

“Effectiveness of past data for the prediction of future return in NSE”

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Abstract:

*Stock market is a good indicator to measure the performance of economy of any country, so a lot of people do trading and investments in this market, to earn higher returns. But this market is unpredictable and highly volatile, because a lot of factors directly or indirectly affect this market. The current paper examines consistency of past data to predict future returns. In order to test whether market has weak form efficiency or not, study considers daily closing prices of **Nifty 50, Nifty 200 and Nifty 500 for our research**. Secondary data has been used in this research, which was collected from NSE website. Unit Root Test, Run Test and Autocorrelation Test were used to justify the objectives. After using above tests, it was found that past data was not so fruitful to predict the future income and there does exist weak form of efficiency in stock market. Other factors like inflation rate, growth rate and government policy affect the return on investment from stock market.*

Key Words: Market return, Inflation rate, Unpredictable, Unit root

Introduction:

Stock market is the place where securities are bought and sold. We can see many fluctuations in stock indices in Indian stock market on daily basis, whether it is NSE or BSE. The present paper focuses on the predictions of returns generated from NSE. NSE came into existence in 1991 by Government of India, on the recommendation of the Pherwani Committee. NSE is mutually owned by a set of leading financial institutions, banks, insurance companies and other financial intermediaries in India. Ownership and management operate separately in NSE. NSE covers different segments like mutual funds, indices, exchange traded funds, equities, etc. of the capital market. NSE is the first exchange in the world, to use screen based system for trading, which connects members through a satellite network and allows them to easily access trade opportunities irrespective of being located in various parts of the country as they are. Nifty is the stock market index for the National Stock Exchange (NSE). Nifty index is an index of 50 stocks

which are largely and most actively traded on NSE, covering 12 sectors of the Indian economy. NIFTY 50 Index represents about 62.9% of the free float market capitalization of the stocks listed on NSE as on March 31, 2017. In addition to Nifty 50, various other indices as Nifty Next 50 index, Nifty 100, Nifty 200, Nifty 500, Nifty Midcap 50, Nifty Midcap 150 etc also exists in NSE. There are so many internal and external factors that affect stock index as well as returns of securities. Here we are going to examine the prediction of future returns on the basis of past data of NSE 50 (represents about 62.9% of the free float market capitalization), NSE 200 (represents about 85% of the free float market capitalization), and NSE 500 (represents about 95.2% of the free float market capitalization). It is also called Random walk theory which measures weak-form of market efficiency. In weak-form efficiency, future prices cannot be predicted by analyzing prices from the past. A lot of researches have been conducted to know how an investor can earn abnormal profit using historical data, technical analysis and current market news. Any negative news may drop the market while a positive can show a string upward trend rally. A company having very good fundamental may seem to erode your all invest money without any logical reason. On the other hand, a company with weak fundamentals can skyrocket. A lot of traders, buyers, FIIs and DIIs are actively trading in different segments of NSE. At present 1906 Companies are registered on NSE out of which 1517 companies are dealing in equity. The main purpose of this trading is getting good returns. According to many experts, return from stock market depends on past data while few are not in this favor. The present study is going to examine whether past data is useful or not for the prediction of future incomes.

Literature Review:

Abraham et al. (2013) examined the random walk behavior of Gulf stock market, and found that emerging market has weak form of efficiency and past data of stock is not so fruitful for future prediction.

Gumus and Zeren (2014) examined random-walk theory, for the main stock markets of the G-20 countries and found that there is efficient market efficiency in 9 countries out of 20, in which India is one of them.

Jain et al (2013) tried to study the weak form of efficiency of Indian capital market during the period of global financial crisis and found that price changes randomly and no abnormal profit can be earned, on the basis of past data.

Jayakumar, Thomas, & Ali (2012) Stated that past stock prices have no predictive content to forecast future stock prices.

Kelikume (2016) found that Nigerian Stock market follows random walk behavior during the studied period. That is, the market is efficient and we can see the impact of last data on current data. We cannot earn huge profit without any positive news, considering only past data.

