

## Comparison of the Spot and Forward Rates over the past years and studying the LIBOR and SWAP rates to determine the causes of variation of currency derivatives over the years

Research paper by *Siddh Vora*

The foreign exchange market in India has evolved significantly, becoming more efficient in determining exchange rates. *It operates as an Over-the-counter (OTC) market where banks engage in direct trade with each other.* They buy and sell foreign exchange for clients through various contracts. The Reserve Bank of India (RBI) occasionally intervenes to buy and sell currencies to manage the country's foreign exchange reserves. *Additionally, there is a Non-Deliverable Forward (NDF) market for the Indian Rupee in international financial centers like Singapore and Dubai. India also boasts of a robust Currency Futures market.*

India adheres to a full Current Account Convertibility Policy, allowing its currency to be exchanged freely for trade in goods and services. This policy facilitates foreign investments into the country via Foreign Direct Investment (FDI) and Foreign Institutional Investors (FII), enabling international investors to participate in the Indian economy seamlessly.

[An Analysis of the Spot-Forward Exchange Rate Relation in the Indian Foreign Exchange Market \[Golaka C NathI\]](#)

My research reflects a study of the comparison of the spot and forward exchange rates in India. Further, I delved into its relation with LIBOR and SWAP rates to understand currency derivatives trends. LIBOR ceased at the end of 2021, hence the need for an alternative benchmark rate.

I have tried to analyze a past trend in comparison:

Period	Deals				Deal Value			
	CASH	TOM	SPOT	FORWARD	CASH	TOM	SPOT	FORWARD
2002-03	0%	0%	74%	26%	0%	0%	71%	29%
2003-04	0%	0%	76%	23%	1%	2%	71%	26%
2004-05	2%	3%	76%	18%	8%	13%	59%	20%
2005-06	3%	4%	76%	17%	13%	17%	50%	20%
2006-07	2%	4%	79%	14%	13%	18%	50%	19%
2007-08	2%	3%	81%	14%	10%	13%	51%	26%
2008-09	2%	3%	81%	14%	10%	13%	48%	29%
2009-10	2%	3%	86%	9%	12%	16%	49%	23%
2010-11	2%	3%	88%	8%	12%	16%	51%	22%
2011-12	2%	3%	87%	9%	12%	15%	50%	23%
2012-13	2%	3%	87%	8%	13%	17%	47%	23%
2013-14 (Sep'13)	2%	2%	89%	7%	13%	17%	48%	21%

Source: CCIL

Table sourced from Golaka. C. Nath [As calculated by RBI formula and data analysis]

The above table explains that the size of deals in the market can range widely. **Approximately 20% of deals are valued at less than USD 1 million, contributing to about 2% of the total value. In contrast, deals exceeding USD 20 million constitute about 3% in terms of quantity but contribute a substantial 38% in overall value.**

**The majority of transactions, about 65%, occur within the range of USD 1 to USD 5 million.**

**In terms of liquidity, forward contracts up to 12 months are generally traded with ease. A significant portion of the market, over 45% in both volume and value, is concentrated in 6-month forward contracts. This can be supported by an understanding of an expansionary monetary policy as increased liquidity is important to increase overall volume in output as has been forecasted.**

