

## Factors Determining Balance of Trade in India

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**Abstract:** This paper aims to determine the major factors influencing Balance of Trade (BoT) of India over the last 40 years (1981-2019). The OLS method of regression analysis has been used in the paper to analyse the relationship between balance of trade of India and its determinants. It is found that four main factors influence balance of trade in India- Real Effective Exchange Rate (REER), real value of global crude oil prices, private investment in India, and GDP per capita of India. Global oil prices have a significant negative relationship with India's trade balance. Investment, REER and GDP per capita have a significant positive relationship with India's trade balance. Furthermore, trade balance of India has been exceptionally low in two years - 2011 and 2017 - mainly due to global financial crisis and global recession respectively. These years are captured by dummy variables in the regression model.

**Keywords:** Balance of Trade, Exchange rate, Exports and imports, Trade balance of India, International trade.

### INTRODUCTION

Balance of Trade or net exports is defined as the difference between the values of exports and imports of goods and services of India during a given time period. Balance of Trade is an indicator of the overall net inflow of foreign exchange in the country. In India, balance of trade has been in deficit, which implies that the values of imports have increased more than the exports. This effect has been prominent since the 2000s, as shown in Figure 2. The trade balance has exhibited a steep downward trend in the past few decades (RBI, 2022). In July 2022, deficit in balance of trade of India was as high as US \$25.63 billion. The reason for such a large deficit has been sluggish growth of export in the context of global recession as well as inflation. On the other hand, imports of petroleum products and gold have been consistently increasing (Nandi, 2022).

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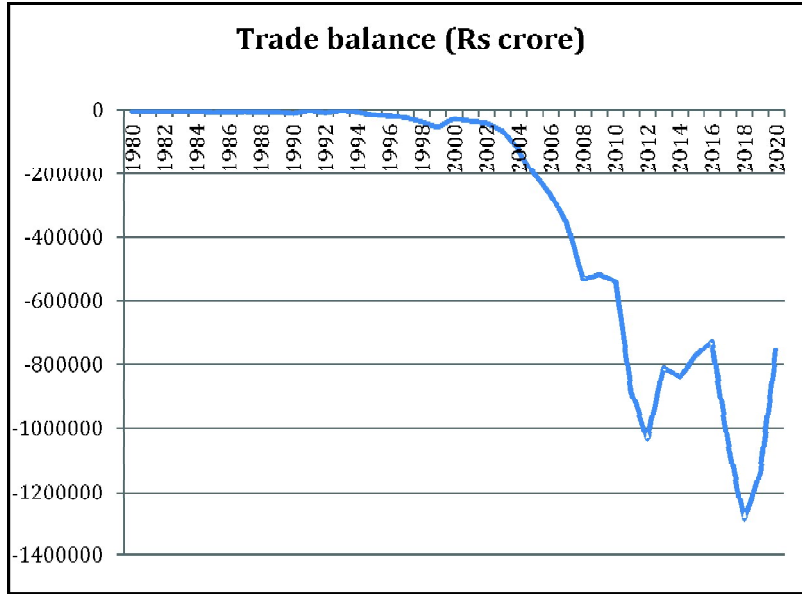


Figure 1: Balance of Trade of India, (Rs crores) (1980-2020)

Source: RBI database

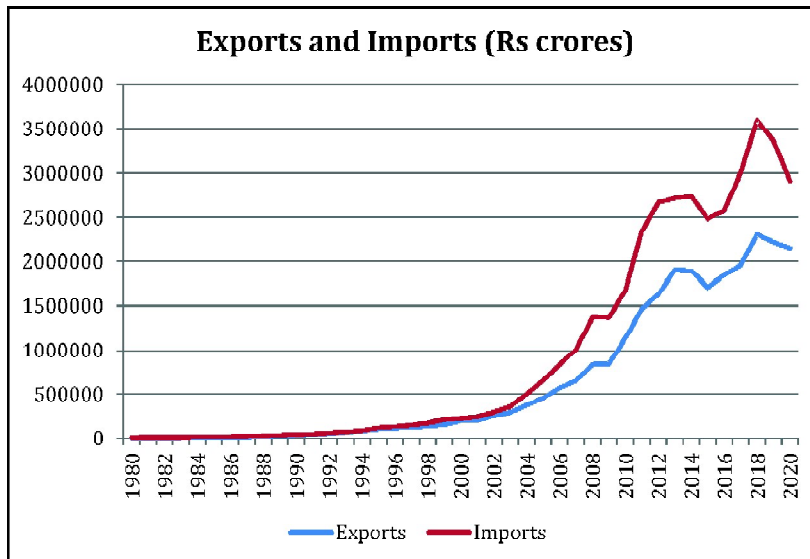


Figure 2: Exports and imports of India (Rs crores)

Source: RBI database.