Lakshmi & Roy B (2012) analyzed that future movements can be predicted based on the historical trends or not, and found non random behavior among the indices. In other words, Indian equity market is inefficient in weak form.

Malhotra et al (2015) examined the weak form of market efficiency of 10 selected stock exchanges in Asia-Pacific markets and found that selected stock indices do not exhibit weak form of market efficiency when it was tested for daily and weekly returns, but on monthly basis there exists random walk.

Malkiel (2003) found that predictable pattern works in short period of time not in long period. We can not conclude that market is perfectly efficient. It follows news efficiently, but this news does not fall impact for a long period.

Mishra (2009) examined the weak form of efficiency in stock market and found that past data is helpful in prediction of future return.

Nikita et al, (2012) conducted a study to test whether Indonesia Stock exchange has weak form or not. In this study, closing prices of Indonesia Stock Exchange were taken to conduct the study. They found that they can predict the return on the basis of past share prices, showing non randomness in data.

Palamalai & Kalaivani (2015) found the absence of the weak-form efficiency and random walk hypothesis in case of all CNX Nifty and BSE Sensex.

Singh et al. (2016) indicated that the present market prices do not reflect the outcome of all the past information, and markets are inefficient to reflect any given change in the information.

Totala et al, (2012) concluded that Indian Stock market with reference to NSE indices is not fully weak form efficient. Rejection of weak form market efficiency indicates that stock prices do not fully reflect historical information and prudent investors may realize abnormal returns by using past and historical data of stock prices and trading volume.

Research Objectives:

- To determine that past returns can be fruitful or not, to predict future returns, on the basis of closing price of NSE 50, NSE 200 and NSE 500 index.

Hypothesis:

H_{01} = The series of closing price of Nifty 50, 200 and 500 don't have unit root.

H_{a1} = The series of closing price of Nifty 50, 200 and 500 have unit root

H_{02} = Past data of returns don't give any predictive power to the investor to earn higher return.

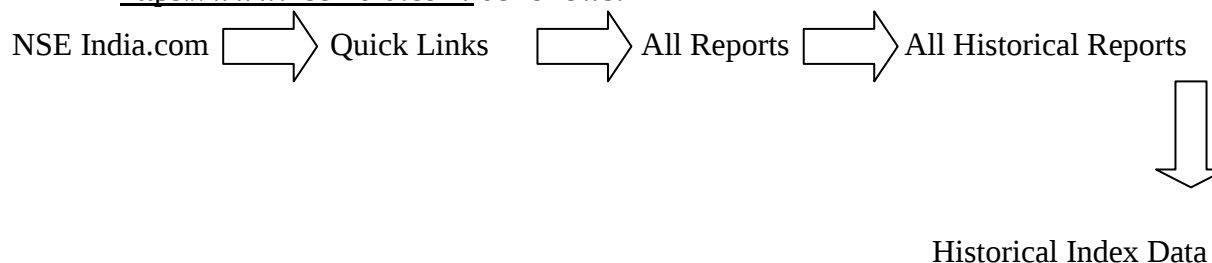
H_{a2} = Past data of returns give predictive power to the investor to earn higher return.

Research Methodology:

(1) Period of the study: Period of study was taken from 01-01-2008 to 31-05-2017(2326 days).

(2) Data sources: In this research paper we used secondary data from

<https://www.nseindia.com/> as follows:



(3) Research tools:

E-views 10 and SPSS 22 have been used in this research.

(4) Statistical Tools: Unit Root Test, Run Test and Autocorrelation have been conducted in this research.

