

# Exchange Rate Valuation and India USA Bilateral Trade: An Elasticity Approach

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## ABSTRACT

Exchange rate plays a very important role in a country's trade performance. In fact, the effects of undervalued currency on prices are similar to those of an export subsidy and import tax. A change in the exchange rates has two effects on the flow of trade – price effect and volume effect. Concerning the same, this paper is articulated to estimate the price and income elasticity of India's trade with USA. The results show that undervaluation of Indian currency against US dollar is deteriorating the overall trade flows as depreciation hits exports more than imports. One per cent undervaluation leads reduction of 14.5 per cent in raw material exports which is too large and bothersome situation for country like India. Especially, rupee undervaluation is extremely bad for raw material exports and moderately bad for capital exports – the sectors where India needs to grow in world market because Indian revealed comparative advantage is low in both the areas comparatively. Moreover, rupee undervaluation also hits imports that are essential not only for consumer in particular but crucial for development of the Indian economy in general. Therefore, this research article hereby draws the attention of international economic bodies towards the issue of currency valuation which causes the dramatically negative effects on developing nations trade which could be worsen the economic growth of the developing economies. This paper thus suggests to policy practitioner that there should be framework or limits within which currencies could depreciate so that developing nations could actively take participation in globalization process.

**Keywords:** Bilateral Trade; Relative Valuation of Currency; Marshall- Lerner Condition; Globalization

## Introduction

The catchphrase “**Be Indian Buy Indian**” again came in the motion for providing the safeguard to domestic industries with converting the jobless growth into job-led growth within the economy. This is not the story of Indian economy, but it is widely spread across the globe. At this time, protectionism has snatched central stage in economic policies throughout the world, even among developed nations. It is very surprising fact, that the leading economies of the world USA and UK, which were then protagonist of globalization of production and trade - reversing the trend and switching towards trade protectionism, technically referred as **de-globalization** and **Globalization 2.0**. The term de-globalization coined by economic and market commentators to present the current scenario of several countries wanting to go back to economic and trade related policies which place their national interest first.

Considering the issues of consistent trade deficit and relative valuation of the currency - have been experiencing by all the major players of international trade. In order to get rid from this burning issue, currency measure is widely considered as acceptable tool. In fact, lower value of national currency in terms of foreign currency has similar effects; either it is the currency devaluation; depreciation or undervaluation. These all currency measures increase the exports (by making domestic goods to foreigners), curtail the imports (by making foreign products expensive) and ultimately alleviate the problem of trade deficit.

Sometimes country deliberately makes its currency devalued aiming to solve the problem of chronic and fundamental disequilibrium in trade balance. In short, for promoting the exports, country chooses the option of currency devaluation. However, it is not sure-footed that by lowering currency value, problem of balance of payments could be eliminated downrightly. Its degree of success depends upon certain economic conditions. First and foremost, it should behave in desired manner that devaluation promotes export and checks imports. But, if the both exports and imports of a country are price inelastic, then it will create distortion in trade surplus rather than improving it. In this regards Marshall Lerner quantified the success of devaluation assured by the devalued price elasticity of exports and imports, if the sum of both the elasticity is greater than unity ( $ex + |em| > 1$ ), it will lead improvement in level of balance of payments and if the sum is less than unity ( $ex + |em| < 1$ ), it will worsen the problem. Economists ponder this approach as elasticity optimism.

Considering all this facts, in order to test the Marshall-Lerner Condition in contest to India's bilateral trade with USA, this research paper is articulated.

### Review of Literature

Incorporating theoretical underpinning in the pragmatic research, Boyd, Maria and Smith (2001) estimated Marshall- Lerner conditions and J- curve approach in their research work. This analysis with capturing eight countries quarterly dataset from 1975 Q1 to 1996 Q4 and by using Polynomial ARDL model concludes that Marshall Lerner condition does not hold in the case of selected eight countries in the short run because J-curve effects work while in the long run export elasticity and import elasticity supports the concept of Marshall Lerner condition.

Although, this conceptually frameworks will not work barely through undervalued currency in pragmatic world effortlessly, rather depends upon the elasticity of export and import elasticity. This elasticity approach, also known as the "imperfect substitutes" model, is still widely and most commonly used in trade analysis.(Derick Boyd & Caporale,2001).

