A Study of Selected Currency Exchange Rate Risk in India: Evidence from 2014–2025

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Abstract

In this study, the movement and risk of above four major currencies US Dollar (USD), Euro (EUR), British Pound (GBP) and Japanese Yen (JPY) have been examined against the Indian Rupee (INR) for the time period 2014–2025. The analysis has been carried out in three terms of the NDA government namely the first, second and third term.This study has analyzed the movement and risk of major four currencies US Dollar (USD), Euro (EUR), British Pound (GBP), and Japanese Yen (JPY) against Indian Rupee (INR) for the period 2014–2025 and compared the exchange-rate behaviour during the first, second and third term of the NDA government. The study utilizes secondary sources to use annual average exchange rates and percentage change, variance, standard deviation, coefficient of variation (CV), correlation, trend regression, one-way ANOVA and the Kruskal–Wallis test. The USD/INR average has increased from ₹61.02 to ₹87.17 (+42.8%) in the last 11 years and rose in 9 of those years. EUR (+21.6%) and GBP (+14.4%) also solidly appreciated against the rupee, but with ups and downs, and the JPY (+0.8%) virtually had no net movement. The CV was highest for the USD (11.56%) and lowest for the JPY (7.91%) but year-to-year percentage moves were most significant for the JPY, indicating that the CV of levels is largely a measure of trend for the USD. The period averages of USD, EUR and GBP are very different from each other on the 5% level, while the JPY does not at that level. The information technology, pharmaceutical, auto, oil/gas, and textiles/electronics sectors are the most exposed sectors, according to a sector-wise exposure analysis. The results are descriptive and not causal. A key factor to consider is the currency depreciation. This phenomenon can be characterized as a fall in the value of the currency.The fall in the value of the currency is known as currency depreciation. JEL Classification: F31, F32, G15, C22

1. Introduction

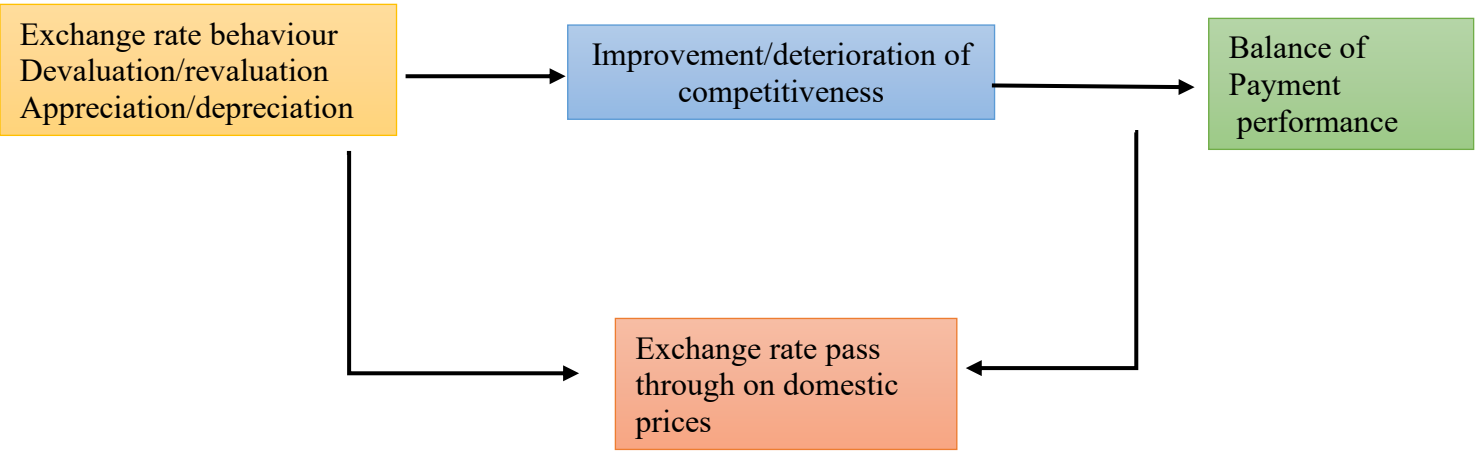
The foreign exchange rate is an important aspect of the international economy, as nations trade and engage in financial activities in various currencies. An exchange rate change impacts on the value of international transactions and uncertainty for enterprises, investors and policy makers.

In India, the large world currencies like the US Dollar (USD), Euro (EUR), British Pound (GBP), and Japanese Yen (JPY) play a significant role in international trade. The exchange rate of these currencies to the Indian Rupee (INR) might fluctuate over time due to several factors including inflation, interest rates, economic conditions, currency demand and supply, and world economic trends.

The changes in the exchange rate leads to appreciation or depreciation of the Indian Rupee and create exchange-rate risk. It is thus crucial to analyse the movement and volatility of selected currencies to understand India's exposure to movements in foreign exchange, especially exporters, importers, multinational companies and the policy makers.

