

Retail-Based Deviations from Covered Interest Parity in the USD/INR Market: Evidence from Indian Fixed Deposit Rates (2015–2023)

Misba Javed Desai*

Nidhi Upendra Argade**

Abstract

The study examines deviations from Covered Interest Rate Parity (CIRP) in the USD/INR FOREX market using daily data between 2015 and 2023. Compared to traditional models that use interbank/sovereign benchmark rates, this study employs a retail-rate-based proxy that considers Indian bank fixed deposit rates and U.S. Treasury Bill yields to calculate Interest Rate Parity (IRP)-implied forward rates. In order to measure the extent and persistence of deviations of parity, observed market forward rates are compared to theoretical forward rates. The results show that deviations are statistically and economically significant and become more noticeable during periods of market stress, COVID-19 and global monetary tightening. These research findings are highly influenced by the use of a retail-based perspective rather than a strict conventional test of covered interest parity. The paper emphasises the importance of capital controls, liquidity segmentation, and slow adjustment of retail rates in explaining persistently sub-optimal retail rates when prices are not at parity. The study expands current empirical findings on parity conditions in emerging markets and sheds light on issues of interest to investors, policymakers, and currency risk managers because it introduces a retail-rate perspective.

Keywords: FOREX, Interest Rate Parity (IRP), Covered Interest Arbitrage (CIA), Retail Based Deviation, Interest Rates, Treasury bill yields, Spot rates, Forward rates.

How to Cite: Desai, M. J., & Argade, N. U. (2026). Retail-based deviations from covered interest parity in the USD/INR market: Evidence from Indian fixed deposit rates (2015–2023). *Journal of Management and Entrepreneurship*, 20(2), 138–150.

DOI: 10.70906/20262002138150

A
b
s
t
r
a
c
t

* Research Scholar, The Maharaja Sayajirao University of Baroda, Gujarat

** Assistant Professor – Research Guide, The Maharaja Sayajirao University of Baroda, Gujarat

1. Introduction

The FOREX markets have been at the centre of financial integration around the world as they provide international trade, international capital flows, and portfolio diversification. Covered Interest Rate Parity (CIRP) is one of the principles of the international financial markets, where it is declared that the forward discount or premium of a currency must compensate the difference in interest rates between two nations. When there is perfect capital mobility, zero transaction costs, and the possibility of arbitrage, the interrelation between spot rates, forward rates, and interest differentials ensures that no risk-free profits can exist.

Although initial empirical studies in developed markets supported the CIRP, especially in large, liquid currency pairs, later studies observed divergences during periods of financial strain and in markets where regulatory frictions are evident. Structural characteristics of emerging economies, including the partial convertibility of capital accounts, exchange rate management, fragmented financial market structures and excessive transaction costs, can attenuate the mechanism of arbitrage. The following institutional features may give rise to short-term departures between implied forward rates inferred using interest rate differentials and market forward rates.

These dynamics can be discussed in the Indian FOREX market. India works under a managed float monetary system, which ensures a control measure over the movement of capital and, at the same time, it engages in more integrated world markets. A framework like that leaves the prospects of parity conditions true in the long run but distorted in the short run in times of monetary tightening, liquidity stress or international economic uncertainty.

This study observes deviations from Covered Interest Rate Parity in the USD /INR market using daily quotations between 2015 and 2023. The high-frequency data enables identification of short-run misalignments that cannot be observed in lower-frequency analysis. This study, unlike traditional studies that mainly use interbank rates or sovereign bond yields as the dominant pricing basis, adopts a

retail-oriented approach of using the Indian three-month bank fixed deposit rates and the U.S three-month Treasury Bill yields to create Interest Rate Parity (IRP)-implied forward rates. Accordingly, this study is interpreted as a retail-oriented parity assessment that highlights pricing gaps among non-institutional funding conditions, not frictionless covered arbitrage in wholesale markets.

2. Review of Literature

2.1. Theoretical roots of Covered Interest Parity

The CIRP is a core assumption of international finance that shows that forward exchange rates must respond so as to reflect interest rate variations between two nations and remove the possibility of risk-free arbitrage. CIRP can provide equilibrium between domestic investment and the foreign currency investment given that they move around perfectly, have insignificant transaction costs, and the availability of forward markets. Initial empirical research, especially in the major currency markets, had shown a great deal of support for the parity conditions when transaction costs are negligible and markets are very liquid (Frenkel & Levich, 1975; Levich, 1978; Taylor, 1987; Aliber, 1973; Popper, 1993). These results supported the perception of the effectiveness of the arbitrage processes in the advanced financial markets.

Nevertheless, the authenticity of CIRP has never been absolute except when based on institutional and structural assumptions. Even the initial studies recognised that they can occur as a result of capital controls, taxation, political risk and transaction costs (Clinton, 1988; Isard, 1980; Akram, Rime, and Sarno, 2008). Parity was therefore perceived not as a law, but rather as an equilibrium point that is liable to market frictions.

