17 Jan 2025

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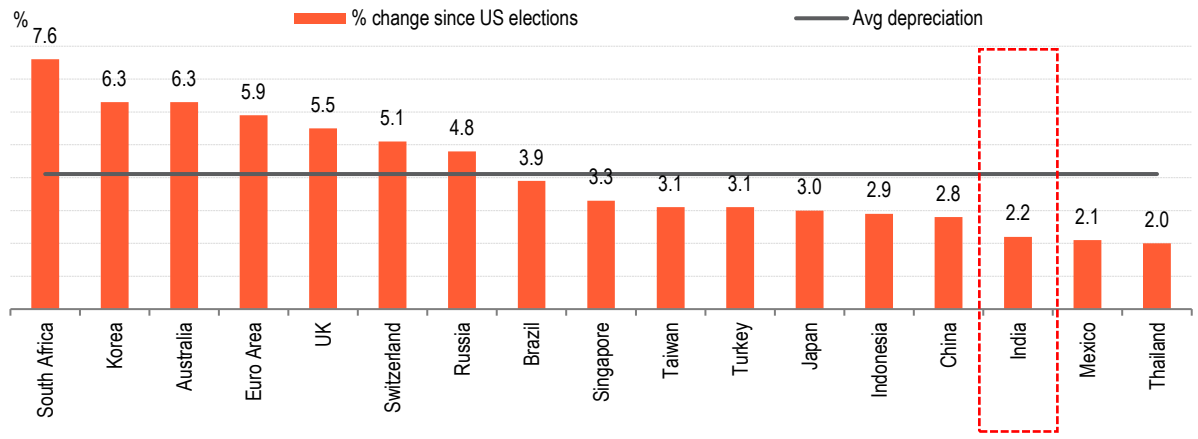
What's next for INR?

The rupee has been quite volatile in the last two weeks with the tendency being more pronounced since the US Elections. While a wider trade deficit and FPI outflows contributed to this volatility, the primary factor driving the rupee down appeared to be the US-factor. The high probability of complete implementation of the economic package under President Donald Trump, which includes higher tariffs, lower corporate taxes, embargoes on migration among others, has made the dollar stronger.

As reported in our fortnightly reports on currency, the rupee appeared to be a better performing currency with selective interventions by the RBI. **Figure 1** shows the change in value of global currencies since 1 Nov 2024, which is before the US elections result till 10 Jan 2025. There has been significant pressure on all major currencies, which depreciated anywhere between 7.6% (South Africa Rand) to 2% (Thailand Bhat). In the same period, the dollar, as measured by the DXY rose by 5.1%. *The average depreciation in the sample of currencies is 4%, in comparison, INR depreciated by only 2.2%*.

Fig 1: Change in currencies between 1 Nov 2024 to 10 Jan 2025



Source: Bloomberg, Bank of Baroda Research | Data as of 10 Jan 2025

The rupee breached the 86.50 barrier on 13th Jan 2025 after ending just shy of the 86/$ mark on Friday the 10th. This marked the Rupee's sharpest single day fall since Feb'23. In fact, in the 47 sessions since the Nov'24, the INR has dipped to a record low in roughly 30 of these sessions. Incidentally, the pace of the Rupee's decline has quickened sharply in the last few sessions leading to speculation on where the rupee will go. While considerable spot sale of dollars as well as forward transactions by the RBI have been used, the rupee continues to go downwards. Forex reserves have already fallen by US$ 70bn from a peak of US$ 705 bn on 27 Sep 2024.

The exercise here is based on a partial equilibrium analysis which assumes that the fundamentals remain stable and that the rupee is driven only by the external factor which has also driven other currencies. Therefore, the question asked is how much more the rupee will decline if it must adjust to the global reality with limited forex intervention from the RBI.

There are three parts to this exercise, which is done using 1 Nov 2024 as the base point, which was just before the US Elections, and 10 Jan 2025 which was the point before the rupee crossed the 86.50 threshold.

A. The first part is an analysis of the mean reversion levels of INR and its distribution.
B. Second is an analysis at the NEER and inflation adjusted levels of depreciation of INR in comparison to major trading partners.
C. Finally, we look at the indicative forward rates to understand the rupee movements.

We conclude with an econometric exercise where conditional heteroscedasticity modelling is used to arrive at the variance equation of INR.

Section 1. What do mean reversion levels say?

