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Original Article

Determinants of India's Exports in the Post-Reforms Period

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Abstract *- This paper tries to identify the major determinants of India's exports in the post-reform period. It is based on secondary data for 25 years from 1990-91 to 2014-15, and the data is used from the RBI Handbook of Statistics and the World Bank datasets. To identify the determinants of export supply and demand, two different regression analyses were employed. Thus, two equations have been estimated to identify the export demand function and export supply function. The stationarity of the data was checked using the Augmented Dickey-Fuller Test. Among the external factors, world income is the most important and dominant factor in determining India's exports. The study found that world income, relative price are the significant determinants of export demand while GDP, REER, and trade openness are the most important determinants of export supply. In terms of the policy, this study identifies important domestic and international macroeconomic variables that have to be handled to boost India's exports.*

Keywords *- Determinants, Exports, REER, GDP, trade openness, India.*

I. INTRODUCTION

International trade plays a crucial role in economic development (Makki & Somwaru, 2004; Zahonogo, 2016). It enhances the country's development and reduces poverty (Bhagwati & Srinivasan, 2002) through increased commercial and investment activities. Moreover, exports provide an outlet for surplus products over and above domestic requirements and a wide range of goods at competitive prices. Earnings from exports contribute to the economic growth of the country. Numerous scholars have asserted the importance of exports in a country's economic development through the export-led growth hypothesis (Dinc et al., 2019; Awokuse, 2003; Shan & Sun, 1998; Faisal & Tursoy, 2017; Ahmad et al., 2018).

India's foreign trade had been seeing sporadic fluctuations till 1990 due to various impeding factors. Still, after 1990 there was a tremendous breakthrough in the country's foreign trade (Rangarajan & Kannan, 2017), which led to an increase in the volume of exports and imports. Like other East-Asian countries that had adopted an export-led growth strategy in the 1970s, India adopted an export-led growth strategy in the 1990s (Sahoo et al., 2013). Consequently, India's approach to foreign trade shifted from inward-looking and import-substituting to an open economy integrated with the rest of the world (Rangarajan & Kannan, 2017), reducing and removing barriers to quantitative controls over imports and tariff rates that opened the economy for the rest of the world. Since then, India's exports have seen a continuous and gradual upward rise contributing to India's economic growth.

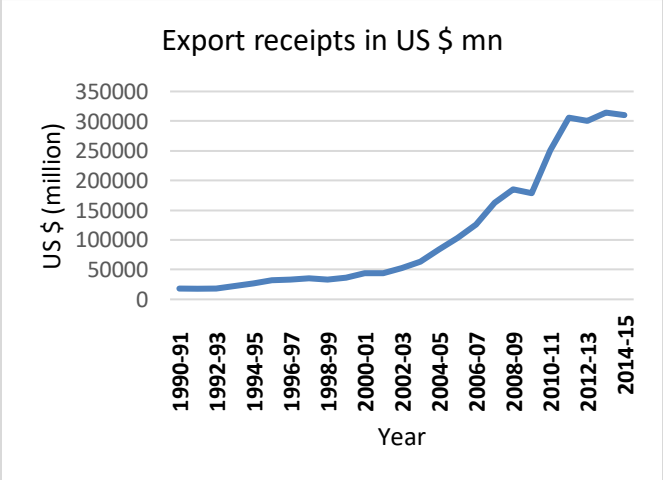

Fig. 1 India's export earnings during the post-reforms period

This article aims to identify major determinants of India's export demand and supply in the post-reforms period from 1990-91 to 2014-15.

It is organized as follows. The performance of India's exports in the post-reform period is discussed in the second section. The third section reviews the literature on the major determinants of exports. Data and methodology are explained

in the fourth section. The fifth section analyzes and discusses the results and findings, while the study is summarized and concluded in the sixth section.

II. OBJECTIVES

a. To see the performance of India's exports in the post-reforms period
b. To identify and analyze the determinants of India's export demand
c. To identify and analyze the major factors influencing India's export supply

III. PERFORMANCE OF INDIA'S EXPORTS

Various reforms that were introduced led to a tremendous rise in exports, which further led to positive growth. The following graph shows the rise in exports in 1990. In the above graph, we can see that there has been a gradual upward and continuous rise in India's export earnings from 1990-91 to 2008-09. In the year 2009-10, the graph becomes flattered, mainly because of the Global Financial Crisis of 2008 that caused the slowdown in many economies. After 2010-11, our exports picked up as the Govt. introduced reforms to come out of the crisis, and many countries started recovering. The share of total exports in the total GDP was 5.72% in the year 1990-91, which increased to 13.89% during 2007-08 and % in 2014-15. Therefore, it is clear that the period from 1990 to 2008 has seen tremendous growth in exports compared to the previous decades. Particularly, from 2001-02 onwards, the surge in exports is due to increased competitiveness in the world market and the implementation of various recommendations and suggestions made by the WTO. However, the rise in imports has been higher, resulting in India's trade deficit widening.

