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RESEARCH ARTICLE

AN EMPIRICAL APPROACH TO TEST THE MARKET EFFICIENCY OF INDIAN STOCK MARKET WITH REFERENCE TO NSE AND BSE

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ABSTRACT

Investors rely on the price reflected on the stock prices but it should be backed a thorough analysis of the efficiency of the stock market. Researchers have been attempting to establish the efficiency of the stock market in different countries. In India also huge work has been done in this respect. In this paper attempt has been made to test the week form of market efficiency on the Indian stock market by taking data from the NSE and BSE. The period of study covers a period of ten years from 2007 to 2017. Statistical tools such as Durbin Watson test, run test for normality and ADF unit root test has been used to derive the result for the efficiency of Indian stock market. The result shows that Indian stock market does not satisfy the week form of market efficiency hypothesis.

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INTRODUCTION

A Stock exchange plays a major role in the development of the country. Therefore it is required that every stock exchange should world in a healthy manner to properly and efficiently support the economy of the country. Efficiency of the stock market is reflected in the association between the information related to a share and its market price as reflected in the stock exchange. If the share price reflects all the information relating to the share then the market is said to be highly efficient. And the more efficient market has a high resistance to the financial crisis in the economy. In this context the study of the market efficiency becomes vital for all the investors in the market. This has lead to many researchers to conduct market efficiency study in the various stock markets across the world. In India also a lot of research has been done in this field. The present study will study the efficiency of the National Stock Exchange and also the Bombay stock Exchange and also compare the efficiency of the both.

Statement of the problem

In the present market situation the shareholders are facing a lot of problem while going for the investment decisions.

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They should at least have some base whether the market is dependable or not. To know this it is very important to know about the efficiency level of the stock market. The efficiency test will help whether the market reflects the whole of the data concerned with the particular stock. If the efficiency test is established them a particular market can be said to be dependable. In this project we have made the efficiency study of the Indian stock market with special reference to National stock exchanges.

Literature review

In support of pattern finding, Lo, Mamaysky and Wang (2000) conclude that human judgment is superior to most computational algorithms. But recent advanced statistical model had successful applications in fingerprint identification, handwriting analysis, and face recognition which can be useful to identify pattern or trend in technical analysis. In paper titled "Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time Varying Covariance" Brock, Lakonishok and LeBaron (1992) tested 26 simple technical trading rules on daily data of the Dow-Jones Industrial Average for the period 1897-1986. They conclude that buy signals generates higher returns during buy days compare to sell signals during sell signals. The first researcher who linked the random walk process to economic processes was French mathematician Louis Bachelier in his Ph.D.

dissertation titled "The Theory of Speculation" who noticed that changes of prices of French government papers are unpredictable what forced him to conclude that "The mathematical expectation of the speculator is zero". In against of Random walk theory, Alexander (1961) applies several filters to the DJIA in the period 1897 − 1929 and the S&P Industrials in the period 1929 − 1959. He developed a filter strategy. According to it buy the stock when price increases by x percent from a recent low and sell when price declines by x percent from a recent high. He concludes in support of technical analysis. He concludes that in speculative markets if price of a stock initiate one trend then it is going to persist for long time. In the paper titled "A Comparative Analysis of Stock Price Behaviour on the Bombay, London and New York Stock Exchanges" Sharma and Kennedy (1977) compared the behavior of stock indices of the Bombay, London and New York Stock Exchanges for the period of 1963-73. He used run test and spectral analysis. He concludes that all 3 stock exchanges follow the random walk movement. Madhuri Malhotra, M. Thenmozhi, G Arun Kumar (2007), in their paper titled "Stock Market Reaction and Liquidity Changes around Bonus Issue Announcement: Evidence from India" by (2007), examines share price reaction to the announcement of bonus issue for a sample of Indian companies. Standard event study methodology has been used for the purpose of studying the Bonus issue announcement reaction. Bonus issue announcement yields negative abnormal returns around the announcement date. There is a negative reaction after the bonus issue announcement conveying that the market under reacts after the announcement.

Need and importance of the study

The need of the study lies in the fact that every investors should know that all the information related to the stock in which they are investing in. even if it is not possible on the part of each and every investor to know about all the stocks at least they can depend on the information available in the stock market. For this reason it is required to test the efficiency of the stock market of the country. The importance of the study is that the level of efficiency of a market is not a stationary phenomena, it keeps on changing from time to time. Therefore it is important to study the efficiency at regular intervals.

Objective of the study

The study will have the following objective:

- To study and understand the operational aspect of the Indian stock exchanges.
- To understand the randomness of the NSE and BSE or in other words to study the weak form of the efficiency of both NSE and BSE.
- To compare the efficiency level of both the markets.

MATERIALS AND METHODS

The data for the study will be mostly on secondary sources and will be collected from the website of the NSE and BSE. The period of the study will be from 01.04.2007 to 31.03.2017 i.e. for ten years. Data will be collected for the major two indices of NSE and BSE i.e. the Nifty and the Sensex. The weekly closing prices of the both indices will be collected over the period. The weekly data has been collected instead of the daily return as the weekly data are free from the daily biasness of the demand and supply and bid-spread biasness of the daily trading.

- For the evaluation of the study the following test will be applied.
- For the test of normality Jarque-Bera Test and Kolmogorove-Smirnov test will be applied.
- For the test of normality two unit root test will be done for example ADF test and PP testy.
- For test of the efficiency level run test and Auto correlation test will be applied.

Limitation of the study

As such there is no limitation in this study because the data is availed without any problem. The website of the NSE and BSE provide these data for all the time. The only limitation of this study is that the findings of the run test and other co linearity are not constant for all the time to come. In other words this study is significant for the present time only and will loss it's important as the time passes away. We have to do the same study again and again for different times.

