

**Determinants of India's Exports**  
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**Abstract** The objective of this paper is to examine the key determinants of India's exports. The estimated equations show that the two variables influencing India's export demand are the real effective exchange rate and world exports. The time trend variable which was introduced to take care of the stationarity problem and India's GDP which is a proxy for availability also are statistically significant. Equations were also estimated at a disaggregated level of commodity groups. The article also focuses on measuring the relative contribution of the variables. For this, a new methodology is proposed. World exports which emerges as the dominant variable is however exogenous to Indian policy makers. This leaves nominal exchange rate as the tool available to policy makers. In the market determination of exchange rate, besides current account deficit, capital flows also play an important part. There is need to moderate the impact of large capital inflows on exchange rate through appropriate intervention so long as we continue to have current account deficit. An appreciating currency will erode the competitiveness of exports. Truly speaking, the critical factor is not so much exchange rate as competitiveness. In this context, maintaining domestic price stability and improving the productivity, particularly of the traded goods sector are equally important.

Maintaining a sustainable level of current account deficit is one of the major objectives of economic policy. External sector stability is a necessary condition for sustained growth and in achieving this goal, export growth plays a critical role. India's trade regime underwent a paradigm shift in the wake of the liberalization programme launched in early 1990's. India moved away from a regime of inward looking 'import-substitution' to adopt an open policy of integrating with the rest of the world.

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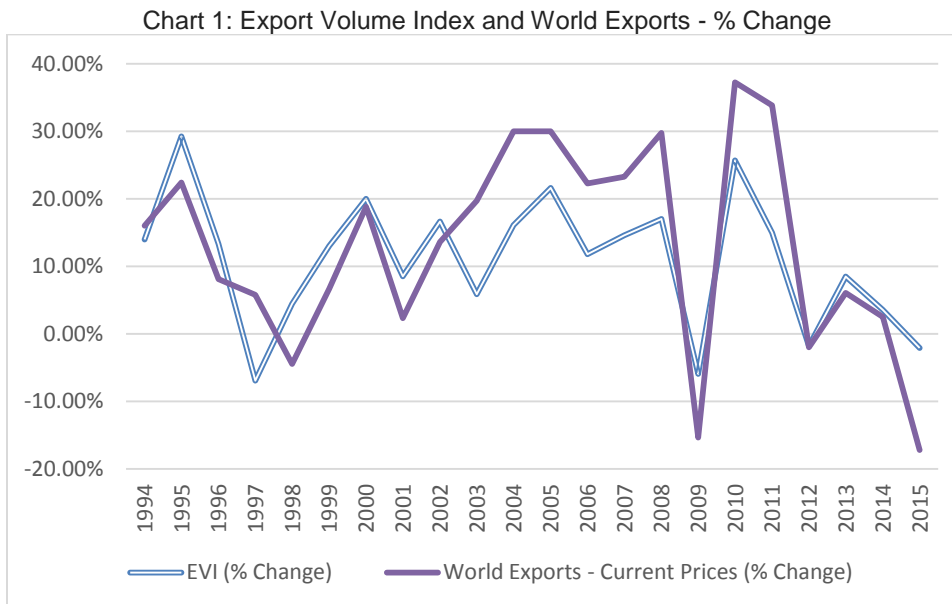
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Quantitative controls over imports were dismantled step by step and the tariff rates were brought down steadily. The simple mean tariff rate on manufactured products as of 2009 came down to 10.2 percent (World Bank 2014). Alongside export promotion became a major goal. The objective of this paper is to analyse the performance of India's exports since liberalization to determine the key factors influencing India's exports. In particular, we analyse the role of exchange rate.

The paper is divided into three sections. Section 1 provides the behavior of Indian exports between 1992-93 and 2013-14. The performance of India in relation to world exports as well as other characteristics is examined. Section 2 is an econometric analysis of the factors affecting exports. Various equations are estimated to bring out the key determinants of exports. We also focus on the relative importance of the different variables in terms of their influence. Section 3 draws some conclusions for policy prescription.

## **I India's Export Performance**

In the first few decades after India's independence, the pursuit of the imports-substitution strategy had an adverse impact on India's exports. India's share in world exports which stood at 1.85 per cent in 1950 came down to 0.50 per cent by 1991. The share started moving up in the post-liberalization period and touched 1.70 per cent in 2013. This was possible only because of Indian exports grew at a rate faster than world exports. In fact there is a strong correlation between India's export growth and world export growth (Chart 1 and Tables A1 and A2).