Assessing the same M-L condition in respect to the small price taking economy i.e. Ghanaian economy Bhattarai and Armah (2005) brought the fact into the light that devaluation is not successful in short run in the small economy as the imports price elasticity was come out the inelastic. Though, in the long run LMR conditions somewhat fulfills and results would be near to one after adding up the elasticities. These results are based on co integration VECM model applied on the annual data series from 1970 to 2000.

Moreover, structure of exports and imports also does matter in determining the effect of currency valuation on balance of payments. As chiefly emphasized by Singer and Prebisch (1949) that not only the elasticity's but the composition of exports and imports, if the exports consist primary products and imports demand manufacturing products, it will surely deteriorate the balance of payments under the devaluation condition. More densely, it can be explained in terms of domestic economic condition of the country. If in case, the external price instability is translated into internal price instability so the cost-price structure of devaluating country is not in situation to support the desired effect of devaluation. Last but not the least, other countries must be prepared to cooperate the devaluation of reporting country and not to think for imposing import duties, otherwise the effect of devaluation tend to vanish out. One more important thing is that, if partner countries also adopt the same devaluation concurrently, so the devaluation would not function because of retaliation.

On the whole, undervalued exchange rate has two effects on the trade flows – the price effect and the volume effect. The former implies that undervalued currency will cause imports to be more expensive and exports to seem cheaper in the short term. The balance of trade may deteriorate in the short run due to the time required

for the exports and imports to adjust to the new exchange rate. Once the economy set off with new system, volume of trade begins to respond to the undervalued currency, so-called “volume effect” of undervalued currency will reverse the trade balance movement and eventually improve it. In simple words, the domination of the volume effect over the price effect in the long run is known as Marshall-Lerner Condition. (Rustam Jamilov, 2011). Although, this conceptually frameworks will not work barely through undervalued currency in pragmatic world effortlessly, rather depends upon the elasticity of export and import elasticity. This elasticity approach, also known as the “imperfect substitutes” model, is still widely and most commonly used in trade analysis. (Derick Boyd & Caporale, 2001). This elasticity approach is also known as monetary approach.

Against the backdrop, one view is regarding elasticity pessimism (Paul Krugman, 2016). There is two approach motivated the lobby of elasticity pessimistic: first one talks about that many researchers over the period found that these price elasticity is not working in softening the trade deficit issue. Indications of this approach had firstly been seen during World War II, due to shortage of dollar, devaluation of currency had not worked in promoting the exports and fixing the imports. However, it currency again in trend, since it has been observed that trade flows barely respond to the price signal due to the global value chain system. Second mirrors the distinction between temporary and permanent changes in exchange rate. If the change is temporary in nature and will come back to the equilibrium level, so the importer due to small price effect adjust the cost compliances and physical quantity of trade will remain unaltered. However, small change in exchange rate price may lead more exports – quantum effect.

### Research Methodology

This particular study is totally based on secondary data sources. For accomplishing the above noted research objectives, required nation wise dataset of Indian GDP; Foreign countries GDP; PPP (Purchasing Power Parity) Value; and Official Exchange Rate have been availed from World Bank Data Group.

Moreover, country wise dataset related to export and import share; top ten trading product categories; four classifications of exports and imports according to HS Standard Product Groups namely Raw Material; Intermediate Goods; Consumer Goods; Capital Goods; Revealed Comparative Advantage Index and Trade Complementarity Index have been accessed from WITS (World Integrated Trade Solution). The details description of the products under each group is available at WITS Reference Menu <https://wits.worldbank.org/referencedata.html>.

For assessing the impact of rupee valuation over trade flows, double log Ordinary Least Square Regression Model is employed with detecting autocorrelation and heteroscedasticity using Stata 11.2. The mathematical model is written below:

$$\ln Y_t = \beta_0 + \beta_1 \ln(\text{Degree of Rupee Undervaluation})_{jt} + \beta_2 \ln(\text{GDP})_{dt} \\ + \beta_3 \ln(\text{GDP})_{ft} + \mu_t$$

Where  $Y_t$  is time series of dependent variable, in this research work, all sorts of exports and imports for all bilateral relationship have been taken as dependent variable in which Gr denotes gross; RM denotes Raw Material Goods; IG represents Intermediate Goods; CG signifies Consumer Goods and CT indicates Capital Goods, while Ex is abbreviation of exports and Im of Imports.

