India Exim Bank

IMPACT OF EXCHANGE RATE MOVEMENTS ON INDIA'S EXPORTS

Occasional Paper No.: 228

Export-Import Bank of India

Occasional Paper No. 228

Impact of Exchange Rate Movements on India's Exports

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Executive Summary

An exchange rate is the price of a country's currency relative to the currencies of other countries. There are three aspects of exchange rate which can have plausible impact on exports—the level of exchange rate, fluctuation in the rates, and the direction of the movement in exchange rates. The empirical and theoretical studies indicate that the impact of currency movements on international trade is multi-faceted, and may differ across countries. Against this background, the current study analyses the impact of currency volatility and appreciation/ depreciation on India's exports both at an overall level and sectoral level.

INDIA'S EXCHANGE RATE REGIME

The exchange rate regime in India has changed several times since independence. During the 1950s, India followed a par value system, under which exchange rate was fixed in terms of gold with pound sterling as the reference. For maintaining stability of the exchange rate and overcoming the weaknesses associated with single currency peg, the exchange rate regime was changed to a basket peg during 1970s and 1980s, before becoming market determined during March 1992 - February 1993. However, since 1993, India has maintained a managed floating exchange rate, with no fixed target. The exchange rate in India is largely determined by market forces, with intervention from the Reserve Bank of India (RBI) only for managing excessive volatility. Such a regime is important from the perspective of the Indian economy on account of the characteristics of its balance of payments. India depends on large capital flows to fund its current account deficit, which is often lumpy in nature, and makes the foreign exchange market in India subject to substantial volatility. Timely interventions from the RBI prevent such undue volatility.

TRENDS IN INDIAN RUPEE

From 2014 to 2023, the Indian Rupee (INR) showed a consistent depreciation against major currencies, particularly the US Dollar (US$) and Euro (EUR). The INR depreciated from 61.0 in 2014 to 82.6 in 2023 against the US$, largely due to factors like India's current account deficits, inflation differentials, and global capital flow volatility.

Nonetheless, it is noteworthy that the INR has been relatively stable compared to other emerging market currencies. According to the RBI's Monetary Policy Report for October 2024, the INR has been the least volatile among major emerging market currencies in recent months. As per the Economic Survey 2023-24, despite facing depreciation pressures, the INR has demonstrated resilience, with a coefficient of variation (CV) of 0.58 in 2023-24—its lowest in recent years. This relative stability, even amidst challenges such as global geopolitical risks, rising interest rates, and volatile commodity prices, reflects India's sound macroeconomic fundamentals, financial stability, and improved external position. Steady foreign inflows and manageable trade deficits are expected to continue supporting the INR, keeping it within a comfortable range.

Over the recent years, India's Nominal Effective Exchange Rate (NEER) and Real Effective Exchange Rate (REER) experienced phases of appreciation and depreciation. Both NEER and REER appreciated from 2014 to 2017 due to low inflation, strong investor confidence, and stable economic conditions. From 2018, NEER depreciated steadily, reflecting global trade uncertainties, rising oil prices, and the COVID-19 pandemic, while REER remained stable due to controlled domestic inflation. In 2021, as the global economy began recovering from the pandemic, REER saw a slight rebound. However, NEER experienced a modest decline, likely due to rising domestic inflation, which reduced India's competitiveness. In 2023, both NEER and REER sharply depreciated, driven by factors such as interest rate hikes in the USA, which strengthened the dollar, as well as India's widening trade deficit and domestic inflationary pressures which impacted India's real competitiveness. Going forward, India's inclusion in global bond indices, such as JP Morgan's Emerging Market Bond Index, could attract foreign investment, thereby stabilising the

rupee, reducing borrowing costs, and boosting economic resilience. However, managing capital inflow volatility will be crucial.

EFFECT OF EXCHANGE RATE ON INDIA'S EXPORTS

The study analyses the impact of exchange rate movements on India's real exports through an Autoregressive Distributed Lag (ARDL) model. The analysis suggests that an appreciation of the Indian Rupee exerts a positive influence on India's real exports to the world. A 1% increase in REER (indicating appreciation of the domestic currency) translates into a 1.07% increase in India's real exports to the world. Typically, an increase in REER would be expected to reduce exports due to reduced price competitiveness. The contrary trend in case of India could be resulting from high import dependence across industries. Several export-oriented sectors in India rely on imported inputs, and a currency appreciation (higher REER) can reduce the cost of these imports, leading to lower production costs and improved competitiveness for exports. This is in fact the case with India, wherein import intensity of raw material in overall manufacturing sector in India stood at nearly 33.4% in FY23, while export orientation was lower at only 6.5%. Analysis also indicates that nearly 56.2% of India's merchandise exports come from industries where the import intensity of raw material is greater than the overall manufacturing average of 33.4%. Hence, an appreciation of Indian Rupee may benefit the real exports from the country.

With regard to responsiveness of India's exports to change in global demand, the study finds that a 1% increase in real GDP of the world, i.e. demand from the world, would lead to an increase of 4.15% in India's real exports in long term. This means that as real GDP of the world rises, it significantly boosts India's real export performance. As far as the volatility parameter is considered, the study finds that a 1% rise in real exchange rate volatility amounts to a 0.20% improvement in India's real exports in the long-run. The long-term positive impact of exchange rate volatility on real exports underscores India's market resilience, indicating that exporters are able to command risk-adjusted premium prices, enabling them to effectively navigate business in volatile environments.

SECTORAL IMPACT OF EXCHANGE RATE MOVEMENTS

A four-quadrant analysis has been undertaken in the study based on the export orientation and import intensity of ten major industries, for understanding the impact of fluctuations in the Indian Rupee on the performance of the industries. The sector-level data on import intensity of raw materials and export orientation for the ten major industries has been benchmarked with the average for the manufacturing sector as a whole, to arrive at four categories viz. i) Trade Intensive (High Export Orientation– High Import Intensity) sectors; (ii) Import Intensive (Low Export Orientation– High Import Intensity) sectors; (iii) Domestic Orientation (Low Export Orientation – Low Import Intensity) sectors; and (iv) Export Intensive (High Export Orientation– Low Import Intensity) sectors. Analysis in the study indicates that sectors such as gems & jewellery, electronics, petroleum and chemicals are trade Intensive sectors, while machinery sector is import Intensive. Transport equipment, food & agro-based products, and metal & metal products industries are domestically oriented sectors, characterised by both low export orientation and low import intensity, while textiles and leather industries fall under export intensive category, characterised by high export orientation and relatively low dependence on imported inputs.

The study finds that impact of currency movements on exports and trade balance varies across sectors based on their export orientation and import intensity. Depreciation in nominal exchange rate generally boosts the value of exports in sectors like electronics, chemicals, machinery, and petroleum products, as evidenced by strong positive correlations with the exchange rate. However, high import dependence in these sectors leads to an increase in import costs, thereby offsetting gains from exports and widening trade deficits. In gems and jewellery sector, the value of export reduces, and trade deficit widens due to depreciation in nominal exchange rate, potentially due to the high import dependence in the sector. Food and agro-based products is the only sector where depreciation is correlated with both increase in exports and improvement in the trade balance, plausibly on account of the low import dependence in this area. In transport equipment, weaker rupee is associated with a low correlation with improvement in exports but moderate

correlation with worsening of trade balance. On the contrary, weak rupee has a moderate correlation with exports of metals and metal products, but a low correlation with trade balance in the sector. Lastly, in the labour-intensive, export-oriented sectors of textiles and leather, a depreciating currency may lead to moderate negative impacts on trade balance in these sectors. However, there is also a moderate correlation of depreciation with increase in exports in case of leather.

CONCLUSION

The analysis in the study confirms that India's exports are responsive to exchange rate changes. Analysis reveals that currency appreciation bodes well for real exports from India. A moderate volatility of Indian Rupee, as witnessed over the recent period, also has a positive relation to exports in the long-run. The analysis also indicates that India's trade performance is influenced by sector-specific dynamics, including currency fluctuations, global demand, and import intensity. Aligning the policies and interventions to these nuances can support export growth and improve trade balance.

1. Introduction

An exchange rate is the price of a country's currency relative to the currencies of other countries. It impacts the prices of both exports from and imports into the country. It also impacts the flow of investments and is crucial for determining the value of existing overseas investments.

Given its role in influencing key macroeconomic variables, exchange rate is an important policy variable in most economies. The exchange rate regimes and the approach to the management of overall foreign exchange reserves varies across countries and is attuned to their respective macroeconomic conditions. The International Monetary Fund (IMF) defines 10 categories of exchange rate arrangements, which are based on four broad types—hard pegs, soft pegs, floating regimes (market-determined rates), and residual (Table 1).

Table 1: Classification of Exchange Rate Arrangements

Type	Categories
Hard Pegs	Exchange arrangement with no separate legal tender
	Currency board arrangement
Soft Pegs	Conventional pegged arrangement
	Pegged exchange rate within horizontal bands
	Stabilised arrangement
	Crawling peg
	Crawl-like arrangement
Floating regimes (market determined rates)	Floating
	Free Floating
Residual	Other managed arrangement

Source: IMF

Soft peg is the most prevalent exchange rate system, adopted by nearly 46.9% of the IMF member countries. Capital flow volatility has contributed to the shift towards increased exchange rate management in many countries to alleviate pressure on their currencies. This volatility has been driven by shifts in global monetary policies, particularly the U.S. Federal Reserve's interest rate hikes, economic uncertainties from trade tensions and geopolitical events, and the COVID-19 pandemic. After 2015, the number of countries with soft pegs declined as many nations shifted to more flexible exchange rate regimes, driven by rising global volatility and the need for adjustments to absorb external shocks.

However, since 2018, the share of countries with soft pegs has stabilised, fluctuating between 46-48%, as countries with crawl-like and stabilised arrangements have continued to adjust their rates in response to external factors while remaining within the soft peg category. This stability reflects a balance between flexibility and stability in exchange rate management (Table 2). The IMF has revised India's exchange rate regime, shifting it from a "floating" status to a "stabilised arrangement" for the period between December 2022 to October 2023.

Table 2: Exchange Rate Arrangements of Economies

EXCHANGE RATE ARRANGEMENT	2014	2015	2016	2017	2018	2019	2020	2021	2022
	(% of IMF Members as of April 30, 2023)								
HARD PEG	**13.1**	**12.6**	**13.0**	**12.5**	**12.5**	**12.5**	**12.5**	**13.0**	**13.4**
No separate legal tender	6.8	6.8	7.3	6.8	6.8	6.8	6.8	7.3	7.2
Currency board	6.3	5.8	5.7	5.7	5.7	5.7	5.7	5.7	6.2
SOFT PEG	**43.5**	**47.1**	**39.6**	**42.2**	**46.4**	**46.4**	**46.9**	**47.7**	**46.9**
Conventional peg	23.0	23.0	22.9	22.4	22.4	21.9	21.4	20.7	20.6
Stabilised arrangement	11	11.5	9.4	12.5	14.1	13.0	12.0	12.4	11.9
Crawling peg	1.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5
Crawl-like arrangement	7.9	10.5	5.2	5.2	7.8	9.4	12.0	12.4	12.4

EXCHANGE RATE ARRANGEMENT	2014	2015	2016	2017	2018	2019	2020	2021	2022
	(% of IMF Members as of April 30, 2023)								
Pegged exchange rate within horizontal bands	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
FLOATING	**34.0**	**35.1**	**37.0**	**35.9**	**34.4**	**34.4**	**32.8**	**33.2**	**34.0**
Floating	18.8	19.4	20.8	19.8	18.2	18.2	16.7	16.6	18.0
Free Floating	15.2	15.7	16.1	16.1	16.1	16.1	16.1	16.6	16.0
RESIDUAL									
Other managed arrangement	9.4	5.2	10.4	9.4	6.8	6.8	7.8	6.2	5.7

Source: Annual Report on Exchange Arrangements and Exchange Restrictions, IMF

EXCHANGE RATE REGIME IN INDIA

The exchange rate regime in India has changed several times since independence. During the 1950s, India followed a par value system, under which exchange rate was fixed in terms of gold with pound sterling as the reference. For maintaining stability of the exchange rate and overcoming the weaknesses associated with single currency peg, the exchange rate regime was changed to a basket peg during 1970s and 1980s, before becoming market determined during March 1992-February 1993. However, since 1993, India has maintained a managed floating exchange rate, with no fixed target (Table 3).