Burgeoning trade deficit is a major concern for Indian economy. Several studies have shown that large deficits in trade balance tend to reduce

economic growth. Blavasciunaite *et al.* (2020) have empirically proved a negative relationship between deficit in trade balance and economic growth of countries in European Union. Trade deficit can hamper economic growth due to several reasons. It may lead to shortage of foreign exchange and can pave way for a Balance of Payments crisis. It restricts the country's access to technology and knowledge, and reduces the market size of the firms of the country (Anderson and Babula, 2009). Low values of exports and high values of imports reduce the national income and can cause unemployment. Imported goods and services provide a cheap substitute for domestically produced goods and services. This is harmful for domestic firms, especially for the Micro, Medium, and Small Enterprises (MSMEs).

In the context of the substantial importance of trade balance of India, the paper aims to study the major determinants of India's balance of trade. The structure of the paper is as follows. Section I provides a brief literature review on the factors affecting trade balance in India. Section II describes the sources of data, trend and stationarity of the variables, and the methodology used in the analysis. Section III provides model specification. Section IV describes the empirical findings. Section V presents some policy recommendations on the basis of the empirical result and the conclusion.

## LITERATURE REVIEW

There exists massive literature on the determinants of India's balance of trade. However, there is no consensus on the main factors that drive balance of trade. Hassan *et al.* (2017) have used the ARDL bounds testing approach to analyse the main determinants of trade deficit in case of India, Pakistan and Bangladesh. They have found that trade deficit in these countries tend to shrink with a depreciation of real effective exchange rate, rapid economic growth, and reduced money supply.

Many authors have found that a real depreciation of currency tend to reduce the deficit in trade balance both in the short as well as long run, as it promotes exports by making it cheaper and reduces imports by making it expensive. As a result, there is greater inflow of foreign exchange and reduced outflow of foreign exchange which leads to reduction in trade deficit (Vijayakumar, 2014; Salmasi, 2013; Muftau & Iyoboyi, 2014; Kurtoviæ, 2017).

Others have presented the argument in favor of the J-curve effect, which suggests that depreciation of currency leads to deterioration of trade balance in the short run, but leads to a surplus in the long run (Ouyang & Dongfack, 2019). The J-curve theory states that demand for export and import is inelastic in the short run as the quantity of export and import is fixed in the trade contracts for a longer duration. Also, consumers take time to switch

their demand pattern to domestic goods and services after the devaluation. Therefore, there is a time lag between depreciation and the resultant surplus in Balance of Trade.

Other authors have argued that depreciation would lead to worsening of trade deficit as it increases the value of imports and reduces the value of exports (Shah & Majeed, 2014; Raza *et al.*, 2013). Devaluation of currency may not always lead to increase in the exports of the country. According to the Marshall Lerner condition, devaluation of currency can lead to higher exports and lower imports only if the elasticities of demand of exports and imports are significant enough. Specifically, the sum of export demand elasticity and import demand elasticity should be greater than one, in order for devaluation to be influential.

Several studies have shown that there is a positive relationship between economic growth and improvement in balance of trade, each causing the other. Improvement in trade balance leads to rise in national income and economic growth. Higher economic growth also enables higher exports and hence surplus trade balance (Blavasciunaite *et al.*, 2020). Interestingly, other authors have argued that economic growth can lead to higher deficit in balance of trade. Higher economic growth and income would promote rise in imports, worsening the balance of trade, which has been observed in the liberalisation period of 42 developing countries (Parikh & Stirbu, 2014).

Fluctuations in global prices of crude oil also impact balance of trade of a country. Volatility of oil prices creates uncertainty and hampers consumer and investor confidence. This results in reduction of a country's exports and deficit in trade balance. Similarly, higher inflation in a country relative to inflation in foreign countries, due to rising global oil prices or otherwise, tend to reduce the country's exports and increases exports as domestically produced goods and services become relatively expensive (Forson *et al.*, 2022).

