

## **AN EMPIRICAL STUDY ON EFFECT OF CHANGES IN FOREX EXCHANGE RATES ON STOCK MARKET FLUCTUATIONS**

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### **ABSTRACT**

One must haven't forgotten the rupee appreciation against US dollar of year 2006-07, from Rs. 45.02 in Oct'06 to Rs. 39.07 in Jan\_08; the period when the Indian stock market was on Bull Run against the other specific industries like IT industry on bear run. Fundamental Logic of rupee appreciation states that the Indian economy is strengthening against US economy. As an investor, one must know the answer of how exchange rate movement affects the economy, a particular industry, and foreign investors to get benefit out of it. As with any macro- economic indicator it is important to understand some of the important concepts in a simple manner so it is easier to apply the analysis on a particular industry or company. The present situation where stock market is going up and down, it is necessary to invest consciously in the market whatever it is this is the study about the last two year fluctuation in stock market which enables the investor in taking decision regarding investment.

This study tells the factor which directly or indirectly affects the market and some basic information not only share market but also other market such as derivatives or commodity market for the new investors or the other students who have some interest in stock market. The objective of selecting the topic is to know about the market trends of the stock market and the information related to the investment for the future investor. The study of fluctuations of stock market makes the investor acquainted with the factor affecting the investment and Stock prices can be volatile and some analysts argue that this volatility is excessive. This is not easy to prove, since it is difficult to assess certainty about future earnings and dividends. Companies tend to smooth dividends, so they will be less volatile than stock prices. Volatile stock prices do not

have a major impact on consumption and capital spending since there is a good chance that price movements in one direction may be reversed.

## INTRODUCTION

In simple words, exchange rate means how much one currency is worth in terms of another currency. For e.g., If one can buy \$ 1 with Rs. 46, the exchange rate of the two currencies would be \$1 = Rs. 46.

The two types of exchange rate are:

- i) Fixed, and
- ii) Floating.

Some countries have fixed exchange rate systems while some have floating. As the name suggests, the fixed exchange rate doesn't fluctuate because of government intervention. The floating exchange rate on the other hand keeps on changing continuously just like the stock market. Thus the government intervention is almost negligible.

In India, there is a Floating Exchange Rate System which means that the Indian government intervenes only if the exchange rate seems to go out of hand by increasing or reducing the money supply as the situation demands.

Two very commonly used terminologies are:

- i) Rupee Appreciation, and
- ii) Rupee Depreciation (instead of using the word 'currency' the word 'rupee' is being used for the Indian context and explain the fluctuation with respect to dollar).

When rupee is said to be appreciating it means that Indian currency is gaining strength and its value is increasing with respect to dollar. However, when rupee depreciates it means the same is getting weaker & its value is falling with respect to dollar. Following example explains the same in a simplified manner:

Suppose, currently, the exchange rate is Rs. 45 = \$1,

Let say 10 months later, either of the following two cases can happen:

Case1: The exchange rate is say Rs. 40 = \$1. This means rupee has appreciated or gotten stronger by approx 11% and one would be paying less to for a dollar.

Case2: The exchange rate is at Rs. 50 = \$1. This means rupee has depreciated or gotten weaker by approx 11% and one end up paying more for a dollar.

Rupee's appreciation or depreciation against the dollar depends on the change in demand and supply for both the currencies. If the demand for rupee is comparatively high, rupee appreciates; if low, it depreciates.

### **Factors driving the demand for a Currency are as followed**

**Interest Rate:** A demand for a currency is hugely dependent on the interest rate differential between two countries. A country like India where int. rate is around 7-8% experiences greater capital inflow as investors get better return than what they might get in US. (With Interest rates of 2-3%). This results into rupee appreciation. **2) Inflation Rate:** The demand for a country's goods & services by the foreign buyers would be more if the inflation rate is lower in that country compared to other countries. Higher demand for goods & services would mean higher demand for that currency resulting in the appreciation of that currency. For instance if India's inflation rate is lower than that of Zimbabwe then the demand for our goods, services and currency would be higher than that for Zimbabwe's.

**3) Export-Import:** If a country is exporting more than its imports from other countries, then this would mean higher demand for that currency, causing appreciation of that currency against others.

**4) Trading in currencies in the Forex market:** The exchange rate fluctuates minute by minute because of speculative trading in the Forex market. Though trading in Forex market causes fluctuations in the exchange rate, over a period the change is backed by the fundamental factors like the growth potential in the economy, interest rate differential and the inflation rate existing in different countries. In a manage floating exchange rate system like India the government purchases rupee in exchange for the foreign currency to increase money supply in the economy which leads to depreciation of the home currency.

Conversely, it purchases foreign currency in exchange for rupee to reduce the money supply in the economy leading to appreciation of the home currency.

### **Impact of Rupee appreciation/depreciation**

**1) Impact on economy:** Exchange rate fluctuation has a significant impact on the overall economy of a country. Rupee appreciation against US dollar is an indication of the strengthening of Indian economy with respect to US economy.

**2) Impact on foreign investors:** If a foreign investor invests in Indian stock market and even if its value doesn't change in 1 year, he'll earn profit if rupee appreciates and make a loss if it depreciates.