India's exports started rising in the 1980s. There were a number of policy initiatives undertaken at that time to help export promotion (Panagariya 2004). However India's exports just kept pace with world exports so that India's share in world exports did not show any increase. The strong pick up happened post 1992. Between 1993 and 1997 the average annual growth rate was 12.4 per cent and India's share in world export went up to 0.63 per cent. In 1998 export growth fell and turned negative primarily because of East Asian crisis. India's exports started showing a strong growth from 2000. Between 2000 and 2008, India's export grew at an annual growth rate of 21 per cent taking India's share in world exports to 1.21 per cent, a virtual doubling of India's share in nine years;. The impact of the Financial Crisis of 2008 led to a negative growth 15.4 per cent in 2009. In the same year world exports fell by 22.3 per cent. India's export performance picked up strongly in 2010 and 2011. Thereafter the performance has been weak. Both in 2014-15 and 2015-16, exports growth turned

negative. In 2015-16, India's exports declined more strongly than world exports. In 2016-17, there has been a positive growth of 4.7 per cent. This comes, however, on a low base. India's current account deficit has however been contained at a low level in the last few years despite a poor performance of exports because imports declined even sharper because of the steep decline in oil prices.

### **Commodity and Region wise Composition**

The commodity composition of India's exports has undergone many changes, the most significant of which is the rise in petroleum products. Oil exports which stood at \$397 million in 1993-94 jumped to \$63,179 million in 2013-14. The share of oil and petroleum products to total exports has reached 20.1 per cent. In the last two years, when India's exports fell, one of the significant contributors is petroleum products because of the sharp fall in oil prices. In 2015-16, the top eight export sectors were petroleum products, gems and jewellery, textiles, chemicals and allied products, agriculture and allied sectors, transport equipment, base metal and machinery. It must however be noted that the share of some of the sectors like Textiles has been declining (Table A3).

An analysis of region wise exports clearly indicates shift towards faster growing economies. The share of exports going to EU countries has come down from 26.1 per cent in 1993-94 to 16.5 per cent in 2013-14. On the other hand, the share of exports to developing Asian countries has increased from 22.0 per cent to 30.4 per cent during this period (Table A4).

## **Trade Policy**

Trade Policy has been an important tool to promote exports. The liberalized trade regime launched in 1991 though focused on liberalization of imports, had an impact on exports. The improved efficiency achieved through liberalization had an impact on export competitiveness as well. The import content of exports as well went up. The stronger economic growth seen since liberalization also helped to create adequate export surplus.

Foreign Trade Policy announced for a five year period outlines the measures to promote exports. These measures have varied over time. But largely speaking they focus on helping exporters to find new markets, undertake studies and surveys for this purpose and on providing financial assistance through duty drawback. Special Economic Zones which provide special tax incentives to units established in the zone have been an important step. However there is a controversy on how effective this measure has been. There is a view that it has diverted exports rather than leading to an overall increase. Similar in spirit to Special Economic Zones has been EOUs which are meant to export nearly all their output. Export Credit Guarantee Corporation of India and EXIM Bank are specialized institutions which are meant to provide insurance and credit respectively. Exporters also obtain credit at a concessional rate. Thus over a period of time, several schemes and incentives have been provided to stimulate export growth.

## **II Factors influencing Exports Growth**

### **Global GDP**

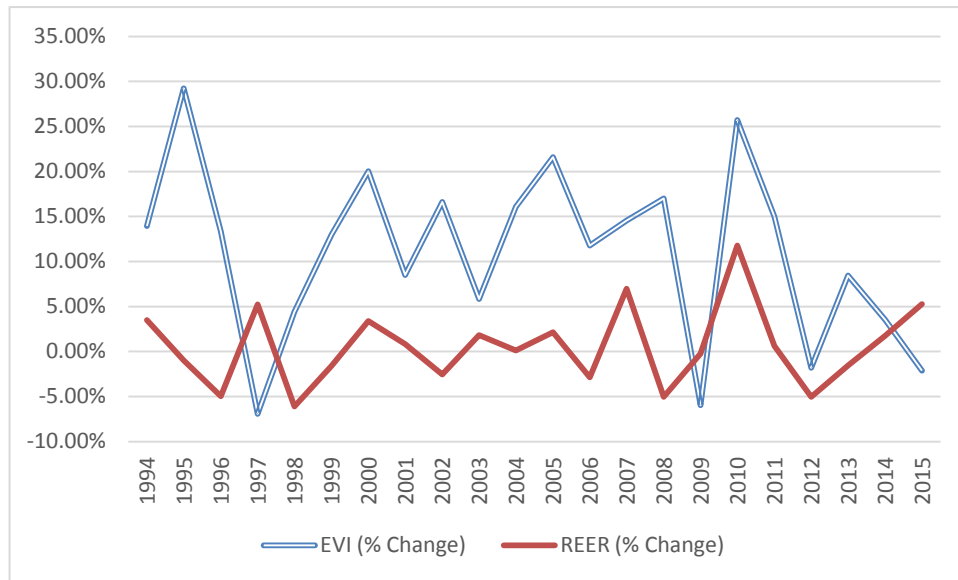
An important factor influencing India's exports is the behavior of the GDP of importing countries or world GDP. This is the direct income effect. As the incomes of the importing countries increase, they increase expenditures part of which spills into imports. The contrary behavior occurs when incomes fall. As Chart 1 referred to earlier shows, India's exports follow a pattern similar to world exports which can be taken as a proxy for world GDP. For example, the 2008 crisis had an immediate impact on India's exports. The poor performance of India's exports since 2014-15 is also largely a reflection of the tepid growth of advanced economies. Apart from affecting the quantum of India's exports, it has affected the value of India's exports in dollar terms because of the fall in international commodity prices. Besides the sharp decline in crude oil prices, there has been a decline in other prices such as metals and minerals. The revival of India's exports depends strongly on the pace of recovery of advanced economies. It also points to the need for Indian exports to shift the direction of trade even more towards faster growing emerging market economies.