Table 3: Chronology of India's Exchange Rate Regime

Year	The Foreign Exchange Market and Exchange Rate
1947-1971	Par Value system of exchange rate. Rupee's external par value was fixed in terms of gold with the pound sterling as the reference currency.
1971	Breakdown of the Bretton-Woods system and floatation of major currencies. Rupee was linked to the pound sterling in December 1971.

Year	The Foreign Exchange Market and Exchange Rate
1975	To ensure stability of the Rupee, and avoid the weaknesses associated with a single currency peg, the Rupee was pegged to a basket of currencies. Currency selection and weight assignment was left to the discretion of the RBI and not publicly announced.
1978	RBI allowed the domestic banks to undertake intra-day trading in foreign exchange.
1978-1992	Banks began quoting two-way prices against the Rupee as well as in other currencies. As trading volumes increased, the 'Guidelines for Internal Control over Foreign Exchange Business' were framed in 1981. The foreign exchange market was still highly regulated with several restrictions on external transactions, entry barriers and transactions costs. Foreign exchange transactions were controlled through the Foreign Exchange Regulations Act (FERA). These restrictions resulted in an extremely efficient unofficial parallel (hawala) market for foreign exchange.
1990-1991	Balance of Payments crisis
July 1991	To stabilise the foreign exchange market, a two-step downward exchange rate adjustment was done (9% and 11%). This was a decisive end to the pegged exchange rate regime.
March 1992	To ease the transition to a market determined exchange rate system, the Liberalised Exchange Rate Management System was put in place, which used a dual exchange rate system. This was mostly a transitional system.
March 1993	The dual rates converged, and the market determined exchange rate regime was introduced. All foreign exchange receipts could now be converted at market determined exchange rates.

Source: RBI

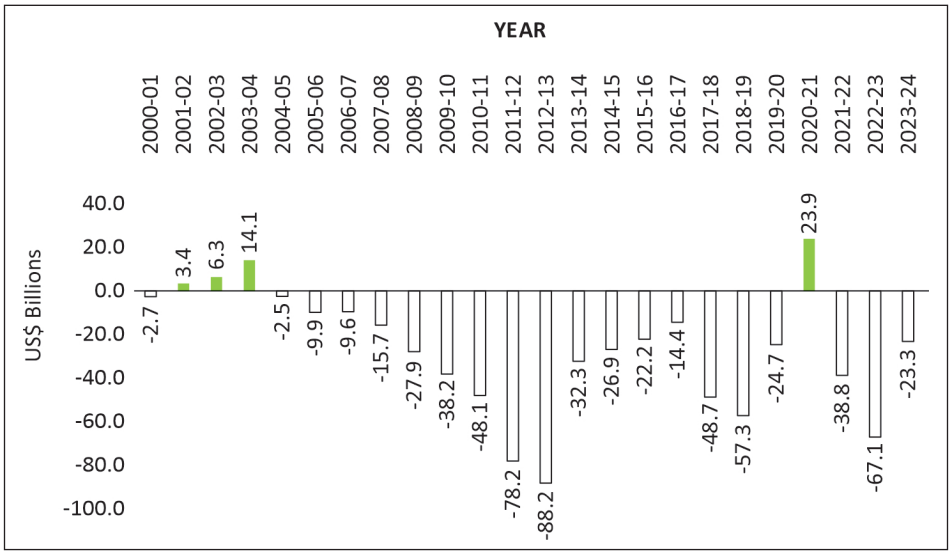
RECENT TRENDS IN INDIA'S EXCHANGE RATE

The exchange rate in India is largely determined by market forces, with intervention from the Reserve Bank of India (RBI) only for managing excessive volatility. Such a regime is important from the perspective of the Indian economy on account of the characteristics of its balance of payments. India's current account deficit reached a peak of US$ 88.2 billion in 2012-13, with

intermittent periods of decline and increase thereafter. In 2020-21, India recorded a current account surplus of US$ 23.9 billion primarily because the trade deficit narrowed significantly, supported by strong services exports. The surplus was further influenced by subdued import demand due to COVID-19 restrictions and weak domestic consumption.

However, with trade normalisation, India's current account shifted back to deficit in 2022-23, reaching US$ 67.1 billion. In 2023-24, the deficit reduced to US$ 23.3 billion, reflecting a partial recovery in export performance and a moderation in import growth as global conditions stabilised (Figure 1). India depends on large capital flows to fund this current account deficit, which is often lumpy in nature, and makes the foreign exchange market in India subject to substantial volatility. Timely interventions from the RBI prevent such undue volatility.

Figure 1: India's Current Account Balance (US$ Billion)

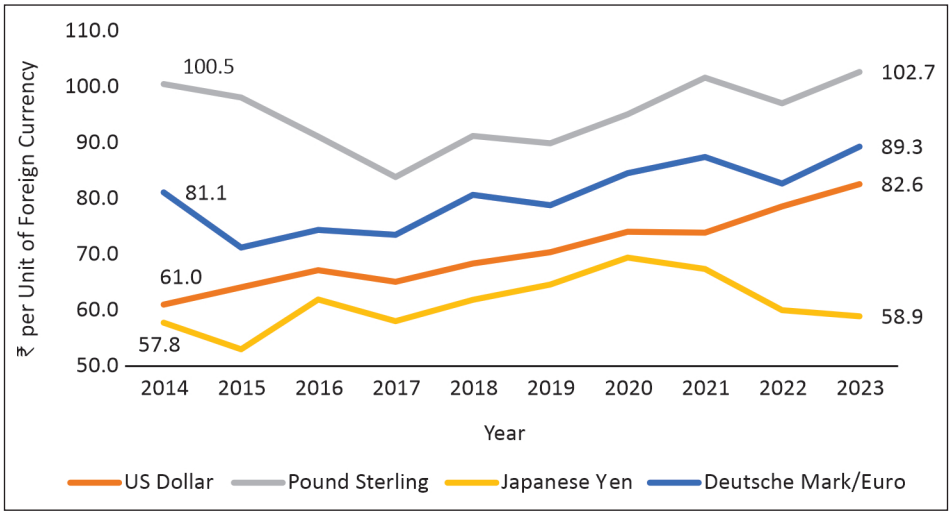


Source: RBI, Exim Bank Research

From 2014 to 2023, the Indian Rupee (INR) showed a consistent depreciation against major currencies, particularly the US Dollar (US$) and Euro (EUR). The INR depreciated from 61.0 in 2014 to 82.6 in 2023 against the US$, largely

due to factors like India's current account deficits, inflation differentials, and global capital flow volatility. The Indian Rupee also experienced depreciation against the Pound Sterling (GBP) and Euro during the same period, albeit the magnitude of depreciation was much less when compared to that against the US Dollar. Meanwhile, the INR remained relatively stable against the Japanese Yen (JPY), reflecting Japan's low-interest-rate environment. The overall trend highlights the INR's vulnerability to global economic conditions and domestic economic pressures, with recent years seeing heightened depreciation amid global monetary tightening and the impact of the pandemic (Figure 2).

Figure 2: Exchange Rate of the Indian Rupee vis-à-vis US Dollar, Pound Sterling, Euro and Japanese Yen

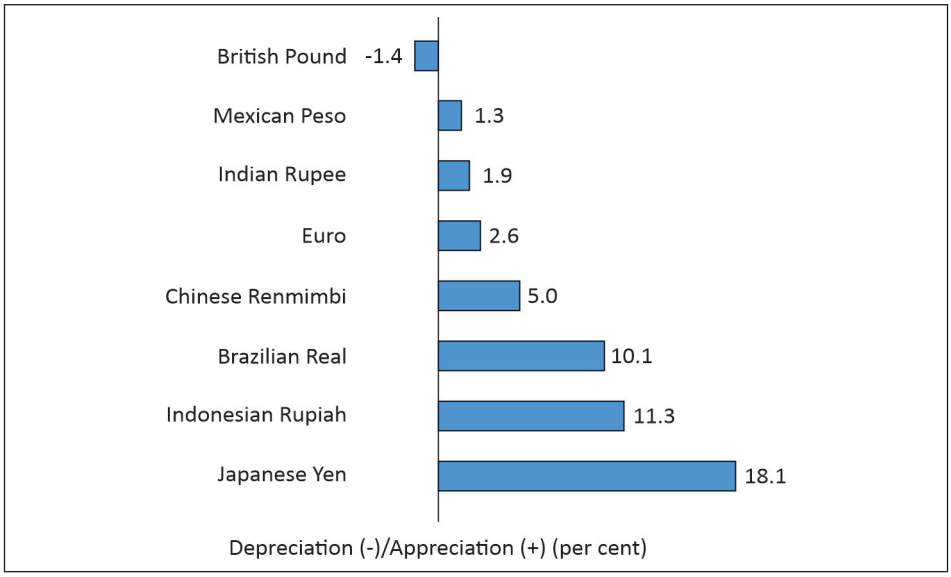


Source: RBI, Exim Bank Research

It is noteworthy that the INR has been relatively stable compared to other emerging market currencies. According to the RBI's Monetary Policy Report for October 2024, the INR has been the least volatile among major emerging market currencies in recent months. As per the Economic Survey 2023-24, despite facing depreciation pressures, the INR has demonstrated resilience, with a coefficient of variation (CV) of 0.58 in 2023-24—its lowest in recent years. This relative stability, even amidst challenges such as global

geopolitical risks, rising interest rates, and volatile commodity prices, reflects India's sound macroeconomic fundamentals, financial stability, and improved external position. Steady foreign inflows and manageable trade deficits are expected to continue supporting the INR, keeping it within a comfortable range (Figure 3).

Figure 3: Volatility in Select Currencies over April'23 – June'24



Source: Economic Survey 2023-24

Trends in India's Nominal Effective Exchange Rate (NEER) and Real Effective Exchange Rate (REER) highlight distinct phases of appreciation and depreciation during the period 2014 to 2023. Between 2014 and 2017, both NEER and REER appreciated, with REER rising from around 95.16 to above 105. This appreciation was largely due to India's lower inflation relative to its trading partners, strong investor confidence, and stable economic conditions, which enhanced the rupee's real competitiveness.

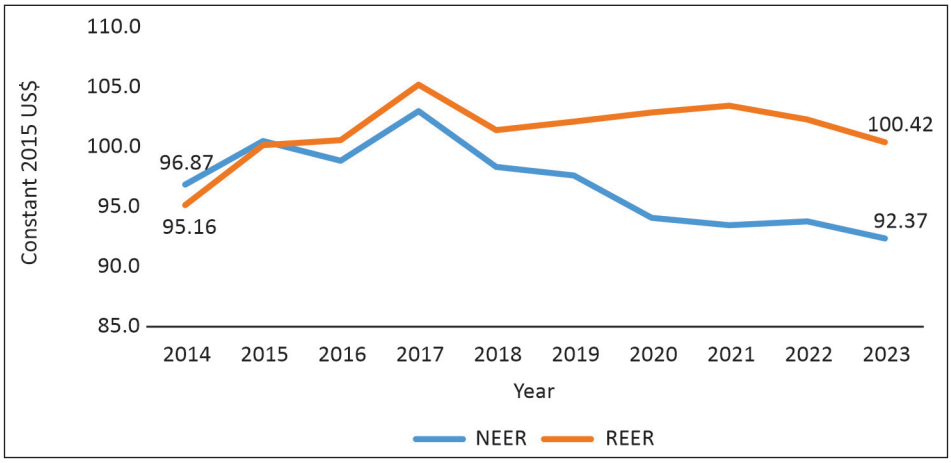
Starting in 2018, NEER began to depreciate steadily, reaching around 94.09 by 2020. This trend reflected a nominal weakening of the rupee, driven by external pressures such as global trade uncertainties, rising oil prices, and, most significantly, the impact of the COVID-19 pandemic in 2020. Meanwhile,

REER remained relatively stable during this period, as controlled inflation within India helped offset some of the rupee's nominal depreciation.

In 2021, as the global economy began recovering from the pandemic, REER saw a slight rebound. However, NEER experienced a modest decline, likely due to rising domestic inflation, which reduced some of India's competitiveness. In 2023, both NEER and REER sharply depreciated, with NEER falling to around 92.37 and REER to approximately 100.42. This decline was driven by factors such as interest rate hikes in the USA, which strengthened the dollar, as well as India's widening trade deficit and domestic inflationary pressures which impacted India's real competitiveness (Figure 4).

Going forward, India's inclusion in global bond indices, such as JP Morgan's Emerging Market Bond Index, is expected to attract significant foreign investment into India's bond market. This could help stabilise the INR by increasing demand for the currency, potentially mitigating recent depreciation pressures. Additionally, increased foreign demand for Indian bonds may reduce government borrowing costs and enhance liquidity, providing a positive signal about India's economic stability and resilience amid global uncertainties. Nonetheless, managing the potential volatility of capital inflows will be crucial in maintaining macroeconomic stability.