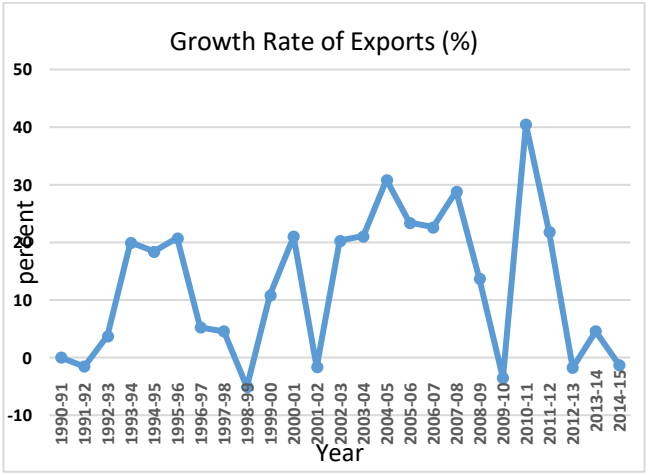

Fig. 2 Growth rates of India's Exports

Source: RBI HBS on Indian Economy 2015-16.

In the above graph, we observe that India's exports are very volatile. If we study exports in terms of growth rates, India's exports exhibit random fluctuations, which are not desirable for an economy. In 1990-91, we saw exports falling into negative territory as India faced a balance of payment crisis.

IV. LITERATURE REVIEW

Sharma (2003) studied the factors determining India's export performance and stated that foreign investors have a very low impact on export performance. Using the annual data from 1970 to 1998, he investigated India's export performance determinants based on the simultaneous equations. He found that the rupee's real appreciation harms the performance of the Indian exports. He also found that export supply is positively related to exports' domestic relative prices, and a higher domestic demand reduces the export supply. Using the standard unit root test, he found out that the demand for exports increases when India maintains the rupee's real depreciation.

At last, he proves that the foreign investment appears to have statistically no significant impact on India's export performance, although its co-efficient has a positive sign. One of the major drawbacks sis they could not find out the effects of liberalization due to short time-series data. Using annual data for the period 1975-2008, Paudel (2014), in his study, examined the impact of liberalization reforms on India's export performance. Using the ARDL approach to co-integration, he carried empirical analysis to estimate an export demand-supply model for manufacturing and merchandise exports. The author has used this method because it does not require prior knowledge of the variables' integration properties. The study's empirical results found that manufacturing and merchandise export demand are largely affected by world demand and manufacturing export supply, mainly determined by domestic manufacturing output, FDI, and liberalization reforms introduced in the 1990s. However, the study results could not find a significant negative effect of trade protection on India's export performance, but the liberalisation reforms of the early 1990s positively impact India's manufacturing exports.

In his paper, Roy (2007) attempts to analyze the changing behavior of India's exports for the period 1960-61 to 1999-2000. The author found two different views regarding India's export behavior. The first one stressed the importance of supply and policy constraints, and the second one on the importance of demand from the rest of the world in the determination of exports. Many econometric found relative price factor, REER to be dominant. In the short-run, individual demand and supply factors are significant, but their association determines the behavior in the long-run. He has used the error-correction method to estimate the demand-supply model of export determination. The study's empirical findings illustrate that world demand and REER are

important factors in the determination of India's exports. Nevertheless, the results of this study are an improvement to the existing studies on India's exports.

To analyze the effect of productivity on India's export performance in engineering goods, Goldar (1989) estimated an export function using time-series data for the period 1960-79. He also analyzed other determinants of exports like the world market, exchange rate, and domestic demand. According to this study's findings, world demand, cumulative output, exchange rate, and total factor productivity are the major determinants of exports. However, the findings also suggest that domestic demand affects performance negatively. A study was done by Shah (2013) to empirically explore the determinants of India's exports for a period of 30 years, i.e., from 1980-2011. This study is based on previous research on the demand-supply factors affecting India's exports and establishes an imperfect-substitution demand-supply simultaneous equation model for determining exports. This paper can serve as a theoretical implication for the Indian economy, suggesting measures to contract the gaping trade deficit. It has been found that the supply of India's exports is price elastic, which implies that govt. Should pursue an export-oriented exchange rate policy and also maintain low and stable domestic prices. Indian exports are significantly affected by world demand implying that the govt. Should diversify India's exports away from agricultural products, textiles, and clothing towards chemical, fuel, and mining products. India accounts for a significant share in world exports in agricultural products. But, its overall share in world exports has been declining, which necessitates the diversification of exports.