The time period of this study is 2014–2025 and the currencies examined are selected in this study and are those that move against the Indian Rupee. It discusses the concepts of appreciation and depreciation, explores the concept of exchange-rate risk from the perspective of standard deviation, variance and coefficient of variation, and compares the behavior of exchange-rates during 1st, 2nd and 3rd term of NDA government and also looks at the various sectors of Indian economy which are vulnerable to these movements..

2. Conceptual Framework



3. Review of Literature

1. Barai and Samal (2025) — Exchange-rate volatility and spillover effects

Barai and Samal examined the relationship between exchange-rate volatility and spillover effects.Barai and Samal (2025) studied the relationship between exchange-rate volatility and spillover effects. The authors, Barai and Samal, examined the exchange-rate volatility of the USD, EUR, GBP, and JPY in India over the period January 2019 to June 2023, based on data from the RBI. They concluded USD/INR to be the most volatile and JPY/INR to be the least volatile of the four currency pairs. They also found a two-way volatility relationship between USD and EUR. This study is relevant since it explores the same currencies as the current study..

2. Sayed and Gayathri (2023) — Exchange-rate exposure of Indian firms

Sayed and Gayathri is the study on exposure to exchange rate of firms in India. Sayed and Gayathri studied 271 companies from the BSE S&P 500 index spanning the years 2001-2020. They analyzed exchange-rate exposure based on USD, EUR, GBP, JPY, and real effective exchange rate. Their research serves as evidence that foreign-exchange exposure is one of the important firm level financial issues. What is unique about the present study is that it considers annual currency fluctuations and the relative currency risk instead of firm exposure.

3. Sharma (2020) — Exchange-rate volatility and Indian exports

Sharma analyzed the link between export and exchange-rate risk for India from December 2012 to November 2017. The results indicated that volatility of exchange rate was detrimental to export performance in the short and long run periods. The results of this study illustrate the significance of the measurement of currency fluctuations in an economic sense.

4. Sharma and Pal (2018) — Exchange rates and cross-border trade

Sharma and Pal discussed the exchange rates and cross-border trade. Using pooled mean group and nonlinear cointegration techniques, Sharma and Pal investigated the volatility and cross-border trade of exchange rates in India. Their research explored how currency uncertainty relates to international trade over time. The study clearly indicates the requirement of analysing the flows of currency for a more extended period but in the present study the emphasis is more on the comparison of four currencies with INR.

5. Sharma and Pal (2019) — Exchange-rate volatility and imports

Sharma and Pal examined whether volatility of exchange rates decreases Indian imports at the commodity level. In their research, they took into account the impact of currency uncertainty on various categories of imports. The study is significant in the sense of understanding the possible impact that exchange rate fluctuations can have on the Indian businesses importing products and materials from foreign markets.

6. Rai and Sharma (2022) — Exchange-rate volatility and past movements

Rai and Sharma analyzed monthly data of the Indian Rupee from January 2005 to December 2020 for studying the exchange rate of Indian Rupee and US Dollar. They used an ARIMA model and concluded that the volatility of the exchange rate may affect the movement for nearly three years. They found that it is necessary to look at the behaviour of currency across time.

7. Bhagawan and Lukose (2014) — Currency exposure and hedging

Bhagawan and Lukose studied the level of exposure in the S&P CNX 500 non-fincap sector companies for the period of 2006-2011. They concluded that 11% of the sample companies were very sensitive to exchange-rate movements. They also found that foreign-currency derivatives and foreign-currency debt decreased the exposure of firms. This is a study that will give a financial risk-management point of view for currency-risk research.

8. Behera, Narasimhan, and Murty (2008) — Central-bank intervention

Behera and colleagues examined the link between RBI intervention and exchange rates volatility. In their analysis, they concluded that RBI intervention was effective in reducing the volatility of the foreign-exchange market in India, but not a guaranteed way of reversing the trend of the exchange-rate movements. This study aims to offer background on central-bank intervention's involvement in currency stability

9. Patnaik and Sengupta (2021) — India's exchange-rate regime

Patnaik and Sengupta nalysed India's exchange-rate regime between 2000 and 2020 using exchange-market pressure. They distinguished four general regimes featuring varying degrees of exchange-rate flexibility. Their analysis revealed that the RBI intervention and movements in the Rupee had differing roles in absorbing pressures on the rupee. With this research infrastructure, policy context on exchange rates between 2014-2025 can be analyzed.

10. Vasumathy (2015) — Currency-risk management among Indian SMEs

Vasumathy focused on currency risk management practices of SMEs exporting to India. It found relative limited knowledge of derivatives and formal risk-management systems among some firms, with the study reporting on the use of forward contracts. The study emphasises the need to keep an eye on currency movements, especially for the smaller businesses involved in cross border trade.