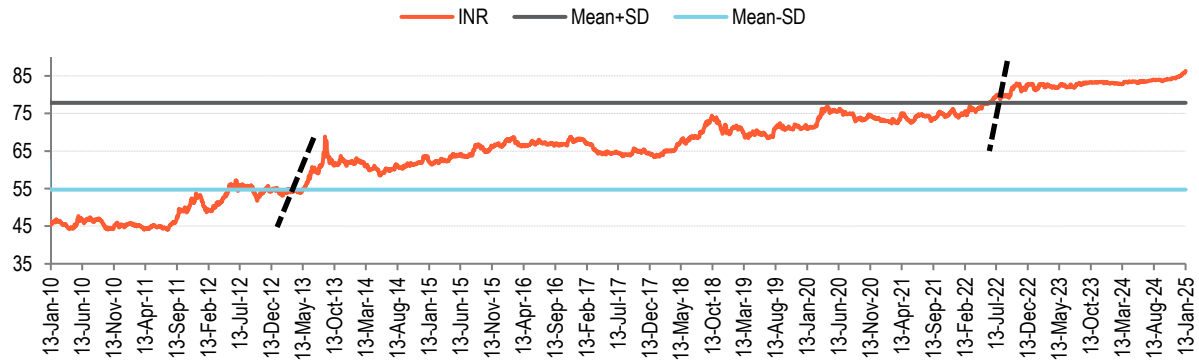
Mean reversion concept is generally used for different asset classes. There are different research papers on calculating the same. In this exercise, we use the simplified form using the basic measures of dispersion such as Mean and SD. In simple terms, it is indicative of a long run range of movement in currency evaluated in terms of the concept of Mean+/- Standard Deviation (SD). This is a rudimentary but indicative measurement.

Data evaluated in the past 15 years shows the mean at 66.27 and SD at 11.55. Based on this range, three phases of INR clearly emerge. In the **first phase i.e. 2010-2012**, INR has remained below the lower cap. The **second phase** is the most crucial phase spanning the longest time period. This phase runs between **2013- Jul 2022**. In this phase INR moved within the upper and lower range. Prudential macro dynamics of Indian economy coupled with effective fiscal and monetary management resulted in a range bound INR.

The testing of upper band is only observed in **third phase which runs from Jul 2022 till date**. This may be on account of a tighter financial conditions worldwide due to stickier inflation regimes. The quantum of Fed tightening has far outweighed major EMs thus frontloading the DXY movements which have been sharper. Geopolitical conflict and volatile energy prices further exacerbated the situation. Thus, the impact was felt in major currencies including INR.

The phases have also been earmarked in accordance with this. Hence to get a perspective of the same, descriptive statistics in different phases have been looked at.

Fig 2: Has INR crossed its mean reversion levels?



Source: Bloomberg, Bank of Baroda Research

For the **first phase,** clearly the mean is much lower than the lower bound. A similar observation is noticed in **phase three**, where mean is at a much higher level, thus changing the bandwidth of INR. So, it is evidently clear that mean reversion levels prima facie might have changed in the contemporary

scenario and convergence to earlier mean reversion levels might not be a plausible outcome in the near term. The Kurtosis value in the third phase also reflects higher peaks and heavier tails which signifies presence of outliers in the data set.

Table 1: Descriptive Statistics of INR in the three phases

	Phase-1 (2010-2012)	Phase-2 (2013-Jul'2022)	Phase-3 (Post Jul'22)
Mean	**48.6**	**67.6**	**82.9**
Median	46.7	67.2	83.0
Mode	46.8	66.7	82.8
Standard Deviation	4.0	5.8	1.2
Mean+SD	**52.7**	**73.4**	**84.1**
Mean-SD	**44.6**	**61.8**	**81.7**
Coefficient of variation	8.3	8.5	1.4
Kurtosis	-1.2	-0.5	1.8
Skewness	0.6	-0.2	-0.7

Source: Bank of Baroda Research

Section 2. Nominal depreciation in the Rupee on a weighted basis

For the first part of this exercise, we have used the NEER concept of RBI when comparing currency movements. In this, we look at the weighted average deprecation of major trading partners of India based on both trade-based and export-based weights for 40 countries. This answers the question of how different our depreciation has been vis-a-vis other currencies. The analysis is presented in the table below. It must be noted that even though US is amongst India's major trading partners, it has been excluded from this analysis as we are looking at depreciation vis-à-vis the dollar. Apart from this, a few other countries have also been excluded as these have a fixed exchange rate regime. These include countries such as UAE and Saudi Arabia, amongst others, which are important trading partners of India. We are thereafter left with 30 countries.

