



# ANALYSIS OF DETERMINANTS OF INDIA'S IMPORTS IN THE POST-REFORMS PERIOD

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## ABSTRACT

*Using econometric analysis, this paper identifies the major determinants of India's exports in the post-reforms period. Yearly time series data for the period of 25 years from 1990-91 to 2014-15 has been used from the RBI Handbook of Statistics and the World Bank datasets. In order to identify determinants of import, an import function has been estimated. Stationarity of the data was checked using the Augmented Dickey-Fuller Test. The most important and dominant factor in determining the demand for India's imports is found to be the domestic income (ZGDP). The study found that real GDP, RUVIIMPWPI and FOREX are the significant determinants of import demand. In terms of policy, this study identifies important domestic and international macroeconomic variables that have to be handled in order to manage India's imports. It is found that increased economic activity encourages imports both for consumption and imports of capital goods while more Forex reserves improve our capacity to import.*

**KEYWORDS:** *Determinants, Exports, REER, GDP, trade openness, India.*

## INTRODUCTION

International trade has played an important role in the development of the Indian economy. Improvement in trade leads to increase in GDP and this increase in GDP again leads to more trade between countries producing a virtuous circle (Bhagwati, 1988) beneficial to all. It helps to enhance the development of the country and also reduce poverty (Bhagwati & Srinivasan, 2002) through increased level of commercial and investment activities. While exports contribute to foreign exchange earnings, imports provide access to scarce or expensive goods to the residents of a country. Imports provide access to wide range of goods that are not produced domestically. Moreover, imports can enhance establishment and expansion of the industrial sector and also improve the productivity of the economy (Lee, 1995). Recent studies (Ugur, 2008; Mazumdar, 2001; Lee, 1995) have highlighted the significance of imports in bringing foreign technology and knowledge into the country. Imports also help in transfer of R&D knowledge from developed to developing countries and contribute largely to enhancing of domestic manufacturing base

that in turn develops the export-oriented industries. A large foreign exchange reserve facilitates the imports of high quality goods and services, machines, technology into the country enhancing the production capacity of the country and thus contributing to economic growth (Baharumshah, 1999).

After the introduction of economic reforms, India's foreign trade saw a lot of volatility till 1990 after which it experienced a tremendous rise in the volume of exports and imports (Rangarajan & Kannan, 2017). Like any other developing economy, India too is heavily dependent on imports. Major items of import are mineral fuels, gems and stones, electrical equipments, organic chemicals, fertilizers, plastics and other items. Imports provide required foreign technology to the domestic industries and contribute to the economic growth (Coe & Helpman, 1995).

From policy point of view, it becomes very important to understand about the determinants of imports. Keeping other things constant, how will our imports respond when our GDP increases? What will be the impact of change in foreign exchange reserves on imports? How will imports respond to change in the

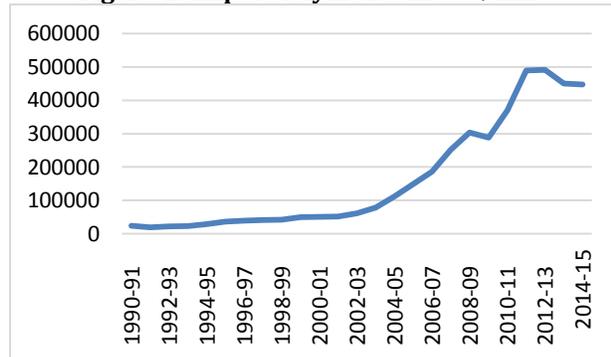
relative prices of imports? To address these questions, this paper identifies major determinants of India's import demand in the post-reforms period from 1990-91 to 2014-15. It is organised as follows. The second section discusses the performance of India's imports while the third section reviews the literature on major determinants of imports. The fourth section discusses the data and methodology. The fifth section analyzes and discusses the results and findings while the study is summarized and concluded in the sixth section.

## OBJECTIVES

1. To see the performance of India's imports in the post-reforms period
2. To identify and analyse the determinants of demand for India's import

## Performance of India's Imports

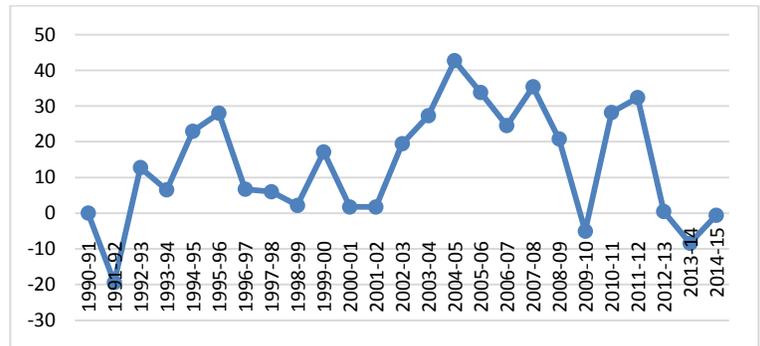
Figure 1. Import Payments in US \$ mn



Source: RBI HBS on Indian Economy, 2015.