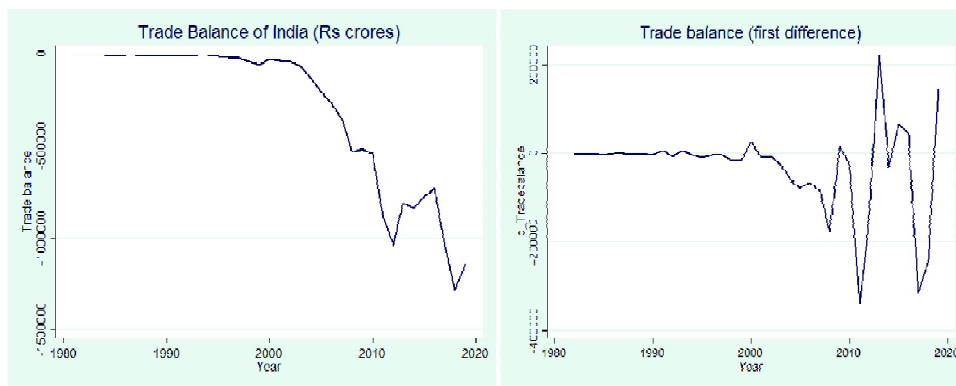
It has been argued that export promotion is a better measure to correct balance of trade deficit instead to import reduction. Growth of exports of India depends on the features of the economies of the trade partners, like foreign income, tariff and non tariff barriers, development of cross-border transportation and its cost, etc. These factors influence and are influenced by the volume, quality, and heterogeneity of the export basket. Research has shown that many of the developing countries have increased the export demand for their goods and services by improving on the quality and product differentiation (UNCTAD, 2005). This implies that reduction of trade barriers of the trade partners can improve the export performance of the country. For instance, Francois, Glismann and Spinanger (2000) have

estimated that reduced trade barriers of the developed world for the textile and clothing sector can generate export income worth US \$40 billion per annum for the developing world.

## DATA AND METHODOLOGY

This section provides a description of the major economic variables used in the paper and the statistical techniques adopted for the empirical analysis. The paper uses data on eight macroeconomic variables pertaining to India and its major trade partners. These variables are total Trade Balance of India, Real Effective Exchange Rate (REER) of Indian rupee, Private investment in India (Gross Domestic Capital Formation), Global crude oil prices, Gross Domestic Product (GDP) per capita of India, CPI of India, CPI of foreign countries, and Net Barter Terms of Trade. Real Effective Exchange Rate (REER) and an index of CPI of foreign countries are calculated by the author using data for India and its 40 largest trade partners, obtained from World Development Indicators, World Bank database. Data on CPI of India and Net barter terms of trade is also taken from WDI, World Bank. Data for Gross Domestic Capital Formation, GDP per capita and Trade balance is obtained from the database of Handbook of Statistics on Indian Economy published by Reserve Bank of India. The data on annual average global prices of crude oil is obtained from the World Bank database.

Trade balance of India, also known as net exports, is the difference between total exports and total imports of goods and services of India. Trade balance is measured in Rs crores. In the last four decades, trade balance has shown a decreasing trend, especially after the year 2000, as India's imports have increased more than its exports.



**Figure 3: Trade balance of India (Rs crores) and its first difference**

Source: RBI database

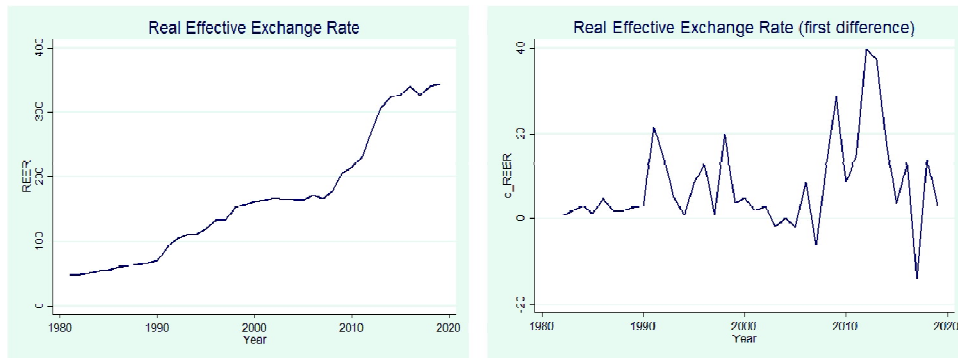
Real Effective Exchange Rate (REER) of India is an index that captures the real values of exchange rate between Indian rupee and the currency of India's 40 largest trade partners. It is calculated as a weighted geometric mean, using the formula given below. The weights allotted to each country correspond to its share in the total trade of India. An increase in REER implies either a depreciation of Indian rupee vis-a-vis the currencies of its trade partners or a decrease in the relative price level of India compared to the price level in the foreign countries.