As afore documented that degree of rupee undervaluation is computed by using the following formulae

$$\text{Degree of Rupee Undervaluation} = \frac{ER_{ijt} - PPP_{ijt}}{ER_{it}} * 100$$

It signifies the distance of rupee exchange rate from its PPP value. It can be seen that, calculated degree of rupee valuation is already showing percentage change. In the regression, it is regressed with logarithmic form, hence once per cent change after applying log would signify the change from 10 to 10.01 and 10.1 will be considered as 10 per cent change.

$$\beta_1 = \frac{\Delta \log_e X}{\Delta \log_e \text{ rupee undervaluation}} \text{ or}$$

$\frac{\Delta \log_e M}{\Delta \log_e \text{ rupee undervaluation}}$  measures the undervalued rupee elasticity of imports and exports. In case of exports, it is expected positive, while in case of imports negative sign is expected, underpinning the theoretical predictions.

$$\beta_2 = \frac{\Delta \log_e M}{\Delta \log_e GDP_d} \text{ shows the income elasticity of Indian imports}$$

$$\frac{\Delta \log_e X}{\Delta \log_e GDP_f} \text{ shows the foreign income elasticity of Indian exports.}$$

In case of exports, GDP of reporting country was also included as one of the independent variable to analyse the impact of economic growth in boosting up the exports.

Ln  $GDP_{dt}$  is reflecting the GDP of domestic economy in the case of all sorts of imports, which represents the income (purchasing capacity) of the economy, whereas  $GDP_{ft}$  is the GDP of partner country reflects the income of foreign country. In case of exports, foreign income is taken into consideration, while with imports Indian GDP is taken as income of the country.

Lastly, the Marshall–Lerner condition is tested to assess the net impact of rupee undervaluation on trade balance, whether it averts the trade deficit or widens the problem of trade deficit. Theoretically, M-L Condition is the condition that an exchange rate devaluation or depreciation will only cause a balance of trade improvement if the absolute sum of the long-term export and import demand elasticities is greater than unity. It is expected that it hurts the imports and supports the exports of a country whose currency is undervalued or depreciated.

Trade Balance is denominated as

$$\text{Net Exports (N}_x) = X - Q_c$$

Where, X denotes exports, and Q imports. Subscript  $e$  is the price of one unit of foreign currency in terms of domestic currency.

Differentiating with respect to  $e$  gives:

$$\frac{\partial N_x}{\partial e} = \frac{\partial X}{\partial e} - e \frac{\partial Q}{\partial e} - Q$$

Dividing through by X

$$\frac{\partial N_x}{\partial e} \frac{1}{X} = \frac{\partial X}{\partial e} \frac{1}{X} - \frac{e}{X} \frac{\partial Q}{\partial e} - \frac{Q}{X}$$

At equilibrium,  $X = eQ$ . Therefore:

$$\frac{\partial N_x}{\partial e} \frac{1}{X} = \frac{\partial X}{\partial e} \frac{1}{X} - \frac{1}{Q} \frac{\partial Q}{\partial e} - \frac{1}{e}$$

Multiplying through by  $e$ :

$$\frac{\partial N_x}{\partial e} \frac{e}{X} = \frac{\partial X}{\partial e} \frac{e}{X} - \frac{e}{Q} \frac{\partial Q}{\partial e} - 1$$

This can be expressed as

$$\frac{\partial N_x}{\partial e} \frac{e}{X} = \eta_{xe} - \eta_{Qe} - 1$$

Where  $\eta_{xe}$  &  $\eta_{Qe}$  are the elasticity of exports and imports with respect to the exchange rate respectively.

If the fall in relative value of exchange rate  $e$  increases the net exports, so the left hand side equation must be positive. Therefore

$$\eta_{xe} - \eta_{Qe} - 1 > 0$$

Which can be written as:

$$\eta_{xe} - \eta_{Qe} > 1$$

$$\eta_{xe} - |\eta_{Qe}| > 1$$

If this total sum exceed unity, then and then only rupee undervaluation said to be beneficial for the Indian economy.

### India USA Bilateral Trade

India's bilateral relations with USA have traditionally and sequentially been settled into a “global strategic partnership” as its convergence of interests over bilateral, regional and global issues at the International platform is being amplified. In fact, the Indian exports to USA stood at \$ 42 billion in the year 2016, while the imports coming from USA in India is just half of the exports i.e. \$ 20.39 billion. However, the Indian exports to USA have totally amplified by 351 per cent in the course of 17 years from 2000 to 2016. In this way, contribution of total Indian bilateral trade with USA in Indian GDP has enlarged by 117 per cent from 1.52 in the year 2000 to 3.3 in the year 2013 inferring the story of increasing strong economic bonding between these two countries with the passage of time.

