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## A Study of Indian Rupee Fluctuation against US Dollar

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### **Abstract**

*This paper is an attempt to study and understand the dynamics of Indian Rupee fluctuations against US Dollar, using yearly observations over the period of 12 years from 2001 to 2012. In this paper, evolution of exchange rate mechanism from fixed to hybrid exchange rate system in the context of India along with the journey since independence has been explored. Further, an attempt has been made to identify the key macroeconomic variables that influence the Indian rupee fluctuations against US Dollar. Finally, Multivariate Regression Analysis is done to know the determinants of the rupee fluctuations against the dollar.*

**Keywords:** Exchange Rate, Forex Reserve, Rupee Fluctuation

### **Introduction**

Depreciation in rupee has become a big worry for the Indian Government because it has depreciated to an all time low with respect to the US dollar. On 28th August 2013, the Indian rupee had gone down to 68.825 against the dollar. Similarly rupee appreciation also causes concerns to imports of India. Exchange rates play a vital role in a country's level of trade, which is critical to almost every free market economy in the world. Therefore, exchange rates are among the most monitored, analyzed and manipulated economic measures by the government. This study aims at exploring the dynamics of exchange rate mechanism, rupee journey against dollar since independence, factors influencing the fluctuation of Indian rupee and finally modeling the exchange rate through multivariate analysis.



The conversion rate fluctuates on timely basis depending on various factors such as demand and supply of each currency, inflation rate in the country, interest rate prevailing in the country etc. All economies that interact with international economy can be broadly classified into three categories on the basis of exchange rate policy of the country (Goyal, 2010).

**Fixed Exchange Rate:** These economies peg the value of their currency to some other prominent currency like US dollar. This system is simple and provides stability to the economy. This type of exchange rate regime is maintained generally by smaller economies like Nepal and Bhutan (pegged to Indian Rupee) or several African nations. The rationale behind such a regime is that in the case of a small economy, if the exchange rate is market determined, the sudden influx or outflow of even relatively small amount of foreign capital will have a large impact on exchange rate and cause instability to its economy. Notable exception is China which despite being a large economy has its currency pegged to US dollar.

**Floating (or free) Exchange Rate:** Bigger and developed economies like US, UK, Japan etc. generally let market determine their exchange rate. In such an economy exchange rate is determined by demand and supply of the currency in international foreign exchange market. In real world, there will be multilateral interactions and the final exchange rate will be an equilibrium reached by all those interactions.

**Hybrid system:** Most mid sized economies like India practice a mix of both these regimes. It allows for the exchange rate to float in a range which it deems comfortable. Once the market determined rate tries to breach this range, the central bank (government) intervenes in the currency market and controls the exchange rate.

Since 1951, despite government attempts to obtain a positive trade balance, India experienced a severe balance of payments deficits. Inflation caused Indian prices to go sky high. When the exchange rate is fixed and a country experiences high inflation relative to other countries, that country's goods become more expensive and foreign goods become cheaper. Therefore, inflation tends to increase imports and decrease exports. Since 1950, India continuously faced trade deficits. Another reason, which played an important role in the 1966 devaluation, was war with Pakistan. The US and other countries withdrew their



aid, which further necessitated devaluation. To improve fiscal position, Government of India devalued Rupee by a huge 57% against Dollar (Johri & Miller).

In 1991, India still had a fixed exchange rate system, where the rupee was hooked to a basket of currencies of major trading partner countries. At the end of 1990, the Government of India found itself in serious economic trouble. The government was close to financial default and its foreign exchange reserves had dried up to the point that India could barely finance three weeks of imports. In July 1991, the Indian government devalued the rupee by 19.5%. The government also changed its trade policy from its highly restrictive form to a system which allowed exporters to import 30% of the value of their exports (Saket, 2013).

The Indian rupee touched a lifetime low of 68.85 against the US dollar on August 28, 2013. The rupee plunged by 3.7 percent on the day in its biggest single-day percentage fall in more than two decades. Since January 2013, the rupee has lost more than 20 percent of its value, the biggest loser among the Asian currencies (Singh, 2013).