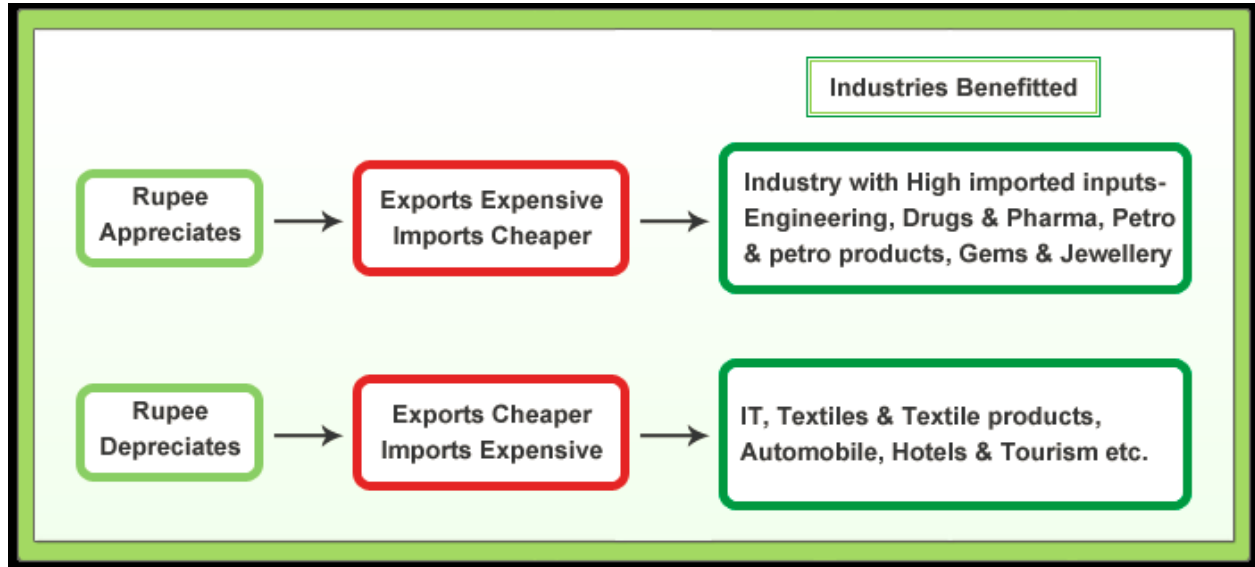
An extension to this could be, Suppose an FII Invests Re. 1 Cr. in the Indian stock market and at an exchange rate of \$1 = Rs. 50. So, the amount invested is \$200,000.

Suppose, after 1 year, even if the value of investment doesn't appreciate the foreign investor can earn a profit if the exchange rate has changed to \$1 = Rs. 40 (Rupee appreciation).

If the investor sells his investment and converts the currency, he would get \$ 250,000. So, he would earn \$ 50,000 as a profit thanks to a change in the exchange rate i.e. rupee appreciation.

So, a continuously appreciating rupee would lead to greater investment by the FIIs.

**3) Impact on industry/companies:** Appreciation of the rupee makes imports cheaper and exports expensive. So, it can spell good news for companies who rely on import of goods like heavy machinery, technology, microchips etc. According to reports by Associated Chambers of Commerce and Industry of India (ASSOCHAM) sectors like Petro & Petro Products, Drugs & Pharmaceutical and Engineering Goods which have import inputs of as much as 77%, 19% and 21% respectively would stand to gain the most if rupee appreciates. They would have to pay less for the imported raw materials which would increase their profit margins.



Similarly, a depreciating rupee makes exports cheaper and imports expensive. So, it is welcome news for sectors like IT, Textiles, Hotel & Tourism etc. which generates revenue mainly from exporting their products or services. Rupee depreciation makes Indian goods & services cheaper for the foreign buyers thus leading to increase in demand and higher revenue generation. The foreign tourist would find it cheaper to come to India thus increasing the business of hotel, tours & travel companies.

## RESEARCH METHODOLOGY

**Method:** In this study all the index data have taken as dependent variable and different combinations of forex exchange rate as independent variable.

To find out the relation between dependent variables and independent variables, the correlation using MS-Excel and T-test between dependent variable and independent variable is done, by using these statistical tools we will prove whether the independent variables impacts the dependent variables or not.

**4) Data Source:** To study the market movement, the data have been collected from various secondary sources. In the present study the weekly data is taken of the last 12 months (Feb\_11-Feb\_12) for various parameters:

- IND/EUR
- IND/GBP
- IND/CAD
- IND/USD

Statistical Tool to be used: Independent Sample T Test.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{X}_1 - \bar{X}_2}}$$

Where,

$$s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Sample Size: 20 observations

### **Objectives**

**1) To Draw, Study and analyze correlation between Sensex with fluctuating Indian Rupee w.r.t. other major currencies of the globe, namely:**

**- Euro (EUR)**

**- Global British Pound (GBP)**

**- Canadian Dollar (CAD)**

**- United States Dollar (USD)**

**- Japanese Yen (JPY)**

**2) To study and analyze various reasons which impact the Indian Currency Market.**

### **Limitations**

**1) Data sets range from February 2011 to February 2012.**

**2) No Conclusions could be made on the fact that the Forex Exchange Rates is the only variable which impacts the stock market movements.**

**3) The others variables like inflation, FDI, political issues, government monetary policies etc. which may also Influence the Sensex has not been studied in the present study.**

**4) Many previous empirical and theoretical models of the link between forex exchange rates and stock prices have been constructed under the premise, but so no such model is developed within the purview of the present study.**

**5) Comparison with other major indices of the world has not been looked upon.**

**Factors influencing Indian Currency Markets are:**

**1) Change of Interest Rates:** The value of the currency of any country depends on the interest rate of that country. In case of upward movement of interest rate in the United States, the US Dollar (USD) appreciates against other currencies as well as against the Indian Rupee (INR). Any change of interest rate by the Federal Reserve Bank of New York (FED) through the Federal Open Market Committee (FOMC) has a great impact on the currency market. In the recent past there have been instances of rate hikes by the FED, as a result of which the USD had appreciated against major international currencies as well as the Indian Rupee. Even an expectation of change of interest rate has a great impact on currency market. Whenever there is any such expectation, the market reacts sharply. The possibility of changes in interest rate is a speculative move, and the market reacts only for a short period of time. The market generally discounts some portion of such expectations well in advance, before they actually happen. Change of interest rate by the European Commercial Bank (ECB) is now equally important .The value of the Euro is influenced by a change of interest rate by ECB. Recently, there have been several occasions when the Euro strengthened against the USD following a hike in interest rate or even the expectation of a hike in interest rate by the ECB.