Import restrictions imposed by the govt. during balance of payment crisis led to decline in imports initially. However, as the govt. eased these restrictions in 1991-92 as a part of the economic reforms, India's imports picked up slowly till 2004-05, after which the imports increased sharply due to rise in demand for crude oil and their prices. During 1999-2000 and 2000-01, there has been a sharp increase in the international price of crude oil. This has resulted in sharp escalation in POL (petroleum, oil and lubricants) imports. A sharp rise in POL prices in 2008-09 led to further increase in India's imports. But due to the global slowdown of 2008, prices of crude oil fell which resulted in a fall in our imports. However, imports again picked up after 2010-11 due to various reforms introduced by the govt. to come out of the crisis. But India's imports in the recent times have been remaining at low levels because of slowdown in the major economies of the world.

Figure 2. Growth rate of India's imports



Source: RBI HBS on Indian Economy, 2015

The above graph depicts India's imports to be very volatile. During the initial phase of liberalization, India experienced negative growth of imports mainly due to various policies undertaken by the government to restrict imports. However, as the country witnessed a huge increase in the export earnings and also felt the need for imports, the tariff and restrictions on imports were eased which led to surge in imports. This surge in imports continued till 1995-96 when India's imports fell because India's industrial sector experienced a slowdown.

After 1996, there was a fall in international prices due to which imports became more attractive and at the same time the policies of liberalisation were encouraged as per the WTO recommendations. During 1999-2000, oil import bill increased due to increase in international crude oil prices. Even though the oil imports rose by 57.8% in 1999, overall import growth remained at 9% because of the downturn in gold and silver imports and also a sharp fall in the imports of capital goods by 30%. In 2000-01, India's imports fell due to fall in crude oil prices.

From 2001-02 to 2004-05, Imports increased at a much higher rate because this period was marked by a strong growth of Indian economy, lower import tariffs, increased import of capital goods and industrial raw material, huge import of cheap Chinese manufacturing goods to India and also nearly 60% rise in import of gold and silver.

During 2009-10, India's imports registered a negative growth of 5.1% in US \$ terms as crude oil prices fell and major developed countries of the world faced economic slowdown as a result of 2008 Global Financial Crisis. A sharp growth in India's imports can be observed for the period of 2010-11 and 2011-12 due to increase in international crude oil prices and huge import of pulses. India's imports fell to 0.3% in 2012-13 and to (-8.3%) in 2013-14 due to various measures



taken by the Govt. to curb the import of gold and fall in non-oil imports.

## REVIEW OF LITERATURE

Amelia and Paulino of University of Kent (2002) in their paper analysed the impact of reduction of tariff and non-tariff barriers on the imports 22 developing countries using the dynamic panel data techniques. They identified that the domestic income and relative prices will significantly deter the import growth. They also examined that import duties reduce import growth and the effect varies from country to country according to the trade policy it adopts. They also got results showing elimination of trade policy distortions has a strong, positive impact on the growth. Finally, they stated that excessive import growth due to trade liberalization has serious policy implications, mainly regarding the balance of trade and payments, because in most cases imports increase by more than exports, causing trade imbalances. Therefore, the policies regarding imports should take place in accordance with the export promotion strategy. Tura (2001) estimated import demand for Ethiopia using Johansen Co-integration technique for the period 1970-70 to 1999-2000 using quarterly data. It was found that real income real income does not have significant impact on imports in the long run although it has positive impact on imports.

Using co-integration and error Correction Modelling, Dutta and Ahmed (2006) in this paper tried to study the behaviour of Indian aggregate import for a period of 24 years i.e. 1971-1995. In the aggregate Import Demand Function for India, it is found that import volume is co-integrated with real GDP and relative import prices. The econometric estimate of aggregate import demand function for India suggests that import demand is largely influenced by real GDP and is generally less sensitive to import prices changes. Import liberalisation is found to have little impact on import demand. They have used co-integration and Error Correction modelling approaches for the empirical analysis of merchandise import demand function for India. It is also found that the demand for imports is less sensitive to import price changes.

To estimate the import demand function for India's aggregate imports Malhotra (2011) made a study on India's import demand functions. In their study they found the India's aggregate import demand function by using log linear form for the period 1986-87 to 2003-04. Here, the log linear model was estimated by including a dummy variable and also not including a dummy variable for the liberalization period. The results showed that imports are highly income and price elastic. The foreign exchange variable was found to be insignificant. The dummy variable is

not statistically significant but has a positive sign which says that it affected imports through its positive impact on GDP growth. The important finding in this paper is that dummy variable is statistically significant in case of chemical of allied industries imports and mineral products. They also affirmed that the demand for imports depend on size, composition and growth rate of population, growth rate of GNP, growth rate of capital formation and growth rate of export earnings. On the determinants of import demand size, the major factors are relative prices and income and capacity to import and domestic production.

