A STUDY ON EXCHANGE RATE FLUCTUATIONS AND ITS IMPACT ON BSE

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Abstract :

The stock market is often considered as the primary indicator of countries' economic strength and development. Now a days more volatility of share prices in the stock market is related to exchange rates, as most of the companies are multinational companies. The main objective of this study is to analyze the relationship between BSE Sensex and Exchange rates of various currencies with respect to rupees. For the purpose of this study, daily prices of BSE Sensex returns and five exchange rates (USD, Euro, Yen, GBP and SGD) for five years are taken. This study uses the data from the period starting Jan 2009 till Dec 2013. Tools used for the study is test of co-linearity, Regression Analysis and Augmented Dickey Fuller test. The results of the study indicates exchange rates have affected the stock indices greatly during the year 2009 to 2013.

Key words : *BSE Sensex, Exchange rate, Augmented Dickey Fuller test, Co-linearity.*

1. Introduction

Financial Markets play an essential role in establishing a balanced and efficient financial system of a countries economy. Various internal and external factors affect the working of the stock market directly or indirectly. The link between the macroeconomic variables and the stock markets are well evidenced in the literature.

Literature that investigates the link between Exchange rate and Stock prices is not conclusive. There exists two major theories related to financial markets. The first approach concludes that exchange rates should lead to Stock prices . Exchange rate fluctuations that affect the value of the firm through changes in competitiveness and changes in the firm's assets and liabilities in foreign currency, eventually affect firm's profits and the value of equity showing a positive effect. Contrarily, changes in stock prices may affect the movements in Exchange rate through portfolio adjustments (inflow/outflow of foreign capital). If there is a persistent upward trend in stock price, inflows of foreign capital would increase. A decrease in stock price would cause a reduction in domestic investor's wealth leading to a fall in the demand for money and lower Interest rates, causing capital outflows that would result in currency depreciation. Therefore under this approach, stock prices would lead Exchange rates with a negative correlation (Fama, 1970).

Exchange Rate

Exchange rate is the price of a nation's currency in terms of another currency. An exchange rate thus has two components, the domestic currency and a foreign currency, and can be quoted either directly or indirectly. In a direct quotation, the price of a unit of foreign currency is expressed in terms of the domestic currency. In an indirect quotation, the price of a unit of domestic currency is expressed in terms of the foreign currency. An exchange rate that does not have the domestic currency as one of the two currency components is known as a cross currency, or cross rate.

Exchange rates can be floating or fixed. While floating exchange rates – in which currency rates are determined by market force – are the norm for most major nations, some nations prefer to fix or peg their domestic currencies to a widely accepted currency like the US dollar.

Exchange rates can also be categorized as the

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spot rate – which is the current rate – or a forward rate, which is the spot rate adjusted for interest rate differentials.

2. Importance of Stock Markets

The stock market is one of the most important sources for companies to raise money. This allows businesses to be publicly traded, or raise additional capital for expansion by selling shares of ownership of the company in a public market. The liquidity that an exchange provides affords investors the ability to quickly and easily sell securities. This is an attractive feature of investing in stocks, compared to other less liquid investments such as real estate. History has shown that the price of shares and other assets is an important part of the dynamics of economic activity, and can influence or be an indicator of social mood. An economy where the stock market is on the rise is considered to be an upcoming economy. In fact, the stock market is often considered the primary indicator of a country's economic strength and development. Rising share prices, for instance, tend to be associated with increased business investment and vice versa. Share prices also affect the wealth of households and their consumption. Therefore, central banks tend to keep an eye on the control and behavior of the stock market and, in general, on the smooth operation of financial system functions. Exchanges also act as the clearinghouse for each transaction, meaning that they collect and deliver the shares, and guarantee payment to the seller of a security. This eliminates the risk to an individual buyer or seller that the counterparty could default on the transaction. The smooth functioning of all these activities facilitates economic growth in that lower costs and enterprise risks promote the production of goods and services as well as employment. In this way the financial system contributes to increased prosperity.

3. Review of Literature

Richard A Ajayi, Joseph Friedman and Seyed M Mehdian (1998) employed monthly and quarterly data on a set of advanced and emerging economies from 1973- 1983 to examine the relationship between real stock return differentials and changes in real exchange rates. Findings provided evidence to indicate unidirectional causality between the stock and currency markets in all the advanced economies but no consistent causal relations were observed in emerging economies. (Vol.9, Issue-2, Page: 241-251).

Abhay Pethe and Ajit Karnik (2000) applied the techniques of unit root tests, co integration and long run Granger non-causality test and tested the causal relationships between stock market index and exchange rate for India. The results showed that there is no long or short run association between stock prices and exchange rates for India. (Economic and Political Weekly 35: 5: 349-356).

Nath and Samanta (2003) employed the Granger causality test on daily data during the period March 1993 to December 2002. The empirical findings of the study suggest that these two markets do not have any causal relationship. When the study extended its analysis to verify if liberalization in both the markets brought them together, it was found that no significant causal relationship between the exchange rate and stock price movements, except for the years 1993, 2001 and 2002 during when a unidirectional causal influence from stock index return to return in forex market is detected and a very mild causal influence in the reverse direction is found in some years such as 1997 and 2002. (www.papers.ssrn.com, Date posted: 7th Dec 2003).