V. DATA AND METHODOLOGY

This study uses the annual time series data for the period 1990-91 to 2014-15. The variables used in the study are:

- ZEXP = Real Exports
- WGDP = World GDP
- RUVIEXPUVIWEXP = Ratio of India's Export price to World Export Price
- ZGDP = Real GDP
- RUVIEXPWPI = Ratio of Export Price to Domestic Price
- REER = Real Effective Exchange Rate (Indian Rupee vis-à-vis US Dollar)
- TO = Trade Openness

This study's data sources are collected from RBI Hand Book of Statistics 2015 and World Bank Data Sets. All variables are taken in the log form to maintain the data's uniformity, and since log transformation gives us the elasticity, interpretation of the coefficient becomes convenient.

VI. RESULTS & DISCUSSION

A. Stationarity Test

The Augmented Dickey-Fuller test has been carried out to check the stationarity. Testing for stationarity involves checking whether the mean and the variance are constant over time.

Table 1. Test for stationarity using Augmented Dickey-Fuller Test

Variables	At levels	1st difference	2nd difference	Inference
LNZEXP	-3.08	-4.02**	-	I(1)
LNWGDP	-1.30	-2.94	-5.41*	I(2)
LNRUVIEXPUVIWEXP	-2.66	-4.79*	-	I(1)
LNZGDP	-2.42	-4.00**	-	I(1)
LNRUVIEXPWPI	-3.26***	-	-	I(0)
LNREER	-5.85*	-	-	I(0)
LNTO	-1.28	-5.56*	-	I(1)

Source: Author's Calculation

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

As required by the established empirical methodology in econometrics, the variables' stationarity has been checked to avoid spurious regression. It is necessary to check time series data for stationarity using the Unit root test. The results of the variables mentioned above are given in the above table.

B. Determinants of Exports in India

This section has run the regression and generated two models, namely the export demand function and the export supply function. The export demand function reflects the external determinants of exports, while the export supply function reflects domestic factors. Here, we have tried to determine the major determinants of India's exports through OLS regressions. These models exhibit the relationship that exists between various factors and exports. We have estimated two different equations for export demand and export supply functions. We have used real exports as the dependent variable in the export demand function, and the independent variables are WGDP and RUVIEXPUVIWEXP. Real exports are calculated by dividing exports by the Unit Value Index (UVI) of exports. The economic relationship is:

ZEXP = f(WGDP, RUVIEXPUVIWEXP)
(+) (-)

The relation between ZEXP and WGDP is positive. As the rest of the world's income increases, demand for our exports also gets pulled up by the world income. On the other hand, export demand is inversely related to relative prices. If the export prices offered by India are more than the prices offered by the rest of the world, then our exports become more expensive and less competitive. Hence the demand for our exports will fall when prices rise.

ZEXP = f(ZGDP, RUVIEXPWPI, REER, TO)
(+) (+) (-) (+)

Since exports are that part of the production that is not consumed domestically, our exports increase as our real GDP increases. The variable RUVIEXPWPI shows the ratio of export prices to domestic prices. When the export prices are higher than the domestic prices, the domestic producer finds it more profitable to export the good rather than sell it in the domestic market. So, there exists a positive relationship between the supply of exports and the ratio of export prices to domestic prices. Exports supply and REER are inversely related. As the currency depreciates, our exports become cheaper. The export supplier will not find it profitable to export more because, after depreciation, they will have to give away more goods for the same amount of money. Trade Openness has a positive impact on export supply (Chaudhary & Amin, 2012). As a country opens up for trade, it will remove barriers, tariffs, duties, etc., which will induce exporters to supply more.

Equation 1: Export Demand Function

D(LnZEXP)= 0.08 + 0.90*D(D(LnWGDP(-1))) –
(5.45) (3.65)

0.44*D(LnRUVIEXPUVIWEXP)
(-2.90)

+ 0.12*DUM(1998, 2014)

$\bar{R}^2$ =0.58 D-W Statistic = 2.08 F-statistic = 10.75

All the variables in the above model have signs according to the theory. In the above model, the export demand from 1990 to 2015 is explained by World Income and the relative prices (i.e., the ratio between India's export prices and World export prices). It is found that the most important and dominant factor determining India's exports is the world income. In the above model, the co-efficiency value signifies that the effect of world income on our exports is more than the effect of relative prices on the demand for our exports. The value of the t-statistic of the world GDP is also found to be significant. Thus, we can infer that our exports' demand is pre-dominantly and positively dependent on world income. It is also clearly evident when we observe India's exports, which shows a decline in our exports whenever the world income fell.