2.2. Evidence of the Post-Crisis and the Disintegration of CIRP

The 2008 global financial crisis has affirmed a change in the empirical knowledge of CIRP. As opposed to the previous expectations, there were significant and sustained deviations in even the well-developed currency markets. Research, including the Du, Tepper,

and Verdelhan (2018) study, reported that a cross-currency basis in major currency pairs developed and that the arbitrage capital should not arrange itself to bring parity. Equally, Borio et al. (2016) and Baba and Packer (2009) related deviations to liquidity constraints of bank balance sheets, counterparty risk, and restrictions on bank balance sheets by regulators. Funding pressures and counterparty risk in the financial crisis were also found to be significant factors affecting the arbitrage activities, which led to a persistent departure from covered interest parity by Coffey, Hrung and Sarkar (2009).

Afterwards, studies placed greater focus on the influence of structural changes within the regulatory environment after the crisis. Increased capital requirements, margin policies, and balance sheet limits reduced the ability to arbitrage, and so the deviations were able to persist. These findings changed the academic discourse on CIRP deviations from short-term anomalies to an interpretation that they were a product of institutional frictions and fragmented funding markets. Avdjiev, Du, Koch and Shin (2019) further provided evidence supporting the relevance of balance-sheet constraints in post-crisis international financial markets by showing that global bank leverage and U.S. dollar funding conditions are important determinants of the cross-currency basis spreads.

2.3. Emerging Market Outlooks

Deviation of CIRP is more vigorous and structural in emerging market economies. Arbitrage linkages may be impaired by partial capital account convertibility, FOREX intervention policies and shallow derivative markets. From observations, Asian and developing economies show that in the long run, parity conditions tend to be true, although there are frequent distortions in the short run (Ito & Roley, 2001; McCauley & Fung, 2003).

Other studies unique to India show these trends. Pattanaik and Behera (2014) and Behera and Pattanaik (2017) discovered that the Indian forward market is deviated by regulatory measures, capital flow management tools, and liquidity conditions. Ghosh and Saggat (2017) also suggested that capital controls and macroprudential policies may modify

the cost of cross-border funding, which will affect the forward pricing dynamics. These results indicate that the CIRP situation in India is being run under a structured institutional setting and not in a fully open financial environment. Similarly, Bhanumurthy and Singh (2013) found that although interest rate parity relationships exist in India over the long run, short-run deviations are influenced by exchange rate volatility, market imperfections, and policy interventions. Goyal and Arora (2012) further emphasised that India's managed exchange rate regime and evolving FOREX policy framework significantly affect the transmission of international financial conditions to domestic currency markets.

2.4. Selecting Interest Rates and Market Access

Another prominent aspect of the existing literature is that it uses institutional standards like interbank rates or the yield on sovereign bonds to test the conditions of parity. Although these measures are a reflection of the wholesale market conditions, it might not reflect the interest rates that are available to the retail players. Investigations of interbank rates make implicit assumptions on the availability of funding markets, which is not necessarily the case with non-institutional investors.

Such an orientation of approach creates a void in the interpretation of how deviations from parity can occur in the case of instruments available to retailers. Since retail fixed rates on deposits tend to vary more slowly and indicate varying liquidity situations compared to interbank rates, the adoption of such rates can indicate a different pattern of variation. However, empirical studies that follow this approach are few, especially in emerging market settings.

2.5. Research Gap in Literature

The existing literature confirms three key themes: (i) CIRP is stronger in stable environments with developed markets; (ii) deviations may be persistent due to funding constraints, regulatory changes, as well as liquidity segmentation; and (iii) the sensitivity of emerging markets to institutional frictions is structurally higher. Nevertheless, two gaps remain unaddressed.

To begin with, there is a scarcity of high-frequency data on CIRP deviations in the Indian USD/INR market based on the last post-pandemic data. Second, the vast majority of empirical research is based on institutional interest rates, disregarding those available to retail investors, which can affect the actual practicability of arbitrage.

The current research aims to fill these gaps by including the daily data of 2015-2023 and applying a retail-rate point of view. It builds upon the growing literature on parity deviations in a managed float regime and whether structural frictions are important to the dynamics of forward pricing in the Indian FOREX market.

3. Objectives

The objectives that guide the study are as follows:

1. To build retail-benchmark parity-implied USD/INR forward rates using Indian bank fixed deposit rates and U.S Treasury bill yields.
2. To measure the size, occurrence and persistence of the deviations between parity-implied forward rates and market forward rates.
3. To examine the possibility of periods of financial pressure and monetary contraction, especially in the COVID-19 predicament and the additional global interest rate changes, enhancing parity deviations in the Indian FOREX market.

4. Research Questions

The research questions that will be taken care of in the study include:

RQ1: What is the frequency of deviations between market USD/INR forward rates and retail-based parity-implied forward rates?

RQ2: Do stress periods and crises have a significant impact on the size of deviations?

RQ3: What would be the method to interpret deviations when parity is estimated using retail rather than wholesale funding rates?

