

AN ANALYTICAL STUDY ON THE MOVEMENT OF NIFTY INDEX AND EXCHANGE RATE

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Abstract

The changes in the capital market bring transformation in the entire economy of the country. The boom and depression of the capital market is reflected in all sectors of the economy. Stock price downward movement continuously in the market forewarns the crisis period in advance. Numerous studies were conducted to trace the movement of stock market and its relationship with various economic factors. CNXNIFTY Index of NSE has been taken to compare the stock market movement with exchange rate. This Index is a well diversified one, which represents the major industries of the economy. This study analyses the dynamic relationship between stock market and exchange rate. As US Dollar is a prominent currency for foreign trade, the exchange rate of rupee and US Dollar has been taken for the study. The result found out that there is a bidirectional causal relationship between exchange rate and Nifty Index.

Keywords: Exchange Rate, Stock Market, Nifty Index, Unit Root Test, Cointegration Test, Granger Causality Test

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INTRODUCTION

The changes in the capital market bring transformation in the entire economy of the country. The boom and depression of the capital market is reflected in all sectors of the economy. Stock price downward movement continuously in the market forewarns the crisis period in advance. Numerous studies were conducted to trace the movement of stock market and its relationship with various economic factors. This study analyses the dynamic relationship between stock market and exchange rate. As US Dollar is a prominent currency for foreign trade, the exchange rate of rupee and US Dollar has been taken for the study.

Exchange rate is decided by the market driven forces after the LERMS (Liberalized Exchange Rate Management System). Due to the global crisis, the rupee dollar exchange rate has depreciated conspicuously. Exchange rate also affects various macro economic factors like GDP, BOP, Money Supply, Interest rate and foreign reserves. CNXNIFTY Index of NSE has been taken to compare the stock market movement with exchange rate. This Index is a well diversified one, which represents the major industries of the economy.

This study consists of five sections. It starts with introduction of the study followed by review of literature. The third section deals with the objectives and hypothesis of the study. The last section discusses the data analysis, interpretations and conclusions.

REVIEW OF LITERATURE

Pan et al. (2007) examined the dynamic linkage between exchange rate and stock price of seven east Asian Countries from 1988 to 1998 and found out there is a bi-directional causal relationship for Hong Kong before the Asian crisis. Also there is a uni-directional casual relationship from exchange rates and stock prices for Japan, Malaysia and Thailand and from stock price to exchange rate for Korea and Singapore.

Vygodina (2006) analysed empirically the exchange rates and stock price nexus for large cap and small cap stocks for the period 1987 to 2005 in USA and used Granger causality methodology. The study found out that there is causality for large cap stocks to exchange rate while there is no causality for small cap stocks to exchange rate.

Doong et al. (2005) investigated the dynamic relationship between stock and exchange rate for six Asian countries over the period 1989 to 2003. The study found out that financial

variables are not cointegrated. The results of Granger Causality test shows that bi-directional causality can be detected in Indonesia, Korea, Malaysia and Thailand. There is a significant negative relation between the stock returns and the contemporaneous change in the exchange rate for all the countries except Thailand.

Kaminsky and Reinhart (2003) investigates the spillover effects of stock price returns and found that US, Japan and Germany markets plays an important role in the spillover relationships in the case of Brazil, Thailand and Russian crises.

Muhammad and Rasheed (2002) examines the exchange rate and stock price relationship for Pakistan, India, Bangladesh and Srilanka using monthly data from 1994 to 2000. The empirical results show that there is a bi-directional long-run causality between these variables for only Bangladesh and Sri Lanka. No associations between exchange rates and stock prices are found for Pakistan and India.

Granger et al. (2000) found strong feedback relationships between Hongkong, Thailand, Taiwan and Malaysia. They used daily data and sample period from January 3, 1986 and finished June 16, 1998. Furthermore, they found that the results are in line with the traditional approach in Korea, while they agree with the portfolio approach in the Philippines.

Pan, Fok & Lui (1999) used daily market data to study the causal relationship between stock prices and exchange rates and found that the exchange rates Granger-cause stock prices with less significant causal relations from stock prices to exchange rate. They also find that the causal relationship have been stronger after the Asian crisis.

