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# A Study of Relationship between Exchange Rate Volatility and Banking Indices (BANEX) - An Indian Perspective

**Dr. Amit Kumar Sinha**

Associate Professor, Amity Business School, Amity University, Lucknow

**Dr. Suresh Kumar Sahoo**

Associate professor, DREAMS B-School, Cuttack

**Deepak Pattanaik**

Sr.Lecturer SAI International School, Bhubaneswar

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## Abstract

*There has been an extensive debate on measuring the sensitivity of returns of stocks. Particularly some Internal and External conditions are involved in measuring the sensitivity of returns of stocks like; industrial Production, money Supply, Foreign exchange Rate, Interest rate, gold prices, GDP and oil prices in the world economy are involved in external conditions whereas dividend policy, earning per share etc are the contributors of internal factors. This paper examines the impact of Macro (External) factor i.e. Exchange rate on BSE Bankex. Macroeconomic indicators are already exhibiting signs of deterioration as Rupee is depreciating against dollar. Especially, an attempt has been made to explore the relation between stock market performance and exchange rate. The results are mixed but interesting whereas, there is significant correlation between stock market and exchange rate.*

**Keyword:** Stock Market, macro economic variables- exchange rate, BSE-Bankex

## 1. Introduction

In the era of globalization, stock market plays a crucial role in countries economic growth and development. It has been considered a healthy and flourishing stock market is essential for national economic growth by channelizing funds towards different sectors. An economy is said to be efficient if it has a good banking system and good stock market exhibiting upward trend (Kumari Jyoti, 2011). It is obvious that the performance of any business organization get influenced not only by the domestic factors but also by the international factors, in this condition the most easily available indicator of firm performance i.e. stock indices may also get influenced by the international macro-economic factors. Under this assumption the researcher has taken the current research topic.

India has experienced a transformation of its exchange rate regime during the past several decades. From 1947 to 1991, the fixed exchange regime was adopted; under this the Indian rupee was initially pegged to gold, then to the British pound sterling in December 1971 and to a basket of currencies in September 1975. Subsequently, against the background of the balance of payment crisis in June 1991, India implemented economic and financial liberalization, as a part of which it decided to shift to the market- determined level against the dollar for a while

thereafter, however, it has only been since 1995 that the rupee has begun to exhibit relatively volatile two-way movements. Under the managed float regime, the Reserve Bank of India (RBI), announced that the exchange rate is largely determined by the demand and supply conditions in the market (Jalan 1999, 1126).

The Government of India framed its policies in the year 1991-92, keeping in view the benefits of liberalization. It was expected that in the process of opening up its economy to the outside world, increased competition could turn the banks more efficient, bring about improvement and ultimately benefits the customers (ICFAI, 2004). Although globalization helped banks to improve in a number of ways but it has also brought international risk exposure to the banks.

Banks, actively deal in foreign currencies holding assets and liabilities in foreign denominated currencies, are continuously exposed to Foreign Exchange Risk. Foreign Exchange risk arises when a bank holds assets or liabilities in foreign currencies which impact on the earnings and capital of bank due to the fluctuations in the exchange rates. It is difficult to predict the fluctuations in exchange rate- it can move in either upward or downward direction regardless of what the estimates and

predictions were. This uncertain movement poses a threat to the earnings and capital of bank. The bank is exposed to foreign exchange risk only upto the extent to which it has not hedged or covered its position. Wherever there is any uncertainty that the future exchange rates will affect the value of financial instruments, there lies the foreign exchange risk of a bank. Foreign Exchange risk does not lie where the future exchange rate is predefined by using different instruments and tools by the bank.

Banks are the major part of any economic system. These banks provide a strong base to Indian economy. Even in share markets also, the performance of bank shares is of great importance. It can be justified only looking at the indices change in both BSE and NSE for banking Sector Shares. So far as our study concern we have taken only BSE Bankex. Thus, the performance of share market, the rise and fall of market is greatly affected by the performance of Banking Sector Shares and this paper analyzes the impact of exchange rate on BSE Bankex.