$$REER_t = \prod_{i=1}^{40} \left( \frac{e P}{e_i P_i} \right)^{w_i}$$

$$\sum_{i=1}^{40} w_i = 1$$

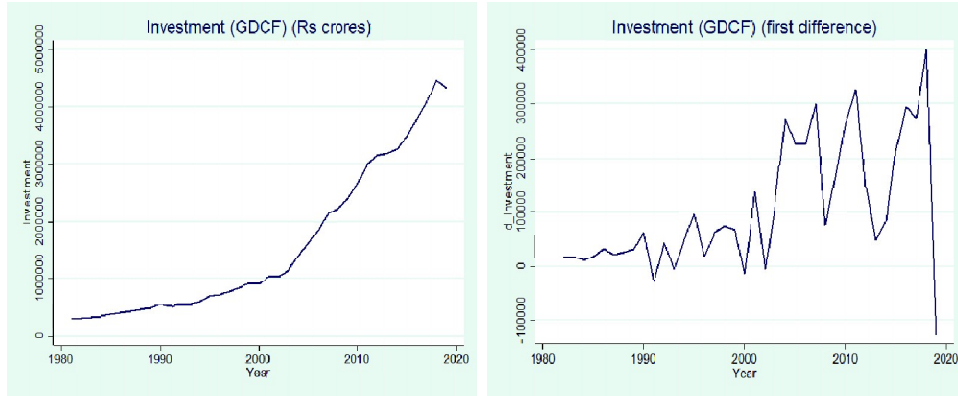
where  $e$  is the exchange rate of Indian rupee vis-à-vis SDR (Special Drawing Rights) and  $e_i$  is the exchange rate of the  $i$ th country vis-à-vis SDR (exchange rate of trade partners). Both  $e$  and  $e_i$  includes number of units of the currency per unit of SDR.  $P$  is the general price level (CPI) of India and  $P_i$  is the general price level (CPI Index) of foreign countries. An increase in REER implies depreciation of Indian rupee and vice versa. It can also mean a rise in the general price level of India or inflation in India vis-à-vis other countries.

Investment in India is measured by Gross Domestic Capital Formation (GDCF), measured in Rs crores. This variable helps to study the investment on fixed physical assets including transport, inventories, equipment, etc., that enable expansion of exports. It also enables domestic production of goods and services that helps in import substitution. Total private investment in India shows an increasing trend.



**Figure 4: Real Effective Exchange Rate (REER) and its first difference**

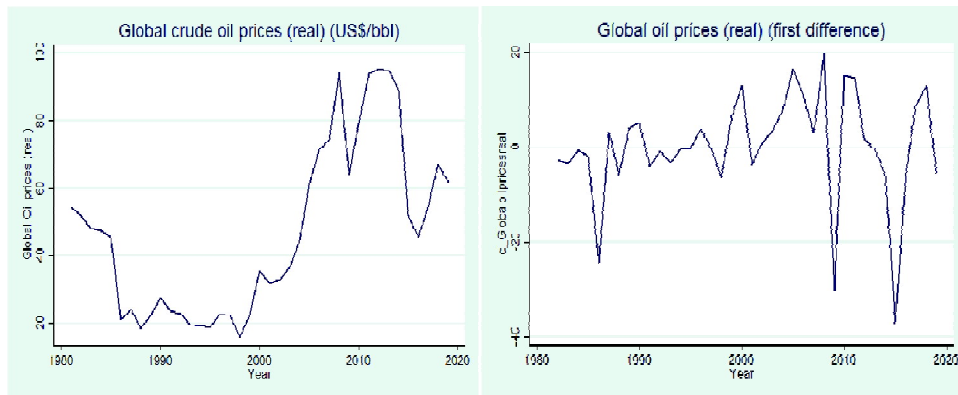
Source: author's calculation using WDI, World Bank database



**Figure 5: Investment (Gross Domestic Capital Formation) (Rs crores) and its first difference**

Source: RBI database

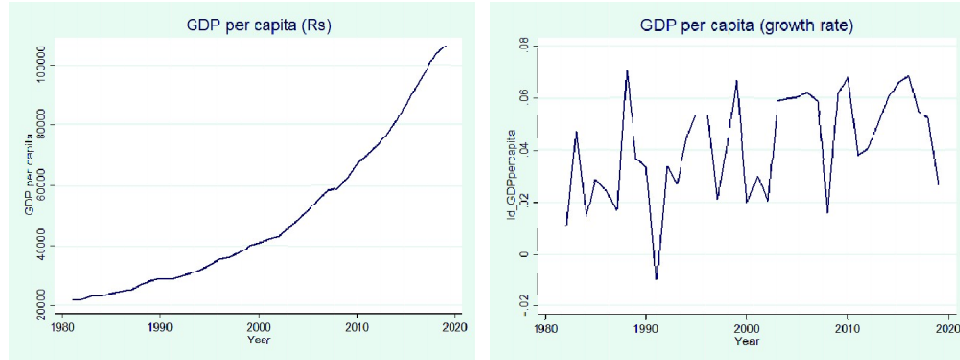
Real values of global crude oil prices are measured in terms of US dollars per barrel of crude oil at 2010 constant prices. Global crude oil prices have been increasing in the last 40 years.



**Figure 6: Average global crude oil prices (US\$/barrel) (2010 constant prices) and its first difference**

Source: World Bank database (Pink sheet)

Gross Domestic Product (GDP) per capita is a measure of final goods and services produced in India in a given time period, on an average by an individual. It can also be considered as a measure of India's per capita income. GDP per capita, measured in Indian Rupees, has been increasing during the last few decades.