Alok Kumar Mishra S (2004) in his article "Stock Market and Foreign Exchange Market in India: Are they Related?" attempts to examine whether stock market and foreign exchange markets are related to each other or not. The study uses Granger's Causality test and Vector Auto Regression technique on monthly stock return, exchange rate interest rate and demand for money for the period April1992 to

March 2002.The major findings of the study states that there exists a unidirectional causality between the exchange rate and interest rate and between the exchange rate return and demand for money; and there is no Granger's causality between the exchange rate return and stock return (South Asia Economic Journal, Vol.5, Issue 2,Page 209-232)

Akshay Madhava Y S and Mihir Dash (2008) have conducted a study on the impact of Currency Fluctuations on the IT Sector of India. The study encompasses 44 Indian IT companies, and employs Bodnar and Marston's model to calculate forex exposure. Further the correlation between forex exposure and the profitability measures of the companies is observed in addition to calculation of standard deviation and mean of companies' forex. The results of the study showed that FOREX exposure was especially alarming for a small fraction of small-cap IT companies. The mid-cap and large-cap IT companies had relatively low/moderate exposure levels. The majority of large-cap companies had already hedged their FOREX risk, and was not significantly affected by their respective FOREX exposures. (www.papers.ssrn.com, Date posted:18th Jan 2009)

From the above review literature, it is observed that many studies have been undertaken to find the relationship between exchange rate market and the general stock market in India as well as other countries. However, it has been identified that very few research has been carried out on the specific share prices of the export and import oriented sectors of India, which has been conducted in the following report.

4. Statement of the problem

The purpose behind this study is to determine the extent to which stock index returns are impacted by fluctuations in exchange rates. The exchange rate fluctuation caused by several factors for example changes in export and import, changes in revenue and expenditure, changes in profit, changes in dividends, natural calamities and hence changes in share price.

Nowadays more volatility of share prices in the stock market is related to exchange rates as most of the Companies are becoming Multinational Companies. The exchange rate fluctuation caused by several factors (discussed earlier) is a traditional worry to companies. It causes changes in exports and imports, leading to changes in revenue and expenditure, followed by changes in profits, changes in dividends, and hence changes in share prices. If the rupee appreciates, revenue of the exporting companies will decrease. Sometimes the profit earned by the exporting companies would become loss when converted to Indian Rupee. For an importing company, the depreciation of a rupee during wide fluctuations in the exchange rate, would turn profit into loss while converting to Indian Rupee. A slight appreciation or depreciation of a rupee would lead to changes in profit of the companies which in turn leads to changes in dividend and return available to the investors. Fluctuations in the exchange rate have a different impact on different sectors. Some sectors have a large impact while some sectors are not affected. Investors in order to reduce the volatility in the return of investment must invest in those sectors the share prices of which are not affected to a large extent due to fluctuations in the stock price.

5. Objectives of the Study

1. To analyze the relationship between BSE Sensex and exchange rate.
2. To study the effect of exchange rates on BSE returns.
3. To enable the investors in exploring the investment opportunities using the INR, USD, EURO, GBP, SGD exchange rates.

6. Hypothesis

H0– Exchange rate does not have a significant impact on stock index returns.

H1 – Exchange rate has a significant impact on stock index returns

7. Methodology

This study is based on secondary data. Daily returns of BSE Sensex and five exchange rates (USD, EURO, YEN, GBP and SGD) for five years are considered for this study. The span of the study is from January 2009 to December 2013. The data collected was analyzed with the help of statistical tools like test of Co-linearity, Regression Analysis, and Augmented Dickey Fuller (ADF) test.

This study is limited to five years and only five currencies have been compared.

8. RESULTS, ANALYSIS AND DISCUSSION

8.1 Test of co-linearity among independent variables:

Co-linearity is the term used to explain the independence of one variable to another. When variables are highly correlated they both express basically the same information. Statistically there should not be any multi co-linearity because if they exist, then independent variables are redundant and do not add any predictive value over each other. Therefore Pearson correlation coefficient has been used to arrive at the co-linearity among independent variables. First, bivariate correlation among the independent variables was examined to find out the multi co-linearity problem. The existence of correlation of more than 0.70 indicates that there is problem of multi co-linearity (Lewis-Back 1993). None of the pair-wise coefficient of correlation was more than 0.70. So, examination of correlation among the explanatory variables found no multi colinearity problem.

TABLE 1: Correlation matrix among the independent variables considered

	BSE SENSEX	*USD*	*EURO*	*GBP*	*Yen*	*SGD*
BSE SENSEX	1					
USD	0.226053354	1				
EURO	0.261760906	0.898294	1			
GBP	0.361853358	0.948293	0.941067	1		
Yen	0.238193834	0.634772	0.468618	0.656276	1	
SGD	0.492599897	0.918974	0.828625	0.926807	0.759652	1

Analysis:

From the above correlation matrix it is evident that all the currencies have weak correlation with SENSEX and all other currencies have a strong correlation with USD. Hence USD alone can be used to predict the relationship between exchange rate and SENSEX.