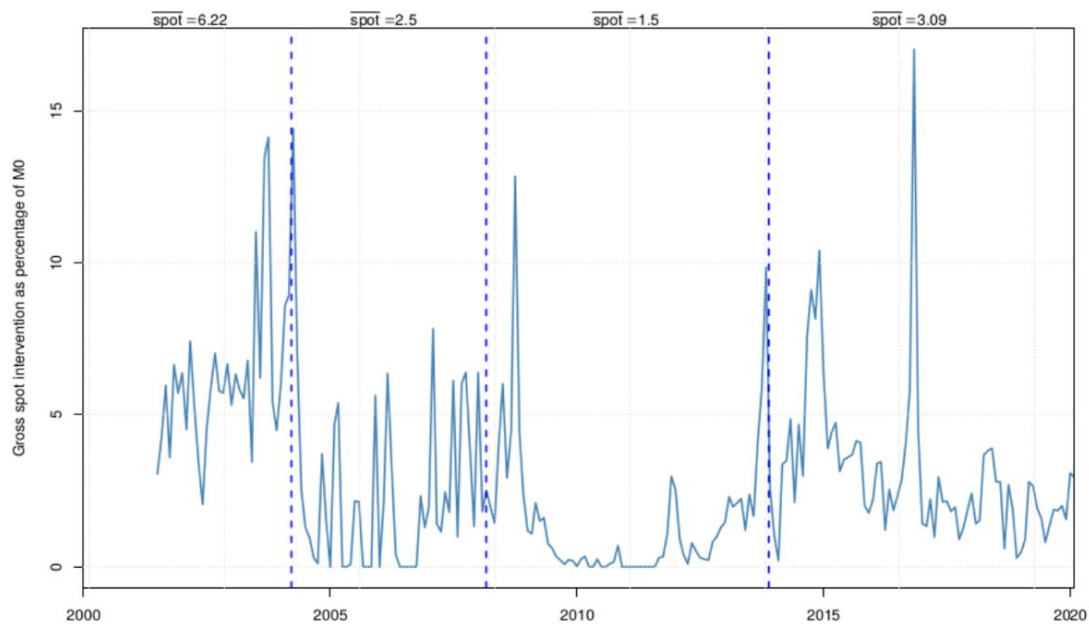
Note: These are calculated by the Reserve Bank of India(RBI) using their formulae and data analysis.

Participants in the Indian foreign exchange market engage in trading both spot and forward contracts over the counter (OTC), while currency futures are traded on an exchange. This OTC market is characterized by a well-established and structured settlement mechanism. **The exchange rate reached a record high of 68.80 against the USD in August 2013 but experienced a significant recovery thereafter.**

Parameters	Monthly Average	Monthly Returns
Mean	46.82	0.24%
Standard Error	0.42	0.19%
Median	45.62	-0.02%
Mode	39.44	-
Standard Deviation	4.68	2.07%
Kurtosis	2.04	115.08%
Skewness	1.25	71.51%
Minimum	39.37	-4.35%
Maximum	64.19	6.54%
Count (Months)	126	125

*Data is about the monthly average RBI reference rate indicating an annualized Standard Deviation of about 16.22p in terms of value and 7.17% in terms of returns. [ The calculations are as sourced through RBI]*

**The above table shows that though the mean monthly average is 46.8, the returns are barely 0.24%. Another notable analysis is the skewness of the monthly returns. The reasons are of course related to the level of exports and imports in an economy, which is not consistent.**