11. Auboin and Ruta (2013) — Exchange rates and international trade

Auboin and Rutaexamined past studies on the volatility of exchange rates, currency misalignment, and international trade. They found that while overall the impact of exchange-rate volatility on trade flows is negative, this impact is not always very strong. They also provided an explanation of the impact of hedging instruments, production structure and economic integration. This review gives a theoretical basis of the study of currency fluctuations..

12. Bhagawan and Lukose (2017) — Use of currency derivatives

Bhagawan and Lukose examined the determinants of the use of currency-derivatives in non-financial firms in India. They studied firm attributes that are related to choosing to hedge foreign-exchange risk, by using the information

provided in firm announcements. The materials they studied have led them to understand how companies can employ derivatives to mitigate financial risk from currency fluctuations.

4. Research Gap

Most of the previous studies are concerned with the volatility of the exchange rate in the aggregate trade, commodities or specific sectors. There are not many studies that compare the USD, EUR, GBP and JPY with the INR for a common time frame of 2014-2025. This study fills this gap by examining the individual movements of currency, the risk of exchange rates, changes in the government's terms and the sectors affected.

5. Objectives of the Study

1. To examine the currency exchange rate of selected currencies against Indian Rupee (INR) during the time period 2014-2025.

2. To interpret the fluctuations in exchange rates of the first, second and third term of the NDA government.

3. To find the important sectors of Indian economy which are affected by fluctuations in the selected currency exchange rates.

6. Hypotheses

H_{01}: There is no significant movement in the given currency exchange rates against the Indian Rupee over the period from 2014 to 2025.

H_{11}: There is a significant movement in the selected currency exchange rates against the Indian Rupee during 2014–2025.

H_{02}: At significant level the selected currency exchange rates are not different among 1st, 2nd and 3rd terms of the NDA government.

H_{12}: The selected currency exchange is significantly different in each of the 1st, 2nd and 3rd term of the NDA government.

H_{03}: No significant effect of exchange-rate fluctuations on the selected sectors of Indian economy.

H_{13}: The selected sectors of Indian economy are greatly affected by the fluctuations in the exchange rate.

7. Research Methodology

7.1 Data and period

The study is based on secondary data. The exchange-rate information pertaining the selected currencies was taken from Reserve Bank of India (RBI) and other financial and economic databases. The study spans 12 years (2014 to 2025) and has an annual average rate, which provides 12 observations per currency. The exchange rates are shown as rupees per

foreign currency unit (Table 1) and therefore increase in rates means depreciation in rupees and a decline in rates means appreciation in rupees.

7.2 Selected currencies

Table 1: Selected currencies

S.No.	Currency	Code	Exchange-rate quotation
1	US Dollar	USD	₹ per 1 USD
2	Euro	EUR	₹ per 1 EUR
3	British Pound	GBP	₹ per 1 GBP
4	Japanese Yen	JPY	₹ per 1 JPY

Source: Authors' compilation.

7.3 Statistical tools

Annual average exchange rate: Average = $\Sigma X / N$, where X is an exchange-rate observation and N is the number of observations.

Appreciation and depreciation: Percentage change = (Current-year rate − Previous-year rate) / Previous-year rate × 100. A positive value indicates depreciation of the rupee; a negative value indicates appreciation.

Variance and standard deviation: Variance = $\Sigma(X - \bar{X})^2 / (N - 1)$, and Standard deviation = √Variance. The sample (N − 1) form is used because the 12 annual observations are treated as a sample of the exchange-rate process; higher values indicate greater fluctuation.

Coefficient of variation: CV = (Standard deviation / Mean) × 100. Because the four currencies are quoted at very different levels, the CV is used to compare relative risk.

Correlation: Pearson's correlation coefficient is used to examine the direction and strength of co-movement among the selected currencies, both in annual-average levels and in annual percentage changes.

Trend regression (H_{01}): Each currency's annual average is regressed on time (year) by ordinary least squares; a statistically significant slope indicates significant movement over the period.

One-way ANOVA and Kruskal–Wallis test (H_{02}): Annual averages are grouped into the three NDA periods, and group means are compared using one-way ANOVA. The Kruskal–Wallis test is used as a non-parametric check, and Tukey's HSD for pairwise comparison.

7.4 NDA government periods For a simple calendar-year comparison, the NDA terms are grouped as 2014–2018 (1st term), 2019–2023 (2nd term) and 2024–2025 (3rd term). This is an estimated start and end date as terms did not start or

end on the designated year. The grouping is only for the purpose of comparison of exchange rate levels over time, and cannot be used to assign responsibility for exchange rate results to government policy.