5. Methodology

5.1. Data Description

The paper uses the high-frequency daily exchange rate USD/INR data between January 1, 2015 and December 29, 2023. The observations are related to business days to align with active trading in the FOREX market.

The spot exchange rates are calculated by using the official reference rate released by the Reserve Bank of India (RBI) and supplemented with the Investing.com rate to bridge gaps in the exchange rate. The domestic interest rate is approximated to the yearly rates of a fixed deposit (FD) of large Indian commercial banks, i.e., State Bank of India (SBI), HDFC Bank and ICICI Bank. These rates are interpolated in order to build a consistent daily time series. Published FD rates of the three banks are averaged to obtain a representative retail benchmark. Retail deposit rates change infrequently, not daily; hence, the published rates are adjusted to a daily series using the last announced rate until a new rate is published. This approach mirrors the true borrowing and investment opportunities that retail investors have, not continuous market repricing. The U.S. T-Bill yield on the Federal Reserve Economic Data (FRED) database is used as the foreign interest rate and is considered the risk-free rate of the dollar for this study. All interest rates will be expressed as a percentage per year, converted to decimals for computation.

5.2. Retail-Based Parity Benchmark Framework

This study calculates a retail-based parity benchmark instead of the conventional Covered Interest Parity studies, which are based on institutional interbank rates, using Indian retail fixed deposit rates and U.S. Treasury Bill yields. Therefore, the present analysis should not be seen as a tight test of the Covered Interest Parity of institutions. Instead, it focuses on the pricing deviations from the realistic funding conditions that retail investors in India have.

$$F_t^{Parity} = S_t \times \left(\frac{1 + i_{d,t}}{1 + i_{f,t}} \right)$$

- $F_t^{Paerity}$: Parity-implied forward rate at time t
- S_t : Spot rate (USD/INR) at time t
- $i_{d,t}$: Domestic interest rate
- $i_{f,t}$: Foreign interest rate

5.3. Assessment of Retail-Based Parity Deviations

The deviation from the retail-based parity benchmark is calculated as the percentage difference between the market forward exchange rate and the parity-implied forward exchange rate, using the spot exchange rate at the same time period:

$$DEV_t = \frac{F_t^{Market} - F_t^{Parity}}{S_t} \times 100$$

A zero number means that there is complete consistency between the forward rate and the retail parity benchmark. A positive value means that the forward rate is higher than the parity rate, while a negative value means that the forward rate is lower than the parity rate.

5.4. Econometric Strategy

The empirical analysis has five sequential stages:

Stage 1: Descriptive Analysis

Descriptive statistics such as mean, median, minimum, maximum, standard deviation, skewness and kurtosis are used to investigate the distributional properties of the retail-based parity deviation series. Time-series plots are used to determine structural breaks and clusters of volatility.

Stage 2: Stationarity Check

Because of the high-frequency nature of the data used in the study, the statistical characteristics of the variables are first analysed before running the regression. The Augmented Dickey–Fuller (ADF) unit root test is used to test for stationarity of the deviation series and other important variables. The stationarity analysis guarantees that the following regression estimates are not influenced by spurious relationships.

Stage 3: Persistence Analysis

To evaluate the persistence of the deviations from the retail-based parity benchmark over a period, an autoregressive model of order one [AR (1)] is used.

$$DEV_t = \alpha + \rho DEV_{t-1} + \varepsilon_t$$

Where, ρ is the one-period lagged deviation. The coefficient ρ indicates the persistence of deviations. If the coefficient is statistically significant and positive, it means that the deviations are not short-term, as they tend to slowly recover toward the equilibrium.

Stage 4: Impact Assessment of Crisis

The magnitude of deviation is assessed with the help of a dummy variable approach according to whether calamity periods (e.g., the COVID-19 pandemic and the following cycle of global tightening of the money supply) have a significant impact on deviations:

$$DEV_t = \alpha + \beta_1 Crisis_t + \beta_2 DEV_{t-1} + \varepsilon_t$$

Where, DEV_t is retail-based parity deviation, $Crisis_t$ dummy variable (1 = COVID-19 period; 0 = otherwise), DEV_{t-1} is one lagged deviation, α is a constant term, β_1 is the impact of the COVID-19 period, β_2 Persistence coefficient and ε_t is the random error term.

Stage 5: Diagnostic Assessment

The coefficient of determination (R^2), adjusted R^2 , F-statistic and residual diagnostics are used to assess the adequacy of the regression models. Residual plots are checked to ensure the overall adequacy of the estimated models, and the Durbin–Watson statistic is reported to check for residual autocorrelation.

5.5. Software

Microsoft Excel is used for the empirical analysis. The Data Analysis ToolPak for Excel and standard spreadsheet functions are used to perform descriptive statistics, parity calculations, regression estimation, autoregressive modelling and graphical analyses. The statistical procedures are applied to the entire sample period, so that the results are comparable.