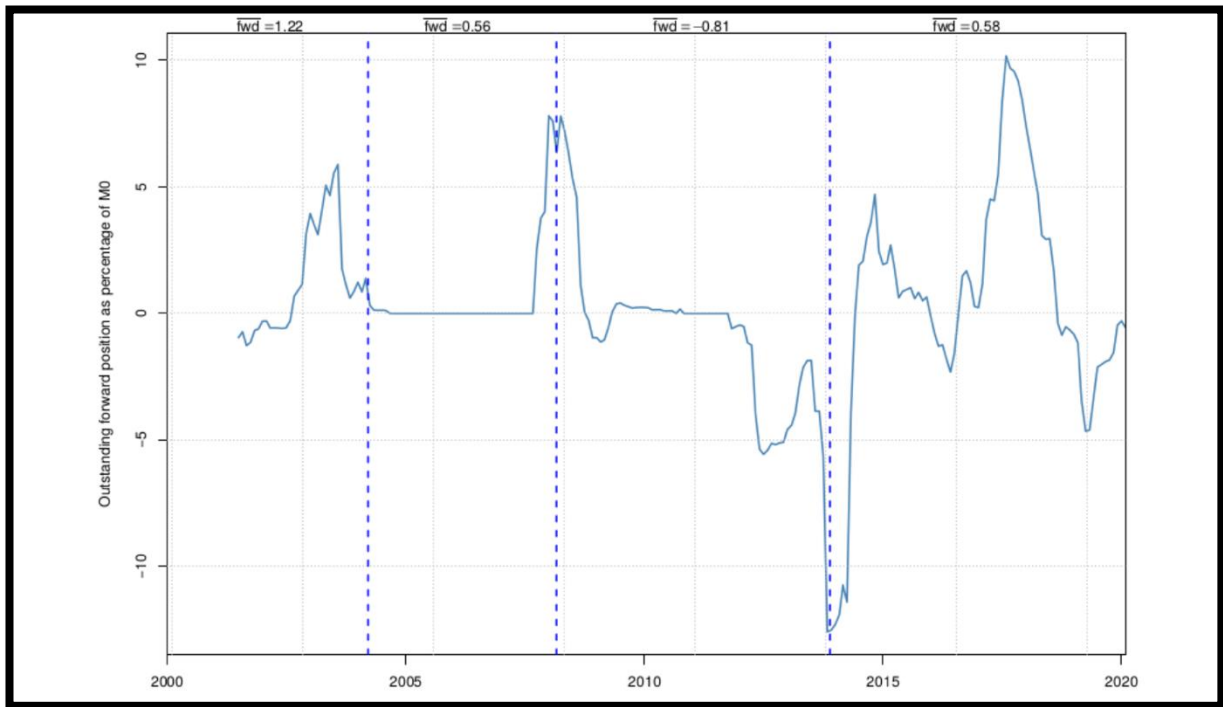
### **Gross turnover in the currency spot market**

<https://www.nipfp.org.in/publications/working-papers/1951/>

***This graphical analysis indicates that, on average, there was a tendency for the exchange rate to increase in value, but instead, it decreased.***

***This anomaly could only occur if the Reserve Bank of India (RBI) intervened extensively in the foreign exchange market to purchase dollars. If the RBI's intervention were only to offsetting the currency appreciation or minimising the volatility of the currency, the exchange rate would still have appreciated on average.***

However, the extent of this appreciation would have been less pronounced than the Exchange Market Pressure (EMP) suggested.