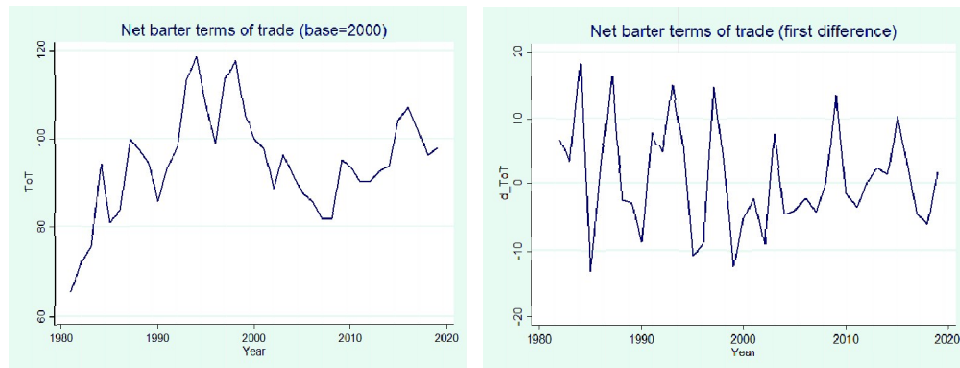
**Figure 7: Gross Domestic Product (GDP) per capita of India (Rs) and its growth rate**

Source: RBI database

Net Barter Terms of Trade is a measure of the value of exported commodities and services relative to imported commodities and service. It indicates the overall benefit of the country from international trade. The base year for the data is 2000. This variable has shown only a slight increasing trend over the last 40 years.

$$ToT_t = \left( \frac{P_x}{P_m} \right) * 100$$

where  $P_x$  is the average price index of India's export basket and  $P_m$  is the average price of India's import basket.



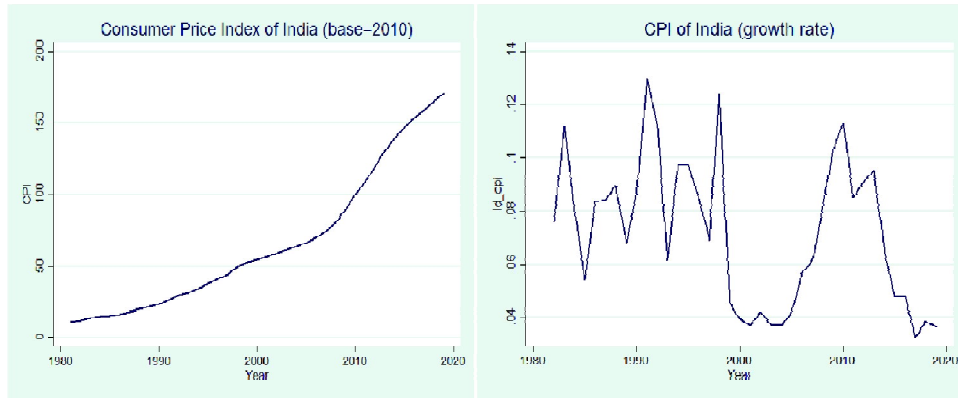
**Figure 8: Net Barter Terms of trade, base 2000 and its first difference**

Source: World Bank database

Consumer Price Index (CPI) of India as well as its 40 trade partners is used as a proxy for the general price level in the countries. CPI of India

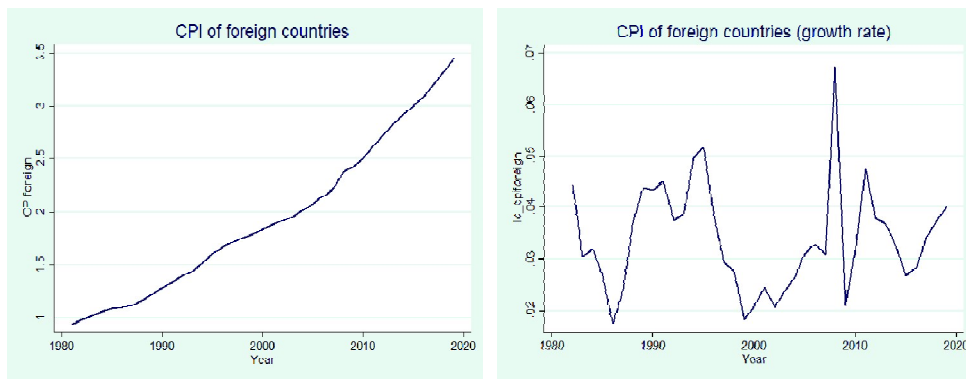


shows the average price of the basket of goods and services consumed by the households of India. For CPI of foreign countries, CPI of the 40 countries is combined into a single measure of prices in the foreign countries by calculating weighted arithmetic mean of the CPI of all foreign countries. The formula for weighted arithmetic mean is as follows.