5.6. Assumptions

The empirical framework is based on the following assumptions:

1. The analysis is not on realised arbitrage profits but on deviations from a retail-based parity benchmark. As such, the transaction costs (such as bid–ask spreads, brokerage fees, taxes, and others) are not included in the calculation of the parity-implied forward rate and the deviation measure.
2. The market forward exchange rate observed is taken as the three-month forward rate prevailing in the FOREX market for the USD/INR. The parity-implied forward rate is derived from the spot exchange rate and the chosen domestic and foreign interest rates of the same maturity.
3. The domestic investment opportunity is given by the average three-month retail fixed deposit (FD) rates of SBI, HDFC Bank and ICICI Bank, and the foreign investment opportunity is given by the yield on three-month U.S. Treasury Bills. These instruments are not intended to give access to the interbank wholesale funding markets and are representative benchmarks for retail investors.
4. The retail fixed deposit rates are assumed to be constant between the successive revisions of the banks. Deposit rates are not updated every day, but are updated periodically, and the last announced rate is applied until the next revision is made, which means that the actual rate available to retail investors during the period between the two revisions is reflected.
5. The empirical framework misses the mark of explicit modelling of counterparty risk, credit risk premiums, funding liquidity constraints and regulatory capital requirements. Therefore, the “deviations” estimated should be viewed as price differences from the retail parity point and not as arbitrage opportunities.
6. It is assumed that all financial instruments have a common three-month maturity.
7. The analysis is based on the assumption that the data sources selected represent market conditions at the time of the sample. Missing observations are filled in with consistent interpolation procedures to maintain continuity of the daily time series.

6. Analytical Insights and results

6.1. Descriptive Analysis and Interpretation

Empirical analysis starts with descriptive statistics of the variables used in the study which gives an overview of the distributional characteristics of the variables before formal time-series analysis. The data includes daily observations from 1 January 2015 to 29 December 2023, and thus allows for a comprehensive assessment of the behaviour of the USD/INR spot exchange rate, one-year market forward exchange rate, domestic and foreign interest rates, parity-implied forward rate, retail-based parity deviation, and the interest rate differential.

The average spot exchange rate of USD/INR for the sample period was 71.64, with moderate fluctuation of the exchange rate between 61.41 and 83.40, as shown in Table 1. The one-year forward exchange rate averaged 74.70, which is higher than the spot exchange rate, and hence the forward premium due to the higher interest rate environment in the domestic market.

The average domestic retail fixed deposit rate was 11.10 per cent, compared to an average one-year U.S. Treasury yield of 1.36 per cent, which gave an average interest rate differential of 9.74 percentage points. The relatively small standard deviation of the domestic interest rate (0.57) suggests that retail fixed deposit rates varied slowly over the sample period, while the foreign interest rate had relatively larger deviations, reflecting changes in the U.S. monetary policy environment.

Based on these interest rate scales, the parity-implied forward exchange rate averaged 78.48, higher than the observed market forward exchange rate during most of the sample period. As a result, the average retail-based parity deviation was –5.25 per cent, and the median was –5.17 per cent. The negative mean shows that the market forward rate was generally lower than the forward rate implied by

the retail interest rate used in this study. This is not a direct measure of the deviations from Covered Interest Rate Parity under institutional market conditions, but rather an indication of ongoing deviations from the retail-based parity benchmark.

The standard deviation for the retail-based parity deviation was 0.82, suggesting that deviations were not large and were relatively consistent over time. The range of the deviations, from –11.87 per cent to –1.48 per cent, shows that the magnitude of the deviations was different under different market conditions. In addition, the deviation series shows a negative skewness (–1.72), indicating that there were more deviations to the left of the mean than to the right. The high kurtosis value (8.32) suggests that the distribution is leptokurtic, with a few extreme values, which is typical of financial time-series data in times of increased market uncertainty.

The descriptive statistics show that the market forward rates were generally not equal to the parity-implied forward rates based on retail investment benchmarks. The deviations were relatively constant throughout the sample period, but the negative skewness and excess kurtosis indicate that larger deviations occurred during certain periods of financial stress. The following stationarity and time-series analyses examine the persistence and dynamic behaviour of the retail-based parity deviations, based on these preliminary findings.

Table 1

Descriptive Statistics of Study Variables (2015–2023)

Variables	Mean	Median	Std. Dev.	Minimum	Maximum	Skewness	Kurtosis
Spot Exchange Rate	71.63962727	71.1857	6.12426216	61.4105	83.395	0.423820794	-0.861636881
Market Forward Rate	74.70285284	74.1153	5.581424177	62.5908	85.2892	0.299023193	-1.012106086
Domestic Interest Rate	11.09771574	11.17	0.570023729	8.57	12.22	-0.207953981	-0.487260216
Foreign Interest Rate	1.357069682	1	1.288011253	0.04	5.25	1.140311916	0.682190472
Parity-Implied Forward Rate	78.47989491	77.4951142	6.07350915	68.57649417	90.91833347	0.335865111	-1.062432804
Retail-Based Parity Deviation	-5.25413747	-5.1714759	0.823320702	-11.86795652	-1.476902992	-1.715563675	8.322452164
Interest Rate Differential	9.740646054	9.91	1.304482452	5.96	12.06	-0.592849191	0.332304669