Data Analysis

The data collected from the websites of the National stock exchange and Bombay stock exchange for ten years has been used for analysis of our project. Before doing the run test and test for the test of efficiency of the both stock market, the data series have to be tested for the unit root existence. The existence of the unit root indicates that the the data is not stationary. This means that the test statistics will yield different results for different a period which is not desirable. To test the existence of the unit root I have applied the ADF (augmented Dicky fuller) test. The results of the test have been presented in the Table -1 and Table-2. From the table it is clear that the p value of the ADF test statistics is 0.000 which is significant and we reject the null hypothesis that the NIFTY series has an unit root and accept the alternative hypothesis that the NIFTY series does not have any unit root. This makes us assure that we can go for other statistical operation with this set of data with assured and reliable results. From the table it is clear that the p value of the ADF test statistics is 0.000 which is significant and we reject the null hypothesis that the SENSEX series has an unit root and accept the alternative hypothesis that the SENSEX series does not have any unit root. This makes us assure that we can go for other statistical operation with this set of data with assured and reliable results

Descriptive statistics

The overall description of the all the common statistical parameters of the both the data series has been represented in the Table-3 bellow. The above descriptive statistics table gives the details of the two market returns (NSE and BSE). As reflected in the table both of the series have high degree of standard deviation calculated from the 2480 number of observations of last 10 years of the closing price of the Nifty and Sensex. The skewness of the both series are non zero which indicates that the series is not normally distributed. Similarly the kurtosis of the both return series is also just below 3. Both these statistics indicates that they violate the preliminary condition of the random walk. These facts are also supported by the fact that the Jarque-Bera test also gives the similar type of result with p value of 0.000 in both series.

Table 1. Adf test results of nifty

Null Hypothesis: D(NIFTY) has a unit root			
Exogenous: Constant, Linear Trend			
Lag Length: 0 (Automatic – based on SIC, maxlag=26)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-46.32628	0.0000
Test critical values:	1% level	-3.961748	
	5% level	-3.411621	
	10% level	-3.127682	

Table 2. Adf test result of sensex

Null Hypothesis: D(SENSEX) has a unit root			
Exogenous: Constant, Linear Trend			
Lag Length: 0 (Automatic - based on SIC, maxlag=26)			
		-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-45.97683	0.0000
Test critical values:	1% level	-3.961748	
	5% level	-3.411621	
	10% level	-3.127682	

Table 3. Descriptive statistics

	SENSEX	NIFTY
Mean	18397.07	5514.698
Median	17822.68	5352.875
Maximum	29681.77	8996.250
Minimum	8160.400	2524.200
Std. Dev.	4960.546	1514.911
Skewness	0.364232	0.385421
Kurtosis	2.644818	2.610852
Jarque-Bera	67.87077	77.04887
Probability	0.000000	0.000000
Sum	45624746	13676451
Sum Sq. Dev.	6.10E+10	5.69E+09
Observations	2480	2480

Table 4. Runs Test

	NIFTY	**SENSEX**
Test Value	5353	17823
Cases < Test Value	1240	1240
Cases >= Test Value	1240	1240
Total Cases	2480	2480
Number of Runs	50	38
Z	-47.841	-48.323
Asymp. Sig. (2-tailed)	.000	.000
a. Median		

Table 5. Regression results of NIFTY

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.859[a]	.737	.737	776.881	.737	6948.311	1	2478	.000	.009

a.Predictors: (Constant), Date
b.Dependent Variable: NIFTY

Table 6. Regression results of SENSEX

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.847[a]	.717	.717	2638.173	.717	6286.535	1	2478	.000	.009

a.Predictors: (Constant), Date
b.Dependent Variable: SENSEX

This indicated that the two return series are not normally distributed and does not fulfill the pre condition of random walk.

RUN test

The run test is done test the weak for of efficiency of the market. In this test run reflects the number of unidirectional movements in the market. When the positive returns changes to negative return then one run changes and vice versa. Then we have to count the number of runs to apply the run test. As the sample size of this data set is very large so the help of the SPSS software has been taken for conducting the run test. The results of the test have been shown in Table-4 below. The table -4 reveals that the test statistics Z for run test for both data series is almost at par (-47.841 of NIFTY and -48.323 of SENSEX). The most important thing is the p values of the both series are 0.000 which is less than 0.05. This indicates that the Null hypothesis that there exists randomness in the market is rejected. On the other hand the alternative hypothesis that there is no randomness in the market is accepted.

Test of Auto correlation among the two data sets

To test the auto correlation of the data series is very important from the point of view that if they are auto correlated then they will affect each other to a great extent. To test the auto correlation the Durbin Watson test statistics has been used. The Durbin Watson statistic is a number that tests for autocorrelation in the residuals from a statistical regression analysis. The Durbin-Watson statistic is always between 0 and 4. A value of 2 means that there is no autocorrelation in the sample. Values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation. Therefore the regression equation of the both series has been found out with the help of SPSS software. The date has been taken as the independent variable and the closing prices of NIFTY have been taken as the dependent variable for the Regression equation. The results of the test has been shown in table-5 and table-6 bellow. From Table-5 and Table-6 we can see the Durbin-Watson test statistics value which is 0.009 in both the cases. This indicates that both series are correlated and a movement of the one series affects movement of the other series positively.

Conclusion

The analysis of the data available and the results of the test lead to the conclusions that the Indian stock market does not full fill the conditions of the weak form of marker hypothesis. We may say that the stock market does not reflect all the information related to the stock. The price in the market is not only because of the fundamental factors associated with the stock but there are also other factors which affects the share prices in the market. In this context we may conclude that the investors while investing in the stock market should also look into the other factors for decision making.

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