Table 1: Analysis based on NEER

Country	Trade- based Weight	Export- based Weight	Exchange rate as of 1 Nov 2024	Exchange rate as of 10 Jan2025	% change (10 Jan 2025)
Euro Area	11.6	14.7	1.0884	1.0244	-5.9
China	12	5.6	7.1290	7.3326	-2.8
Switzerland	2.7	0.4	0.8700	0.9164	-5.1
Indonesia	2.8	1.6	15,720	16,185	-2.9
Singapore	3.2	3.7	1.3261	1.3715	-3.3
Korea	2.9	1.7	1,378.6	1,471.3	-6.3
Japan	2.3	1.7	153.0100	157.7300	-3.0
UK	2.2	3.3	1.2924	1.2207	-5.5
Malaysia	2.2	2.2	4.3807	4.4975	-2.6
Australia	2.2	1.2	0.6559	0.6147	-6.3

Country	Trade- based Weight	Export- based Weight	Exchange rate as of 1 Nov 2024	Exchange rate as of 10 Jan2025	% change (10 Jan 2025)
South Africa	1.5	1.4	17.6549	19.1084	-7.6
Brazil	1.1	1.3	5.8703	0. 6.1079	-3.9
Thailand	1.6	1.5	33.90	34.58	-2.0
Vietnam	1.8	2.3	25,300	25,371	-0.3
Bangladesh	1.3	3.1	119.50	121.46	-1.6
Taiwan	0.9	0.8	31.96	32.98	-3.1
Angola	0.6	0.1	918.14	921.12	-0.3
Russia	1.3	0.9	97.02	101.91	-4.8
Turkey	1.0	1.9	34.33	35.43	-3.1
Mexico	1.2	1.3	20.28	20.72	-2.1
Israel	0.7	1.3	3.746	3.693	1.4
Sri Lanka	0.7	1.6	292.82	294.39	-0.5
Canada	0.9	1.0	1.3949	1.4423	-3.3
Egypt	0.6	0.9	49.08	50.57	-3.0
Oman	0.8	0.8	0.3840	0.3850	-0.3
Kenya	0.3	0.7	129.06	129.52	-0.4
Tanzania	0.4	0.6	2,697.95	2,472.53	9.1
Chile	0.3	0.3	954.55	1,012.75	-5.7
Ukraine	0.4	0.1	41.33	42.26	-2.2
Ghana	0.5	0.2	16.30	14.78	10.3
India			84.11	85.97	-2.2

Source: Bloomberg, Bank of Baroda Research | Data as of 10 Jan 2025

Based on this analysis, we estimate that the weighted nominal depreciation in the sample of the 30 currencies for the period between 1 Nov 2024 and 10 Jan 2025 was 3.63%, on trade-weighted basis. For export-based weights as well, the depreciation in the sample currencies was similar at 3.57%. In comparison, INR depreciated by only 2.2%. Hence, we can conclude that the extent of depreciation in INR is lower than its trading partners. Thus, what can be deferred from this analysis is that when the major trading partners have depreciated at an approximate pace of 3.6%, *INR has the potential to further depreciate by another 1.4% in the near to medium term*. But theoretically this needs to be mapped with inflation differentials which is done in the next part of the analysis.