## 1.1 BSE BANKEX

Bombay Stock Exchange Limited launched "BSE BANKEX Index" on 23<sup>rd</sup> June 2003. This index consists of major Public and Private Sector Banks listed on BSE. The BSE BANKEX Index is displayed online on the BOLT trading terminals nationwide.

### 1.1.1 Features of Bankex

A few important features of the BANKEX are given below:

- Bankex tracks the performance of the leading banking sector stocks listed on the BSE.
- Bankex is based on the free float methodology of index construction.
- The base date for Bankex is 1<sup>st</sup> January 2002. The base value for Bankex is 1000 points. BSE has calculated the historical index values of Bankex since 1<sup>st</sup> January 2002.
- Date of launch is 23<sup>rd</sup> June, 2003.
- 14 stocks which represent 90 percent of the total market capitalization of all banking sector stocks listed on BSE were included in the index.
- The index is disseminated on a real time basis through BSE online trading (BOLT) terminals.
- Initially 12 stocks were included in the BSE Bankex. The stocks in the index were Andhra Bank, Bank of Baroda, Bank of India, Canara Bank, Corp Bank, HDFC Bank, ICICI Bank Ltd, ING Vysya, Oriental Bank of Commerce, Punjab National Bank, SBI and Union Bank of India Ltd.
- But later on a number of replacements took place and now finally these 14 stocks are a part of BSE Bankex. Bank Ltd, Bank of Baroda, Bank of India Ltd, Canara Bank, Federal Bank Ltd, HDFC Bank Ltd, ICICI Bank Ltd, IDBI Bank Ltd, Indusind Bank Ltd, Axis, Kotak Mahindra Bank Ltd, Punjab National Bank, State Bank of India, Union Bank of India, Yes bank.

## 2. Literature Review

The existence of a relationship between stock prices and exchange rate has received considerable attention. Early studies (Aggarwal, 1981; Soenen and Hennigar, 1988) in this area considered only the correlation between the two variables-exchange rates and stock returns. Theory explained that a change in the exchange rates would affect a firm's foreign operation and overall profits which would, in turn, affect its stock prices, depending on the multinational characteristics of the firm. Conversely, a general downward movement of the stock market will motivate investors to seek for better returns elsewhere. This decreases the demand for money, pushing interest rates down, causing further outflow of funds and hence depreciating the currency. While the theoretical explanation was clear, empirical evidence was mixed. It was Maysami-Koh (2000), who examined the impacts of the interest rate and exchange rate on the stock returns and showed that the exchange rate and interest rate are the determinants in the stock prices. It was in 1992 that Oskooe and Sohrabian used Cointegration test for the first time and concluded bidirectional causality but no long term relationship between the two variables. Najang and Seifert(1992), employing GARCH framework for daily data from the U.S, Canada, the UK, Germany and Japan, showed that absolute differences in stock returns have positive effects on exchange rate volatility. Ajayi and Mougoué in 1996 picked daily data from 1985 to 1991 for eight advance economic countries; employed error correction model and causality test and eventually discovered that increase in aggregate domestic stock price has a negative short-run effect and a positive long-run effect on domestic currency value. On the other hand, currency depreciation has both negative short-run and long-run effect on the stock market. Abdalla and Murinde(1997) used data from 1985 to 1994, giving results for India, Korea and Pakistan that suggested exchange rates Granger cause stock prices. But, for the Philippines the stock prices lead the exchange rates. Furthering into Indian context, work in this area for the Indian Economy has not progressed much. Abhay Pethe and Ajit Karnik (2000) has investigated the inter – relationships between stock prices and important macroeconomic variables, viz., exchange rate of rupee vis - a-vis the dollar, prime lending rate, narrow money supply, and index of industrial production. The analysis and discussion are situated in the context of macroeconomic changes, especially in the financial sector, that have been taking place in India since the early 1990s.