Figure 4: Trends in NEER & REER – 40 Currency Export-Weighted (2014 - 2023)



Source: Economic Survey 2023-24

EXCHANGE RATE AND EXPORTS

There are three aspects of exchange rate which can have plausible impact on exports—the level of exchange rate, fluctuation in the rates, and the direction of the movement in exchange rates.

The level of exchange rate may have an impact on exports if it is at variance from the underlying "equilibrium" value of the exchange rate. Such currency misalignments could impact a country's trade through its impact on relative import prices. According to Frieden and Broz (2006), an undervalued currency enhances the competitiveness of exporting and import-competing firms at the expense of consumers and non-tradable sector[1]. However, these misalignments may not lead to such outcomes if the differential is absorbed by firms, and does not reflect in the prices in destination countries. Firms may also incur irreversible sunk costs for entry into the exports market, which may deter an exit even in case of undervaluation of the importing country's currency[2]. Vertical integration of production wherein imported units have a large share in the production process can also make currency misalignments less important.

The second important aspect of exchange rate is the strengthening or weakening of the currency over time. These changes in exchange rate can impact the economic activity in countries through the trade channel or the financial channel. According to BIS (2016), the impact of fluctuations in exchange rate through the two channels— trade channel and financial channel, are contrary in nature. Under the trade channel, an exchange rate appreciation typically has a contractionary impact on domestic economic activity. This is because appreciation in exchange rate increases the cost of exports and reduces the domestic import costs, thereby leading to a reduction in export demand. On the other hand, appreciation of currency could also strengthen the balance sheets of domestic borrowers in foreign currency, thereby easing the domestic financial conditions. As a result, the financial

[1] Frieden, Jeffry, and Lawrence Broz, (2006), "The Political Economy of Exchange Rates." In Oxford Handbook of Political Economy, ed. Barry Weingast and Donald Wittman, 587-600. Oxford: Oxford University Press.

[2] Baldwin, Richard, (1988), Hysteresis in Import Prices: The Beachhead Effect. American Economic Review. 78(4), 773- 85.

channel may have an expansionary effect on the economic activity. An accurate assessment of the impact of exchange rate movements on economic activity is therefore difficult. Even an assessment of the impact through the trade channel is not straightforward.

Theoretically, depreciation should lead to an improvement in exports and thereby the domestic economic activity, provided certain assumptions are satisfied. One of the basic assumptions is that each country sets export prices in its own currency, and these change less frequently than exchange rates. However, in practice, evidence suggests that exporters often use US Dollar as the invoicing currency. In fact, the USD's share as an invoicing currency is 3.1 times the share of the USA in world exports. The overwhelming use of US Dollar in exports invoicing leads to almost no change in the destination currency price in case of a currency depreciation, and therefore no change in demand and in export quantities[3].

Box 1: Dominant Currency Paradigm and Impact of Depreciation on Exports

The relationship between movements in the exchange rate and other macroeconomic variables hinges critically on the currency in which prices are rigid. The New Keynesian models assumed prices to be sticky in the exporting country. Under this 'producer currency pricing' paradigm, the law of one price is applicable and a nominal depreciation increases the price of imports vis-à-vis exports (the terms-of-trade), thereby increasing the export competitiveness.

Recent empirical work indicates that there is very little evidence that the pricing in international trade follows the producer currency pricing paradigm. Instead, a large share of trade is invoiced in a small number of 'dominant currencies', the US Dollar being the most used currency. Moreover, exporters face strategic complementarities in pricing, as a result of which their mark ups vary over time and across destination markets. Finally, the rise of global value chains also impacts the working of this

[3] Dollar Dominance in Trade: Facts and Implications, Export-Import Bank of India's 33rd Commencement Day Lecture by Dr. Gita Gopinath, John Zwaanstra Professor of International Studies and of Economics Harvard University, December 2017

paradigm, as employment of imported raw materials reduces the local value added content of exports.

The 'dominant currency paradigm' is an alternative for the producer currency pricing paradigm. Under the paradigm, firms set export prices in a dominant currency such as the US Dollar and change them infrequently. They also face strategic complementarities in pricing. There is also roundabout production, with domestic and foreign inputs employed in production.

Some of the key results of the dominant currency paradigm are:

1. In both short and medium term, the terms of trade remain stable, playing a negligible role in expenditure switching.
2. The dominant currency exchange rate pass-through into export and import prices is high, regardless of the destination or origin of goods. However, the exchange rate pass-through of non-dominant currencies is negligible.
3. While depreciations have a limited expansionary impact on exports, expenditure switching still occurs through imports, arising from fluctuations in the relative price of imported to domestic goods. These are driven by movements in a country's exchange rate relative to the dominant currency, regardless of the country of origin of the imported goods.
4. Strengthening of the dominant currency relative to non-dominant ones can negatively impact global trade. US Dollar appreciation reduces the demand for not only exports from the USA but also all those exports where US Dollar is the invoicing currency. According to Boz, Gopinath and Plagborg-Moller (2019), a 1% US dollar appreciation against all other currencies predicts a 0.6% decline within a year in the volume of total trade between countries in the rest of the world, controlling for the global business cycle.

Source: Gopinath, G., Boz, E., Casas, C., Díez, F. J., Gourinchas, P.-O., & Plagborg-Møller, M. (2016), Revised March 2019 JEL No. E0,F0.Dominant currency paradigm (NBER Working Paper No. 22943

The third important facet of exchange rate is its volatility. Stability of exchange rate is considered important for overall macroeconomic stability of economies. Several emerging market economies have adopted a policy of managed floating exchange rate to avoid sharp appreciation or depreciation of currencies. Emerging economies often do not possess appropriate institutional requirements to undertake effective monetary policy under pure floating exchange rates, necessitating a managed floating approach to exchange rate determination.

As far as the impact of foreign exchange volatility on exports is concerned, the literature is vast, with varying results. According to Coric and Pugh (2010), the average trade effects of exchange rate variability are not sufficiently robust to generalise across countries[4]. There are several contesting views on the impact of exchange rate volatility on exports, and the sensitivity of exporting firms to fluctuations in exchange rate depends on several factors including existence of hedging instruments, import intensity of exports, the presence of subsidiaries in other geographies, currency of invoicing, etc.

Exchange rate volatility can have a negative impact on exports as it creates an uncertain operational environment for firms and adversely impacts the scope of increasing profits. According to Clark (1973), in the absence of hedging facilities, rational firms reduce their output and export volumes on account of such uncertainty[5]. Vergil (2002) also argued that volatility discourages local suppliers from expanding into foreign markets on fear of being exposed to profit variability which may arise from unstable exchange rates[6]. Exporters exit the market when the environment is considered too risky and re-enter once stability is restored. Franke (1991)[7] and Seru and Vanhulle (1992)[8]

[4] Coric, Bruni and Geoffrey Pugh (2010), The Effects of Exchange Rate Variability on International Trade: A Meta- Regression Analysis, Applied Economics 42: 2631-2644.

[5] Clark, P., (1973), 'Uncertainty, exchange risk, and the level of international trade', Economic Inquiry 11(3), 302–313.

[6] Vergil, H., (2002), 'Exchange rate volatility in Turkey and its effect on trade flows', Journal of Economic and Social Research 4(1), 83–99.

[7] Franke, G., (1991), 'Exchange rate volatility and international trading strategy', Journal of International Money and Finance 10(2), 292–307.

[8] Sercu, P. & Vanhulle, C., (1992), 'Exchange rate volatility, international trade, and the value of exporting firms', Journal of Banking & Finance 16(1), 155–182

further demonstrate that exporters cut exports and exit market when volatility increases, if the costs of entering or exiting the market are lower.

Some studies have also argued that exchange rate volatility in fact supports export growth. This is because some exporters abide by the principle of low risk-low-return, tending to export more when the volatility is high[9]. The rationale behind this is that if exporters expect marginal revenue to decline with an increase in volatility, they will be induced to increase export volumes to make up for the likelihood of reduction in marginal revenue. According to some studies, exporters may also increase their trade if they expect the environment to deteriorate further on account of persistent exchange rate volatility. Under such circumstances, exporters are likely to make up for the expected decrease in future activity by increasing trade in the current period.

In contrast to this, some studies have been unable to determine any relationship between volatility and exports. This has especially been found in case of countries with good hedging options. In such economies, future fluctuations in the exchange rate does not affect the already pegged price and volume of exportable goods and services. Exports of developed countries are therefore expected to have no relationship with exchange rate volatility. However, there is an alternate view. A study by Hall et al. (2010) found a negative relationship of volatility in case of developed countries but no significant relationship in case of emerging markets. No effect is usually on account of openness of the capital market of these countries[10].

Clearly, literature does not indicate any definite relationship between exchange rate volatility and exports performance. Volatility has both costs and benefits, and exporters respond differently to the risks posed by exchange rate volatility. Similar to theoretical literature, empirical studies have also rendered mixed results depending on a host of factors, including the measure

[9] Côté, A., (1994), Exchange rate volatility and trade: a survey, Working Paper Number 94-5, Bank of Canada.

[10] Hall, S., Hondroyiannis, G., Swamy, P.A.V.B., Tavlas, G., Ulan, M., (2010), 'Exchange-rate volatility and export performance: Do emerging market economies resemble industrial countries or other developing countries?', Economic Modelling 27(6), 1514–1521.

of exchange rate volatility, the time dimension of the study (long run or short run), choice of real and nominal exchange rate, among others.

SCOPE OF THE STUDY

The current study discusses the exchange rate volatility and depreciation/ appreciation in the context of Indian exports. The empirical and theoretical studies show that the impact of currency movements on international trade is multi-faceted, and may differ across countries. Against this background, the current study analyses the impact of currency volatility and appreciation/ depreciation on India's exports both at an overall level and sectoral level.

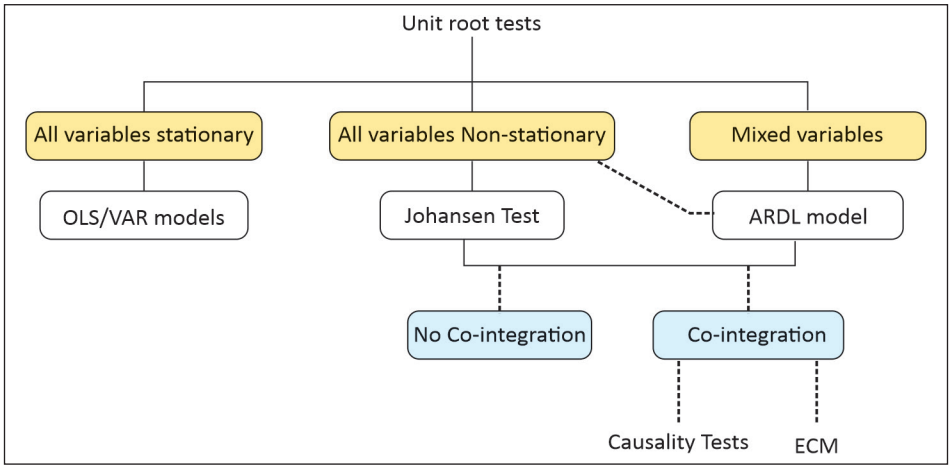
2. Impact of Exchange Rate Movements on India's Exports

As discussed in the previous chapter, Indian Rupee has registered a persistent depreciating trend. A depreciation in currency can affect the economy through trade channels i.e., by making exports competitive and imports costlier, or through financing channels i.e., raising cost of capital inflow. As per the Economic Survey 2023-24, in the case of India, India's trade channel outweighs its financial channel in response to currency movements. This would render the Marshall-Lerner condition important for the impact of exchange rate on India's exports.

In theory, the Marshall-Lerner condition posits that a currency depreciation will improve a country's trade balance if the sum of the price elasticities of exports and imports exceeds one. This condition highlights that for currency depreciation to be effective, demand for exports and imports should be sufficiently responsive to price changes. According to the Economic Survey 2023-24, this is largely the case for India due to its high trade openness and relatively lower share of external debt. The Survey's analysis uses an export-weighted NEER to capture trade channel effects and a debt-weighted exchange rate (DWER) to capture financial channel effects on the Balance of Payments (BoP). Analysis reveals that an appreciation of the rupee reduces the BoP by approximately 0.54% over the long term, with NEER displaying a significant negative elasticity of -0.7 compared to a smaller positive elasticity of 0.16 for DWER. This suggests that India's BoP is more sensitive to changes in trade dynamics than financial flows. The analysis confirms that the Marshall-Lerner condition would hold true in case of India.