Using time-series data and applying Johansen-Juselius multivariate co-integration technique, Dash (2005) has attempted to examine the behaviour of aggregate import demand function for India for the period 1975-2003. The author has used co-integration and error correction technique for empirical analysis of the aggregate import demand function for India. By using macro-economic variables like GDP, UVI of imports, prices of domestically produced goods and foreign exchange reserves the study has illustrated the existence of co-integrating relationship among these variables. The study has also found more than one co-integrating relationships between these variables which implies that the system is more stable. It has been found that the demand for import is largely dominated by price of domestically produced goods, lag of import and foreign exchange reserves. Mishra (2012) used time series techniques using India's annual time series data for the period 1970-71 to 2009-10 to understand the relationship between imports and economic growth for India. The results suggest that growth in imports lead to increase in real economic growth in the long run only and not in the short run.

## DATA AND METHODOLOGY

The objective of this paper is to identify the determinants of India's imports using the annual time-series secondary data for the time-period 1990-91 to 2014-15. The dependent variable used in the study is Real Imports denoted by ZIMP. The independent or explanatory variables used are: Real GDP (ZGDP), Ratio of Unit Value Index to Wholesale Price Index (RUVIIMPWPI) and Foreign Exchange Reserves (FOREX). Real GDP is used as a proxy for India's economic growth while Foreign exchange reserves represent India's capacity to import. All required data for the sample period have been sourced from RBI Hand Book of Statistics 2015 and World Bank Data Sets. Natural logarithms of all variables have been taken to avoid the problem of heteroskedasticity.

This study analyses the relationship between imports and real GDP (ZGDP), ratio of UVI of imports to WPI (RUVIIMPWPI) and foreign exchange reserves



(FOREX) using a multiple regression technique. Imports are assumed to be a function of GDP, UVIIMPWPI and FOREX:

$$ZIMP = f(ZGDP, RUVIIMPWPI, FOREX)$$

The following multiple regression equation establishes the relationship between the factors. Here, the percentage growth in imports is the dependent variable and other variables are the independent variables:

$$M = a_0 + b_1ZGDP + b_2 RUVIIMPWPI + b_3 FOREX$$

This model exhibits the relationship that exists between various factors and the imports.

### EMPIRICAL ANALYSIS

The variables used in the study are tested for their stationarity using Augmented Dickey Fuller (ADF) Test in order to avoid spurious results. The ADF test has been carried out to check the stationarity of the used variables. Testing for stationarity involves checking whether the mean and the variance are constant over time. The results of the unit root test are presented in Table 1. According to the ADF Test, LNRUVIIMPWPI is stationary on level and is taken as I(0). Other three variables are non-stationary at levels and become stationary after first difference. Thus they are taken as I(1).

**Table 1: Results of the Unit Root Test using Augmented Dickey Fuller Test**

Variables	At level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Inference
LNZGDP	-2.42	-4.00**	-	I(1)
LNZIMP	-1.46	-4.55*	-	I(1)
LNRUVIIMPWPI	-	-	-	I(0)
WPI	3.29**			
LNFOREX	-1.47	-5.20*	-	I(1)

t-values significant at 1%, 5% and 10% level of significance \*, \*\*, \*\*\* Critical t-values: 1%= -4.009, 5%= -3.4347, 10%= -3.1413

In the second step, the regression models are constructed to establish the relationship between real imports (ZIMP) and various variables influencing them. Using the OLS estimation, we have identified the determinants of the trade flows in India.

### ESTIMATED RELATIONSHIP

#### Equation 1: Import Demand Function

$$D(\ln ZIMP) = -0.07 + 3.20 * D(\ln ZGDP) - 0.04 * \ln RUVIIMPWPI + 0.25 * D(\ln FOREX(-1))$$

(-1.09) (4.00) (-2.32)

(3.20)

+ 0.21 \* DUM (1991, 2007, 2011)

$\bar{R}^2 = 0.76$

D-W Statistic = 1.98

F-

statistic = 19.20

The import demand function establishes a relationship between the demand for the imports and the major factors that determine the demand for imports. The independent variables in the model are Real GDP, ratio of import prices to domestic prices and foreign exchange reserves. The most important and dominant factor in determining the demand for India's imports is found to be the domestic income (ZGDP). Increase in domestic income leads to increase in marginal propensity to import and fall in income will lead to decrease in propensity to import. Thus, there exists a strong positive relationship between domestic income and demand for imports. The results support the view that domestic production strongly and positively influences the import behavior of a country (Ugur, 2008; Velnampy & Achchuthan, 2013;).