With the blowing waves of globalization since 90's, involvement in trade among the countries diversified and extended worldwide, especially during global financial crisis. Despite having multiple options for trading, since 1947 to till now, USA has unceasingly been the first choice of India for trading. The reason being is the India and USA is not only associated in terms of trade, but USA has been helping in spurring green revolution and in setting up the educational institutes like IIT's and also in fostering education exchange which is far beyond than trade.

### India-USA Trade Openness

It can proudly be written that superpower of world i.e. United States of America is biggest trade partner of India as following table 1 reported that India's highest exports goes to USA accommodating 16 per cent of its total exports while in case of imports it is stayed on second rank just after China comprising around 6 per cent of Indian total imports.

However, India's representation in USA's trade chart is not rosy glossy. India still after 25 years of liberalization doesn't make charismatic miracle relationship in view of super economy.

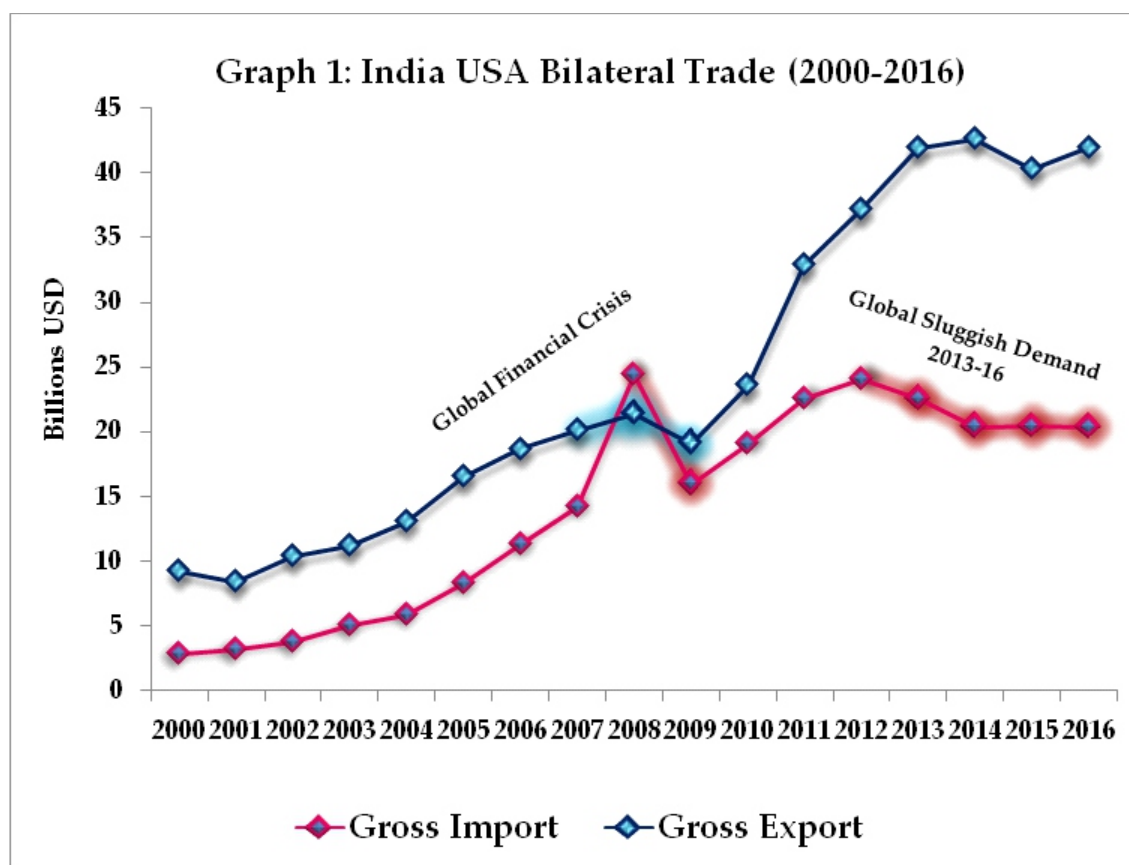
| <b>Table 1: India-USA Trade Share Status Dashboard (2000-16)</b>        |                |                                      |              |             |
|---|----------------|--------------------------------------|--------------|-------------|
| <b>Reporter</b>   | <b>Partner</b> | <b>Trade Flow</b>                    | <b>Share</b> | <b>Rank</b> |
| <b>India</b>  | USA            | Export Share in Indian Total Exports | 15.18        | 1           |
|   | China          | Import Share in Indian Total Imports | 9.54         | 1           |
|   | USA            | Import Share in Indian Total Imports | 5.85         | 2           |
| <b>USA</b>  | Canada         | Export Share in USA's Total Exports  | 20.82        | 1           |
|   | India          | Export Share in USA's Total Exports  | 1.14         | 18          |
|   | China          | Import Share in USA's Total Imports  | 16.37        | 1           |
|   | India          | Import Share in USA's Total Imports  | 1.42         | 15          |
| <i>Source: WITS</i>   |                |                                      |              |             |
| <i>Share values are periodical average and mentioned in Percentage)</i> |                |                                      |              |             |
| <i>Author's Calculation</i>   |                |                                      |              |             |



