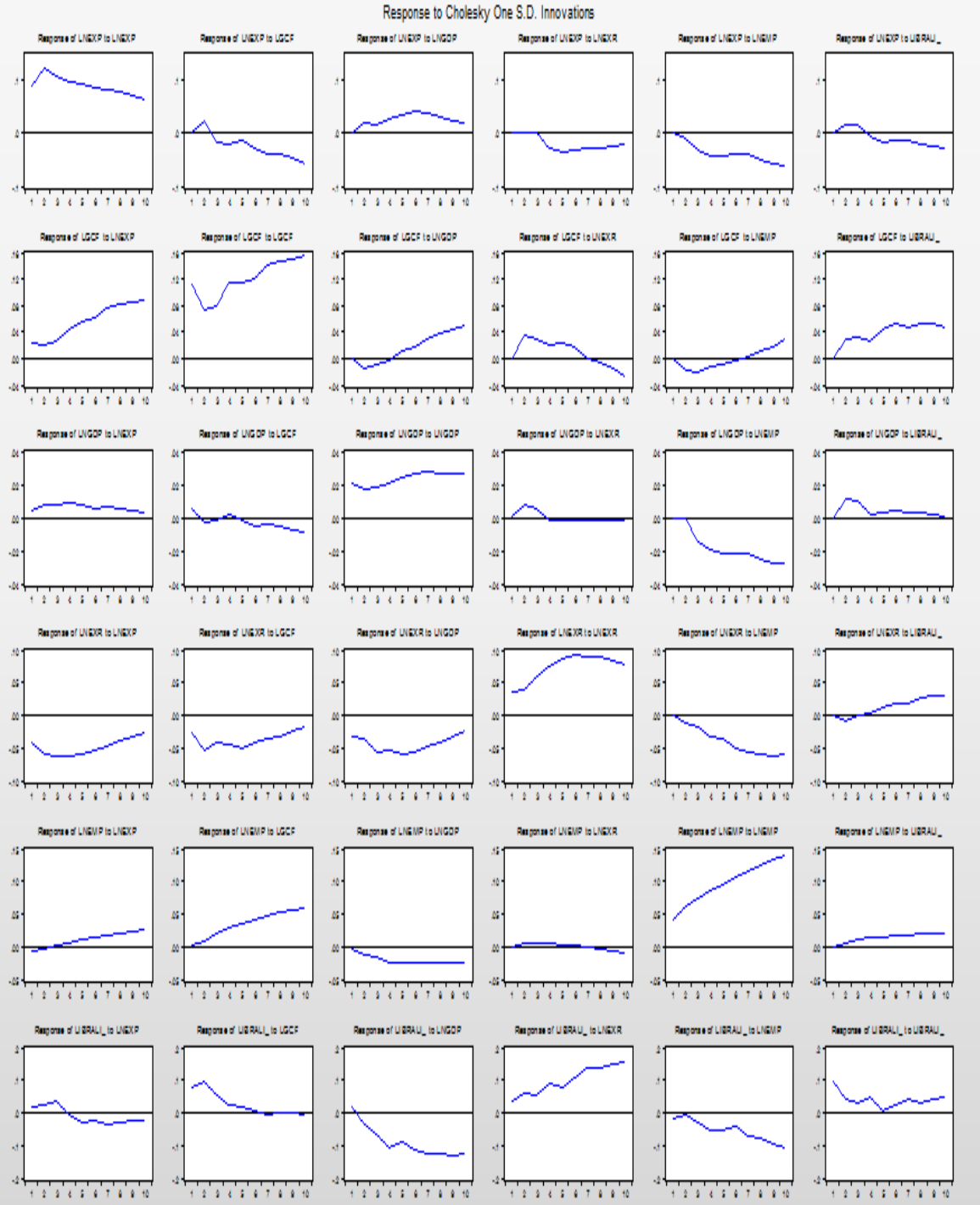
The error correction model results is correctly sign but statistically insignificant at 5 percent level. This implies that disequilibrium in export demand is not corrected within the years under study. Therefore, when exports are below or above equilibrium level it does not adjusts in restoring its equilibrium position within first year. The sign of the coefficient of vector error correction must be negative and significance for us to conclude that there is cointegration in the model; by implication it means convergence towards equilibrium level in the future which is actually not so in case of export demand function. The value of R^2 which gives the overall fitness of the model has average value; hence reveals a less explanatory power of the independent variables in the model. The F-statistics shows that the coefficients of the independent variables in the model are all non-zero. D.W statistics shows no autocorrelation at 10 percent level.