### **Exchange Rate**

In the export demand equation, exchange rate can be taken as a kind of price variable. If the Indian rupee is over-valued, it has a negative impact on India's exports. In popular perception, rupee's value in relation to Dollar is dominant. However, we need to look at the behavior of rupee in relation to currencies of our major trading partners. That is why RBI started constructing the nominal and real effective exchange rates (NEER and REER). We now have two series under each head depending on the

number of countries included. The real effective exchange rate is nominal effective exchange rate adjusted for relative inflation. The weights can depend upon either exports or total trade. Chart 2 shows the behaviour of REER and exports. The launch of the liberalization reforms began with the devaluation of the rupees in two stages in early June, 1991. The rupee was devalued by 17.38 per cent in relation to Sterling which was then the intervention currency. India moved to a new exchange rate regime in February 1993 when the rupee was left to be determined by and large by the market. This however did not preclude the RBI to intervene in the market, if there was volatility in the market and if the rate was deemed to be unsustainable. On the role of exchange rate, there are some who hold strongly the view that the rupee should be kept undervalued. The frequently cited example is that of the East Asian countries who in the seventies and eighties were able to maintain a strong export growth by keeping the value of their currencies low. In theory, there is no doubt that exchange rate as a price variable must have an impact on the volume of exports. However how strong a variable it is, will be known only through empirical testing. The impact of exchange rate also depends on the import content of exports. As this share goes up, the impact will go down. The import content of India's exports has risen from 9.4 per cent in 1995 to 24 per cent in 2011.

Chart 2: Export Volume Index and REER - % change



An alternative to real effective exchange rate as a price variable is the ratio of domestic price to world price level. A slightly different formulation is the ratio of unit value of exports to world price level. In both cases, a rise in this ratio will lead to fall in exports.

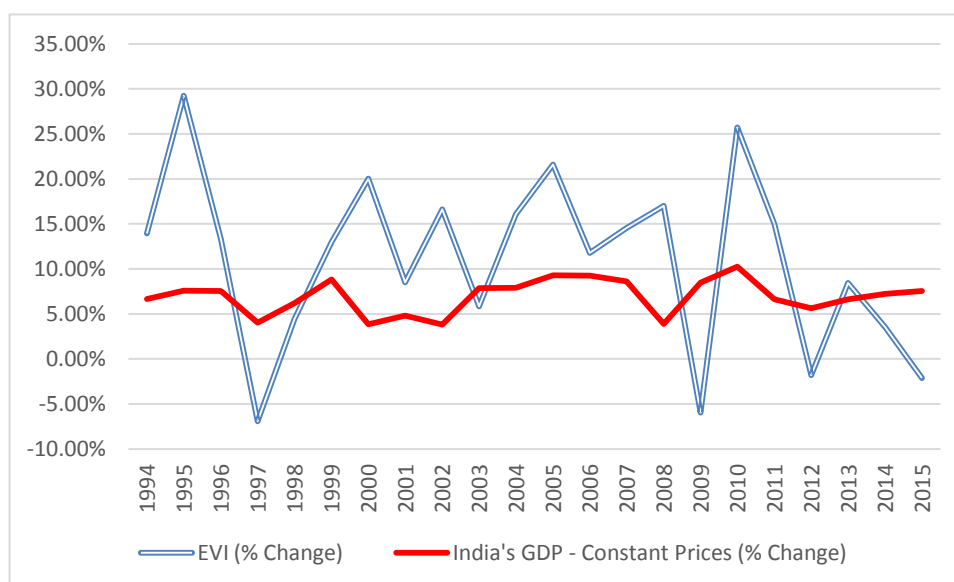
While world GDP and exchange rate are the main variables influencing exports, we must also take note of many other factors that have a bearing on exports. Earlier we have indicated the various trade policy measures that have been undertaken. All of them result in one way or other in cutting the costs and improving the export competitiveness. It is very difficult to compress them into a single quantifiable variable. But this however must be kept in mind in any empirical estimation.

Demand has to be supported by availability. In the first few decades after independence; the domestic demand was so strong, that the surplus available for export was limited. As the economy has grown, this situation has changed. However, it does



happen even now that in the years of poor monsoon, exports of agricultural products suffer. Chart 3 shows the relationship between India's exports and GDP growth. The relationship is not that strong even though positive. However, we need to test its impact along with the other variables such as world output and exchange rate. In that case, the function we test ceases to be a pure demand function. It is a hybrid function.