India all an average fulfils barely around 1.15 per cent of USA's demand staying on 18th rank in USA's list while India's second highest 6 per cent imports is meagrely account 1.42 per cent of USA's total exports send to India stayed at 15 rank in USA's list.

### Pace and Pattern of India-USA Trade

Here, the graph 1 illustrates the India's bilateral trade with USA and compares the gross exports and gross imports level from 2000 to 2016. As is evident that the Indian exports have rapidly been increasing all along, while, the imports coming from USA had steeply been increasing from 2000 to 2009; thereafter it became straight with a down fall in the year 2010.



It is clearly visible that India is enjoying trade surplus with USA for the period starts from 2000 to 2016, except the year 2008—the period of global financial crisis, in which the imports exceeded the exports slightly and again came down steeply. In fact, the exports have been growing with the speed of 11 per cent per annum while the imports have continuously been climbing up with the more than double pace than exports i.e. 24 per cent per annum. Though the growing speed of imports was high till 2008 and reached the peak level, thereafter the average pace of moving became stable, whereas during this period exports were growing with the speed of eight per cent per annum. Remarkably, India has successively been enjoying trade surplus with the world's largest economy- USA.

### India's Trade Elasticity with USA

Currency undervaluation or devaluation is considered successful; when it's aggregate effect over both the trade flows comes out positive and exceeds unity. However, internal economic conditions also crucial in taking the gains from trade with undervalued currency. To estimate the cumulative effect of undervaluation and income, coefficients of elasticity is added and presented in following table 2.

India has been famous for her diversified and varied natural richness which are very useful for manufacturing of majorly eatable items and medicinal staples. Thus, the Indian consumer goods are very trendy and demanding outside. Theoretically, if India does have revealed comparative advantage in consumer goods so exports of it should be highly promoted for uplifting the economy. The consumer goods are highly elastic with respect to income. As American income goes up by one per cent the Indian exports tend to increase by 4.45 per cent. As it can be seen that, rupee undervaluation also checks the consumer goods exports by 1.35 per cent and in case of imports it is not found significant despite after applying Cochrane–Orcutt Transformation.

| <b>Table 2: India's Trade Elasticity with USA</b>                                  |              |           |           |           |           |
|--|--------------|-----------|-----------|-----------|-----------|
| <b>Elasticity of Export</b>  |              |           |           |           |           |
|  | <b>Gross</b> | <b>RM</b> | <b>IG</b> | <b>CG</b> | <b>CT</b> |
| <b>Price Elasticity (<math>e_x</math>)</b>   | (-2.7)*      | (-14.5)** | (-3.15)*  | (-1.3)**  | (-5.33)*  |
| <b>Income Elasticity (<math>e_{fi}</math>)</b>                                     | 3.23*        | 9.7       | 2.05*     | 4.45*     | 8.0*      |
| $e_x + e_{fi}$   | 0.53         | -4.8      | -1.1      | 3.15      | 2.67      |
| <b>Elasticity of Import</b>  |              |           |           |           |           |
| <b>Price Elasticity (<math>e_m</math>)</b>   | (-3.14)**    | (-5.98)*  | (-4.67)*  | --        | (-9.35)*  |
| <b>Income Elasticity (<math>e_{di}</math>)</b>                                     | 3.40*        | 1.58*     | 3.39*     | 1.18*     | --        |
| $e_x + e_{di}$   | 0.26         | -4.4      | -1.28     | --        | --        |
| <b>Marshall Lerner Condition</b>   |              |           |           |           |           |
| $e_x +  e_m $  | 0.44         | -8.52     | 1.52      | --        | 4.02      |
| <b>M-L Condition</b>   | No           | No        | Yes       | --        | Yes       |
| <i>Empty cells implies insignificance of coefficients</i>                          |              |           |           |           |           |
| <i>*, **, *** significant at 1 %, 5 %, 10% level of significance respectively.</i> |              |           |           |           |           |
| <i><math>e_{fi}</math> is the foreign income elasticity of Indian exports</i>      |              |           |           |           |           |
| <i><math>e_{di}</math> is the Indian income elasticity of Indian imports</i>       |              |           |           |           |           |
| <i>Author's Calculation</i>  |              |           |           |           |           |