**Figure 9: Consumer Price Index of India (CPI) base 2010 and its growth rate (inflation)**

Source: World Bank database



**Figure 10: Consumer Price Index of India's trade partners and its growth rate (inflation)**

Source: Author's calculation using World Bank database

**TEST FOR STATIONARITY**

All the variables used in the paper are non-stationary at their levels, but stationary at their first differences. Augmented Dickey-Fuller (ADF) unit root test for stationarity has been used to test the stationarity of the variables

at their first difference or log difference (growth rate). The results are summarised in the table below. As the p value of the ADF test is insignificant, we reject the null hypothesis that the series is non-stationary. In other words, the first difference or log-difference of the variables is stationary.

Null hypothesis: Series is non-stationary

**Table 1: ADF unit root test for stationarity of variables**

| Variables<br>(first difference) | ADF    | Critical value |        |        | p value | Null hypothesis |
|---------------------------------|--------|----------------|--------|--------|---------|-----------------|
|                                 |        | Z value        | 1%     | 5%     |         |                 |
| d_Tradebalance                  | -5.146 | -3.662         | -2.964 | -2.614 | 0.0000  | Rejected        |
| d_Investment                    | -3.382 |                |        |        | 0.0116  | Rejected        |
| d_Globaloilpricesreal           | -5.905 |                |        |        | 0.0000  | Rejected        |
| ld_GDPpercapita                 | -5.008 |                |        |        | 0.0000  | Rejected        |
| d_REER                          | -4.174 |                |        |        | 0.0007  | Rejected        |
| ld_CPI                          | -3.153 |                |        |        | 0.0028  | Rejected        |
| ld_CPIforeign                   | -4.269 |                |        |        | 0.0005  | Rejected        |
| d_ToT                           | -6.145 |                |        |        | 0.0000  | Rejected        |

## MODEL SPECIFICATION

India's balance of trade is expected to be dependent on the independent variables discussed in the previous section. Therefore, trade balance would be a function of the following form.

$$\text{Trade Balance}_t = f(\text{Private investment}_t, \text{Global Oil Prices}_t, \text{GDP per capita}_t, \text{REER}_t, \text{CPI}_t, \text{CPI foreign}_t, \text{ToT}_t)$$

Specifically, trade balance of India can be regressed on the independent variables and the equation to be estimated is as follows.

$$\begin{aligned} d\_Tradebalance_t &= \alpha_t + \beta_1 d\_Investment_t + \beta_2 d\_Globaloilpricesreal_t + \beta_3 ld\_GDPpercapita_t \\ &+ \beta_4 d\_REER_t + \beta_5 ld\_CPI_t + \beta_6 ld\_CPIforeign_t + \beta_7 d\_ToT_t + \beta_8 D_1 \\ &+ \beta_9 D_2 \mu_t \end{aligned}$$

Where d\_Tradebalance = first difference of India's balance of trade or net exports, d\_Investment = first difference of private investment in India (Gross domestic capital formation), d\_Globaloilpricesreal = first difference of real values of global crude oil prices, ld\_GDPpercapita = log-difference or growth rate of GDP per capita of India, d\_REER = first difference of Real Effective Exchange Rate of India, ld\_CPI = log-difference or growth rate of CPI of India (inflation in India), ld\_CPIforeign = log-difference or growth

rate of CPI of foreign countries (inflation in foreign countries),  $d\_ToT$  = first difference of Net barter terms of trade for India,  $D1$  = dummy variable for 2011,  $D2$  = dummy variable for 2017.

It is expected that change in trade balance would be positively related to change in private investment as higher investment promotes exports and enable import substitution. Change in trade balance is expected to be negatively related to change in global prices of oil as higher global oil prices would lead to increase in the value of imported goods and services. Change in trade balance can be positively or negatively related to change growth of GDP per capita depending on whether it influences exports or imports to a greater extent. Change in trade balance is expected to be positively related to change in real effective exchange rate, as higher value of REER implies depreciation, which would lead to Balance of Trade surplus by making exports cheaper and imports expensive. Change in trade balance is expected to be negatively related to inflation in India and positively related to inflation in the foreign countries, as the former would make Indian products expensive compared to the foreign products and vice versa. Finally, change in trade balance is expected to be negatively related to terms of trade as higher terms of trade would make Indian exports expensive and imports cheaper leading to improvement in trade balance.