IMPULSE RESPOSE FUNCTION OF EXPORT DEMAND

The impulse response function of export demand is developed in order to trace the effect of innovations from the vector endogenous variables in the VECM model. Figure 4.4 below shows the responses endogenous variables to its own shocks and that of other variables. For instance, the responses of export level on its own in the short run and long run are both positive 0.09 percent, and 0.06 percent respectively. While the response of export on gross capital formation is totally negative in both short run and long run as -0.01 percent and -0.06 respectively. The responses of export on income are totally positive in both periods which are -0.04 percent in the short run and 0.02 percent in the long run. Export responses to exchange rate are totally negative in short run and long run as-0.04 percent and -0.06 percent. Export response on employment is also totally negative in short run and long run as -0.04 percent and -0.06 percent

respectively. And lastly, the responses of export on liberalization are totally negative in both short run and long run as -0.02 and -0.03 respectively. This implies 1 percent of depreciation in exchange rates will lead to 4 percent increases in export and a corresponding 4 percent rise in income.

FIGURE 2: IMPULSE RESPONSES OF EXPORT DEMAND



VARIANCE DECOMPOSITIONS OF EXPORT DEMAND

The variance decomposition helps break down the forecast variance of imports level into component that can be attributed to each of the various shocks tracing the relative importance of the various fluctuations. The findings from variance decomposition of export level account for 100 percent for its own shock, it further decline to 82.1 percent after five years and 64.7 percent after ten years. While gross capital formation accounts for 2.15 percent fluctuations in 5 years and 8.63 percent in long run, it can also be shown the effect of exchange rate on the export fluctuation is higher than that of income, as it account for 6.72 and 10.3 percent in both short run and long run respectively. Income on export has the least effect in both short run and long run, as it accounts for 0.65 and 0.42 percent respectively. Employment on export however has effects, as it accounts for 7.32 and 13.6 percent in short run and long run respectively. Lastly, policy variable proxied as dummy variable accounts for 1.09 and 2.23 percent respectively in both short and long run periods. The result of variance decomposition is depicted below:

TABLE 9: VARIANCE DECOMPOSITION OF EXPORT

Time	$lnEX_t$	lnGCF	lnEXR	lnGDP	lnEMP	lnDlib
1	100.0	0.00	0.00	0.00	0.00	0.00
5	82.1	2.15	6.72	0.65	7.32	1.09
10	64.7	8.63	10.4	0.42	13.6	2.28

Source: E-views version 8, user work, 2015

FINDINGS

Results from Jonansen test of cointegration revels several cointegrating equations in both import and export demand functions respectively. Following the use of vector error correction model we found that there is a long run relationship in import which is not the case with export demand function. These would be very useful for policy formulation and implementation. A result of the estimated vector autoregressive model shows that:

Current income level exerts significant influence on both Imports and Exports demand functions. This is theoretically consistent, and does obviously reflect the actual imports and exports patterns in the country. As world income increases, India's export shrinks because of very higher income elasticity.

In absolute terms, exchange rate significantly affects imports more than exports and this largely, is due to the intrinsic nature of India's exports and multifarious nature of its imports.

The Marshall-Lerner condition is said to hold in India. The absolute sum of coefficient of elasicities is greater than one from the two models.

It was further discovered that index of openness in the import model stimulates more export while, liberalisation proxied by a dummy variable is anti-exports rather stimulates imports.

In the long run, other factors not included in the model but captured by the error correction mechanism in imports model exert negative influence on imports, while the same in the exports model exert also negative influence on exports. Thus, although disequilibrium in the short run is possible, but this suggests that there is no room for convergence in the long run.

RECOMMENDATIONS

To achieve a better foreign trade and exchange rate policy and promotion of balance of payment stability, the research recommends that:

1. Although openness is inevitable in today's global world, sequencing of phases of liberalization is highly desirable, especially in a developing economy like India, this is especially so because the coefficient of dummy variable in the export model was considerably negative.
2. Fulfilment of the Marshall-Lerner condition unveils the need for ensuring greater stability in the foreign exchange market for the attainment of a stable exchange rate.
3. Income restriction and expenditure switching measures to free resources for direct investment in the former and to sway attention away from wasteful consumption in the latter should also be put in place.
4. As the sum of elasticities in both models is greater than one, currency devaluation would have positive impact on trade balance and hence balance of payment favourability.

CONCLUSION

The research presents empirical analyses of the import and export demand functions in the Indian economy from 1983-84 to 2013-14. Although there was no consensus on the specific factors affecting imports and exports demand models, most applications of these models to different countries adopt a similar approach, we use vector autoregressive and vector error correction model. Results from Jonansen test of cointegration revels several cointegrating equations in both import and export demand functions respectively. Following the use of vector error correction model we found that there is a long run relationship in import which is not the case with export demand function. These would be very useful for policy formulation and implementation.

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