**2) Inflow of Foreign Funds:** The exchange rate depends on demand and supply of currency. Strong economic fundamentals and good ratings by international rating agencies have boosted foreign investors' confidence in the Indian market. Huge foreign investments have already come

to India, while big investments through Foreign Institutional Investors (FIIs) and Foreign Direct Investment (FDI) are expected in the near future. In the last couple of months, substantial foreign funds have been infused into the Indian market. Since most of these have been in the form of USD, the supply of USD against the Indian Rupee became high, and it depreciated against the Rupee. On the other hand, at the time when FIIs wanted to withdraw funds from the market, the demand for USD in the Indian market became high, and it appreciated against the Rupee. During the last one to one-and-a-half years, the Indian rupee has shown a tendency to appreciate due to a huge inflow of foreign funds in the Indian market by FIIs or through FDIs in the form of External Commercial Borrowings (ECB) and Foreign Currency Convertible Bonds (FCCBs). A direct relationship may be drawn between the USD–INR exchange rate and the BSE index. Considering all other factors to be constant, whenever overseas FIIs buy shares from the Indian market, there is an upward movement of the BSE index. At the same time, due to inflow of foreign funds (foreign investors have USD to sell—they will buy INR to invest in Indian market against USD) in the Indian market, the supply of USD increases in the market and it depreciates against INR, or INR appreciates against USD. On the other hand, if there is any negative flow of funds by FIIs, there would be a downward movement of the BSE index, and consequently USD would appreciate against INR.

**3) Price of Oil:** A large portion of India's import payment is mainly for payment of oil. Internationally, crude prices are named as BRENT, NYMEX, and Dubai Crude. Whenever there is any hike in the oil price per barrel, the Indian Rupee depreciates against the US Dollar. As such, the Indian Government buys more USD against INR to honor the import liability, resulting in heavy demand for USD. Consequently, the Indian rupee depreciates against USD. The Indian currency market largely depends on the price of Dubai Crude. It is observed that USD appreciates at the end of the month when compared to other days of the month, primarily because of the month-end demand of USD in the wake of payment for imported oil. However, today's market is mature enough, with players of foreign exchange covering themselves against this type of expected fluctuations in the market. Whenever FIIs book profits by selling their shares, the BSE index falls, and at the same time INR depreciates against the USD. On April 12, 2006, the BSE index fell by more than 300 points due to heavy selling by FIIs, and on the same



day the crude price also shot up to around USD70 per barrel. The Indian Rupee depreciated by 45-50 paise on the same day, owing to the impact of these two important factors.

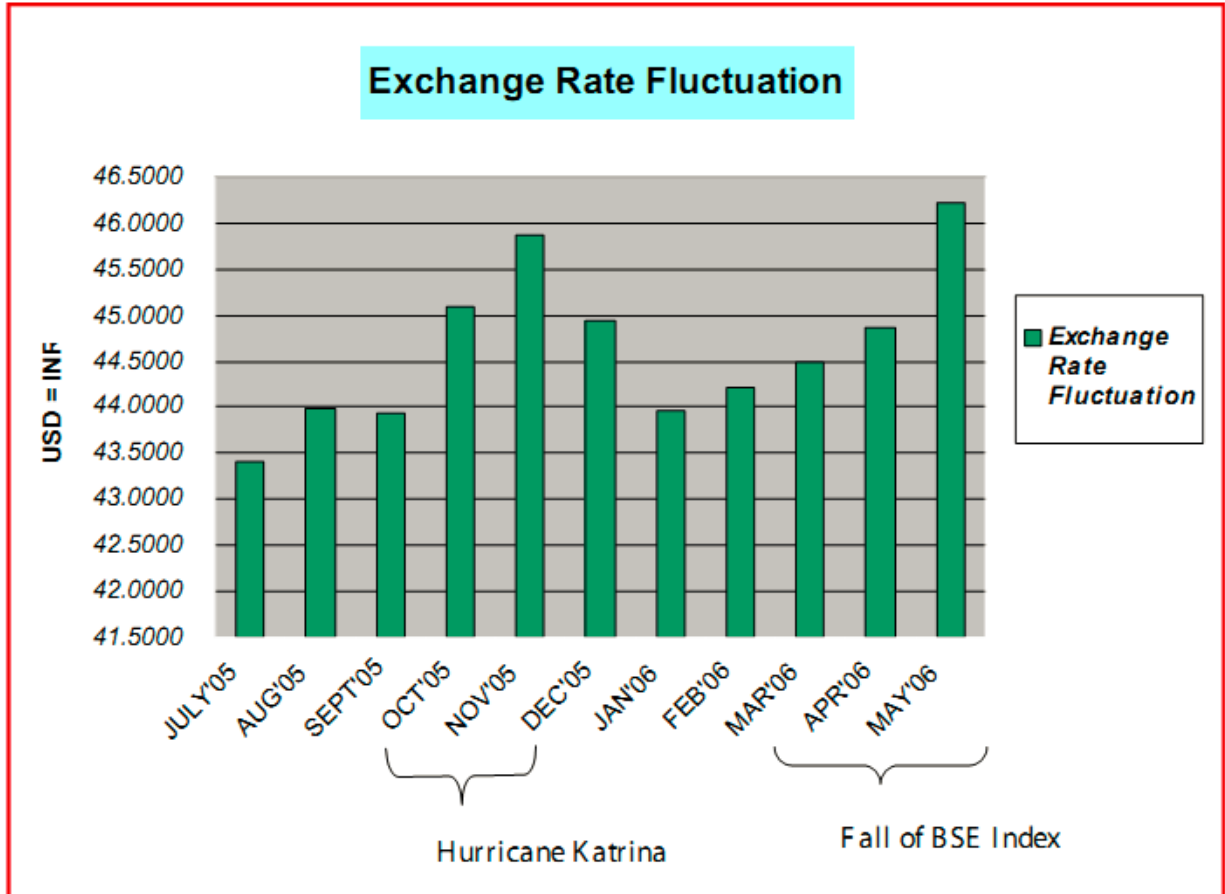
**4) Comments of Political leaders:** Comments from political leaders and top bureaucrats do influence the market, but this is very short-term. It is quite common in India, particularly when it comes to comments from political leaders or the Governor of the Reserve Bank of India (RBI). We know that the Japanese economy is export-oriented, and that Japanese exporters welcome any move that depreciates the Japanese Yen. It has been observed that whenever the Yen strengthens against the USD, Japanese politicians tend to pass comments on economy that allows the Yen to slip back to its original level. Political unrests can also strongly influence the currency market, but again only for a short period of time. Extended periods of political uncertainty can, however, cause the rest of the world to lose confidence in that country, and could finally result in a steep fall in the value of that country's currency.