Against this backdrop, this section attempts to measure the impact of exchange rate depreciation/appreciation and volatility on real exports through an Autoregressive Distributed Lag (ARDL) model. The ARDL model has advantages over other co-integration tests in non-stationary variables, such as the one developed by Engle and Granger (1987), Phillips and Hansen (1990) and Johansen (1991), as also over the traditional VAR models. According to Pesaran and Shin (1999), the ARDL model applied to co-integration is more efficient in capturing long-term relationship data in small samples, and they perform well irrespective of whether the variables are stationary [i.e. I(0)], non-stationary [I(1)], or even mutually co-integrated (Figure 5). Since our sample size is relatively small, and we expect some of the variables in our analysis to be I(0) while others to be I(1), the ARDL model is preferred for the analysis.

Figure 5: Model Selection Criteria in Time Series Models



Source: Exim Bank Research

DATA SOURCES

The data set consists of observations on quarterly estimates of India's real exports, real Gross Domestic Product (GDP), real effective exchange rate, and volatility in the real exchange rate. Data on exports in volume terms, i.e. real exports has been derived by dividing the merchandise exports value with the

unit value index for the corresponding year. Real exports is therefore given by:

$$Real\ Exports = \frac{Value\ of\ Merchandise\ Exports}{Unit\ Value\ Index}$$

Data on value of merchandise exports has been obtained from the World Trade Organisation Stats. The unit value index has been taken from International Financial Statistics of the IMF.

The real GDP data refers to the seasonally adjusted GDP at constant 2010 US$ prices. This has been sourced from the Global Economic Monitor of the World Bank.

Real effective exchange rate reflects the movements in relative price levels, acting as a measure of exports competitiveness. The export weighted 40-Currency basket REER is sourced from the RBI.

One of the widely used measures of exchange rate volatility has been utilised for this analysis. It is quantified as the standard deviation of the first difference of the exchange rates. The exchange rate data of INR has been sourced from the RBI. Exchange rate volatility between countries k and j in time period t is given by:

$$ERVol_{kjt} = std.dev[\ln(ER_{kjt,m}) - \ln(ER_{kjt,m-1})]$$

Where ER refers to the nominal exchange rate with respect to the US Dollar, and 'm' denotes month for calculating volatility at the quarterly level. A value of equal to zero indicates no volatility. Volatility measures are taken in percentage terms.

The data on various parameters has been considered for the period 2005 Q1 to 2021 Q3.

ESTIMATION OF IMPACT ON INDIA'S EXPORTS

The ARDL model of the following form has been taken for analysing the impact of exchange rate on India's exports to the world:

$$\Delta \log Exp = a_0 + \sum_{i=1}^{q} a_1 \Delta \log Exp + \sum_{i=1}^{m} a_2 \Delta \log GDP + \sum_{i=1}^{n} a_3 \Delta \log REER + \sum_{i=1}^{p} a_4 \Delta \log Vol + a_5 \log Exp + a_6 \log GDP + a_7 \log REER + a_8 \log \text{Vol} + \beta_1 Dummy_{2008} + \beta_2 Dummy_{2020} + \in \quad (1)$$

Where Exp represents India's real exports to the world, REER is the real effective exchange rate, GDP is the real gross domestic product of the world excluding India, Vol is the measure of real exchange rate volatility, Dum is a structural break dummy, q, m, n, and p are the lag length, Δ denotes a first difference operation, a_0 is an intercept and ε denotes the white noise error term.

The analysis considers two structural breaks—one on account of the global financial crisis in 2008, and the other on account of the pandemic-induced disruptions in 2020. The 2008 dummy variable takes the value of 1 during the period 2008 Q2 to 2021 Q3, and 0 in rest of the quarters; while the 2020 dummy variable takes the value of 1 during the period 2020 Q2 to 2021 Q3, and 0 in rest of the quarters. Presence of structural breaks has been confirmed from the Chow breakpoint test. Test results for structural breaks at 2008 Q2 and 2020 Q2 are presented in Table 4.

Table 4: Chow Breakpoint Test Results for Structural Break

Chow Breakpoint Test:2008Q2 Null Hypothesis: No breaks at specified breakpoints Varying regressors: All equation variables Equation Sample: 2005Q1 2021Q3			
F-statistic	6.644253	Prob. F(4,59)	0.0002
Log likelihood ratio	24.91591	Prob. Chi-Square(4)	0.0001
Wald Statistic	26.57701	Prob. Chi-Square(4)	0.0000
Chow Breakpoint Test:2020Q2 Null Hypothesis: No breaks at specified breakpoints Varying regressors: All equation variables Equation Sample: 2005Q1 2021Q3			
F-statistic	4.721678	Prob. F(4,59)	0.0023
Log likelihood ratio	18.60710	Prob. Chi-Square(4)	0.0009
Wald Statistic	18.88671	Prob. Chi-Square(4)	0.0008

Source: Computed using Eviews 14, Exim Bank Research

The first step in ARDL bounds testing approach is the estimation of the aforementioned equation in order to test for existence of a long-run relationship among the variables by conducting an F-test for the joint significance of coefficients of lagged level variables. Two sets of critical bounds for F-statistics are generated by Pesaran et al (2001). If computed F-statistic is above the higher bound value, null hypothesis of no co-integration cannot be rejected, implying presence of long-run co-integration relationship among the variables taken into consideration.

Once co-integration is established, the long-run model export function can be written as:

$$\log Exp_t = \beta_0 + \sum_{i=1}^{q}\beta_1 \Delta\log Exp_{t-i} + \sum_{i=1}^{m}\beta_2 \Delta\log GDP_{t-i} + \sum_{i=1}^{n}\beta_3 \Delta\log REER_{t-i} + \sum_{i=1}^{p}\beta_4 \Delta\log Vol_{t-i} + \beta_5 Dummy_{2008} + \beta_6 Dummy_{2020} + \varepsilon_t \quad (2)$$

The orders of the ARDL model would be selected using the Akaike Information Criteria (AIC). Finally, the short-run dynamic parameters would be selected by estimating an error correction model associated with the long-run estimates. This is specified as follows:

$$\Delta\log Exp_t = \delta_0 + \sum_{i=1}^{q}\delta_1 \Delta\log Exp_{t-i} + \sum_{i=1}^{m}\delta_2 \Delta\log GDP_{t-i} + \sum_{i=1}^{n}\delta_3 \Delta\log REER_{t-i} + \sum_{i=1}^{p}\delta_4 \Delta\log Vol_{t-i} + \delta_5 Dummy_{2008} + \delta_6 Dummy_{2020} + \varphi ECM_{t-i} + \varepsilon_t \quad (3)$$

Where δ_1, δ_2, δ_3, δ_4 and δ_5 are the short-run dynamic coefficients of the model's convergence to equilibrium and Φ is the error correction coefficient and measures the speed of adjustment parameter. ECM is the error correction term that is derived from estimated equilibrium relationship of equation (1). A negative and significant coefficient of ECM will be indication of co-integration.

Stationarity Tests

Both the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are used to check for the presence of unit roots and for the determination of the order of integration of the variables. The unit root test results indicate that log Exp, log GDP, and log REER are I(1) while, log volatility is I(0) (Table 5).

Since all the variables are either I(0) or I(1), the ARDL process is used as it is a preferred model in case of mixed variables.

Table 5: Results of Unit Root Test

	Augmented Dickey Fuller (ADF)		Phillips Perron (PP)	
Level				
Variable	**Constant without Trend**	**Constant with Trend**	**Constant without Trend**	**Constant with Trend**
Log Exp	-2.367128 (1)	-3.041092 (2)	-3.1462355** [0]	-3.176518* [0]
Log GDP	-0.694326 (0)	-3.379416* (0)	-0.649873 [4]	-3.481915** [1]
Log REER	-1.673560 (6)	-4.438273*** (2)	-1.962538 [2]	-3.156090 [2]
Log Vol	-7.620452*** (0)	-7.552228*** (0)	-7.642947*** [3]	-7.579962*** [3]
First Difference				
Log Exp	-11/88797*** (0)	-11.80943*** (0)	-11.91963*** [3]	-11.88019*** [3]
Log GDP	-8.184443*** (0)	-8.121704*** (0)	-8.369499*** [5]	-8.296499*** [5]
Log REER	-4.699519*** (5)	-4.689645*** (5)	-6.927452*** [0]	-6.870918*** [0]
Log Vol	-7.331887*** (3)	-7.255057*** (3)	-26.88401*** [10]	-27.99107*** [11]

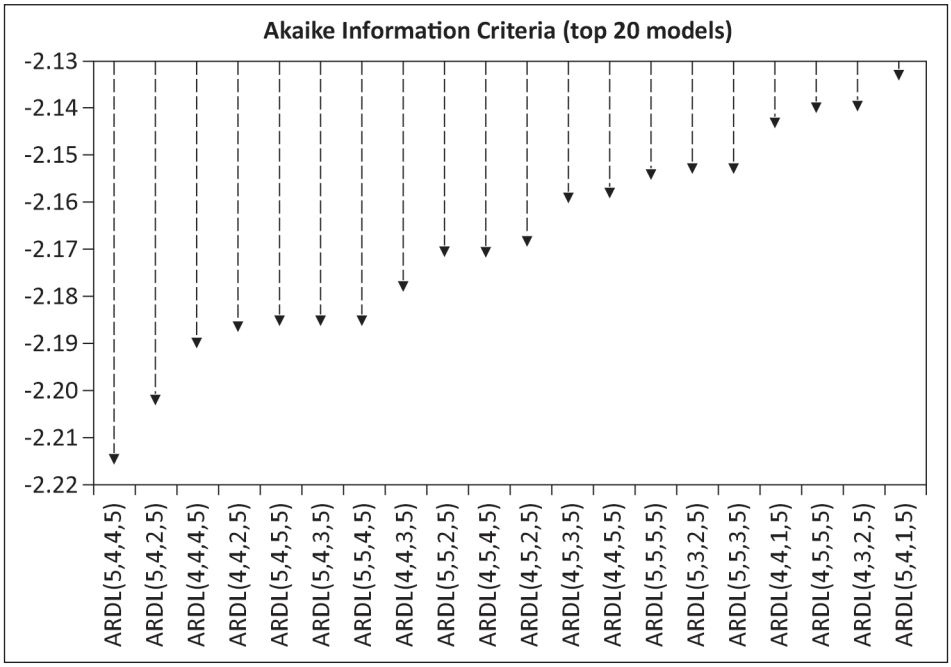
*Note: ***, **, and * denote significant at 1%, 5% and 10% significance level, respectively. The figure in parenthesis (…) represents optimum lag length selected based on Akaike Information Criterion (AIC). The figure in bracket […] represents the bandwidth used in Barlett kernel selected based on Newey-West automatic bandwidth criterion.*
Source: Computed using Eviews 14, Exim Bank Research

ARDL Bounds Test – Establishment of Co-Integration Relationship

For implementing the bound test for co-integration, a conditional ARDL error correction model as specified in equation (1) is estimated in EViews 14 with

log Exp as the dependent variable, log GDP, log REER, and Log Vol as the dynamic regressors, and structural break dummies, namely dummy_2008 and dummy_2020, as the fixed regressors. The appropriate lag has been automatically selected based on AIC, with the maximum lag set at 5. As seen from Figure 6, the AIC was lowest for ARDL (5, 4, 4, 5).

Figure 6: ARDL Lag Length Selection



Source: Computed using EViews 14, Exim Bank Research

Table 6 presents the results of the ARDL Bounds F-test for co-integration based on equation (1). As per the results, the computed F-statistics of 7.070611 is greater than the upper bound critical value at 5% level of significance. Therefore, the null hypothesis of no co-integration is rejected, indicative of a stable long-run co-integration relationship among the variables taken into consideration.

Table 6: Results of Bounds Test Approach to Co-Integration

Significance Level	Critical Value	
	Lower Bound	Upper Bound
10%	3.65	4.68
5%	4.30	5.45
1%	5.84	7.11
Computed F-Statistics	**7.070611**	

Source: Computed using EViews 14, Exim Bank Research

Analysis indicates that the variables are co-integrated among themselves and the series cannot move too far away from each other or cannot move independently of each other. Moreover, the co-integration of variables also implies that there is some adjustment in the short run which prevents the errors in the long run relationship from becoming larger.