Chart 3: Export Volume Index and India's GDP - % Change



### Estimation of India's Export Demand

There have been a number of studies to assess the factors influencing India's exports. We cite below only a few:

Srinivasan et al (2003) studied the impact of three variables on exports – Real Effective Exchange Rate, value of world exports as a proxy for world GDP and a supply side factor, India's Real GDP. They found that all these three factors had an influence on the value of exports. The methodology used is a simple linear regression with all variables in log form. They also add a time trend to the linear regression equation, as all the series at level are non-stationary and display an increasing trend. To counter

the unit root issue, they estimated equations with added time trend and also in first differences also. They concluded that REER played a definite role in explaining India's exports.

The other studies include Joshi and Little (1994), Sharma (2003), Veeramani (2007, 2008) and Virmani (1991). The studies cover different time periods some relating to pre reform period and some including post reform period. They all find in general a negative relationship between real effective exchange rate and exports.

Against this background, we postulated a demand function for India's exports which could be estimated using the recent data. The postulated demand function was as follows:

$$\text{Export Volume} = f(\text{world GDP or world exports, real effective exchange rate or price ratio})$$

In any demand function, the endogenous variable has to be the quantum. Accordingly, we have used the quantum index of India's exports as the dependent variable and these data are available on a consistent basis from World Bank. Some authors in the studies cited previously have used the value of exports as the dependent variable.

The income effect comes from world GDP. But data on world GDP are not as firm as world exports which can serve as a proxy. The fact that India's exports are included in world exports may not matter much as India's share in world exports even as of today is less than 2 per cent.

The price variable we have used is the export weighted 36 country real effective exchange rate. The data are available from RBI and we have used calendar year data as the quantum index from World Bank is available on calendar year basis. An alternative to real effective exchange rate is simply the ratio of Indian consumer prices

to world prices. Mohsin Khan (1974) had used the ratio of unit value of exports to world price level as an explanatory variable while estimating the value of exports. We have also estimated an equation using such a variable.

### Estimated Equations

We estimated the export demand function using the data for the period 1991-2013. This is basically the post reform period and it is best done in this way because of the paradigm shift. All the variables are in log terms.

**Table 1: Estimated Regression Equations (Dependent Variable – Log of Export Volume Index)**

Variables	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
ln REER t		-1.129** (-4.52)		-0.60** (-2.39)	-0.974*** (-3.65)	
ln PR t	-0.65** (-2.53)		-0.43*** (-5.44)			
ln WOREX t	1.90*** (20.65)	0.987*** (9.21)	0.46*** (4.50)	0.52** (3.17)	0.823*** (7.41)	1.65*** (18.41)
Ln ( India's GDP ) t					0.417 ** (2.57)	
Ln ( PR 2 ) t						-0.73 ** (-2.63)
Time Trend (t)			0.09*** (14.56)	0.08*** (8.23)		
Constant	-5.25*** (-10.57)	-9.24 (1.30)	0.51 (1.26)	0.47 ( 1.21)	-6.435*** (-5.921)	-4.71 *** (-7.12)
R-Bar Square	0.9559	0.9679	0.9962	0.9927	0.9932	0.9961
Sample Period	1991-2013	1991-2013	1991-2013	1991-2013	1991-2013	1991-2013

Note:

Export volume index (2000=100) calendar year basis

REER : Real Effective Exchange Rate --36 countries export based—index form with 1993=100

World exports index 1998=100

PR: Price ratio ( Consumer price index in India/ World consumer price index )

PR2: Price ratio 2 ( Unit value index of exports / world consumer price index )

India's GDP : GDP at factor cost at constant prices--index with 1993 - 94 = 100

Figures in brackets indicate t values

\*\*\*: significant at 1 per cent \*\* : significant at 5 per cent

All data are on a calendar year basis except India's GDP.

The estimated equations are given in Table 1. As can be seen from equations (1) and (2), all the independent variables are statistically significant and have the right sign. World exports have a positive sign and are statistically highly significant. Real effective exchange rate and price ratio have a negative sign and statistically significant. The explanatory power of the equation is also high as evidenced by the high value of  $\bar{R}$ -squared. From equation (6), we see that the price ratio 2 which uses unit value of exports performs even better than price ratio 1 which uses domestic price. In equation (5), we introduced additionally the variable of India's GDP which is also significant and has a positive sign.

These results are, however, suspect, as they do not satisfy the stationarity condition. We performed the augmented Dicky-Fuller unit root tests over the data series and found that the exogenous variables are non-stationary. To overcome the problem, we introduced a time trend variable as an additional independent variable as was done by Srinivasan et al. (2003). In equations (3) and (4), we have introduced time trend as an additional variable. It can be seen that apart from the fact that the time trend variable is significant, the other two variables are also statistically significant and have the right sign confirming the importance of these two variables. The explanatory power is extremely strong with  $\bar{R}^2$  touching 0.99.