Source: Author's Calculation

6.2. Stationarity Analysis

Table 2

Statistical Tests – Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Test Statistic	p-value	Lag Length	Decision
Retail-Based Parity Deviation (DEV)	-10.3843	1.919×10^{-20}	1	Stationary

Source: Author's Calculation

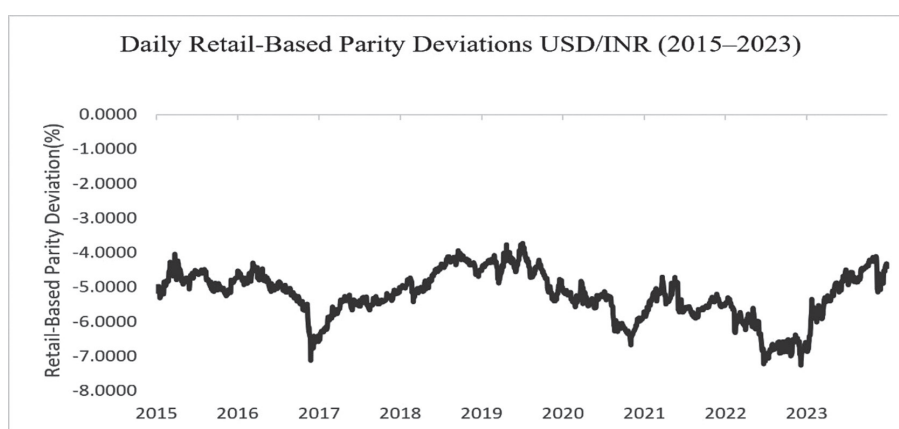
The results of the Augmented Dickey-Fuller (ADF) unit root test for the Retail Based Parity Deviation (DEV) series are presented in Table 2. The test statistic for the ADF is -10.3843 and the asymptotic p-value is 1.919×10^{-20} , which is highly significant and makes it easy to reject the null hypothesis of a unit root at the 1 percent level. The results show that the deviation series is stationary and the deviation values oscillate around a constant mean level during the sample period. Thus, the series is stationary and can be used in the subsequent time-series regression analysis. The first-order autocorrelation coefficient of the residuals (-0.113) is relatively small, indicating that the series has only a small amount of short-run serial dependence, which is captured by the inclusion of one lag.

6.3. Behaviour of Retail-Based Parity Deviation

The daily evolution of the Retail-Based Parity Deviation (DEV) is presented in Figure 1 for the sample period of 2015 to 2023. The series shows a tendency to fluctuate throughout the study period, with deviations mostly negative. The deviations are generally negative and range widely from about -4% to -7% for the entire sample, reflecting the fact that the forward rates (based on retail deposit and T-bill yields) tend to be consistently away from parity. This negativity is not a short-term phenomenon of arbitrage mispricing, but rather a systematic violation of the CIP/IRP in the Indian forex market when viewed from a retail-rate perspective. The deviations are not random but rather show clear cyclical movements, corresponding to times of narrowing and widening of parity gaps in response to the macro-financial environment.

Figure 1

Daily Retail-Based Parity Deviations in the USD/INR Market (2015–2023)



Source: Author's calculations based on RBI reference spot exchange rates, one-year market forward rates, Indian retail fixed deposit rates, and U.S. one-year Treasury Bill yields.

The figure shows that the deviations from parity were not immediately corrected, but rather exhibited some persistence over time. The graphical evidence gives a descriptive picture of the evolution of the deviation series, and the econometric analysis which follows is a formal assessment of the statistical characteristics and persistence of the deviation series.

6.4. Persistence Analysis (AR (1) + HAC)

This method is known as the AR (1) Persistence Model with Newey–West HAC Standard Errors. The AR (1) specification of retail-based parity deviations estimated with Newey–West HAC standard errors (Bartlett kernel, bandwidth = 9) is presented in Table 3 for 2,166 observations. The model provides a dynamic representation of deviations from parity.

Table 3

Statistical Tests – OLS regression AR (1) Model with Newey–West HAC Standard Errors

Variable	Coefficient	HAC Std. Error	t-statistic	p-value
Constant	-1.2722	0.2997	-4.244	<0.001***
Lagged Retail-Based Parity Deviation	0.7579	0.0570	13.290	<0.001***

Source: Author's Calculation

Constant Term

The intercept is negative and statistically significant ($\beta = -1.2722$, $p < 0.001$), suggesting that the unconditional level of retail-based parity deviations is negative once the persistence effect is taken into account. This is a systematic downward bias in the deviations from the parity-implied forward rate based on retail interest differentials.

Retail Based Parity Deviation (RBP) with lag

The lagged dependent variable is positive and highly significant ($\beta = 0.7579$, $p < 0.001$), which suggests high persistence. The previous day's deviation is on average about 76% carried forward, indicating that the system is not reverting quickly, but rather slowly. This persistence is in line with frictions like transaction costs, rate rigidities, and segmented retail financial markets.