Estimation of Long-Run and Short-Run Coefficients

Upon establishment of existence of co-integration relationship among the variables, equation (2) is estimated for long-run coefficients of the selected ARDL (5, 4, 4, 5) based on Akaike Information Criterion. The results of estimation are presented in Table 7. Given this is a log-log model, each coefficient corresponds to elasticity.

The results indicate that the impact of real GDP of the world and real exchange rate volatility on India's real exports to the world is positive, and significant at even 1% level of significance. A 1% increase in real GDP of the world, i.e. demand from the world, would lead to an increase of 4.15% in India's real exports in long term, suggesting a highly elastic relation. As real GDP of the world rises, it significantly boosts India's real export performance. As far as the volatility parameter is considered, a 1% rise in real exchange rate volatility amounts to a 0.20% improvement in India's real exports in the long-run. This may be owing to greater competitiveness or higher risk premiums demanded by exporters in volatile environments.

As far as real effective exchange rate is concerned, 1% increase in REER would lead to a long-term 1.07% increase in India's real exports; significant at

5% level. That is, an appreciation in Indian Rupee translates into a significant positive impact on real exports from India to the world. Typically, an increase in REER (indicating appreciation of the domestic currency) would be expected to reduce exports due to reduced price competitiveness. A positive coefficient of REER with respect to real exports can result from high import dependence across industries. This is because many export-oriented sectors rely on imported inputs, and a currency appreciation (higher REER) can reduce the cost of these imports, leading to lower production costs and increased competitiveness for exports. This is in fact the case with India. Analysis of the data on export orientation (i.e., export earnings as % of sales revenue) and import intensity of raw material (share of imported raw material in total raw material consumed) for overall manufacturing sector in India highlights that the import intensity of raw material in manufacturing sector in India stood at nearly 33.4% in FY23, while export orientation was lower at only 6.5%. Analysis also indicates that nearly 56.2% of India's merchandise exports come from industries where the import intensity of raw material is greater than the overall manufacturing average of 33.4%. Hence, an appreciation of Indian Rupee may benefit the real exports from the country.

Table 7: Long-Run Coefficients of the Selected ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log GDP	4.152328	1.433867	2.895895	0.0063
Log REER	1.071103	0.458835	2.334400	0.0251
Log Volatility	0.200368	0.053581	3.739569	0.0006
C	-68.39292	23.67688	-2.888595	0.0064

Source: Computed using Eviews 14, Exim Bank Research

The results of short-run dynamic coefficients associated with the long-run relationships obtained from equation (3) are in Table 8. The negative and highly significant error correction terms (ECT) confirms the presence of a stable long-run relationship. This model suggests a relatively fast adjustment towards long run equilibrium following a disturbance or shock. Post a shock, 60.64% of any short-term disequilibrium gets corrected in the following quarter. In the short run, an increment in real GDP has a positive and highly significant impact on India's real exports. A 1% rise in real GDP in short-run

leads to 7.63% rise in real exports from India to the World. As far as REER is concerned, the short-term coefficients are not found to be statistically significant. However, the effect of exchange rate volatility on exports is found to be significant and positive.

Table 8: Error Correction Representation for the Selected ARDL (5, 4, 4, 5)

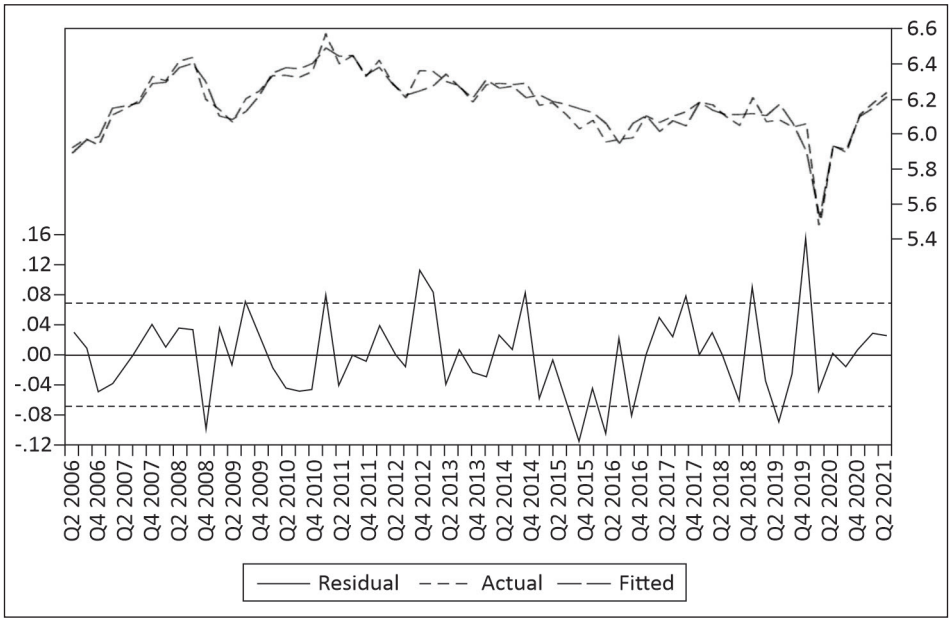
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG_GDP)	7.632607	0.911086	8.377479	0.0000
D(LOG_GDP(-1))	0.778790	1.165194	0.668378	0.5080
D(LOG_GDP(-2))	3.121023	1.148040	2.718568	0.0099
D(LOG_GDP(-3))	2.615518	1.165003	2.245074	0.0308
D(LOG_REER)	-0.260207	0.529680	-0.491254	0.6261
D(LOG_REER(-1))	1.027344	0.543526	1.890146	0.0666
D(LOG_REER(-2))	0.423687	0.551268	0.768569	0.4470
D(LOG_REER(-3))	-0.791774	0.515642	-1.535510	0.1332
D(LOG_VOLATILITY)	0.051094	0.017113	2.985614	0.0050
D(LOG_VOLATILITY(-1))	-0.124515	0.038792	-3.209838	0.0027
D(LOG_VOLATILITY(-2))	-0.108674	0.032842	-3.309004	0.0021
D(LOG_VOLATILITY(-3))	-0.074185	0.024958	-2.972394	0.0052
D(LOG_VOLATILITY(-4))	-0.056280	0.017000	-3.310627	0.0021
DUMMY_2008	0.161604	0.072677	2.223596	0.0324
DUMMY_2020	0.210103	0.075807	2.771571	0.0087
COINTEQ	-0.606371	0.109661	-5.529522	0.0000

Source: Computed using Eviews 14, Exim Bank Research

Performance on Diagnostic Tests

The model passes all diagnostic tests for usual econometric problems. The Breush-Pagan-Godfrey Serial Correlation LM test was used to verify that the residuals from the model are serially uncorrelated. The residuals were also found to be homoscedastic. The Ramsey RESET test also indicates that the model is correctly specified. The model's fit is notably strong, as evidenced by an R^2 value of 0.8339 (Figure 7).

Figure 7: ARDL Model fit

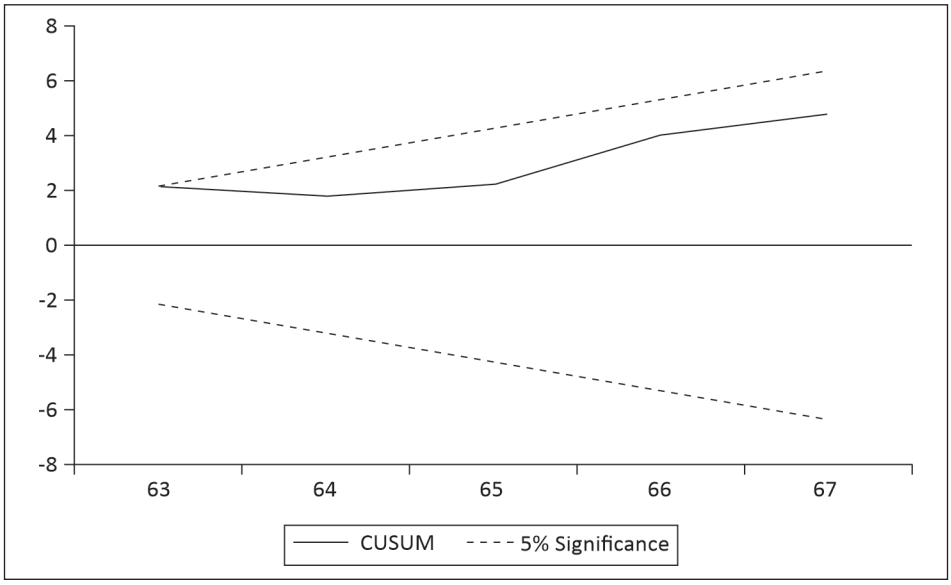


Source: Computed using Eviews 14, Exim Bank Research

The stability of long-run coefficients together with the short-run dynamics is also examined by applying the CUSUM (Cumulative Sum of Recursive Residuals) and CUSUMSQ (Cumulative Sum of Squares of Recursive Residuals) plots.

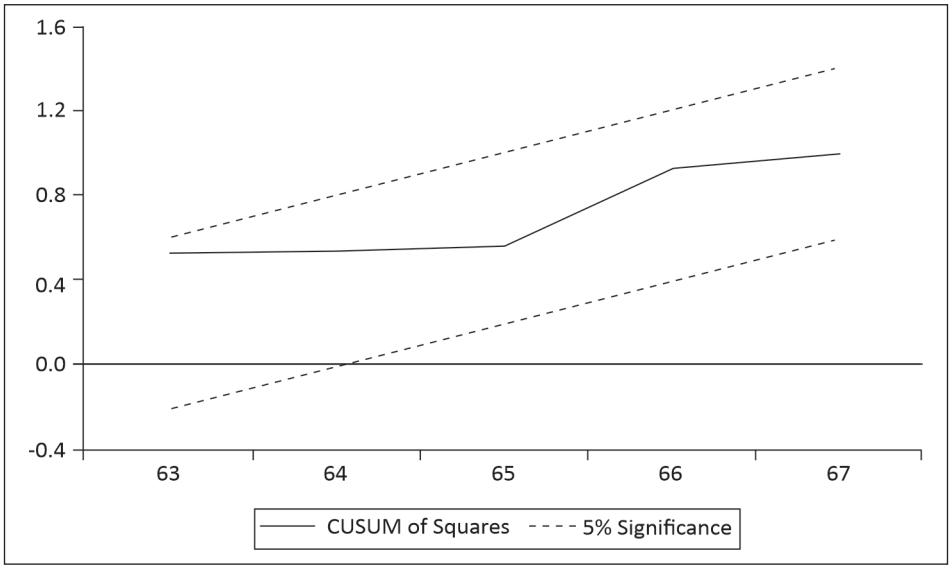
As evident from Figures 8 and 9, the plots of CUSUM and CUSUMSQ are within the critical bounds of 5% level of significance, and therefore the null hypothesis of all coefficients in the given regression being stable cannot be rejected. The short-run and long-run coefficients of the estimated model are stable.

Figure 8: Plot of Cumulative Sum of Recursive Residuals



Source: Computed using Eviews 14, Exim Bank Research

Figure 9: Plot of Cumulative Sum of Squares of Recursive Residuals



Source: Computed using Eviews 14, Exim Bank Research

CONCLUSION

The analysis suggests that an appreciation of the Indian Rupee exerts a positive influence on India's real exports to the world, which could be due to the high reliance of exports on imported raw material. An appreciation of rupee could translate into reduced input costs and improve price competitiveness of exports. Furthermore, the long-term positive impact of exchange rate volatility on real exports underscores India's exports resilience, indicating that exporters are able to command risk-adjusted premium prices, enabling them to effectively navigate business in volatile environments.