**5) Release of Economic Data:** The economic data or surveys released by various national and international agencies, including FED, RBI, Moody's, etc. can influence market sentiments and lead to movement in exchange rates. Some data from the US, such as Non-Form Payroll, Jobless Claim, US trade deficit and GDP growth rate are known to influence the currency market. In the last week of May 2006, the Non-Form Payroll data (monthly data generally released on the first Friday of the month) was released by the US Department of Labor, and it was weaker than market expectations. As a result, the Euro became stronger against the USD, from 1.2739 to 1.2953 between 26 May and 5 June 2006. Annual economic review, RBI credit policy, monetary policy, etc. also strongly influence the currency market. Understanding, interpretation and correlation of different data are important to gain a thorough understanding of the exchange rate movement by any corporate. Any mistake in the interpretation of data released could cause heavy loss to an organization.

**6) RBI Interventions:** The RBI, which regulates the Indian currency market, does intervene whenever it feels it is required to stabilize the market, or to keep market volatility under control. It is the responsibility of the RBI to keep the exchange rate unaffected at a time of volatility in the foreign currency market. It has been observed that RBI intervenes in the currency market whenever there is any abnormal movement in the exchange rate, either upward or downward.

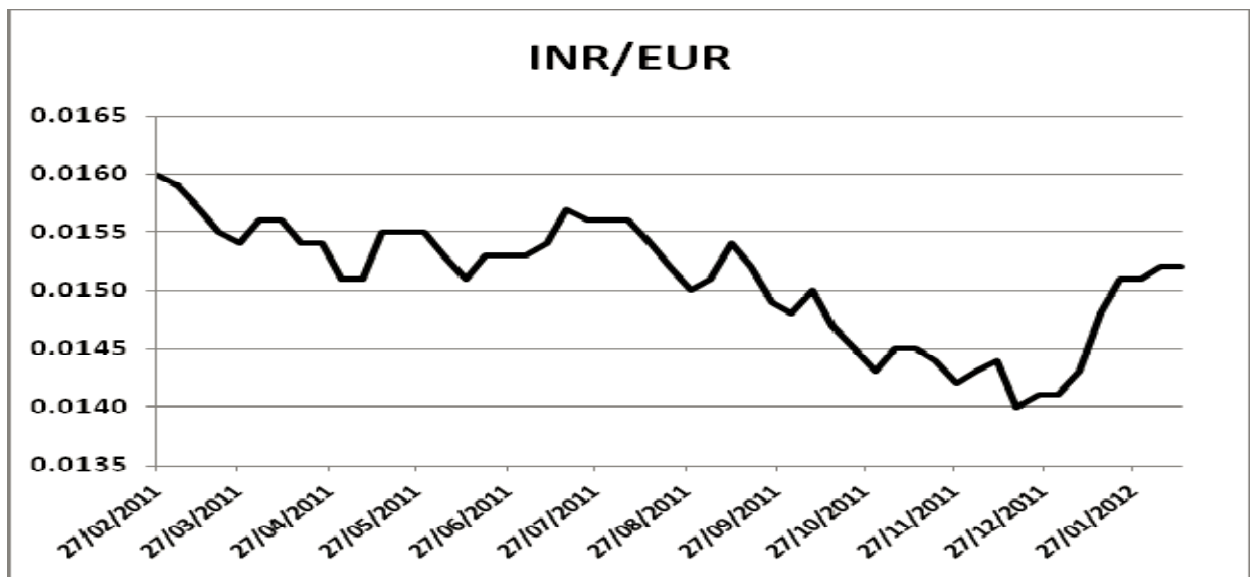
The RBI buys foreign currency (USD) to depreciate the domestic currency, and sells foreign currency when the domestic currency depreciates abnormally. Sometimes the RBI does not intervene at all. In April and May 2006, the Indian Rupee depreciated heavily in the wake of the fall of the BSE Index, but the RBI did not intervene, much as previously the Indian Rupee had appreciated (in January and February 2006) to such a level that it needed to be depreciated solely by market forces.