7.5 Sectoral analysis The sectors impacted by exchange rate fluctuations are identified based on the export/import/foreign currency payment structure of the sector and are mapped onto the currencies which the sector is predominantly exposed to.8. Data Analysis and Interpretation

8.1 USD/INR movement

Table 2: USD/INR – annual average and change

Year	Average ₹/USD	% Change	Movement of INR
2014	61.023	—	—
2015	64.178	5.17%	Depreciation
2016	67.198	4.71%	Depreciation
2017	65.129	−3.08%	Appreciation
2018	68.448	5.10%	Depreciation
2019	70.427	2.89%	Depreciation
2020	74.108	5.23%	Depreciation
2021	73.945	−0.22%	Appreciation
2022	78.628	6.33%	Depreciation
2023	82.592	5.04%	Depreciation
2024	83.668	1.30%	Depreciation
2025	87.166	4.18%	Depreciation

Source: RBI and other financial databases; authors' calculations.

The overall trend of the USD/INR is upwards. The cumulative increase was from ₹61.023 per USD in 2014 to ₹87.166 in 2025, increasing by 42.84% per annum, indicating a general depreciation of the rupee. The depreciation took place on nine of the eleven annual changes, with significant increases in 2018, 2020, 2022 and 2023. A decrease in 2017 and 2021 shows temporary appreciation. Interpretation: USD has seen significant and persistent long-term movement against INR, suggesting that USD exposure for Indian exporters/importers exists and is continuing to build up over time.

8.2 EUR/INR movement

Table 3: EUR/INR – annual average and change

Year	Average ₹/EUR	% Change	Movement of INR
2014	81.041	—	—
2015	71.196	−12.15%	Appreciation
2016	74.372	4.46%	Depreciation
2017	73.532	−1.13%	Appreciation
2018	80.733	9.79%	Depreciation
2019	78.836	−2.35%	Appreciation
2020	84.639	7.36%	Depreciation
2021	87.439	3.31%	Depreciation
2022	82.686	−5.44%	Appreciation
2023	89.300	8.00%	Depreciation
2024	90.556	1.41%	Depreciation
2025	98.524	8.80%	Depreciation

Source: RBI and other financial databases; authors' calculations.

The EUR/INR rate fluctuated considerably, rising from ₹81.041 in 2014 to ₹98.524 in 2025 (+21.57%). The largest single-year fall was in 2015 (−12.15%) and the largest rise in 2018 (+9.79%), with a further sharp increase in 2025 (+8.80%). Declines also occurred in 2017, 2019 and 2022. Meaning: EUR/INR had both appreciation and depreciation periods so businesses doing business with Europe have an exchange-rate uncertainty.

8.3 GBP/INR movement

Table 4: GBP/INR – annual average and change

Year	Average ₹/GBP	% Change	Movement of INR
2014	100.510	—	—
2015	98.118	−2.38%	Appreciation
2016	91.050	−7.20%	Appreciation

Year	Average ₹/GBP	% Change	Movement of INR
2017	83.865	−7.89%	Appreciation
2018	91.261	8.82%	Depreciation
2019	89.866	−1.53%	Appreciation
2020	95.112	5.84%	Depreciation
2021	101.730	6.96%	Depreciation
2022	97.004	−4.65%	Appreciation
2023	102.690	5.86%	Depreciation
2024	106.980	4.18%	Depreciation
2025	114.930	7.43%	Depreciation

Source: RBI and other financial databases; authors' calculations.

The GBP/INR rate fell from ₹100.510 in 2014 to ₹83.865 in 2017, with the largest declines during 2016–2017, and subsequently rose to ₹114.930 in 2025 (+14.35% over the full period). Significant increases occurred in 2018, 2020, 2021 and 2025. Interpretation: The GBP saw significant volatility, which may affect the value of the rupee for payments and receipts with the United Kingdom.

8.4 JPY/INR movement

Table 5: JPY/INR – annual average and change

Year	Average ₹/JPY	% Change	Movement of INR
2014	0.57796	—	—
2015	0.53011	−8.28%	Appreciation
2016	0.62002	16.96%	Depreciation
2017	0.58053	−6.37%	Appreciation
2018	0.61941	6.70%	Depreciation
2019	0.64644	4.36%	Depreciation
2020	0.69458	7.45%	Depreciation

Year	Average ₹/JPY	% Change	Movement of INR
2021	0.67337	−3.05%	Appreciation
2022	0.60015	−10.87%	Appreciation
2023	0.58872	−1.90%	Appreciation
2024	0.55310	−6.05%	Appreciation
2025	0.58278	5.37%	Depreciation

Source: RBI and other financial databases; authors' calculations.

The rate of JPY/INR was inverse. It increased from ₹0.578 per yen in 2014 to ₹0.695 in 2020, declined during 2021–2024 to ₹0.553, and rose again in 2025 to ₹0.583. The net change over the full period is only +0.83%, though individual years saw large moves, such as +16.96% in 2016 and −10.88% in 2022. Interpretation: Yen fluctuated with no clear trend, reflecting shifting and more dynamic exchange rate dynamics for India–Japan trade.