3. Sectoral Impact of Exchange Rate Movements

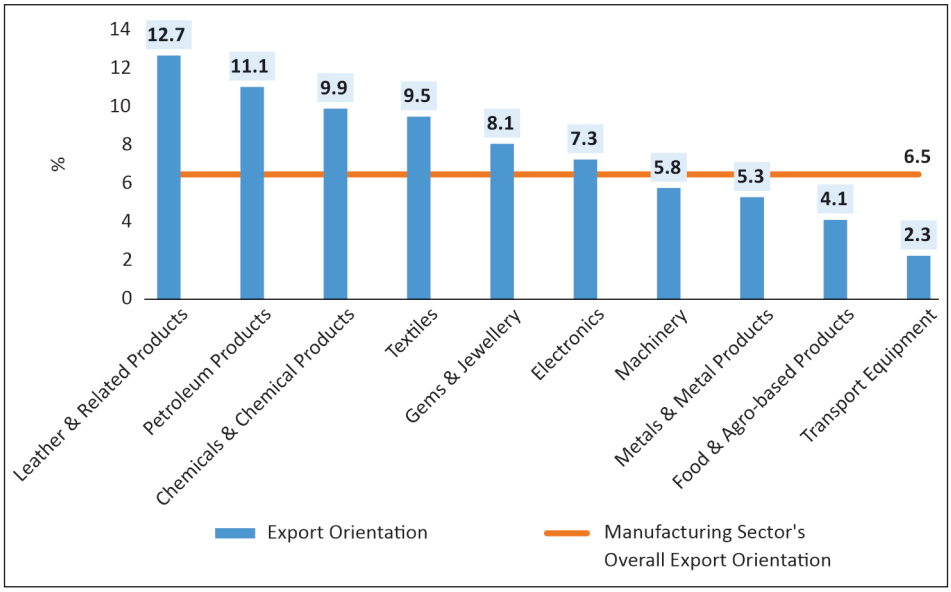
An attempt has been made in this section to analyse the sectoral impact of exchange rate movements. The analysis has been undertaken for ten industries – gems and jewellery, leather and related products, electronics, textiles, petroleum products, chemicals and chemical products, machinery, metals and metal products, food and agro-based products, and transport equipment, which are vital to India's economy and exports. Together, these sectors accounted for 88.4% of India's merchandise exports in 2023-24.

For the analysis, sectoral level data on the import intensity of raw material and export orientation for the major industries have been sourced from CMIE Industry Outlook for the year 2022-23. Export orientation, measured as the percentage of exports relative to total sales, indicates the reliance of each of the sectors on foreign markets. Depreciation of the domestic currency is typically expected to impact sectors with high export orientation by making their goods more competitive in global markets. Conversely, currency appreciation can reduce competitiveness, as exported goods become relatively more expensive.

Manufacturing as a whole, has an export orientation of 6.5% (Figure 10). This provides a benchmark to categorise industries as high or low export oriented. Leather & related products industry emerged as the most export-oriented sector, with an export orientation of 12.7%, followed by the petroleum products, chemicals and chemical products, textiles, and gems and jewellery, with export orientations of 11.1%, 9.9%, 9.5% and 8.1%, respectively, which are well above the manufacturing average. Export orientation of electronics sector is also slightly above that of the manufacturing average. Exports from

these highly export-oriented sectors are likely to be more sensitive to currency fluctuations. Among the least export-oriented are industries such as transport equipment and food and agro based products with export orientations of 2.3% and 4.1%, respectively. The impact of currency movements on exports from these sectors is likely to be relatively lower.

Figure 10: Export Orientation of Major Industries (2022-23)



Sample: 10,844 companies

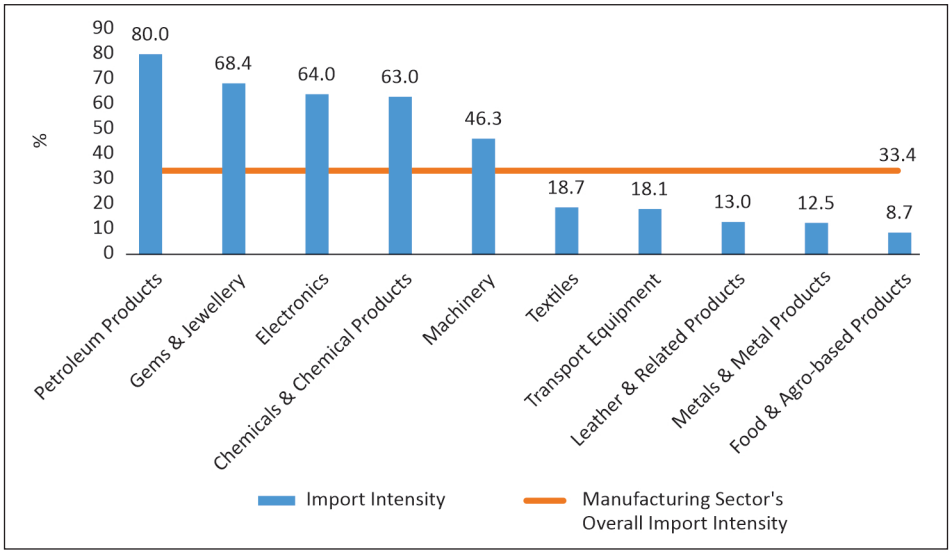
Source: CMIE Industry Outlook; Exim Bank Research

Currency movements, particularly depreciation of the domestic currency, also significantly impacts sectors with high dependence on imported raw material, as depreciation leads to a rise in the cost of inputs and affects the overall cost competitiveness. A weaker currency generally places financial pressure on these sectors, potentially increasing production costs as imported inputs become more expensive. Conversely, currency appreciation can ease costs for these sectors, as foreign-sourced materials become relatively cheaper, supporting lower production expenses and potentially boosting profitability.

Analysis of import intensity across the ten industries under consideration highlights that, for manufacturing as a whole, the import intensity, as

evidenced by the share of imported raw material in total raw material consumed, stands at 33.4% (Figure 11). Among the industries considered, petroleum products has the highest import intensity at 80%, followed by gems & jewellery and electronics, with import intensity at 68.4% and 64.0%, respectively. Apart from these, industries such as chemicals and chemical products, and machinery also have higher import intensity when compared to the manufacturing sector as a whole. These industries are likely to be relatively more sensitive to currency fluctuations, as it would directly impact their operating expenses. Among the least import-intensive are industries such as food & agro based products and metal products with import intensities of 8.7% and 12.5%, respectively. The impact of currency movements on imports from these sectors is likely to be relatively lower.

Figure 11: Dependency on Imported Raw Materials Across Major Industries (2022-23)



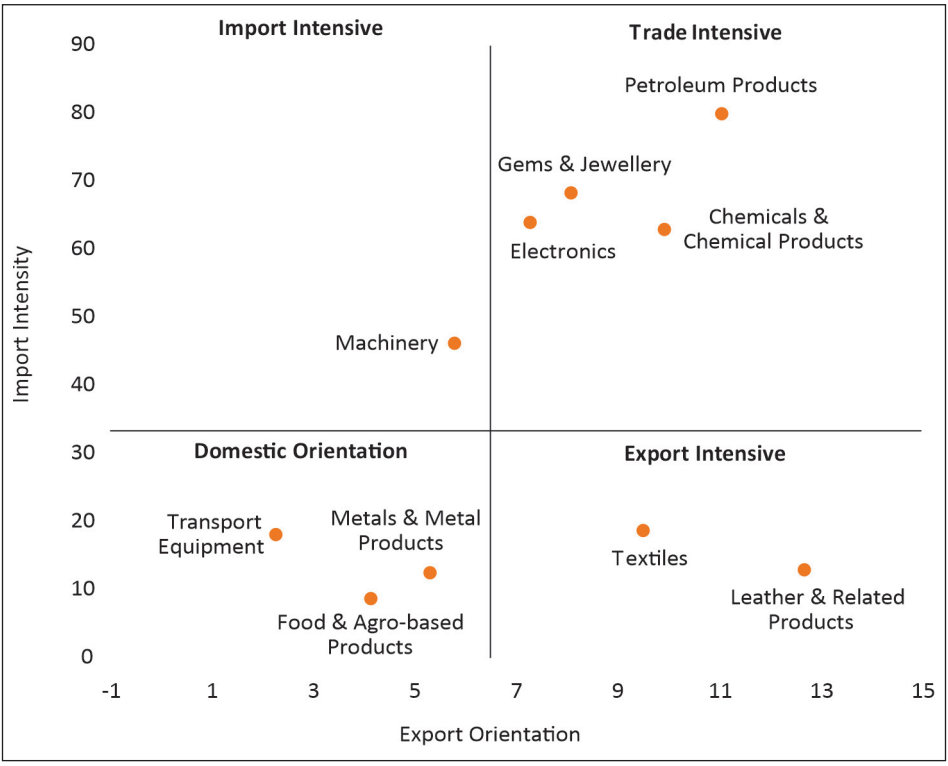
Sample: 10,844 companies
Source: CMIE Industry Outlook; Exim Bank Research

SENSITIVITY OF SECTORS TO EXCHANGE RATE MOVEMENTS

A four-quadrant analysis has been undertaken to classify sectors based on their export orientation and import intensity, to gain insights into how

fluctuations in the Indian Rupee might impact the performance of the industries. Sector-level data on the import intensity of raw materials and export orientation for ten major industries has been benchmarked with the average for the manufacturing sector as a whole, to arrive at four categories (Figure 12).

Figure 12: Quadrant Analysis of Sectors



Source: CMIE Industry Outlook; Exim Bank Research

The four categories are (i) **Trade Intensive (High Export Orientation– High Import Intensity)** sectors which are likely to witness mixed impacts from currency depreciation, as enhanced export demand is counterbalanced by rising import costs. Firms in these sectors ought to consider hedging strategies to navigate currency volatility and optimise supply chain efficiency by diversifying input suppliers, (ii) **Import Intensive (Low Export Orientation – High Import Intensity)** sectors that face vulnerabilities as weaker rupee can

increase production costs, highlighting the need for cost-reduction strategies and securing fixed-price arrangements with input suppliers, (iii) **Domestic Orientation (Low Export Orientation – Low Import Intensity)** sectors which are expected to exhibit muted responses to currency fluctuations due to limited global engagement and low import reliance. **(iv) Export Intensive (High Export Orientation– Low Import Intensity)** sectors which may benefit from currency depreciation, as their competitiveness improves without significant increase in import cost burdens.

Trade Intensive

For trade Intensive sectors, such as gems & jewellery, electronics, petroleum and chemicals, the combination of high export reliance and significant import dependency makes them vulnerable to exchange rate fluctuations. A depreciating INR generally boosts export competitiveness by making Indian goods more affordable in international markets, which is favourable for these sectors. However, their reliance on imported inputs—gold for jewellery, electronic components, petroleum and chemicals etc., —means that a weaker INR raises the cost of these imports, impacting production expenses and potentially squeezing profit margins if firms cannot pass these costs onto customers. Conversely, an appreciating rupee reduces the cost of imported raw materials, which can lower production costs and increase profit margins domestically, but at the expense of reduced export competitiveness, making Indian goods relatively more expensive abroad and potentially eroding market share. This dual impact creates uncertainty in business planning for these sectors, as they must navigate the complexities of cost management and pricing strategies amidst fluctuating exchange rates. High volatility in exchange rate would thus impose challenges for firms in these sectors to stabilise their margins and maintain their competitive positions globally. Conversely, low volatility in exchange rate would bode well for these sectors.

Import Intensive

Machinery sector, positioned in import intensive quadrant, exhibits low export orientation and high import intensity. Firms in this sector rely substantially on imported raw materials, components and parts for their production

processes, while the sector's export revenues are relatively modest. Consequently, fluctuations in exchange rates, particularly a depreciating INR, can significantly impact their cost structures by increasing the price of imported inputs without providing the compensatory advantage of enhanced export competitiveness. As input costs rise, production expenses escalate, which can erode profit margins and result in higher product prices in the domestic market, thereby undermining their competitiveness. These sectors would typically benefit from an appreciation in the Indian Rupee.

Domestic Orientation

Transport equipment, food & agro-based products, and metal & metal products industries are characterised by both low export orientation and low import intensity. While these industries do not have significantly high exposure to imports and exports, fluctuations in the exchange rate can still affect their operating environment. For instance, a depreciating INR may lead to increased inflationary pressures, raising costs for essential inputs such as raw materials, fuel and transportation, which are vital for these industries. The increase in production costs can compress profit margins or compel firms to raise prices, potentially resulting in decreased demand. Conversely, an appreciating INR may alleviate some inflationary pressures, but it could also render domestic products more expensive compared to imports, posing a risk of losing market share to cheaper foreign imports. Thus, while these industries might be insulated from direct exchange rate impacts, the broader economic consequences can still significantly influence their performance and competitiveness.

Export Intensive

Textiles, and leather and related products industries fall under export intensive category, characterised by high export orientation and relatively low dependence on imported inputs. Changes in exchange rate can significantly impact export revenues for these sectors, as a substantial portion of their sales is generated from international markets. A depreciating INR can enhance export competitiveness by making products from these industries more affordable and attractive to global buyers, potentially leading to

increased export revenues. However, the extent of this benefit is contingent upon global demand conditions and the industry's capacity to maintain or expand its market share. Additionally, a weaker INR may contribute to domestic inflation, raising the cost of locally sourced production inputs, which could counteract some of the advantages gained from higher export revenues. Conversely, an appreciating INR can compress export margins by making Indian products more expensive for international customers, possibly resulting in a decline in export volumes and market share. This variability in exchange rates introduces challenges for firms in planning pricing strategies and making revenue forecasts, thereby creating a layer of uncertainty in their business operations. Notwithstanding the uncertainties, a depreciation in Indian Rupee would typically be beneficial for these sectors.