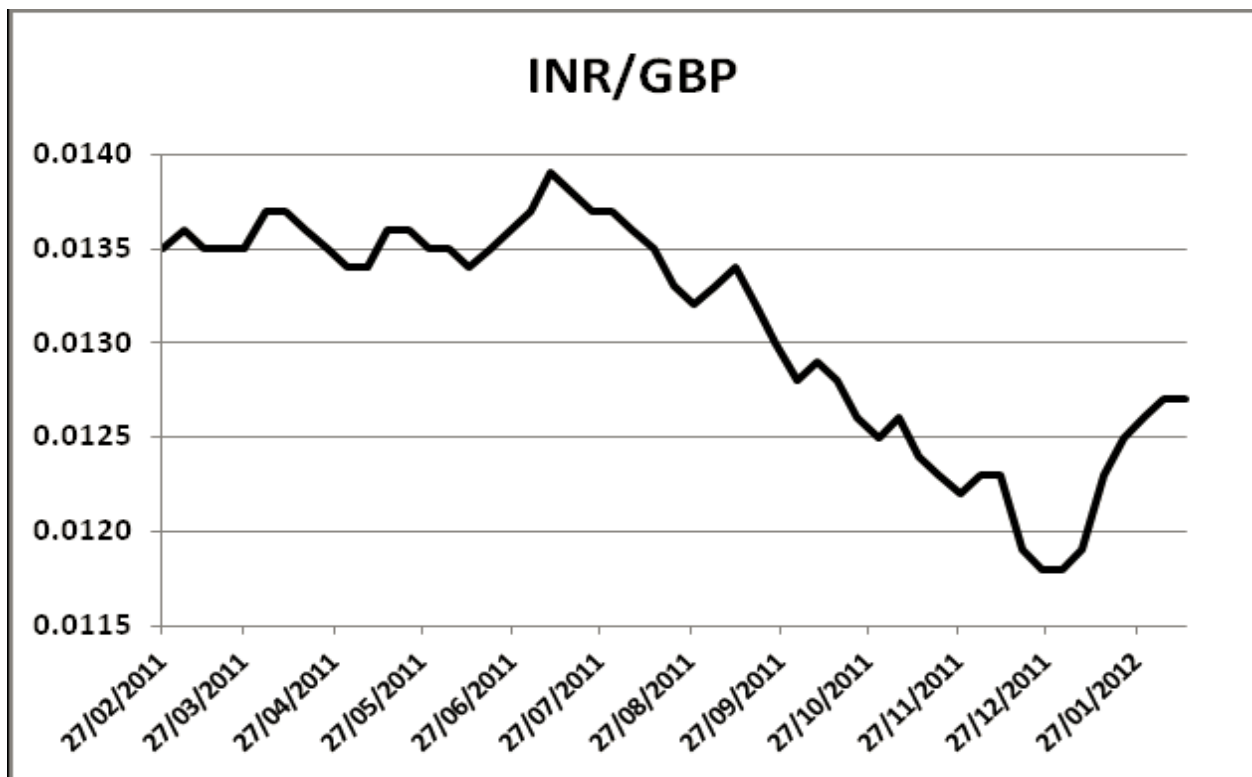
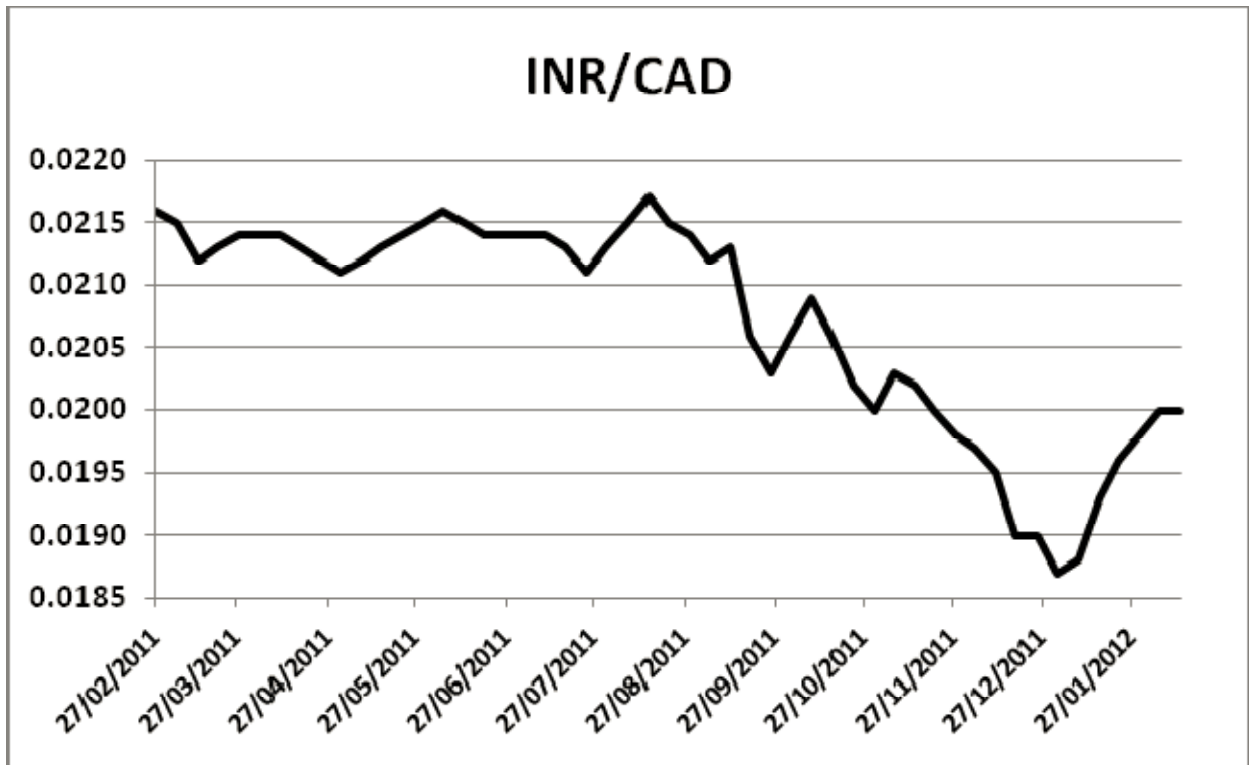
**Natural Calamities:** Natural calamities may also affect the currency market for a short period of time. In August 2005, Hurricane Katrina affected the entire region around the Gulf of Mexico. This region contributes around one-third of US oil production and accounts for around half of the nation's refining capacity. Besides, a large part of US oil imports reaches ports in this area. The hurricane caused a huge loss in production of crude oil and natural gas. It affected the prices of crude oil and prices shot up to around USD70 per barrel in a very short time. Automatically, the oil price increased globally and at the same time affected the exchange rate. Since India had to buy more USD to honor its import liability, the Rupee became weaker by around 60-65 paise against the USD.