Another way of overcoming the stationarity problem is to estimate the equation in the first difference form. The results are given in Table 2.

**Table 2: First-Difference Regression Equations (Dependent Variable – First difference of Log of Export Volume Index)**

Variable	Equation 7	Equation 8
D In PR	-0.45 (-1.83)	
D In REER		-0.60 (-1.85)
D In WOREX	0.46** (3.42)	0.61*** (4.31)
Constant	0.08*** (5.42)	0.07*** (4.72)
R-Bar Square	0.5072	0.5088
Sample Period	1992-2013	1992-2013

(In the above table D denotes the first difference)

The explanatory power of the equation drops, as is the case always with first difference equations. The real effective exchange rate variable or the price ratio is not significant but they have the right sign. This was so in the case of equation estimated by Srinivasan et al (2003). World export has a positive sign and is statistically significant.

Yet another way of understanding India's export performance is to look at the share of India's exports in world exports. As indicated earlier, India's share had dropped to 0.5 per cent by 1990. It has since then increased to 1.7 per cent. To test the role played by real effective rate in this improved performance, we estimated an equation linking India's share in world exports with real effective exchange rate as well as India's GDP which can reflect the availability of supply. Table 3 presents the results. GDP has a positive sign and REER a negative sign in line with theoretical arguments. Both are statistically significant. The explanatory power is very strong.

**Table 3: Estimation Results for India's Share of World Exports (The dependent variable is the share of India's exports to that of World exports)**

Variable	Equation 9
In REER <sub>t</sub>	- 1.26** - (4.19)
In IGDP <sub>t</sub>	0.80*** (23.84)
R-Bar Square	0.9837
Sample Period	1993-2013

To improve our understanding, we also studied the impact of world exports and real effective exchange rate on the export volume index at a more disaggregated level. We examined the impact on exports of five principal commodity groups i.e. Agriculture and Allied Products, Chemical Goods, Manufacturing Goods, Machine Equipment and Miscellaneous Manufacturing Goods, for which the needed data were available. The estimated equations are given in Table 4.

**Table 4: Export Demand Function for Commodity Groups (1993-2013)**

Variable/Dependent Variable	Agriculture and Allied Products	Chemical Goods	Manufacturing Goods	Machine Equipment	Miscellaneous Manufacturing Goods
In REER <sub>t</sub>	-0.41 (-0.41)	-4.03** (-2.71)		-0.24 (-0.26)	-5.13*** (-4.96)
In REER <sub>t-1</sub>			-2.53** (-2.72)		
In WOREX <sub>t</sub>	1.25*** (9.95)	2.58*** (13.65)	1.32*** (11.27)	2.21*** (19.07)	1.92*** (14.66)
Constant	1.12 (0.31)	11.04 (2.02)	9.56** (2.72)	-3.36 (-1.00)	17.72*** (4.66)
R-Bar Square	0.90	0.93	0.89	0.97	0.93

Note:- In the above table REER and the Dependent Variable i.e. Export Volume Index of the respective commodity group is on a fiscal year basis whereas World Exports is on Calendar year basis.

On the basis of these equations, we infer that REER or REER lagged by one period is a significant variable in explaining the demand for three commodity groups, viz., Chemicals, manufacturing goods, and miscellaneous manufacturing goods. But agriculture and allied products and machine equipment are not significantly influenced by the REER. World exports are having a significant impact. We estimated all the equations with price ratio also. But it turned out to be non-significant. The explanatory power is uniformly high. These results however need to be interpreted with caution because all the equations other than the one for Agriculture and Allied products do not satisfy the condition of stationarity.

From the analysis presented above, it is reasonable to conclude that REER and world exports do explain the demand for India's exports even though in some of the equations, exchange rate is not statistically significant. Being in double log form, the coefficients represent elasticities. It is also necessary to understand the relative importance of the two variables in terms of quantitative impact. This problem is sometimes referred to as 'allocating  $R^2$  among regressors'. The existing literature on the subject is inconclusive. A detailed analysis of the problem is given in the Appendix. Based on the methodology suggested in the Appendix, we find that World Exports has a more powerful effect in influencing exports than REER. World Exports account for 83 per cent of the variability as against 17 per cent of REER.

### **III Implications for Policy**

The broad conclusion that emerges from this empirical study is that the two key variables influencing India's export demand are the real effective exchange rate and world exports. Of these two, global exports are beyond the control of policy makers. It is exogenous to even Indian policy markers. Therefore, the only policy variable available for adjustment is nominal exchange rate. However, this needs to be interpreted carefully. In fact, the exchange rate variable represents more than the pure exchange rate. It really stands for the degree of competitiveness of Indian exports. In fact, some authors (Joshi et al (1994) and Veeramani C. (2008) created a fresh series of exchange rate, adjusting for the cash subsidy provided by the government. Such a direct adjustment is not possible now. After the devaluation of 1991, almost all cash subsidies were withdrawn. In fact, the various policy measures introduced by the government to

promote exports have an impact on price competitiveness. It is difficult to translate them into a single numerical variable. It is therefore important not to ignore the impact of various export promotion measures.