The daily adjusted closing prices are transformed into stock return series by using the formula:

$$R_t = \ln(P_t/P_{t-1}) * 100$$

$\ln$ = Natural log

P_t = Closing price of stock on the day

P_{t-1} = Closing price of stock index on day before the day

Analysis

1. Unit Root Test: It was used to check the stationarity of data. We applied Augmented Dickey Fuller Test, to verify, if all the variables are stationary or not. ADF test is mostly used and standard test for Unit Root. We considered 26 lags as optimal lags to run this

test. It can be seen that P values in all the variables are higher than 0.05, and t- values are lesser than critical values at 1%, 5% and 10%, so our hypothesis is accepted that variables have Unit Root.

Augmented Dickey -Fuller Test Statistic

Null Hypothesis: Nifty 50 has unit root

Lag length: 1(Automatic-based on SIC, max lag=26)

	t statistic	Prob.
Nifty 50	-0.205991	0.9353
Nifty 200	-0.057574	0.9520
Nifty 500	-0.091770	0.9651
Test critical values:		
1% level	-3.432965	
5% level	-2.862581	
10%level	-2.567971	

After finding unit root in our variables, we converted all the three variables at 1st difference, for further research. At 1st difference, it was found that there is no unit root in the variables and data is stationary, it can be seen through below mentioned table. With the help of following formula, new series were generated to convert non stationary data into stationary: New **Return Nifty 50= dlog (Nifty 50)*100**.

Augmented Dickey -Fuller Test Statistic

Null Hypothesis: Nifty 50 has unit root

Lag length: 1(Automatic-based on SIC, max lag=26)

	t statistic	Prob.
Return Nifty 50	-45.42722	0.0001
Return Nifty 200	-44.10476	0.0025
Return Nifty 500	-44.10476	0.0001

Test critical values:

	1% level	-3.432965
	5% level	-2.862581
2	10%level	-2.567971

2. Run Test: Wald–Wolfowitz runs test (or simply **runs test**) is examined to test the randomness behavior of daily return, using daily closing price index of Nifty 50, Nifty 200 and Nifty 500. Run test was conducted through SPSS software to test the data. Run test can be conducted, on the basis of mean or median as cut point .Here we calculated Run test, using both the basis. Results obtained are given below:

Run Test (Median)

	Nifty 50	Nifty 200	Nifty 500
Test Value	5768.70	2921.32	4569.33
Cases <= Test Value	1163	1163	1163
Cases >= Test Value	1163	1163	1163
Total Cases	2326	2326	2326
Numbers of Runs	31	39	35
Z	-46.995	-46.663	-46.829
Asymp.Sig.(2-tailed)	0.000	0.000	0.000

Run Test (Mean)

	Nifty 50	Nifty 200	Nifty 500
Test Value	6159.4367	3184.1960	5022.4809
Cases <= Test Value	1450	1493	1500
Cases >= Test Value	876	833	826
Total Cases	2326	2326	2326
Numbers of Runs	26	11	17
Z	-47.136	-47.790	-47.516
Asymp.Sig.(2-tailed)	0.000	0.000	0.000

The values of Z in all the above cases of Nifty 50, Nifty 200 and Nifty 500 are outside the critical region. Value of Z must be less than 1.96 to justify the criteria of randomness. So from the results, it is concluded that data is not random and it accepts our null hypothesis.

3. Autocorrelation test: This test was developed by Ljung and Box (1978). It is also known as serial correlation. The autocorrelation test is used to determine the independence of stock price changes. It measures the relationship between a variable's current value and its past values. It is used to check the dependency of present returns on past return exists or not. It is correlation between **Successor and predecessor** of variables. Here, autocorrelation was checked separately for all the three indices.

Autocorrelation of Nifty 50 index

	AC	Autocorrelation
1	0.060	
2	-0.014	
3	-0.016	
4	-0.039	
5	-0.039	
6	-0.042	
7	0.053	
8	0.063	
9	0.016	
10	-0.007	
11	-0.017	
12	0.009	
13	0.000	
14	0.042	
15	0.010	
16	0.020	
17	0.058	
18	-0.024	
19	-0.009	
20	-0.047	
21	-0.026	
22	-0.009	
23	-0.046	
24	0.031	
25	0.046	
26	0.019	

Results: In this case of nifty 50 returns, results indicate that 12 lags out of 26 have negative autocorrelation, lag 9,12,13,14,15,16,24,25,26 are showing less autocorrelation . Only 5 lags showing significant coefficients and dependence on past stock index, which is not sufficient at 5% level. A value of autocorrelation near to zero and negative correlation shows higher level of independence in the successive daily returns, at 5% level of significance. We can justify, our hypothesis (H02) that future returns are not based on past returns is accepted.