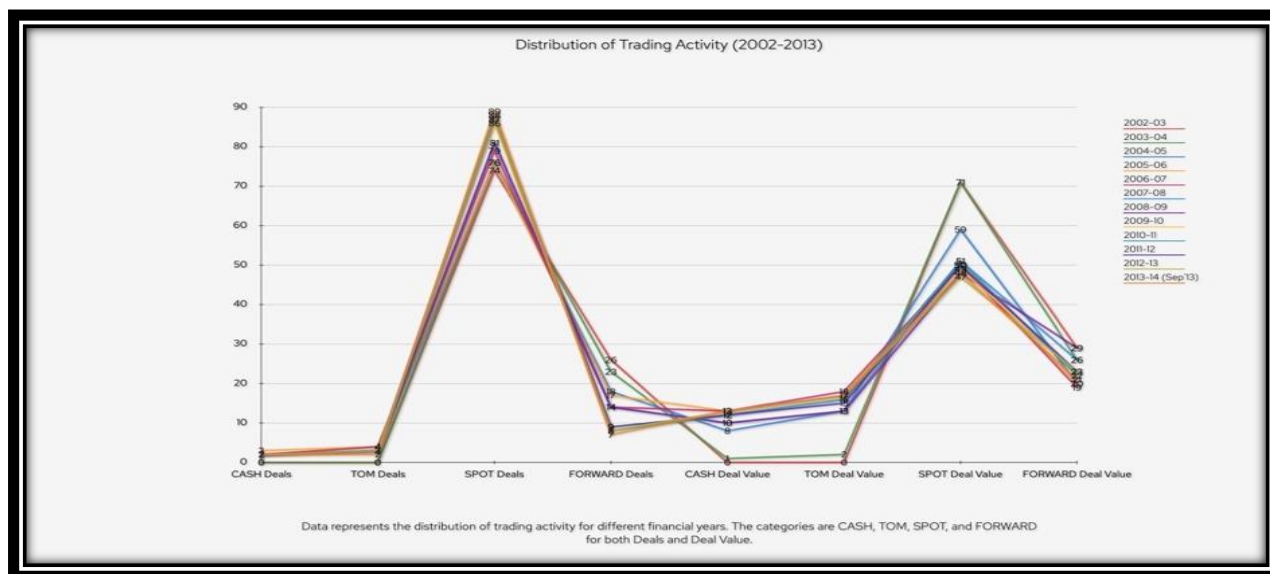


**Outstanding position in the currency forward market**

*Source: RBI database and authors' calculations*

This graph shows the monthly outstanding forward position as a share of M0 (the measure of Money Supply in the economy). The average values are shown at the top of each regime. ***The average value fluctuates as importers and exporters generally use currency forwards to hedge against fluctuations in exchange rates.***

## Trends in the spot and forward rates – an empirical approach



*Data sourced and calculated by RBI*

***The above graph analyses that the forward exchange rate is generally expected to match the market's forecast of the future spot rate when the contract period concludes.*** If both covered and uncovered interest rate parity is held, then it would have forward rate parity, and the market would set the forward exchange rate equal to the expected spot exchange rate.

The forward exchange rate would be an unbiased predictor of the future spot exchange rate. Similarly, as market expectations for LIBOR shift, the fixed rate investors' requirements for new swaps will also adjust.

As a result, businesses may engage in swaps to modify the nature or duration of the floating rate index they are subject to, which is often the LIBOR with maturities of one, three, or six months.

Additionally, a firm can transition to alternative indices like the federal funds rate, commercial paper, or the Treasury bill rate. Financial instruments most frequently linked to LIBOR encompass interest rate swaps, other derivatives, fixed-income securities, and Adjustable Rate Mortgages (ARMs).

***As of April 2022, the trading volume of interest rate swaps increased by 10% to \$4.5 trillion, with the turnover for contracts in U.S. dollars reaching \$2.3 trillion (“OTC Interest Rate Derivatives Turnover in April 2022”).***

### There are three best methods to forecast currency exchange rates:

**Purchasing power parity (PPP):** This is based on the law of one price, which means identical goods in different countries should have the same price. For example, if we assume that prices of pencils in the US and Canada should be the same and if the costs of pencils in the US are to rise by 4% and by 2% in Canada, the PPP approach means that the US dollar would have to depreciate by 2% to keep the PPP same.

**Economic growth:** This approach takes a more general view and looks at all the investment flows, just doesn't examine the relative financial strength between countries. For instance, another factor that can draw investors to a particular country is interest rates. *High-interest rates will attract investors looking for the highest yield on their investments, causing demand for the currency to increase, again resulting in an appreciation of the money.*

**Econometric Models of Forecasting Exchange Rates:** For example, suppose that a forecaster for a Canadian company has been tasked with forecasting the USD/CAD exchange rate over the next year. They believe an econometric model would be an excellent method and have thus researched factors affecting the exchange rate. From their research and analysis, they conclude the most influential factors are the Interest Rate Differential (INT), the difference in GDP Growth Rates (GDP), and the difference in Income Growth Rate (IGR) between the two countries. The econometric model they came up with is shown as follows:

$$\text{USD/CAD}(1 - \text{Year}) = z + a(\text{INT}) + b(\text{GDP}) + c(\text{IGR})$$

Where:

$Z$  = Constant baseline exchange rate

$a, b$  and  $c$  = Coefficients representing relative weight of each factor

INT = difference in interest rates between the U.S. and Canada

GDP = Difference in GDP growth rates

IGR = Difference in income growth rates

*Hence, using such statistical tools, one can analyze or forecast a spot rate's impact on forward momentum.*

*These linkages are connected to the outcome, the currency derivatives' behavior. (Nguyen)*

### My analysis concludes with the following observations:

If the forward rate is consistently higher than the spot rate for a particular currency pair, it may indicate that the market expects the first currency to appreciate relative to the second currency.