Also, the model shows that the export demand is inversely related to relative prices. If India's export prices are more than the world export prices, then our exports become more expensive and less competitive. Hence the demand for our exports will fall when prices rise. Here, co-efficient is also found to be significant with a t-value of -2.90. The dummies have been used for the two periods, viz. 1998 and 2014. The dummy for 1998 represented when the global economy faced a severe economic slowdown due to the East Asian Crisis. The period 2014 represents continued slowdown in the emerging countries, disappointing performance by the developed economies, and worsening of the geopolitical situation (Islam & Verick, 2011). In this regard, the t-statistic of the dummy is also found to be significant.

The R-squared of 0.58 indicates that 58 % of the dependent variable changes due to changes in the independent variables. The Durbin-Watson stat (2.08) shows a negligible level of serial or auto-correlation among the error terms. The F-statistic (10.75) tells us that the combination of all the independent variables is significant and is a good fit.

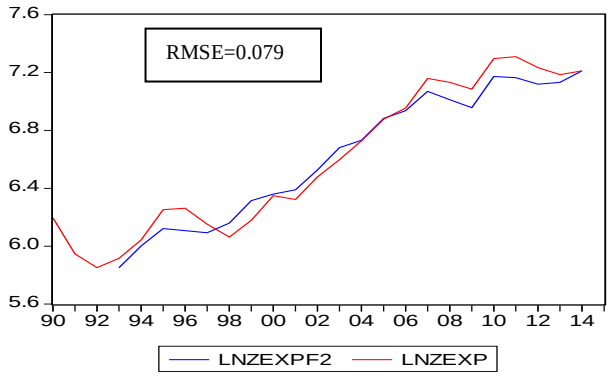

Fig. 2 In-sample forecast for export demand function

Source: Author's Calculation

The forecasting ability of the model can be assessed through in-sample forecasting. From the in-sample forecasting graph, we can see that the estimated model and the forecast model are almost the same for the entire period. Here in this model, RMSE is 0.079, which signifies a 0.079 deviation from the forecasted model, which tells that the forecasted model is very good.

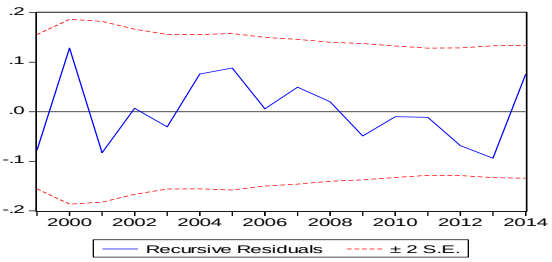

Fig. 4 Stability test for Export demand function

A good model has to be stable through all sub-samples of the given data. For this, we use a stability test. The residuals have to lie within a standard error band. The residuals lie within the standard error band in the above figure, indicating that the model's parameters are stable across subsamples of the data. The blue line represents the estimated model, while the red lines represent the standard errors. If the estimated model lies within the ±2 standard errors, it is considered a good fit. The estimated model is within ±2. Thus, we accept this model as a good model.

Equation2: Export Supply Function

$$D(LnZEXP) = 3.23 + 2.49*D(LnZGDP) + 0.04*LnRUVIEXPWPI(-1) - 0.75*LnREER(-1) + 0.54*D(LnTO) + 0.15*DUM(1994,1995,2002)$$

(2.70) (3.04) (1.78) (-2.96) (2.81)

$\bar{R}^2 = 0.65$ D-W Statistic = 2.10 F-statistic = 9.90

This model establishes the relationship between the export supply and the various factors that determine exports' supply. Here, the model's independent variables are Real GDP, the ratio of UVI of exports to domestic inflation, Real Effective Exchange Rate, Trade Openness.

From the above model, we can infer that the Real GDP variable plays a dominant role in determining exports' supply. Since exports are that part of the production that is not consumed domestically, our exports increase as our Real GDP increases. Of the three remaining variables, REER is more significant than the other two variables. The real effective exchange rate index of the Indian economy is calculated as a weighted average of top currency basket taken as a representative of the variable exchange rate. The co-efficient value of REER is also higher than that of RUVIEXPWPI and trade openness. As the currency depreciates, our exports become cheaper. The export supplier will not find it profitable to export more because, after depreciation, they will have to give away more goods for the same amount of money. Thus, there is an inverse relationship between the supply of exports and REER, which is correctly reflected by the model. The variable RUVIEXPWPI shows the ratio of export prices to domestic prices. It is said that when the export prices are higher than the domestic prices, the domestic producer finds it more profitable to export the good rather than sell it in the domestic market. There is a positive relationship between the supply of exports and the ratio of export prices to domestic prices in the above model. Here, the t-statistic is found to be significant. Trade Openness has been found to have a significantly positive impact on export supply. As a country opens up for trade, it will remove barriers, tariffs, duties, etc.
Which will induce exporters to supply more.