8.5 Appreciation and depreciation analysis

In every year the rupee did not appreciate against all currencies. Table 6 shows the direction and magnitude of annual movements. The depreciation of the rupee against the USD occurred in 9 of the 11 years while against EUR, GBP and JPY it happened in an even fashion. Even the yen appreciated (or strengthened) more years that it depreciated.

Table 6: Summary of annual movements, 2014–2025

Currency	Cumulative change	Avg. annual change	Years of depreciation	Years of appreciation	SD of annual % change
USD	+42.84%	+3.33%	9	2	2.87
EUR	+21.57%	+2.01%	7	4	6.81
GBP	+14.35%	+1.40%	6	5	6.24
JPY	+0.83%	+0.39%	5	6	8.43

Source: Authors' calculations from Tables 2–5. Eleven annual changes per currency.



Figure 1: Exchange rates indexed to 2014 = 100 (₹ per unit of foreign currency)

USD has been trending upwards, EUR is rising in steps, GBP is u-shaped and JPY is oscillating in a trendless manner as seen in Figure 1. The selected currencies show a fair amount of volatility in the period of 2014–2025.

8.6 Exchange-rate risk analysis

Table 7: Exchange-rate risk analysis

Currency	Mean	Variance	Standard deviation	CV (%)
USD	73.043	71.318	8.445	11.56
EUR	82.738	62.653	7.915	9.57
GBP	97.760	70.710	8.409	8.60
JPY	0.606	0.0023	0.0479	7.91

Source: Authors' calculations (sample variance, N − 1).

The standard deviation shows the magnitude of the differences in exchange rates, however, since the four currencies are quoted at widely different levels, it is more appropriate to compare the relative variability based on the coefficient of variation.

Table 8: Relative risk ranking based on CV

Rank	Currency	CV (%)	Interpretation
1	USD	11.56	Relatively higher variation
2	EUR	9.57	Moderate variation
3	GBP	8.60	Moderate variation

Rank	Currency	CV (%)	Interpretation
4	JPY	7.91	Relatively lower variation

Source: Authors' calculations.

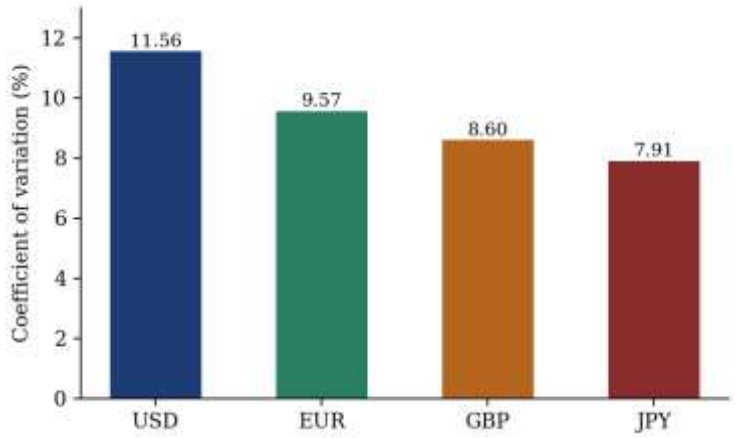


Figure 2: Coefficient of variation of annual average exchange rates

Based on the annual-average levels, the USD has the highest relative variability and the JPY the lowest. It is important to read this ranking with caution. The high CV for the USD is due primarily to the positive correlation with time (0.98), and the smallest year to year change (standard deviation of the annual change 2.87%). The low CV of the JPY is due to the fact that it did not show a significant trend over the past year, but rather varied around a relatively stable mean with the highest deviation from this mean (8.43%) to be found between the highest and lowest points of the curve. The CV of levels thus measures variation about the period mean of levels, and measures the standard deviation of the annual changes captures year-to-year 'unpredictability', both of which are pertinent to risk management. Note: This is a descriptive comparison of exchange rates for 12-month averages and should not be seen as a prediction of currency risk. An annual average also masks the volatility within the year.

8.7 Correlation analysis

Table 9: Correlation among selected currencies (annual-average levels)

Currency	USD	EUR	GBP	JPY
USD	1.000	0.868	0.701	0.007
EUR	0.868	1.000	0.831	0.107
GBP	0.701	0.831	1.000	−0.267
JPY	0.007	0.107	−0.267	1.000

Source: Authors' calculations.

The Correlation results reveal a high level of positive correlation between USD and EUR (0.868), EUR and GBP (0.831) and a moderate level of positive correlation between USD and GBP (0.701). During the study period, their annual exchange-rate series were generally in the same direction. The USD/JPY relationship is essentially flat (0.007) and the

GBP/JPY relationship has a slight negative correlation (−0.267). Levels can be correlated with each other with the added possibility of inflating the correlation when two series show a common trend. As a robustness check, correlations of annual percentage changes were also computed (Table 10). Once the trend has been removed, the USD co-movement is quite low with EUR (0.07) and GBP (0.18), and the EUR has moderate correlation with GBP (0.65) and JPY (0.62).