Table 4

Model Statistics

Statistic	Value
Observations	2166
R ²	0.5741
Adjusted R ²	0.5739
Durbin-Watson	2.628
HAC Standard Errors	Newey-West (Bandwidth = 9, Bartlett Kernel)

Source: Author's Calculation

Model Fit

The model accounts for a significant proportion of the variation in deviations ($R^2 = 0.5741$; Adjusted $R^2 = 0.5739$), suggesting that the main reason for the short-run dynamics in the series is persistence.

Durbin–Watson Statistic

The Durbin-Watson statistic of 2.628 indicates that there is no significant evidence of positive serial correlation of the residuals after the lagged dependent variable has been added and HAC corrections have been applied. The small variation above 2 is not economically significant.

The results show that the parity deviations between the retail prices are very persistent and that convergence to equilibrium is relatively slow. This is consistent with the evidence of post-crisis covered interest parity deviations found in global markets (e.g., Du et al., 2018; Borio et al., 2016). Slow adjustment of retail deposit rates and institutional impediments in foreign exchange and money markets are other factors that may contribute to persistence in the Indian context. In general, the findings are consistent with a frictional arbitrage market with short-run deviations but with a tendency to converge in the long run.

6.5. Crisis Dummy Regression – Impact of Crisis on Retail-Based Parity Deviations

To investigate the impact of the crisis period on retail-based parity deviations with the account of their persistence, an autoregressive regression model with a crisis dummy was estimated. The model was estimated with Ordinary Least Squares (OLS) and Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors, after the Augmented Dickey–Fuller (ADF) test confirmed the stationarity of the deviation series, to ensure robust statistical inference.

Table 5

AR(1) Regression with Crisis Dummy Using Newey–West HAC Standard Errors

Variable	Coefficient	HAC Std. Error	t-statistic	p-value
Constant	-1.4477	0.3175	-4.560	<0.001***
Lagged Retail-Based Parity Deviation	0.7084	0.0636	11.140	<0.001***
Crisis Dummy	-0.1983	0.0502	-3.949	<0.001***

Source: Author's Calculation

The coefficient of the lagged retail-based parity deviation is 0.7084, which is highly significant ($t = 11.140$, $p < 0.001$), and means that about 71% of the deviation on the previous day is carried over to the current trading day. The coefficient is positive and less than 1, indicating that deviations are persistent but mean-reverting, which suggests that the results

indicate that the deviations are not corrected immediately but gradually move towards Covered Interest Parity.

The crisis dummy coefficient is statistically significant at the 1% level ($t = -3.949$, $p < 0.001$) and is equal to -0.1983 . This suggests that, on average, the retail-based parity deviations were 0.20 percentage points more negative in the crisis period than in the non-crisis period, which means that the market forward rate was more different from the parity-implied forward rate.

The negative and significant intercept further confirms that the deviation series had an average negative trend during the sample period, as seen in the descriptive statistics.

Table 5

Model Statistics

Statistic	Value
Observations	2,166
R^2	0.5860
Adjusted R^2	0.5856
Standard Error of Regression	0.5275
Durbin–Watson Statistic	2.5624
HAC Estimation	Newey–West (Bandwidth = 9, Bartlett Kernel)

Source: Author's Calculation - The Retail Based Parity Deviation (DEV) is the dependent variable. The model is estimated by Ordinary Least Squares (OLS) with Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors for robust statistical inference.

The model accounts for 58.6% of the variance in retail-based parity deviations ($R^2 = 0.5860$) and the Durbin–Watson statistic is 2.562, indicating that there is a significant reduction in residual autocorrelation. The use of Newey–West HAC standard errors further improves the reliability of the statistical inference by correcting for any remaining heteroskedasticity and autocorrelation.

Overall, the findings suggest that retail-based parity deviations in the USD/INR market were found to be highly persistent in the short run and moderately increased during the crisis period. The results

suggest that the deviations from Covered Interest Parity were not eliminated instantly by arbitrage, but rather were smoothed out over time.

7. Discussions

The empirical results confirm that deviations from Covered Interest Rate Parity (CIRP) in the USD/INR foreign exchange market remained in the sample period 2015–2023. The descriptive statistics show that the deviation series was always negative, which means that the observed one-year forward rate of the market tended to be below the parity-implied forward rate calculated based on the one-year fixed deposit rates in the Indian retail market and the one-year Treasury Bill yields in the U.S. market. The Augmented Dickey–Fuller (ADF) test showed that the deviation series was stationary, meaning that the deviations were not explosive but slowly moved back towards the long-run equilibrium.

The autoregressive regression model also showed that the parity deviations from the retail price have significant short-run memory. The estimated AR coefficient of 0.708 implies that the market is not perfectly adjusted to parity from one trading day to the next, and that the adjustment process is a gradual one in the USD/INR market. In addition, the crisis dummy variable was negative and significant, suggesting that the deviations increased moderately in the periods of increased financial uncertainty. This association should not be taken as a direct causal link, however, because other macro-financial factors not included in the model could have influenced the changes in parity deviations.