8.2 REGRESSION ANALYSIS

Multiple regression analysis is a powerful technique used for predicting the unknown value of a variable from the known value of two or more variables- also called the predictors.

H0: There is no relationship between exchange rate and SENSEX return

H1: There is relationship between exchange rate and SENSEX return

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.8722
R Square	0.7608
Adjusted R Square	0.7598
Standard Error	1270.6797
Observations	1243

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	6.352E+09	1.27E+09	786.7672	0
Residual	1237	1.997E+09	1614627		
Total	1242	8.349E+09			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	29802.6457	557.5949	53.4486	0.0000	28708.7095	30896.5819
USD	-918.4945	22.7460	-40.3805	0.0000	-963.1195	-873.8695
EURO	-269.4613	19.8883	-13.5487	0.0000	-308.4798	-230.4427
GBP	365.8807	21.4650	17.0455	0.0000	323.7689	407.9926
Yen	-29161.2904	1009.1283	-28.8975	0.0000	-31141.082	-27181.498
SGD	1036.4833	21.9437	47.2338	0.0000	993.4324	1079.5343

Analysis

- The "R Square 0.7608" indicates that 76.08% of the variability in share returns, around the sample mean share return, is associated with the exchange rate.
- The column labeled F gives the overall F-test of H0 and H1
- The column labeled significance F has the associated p-value. From the ANOVA table the F-test statistic is 786.7672 with p-value '0'. Hence Reject H0 and accept that there is a relationship between exchange rate and SENSEX return.

Inference

- The "R Square of 0.7608" indicates that the explanatory power of this regressions very strong.
- The coefficient of all the currencies have p-value of 0.0000 < 0.05. It is therefore concluded that relationship is statistically significant at significance level $\alpha = 0.05$. Hence, all the exchange rates have significant impact on SENSEX.

8.3 ADF (Augmented Dickey Fuller) TEST

In statistics and econometrics, an augmented Dickey–Fuller test (ADF) is a test for a unit root in a time series sample. It is an augmented version of the Dickey–Fuller test for a larger and more complicated set of time series models. The augmented Dickey–Fuller (ADF) statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence. Stationarity is used as a tool in time series analysis, where the raw data are often transformed to become stationary, for example, economic data are often seasonal and/or dependent on the price level. Processes are described as trend stationary if they are a linear combination of a stationary process and one or more processes exhibiting a trend. Transforming this data to leave a stationary data set for analysis is referred to as detrending. Before doing

regression analysis, it is necessary to test whether the time series are stationary at levels by running Augmented Dickey fuller (ADF) test on the series. Because most time series are non-stationary in levels, and the original data need to be transformed to obtain stationary series.

Constraint	ADF Values	Critical values
BSE Return	-21.056975*	1%(-3.435505) 5%(-2.863693) 10%(-2.567945)
US Dollar	-9.455525*	1%(-3.455525) 5%(-2.863709) 10%(-2.567952)
Euro	-10.720470*	1%(-3.435536) 5%(-2.863711) 10%(-2.567953)
Yen	-10.866148*	1%(-3.435531) 5%(-2.863709) 10%(-2.56952)
GBP	-10.747067*	1%(-3.435536) 5%(-2.863711) 10%(-2.567953)
SGD	-9.859107*	1%(-3.435531) 5%(-2.863709) 10%(-2.567952)

Where,

(** indicates acceptance of null hypothesis)

(* indicates rejection of null hypothesis)

Analysis

After conducting the ADF test the value of t-statistic are lesser than critical values and probability are 0.00000 at 1st difference for all the currencies.

Inference

After running the ADF test, ADF t-Statistic value is the lowest (highest negative value) as compared to the critical values at 1%, 5% and 10% level of significance. Thus null hypothesis rejected. So, the time series is stationary for all the currencies.

9. CONCLUSION

To conclude we can say that though many studies in various countries suggest that Exchange rate has a huge impact on stock prices and returns, the study conducted by us confirms the earlier findings. Stock indices BSE being representative of the economy and financial situation are affected by exchange rate. As per our study exchange rate has affected stock indices greatly from the year 2009 to 2013. It is evident from the Correlation matrix that there exists a strong correlation between the currencies considered for the study with USD. The existence of correlation between USD and Sensex is also noticeable. Hence USD can be used to predict the relationship between exchange rate and Sensex. Regression analysis also confirms that relationship is statistically significant at 5% level of significance with significant impact on Sensex . It is also evident that the series are stationery at first difference. So the relation between the Forex markets and the stock markets exists and the need to study the impact becomes necessary mainly for the investors, policy makers and researchers. Findings of the study have some important policy implications. It is evident that exchange rate incorporates some significant data in forecasting stock prices and its performance.

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