### EMPIRICAL RESULT

The technique of OLS method has been used to determine the linear relationship between change in trade balance and the seven independent variables discussed in the previous section. OLS method of linear regression is chosen as the variables are stationary and there exists no auto-correlation in the model. It has been found that out of the seven independent variables used in the regression, only four are significantly related to the dependent variable. The main factors affecting changes in balance of trade of India include change in private investment of India, change in global prices of crude oil, growth rate of GDP per capita of India, and change in Real Effective Exchange Rate of India. Moreover, two dummy variables are found to be significantly related to the trade balance of India. The results of OLS regression are summarised in Table 2. The estimated equation is as follows:

$$\begin{aligned} d\_Tradebalance_t &= -25886 + 0.47d\_Investment_t - 2211.6 d\_Globaloilpricesreal_t \\ &+ 1.32ld\_GDPpercapita_t + 173.58d\_REER_t - 180424D1 \\ &- 213463D2 + \mu_t \end{aligned}$$

OLS, using observations 1982-2019 (T = 38)

Dependent variable: d\_Tradebalance

**Table 2: Regression of trade balance on India on investment, global oil prices, REER, and GDP per capita**

|                       | <i>Coefficient</i> | <i>Std. Error</i>  | <i>t-ratio</i> | <i>p-value</i> |     |
|-----------------------|--------------------|--------------------|----------------|----------------|-----|
| const                 | -25886.3           | 24950.7            | -1.037         | 0.3075         |     |
| d_Investment          | 0.469166           | 0.117876           | -3.980         | 0.0004         | *** |
| d_GlobalOilpricesreal | -2211.59           | 912.385            | -2.424         | 0.0214         | **  |
| ld_GDPpercapita       | 1.32784            | 647892             | 2.049          | 0.0490         | **  |
| d_REER                | 173.580            | 989.247            | 0.1755         | 0.8619         | *   |
| D1                    | -180424            | 67767.8            | -2.662         | 0.0122         | **  |
| D2                    | -213463            | 66903.7            | -3.191         | 0.0032         | *** |
| Mean dependent var    | -29884.50          | S.D. dependent var | 103844.0       |                |     |
| Sum squared resid     | 1.12e+11           | S.E. of regression | 60043.87       |                |     |
| R-squared             | 0.719886           | Adjusted R-squared | 0.665670       |                |     |
| F(6, 31)              | 13.27820           | P-value(F)         | 2.13e-07       |                |     |
| Log-likelihood        | -468.1589          | Akaike criterion   | 950.3177       |                |     |
| Schwarz criterion     | 961.7808           | Hannan-Quinn       | 954.3962       |                |     |
| rho                   | -0.389699          | Durbin-Watson      | 2.211841       |                |     |

Notes: 1. ld indicates log difference, d indicates first difference

2. Level of significance: (\*): 10 per cent, (\*\*): 5 per cent, (\*\*\*): 1 per cent

The regression analysis has interesting implications. Change in private investment in India has a significant positive relationship with change in trade balance of India. As the first difference of private investment in India increases by 1 crore, first difference of trade balance of India increases by 0.47 crores approximately. This effect is significant at 99 per cent confidence level.

Investment in the model is measured by Gross Domestic Capital Formation which includes expenditure on fixed physical assets as well as the net changes in the inventories of the firms. GDCF enhances the capital stock of the country including machines, tools, equipments, etc. This enables expansion of production capacity of firms, increases employment, improves productivity of workers, contributes to the aggregate demand, and promotes technological improvement (Budget, 2022). All these factors contribute to the growth of exports as it facilitates higher production and capacity generation. Also, higher production for the domestic market would enable the domestic consumers to switch their demand from imported goods and services to domestically produced goods and services. This would lead to import substitution and reduction in imports. Ultimately, balance of trade of India would improve.

Second significant factor influencing trade balance of India is the average global price of crude oil. As the first difference of global oil prices of one barrel of oil increases by 1 US dollar, the trade balance of India would reduce by Rs 2211 crore on an average. This effect is significant at 95 per cent confidence level.

Rise in global prices of crude oil leads to inflation in several countries of the world as crude oil is one of the main inputs used in the production of goods and services. Higher prices of crude oil lead to cost push inflation and reduction in the purchasing power of income. Fluctuations in the global prices of crude oil also create uncertainty and hamper consumer confidence. Hence, both these effects reduce the quantity demanded of Indian exports. On the other hand, the prices of India's oil and non-oil imports increase when global prices of oil increase. This would increase the value of Indian imports. Both these factors worsen India's trade balance.

Third factor affecting India's trade balance is the growth rate of India's per capita GDP. As the growth rate of GDP per capita of India increases by 1 per cent, the first difference of trade balance of India increases by Rs 1.32 crore on an average. This effect is found to be significant at 95 per cent confidence level.

Higher growth rate of GDP per capita can improve trade balance through both supply and demand side. Higher GDP per capita implies higher production of goods and services. It increases the supply of goods and services in the country. On the supply side, surplus output above domestic consumption can be exported to the foreign countries. It increases the total exports of goods and services of India and reduces the total imports due to import substitution, improving trade balance of India. On the demand side, higher and stable growth of GDP per capita indicates economic growth and stability. It strengthens the confidence of foreign consumers and generates demand for Indian goods and services. As a result, Indian exports would increase and trade balance would improve.