(Oguzhan Aydemir, 2009) Investigates the causal relationship between stock prices and exchange rates; using data from 23 February 2001 to 11 January 2008 about Turkey. The major investigating Question was that whether a connection between the exchange rate and the stock prices exists or not. To perform the study, work of many prior related researches was considered and mostly secondary data was collected whose dates are mentioned above. To find the observed results Augmented Dickey-Fuller (ADF), Phillips- Perron (PP) and KPSS tests were run. The main variables used in the research

are turkey stock exchange index National 100, services, financials, industrial, and technology indices are taken as stock price indices. The outcome of empirical study specifies that there is bi-directional causal association between exchange rate and all stock market indices. While the negative causality exists from national 100, services, financials and industrials indices to exchange rate (sustaining portfolio balance approach), there is a positive causal relationship from technology indices to exchange rate. On the contrary, negative causal relationship from exchange rate to all stock market indices is determined.

(Charles Adjasi, 2008) Investigates the relationship among the Stock Market and the Foreign exchange Market and determined its impact upon the Ghana Stock Exchange. The study was conducted keeping in mind two main research questions. The first was to determine whether exchange rate volatility has an impact on the Ghana stock market. Second main research question was to determine if other macroeconomic variables effect stock market volatility in Ghana. The variables used to form the model for testing were Exports and Imports, Treasury bill rates, money supply, foreign exchange rates, Trade deficit and Ghana stock exchange indices. To determine the relation among the variables, the method of "The Exponential Generalised Autoregressive Conditional Heteroskedascity (EGARCH)" was used. This is majorly used to model the conditional variance in the financial market and is given preference over GARCH model. Prior to running the regressions, a stationary test was run to eliminate any suppression in the model. The results found that there exists a negative relation between the exchange rate volatility and stock market returns. If the local currency depreciates, the stock market returns increase in the long run whereas in the short run, the returns are reduced.

Stavarek, Daniel (2008) This paper has examined the relation between the stock prices and the exchange rate with their mutual interactions in the USA and European Union. To find relations among certain sorts of variables in the financial markets, the previous scholars have run unit root tests to reduce the problems in the regression because of these non stationary macroeconomic variables in a time series. Four old, four new EU countries and USA were chosen for the samples of the variables. Nominal Exchange rates and real Exchange rates were incorporated in monthly form of data. The local stock indices embodied into monthly data lead to some confusion due to the fact that different countries calculated the stock indices differently; hence to reduce the confusion national stock indices with uniform methodology was used. The sample period for each country varied depending upon the availability of the data. NEER, for Austria, France, Germany, UK, and the USA the sample period is December 1969 till December 2003; for Poland December 1993 till December 2003; for the Czech Republic December 1994 till December 2003; for Hungary January 1995 till December 2003 and for Slovakia June 1995 till December 2003. For the Real Exchange rates, sample period for the first group of the countries is January 1978 till December 2003 for others

it is the same as the data for nominal exchange rates. To test the said variables first of all the stationary test and co integration analysis was run. The results showed that exchange rates and stock market indices proved to be co integrated in six out of nine analyzed countries. The time series for Hungarian and Poland are identified to be 0, hence the such results are termed as invalid and do not involve into further analysis. Hence then a Vector Error Correction and Granger Causality Test was run to identify the problematic areas in the regression model and to know what causes what in the model on the said variables. As the time period is divided into two categories, the first being 1970–1992 and the second being 1993 to 2003, in the first category the long run relationship between the said variables did not exist, reason might be due to the under estimation of the prevailing exchange rate arrangements in the developed countries. Under the Brettonwood system there was little fluctuations within a tightened frame in the nominal Exchange rate which provided little space for exchange rate volatility. In the second period from 1993-2003 shows much stronger long run causalities in the developed countries. In four out of the nine selected economies, co integration between the stock prices and the exchange rate existed. The nature of the relationship however was not consistent in all the cases. In case of United Kingdom and United States of America, there was evident movement in the stock market as a result of exchange rate developments.