How inflation rates of trading partners fared

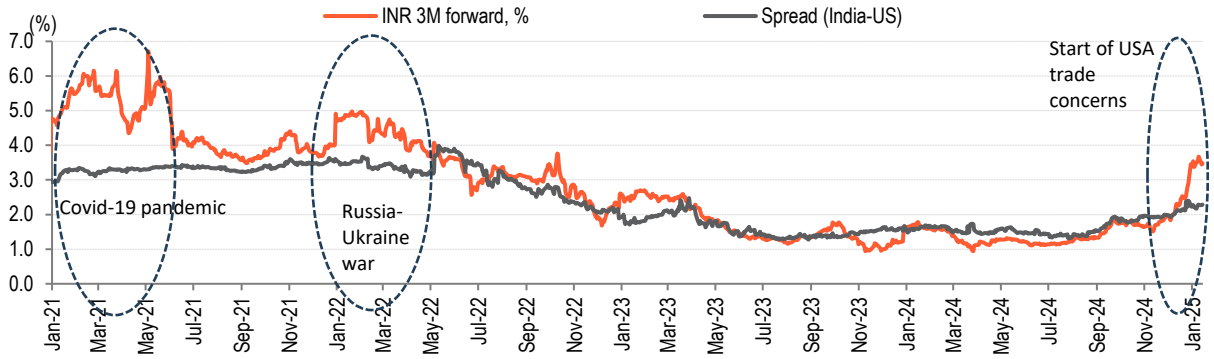
Inflation picture has been brought in to get a glimpse of how in real terms currency would perform. Both trade weighted and export weighted inflation numbers of major trading partners have been accounted, whose composite print comes to around 4.1%. This number is calculated incorporating the latest inflation print of the trading countries and excluding the outlier values which tend to overstate or understate the numbers. A sample of 34 countries have been incorporated. Inflation print of US here is incorporated as it has exhibited significant momentum of late. Inflation differential of the composite global print with India translates to around 1.1%. *Thus, juxtaposing the same with the tendency of INR to depreciate in line with weighted global exchange rate (trading partners-based on*

NEER), we arrive at how far in real terms INR would fall. Our calculation shows, INR is likely to depreciate further by 20-30 paise.

Section 3. What do forward rates indicate?

There has been a sharp spike in INR forward rates in the last month or so. To understand this movement, the same has been juxtaposed with the spread between Indian and US treasuries of similar tenure. For example, while the difference in 3M treasury yield of India and US was 2.27%, the 3M INR forward rate was 3.62%. This suggests that the forward rates are over 100bps higher than the difference in corresponding yields between US and India. In comparison, the two were broadly aligned at the start of Nov'24. Thus, forward rates are also indicative of a weakening INR going forward.

Fig 2: INR forward rates inching up



Source: Bloomberg, Bank of Baroda Research | Note: Data as of 14 Jan 2025

Volatility level of INR

To understand better the volatility levels in the rupee, literature points to the use of conditional heteroscedasticity models. Here we limit our analysis to finding the variance equation which can be used to give a peripheral view of the variability of the INR series. The data has been divided into two parts: the entire series from 2010 to date and from Jul 2022 onwards. The rationale for using the second series is in line with Section 1 where we examine levels of volatility.

We have used a parsimonious model. We have seen ARMA (1,1) model from the correlogram which has been an ideal fit for both the series. Then the ARCH effect was tested. Two lags have been found to be significant. From the ARCH (2) model, the variance equation adds up to 0.66 for the **first series** (coefficients in Table 2). For the **second series** as well, 2 lags have been tested to be significant and the variance equation adds up to 0.86 (coefficients in Table 3), which shows higher volatility in the data set. Thus, we can say that the volatility has been more pronounced towards the latter series which is from Jul 2022 onwards.

[Note: the variance equation should be less than 1 and a number closer to 1 indicated higher volatility. We have limited the exercise up to this point for simplicity. GARCH can provide a further refined extension to this).

Table 2: Results for past 15 years

Variance Equation	Coefficient	Std. Error	z-Statistic	Prob.
C	**0.00**	0.00	43.27	0.00
RESID(-1)^2	**0.40**	0.02	19.34	0.00
RESID(-2)^2	**0.27**	0.02	15.50	0.00

Source: Bank of Baroda Research

Table 3: Results since Jul 2022 onwards

Variance Equation	Coefficient	Std. Error	z-Statistic	Prob.
C	0.00	0.00	24.54	0.00
RESID(-1)^2	**0.51**	0.05	9.67	0.00
RESID(-2)^2	**0.35**	0.06	5.80	0.00

Source: Bank of Baroda Research

Conclusion:

Based on our analysis we can conclude that the depreciation pressure on INR is stemming largely from a stronger dollar. Even so, India's strong fundamentals have limited the slide in the rupee, with the depreciation in the domestic currency lower than other global currencies, in terms of spot rates, NEER basis as well as inflation adjusted basis. This also suggests that we can expect a further depreciation in the rupee of ~20-30 paise from current levels in real terms and in nominal terms by 1.4%. The variance equation also reflects that since Jul 2022 onwards the volatility of INR has been sharper. However, this rests on the assumption that the dollar strength remains intact, and there is no active intervention from the RBI to stem the Rupee's decline. *Hence, we believe that much of the watershed decline in the rupee has been past us, and we can expect the currency to settle in the range of 86.5-87/$ in the near term.*

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