The R-squared of 0.65 indicates that the model explains 65% changes independent variables by the independent variables. The Durbin-Watson stat (2.10) shows a negligible level of serial or auto-correlation among the error terms. The higher F-statistic of 9.90 tells us that the combination of all the independent variables is significant, and it is a good fit. Here, the dummy variable has been chosen for the periods 1994, 1995, and 2002. The sweeping reforms in India's exchange rate and trade policies in 1994 led to a remarkable increase in exports' supply. The period 1995 saw a shift in India's foreign trade strategy from inward-looking import substitution to an outward-looking export promotion that further encouraged the exporters to supply more. The Eurozone crisis in 2011 had a negative impact on India's exports (Swamy, 2013) because India's major trading partners were going through a slowdown.

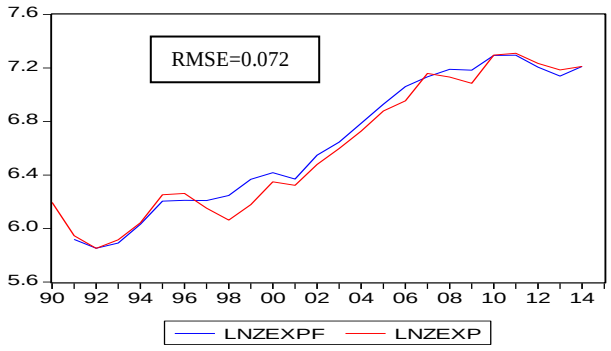

Fig. 5 In-sample forecast for export supply function
Source: Author's Calculation

Here in this model, RMSE is 0.072, which signifies a 0.072 deviation from the forecast model, which tells that the forecast model is satisfactory.

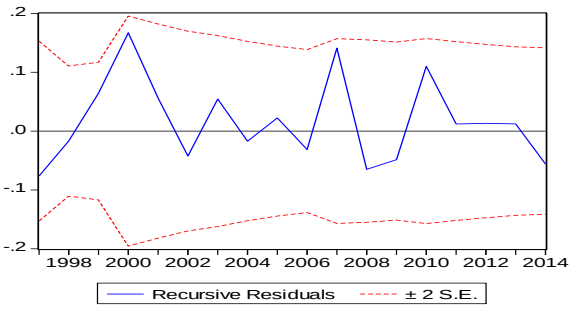

Fig. 6 Stability test for Export Supply function

Source: Author's Calculation

The residuals lie within the standard error band in the above figure, indicating that the model's parameters are stable across subsamples of the data. The estimated model is within ±2. Thus, we accept this model as a good model.

VII. CONCLUSION

Using time-series data from 1990-91 to 2014-15, this study aims to identify the major factors- both external and domestic- that determine India's exports. For this purpose, yearly data was used from the RBI Handbook of Statistics. OLS method was used to estimate the relationship between exports and their potential determinants. Two equations have been estimated to identify the export demand function and export supply function. The export demand function reflects the external determinants of exports, while the export supply function reflects domestic factors. Among the external factors, it is found that the most important and dominant factor determining India's exports is the world income. However, world income is an exogenous variable beyond our control. Therefore we should work on the next variable, i.e., the relative prices. Export demand is inversely related to relative prices. If India's export prices are more than the world export prices, then our exports become more expensive and less competitive. Hence the demand for our exports will fall when prices rise. Thus, India should focus on specializing in producing goods identified for exports and reducing production costs to export at competitive prices.

Among the domestic factors, we can see that the Real GDP variable plays a dominant role in determining exports' supply. Since exports are that part of the production that is not consumed domestically, our exports increase as our Real GDP increases. Therefore, it is very important to maintain a high rate of economic growth. Of the three remaining variables, REER is more significant than the other two variables. As the currency depreciates, our exports become cheaper. The export supplier will not find it profitable to export more because, after depreciation, they will have to give away more goods for the same amount of money. Thus, there is an inverse relationship between the supply of exports and REER, which is correctly reflected by the model. Thus, stability in the exchange rate has to be ensured against exchange rate risks. Removal or reduction of barriers, tariffs, and duties will induce exporters to supply more and increase exports.

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