Real Effective Exchange Rate (REER) also has a positive significant relationship with India's trade balance. When the first difference of REER increases by 1 unit, the first difference of India's trade balance increases by 173 crore rupees on an average. The result is significant at 90 per cent confidence level.

An increase in REER indicates depreciation of Indian rupee vis-à-vis currencies of its trade partners. It implies a fall in the value of Indian Rupee. This would result in Indian goods and services becoming cheaper for the foreign consumers and foreign goods and services becoming expensive for Indians. REER can also increase due to higher inflation in India relative to inflation in the foreign countries. This would also result in improvement of

Indian exports and reduction of imports as Indian goods becomes relatively cheaper. As a result, Indian exports increase and imports reduce, causing improvement in balance of trade.

Lastly, trade balance is significantly dependent on two dummy variables. D1 is the dummy variable used for the year 2011 and D2 is the dummy variable used for the year 2017 respectively. There is a substantial reduction in the trade balance of India in these two years. The effect is significant at 95 per cent confidence level for D1 and 99 per cent confidence level for D2. Deterioration of trade balance in the year 2011 is due to the negative impact of Global Financial Crisis 2008 on the world income. The spillover of the crisis on several countries of the world reduced the purchasing power and hence the demand for Indian exports reduced. On the other hand, global inflation in this time period led to a rise in the value of Indian imports, leading to worsening of India's trade balance. In the year 2017, trade balance deteriorated due to recessionary tendencies throughout the world. Several factors like slowdown in global demand, lags in policy implementation, inability to connect with global supply chains, are some of the reasons considered for the slowdown in export growth in this period (ORF, 2015).

The OLS model is robust as the value of R square is 0.71988 which implies that approximately 72 per cent of the deviation in the values of first difference of trade balance can be explained by this model. The value of adjusted R square is also substantial and equal to 0.6656. The model does not suffer from the problem of auto-correlation as the value of Durbin-Watson statistic is 2.211, which is within the acceptable range.

## **CONCLUSION AND POLICY RECOMMENDATION**

From the analysis of this paper, it can be concluded that the main determinants of trade balance in India are private investment, global oil prices of crude oil, real effective exchange rate, and growth rate of GDP per capita. Besides these, external shocks due to global crises or global recession can also influence trade balance of India by affecting purchasing power of countries. It is recommended that the government of India should take the necessary measures to improve the country's balance of trade situation. Specifically, government should increase investment, reduce the import of crude oil, keep exchange rate stable, and improve the economic growth of India to improve the balance of trade situation.

Creating incentives for the industries, especially Micro, Small and Medium Enterprises (MSMEs) is vital to boost the exports of India. In this regard, government should formulate and implement industry-specific Production Linked Incentives (PLI) schemes which can improve the

competitiveness of Indian industries. The base of manufacturing sector of India has to be strengthened to boost the exports of manufactured products. Specifically, the Revealed Comparative Advantage of India lies predominantly in stone and glass, minerals, clothing and textiles, food and vegetables, and skins and hides (RBI, 2022). Development of these industries can increase the exports as well as boost the employment opportunities in India. Boosting exports would improve Balance of Trade of India.

To prevent the rise in global oil prices or its volatility from affecting India's balance of trade, India has to develop alternative source to imported crude oil. Particularly, India should develop renewable sources of energy which would reduce India's dependence on oil. These include wind energy, solar energy, etc.

Chibber and Kalloor (2017) have suggested some effective remedies to increase private investment in India. It is found that public investment leads to crowding-in of private investment. Government spending on infrastructure like electricity, roads, internet connection, transportation, etc., reduces the cost of production for the private sector and encourages private investment. Besides public investment, government can boost private investment by providing quick and affordable credit, giving subsidies and tax concessions, boosting aggregate demand, and strengthening the confidence of the business owners. All these measures would boost investment and improve trade balance of India.

Although a real depreciation of Indian rupee can lead to improvement in trade balance, it may not be the best measure of creating a surplus trade balance. It would lead to a long-lasting reduction in the value of Indian rupee. Instead, government should try to keep inflation stable through its fiscal and monetary policy that would make Indian goods and services competitive in the global market.

It can also be inferred from the results that external shocks can have a significant influence on India's trade balance. Thus, Indian trade balance is not completely shock-proof, as observed in the aftermath of Global Financial Crisis 2008. Indian trade balance is to be made more resilient to prevent the volatility of international variables from affecting economic growth of India. In order to achieve this, India has to integrate itself firmly in the global value chains and develop an inelastic demand for its products. Moreover, it should try to curtail the growth of its imports.

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