Muhammad (2001), in his article has examined whether stock prices and exchange rates are associated to each other or not. The investigation is based upon secondary data which is collected on South Asian countries, including Pakistan, India, Bangladesh and Sri- Lanka, for the period January 1994 to December 2000 on a month-on-month basis. The methodology used for this study is co-integration, vector error correction modelling technique and typical Granger causality tests to observe the long-run and short-run association between stock prices and exchange rates. Variables used for this study are key stock price indices of these countries and the exchange rates between the currencies of these countries with respect to the U.S. dollar. Outcome shows no long run and short-run association connecting stock prices and exchange rates for Pakistan and India. This can be associated to the manipulation in trading activities in these emerging markets in the form of insider trading and manipulated annual reports. No short-run association was also found for Bangladesh and Sri- Lanka. However, there seem to be a bi-directional long-run causality between these variables for Bangladesh and Sri Lanka.

Most past studies on the relationship between stock prices and exchange rates are based on bivariate estimation. However, the theoretical explanations indicate the existence of some other variables, which may interact with exchange rates and stock prices. Thus, multivariate estimation is necessary. In fact, further studies have been carried out employing a multivariate framework

### 3. Rationale of the Study:

Number of macro economic indicators which influence stock markets have been analyzed in past and recent empirical literature.

Most of the previous studies only focused on the stock market as a whole ignoring the effects of these variables on different sectors of the economy (Ahmed et al.,2010, Hussain, Mahmood, 2001), while this is significant but investor must understand that different sectors of the economy react differently to changes in macro economic variables.

The present study is an endeavour to analyze the relationship between exchange rate volatility and banking indices (Bankex) movement in India. The analysis on stock markets has come to the fore since this is the most sensitive segment of the economy and it is through this segment that the country's exposure to the outer world is most readily felt. This paper attempts to examine how changes in exchange rates and Bankex are related to each other over the period July 2012- February 2014.

### 4. Objectives & Hypothesis of the Study:

Research study aimed at understanding and revealing the relationship between exchange rate and Bankex. More precisely it has been stated below:

1. To investigate the impact of exchange rates on Banking Index.
2. To know the intensity of relationship between exchange rate and BSE Bankex.

In order to achieve the above objective the following hypothesis was drawn.

$H_1$ : There exist a positive relationship between exchange rate and Bankex.

### 5. Data and Methodology:

The data consist of monthly time series observation regarding the macroeconomic variables namely exchange rate and Bankex covering a period from 1<sup>st</sup> July 2012 to 28<sup>th</sup> February 2014. This data has been taken from S&P BSE BANKEX. Only Indian Rupee -US Dollar exchange rates has been taken for the analysis. Frequency of data are kept on daily basis.

**Table - 1 : Methodology in Nutshell**

Particulars	Descriptions
Research Design	Exploratory research design
Sampling Design	Secondary data acquired from BSE website and Investing.com
Sample selection	The sample selection for this study will include all the banking companies listed on the BSE Bankex
Sample Size	520
Data Collection	The study will be using mainly secondary data. 1. Information relating to the value of BSE Bankex has been obtained from <a href="http://www.bseindia.com/indices/indexarchivedata.aspx">http://www.bseindia.com/indices/indexarchivedata.aspx</a> 2 .INR-USD exchange rate data is collected from <a href="http://www.investing.com/currencies/usd-inr-historical-data">http://www.investing.com/currencies/usd-inr-historical-data</a>
Time Period	1 <sup>st</sup> July 2012 to 28 <sup>th</sup> February 2014

