THE EFFECT OF GDP AND EXCHANGE RATES ON THE TRADE BALANCE BETWEEN THE UNITED STATES AND INDIA

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Abstract
The purpose of this study is to examine how the trade balance between India and the United State of America is influenced by the Dollar/Rupee exchange rate as well as US and Indian GDP. This study also briefly examines the Marshall-Lerner condition and J-curve phenomena. The independent variables used in this study are Imports value, Exports value, domestic GDP and REER to analyze Annual GDP. The sample period of this study is 1960 to 2016. The elasticity approach models are used to analyze the US and India trade balance. Results from both models show a fall in Indian GDP positively impacts the trade balance; while a drop in the US GDP negatively affects the trade balance. Most importantly results show that the trade balance displays an immediate positive reaction to a depreciation of the Rupee. Further, the effects of depreciation have a positive impact on the trade balance for an additional three periods following the depreciation. These results support the hypothesis that the Marshall-Lerner condition is met and provide no evidence of J-Curve patterns.

Keywords: Devaluation, J-Curve, Reer, Depreciation.

Introduction
Devaluation or depreciation plays a major role in the balance of trade of the country. The trade balance between India and the USA is influences mainly on real effective exchange rate of the US dollar and Indian rupee. Due devaluation of rupee of India is trade balance increased or decreased with the US and India holds Marshall-Lerner condition.

The J-curve terminology was first introduced by **Prof. Stephen P Magee** (1973) after the 1967 devaluation of the Pound Sterling (See NISER, 1968, p.11) which was followed by a trade deficit which was tested until 1970 and later on it was developed by Bahamani-Oskooee in 1985.

Review of Literature
The Marshall-Lerner condition, Elasticity approach, Monetary approach, and Absorption approaches are used to estimate short run and long run relationships between trade balance and exchange rate in different countries a number of studies attempted applying different theoretical and methodological constructs. In this paper, some of these studies are summarized in terms of their methodologies and findings.

Christensen C (2012) in his paper, "**The Effect of GDP & Exchange Rates on the Trade Balance Between the United States and Mexico**" The study revealed that if the country impalement the successful trade policy is depends on currency devaluation or depreciation of that country and study examined that the bilateral trade between Unites Status and Mexico and based on the Marshall-Lerner condition and J-curve phenomenon and both have similar conclusion, the study have two subsections namely, elasticity approach and absorption approach of Himarios and has used Quarterly data from 1994(Q1) to 2010(Q4).They are analyzed using each model and The sample period has chosen because the Peso was revalued in 1993 and 1994(Q1) has taken because revaluation process not completed and data on United States GDP, Mexican GDP, nominal exchange rate, Consumer Price Index, money supply, government expenditure, and interest rates have spanned from International Financial Statistics of International Monetary Fund and Trade balance data has sourced from the United States Census Bureau in monthly form and compiled into quarterly observations. The Consumer Price Index is used to calculate the real trade balance, real U.S. GDP, real Mexican GDP, and the real exchange rate. The independent variables are highly statistically significant determinants of trade balance. The study concluded that import and export elasticities are greater than one then Marshall-Lerner condition holds in both counties, this has implies by positive coefficient of real exchange rate and provided support for monetary policy, fiscal policy.

Yu Hsing (2010), in his paper, **"Test of an Inverted J-Shape Hypothesis between the Expected Real Exchange Rate and Real Output: The Case of Ireland"** the paper has applied an open-economy macroeconomic model and Due global financial recession in 2008 the Ireland effected from this effect and IMF quoted in 2009 the problems of Ireland as high dependence on construction, housing prices overvaluation, over expansion of banking sector,

global competitive disadvantages, falling international market shares, high unit labor costs, declining share of FDI, risks associated with falling inflation, vulnerability in the financial sector, low interest margins, lack of growth in deposits, concentration of loan portfolios in residential mortgages, commercial properties, and real estate developments, and other challenges. The paper has examined that the roles of real exchange rate and other related macroeconomic variables affecting output fluctuations. The study used the variables real GDP in Ireland, the domestic real interest rate, government spending, government tax revenues, the real financial stock price, the real exchange rate measured as the euro per U.S. dollar times the relative prices in the U.S. and the EU (An increase means real depreciation of the euro), the inflation rate, world real interest rate, the expected real exchange rate, the expected inflation rate, potential output for Ireland, and these variables data spanned from International Financial Statistics of IMF and European Central Bank during 2001(Q1) to 2009(Q1) and these variables are checked by ADF and ECM. The study has concluded that the evidence of an inverted J-shape relationship between the expected real exchange rate and real output, suggesting that expected real depreciation would increase real output up to 2001(Q3) real output raise after 2001(Q3) due to real appreciation. Besides, a higher real stock price index, a higher refinancing rate, or a lower expected inflation rate has helped to raise real output. Expansionary fiscal policy represented by a higher ratio of government borrowing to GDP is found to be insignificant.

Research Gap: The number of research work done on, to compare the J-curve effect between developed and developing countries this paper finds how the devaluation improves the balance of trade between developed and developing countries like, India and The USA.