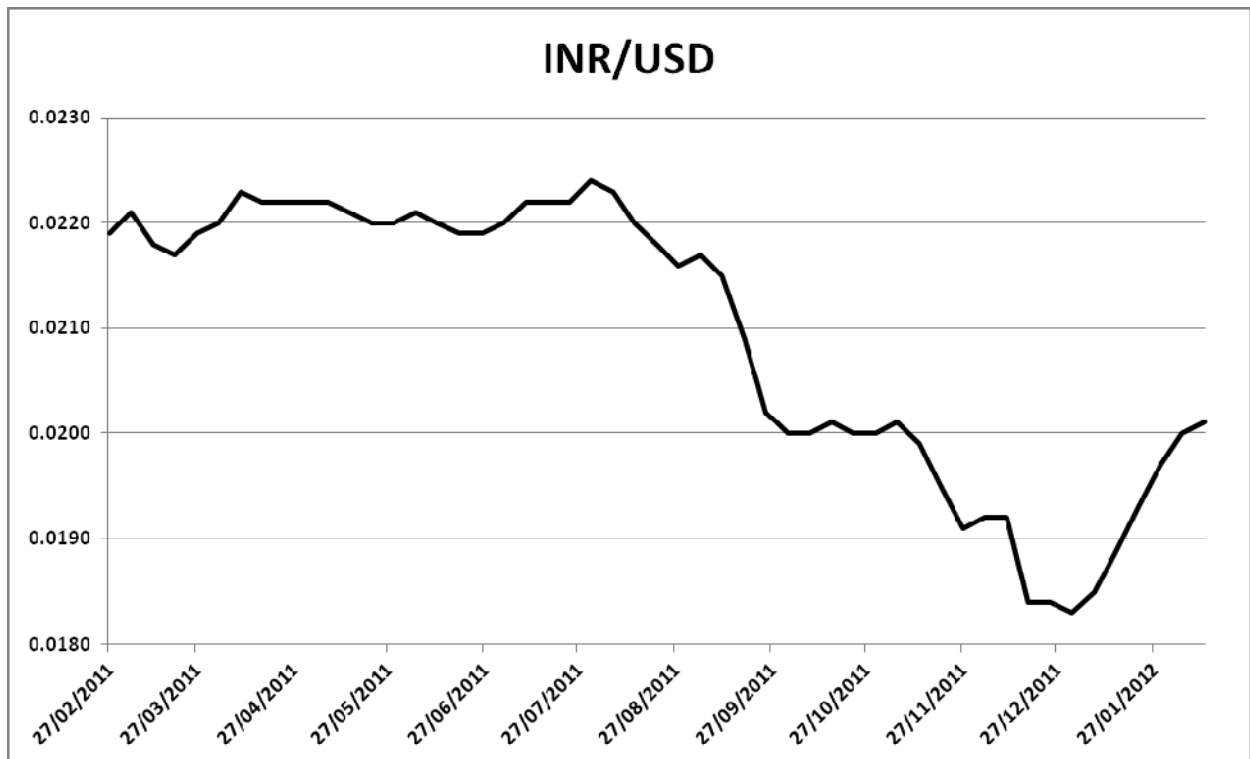
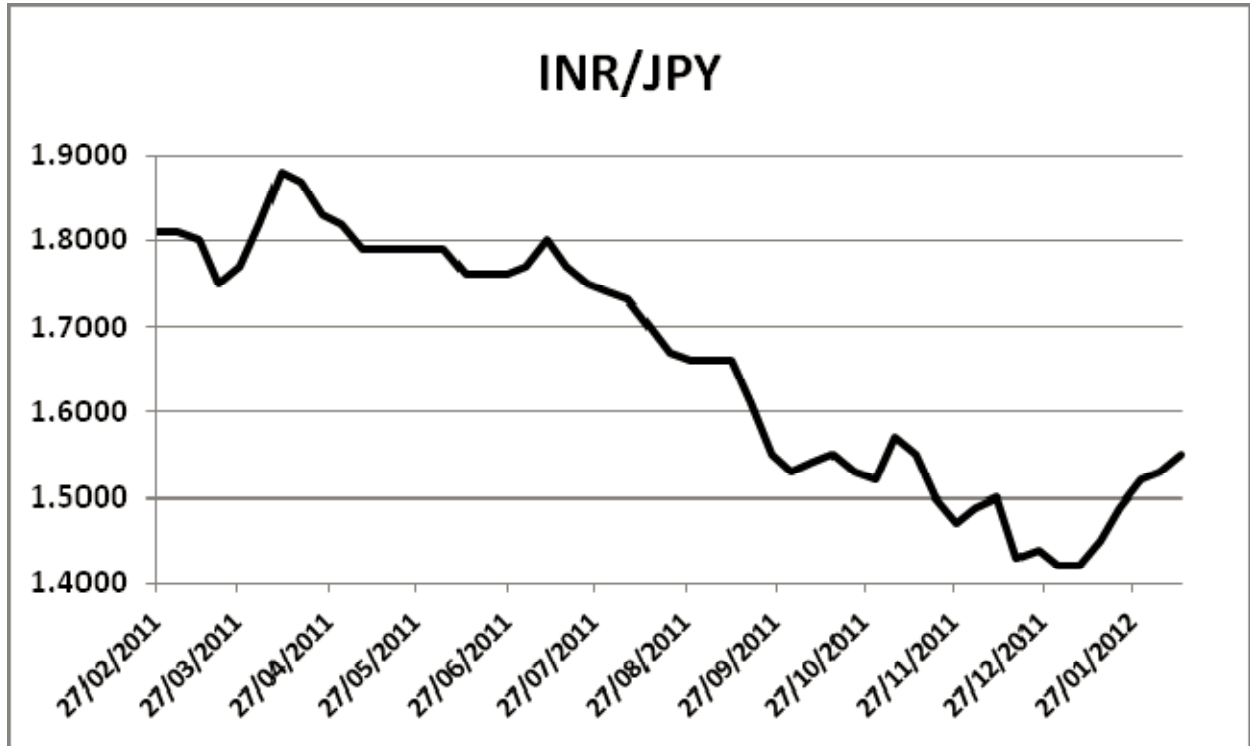