The persistence of retail-based parity deviations is in line with the increasing post global financial crisis literature which suggests that the Covered Interest Parity may not be observed continuously in practice due to institutional frictions and market imperfections. The present study examines parity based on retail investment rates, which is a different approach than past studies, which focused mainly on interbank funding rates, and thus offers evidence from a non-institutional market participant's point of view.

7.1. Regulatory Framework and Capital Controls

Regulatory and institutional restrictions on capital mobility may be one reason for the continued existence of parity deviations. Cross-border capital flows and derivative transactions are still subject to a regulated regime in India, though the financial markets have been gradually liberalised. These restrictions can slow down the process of arbitrage transactions to close price spreads between domestic and international financial markets. Thus, there is a possibility that parity deviations can also occur despite theoretical arbitrage opportunities.

7.2. Liquidity Conditions and Market Segmentation

The Indian foreign exchange market can be broadly segmented into both onshore forward markets and offshore non-deliverable forward (NDF) markets, which have distinct market participants, market liquidity and market pricing. This segmentation may result in short-term discrepancies among the forward rates and parity-implied rates. Furthermore, during financial crises, market liquidity can differ, which can diminish the ability to arbitrage and slow down the process of convergence towards parity.

7.3. During crisis periods, funding constraints are an issue

The parity deviations were moderately larger during periods of financial stress, based on the significant crisis dummy coefficient. This is in line with the literature that suggests that financial institutions' ability to undertake arbitrage transactions is limited due to funding constraints, higher risk aversion, and restrictive balance-sheet requirements. The empirical evidence suggests that there were wider deviations from parity during crisis periods, though these mechanisms are not explicitly modelled in the present analysis.

7.4. Inflexibility in Retail Interest Rate

One of the key aspects of this study is the use of retail fixed deposit rates rather than interbank interest rates. Retail deposit rates tend to move at a slower pace in response to monetary policy and market

conditions than do wholesale funding rates. This means that the parity implied forward rate based on retail interest rates can be systematically different from market forward rates, which may be due to the lagged nature of the interest rate adjustment process in the retail banking industry. This discovery underscores the need to take investor specific financing conditions into account when assessing Covered Interest Parity.

7.5. The implications for market efficiency

The results obtained from the empirical tests do not necessarily suggest that the USD/INR foreign exchange market is inefficient. Instead, they argue that parity deviations could be due to institutional features, market segmentation, funding limitations and retail/wholesale financing conditions. Any observed deviations from Covered Interest Parity should thus be viewed as a sign of market frictions and not as proof of market inefficiency.

8. Contributions of the Study

8.1. Academic Contribution

This study makes several important contributions to the international finance literature. First, it looks at Covered Interest Parity with daily data on the USD/INR market from 2015 to 2023, which includes periods of substantial global financial uncertainty. Second, the study uses a retail-oriented strategy of using the fixed deposit rates in India and the one-year Treasury Bill yields in the U.S. for calculating the parity-implied forward rate as opposed to most of the earlier studies that use interbank or sovereign benchmark interest rates. This offers some insight into parity deviations from the non-institutional investor's point of view.

Third, the study enhances the empirical analysis by using the modern time-series techniques such as stationarity tests (Augmented Dickey–Fuller test) and autoregressive regression models with Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors. The methodological advances increase the reliability of statistical inference and resolve some of the typical problems of econometrics with financial time-series data.

8.2. Practical Contribution

The results have implications for financial institutions, foreign exchange market players and policy makers. The findings suggest that the discrepancy between the observed and parity-implied forward rates could be a persistent phenomenon in the foreign exchange market, but the profitability of exploiting it could be limited by funding costs, regulations, and market frictions. The findings offer policy makers some insights into the role of institutional features and financial market structure in the process of parity adjustment, which underscores the need for ongoing work to enhance market integration and liquidity in the foreign exchange market.

9. Conclusion

This study examines the deviations from Covered Interest Parity in the USD/INR foreign exchange market at the retail level using daily data for the period 2015–2023. The parity-implied forward rate was constructed using Indian one-year retail fixed deposit rates and U.S. one-year Treasury Bill yields, and compared with the observed one-year market forward rate to measure deviations from parity.

Empirically, retail-based parity deviations are found to be persistently negative over the whole sample period, which implies that the observed market forward rate generally traded below the parity-implied forward rate. The Augmented Dickey–Fuller test confirmed the stationarity of the deviation series, and the autoregressive regression model demonstrated considerable persistence in the short run. The crisis-period analysis also indicated that the deviations were somewhat larger in periods of elevated financial uncertainty, after controlling for persistence.

The results indicate that deviations from Covered Interest Parity in the USD/INR market are slow to adjust and are not instantaneous. These findings are consistent with the idea that institutional frictions, market segmentation, funding conditions and the use of retail financing rates may lead to persistent deviations from theoretical parity. Therefore, the study provides additional evidence on the behaviour of Covered Interest Parity in an emerging market context and extends the literature from a retail-rate perspective.