### **Review of Literature**

Various theoretical models are available to analyze exchange rate determination and behavior in the international finance literature. Most of the studies on exchange rate models prior to the 1970s were based on the fixed price assumption (Dua & Ranjan, 2010). With the advent of the floating exchange rate regime amongst major industrialized countries in the early 1970s, an important advance was made with the development of the monetary approach to exchange rate determination.

With liberalization and development of foreign exchange and assets markets, variables such as capital flows, volatility in capital flows and forward premium have also become important in determining exchange rates. Furthermore, with the growing development of foreign exchange markets and a rise in the trading volume in these markets, the micro level dynamics in foreign exchange markets became increasingly important in determining the exchange rates. Agents in the foreign exchange market have access to private information about fundamentals or liquidity, which is reflected in the buying/ selling transactions they undertake, that are termed as order flows (Medeiros, 2005) (Bjonnes, 2003). Microstructure theory evolved in order to capture the micro level dynamics in the foreign



exchange market (Evans, 1999). Another variable that is important in determining exchange rates is central bank intervention in the foreign exchange market. Pros and Cons of currency appreciation and depreciation are studied as boon and bane for the economic growth. It also provides suggestions or steps needed to control as well as to overcome ill-effects of excessive fluctuations between rupee and dollar, keeping in view current trends (Raithatha, 2012). (Mishra & Yadav, 2012) tried to find some stylized facts about the rupee-dollar exchange rates (ER) based on Hooper-Morton model by relating it with five very important macroeconomic variables, namely, Money Supply (MS), Real Inflation Rate (RIR), Real Output (Y), Inflation Rate (IR) and Trade Balance (TB) for both domestic and foreign economy. The findings based on Vector Autoregressive (VAR) model confirm most of the stylized facts such that RIR and MS have prominent effects on ER. (Dua & Ranjan, 2011) reported that the Bayesian vector autoregressive models generally outperform their corresponding VAR variants. It is well known that exchange rate fluctuations are very difficult to predict using economic models, and that a random walk forecasts currency rates better than any economic model (Meese, 1991). ARCH and GARCH models and its categories have also been used by many authors to predict the time varying volatility of exchange rates (Dukich, Kim, & Lin, 2010) (Samsudheen & Shanmugasundaram). However, the recent literature has identified a series of fundamentals/methodologies that claim to answer the question whether currency rates are predictable. On the whole, analysis of the literature and the data used by various authors suggest that the answer to the question, "Are currency rates predictable?" is that it depends on the choice of predictor, forecast horizon, sample period, model, and forecast evaluation method (Rossi, 2013).

As is evident from the literature review, a good number of studies carried out in different countries have studied the volatility of exchange rates. The focus of this study is on the Indian rupee fluctuation. Aiming to conduct an extensive analysis of determinants of Indian rupee against US dollar, the present study tries to study the macroeconomic factors that influence the Indian rupee fluctuation against the US dollar.

### **Factors Affecting Fluctuations**

The value of any currency in an economy is hard to bet, to be stable for a long period of time as there are a number of factors influencing its appreciation and the depreciation. The



currency value of an economy influences the growth rate of GDP in an economy. Several other factors that have a direct influence on the over- or undervaluation of a currency are listed below:

*Basic Law of Economics:* As per the basic laws of economics, if the demand for \$ in India exceeds its supply then its worth will go up. If the demand for the Indian rupee is more (to settle international payments) than its supply in the foreign exchange market, its value will appreciate and vice-versa. It may be that importers are the major entities who are in need of the dollar for making their payments. Another possibility here could be that the Foreign Institutional Investors are withdrawing their investments in the country and taking them elsewhere. Besides the basic law of economics, there are many other factors which can cause a fluctuation in currency in international market. Some factors are discussed below.