Table 10: Correlation among selected currencies (annual % changes)

Currency	USD	EUR	GBP	JPY
USD	1.000	0.069	0.183	0.267
EUR	0.069	1.000	0.645	0.622
GBP	0.183	0.645	1.000	0.134
JPY	0.267	0.622	0.134	1.000

Source: Authors' calculations. n = 11 annual changes; with so few observations, only the larger coefficients should be treated as meaningful.

Interpretation: The selected currencies do not move the same way. The USD's daily movement relative to the rupee is not closely aligned with the daily movement of other major currencies, such as EUR, GBP and JPY, and therefore can't be relied upon to offset, or mirror, exposure to other currencies..

8.8 Period-wise analysis of NDA terms

Table 11: Period-wise average exchange rate (₹ per unit)

Currency	1st NDA (2014–2018)	2nd NDA (2019–2023)	3rd NDA (2024–2025)
USD	65.195	75.940	85.417
EUR	76.175	84.580	94.540
GBP	92.961	97.280	110.955
JPY	0.586	0.641	0.568

Source: Authors' calculations. Calendar-year approximation of government terms; the 3rd term has only two annual observations.

The average USD, EUR and GBP rates rose over the three periods, meaning that the amount of rupees required to obtain one unit of these currencies grew in each subsequent period. The JPY was up in the 2nd period and down in the 3rd period. Revolutions, in turn, fluctuated in terms of currencies and in government terms. These are comparisons of levels and do not provide evidence of the differences arising from the policies of any government..

9. Hypothesis Testing

9.1 H_{01}: movement of exchange rates, 2014–2025

Each currency's annual average was regressed on time. The slope represents the average yearly change in the rupee price of the currency.

Table 12: Trend regression of annual average exchange rate on year

Currency	Slope (₹ per year)	r	p-value	Decision on H_{01} (5%)
USD	2.302	0.983	< 0.001	Reject
EUR	1.898	0.864	< 0.001	Reject
GBP	1.476	0.633	0.027	Reject
JPY	0.0012	0.092	0.777	Fail to reject

Source: Authors' calculations. n = 12 per currency.

The null hypothesis of no significant movement is rejected for the USD, EUR and GBP, whose rupee price rose significantly over the period, by about ₹2.30, ₹1.90 and ₹1.48 per year respectively. For the JPY, the trend is not statistically significant (p = 0.777); its movements were fluctuations around a stable level rather than a sustained directional shift. H_{11} is therefore accepted for three of the four currencies.

9.2 H_{02}: difference across NDA terms

Table 13: One-way ANOVA and Kruskal–Wallis test of period means

Currency	ANOVA F	ANOVA p	Kruskal–Wallis p	Decision on H_{02} (5%)
USD	23.00	< 0.001	0.009	Reject
EUR	12.90	0.002	0.018	Reject
GBP	6.67	0.017	0.073	Reject (ANOVA); marginal on K–W
JPY	3.46	0.077	0.080	Fail to reject

Source: Authors' calculations. Group sizes: 5, 5 and 2.

The null hypothesis is rejected for both tests across the USD and EUR and ANOVA only across the GBP. The conversion rate of the JPY is not rejected at the 5% threshold. Tukey's pairwise comparisons indicate that there are significant differences between all three pairs of periods (1st vs 2nd p = 0.004; 2nd vs 3rd p = 0.036; 1st vs 3rd p < 0.001). For the EUR, the 1st period differs from the 2nd (p = 0.037) and 3rd (p = 0.002), while the 2nd and 3rd differ only marginally (p = 0.060). In the case of the GBP, only the 1st and 3rd periods are significantly different (p = 0.013). The results should be interpreted carefully: the third period has only two values and yearly values that are on the rise do not meet the ANOVA assumptions of independence. The tests confirm that there are significant differences among averages over periods of time, mainly due to the trend that was set up in Section 9.1.

9.3 H_{03}: effect on selected sectors

based on exposure channels, rather than sector-level time-series data, a formal statistical test of H_{03} was not possible with the data used here in the sectoral analysis of Section 10. The evidence is qualitative, as the evidence for all 6 sectors is direct and identifiable and the currencies to which they are linked exhibited significant movement over the period. This is only a basis for an exposure sense, and the impact on sectoral output, profits or exports is for further research with sectoral data.

10. Sectoral Analysis

The impact of exchange rate fluctuations in the Indian economy is through exports, imports, foreign-currency revenue and foreign-currency payment.