According to the theoretical analysis of currency appreciation, this would mean that exports in the country related to the first currency would fall. This impacted country would then increase imports to meet the demand.

Conversely, if the forward rate is lower than the spot rate, the market may expect the first currency to depreciate, and the reverse impacts would appear in the country's exports and imports.

A rising LIBOR might indicate tightening liquidity conditions, following a contractionary monetary policy and leading to higher borrowing costs.

This can influence the demand for currency derivatives as companies and investors look to hedge against potential currency fluctuations.

Swap rates can provide insights into the relative attractiveness of borrowing in different currencies. If the swap rate for one coin is significantly higher than another, it might indicate a higher demand for borrowing in that currency, influencing currency derivative prices.

Other factors, such as economic data releases, central bank decisions, and geopolitical events, can also significantly influence currency derivatives.

These indicators impact a country's monetary policy and help to decide the direction and flow of the foreign exchange market.

This analysis reflects the importance of the spot and forward exchange rates in an economy to leverage liquidity and overall economic growth, which in today's open economies are so susceptible to world money market fluctuations.

## Glossary:

### Currency Derivatives

Currency Derivatives are exchange-traded contracts deriving their value from their underlying asset, i.e., the currency. The investor buys or sells specific units of fixed currency on a pre-specified date and rate.

Spot, forward, LIBOR, and SWAP rates can impact currency derivatives in various ways.

Here are some of the impacts:

#### Spot rates:

In currency derivatives, the spot rate is the exchange rate for the immediate delivery of a currency. Changes in the spot rate can impact the value of currency derivatives, such as options and futures contracts, based on the spot rate (Nickolas).

#### Forward rate:

In currency derivatives, the forward rate is the exchange rate for delivery of a currency at a future date. Changes in the forward momentum can impact the value of currency derivatives based on the forward rate (Nickolas).

#### LIBOR rate:

The London Interbank Offered Rate (LIBOR) was a benchmark interest rate at which central global banks lent to one another in the international interbank market for short-term loans. In interest rate swaps, the swap rate is the fixed interest rate the receiver demands in exchange for the uncertainty of paying the short-term LIBOR (floating) rate over time. Changes in the LIBOR rate can impact the value of interest rate swaps, affecting the value of currency derivatives based on interest rate swaps (PIMCO).

#### SWAP rate:

The swap rate is a special kind of interest rate utilized to calculate fixed payments in a derivative instrument called an interest rate swap. It is a financial contract between two parties who agree to exchange interest rate cash flows based on a notional amount [ Investopedia]. Changes in the SWAP rate can impact the value of interest rate swaps, affecting the value of currency derivatives based on interest rate swaps.



*In summary, changes in Spot, Forward, LIBOR, and SWAP rates can impact the value of currency derivatives in various ways, depending on the specific type of derivative and the contract terms.*

**The currency derivatives have varied over the past years due to many factors like:**

- A country's economic performance plays a significant role; a strong economy generally strengthens the currency, while a weak one leads to depreciation.
- Inflation rates also impact; lower inflation tends to boost currency value, whereas higher rates cause it to decline.
- Interest rates are another critical determinant; higher rates usually make a currency more robust, while lower rates weaken it.
- Capital flows, both in and out of a country, can also sway currency value; more foreign investment often leads to appreciation, while capital outflows result in depreciation. Additionally, a country's budget and trade balances can affect its currency; a trade surplus may lead to appreciating money, while a deficit could cause depreciation.

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