Source: Federal Reserve Bank of New York

Graphs depicting volatility of different Forex Exchange Rates (for the period ranging from February 2011-February 2012)

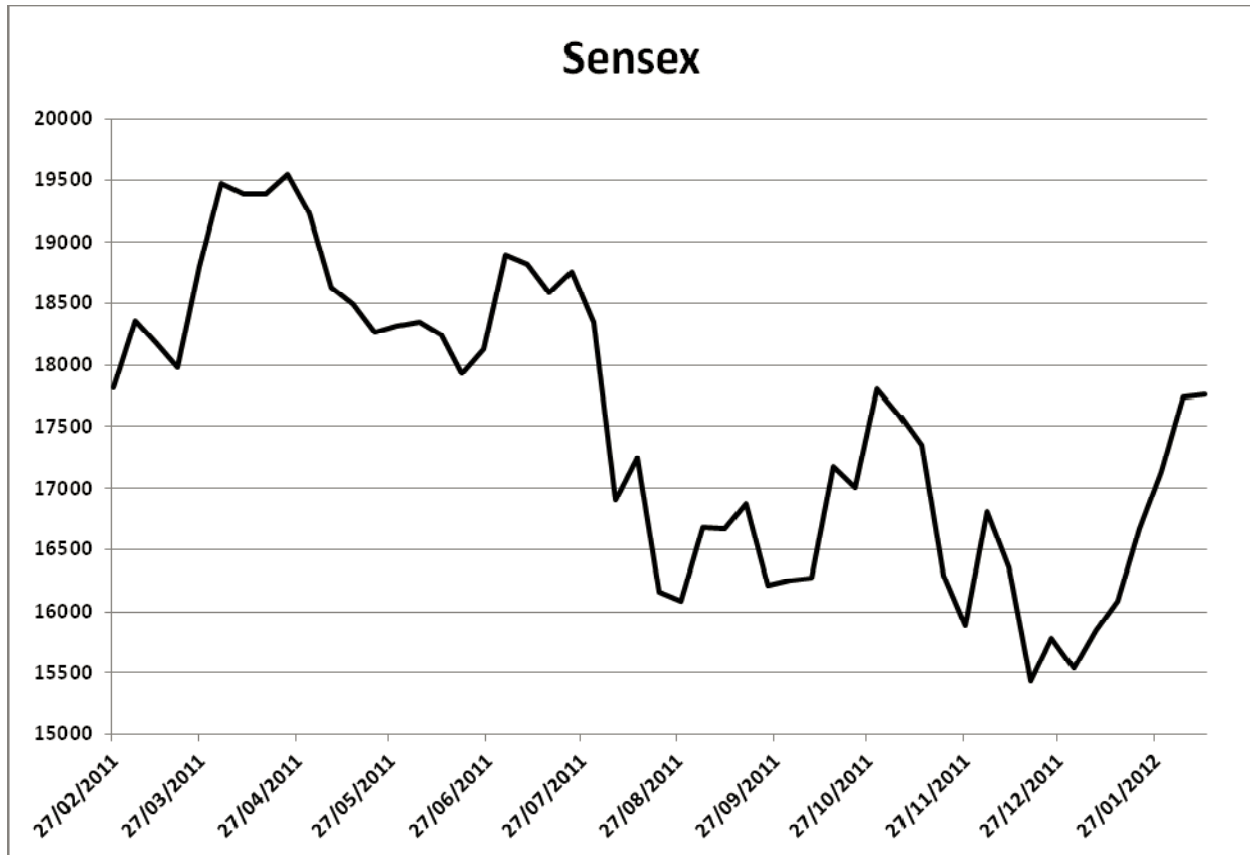






The above graph shows the volatility of INR/USD exchange rates for the same period, wherein it was observed that the period average was  $-0.0209$ , with the period lowest value being  $-0.0183$

and period highest value being  $-0.0224$ , this shows that the exchange rates during this period was highly fluctuating, the period since February 2011 till July end was mostly stable for INR/USD exchange rates wherein the exchange was prevailing on a higher end i.e. maintaining  $-0.022$  level but the period i.e. from August 2011 to January 2012 beginning was the period when rupee weaken the most in compared to US Dollar, but it again regained its value to the period's average value i.e. near to  $-0.02$  level.



The above graph shows the volatility of SENSEX value for the same period of 52 weeks, wherein it was observed that the period average SENSEX value was  $-17520.141$ , with the 52 weeks lowest value being  $-15440.100$  and highest value being  $-19538.520$ , this shows that the SENSEX was highly fluctuating as always, the period since February 2011 till July end the fluctuations were on higher side, the reason may or may not be the stable INR/USD exchange rates when the exchange was prevailing the higher end i.e.  $-0.022$  level but the after that i.e. the period from August 2011 to January 2012 beginning was the period when it started fluctuating on the lower sides and in the same period rupee weaken the most against US Dollar this could be

considered as one of the reason for SENSEX behaving like it did, but again it can never be the only reason of happening of the same. At closure SENSEX again behaved like INR/USD exchange rate as it again tried to regain its value after December last week was trading at the above mentioned average value.