### **Exchange Rate Policy**

What should be the policy towards exchange rate? The stated policy of the Reserve Bank is that it has no specific target and that it intervenes only to reduce volatility. This is only partially true. For example, in 2007-08 when there was a huge inflow of capital, to prevent appreciation, the RBI entered the market and bought dollars. This was responsible for the sharp increase in reserves. There are many other instances of intervention in both directions that can be cited.

In the past, when capital inflows were “passive”, the exchange rate was merely determined by the level of current account deficit. That is when the purchasing power parity theory held good. With the emergence of capital flows, as an independent factor, this is not true anymore. With inflows in excess of current account deficit, the nominal exchange rate may remain the same or even appreciate. In fact if at that time, the domestic inflation is higher than that of the trading partners, the real effective exchange rate will appreciate. In the contrary case of sudden withdrawal of capital as it happened around June 2013, the exchange rate can decline very sharply. The critical question is that in the context of very large capital inflows what should be the stand of the central bank? If the flows are allowed to pass through the market, the currency will begin to appreciate in nominal terms even when there is a current account deficit. On the other hand, if the central bank intervenes and buys foreign exchange, the nominal exchange rate may not appreciate. But in real terms it could, if the additional reserves



accumulated cause an increase in money supply beyond the desirable level and prices rise as a consequence. If the impact of the additional reserves on money supply is to be neutralized, the authorities will have to issue bonds to absorb liquidity out of the system. But there is a cost to it, which depends on the return on the reserves and the interest on stabilization bonds.

The appreciation in real terms can occur because of the influence of both capital flows and higher domestic inflation relative to the trading partners. As Economic Survey 2015 points out, between January 2014 and February 2015 the real effective exchange rate of the rupee had appreciated by 8.5 per cent. Of this, higher inflation in India relating to trading partners contributed only 2.3 percentage points, while the remaining 6.2 percentage points were accounted for by the rupee strengthening in nominal terms because of the surging capital inflows (Government of India, 2015). There are other years in which higher inflation has contributed more to appreciation. For example in 2010-11, the average real effective exchange rate rose by 8.5 per cent. In the same period, the nominal effective exchange rate rose by 2.8 per cent. Thus the bulk of the change in REER was accounted for by higher inflation relative to the trade partners.

India's REER touched 119.5 as of March 2017. Should the appreciation of currency really matter? Raghuram Rajan (2016) says: "So offsetting any rise in the real exchange rate is any productivity differential we enjoy with respect to the rest of the world. Assuming conservatively that this is about 2 per cent a year, much of the real appreciation that economists complain about is offset by productivity differentials".

Using the Balasa – Samuelson theory of the impact of productivity on price rise, some have come to the conclusion that the rupee is undervalued. The crucial question to ask is whether we can assume such a sustained increase in productivity as far as India is concerned, even assuming the validity of the argument. In a similar vein but on a different note, Avinash Persaud argues (2015) that on a purchasing power parity basis, one dollar is equivalent to Rs. 18.5 and therefore this means that the rupee is more than 60 per cent undervalued. It appears somewhat farfetched to treat the PP exchange rate as some kind of a market equilibrium rate.

India does have a large trade deficit, even though current account deficit is low because of the surplus on the services account. With capital flows playing a significant role on the determination of exchange rate, it is important to neutralize the impact of capital flows and prevent the appreciation of the rupee in real terms. We also need to take note of the fact that nominal depreciation of the currency has an effect on capital flows. Foreign investors would want the return to be much higher if the currency of the country in which they are investing is depreciating. Thus one must be conscious of the implications of exchange rate depreciation on various forms of capital flows.

It should not be forgotten that the stability of domestic prices is an important factor in stabilizing the external value of the currency in real terms. Therefore, a monetary policy framework with a focus on price stability has a key role. Simply raising the nominal exchange rate to compensate for higher inflation is not the answer. The broad conclusion is that there is need to moderate the impact of large capital inflows on the rupee so long as we continue to have a current account deficit. An appreciating currency will erode the competitiveness of our exports. The crucial factor is not so

much exchange rate as competitiveness. The whole gamut of policy measures government introduces from time to time are aimed at this objective. We have not been able to take into account explicitly this factor. Exchange rate is one element in this basket of measures. An aggressive policy of undervaluation will raise many heckles and much opposition. Adjusting the nominal rate to keep the real rate steady may be an acceptable strategy. Maintaining domestic price stability and improving the productivity particularly of the traded goods sector are other factors that have to be kept in mind.

**Acknowledgements** The authors wish to thank Shri Saurab Gupta for the excellent research assistance provided by him both in terms of collecting data and estimating the initial equations.