Objectives of the Study: The study is undertaken to examine the existence of J-curve. The tendency of expecting J curve in nation's exchange rate is to examine the effect of devaluation on its trade balance. Hence, to study this research question following objective i.e., to compare the J-curve effect between developed and developing countries is formulated.

Hypothesis: The stated objective is tested by using the following hypothesis
H1: There is a significant impact of the trade balance on exchange rate of India with the US.

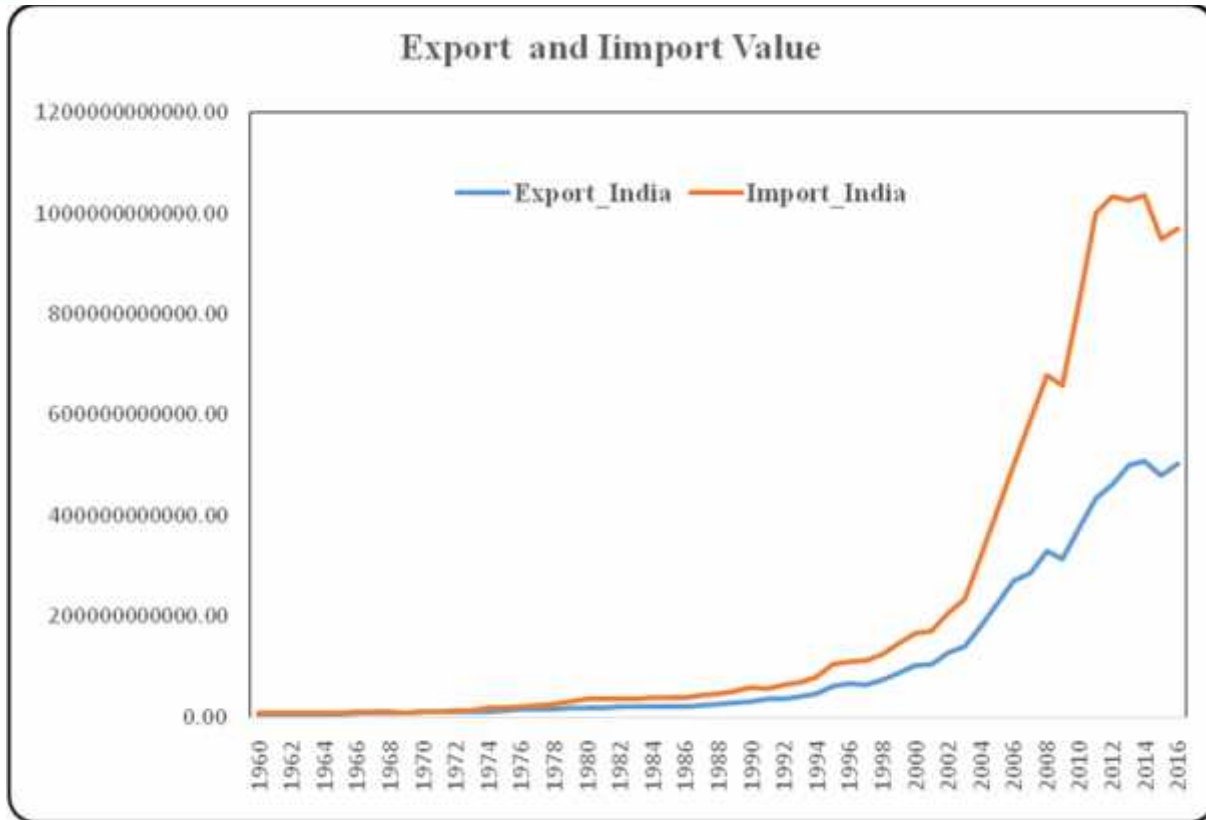**Research Methodology:** This paper used the model specification of Ordinary Least Square Method.

Period of Study: The present study has undertaken by using the time period of the macroeconomic variable from 1960 to 2016.

Data Description: The estimated period of model is 1960 to 2016 using annual data of Real Effective Exchange Rate (REER), GDP, Imports value, Exports value, and Balance of trade from International Financial Statistics & Direction of Trade Statistics of IMF and World Development Indicator of World Bank.

Quantitative Tools and Econometric Methodlogy
To study the stated objective and to test the hypothesis, statistical tool of descriptive statistics and simple correlation is used. The econometric model of bivariate regression model of first difference is applied.

The present research paper studies the well-known model to evaluate the effects of depreciation of the nation's balance of trade. The major approach and most popular approach of Elasticity approach is employed to analyse the effect of depreciation on the trade balance. The variables chosen for the study is transformed into logarithmic form. Hence, the variables are interpreted in terms of percentage change in the regressor due to percentage change in regressed.

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The table indicates that India's trade balance from 1960 to 2016 and shows that Marshall-Lerner condition holds partially and improves India's GDP.