**Table 1: Depicting correlation of different Forex Exchange Rates with SENSEX value**

Correlation	Sensex
INR-EUR	0.69
INR-GBP	0.77
INR-CAD	0.67
INR-USD	0.78
INR-JPY	0.86

- 1) The correlation values of all the five different currencies with SENSEX ranges from  $-0.69$ - $0.86$  which shows the amount of FII involvement in fluctuating value of SENSEX.
- 2) The values don't specify the weightage of either currency, due to which the minute variation exist in the correlation values of either of the currency with SENSEX.
- 3) INR-CAD being the least correlated exchange rate with a value of  $-0.67$  depicts that for every 1 unit rise in the exchange rate of the two currencies, there is a movement of 0.67 units i.e. more than  $2/3$ rd of the SENSEX value.
- 4) Similarly INR-JPY being the highly correlated with a value of  $-0.86$  depicts a similar movement in the SENSEX value.
- 5) US Dollar being the global currency and most demanded currency for facilitating International trade amongst different countries is also positively correlated with a value of  $-0.78$ , depicting more than  $3/4$ th movement of SENSEX value with 1 unit change in INR to USD value.
- 6) Like US Dollar, similar is the case of Global pound which shares almost similar correlation value i.e.  $-0.77$  with SENSEX, the reason for this could be same as was for US Dollar, as USA and UK are two countries which has high investments in Indian stock market and at the same

time are involved in trading of its major goods thereby affecting the exchange rates between the two currencies too.

7) The correlation value of IND-EUR and SENSEX value is  $-0.69$  which is extremely fair as the amount of investments and trade between European nations and India is less as compared to USA or UK. There is a not as such huge variation in all the values, hence it shows that all the countries affect our indices FII held by them.

## HYPOTHESIS TESTING

Let the null hypotheses is

$H_0 = \mu =$  the independent variable doesn't have any impact on stock market (Sensex).

And Alternative hypothesis is

$H_1 = \mu =$  the independent variable have impact on stock market (Sensex).

<b>t-Test: Two-Sample Assuming Unequal Variances</b>	<b>INR/USD</b>	<b>Sensex</b>
Mean	0.02	17520.14
Variance	1.77373E-06	1353369.35
Observations	51	51
Hypothesized Mean Difference	0	
Degree of Freedom	50	
t Stat	-107.55	
P(T<=t) one-tail	3.95251E-61	
t Critical one-tail	1.68	
P(T<=t) two-tail	7.90503E-61	
t Critical two-tail	2.01	

a) Independent Variable: INR-USD Exchange Rates

b) Dependent Variable: SENSEX Value

The above table represents analysis of variance; the table signifies the statistical validity which is used for testing Hypothesis.

In this table, T Stats value (calculated value) =  $-107.55$ .

Now, if we refer the T table with pre-determinant level of significant  $=0.05\%$



$$= -107.55 < 2.06.$$

Hence, Calculated Value < Table Value. But at the same time calculated value doesn't fall between  $-2.06$  and  $+2.06$ .

So, Null hypothesis  $=H_0=\mu$  is rejected and Accept the alternative hypothesis  $=H_1$

So, INR-USD Exchange Rates do affect the SENSEX price movements.

## Conclusion

In the era of globalization the Indian economy is no longer immune to international news and events, and reacts accordingly. Some countries are now considering converting some portion of their reserve into Euro from USD, and recently a number of international transactions have started moving from USD to Euro. These changing circumstances may influence the Euro-USD exchange rate. Also, many corporate are now entering into derivative contracts to protect future cash outflow.

Further, some corporate also consider options such as double-no-touch barrier, particularly when entering into contract-like structure deposits on foreign currency denominated fund. While entering into such transactions, a corporate has to look into all factors that may influence the exchange rate of the currency pair (such as USD-INR, Euro-USD and USD-JPY, and also perhaps USD-CHF and GBP-USD).

Nowadays many corporate take Term Liability and enter into transactions by which they can reduce the Rupee interest burden by swiping the same liability into Japanese Yen (JPY), as interest rate on JPY is lower than that on the Indian Rupee. But in this type of transaction, the corporate is exposed to the currency risk of both USD-INR and USD-JPY.

In India, direct quotation for USD-INR is available, but direct exchange rate between other foreign currencies (other than USD) and the Indian Rupee is not available. So, if any corporate has to buy JPY to honor its financial liability on the maturity date, it has to undertake two transactions. First of all it will have to buy USD from Indian market against Indian Rupee. Then it will have to buy JPY from the international market against the said USD. At the same time, the

corporate has to bear the cost of two transactions in the form of margin, etc. So, in this type of transaction the corporate has to be well-informed about factors that may influence not only USD-INR but also USD-JPY.

Some corporate may even undertake such transactions through the Swiss Franc (CHF), if they feel this is less volatile than JPY. Since different currencies react for different reasons and economic fundamentals, it has been noticed many times that the Indian Rupee may depreciate against the USD, while at the same time other major currencies appreciate against the USD or remain unchanged. Corporate have to pay attention to all factors that may influence the currency market, and only then they can take a correct stance.

It has been noticed that despite interest rate hike by FED, the USD depreciates gradually in comparison to other major currencies, primarily due to the release of negative data about current account deficit in the US. It has also been observed that an increase in the Repo rate by RBI results in the Indian Rupee getting marginally stronger against the USD (as it happened on 9th June, 2006), but at the same time due to positive data released on the US trade deficit, the USD was still strong against other major currencies, including the Euro.

A large portion of India's import payment is mainly for payment of oil. Internationally, crude prices are named as BRENT, NYMEX, and Dubai Crude. Whenever there is any hike in the oil price per barrel, the Indian Rupee depreciates against the US Dollar. As such, the Indian Government buys more USD against INR to honor the import liability, resulting in heavy demand for USD.

The bottom line exists as long gone are the days of the fixed exchange rate regime, when corporate executives used to be ill-informed about international news, movement of oil prices or other factors influencing the currency market, as in today's scenario many factors are inter-related or one could say interdependent on each other, like in the present study forex exchange rates affects the stock market of any country where the amount of FII involvement is high and vice-versa.

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