## Appendix

### Relative Importance of Independent Variables

This appendix examines the issue relating to the determination of the relative importance of the independent variables in an equation when there are two independent variables. This problem is discussed in some detail by D. Gujarati et.al in their book 'Basic Econometrics'. They take the example of an estimated equation with two independent variables. Suppose we estimate the equation with one variable and obtain the  $R^2$ . The difference between this  $R^2$  and the  $R^2$  of the equation with the two variables can be attributed to the second variable. But the residual  $R^2$  so obtained may not be equal to  $R^2$  when we run the equation only with the second variable. Therefore, the authors say, "Unfortunately we cannot do so for the allocation depends on the order in which the regressors are introduced". The problem arises because of the correlation between the two regressors. Therefore, Gujarati et.al conclude: "The best practical advice is that there is little point in trying to allocate  $R^2$  value to its constituent regressors".

One suggestion for finding out the relative importance of the two variables is to transform the variables to standardized variables and run the equation. We have reestimated equation (2) in Table 1 and the new estimate equation is

$$\ln(\text{Exports-Volume Index}) = -7.627 + 0.843 \ln(\text{World Exports}) - 0.427 \ln(\text{REER})$$

(6.41)

(3.217)

The coefficient of world exports is higher than that of REER, which implies that in explaining the variation of India's exports the contribution of world exports is more than

that of REER. The real issue is whether we can say ‘the contribution of world exports is almost double that of REER in explaining the demand for India’s exports.

An alternative method to measure the relative importance of independent variable is suggested below:

$$Y_t = c + \beta_1 \cdot X_{1t} + \beta_2 \cdot X_{2t} + \varepsilon_t$$

$$Y_{t-1} = c + \beta_1 \cdot X_{1t-1} + \beta_2 \cdot X_{2t-1} + \varepsilon_{t-1}$$

$$| Y_t - Y_{t-1} | = | \beta_1 \cdot (X_{1t} - X_{1t-1}) | + | \beta_2 \cdot (X_{2t} - X_{2t-1}) | + | \varepsilon_t - \varepsilon_{t-1} |$$

$$\text{Explanatory Power of Variable } X_1 = \frac{(\sum | \beta_1 \cdot (X_{1t} - X_{1t-1}) |)}{[\sum | \beta_2 \cdot (X_{2t} - X_{2t-1}) | + \sum | \beta_1 \cdot (X_{1t} - X_{1t-1}) |]}$$

$$\text{Explanatory Power of Variable } X_2 = \frac{(\sum | \beta_2 \cdot (X_{2t} - X_{2t-1}) |)}{[\sum | \beta_2 \cdot (X_{2t} - X_{2t-1}) | + \sum | \beta_1 \cdot (X_{1t} - X_{1t-1}) |]}$$

On the basis of this methodology we compared the contribution of exogenous variables for both traditional and standardized equations.

Equation	World exports	REER
Traditional	83	17
Standardized	79	21

From both the equations we observe that contribution of REER is much less than that of World exports in explaining the variability in exports.

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Table A1: India's Exports and Her Share in World Exports

Year	World Exports (US \$ billion)	India's Exports - (US \$ billions)	India's Share
1990	3490.00	17.97	0.51%
1991	3511.00	17.73	0.50%
1992	3779.00	19.63	0.52%
1993	3795.00	21.57	0.57%
1994	4328.00	25.02	0.58%
1995	5168.00	30.63	0.59%
1996	5406.00	33.11	0.61%
1997	5592.00	35.01	0.63%
1998	5503.00	33.44	0.61%
1999	5719.00	35.67	0.62%
2000	6458.00	42.38	0.66%
2001	6195.00	43.36	0.70%
2002	6499.00	49.25	0.76%
2003	7590.00	58.96	0.78%
2004	9223.00	76.65	0.83%
2005	10509.00	99.62	0.95%
2006	12131.00	121.81	1.00%
2007	14023.00	150.16	1.07%
2008	16160.00	194.83	1.21%
2009	12555.00	164.91	1.31%
2010	15301.00	226.35	1.48%
2011	18338.00	302.91	1.65%
2012	18496.00	296.83	1.60%
2013	18948.00	314.85	1.66%

Source : Reserve Bank of India (Handbook of Statistics), World Bank-Data and International Financial Statistics



Table A2: Growth Rates of Selected Macro Variables

Year	Percentage growth of EVI	Percentage change in REER	World exports growth rate	Growth rate of India's GDP
1993	14.65	-4.41	-2.56	4.69
1994	14.10	3.52	10.53	6.66
1995	29.15	-0.96	16.10	7.58
1996	13.30	-4.93	1.72	7.55
1997	-6.86	5.19	1.08	4.05
1998	4.39	-6.09	-3.19	6.18
1999	13.03	-1.57	1.54	8.85
2000	20.05	3.39	9.32	3.84
2001	8.50	0.85	-6.70	4.82
2002	16.59	-2.53	3.20	3.81
2003	5.85	1.84	14.22	7.86
2004	16.13	0.11	18.44	7.92
2005	16.01	2.17	10.14	9.28
2006	16.13	-1.38	11.93	9.26
2007	7.11	7.49	12.32	9.80
2008	16.80	-5.48	11.03	3.89
2009	-6.79	-0.22	-22.07	8.48
2010	13.96	11.78	19.93	10.26
2011	14.87	0.62	16.13	6.64
2012	-1.81	-5.04	-1.15	5.08
2013	8.47	-1.54	1.04	6.90