Ajayi and Mougoue (1996) analysed the relationship between exchange rate and stock prices in eight advanced countries using an error correction model and found short and long run feedback between these two variables.

OBJECTIVES OF THE STUDY

- To examine the relationship between Exchange rate and Nifty Index movement of NSE.
- To analyse the causal relationship between the above two variables.

HYPOTHESIS OF THE STUDY

- ❧ Exchange rate has no significant impact on the share price movement in Indian stock market.
- ❧ Nifty Index of Indian Stock Market does not predict the movement of Exchange rate.

DATA AND METHODOLOGY

The information regarding exchange rate and the value of S&P CNX NIFTY Index were obtained from the Reserve Bank of India and nseindia website. The monthly data were collected from April 2001 to March 2011.

UNIT ROOT TEST

The time series variables considered in this paper are the stock Index and Exchange rate. In order to avoid a spurious regression situation the variables in a regression model must be stationary or cointegrated. Therefore, in the first step, unit root tests performed to investigate whether they are stationary or not. The Augmented Dickey-Fuller (ADF) unit root test is used for this purpose. The ADF regression equations are:

$$\Delta Y_t = \alpha_1 Y_{t-1} + \sum_{j=1}^p \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^p \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + \sum_{j=1}^p \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots$$

where $\hat{\varepsilon}_t$ is white noise. The additional lagged terms are included to ensure that the errors are uncorrelated.

COINTEGRATION TEST

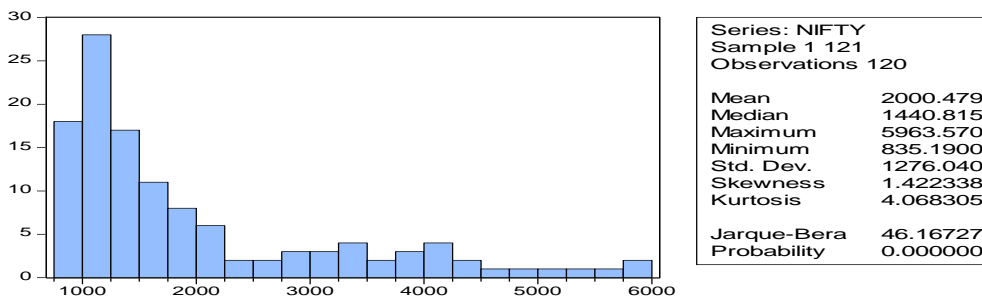
Cointegration can occur among different time series integrated of the same order or when the different series move together towards an equilibrium relation. If the series are integrated of order one, Johansen's procedure should be used to determine whether any cointegrating vector among variables exists or not. In this procedure, trace (λ_{trace}) and maximum eigenvalue (λ_{max}) statistics are computed, proposed by Johansen (1988) and Johansen and Juselius (1990). When performing λ_{trace} and λ_{max} test, the null hypothesis that there are r or fewer cointegrating vectors are tested against at least $r + 1$ cointegration vectors and $r + 1$ cointegrating vectors, respectively.

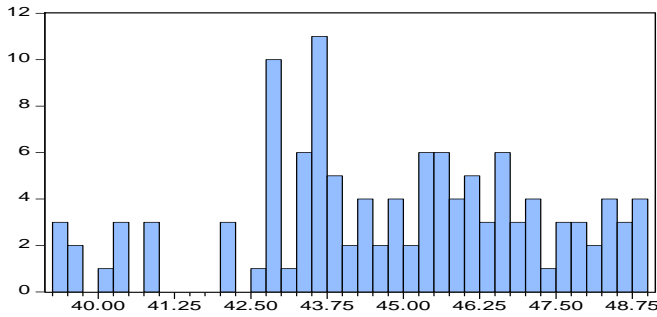
GRANGER CAUSALITY TEST

Granger causality is a technique for determining whether one time series is useful in forecasting another. Ordinarily, regressions reflect "mere" correlations. A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also known), that those X values provide statistically significant information on future values of Y .