Table 14: Sectoral exposure to exchange-rate fluctuations

S.No.	Sector	Possible exposure to exchange-rate fluctuation	Major currency
1	Information Technology	Export revenue and foreign-currency receipts	USD
2	Pharmaceuticals	Export revenue and imported inputs	USD/EUR
3	Automobile	Imports of components and machinery	EUR/JPY/USD
4	Oil & Gas	Import payments	USD
5	Textiles	Export receipts and imported inputs	USD/EUR
6	Electronics	Import costs and international payments	USD/JPY

Source: Authors' compilation.

Information technology

Large part of the revenues of the IT sector is generated from international markets to a large extent in US dollars. As a result, the value of export earnings in terms of the rupee changes with the exchange rate of the USD/INR. The depreciating rupee brings in more rupees to the table for a fixed dollar bill, but sudden reversion may upset the pricing and margins for contracts.

Pharmaceuticals

Indian pharmaceutical companies sell overseas and import raw materials/inputs from outside India. Thus, when the exchange rate changes, the impact on revenue is also felt on expenditure, the overall impact on the economy depends on the difference between the value of exports and value of imports**.**

Automobile

This is due to international suppliers, components, machinery and trade relation with the currencies such as EUR and JPY for the automobile sector. Depreciation increases the rupee value of imported content.

Green = high human impact, Red = high A

Oil and gas

International crude-oil transactions are mostly in U.S. dollars. USD/INR movements will consequently have an impact on the rupee cost of imports which in turn will impact fuel costs and domestic inflation, and hence the pass-through channel in the conceptual framework.

Textiles

The Foreign currencies are used in the textile industry in the form of export income and raw material inputs. It is affected by changes in the exchange rate which have an impact on its competitiveness and cost structure.

Electronics

The electronics industry relies on imports of components and foreign payments, primarily in USD and JPY. Costs of depreciation rise the price of imports, and may result in reduced margins if costs are not passed on.

11. Major findings

- **USD:** The annual average exchange rate rose from ₹61.02 in 2014 to ₹87.17 in 2025, a growth rate of around 42.84%. The Indian Rupee lost value in 9 of 11 year to year changes. Overall, the USD increased in value against the INR in the period under consideration.

- **EUR**: The annual average exchange rate rose by about 21.57% from ₹81.04 in 2014 to ₹98.52 in 2025. The exchange rate saw changes such as a drop of 12.15% in 2015 and an appreciation of 8.80% in 2025. Overall, the EUR was higher versus the INR.

- **GBP:** The annual average exchange rate of British Pound (GBP) rose from ₹100.51 in 2014 to ₹114.93 in 2025, an increase of about 14.35%. This rate dropped to ₹ 83.87 in 2017 but improved in the following years. In general, the GBPIR pair moved upwards, with currency appreciation and depreciation periods.

- **JPY:** annual average exchange rate in Japanese Yen (JPY) rose from about ₹0.578 in 2014 to about ₹0.583 in 2025, which is approximately 0.83% higher. The rate was quite volatile and rose to around ₹0.695 in 2020 before falling to ₹0.553 in 2024 and recovering in 2025. In general, the net movements of the Japanese Yen against the INR were relatively small compared to the other currencies considered.

- **Risk**: By The USD had the highest coefficient of variation (11.56%), followed by EUR (9.57%), GBP (8.60%) and JPY (7.91%), indicating the greatest relative variability. Thus, the relative exchange-rate risk was the highest for the USD and the lowest for the JPY in the period under study.

The USD is more or less detached from the other currencies in annual percentage changes. Average USD, EUR and GBP rates increased in each NDA period, with statistically significant differences between the average rates in the USD and EUR. This is not very much different for the JPY.

Exposure channels are clearly established in sectors such as IT, pharmaceuticals, automobiles, oil and gas, textiles and electronics each have clear exposure channels to the USD, EUR or JPY.

12. Discussion

The USD/INR rate is down and its movements are not very volatile, suggesting a managed-flexibility regime with central-bank intervention slowing down the rate of sudden changes, as highlighted by Patnaik and Sengupta (2021/2022); and interest-rate differentials, capital flows and crude-oil prices, as noted by Damani and Vora (2018), are the primary drivers in the short run. The bigger the swings in the EUR, GBP and JPY, the greater would be the swings in the value of the rupee against these currencies, since here the value of the rupee is largely dependent on the movements of the dollar, and not directly on that of the rupee, against the currencies. The pattern of the data and the cited studies suggest this explanation, but was not tested here. The sectoral linkages are consistent with the findings of Sivarajadhanavel and Chandrakumaramangalam (2012) for IT firms and Soni (2018) for exporters and the exposure varies across currencies is consistent with Sayed and Gayathri (2021). A dollar devaluation can be beneficial to export sectors and hurt import-dependent sectors because the rupee benefit from the dollar devaluation.A dollar depreciation can benefit export firms and hurt import dependent firms because of the rupee gain from the dollar depreciation.