Autocorrelation of Nifty 200 index

AC	Autocorrelation
1 0.089	
2 0.008	
3 0.003	
4 -0.046	
5 -0.041	
6 -0.029	
7 0.063	
8 0.068	
9 0.027	
10 -0.002	
11 -0.017	
12 0.009	
13 -0.002	
14 0.050	
15 0.012	
16 0.025	
17 0.057	
18 -0.015	
19 -0.011	
20 -0.042	
21 -0.015	
22 -0.014	
23 -0.036	
24 0.028	
25 0.043	
26 0.026	

Result: In this Return Nifty 200, it can be see that 12 lags out of 26 are negative while lags 2,3,9,12,15,16,24,25,26 have less autocorrelation near to Zero, at 5% significant level . Only lags 1,7,8,14,17 have significant correlation. It is not significant at 5% level and not giving a solid indication for prediction of future returns, because we have so many negative and zero correlation, so our hypothesis of weak form of efficiency is accepted.

Autocorrelation of Nifty 500 index

	AC	Autocorrelation
1	0.097	
2	0.014	
3	0.009	
4	-0.045	
5	-0.039	
6	-0.028	
7	0.064	
8	0.068	
9	0.029	
10	0.002	
11	-0.013	
12	0.010	
13	-0.002	
14	0.049	
15	0.013	
16	0.025	
17	0.060	
18	-0.013	
19	-0.011	
20	-0.042	
21	-0.014	
22	-0.011	
23	-0.036	
24	0.030	
25	0.042	
26	0.028	

Result: The results of autocorrelation of Return Nifty 500 shows that lag 4,5,6,11,13,18,19,20,21,22,23 i.e. 11 out of 26 are negative while 11 are near to zero while only 4 shows positive correlation which is not sufficient at this 5% level. Here our hypothesis is accepted about weak form of efficiency in market, because 11 lags are near to 0 and 11 are negative, indicating weak form of efficiency.

Factors affect stock market:

There are a lot of factors responsible for affecting stock market as government economic policy, changes in interest rates, changes in government, inflation and deflation in country, election time in country, GDP, fiscal deficit of government, fluctuations in global stock market, and fear of war between the countries. News of trade war between USA and North Korea is the latest example of falling market by 300 points in Nifty 50 index and more than 600 points in BSE sensex. A key factor is the mood of investors. If they get positive economic news they start buying or vice-versa.

Conclusion

The analysis of data shows that data was not stationary at 5% level of significance and unit root exists in our variables, therefore the null hypothesis (H_{01}) of unit root is rejected. It indicates the randomness in indices of Nifty 50, Nifty 200 and Nifty 500. Data was converted into stationary series, at first level of difference, to check autocorrelation. The results of autocorrelation test in Nifty 50, Nifty 200 and Nifty 500 indicate weak form of efficiency exists in the market, because more than 80% lags have zero and negative correlation, so it strongly supports to our null hypothesis (H_{02}). Results of Run test showed that Z value was less than 1.96 which supports our null hypothesis (H_{02}). Investors cannot get abnormal profit on the basis of past data, if they want to earn abnormal profit; they would have to use technical analysis and different strategies, keeping current news and factors of market in mind. We can find only predictive direction, using historical data. The findings support to weak form of market. Yesterday's and today's data cannot be strongly used to predict tomorrow's data. We can only forecast the direction which may be wrong. The stocks in the index don't absorb the price information effectively.

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