*Price of Crude Oil:* India is a major importer of oil and the valuation of Indian money gets easily affected by the increase in the prices of the crude oil. It can further result in spreading inflation in an economy due to the over valuation of the Indian currency. The worth of crude oil has been a major nuisance for India since it has to bring in the majority of its requirement from outside the country. The demand for oil in India has been going up every year and this has led to the present situation. All over the world, the price of oil is given in dollars. This implies that as and when the demand for oil increases in India or there is an increase in oil prices in the global market, there also arises a need for more dollars to pay the suppliers.

*Forex Reserve:* India's foreign exchange reserves is made up of Foreign currency assets (US dollar, euro, pound sterling, Canadian dollar, Australian dollar, Japanese yen, etc.), gold, special drawing rights (SDRs) of IMF and Reserve tranche position (RTP) in the International Monetary Fund (IMF). The level of forex reserve is expressed in US dollars. Hence India's forex reserve declines when US dollar appreciates against major international currencies and vice versa. RBI gains Foreign exchange reserves by buying foreign currency (via intervention in the foreign exchange market), Funding from the International Bank for Reconstruction and Development (IBRD), Asian Development Bank (ADB), International Development Association (IDA) etc., aid receipts and interest receipts.



*Relative Inflation Rates:* It is necessary to note that exchange rate is a relative price and hence the market weighs all the relevant factors in a relative term, (in relation to the counterpart countries). The underlying reasoning behind this conviction was that a relatively high rate of inflation reduces a country's competitiveness in international markets and weakens its ability to sell in foreign markets. This will weaken the expected demand for foreign currency (increase in supply of domestic currency and decrease in supply of foreign currency). But during 1981-85 period exchange rates of major currencies did not confirm the direction of relative inflation rates. The rise of the dollar persistently for such a long period discredited this principle.

*Interest Rates:* An important factor for movements in exchange rates in recent years has been difference in interest rates; i.e. interest differential between major countries. In this respect the growing integration of the financial markets of major currencies, the revolution in telecommunication facilities, the growth of specialized asset managing agencies, the deregulation of financial markets by major countries, the emergence of foreign exchange trading etc. have accelerated the potential for exchange rates volatility.

*Trade Balance:* If a country is exporting from other countries more than its imports, then this would result in higher demand for that exchange, resulting appreciation of that currency against others. One of the main reasons behind the Indian government's inability to arrest the fall of the national currency is the imbalance between export and import. A negative trade balance occurs when imports are more than the exports of the country and vice-versa. The trade balance is generally measured by the current account. In the fiscal year 2012-13, India's current account deficit (CAD) was measured at 4.8 per cent of the GDP.

*Foreign Institutional Investment:* Recently Arcelor Mittal and Posco decided to pull out from their projects in India. Posco did not go ahead with a steel plant worth 30,000 crore that was supposed to be built in Karnataka and Arcelor Mittal withdrew from setting up a steel plant in Odisha that was supposed to cost around 52,000 crore. There were lots of delays and problems related to acquiring land for the project. In fact in 2012-13 the Indian companies have spent more outside India compared to FIIs in India.



The money supply of Rupees can change due to the trade balance, which is nothing more than how much a country imports versus exports. When a country sells more goods and services to overseas markets than it buys from them, then it has a trade surplus. A trade surplus increases the value of the Rupee because it brings in more foreign currency into India than the amount of Rupees that are paid for imports.

*Capital flows and the stock market of India:* It is important to note that in spite of suffering recession, an economy can grow if the capital inflow is constant or continuously rising. In India even if the GDP rate is less, the currency can still get overvalued due to excessive capital inflows made by the FII's in the Indian economy.

*Global Currency trends:* Like many other currencies, the Indian rupee also has tied its knot with some of the big economies of the world including the names of UK, US, Japan and Canada. The depreciation or appreciation in the currency of any of these, especially in the US dollar, influences the valuation of the Indian currency in one way or the other.

*RBI Intervention:* The valuation of the Indian currency highly depends on RBI that manages the balance of payments, slight modification in which can define the over- or the under- valuation of the Indian currency.

*Political Factors:* Several other factors that affect the currency stability are some political factors like change in the government set up, introduction of new export and import policies, tax rates and many more.