The main reason for escalating the capital goods exports is its extremely high income elasticity with USA. As the income of USA goes up it will demand six times more capital goods from India. In case of capital imports, Indian GDP do not play any significant role inferring that these are needy products and can be categorized as necessity goods for developing nation like India, hence it should be less elastic with income or having no impact of income fluctuation. Here, undervaluation negatively affects trade with high degree. One percent changes in undervaluation leads 5.3 per cent deterioration in capital goods exports due to cost differentials as a result of monetary wage rise.

According to the table, it can be seen that rupee undervaluation elasticity is weightier than income elasticity in case of raw materials and intermediate goods' exports, while the income elasticity is found heavier in exports of consumer and capital goods. Since the gross effect of income and rupee undervaluation is coming out negative in former case and positive in latter case. Turning to the imports, gross effect is estimated negative in raw materials and intermediate goods' imports, otherwise found insignificant. Though, the negative effects are good in case of imports but bad if it comes out in case of exports for domestic economy.



On the whole, Marshall-Lerner condition asserts that rupee undervaluation has increasingly been worsening the trade flows hence it is not conducive in economic growth. Nevertheless, the M-L condition holds true in trade of intermediate goods and capital goods statistically, but it is not viable pragmatically, as it can be seen that undervaluation is hampering the flow of exports.

### Conclusion

To sum up, it can be proudly asserted that World economic leader is India's topmost trading destination. In fact, India's trade with USA has been increasing with the pace of 50 per cent per annum over the period. On the foundation of economics, it is being posited that the income elasticity of primary products are low as compared to manufacturer products. However, in this study it is found that raw material goods have highest income elasticity because raw materials or primary products can be utilized in multi-way either for direct consumption or in food-processing units or for manufacturing the goods and it is general phenomenon that world is running towards high mass consumption stage especially in luxuries and food items. Henceforth, the Indian raw material exports are highly elastic with USA's income but not only the exports but at the same time imports of raw materials is also having highly elastic relationship with Indian GDP. Similarly, capital goods are also highly elastic with USA's income but Indian income does not have any impact on capital goods' imports, might be because these are pressing need of emerging developing nations like India.

Referring the rupee undervaluation elasticity, it is determined that undervaluation of Indian currency against US dollar is deteriorating the overall trade flows i.e. exports as well as imports, and it seems that undervaluation dips exports more than imports because value of exports coefficient is found greater than imports. A slight change of 1 per cent in rupee value against dollar (that is 10 to 10.01) leads reduction of 14.52 per cent in raw material exports which is too bigger in number and bothersome situation for country like India, which is continuing in her developing age and trying to emerge as super power economy across globe. Especially, rupee undervaluation is found extremely bad for raw material exports and then moderately bad for capital exports – the sectors where we need to grow in world market since Indian revealed comparative advantage is low in both the areas comparatively. Moreover, undervaluation also hits imports that are essential not only for consumer in particular but crucial for development of the Indian economy in general. Lastly, Marshall-Lerner condition asserts that rupee undervaluation has increasingly been worsening the trade flows hence it is not conducive in economic growth. Nevertheless, the M-L condition holds true in trade of intermediate goods and capital goods statistically, but it is not viable pragmatically, as it can be seen that undervaluation is hampering the flow of exports. Therefore, this research article hereby draws the attention of international economic bodies towards the issue of currency valuation which causes the dramatically negative effects on developing nations trade which could be worsen the economic growth of the developing economies. This paper thus suggests to policy practitioner that there should be framework or limits within which currencies could depreciate so that developing nations could actively take participation in globalization process.

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