Source: Authors' work

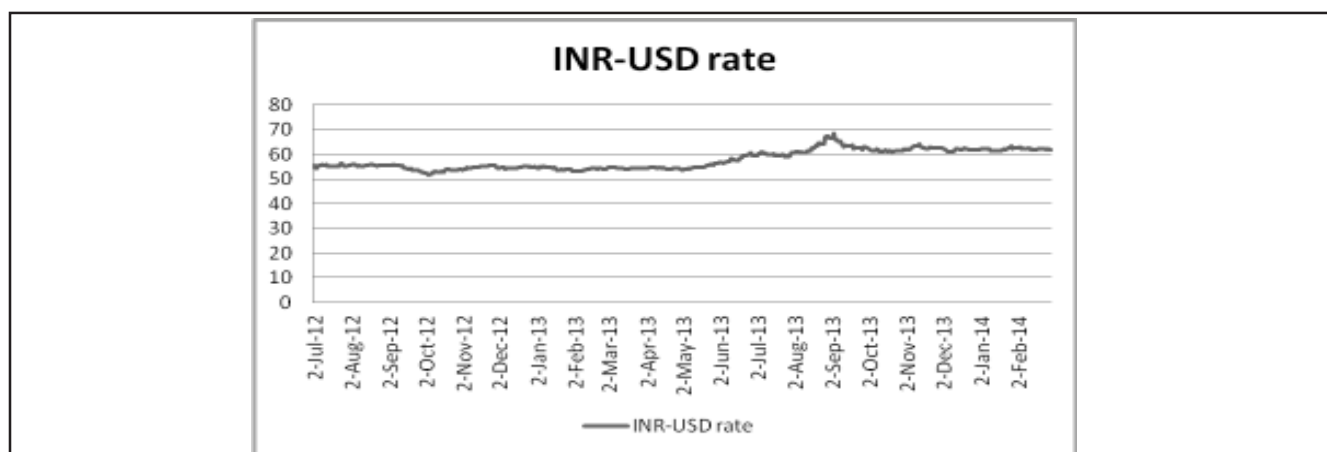
#### 5.1. Tools & Techniques used:

The data thus collected were classified according to the categories, counting sheets & the summary tables were prepared. Below mentioned Statistical tools were used for data analysis like; Mean, standard deviation, correlation Analysis, covariance analysis & regression Analysis.

### 6. Data Analysis

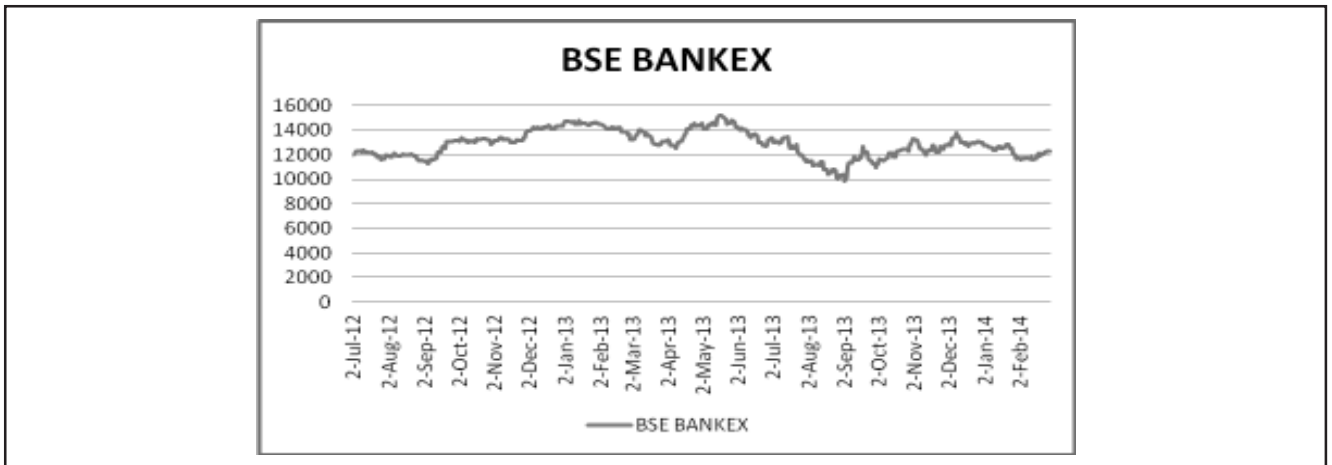
We study the trend of INR-USD Rate and BSE Bankex with the help of graphs presented in figure 1 & 2 by using monthly data.