10. Limitations

There are a number of limitations with this study. First of all, the analysis is done on Indian retail fixed deposit rates, not interbank funding rates. This would reflect the financing conditions available to retail investors but may not necessarily fully reflect the financing conditions available to an institutional arbitrageur. Secondly, the empirical analysis is based on only one currency pair (USD/INR) and the results might not be directly applicable to other emerging market currencies. Third, the empirical models do not include explicitly transaction costs, bid–ask spreads, taxation, and counterparty risk. Finally, the analysis uses a parsimonious autoregressive framework and excludes other macro-financial variables which can also affect parity deviations.

11. Future Research Scope

Future research may extend the present study in several directions. A comparison of several emerging market currencies would provide a wider range of evidence on the behaviour of Covered Interest Parity in different institutional settings. Future studies may also incorporate interbank funding rates, overnight indexed swap rates, or cross-currency basis measures to compare retail and institutional perspectives.

References

- Akram, Q. F., Rime, D., & Sarno, L. (2008). Arbitrage in the FOREX market: Turning on the microscope. *Journal of International Economics*, 76(2), 237–253. <https://doi.org/10.1016/j.jinteco.2008.07.004>
- Aliber, R. Z. (1973). The interest parity theorem: A reinterpretation. *Journal of Political Economy*, 81(6), 1451–1459. <https://doi.org/10.1086/260142>
- Avdjiev, S., Du, W., Koch, C., & Shin, H. S. (2019). The dollar, bank leverage, and deviations from covered interest parity. *American Economic Review: Insights*, 1(2), 193–208. <https://doi.org/10.1257/aeri.20180195>
- Baba, N., & Packer, F. (2009). Interpreting deviations from covered interest parity during the financial market turmoil of 2007–08. *Journal of Banking & Finance*, 33(11), 1953–1962. <https://doi.org/10.1016/j.jbankfin.2009.04.023>

- Behera, H., & Pattanaik, S. (2017). Understanding the forward premium puzzle in India. *RBI Working Paper Series*.
- Bhanumurthy, N. R., & Singh, K. (2013). Interest rate parity in India: An empirical analysis. *Journal of Economic Integration*, 28(2), 324–346. <https://doi.org/10.11130/jei.2013.28.2.324>
- Borio, C., McCauley, R. N., McGuire, P., & Sushko, V. (2016). Covered interest parity lost: Understanding the cross-currency basis. *BIS Quarterly Review*.
- Clinton, K. W. (1988). Transactions costs and covered interest arbitrage: Theory and evidence. *Journal of Political Economy*, 96(2), 358–370. <https://doi.org/10.1086/261536>
- Coffey, N., Hrungr, W. B., & Sarkar, A. (2009). Capital constraints, counterparty risk, and deviations from covered interest parity. *Federal Reserve Bank of New York Staff Reports*, No. 393.
- Du, W., Tepper, A., & Verdelhan, A. (2018). Deviations from covered interest rate parity. *Journal of Finance*, 73(3), 915–957. <https://doi.org/10.1111/jofi.12620>
- Frenkel, J. A., & Levich, R. M. (1975). Covered interest arbitrage: Unexploited profits? *Journal of Political Economy*, 83(2), 325–338. <https://doi.org/10.1086/260328>
- Ghosh, A. R., & Saggar, M. (2017). Capital controls and the cost of capital: Evidence from India. *IMF Working Paper*.
- Goyal, A., & Arora, S. (2012). Indian exchange rates and exchange rate policy: A survey. *IGIDR Working Paper*.
- Isard, P. (1980). Capital controls, political risk, and deviations from interest-rate parity. *Journal of Political Economy*, 88(2), 370–384. <https://doi.org/10.1086/260869>
- Ito, T., & Roley, V. V. (2001). Do the cheap yen and cheaper dollar signal a new era of currency instability? *Pacific-Basin Finance Journal*, 9(1), 1–19. [https://doi.org/10.1016/S0927-538X\(00\)00023-2](https://doi.org/10.1016/S0927-538X(00)00023-2)
- McCauley, R. N., & Fung, B. (2003). Choosing instruments for managing capital flows and exchange rates. *BIS Quarterly Review*.
- Pattanaik, S., & Behera, H. (2014). Covered interest parity in India: Evidence and implications. *RBI Occasional Papers*.
- Popper, H. L. (1993). Long-term covered interest parity: Evidence from the United States and Japan. *Journal of International Money and Finance*, 12(4), 439–448. [https://doi.org/10.1016/0261-5606\(93\)90039-A](https://doi.org/10.1016/0261-5606(93)90039-A)
- Taylor, M. P. (1987). Covered interest parity: A high-frequency, high-quality data study. *Economica*, 54(216), 429–438. <https://doi.org/10.2307/2554230>
- Reserve Bank of India. (2023). *Official website*. <https://www.rbi.org.in>
- Federal Reserve Bank of St. Louis. (2023). *Federal Reserve Economic Data (FRED)*. <https://fred.stlouisfed.org>