CORRELATION OF CURRENCY MOVEMENTS

Sensitivity of the sectors can be gauged by the responsiveness of the exports in the sectors to the exchange rate movements. Pearson correlation indices have been calculated for exports with both the average yearly nominal exchange rate (INR/USD) and the global import demand for the ten major sectors across 10 years from 2014-2023. Further, the correlation of trade deficit with the average yearly nominal exchange rate (INR/USD) has also been undertaken.

The Pearson correlation coefficient (denoted as r) is a statistical measure expressing the degree of linear relationship between two variables. It is calculated using the formula:

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})\ \ (y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

Where, x_i and y_i are the individual data points of variables X and Y; $\bar{x}$ and $\bar{y}$ are the mean values of X and Y; Σ denotes the summation over all data points. The Pearson correlation coefficient (r) quantifies the linear relationship between two variables, with values ranging from -1 to +1. A coefficient of +1 indicates a perfect positive correlation, while -1 shows a perfect negative correlation; a value of 0 means no linear relationship.

For this analysis, sectoral data for the period 2014 to 2023 on exports, trade balance, and global import demand for 10 sectors under consideration was obtained from ITC Trademap, while the average yearly nominal exchange rate (INR/USD) was sourced from the RBI. The correlation between exports and the nominal exchange rate highlights how changes in the exchange rate affect export prices and competitiveness. A positive correlation would suggest that a depreciation of the currency might enhance export performance by making Indian goods more attractively priced in international markets, whereas a negative correlation could imply that exports decrease due to currency depreciation. The latter could be true when the export industries rely heavily on imported raw materials or intermediate goods. When the currency depreciates, the cost of the imported inputs increases, raising production costs and reducing export competitiveness.

Further, the relationship between global import demand and exports is also analysed in this section to provide insights on how external demand conditions impact export volumes. A positive correlation in this context would indicate that as global import demand increases, Indian exports are likely to rise correspondingly. Lastly, the correlation between the trade balance and the nominal exchange rate sheds light on how currency movements affect the trade balance. A positive correlation may imply that a depreciating currency could improve the trade balance by boosting export revenues while potentially curbing imports due to rising costs, whereas a negative correlation may imply that a depreciating currency could worsen the trade balance by potentially increasing the import value or decreasing exports. The latter could be true when the demand for imports is inelastic, i.e., the quantity of imports may not reduce significantly despite higher prices in local currency terms, which could be particularly true in sectors with high import intensity. This could also be true in sectors where export price competitiveness is negatively impacted due to depreciation owing to the excessive dependence on imported raw material, leading to worsening of trade balance. Further, it could also be the case when the goods exported are not significantly competitive to attract higher demand globally, leading to worsening of trade balance as imports become costlier and exports do not grow significantly to outweigh that effect.

Overall, the correlation analysis can provide a comprehensive understanding of the interplay between currency movements, global demand, and trade dynamics across sectors. By mapping these relationships, the analysis aims to provide insights that can inform policymakers and businesses about the complex factors driving export performance in the Indian economy, enabling more informed decision-making in response to changing economic conditions.

Table 9: Correlation of Currency Movements, Global Demand and Trade Dynamics (2014-2023)

Sectors	Correlation between Exports and Nominal Exchange Rate	Correlation between Exports and Global Import Demand	Correlation between Trade Balance and Nominal Exchange Rate
Electronics	0.93	0.88	-0.81
Chemicals & Chemical Product	0.92	0.95	-0.40
Machinery	0.92	0.97	-0.23
Food & Agro-based Products	**0.76**	**0.97**	**0.37***
Petroleum Products	0.63	0.97	-0.60
Metal & Metal Product	0.62	0.90	-0.26
Transport Equipment	0.31	0.84	-0.60*
Textile	-0.24	0.33	-0.65*
Gems & Jewellery	-0.51	-0.32	-0.56
Leather and Related Products	-0.67	0.64	-0.72*

Note: 1. Nominal exchange rate is calendar year average (INR/USD)

2. Cells highlighted in light green indicate sectors with positive correlation between exports and exchange rate and negative correlation between trade balance and exchange rate; cell highlighted in dark green indicate sector with positive correlation between both exports and exchange rate, and trade balance and exchange rate; and cells highlighted in orange indicate sectors with negative correlation between both exports and exchange rate and trade balance and exchange rate.

** Indicates sectors with trade surplus, whereby a positive correlation would mean improved trade surplus due to currency depreciation and vice versa.*

Source: ITC Trademap, RBI, Exim Bank Research

Electronics

Electronics industry is one of India's fastest-growing export sectors, recording a compound annual growth rate (CAGR) of 25.9% during the period 2019-20 to 2023-24. India's electronics exports were valued at approximately US$ 28.2 billion, representing a significant share of 6.5% in India's total merchandise exports during 2023-24. However, the sector also relies heavily on imported components, with imports reaching around US$ 83.9 billion in 2023-24, making electronics a major import-dependent industry for India. In recent years, imports of electronics have grown significantly, registering a CAGR of 12.4% from 2019-20 to 2023-24. Accordingly, while exports have grown, the trade deficit in the sector has also increased sharply, witnessing a CAGR of 7.8% from 2019-20 to 2023-24, to reach (-) US$ 55.7 billion in 2023-24. This sector is crucial for India's trade balance due to its high imports as well as substantial contribution to the country's growing high-tech export profile.

The correlation analysis indicates a strong positive correlation of 0.93 between exports and the nominal exchange rate, suggesting that a depreciation of the Indian Rupee is likely to boost exports in the electronics sector. Additionally, the positive correlation of 0.88 between global import demand and exports indicates that rising international demand is a significant driver of export growth in this sector. However, the strong negative correlation of (-) 0.81 between the trade balance and the nominal exchange rate reveals a complex dynamic in this sector. As noted in the previous section, the electronics sector is both a highly import intensive and highly export oriented sector. Since the sector relies heavily on imported inputs such as electronic components to produce finished goods, rupee depreciation increases the import bill as imports become costlier. Thus, while a weaker rupee makes exports more competitive abroad, the higher import costs more than offsets the gains from higher exports, leading to a wider trade deficit.

Chemicals & Chemical Products

Chemicals & related products are among the largest exported product categories for India, with exports valued at approximately US$ 58.6 billion,

representing a significant share of 13.4% in India's total merchandise exports during 2023-24. During the period 2019-20 to 2023-24, India's exports of chemicals have recorded a CAGR of 6.8%. However, the sector is also highly import dependent, with imports reaching around US$ 61.9 billion in 2023-24. In recent years, imports of chemicals have grown at a faster pace, registering a CAGR of 8.7% from 2019-20 to 2023-24. Consequently, the sector recorded a trade deficit of US$ (-) 3.3 billion in 2023-24, as opposed to a trade surplus of US$ 0.72 billion in 2019-20.

According to the correlation analysis, there is a strong positive correlation of 0.92 between exports and the nominal exchange rate in the chemicals sector. This suggests that rupee depreciation aligns with increased exports in the sector. Furthermore, the strong correlation of 0.95 between global import demand and exports underscores the critical role of global demand in driving exports from this sector, affirming its sensitivity to international market conditions. On the other hand, the moderate negative correlation of (-) 0.40 between the trade balance and the nominal exchange rate suggests that rupee depreciation may widen the trade deficit to some extent. As noted earlier, the sector is highly export-oriented and highly import intensive. Thus, while a weaker rupee makes exports more competitive, there could be a slight rise in the trade deficit due to the reliance on imports in this sector.

Machinery

Machinery exports accounted for 9.6% of India's merchandise exports in 2023-24. During 2019-20 to 2023-24, machinery exports registered a robust CAGR of 10%, with exports valued at around US$ 41.8 billion in 2023-24. Positioned in the import intensive quadrant, the machinery sector is characterised by low export orientation but high import intensity, reflecting its reliance on imported components. During 2023-24, India's machinery imports reached US$ 60.3 billion. Over recent years, machinery imports have grown steadily, registering a CAGR of 7.5% during the period 2019-20 to 2023-24. As a result, the trade deficit in this sector has recorded a relatively slower CAGR of 2.7% between 2019-20 and 2023-24.

The correlation analysis reveals that the machinery sector's export performance is highly correlated with currency and demand fluctuations. A strong correlation of 0.92 between exports and the nominal exchange rate suggests that rupee depreciation is associated with increased exports. Furthermore, the high positive correlation of 0.97 between global import demand and exports highlights the importance of international market demand as a key driver of export growth in this sector. Additionally, the low negative correlation of (-) 0.23 between the trade balance and the nominal exchange rate implies that trade balance is less sensitive to currency fluctuations.

Food and Agro-based Products

Food and agro-based products make up a substantial 8.7% of India's merchandise exports, with exports valued at US$ 38.2 billion in 2023-24. Between 2019-20 and 2023-24, exports from this sector have registered a CAGR of 9.9%. Meanwhile, imports of food and agro products were valued at around US$ 30.6 billion in 2023-24. Imports have grown significantly over the recent years, recording a CAGR of 12.6% during 2019-20 to 2023-24. Despite the recent surge in imports in the sector, India continues to hold a trade surplus in this category, which amounted to US$ 7.6 billion during 2023-24. Over the recent years, trade surplus in the sector has slightly expanded, witnessing a CAGR of 1.5% over 2019-20 to 2023-24.

Correlation analysis indicates a moderately high sensitivity of exports to the nominal exchange rate (0.76) and strong sensitivity of exports to global demand (0.97). A weaker rupee would thus support exports from the sector, though to a lesser extent than sectors like electronics or chemicals. The sector also exhibits a low positive correlation between trade balance and nominal exchange rate (0.37). The low import dependence of the sector leads to the lower sensitivity of trade balance to exchange rate movements. Food and agro-based products is the only sector wherein rupee depreciation is correlated with both increase in exports and improvement in trade balance.

Petroleum Products

Petroleum products are the largest contributor to India's merchandise exports, constituting a notable 19.3% of India's total merchandise exports in 2023-24. Between 2019-20 and 2023-24, exports from this sector recorded a CAGR of 19.5% to reach US$ 84.2 billion in 2023-24. However, the industry remains substantially dependent on imported inputs, with imports amounting to approximately US$ 178.7 billion in 2023-24, making it among India's most import-reliant sectors. Over recent years, imports in petroleum products have surged, witnessing a CAGR of 8.2% from 2019-20 to 2023-24. Consequently, while exports have risen, the sector's trade deficit has also slightly expanded, with a CAGR of 1.5% during this period.

Positioned in the trade intensive quadrant in the analysis, the petroleum sector exhibits high export orientation and high import dependence. Correlation analysis reveals a moderately strong correlation between exports and the nominal exchange rate (0.63), which indicates that rupee depreciation could moderately enhance petroleum product exports from India. Meanwhile, strong correlation with global import demand (0.97) suggests that rising global demand significantly drives export growth. However, there is also a moderately high negative correlation between trade balance and nominal exchange rate (-) 0.60, indicating that a weaker rupee could also escalates import costs, which may offset export gains and increase the trade deficit. Overall, while strong international demand, combined with a weaker rupee, may enhance the competitiveness of Indian petroleum exports, rising import costs due to high import dependence may offset the gains from enhanced exports from the sector and widen the trade deficit.

Metal & Metal Products

India's metal and metal products sector contributed to nearly 7.9% to the country's total merchandise exports in 2023-24. During 2019-20 to 2023-24, exports from the sector witnessed a CAGR of 9.5% to reach US$ 34.4 billion in 2023-24. However, the industry's imports also grew rapidly recording a CAGR of 12.2% over the same period, reaching US$ 45.2 billion in 2023-24. Accordingly, India's trade deficit in the sector also increased significantly,

registering a CAGR of 23.7% from 2019-20 to 2023-24, to reach US$ 10.8 billion in 2023-24.

Correlation analysis indicates a moderately strong positive correlation between exports and nominal exchange rate (0.62), and a strong positive correlation between exports and global import demand (0.90). This indicates that a weaker rupee may aid export competitiveness to some extent, but global demand plays a more significant role in export performance. The weak negative correlation between the trade balance and exchange rate ((-) 0.26) implies that trade balance is less sensitive to currency fluctuations.