ANALYSIS AND INTERPRETATIONS

Table No. 1 Descriptive statistics of NIFTY Index and Exchange rate





Series: EXRATE	
Sample 1 121	
Observations 120	
Mean	44.82771
Median	44.89990
Maximum	48.99680
Minimum	39.37370
Std. Dev.	2.415925
Skewness	-0.313419
Kurtosis	2.571249
Jarque-Bera	2.883766
Probability	0.236482

The table 1 depicts the descriptive statistics of the individual variables NIFTY Index and exchange rate. It is used to understand the characteristics of the variable and its fitness for further applications. The chart portrays the pattern of monthly NIFTY Index and exchange rate during the study period. Both NIFTY Index and exchange rate have reported a positive mean returns during the study period. While NIFTY reports a positive skewness with 1.422338 but exchange rate records a negative results of skewness with -0.313419. NIFTY Index has a leptokurtic (Kurtosis > 2.58) distribution of returns with flatter tails than normal distribution(Hair, Anderson, Tatham, Black 2005) while exchange rate shows an inverse one (Kurtosis < 2.58).

Table No. 2 Augmented Dickey Fuller Test for stationarity of variables

Variable	Without trend		With trend	
	Levels	1st Difference	Levels	1st Difference
NIFTY	1.906809	-6.924156**	0.011530	-6.793256**
Exchange Rate	-1.533141	-7.763179**	-2.434002	-7.822737**

In order to investigate the stationarity properties of the data, a univariate analysis of each of the time series was carried out by testing for the present of unit root. Augmented Dickey Fuller (ADF) tests (Dickey & Fuller 1979), for the time series of the individual data and their first differences are estimated and presented in Table 2. Moreover both the models with and without trend are tested. The results in the table indicate that all the series are non-stationarity at their

level. The critical values at 5% level of significance for ADF test under intercept and both (i.e. intercept and constant) are -2.89678 and -3.46487 respectively. They become stationary after employing difference operator of degree one. That is, these series are integrated of order one I(1).

**Table No. 3 Multivariate Cointegration test
between Nifty Index and Exchange rate**

Period	Eigen Values	Null Hypothesis	Trace Statistics	Critical Values (Trace)	
				At 5%	At 1%
April 2001 to March 2011	0.098357	$r=0$	12.43297	15.49	20.04
	0.004566	$r<1$	0.526260	3.84	6.65

Table No. 3 presents the results of Johansen's (1991) maximum likelihood cointegration test results which examines whether the exchange rate and nifty are cointegrated. The result shows very clearly there is no cointegration vector between the Nifty and exchange rate. Consequently, there is no need to include an error correction term in the Granger causality test equations.

Table No. 4 Pair wise Granger Causality Test

Pairwise Granger Causality Tests		
Lags: 3		
Null Hypothesis:	F-Statistic	Prob.
EXRATE does not Granger Cause NIFTY	1.76366	0.1583
NIFTY does not Granger Cause EXRATE	3.20431	0.0261

The table No. 4 presents the results of Pairwise granger causality test between exchange

rate and nifty. On analyzing the results, it can be inferred that the F-statistic value 1.76366 and 3.20431 are above the critical values of 1.53 and 1.40 at 5% and 1% significance level respectively. Hence the null hypothesis is rejected which signifies that there is a bidirectional causal relationship between exchange rate and nifty.

CONCLUSIONS & POLICY IMPLICATIONS

The study focused on analyzing the dynamic relationship between the exchange rate and Indian stock market (NIFTY). At the first step ADF unit root test is done to test the stationarity of all the variables and found out they are non-stationary at their levels, but becomes stationary at the first difference. Thus the series are integrated of order I(1). On the second step Johansen maximum likelihood test is done to find out whether exchange rate and NIFTY Index is cointegrated. The result shows very clearly there is no cointegration vector between the nifty and exchange rate. Then the Pairwise Granger causality test for the study period April 2001 to March 2011 is performed as the next step. Granger causality test is used to test the hypothesis of the study and found out that the null hypothesis is rejected. The result found out that there is a bidirectional causal relationship between exchange rate and nifty, i.e. changes in stock market will affect exchange rate and vice versa. Government and policy makers should give weightage to this bi-directional causal relationship while framing policies.

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