Also, the model shows that the demand for imports is inversely related to relative prices. This relationship is also according to the theory. If the prices of imports from the rest of the world are lesser than the domestic prices, then we find it more profitable to import than consume domestic products (Reinhart, 1995). Hence, demand for imports will rise when relative prices fall. Here, co-efficient is also found to be significant with a t-value of 2.32.

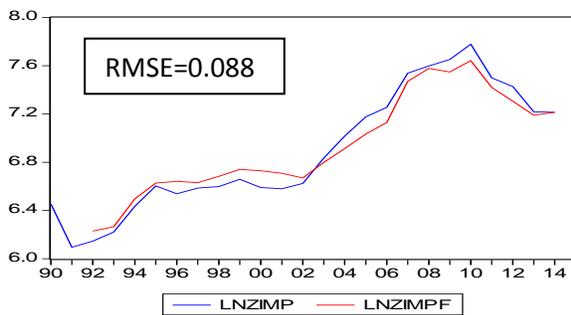
The foreign exchange reserves act as import cover and reveal the strength of external payments position which provides the confidence to import more. For that reason, a positive relationship is assumed between the foreign exchange reserves and the demand for imports (Arize & Osang, 2007). Here, the co-efficient is also found to be significant with a t-value of 3.20.

The dummies have been used for the three period viz. 1991, 2007 and 2011. The dummy for 1991 represents the period when India faced Balance of Payments crisis. During this period, various policies were introduced to restrict imports and boost exports which led to drastic fall in the imports. The period 2007 represents the period when India's real GDP grew by 9.2 percentages and also saw booming investment and consumption. This might have led to a considerable increase in India's demand for imports. In this regard, the t-statistic of the dummy is found to be significant.

The R-squared of 0.76 indicates that the model explains 76% changes in dependent variable. The Durbin-Watson stat (1.98) shows that there is no serial or auto-correlation among the error terms. The high F-statistic (19.20) tells us that the combination of all the independent variables is significant and is a good fit.

### In-sample Forecasting and stability diagnostics

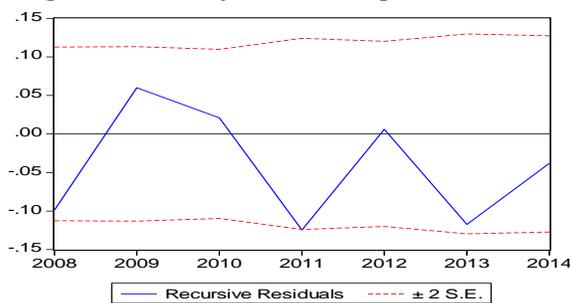
Figure 6. In-sample forecast for Import demand function



Source: Author's Calculation

Here in this model RMSE is 0.088 which signifies that there is a 0.088 deviation from the forecasted model, which tells that the forecasted model is satisfactory and suggests that the predictive performance of the model is very satisfactory implying that the forecasted series in the model is very close to the actual series and there are no systematic tendencies to over/under estimate the actual data.

### Figure 7. Stability tests for Import Demand



In the above figure, the residuals lie within the standard error band indicating that there is stability in the parameters of the model across subsamples of the data. A good model has to be stable through all subsamples of the given data. For this, we use stability test. The residuals have to lie within a standard error band. In the above figure, the residuals lie within the standard error band indicating that there is stability in the parameters of the model across subsamples of the data. Blue line represents the estimated model while the standard errors are represented by the red lines. If the estimated model lies within the  $\pm 2$  standard errors, the model is considered to be good fit. The estimated model is within the  $\pm 2$ . Thus, we accept this model as a good model.

### CONCLUSION

Using time-series data from 1990-91 to 2014-

15, this study aims to identify the major factors that determine the imports in India. For this purpose, yearly data was used from RBI Handbook of Statistics. OLS method was used to estimate the relationship between imports and its potential determinants. An import demand function has been estimated to identify the determinants of India's imports. The factors that we observed in the study were Real GDP, Ratio of Import Prices to Domestic Prices and Foreign Exchange Reserves. All these variables were tested for stationarity using the ADF test and a regression model was constructed to determine the factors responsible for the volatility in India's imports. Domestic income and foreign exchange reserves were found to be the most significant variables influencing India's imports. Since imports are that part of consumption that is not produced domestically, our imports increase as our domestic income increases. Foreign exchange reserves represent the capacity to import. Therefore, accumulation of more foreign exchange encourages more imports. Forecasting from the equation, we found that the estimated equation when subjected to a confirmation test, proved to be good which was undertaken using the technique of in-sample forecasting.

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