**Fig. 1: Trend of INR - USD Rate**





**Fig. 2: Trend of BSE BANKEK**



**Table 2: Descriptive Statistics**

Source: Compiled & Computed

From Table No. 1, it can be read that the mean value of Bankex & exchange rate are 12879.37692 & 57.746325 with standard deviation 1092.712963 & 3.841868052 re-

spectively. The coefficient of variation is highest in case of Bankex in comparison to Exchange rate as 8.48% & 6.65% respectively.

**Table 3 : Correlation Matrix**

Pearson Correlation	Stock Prices (BANKEK)	Exchange Rates
Stock Prices (BANKEK)	1.00	
Exchange Rates	-0.62159	1.00

Source: Compiled & Computed

Table No. 2 shows correlation of the Bankex with the exchange rate. Exchange rates are negatively related to

the Bankex. But this is showing strong negative correlation between these two variables.

**Table 4 : Covariance Matrix**

Covariance	Stock Prices (BANKEK)	Exchange Rates
Stock Prices (BANKEK)	1190961	
Exchange Rates	-2602.04	14.71352

Source: Compiled & Computed

From the above table covariance between exchange rate and banking sector stock price is -2602.04 which is showing negative relationship between these two variables. It simply reveals the fact that both the variables are move in same direction justifying a close negative association between the two.

To know the concrete relationship among the variables researcher has tried with regression analysis in two phases introducing the time factor into it. The long term regression summary is shown below.

**Table 5: Regression Model Summary (Long – Term)**

Regression Statistics	
Multiple R	0.62315303
R Square	0.3883197
Adjusted R Square	0.38713885
Standard Error	855.435248
Observations	520

Source: Compiled & Computed

Here, the data has been taken for the long term analysis with spread over from 2<sup>nd</sup> July 2012 to 28<sup>th</sup> Feb 2014. It has been observed from the above table, R<sup>2</sup> is 38.8% showing that exchange rate has only 38.8% impact on banking sector stock price, so there is no significant relationship between exchange rate and Banking sector

stock price in the long term. Adjusted R<sup>2</sup> (sometimes written as) is a modification of R<sup>2</sup> that adjusts for the number of explanatory terms in a model. The adjusted R<sup>2</sup> can be negative and will always be less than or equal to R<sup>2</sup>. Adjusted R square in the table is 38.7% which is less than R square.

**Table 6 : Regression Model Summary (Short – Term)**

Regression Statistics	
Multiple R	0.796693308
R Square	0.634720226
Adjusted R Square	0.633626574
Standard Error	672.228565
Observations	336

Source: Compiled & Computed

So far as the short-term is concerned the data has been taken from 1<sup>st</sup> Feb 2013 to 28<sup>th</sup> Feb 2014 and the result has been shown above. Describing it in the same line as above the R<sup>2</sup> value is 63.4%, this shows that exchange rate has 63.4% impact on banking sector stock price, so there is a significant relationship between exchange rate and Banking sector stock price in the short term. Adjusted R square in the table is 63.3% which is less than R square.

Coming to the hypothesis “there exist a positive relationship between exchange rate and Bankex”, the researcher reached at a conclusion basing on the covariance, correlation and regression that both are more or less moving in same direction.

## 7. Conclusion

This research empirically examines the causal relationship between Rupee-Dollar exchange rates and banking sector stock prices. In this study, correlation and regression model is employed to test for the effects of exchange rate on banking sector stock price for the period July 2012 to Feb 2014 on daily basis. For the purpose of conducting research, banking sector stock price are used as dependent variables, while the exchange rates are used as independent variables.

To begin with, absolute values of data have been taken from internet. Then, the coefficient of correlation between the two variables was computed, which indicated slight negative correlation between them. Regression statistics was applied on the data, which shows that exchange rate affects the BSE BANKEX in the short- run and exchange rate has a significant impact i.e. 63.3% on banking sector stock prices but this is not the case in the long run as other major macro-economic variables play significant role in the long run.

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