There are many factors that arise from the economic structure of Indian economy and affect the fluctuation of the Indian currency that in turn affects the economic growth rate of the economy.

## **Research Methodology**

### ***Objective of the Study***

This study aims at finding out the crucial factors of the economy that cause an impact on the Indian rupee fluctuation against the US dollar.



## Research Methodology

There are several factors affecting the exchange rate like the inflation, interest rates, trade balance, FII, money supply (M3) in economy, Foreign Exchange Reserve, political factors, etc. From these factors we have identified six independent variables and exchange rate (ER) as the dependent variable.

1. Forex Reserve (Rs Billion) (FR)
2. Foreign Institutional Investment (Rs Billion) (FII)
3. Money supply (Rs Billion) (MS)
4. Trade Balance (Rs Billion) (TB)
5. Inflation (%) (INF)
6. Interest Rate (%) (INT)

Yearly data for the six Independent variables mentioned in the previous section was considered for the period 2001-2012. Also data for the dependent variable, Rupee Exchange Rate against Dollar (ER), was considered for the same period. The data was obtained from RBI database on Indian economy. Further the data for the study period was processed through excel by taking natural logarithm of the variable for converting the data in normal distribution at primary level and regression analysis was done. Contribution of each independent variable individually and their collective impact on the dependant variable was observed.

## Findings & Analysis

Table 1 presents the summary of model application stating that there is 93.7% correlation between the dependent and independent variables. The table also reveals that 87.9% of dependent variable is explained by the six identified independent variables. Only 12.1% of currency rate is because of other factors influencing the dependent variable. Thus, the model seems to be a good fit for the currency rate.

**Table 1: Model Summary**

<i>Regression Statistics</i>	
Multiple R	0.937759528
R Square	0.879392932
Adjusted R Square	0.73466445
Standard Error	1.561454837
Observations	12





Table 2 depicts the analysis of variance of predicting variables where the F-Significance is 0.033 which is significant at 5% level of significance.

**Table 2: ANOVA**

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	88.88716807	14.81452801	6.076156692	0.033248894
Residual	5	12.19070604	2.438141207		
Total	11	101.0778741			

Table 3 shows the coefficients of the independent variables in Regression model. Thus, the predictor equation becomes as follows:

$$ER = 35.29 + (-0.000086) FR + 0.000082 FII + 0.000805 MS + 0.0002640 TB + (-0.839779) INF + 0.828713 INT + et$$

**Table 3: Coefficients**

	<i>Coefficients</i>	<i>St. Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	35.290111	9.6685	3.6500	0.0147	10.4363	60.1439
Forex Reserve (US Million \$)	-0.000086	0.0000	-3.8278	0.0123	-0.0001	0.0000
FII Investment (US Million\$)	0.000082	0.0001	1.3742	0.2278	-0.0001	0.0002
Money Supply (Billion Rs.)	0.000805	0.0006	1.2617	0.2627	-0.0008	0.0024
Trade Balance (Billion Rs.)	0.002640	0.0032	0.8342	0.4422	-0.0055	0.0108
Inflation	-0.839779	1.0792	-0.7781	0.4717	-3.6140	1.9344
Interest Rate	0.828713	0.5612	1.4767	0.1998	-0.6138	2.2713

## Conclusion

Depreciation and appreciation in rupee is not a permanent phenomenon but it is due to various reasons. The focus of this study is on the Indian rupee fluctuation. Aiming to conduct an extensive analysis of determinants of Indian rupee against US dollar, here six factors have been identified to be specific to rupee fluctuation and are modeled with



multivariate regression analysis. The result of analysis shows that these variables can explain the exchange rate dynamics to the extent of 87.9%. Since there are various internal as well as external reasons behind rupee appreciation and depreciation to a large extent, it takes time to bring back the situation to the normal state. The RBI and other Government agencies have to play their role to tackle this situation. However, the exchange rate fluctuations modeling through various other econometric techniques based on the different aspects of currency rates remain the area for further research.

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