Table A3: Share of Different Commodity Groups in Total Exports

Year / Commodity	Agriculture and Allied Products	Engineering Goods	Machinery and Instruments	Transport Equipment	Chemicals and Related Products	Textile and Textile Products	Gems and Jewellery	Petroleum and oil products
1993-94	0.21	0.06	0.04	0.04	0.14	0.28	0.21	0.02
1994-95	0.17	0.14	0.04	0.04	0.13	0.28	0.18	0.02
1995-96	0.2	0.14	0.04	0.04	0.12	0.26	0.18	0.02
1996-97	0.21	0.15	0.04	0.04	0.13	0.27	0.14	0.02
1997-98	0.2	0.15	0.03	0.04	0.14	0.27	0.15	0.02
1998-99	0.19	0.14	0.03	0.03	0.12	0.29	0.19	0.01
1999-00	0.16	0.15	0.04	0.03	0.14	0.27	0.2	0.01
2000-01	0.14	0.16	0.04	0.03	0.14	0.25	0.19	0.05
2001-02	0.14	0.17	0.04	0.03	0.15	0.24	0.18	0.05
2002-03	0.13	0.18	0.04	0.04	0.15	0.22	0.18	0.06
2003-04	0.12	0.2	0.05	0.03	0.15	0.21	0.17	0.07
2004-05	0.11	0.22	0.06	0.04	0.15	0.17	0.16	0.09
2005-06	0.11	0.22	0.05	0.04	0.15	0.16	0.16	0.11
2006-07	0.1	0.23	0.05	0.04	0.14	0.15	0.14	0.15
2007-08	0.11	0.24	0.07	0.04	0.13	0.12	0.12	0.17
2008-09	0.09	0.26	0.06	0.06	0.12	0.11	0.15	0.15
2009-10	0.11	0.22	0.06	0.05	0.13	0.11	0.16	0.16
2010-11	0.1	0.23	0.05	0.07	0.11	0.11	0.16	0.17
2011-12	0.12	0.22	0.05	0.07	0.12	0.09	0.15	0.18
2012-13	0.13	0.22	0.05	0.08	0.12	0.08	0.12	0.20
2013-14	0.14	0.23	0.05	0.05	0.11	0.1	0.12	0.20

Source: Statistical tables relating to Indian Economy, Reserve Bank of India, various issues

Table A4: Percentage Share of Different Selected Regions in India's Exports

	EU	North America	OPEC	Eastern Europe	Developing countries of Asia	Africa	Latin American countries
1993-94	26.1	19.0	10.7	4.5	22.0	3.0	1.1
1994-95	26.7	20.1	9.2	4.0	21.7	3.3	1.5
1995-96	27.4	18.3	9.7	4.2	23.0	4.8	1.2
1996-97	25.9	20.6	9.6	3.3	24.3	4.2	1.4
1997-98	26.1	20.7	10.1	3.7	22.8	4.7	2.0
1998-99	26.9	23.1	10.7	3.2	20.6	5.3	1.9
1999-00	25.5	24.4	10.6	3.5	22.3	4.2	1.9
2000-01	23.4	22.4	10.9	3.0	22.5	4.4	2.3
2001-02	22.5	20.8	11.9	2.9	23.6	5.2	2.1
2002-03	21.9	22.0	13.1	2.4	26.5	4.9	2.5
2003-04	21.8	19.2	14.9	2.4	28.9	4.8	2.0
2004-05	21.0	17.5	15.8	2.1	29.9	5.4	2.6
2005-06	21.7	17.8	14.8	1.9	30.1	5.5	3.0
2006-07	21.2	15.8	16.6	1.2	29.8	6.9	3.3
2007-08	21.2	13.5	16.6	1.1	31.6	7.5	3.4
2008-09	21.3	12.2	21.3	1.1	28.0	6.3	3.1
2009-10	20.1	11.5	21.1	1.0	29.8	5.8	3.6
2010-11	18.4	10.6	21.5	1.2	30.9	6.5	4.1
2011-12	17.2	12.0	16.8	1.0	31.9	6.7	4.4
2012-13	16.8	12.7	19.2	1.3	30.4	8.1	4.9
2013-14	16.5	13.1	17.7	1.1	30.4	8.4	4.0

Source: Hand book of Statistics on the Indian Economy, Reserve Bank of India various issues

Note: The total for each row will not add upto 100 as some regions are not included here.