13.Suggestions and Implications

- **For businesses:** Companies that receive or pay in USD should hedge foreign-currency transactions using foreign-currency hedging instruments, including forward contracts and options, and, as far as possible, use natural hedges (match foreign-currency transactions with transactions in foreign-currency on the other side of the books).

- **Currency specific policy** – USD has been trending, while EUR, GBP and JPY have been volatile – hedging policy should be currency specific; longer horizons for USD and shorter ones for EUR, GBP and JPY.

Sector planning: The import dependant industries like oil and gas, automotive and electronic should plan on the basis of rupee depreciation, and the export industries like IT, pharmaceuticals and textile should not consider the rupee appreciation as permanent. **To policy makers**: There is a need to ensure continued effective management of the foreign exchange reserves, a need to deepen the currency-derivatives market and to expand the use of rupee denomination for settlement of trades.

14. Limitations and Scope for Further Research

- Annual Daily/monthly data and GARCH-type models would provide a better measure of risk than annual averages.

- Statistical tests have limited power with 12 observations and the 3rd NDA period has only 2 observations.

- The NDA terms are estimated and the movements between the periods do not necessarily mean that the policy is responsible for the movement.

- The sectoral analysis is conducted using exposure channels. H_{03} could be formally tested in future studies, either with sectoral indices or export–import values or with data on profitability of firms.

• Other currencies, such as the Chinese yuan, and the REER could be included for a broader assessment.

15. Conclusion

This movement and risk of USD, EUR, GBP, and JPY against INR for the period (2014-2025) has been analysed in this study. The rupee weakened considerably against the USD, EUR and GBP, most notably against the USD, with no significant trend seen against the JPY. The year-to-year movements of the yen were the most erratic, and the risk is measured in ways that are quite different. The coefficient of variation is highest for the USD and lowest for the JPY, but the two risk measures should be interpreted in conjunction. The average rates for USD and EUR vary considerably between all three NDA periods and the GBP is different under ANOVA. Six sectors are clearly exposed with different directional effects and consequences. India's overall exchange-rate risk comes in two forms: a continuing decline in the value of the dollar and volatile fluctuations in the euro, pound and yen. It is important that businesses as well as policy makers are aware of both so that they can control the rupee's vulnerability to foreign exchange fluctuations.

References

1. Barai, D., & Samal, G. P. (2025). Volatility behaviour and spillover effect: Evidence from Indian foreign exchange market. Global Business Review. https://doi.org/10.1177/09721509251379836

2. Sayed, Z. B., & Gayathri, J. (2023). Factors determining the exchange rate exposure of firms: Evidence from India. Business Perspectives and Research, 11(2). https://doi.org/10.1177/22785337211033766

3. Sharma, C. (2020). Exchange rate volatility and exports from India: A commodity-level panel data analysis. Journal of Financial Economic Policy, 12(1), 23–44. https://doi.org/10.1108/JFEP-11-2018-0157

4. Sharma, C., & Pal, D. (2018). Exchange rate volatility and India's cross-border trade: A pooled mean group and nonlinear cointegration approach. Economic Modelling, 74, 230–246. https://doi.org/10.1016/j.econmod.2018.05.016

5. Sharma, C., & Pal, D. (2019). Does exchange rate volatility dampen imports? Commodity-level evidence from India. International Economic Journal, 33(4), 696–718. https://doi.org/10.1080/10168737.2019.1630467

6. Rai, S. K., & Sharma, A. K. (2022). Do lagged terms affect exchange rate volatility in India? An analysis using ARIMA model. Indian Journal of Finance, 16(10), 8–23. https://doi.org/10.17010/ijf/2022/v16i10/172385

7. Bhagawan, P. M., & Lukose, P. J. J. (2014). Currency exposure and hedging practices among Indian non-financial firms: An empirical study. Foreign Trade Review, 49(3), 247–262. https://doi.org/10.1177/0015732514539202

8. Behera, H., Narasimhan, V., & Murty, K. N. (2008). Relationship between exchange rate volatility and central bank intervention: An empirical analysis for India. The IUP Journal of Financial Economics, 6(3–4). Publication record

9. Patnaik, I., & Sengupta, R. (2021). Analysing India's exchange rate regime (NIPFP Working Paper No. 353). National Institute of Public Finance and Policy. Official publication page

10. Vasumathy, S. (2015). Currency risk management practices of Indian export SMEs: A descriptive study. Indian Journal of Finance, 9(8), 34–44. https://doi.org/10.17010/ijf/2015/v9i8/74561

11. Auboin, M., & Ruta, M. (2013). The relationship between exchange rates and international trade: A literature review. World Trade Review, 12(3), 577–605. https://doi.org/10.1017/S1474745613000025

12. Bhagawan, P. M., & Lukose, P. J. J. (2017). The determinants of currency derivatives usage among Indian non-financial firms: An empirical study. Studies in Economics and Finance, 34(3), 363–382. https://doi.org/10.1108/SEF-09-2014-0172