Transport Equipment

India's exports of transport equipment were valued at approximately US$ 29.6 billion in 2023-24, contributing 6.8% to the country's total merchandise exports. Between 2019-20 and 2023-24, exports from this sector registered a healthy CAGR of 5.7%. Meanwhile, India's imports of transport equipment stood at US$ 25.2 billion in 2023-24, recording a lower CAGR of 3.7% during 2019-20 to 2023-24. Accordingly, India had a trade surplus in the sector worth US$ 4.4 billion in 2023-24, which recorded a robust CAGR of 22.2% during 2019-20 to 2023-24.

Placed in the domestic orientation quadrant, this sector has low export orientation and modest import intensity. Transport equipment exports have a weak positive correlation with the nominal exchange rate (0.31) and a strong positive correlation with global demand (0.84). This indicates that global demand, rather than currency movements, primarily drives export performance in this sector. On the other hand, the moderately strong negative correlation between the trade balance in the sector and exchange rate ((-) 0.60) shows that depreciation could worsen the trade balance, which could likely be due to inelastic demand for imports in this segment.

Textile Sector

Textiles sector has traditionally been important for India's export basket. During 2023-24, India's textile exports were valued at approximately

US$ 34.4 billion, accounting for 7.9% of the country's total merchandise exports. Over the recent period, export growth in the sector has been modest, recording a CAGR of only 0.5% between 2019-20 and 2023-24. The sector's reliance on imported components is low, with imports valued at US$ 8.1 billion in 2023-24. As a result, India is a net exporter in the sector, with a trade surplus of US$ 26.3 billion in 2023-24.

Correlation analysis indicates a weak negative correlation between exports and the nominal exchange rate ((-) 0.24), implying that rupee depreciation may not significantly impact textile exports. Additionally, a weak positive correlation with global import demand (0.33) suggests that the sector's export performance is also not strongly influenced by global demand fluctuations, indicating potential challenges in capitalising on rising demand. Meanwhile, moderately strong negative correlation of trade balance with the nominal exchange rate ((-) 0.65), indicates that trade balance could worsen due to rupee depreciation. India has a trade surplus in the sector, which could narrow with rupee depreciation.

Gems & Jewellery Sector

India's gems and jewellery exports were valued at US$ 32.7 billion in 2023-24, accounting for a significant 7.5% of total merchandise exports. During 2019-20 to 2023-24, exports from the sector declined, recording a negative CAGR of (-) 2.3%. The industry is highly import-dependent, with imports reaching US$ 78.4 billion in 2023-24. Imports of gems and jewellery grew substantially over the recent years, recording a CAGR of 9.6% during 2019-20 to 2023-24. Consequently, India's trade deficit in the sector reached a substantial US$ 45.7 billion in 2023-24, recording a CAGR of 25.3% during 2019-20 to 2023-24.

Correlation analysis highlights moderate negative correlation between exports and the nominal exchange rate ((-) 0.51), indicating that rupee appreciation has a positive impact on export performance. The sector is both highly export oriented and highly import dependent, with more than two-thirds of the raw material in the sector being imported. Cheaper imports of raw materials on account of rupee appreciation can enhance profitability for

businesses involved in value addition, enabling them to produce value-added exports more cost-effectively. Meanwhile, the moderate negative correlation between trade deficit and nominal exchange rate ((-) 0.56), implies that rupee depreciation could exacerbate the trade deficit in the sector on account of the heavy reliance on imported inputs. A weak negative correlation of exports with global import demand ((-) 0.32) indicates that exports are relatively less sensitive to international demand.

Leather Sector

India's leather exports were valued at US$ 4.5 billion in 2023-24, accounting for about 1% of total merchandise exports. During 2019-20 to 2023-24, leather exports recorded a negative CAGR of (-) 1.8%. This sector is highly export-oriented with low import reliance. Imports in the sector were valued at US$ 0.9 billion in 2023-24. Overall, India holds a trade surplus in the sector, which stood at US$ 3.5 billion in 2023-24.

Correlation analysis indicates a moderate negative correlation between exports and the nominal exchange rate ((-) 0.67), implying that rupee depreciation may not benefit exports from the sector. This could be on account of stiff competition from other low-cost suppliers such as China and Vietnam, and lack of ability to compete in premium segments catered to by countries such as Italy. Meanwhile, the correlation between exports and global import demand in the sector is moderately high (0.64), indicating that rising global demand would drive export growth in the sector. On the other hand, a moderately high negative correlation ((-) 0.72) between the trade surplus and the nominal exchange rate indicates that currency depreciation could worsen the trade balance potentially due to lack of improvement in exports coupled with costlier imports in premium segments.

CONCLUSION

Based on the sectoral analysis, several patterns emerge, highlighting the interplay between currency fluctuations, global demand, and trade dynamics. Each sector's positioning in the four-quadrant framework allows

for an understanding of its export orientation and import intensity, and the correlation analysis highlights the responsiveness of the sector's trade to the currency movements.

1. **Impact of Currency Movements:** The impact of currency movements on exports and trade balance varies across sectors based on their export orientation and import intensity. Depreciation in nominal exchange rate generally boosts the value of exports in sectors like electronics, chemicals, machinery, and petroleum products, as evidenced by strong positive correlations with the exchange rate. However, high import dependence in these sectors leads to an increase in import costs, thereby offsetting gains from exports and widening trade deficits. In gems and jewellery sector, the value of export reduces and trade deficit widens due to depreciation in nominal exchange rate, potentially due to the high import dependence in the sector. Food and agro-based products is the only sector where depreciation is correlated with both increase in exports and improvement in the trade balance, plausibly on account of the low import dependence in this area. In transport equipment, weaker rupee is associated with a low correlation with improvement in exports but moderate correlation with worsening of trade balance. On the contrary, weak rupee has a moderate correlation with exports of metals and metal products, but a low correlation with trade balance in the sector. Lastly, in the labour-intensive, export-oriented sectors of textiles and leather, a depreciating currency may lead to moderate negative impacts on trade balance in these sectors. However, there is also a moderate correlation of depreciation with increase in exports in case of leather.

2. **Global Demand as a Key Driver:** The correlation between global demand and export performance is evident in sectors like chemicals, machinery, electronics, food, metal, transport equipment, and petroleum products. High sensitivity to global market demand underlines the importance of favourable international economic conditions in driving India's export growth in these segments. Indian exporters may consider strengthening trade relationships and tapping into latent demand in untapped,

emerging markets to cushion these sectors against potential downturns in established markets.

India's trade performance is intricately tied to sector-specific dynamics, driven by exchange rate movements, global demand conditions, and import intensity. Considering these sectoral variations, especially in times of heightened uncertainties, can help optimise policy response and targeted interventions for India's export growth.

4. Conclusion

Exchange rate is a critical factor for any country's international competitiveness. Literature provides mixed evidence for the impact of various facets of exchange rate on exports. The major facets of exchange rate – price elasticity of exports, impact of exchange rate volatility, and sectoral sensitivity to movements has been analysed in the study. The results indicate that an appreciation in Indian Rupee has a positive impact on real exports from India to the world. Alongside, the impact of volatility on real exports to world is also positive in the long-run.

EXCHANGE RATE MOVEMENTS ON INDIA'S EXPORTS

The analysis confirms that India's exports are highly responsive to exchange rate changes. As per the analysis, a 1% increase in REER would lead to a long-term increase of 1.07% in India's exports to the world, suggesting that appreciation of the INR boosts export volumes. This finding indicates that a stronger rupee can be a powerful lever for improving India's exports by reducing cost of imported inputs. Analysis also indicates that India's exports are sensitive to changes in global demand, conforming to the traditional assumptions of higher global income driving export growth. Notably, the impact of volatility of INR on India's real exports to the world is found to have a significant positive impact in both short-run and long-run, though the magnitude of the impact remains low. This may be attributed to the higher risk premiums demanded by exporters in volatile environments.

SECTORAL ANALYSIS

India's trade performance is highly influenced by sector-specific dynamics, shaped by currency fluctuations, global demand, and import intensity. In

trade intensive sectors such as electronics, chemicals, and petroleum product currency depreciation may increase export values but simultaneously raise import costs, thereby widening trade deficits. In the trade intensive sector of gems and jewellery sector, INR appreciation has positive impact on export performance, as cheaper imports of raw material can enable production of value-added exports more cost-effectively. In domestically oriented sectors like food and agro-based products, with minimal import reliance, weaker rupee is correlated with improvements in both exports and trade balance. In transport equipment, weaker rupee is associated with a low correlation with improvement in exports but moderate correlation with worsening of trade balance. On the contrary, weak rupee has a moderate correlation with exports of metals and metal products, but a low correlation with trade balance in the sector. Lastly, in the labour-intensive, export-oriented sectors of textiles and leather, a depreciating currency may lead to moderate negative impacts on trade balance in these sectors. However, there is also a moderate correlation of depreciation with increase in exports in case of leather.

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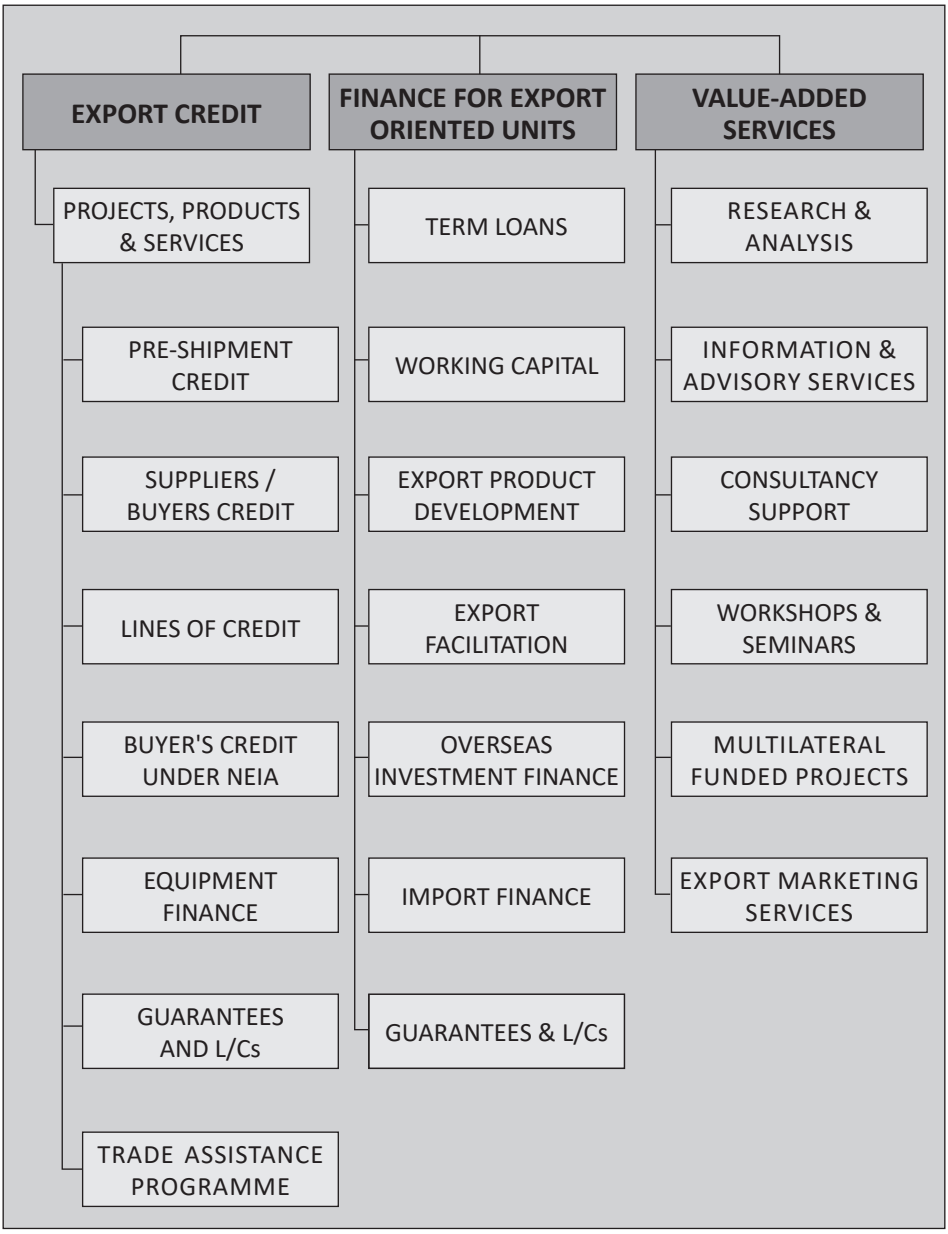

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