Table No: 1 Descriptive Statistics

	LNGDPI	LNGDPU	LNREER	LNXM
Mean	26.86611	29.72995	3.676664	-0.156098
Median	26.75697	29.78022	3.659765	-0.130670
Maximum	28.53319	30.45630	4.225390	0.375902
Minimum	25.64139	28.75532	2.983815	-0.558822
Std. Dev.	0.857313	0.508442	0.374359	0.187291
Skewness	0.371942	-0.242271	-0.065254	-0.011114
Kurtosis	1.924382	1.856957	1.585683	3.422923
Jarque-Bera	4.062009	3.660652	4.791146	0.425976
Probability	0.131204	0.160361	0.091120	0.808166
Sum	1531.368	1694.607	209.5698	-8.897585
Sum Sq. Dev.	41.15917	14.47675	7.848094	1.964354
Observations	57	57	57	57

The stated model is estimated by using OLS method and estimated model parameters are as follows.From the Table 2, the simple correlation between export value index with import value index high degree positive due to trend pattern in the data as well as non-stationary and both are I(1). Hence by transforming the Import and export index into trade, the following regressing model of trade balance on exchange rate is obtained.

$$Y_t = \beta_0 + \beta_1 X_t + u_t$$

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The following model is specified to study the effect of depreciation on the trade balance:

$$ln\left(\frac{X}{M}\right) = \alpha_0 + \beta_1 \ln(Y_{India}) + \beta_2 \ln(Y_{USA}) + \beta_3 \ln(REER) + \varepsilon_t$$

Variable	Definition	Expected Sign of coefficients
$\left(\frac{X}{M}\right)$	It measures the ratio of exports to Imports of India. Exports of goods and services are expressed into constant prices of 2010 in US\$. Imports of goods and services are expressed into constant prices of 2010 in US\$.	*
Y_{India}	It is the GDP of India. Expressed in constant prices of 2010 in US \$.	$\beta_1 < 0$
Y_{USA}	It is the GDP of India. Expressed in constant prices of 2010 in terms of US \$.	$\beta_2 > 0$
$REER$	Real Effective Exchange Rate. Expressed Indian Rupee in terms of US dollar	$\beta_3 > 0$

The ratio of exports to imports is used in the stated model rather than trade balance as regress and because of the ratio of exports to imports can be viewed as either nominal or real and it is insensitive for changes in the scale of measurements or levels of price. Since they are expressed in the form of logarithms, hence, it is the directly captures the Marshal-Learner condition.

The domestic and foreign outputs are major determinants and cause the movements in the nation's balance of trade. The rise of domestic GDP has direct effect on the imports since rise in domestic GDP enhances the propensity to import and causes the deficits in trade balance. Similarly rise of foreign GDP has direct effect on the exports of domestic nations since the rise in foreign GDP enhances the propensity to import from the foreign nationals and leads to positive effect on trade balance. Therefore the signs of the parameters in the model are expected to be as $\beta_1 < 0$ and $\beta_2 > 0$.

The Real Exchange Rate is computed by using consumer price index of both the nations.

$$REER = \frac{e \ P_{India}}{P_{USA}}$$

Here e = Nominal Exchange Rate between Rupees per Dollar. P_{India} is the consumer price index of India and P_{USA} is the consumer price index of USA. The change in the exchange rate basically captures the relative changes in the price level of both countries. A Rise in REER reveals the appreciation of Indian Rupee and less rupee per dollar. As per the theoretical reviews, depreciation of domestic currency against the foreign currency leads dearer of imports and cheaper of exports, therefore, it affects the trade balance positively. Hence the sign of β_3 is expected to be positive and most of the research in this direction have revealed that the $\beta_3 > 0$ is the satisfaction of Marshal-Learner condition.

Results: The results of the study related to elasticity approach have reveals that the three regress or are the major determinant of trade balance of a country. The output of the model is demonstrated as below:

$$Y_t = 27.64702 - 0.14434 X_t$$

Std.Error	(2.72212)	(0.03381)
t Stat	(10.15641)	(-4.26932)
P value	(0.00000)	(-0.00015)
F = 18.22711		P value = 0.000149
R square = 0.3490		Adjusted R Square = 0.3299

From the estimated model it can be conclude that the regression coefficient of X_t = trade balance on Y_t = exchange rate of Rs as against $ is statistically significant. Since the regression coefficient is negative it can be infer that the negative balance of trade is influencing the exchange rate negatively.

Conclusion
Among the fast growing developing economies, Indian economy is growing an average of 7% per annum. In pace with this growth rate, the export and import of the country is also alarming increased over the few decades. The scenario of higher growth in export and import are not matching equally; therefore, excess of import over the export having negative impact on BOP. The chronicle unfavorable condition in BOP is always detrimental. Therefore, the present paper reveals that the depreciation of Indian rupee or devaluation of the currency through policy decision did not add much benefit and unsupported to the earlier research work of J-curve effect of devaluation. Hence, the existence of J-curve may not uniform to all the economies and to check the unfavorable condition of BOP, India need to proceed with other measures of export promotions.

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