AN EMPIRICAL STUDY OF WEAK FORM OF MARKET EFFICIENCY: A CASE OF ENERGY STOCKS OF INDIA

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ABSTRACT

Efficiency of financial market depends upon how quickly market assimilates new information. In weak form of efficient market, current price reflects all the information contained in past price. Hence, there are no linear as well as non-linear dependences with the lagged values and price process has no memory, thus follows a random walk model.

The study has been done to examine the random walk hypothesis to determine the validity of weakform efficiency for CNX Energy. Everyday returns from April 1, 2004 to March 31, 2014 for the CNX Energy are used in this paper. The random walk hypothesis is examined using two statistical methods, namely a serial autocorrelation test, a non-parametric runs test. The statistical tests are conducted for full sample period.

Keywords: *Weak Form of Efficient Market, Random Walk Model, CNX Energy*

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Introduction

From the last few years it is now necessary to understand the behavior of the financial markets because of the new invention of the various risk management tools that is used to influence the financial market efficiency that were not used before few decades and now the efficiency of markets is more dynamic and capable than before (Husain, 2011). Fama, (1970) prescribed the theory of market efficiency, structured the experimental indication and categorize the market efficiency into three types namely:

_ Weak form efficiency (WFE)

_ Semi-strong from efficiency (SSFE)

_ Strong form efficiency (SFE)

The Efficient Market Hypothesis (EMH) believes that in the accession of new information the stock prices adjust quickly, and consequently, current prices reflects by all existing historical information (Ansari, 2011; Hussain, Hamid, & Khan, 2011). The weak form efficiency is commonly known as "random walk theory". The market will be weak form efficient contends that, if the currents prices such as: buying & selling volumes, prices and other market associated information reflects by all prices of historical information (Ansari, 2011; Hussain, Hamid, & Khan, 2011). The semi-strong form market efficiency states that the prices entirely reflect both historical and all public information which includes non-market information, for instance: earnings, declaration of dividend, monetary and social information. Lastly the strong-form efficiency asserts that all information from past, private and public resources reflects by stock prices, so that not anyone shareholder can acquire abnormal rate of return (Ansari, 2011).

An efficient capital market is one where the security prices reflect all the, relevant information(Fama 1965). Capital Market efficiency is very important for the investors from the investment point of view. In an efficient market, no investor is able to earn abnormal profit, as all the information is absorbed and disseminated in the market is quickly and accurately reflected by the security prices.

Research methodology

The study is based on the empirical data. The movement of the stock market provides an insight to investors who buys and sells shares and securities with the aim of making profits. Various models are employed for the purpose of studying the movement of stock market and also anticipating future changes in price or volume. The present study tests the market efficiency of the NSE Energy Index in its weak form of Efficient Market Hypothesis (EMH). The present study entails everyday closing and opening returns of 10 years fromApril 1st 2004 to March 31st 2014.

Objectives of the study

The main objective of study is to examine whether the CNX Energy indices of national stock exchange (NSE) is weak form efficient over the period 2004-2014. Present study applies a classical theory of testing market efficiency, to determine whether or not the time series predictability in NSE CNX Energy returns follow the random walk model, which maintains that past stock price can be used to predict future stock returns.

Hypothesis

Null Hypothesis: The CNX Energy is a weak form efficient
Alternate Hypothesis: The CNX Energy is a weak form inefficient

Data

Every day's opening and closing index values of CNX Energy is used for analyzing the data. These Index values then were converted into returns by MS excel. The index values have been

obtained from NSE's website and have been refined to remove duplicate data entries. There is collection of closing price for each stock for the period from 1st April 2004 to 31st March 2014.

Statistical tools

Runs Test

The runs test (also called Wald–Wolfowitz test after Abraham Wald and Jacob Wolfowitz) is a non-parametric statistical test that checks a randomness hypothesis for a two-valued data sequence. More precisely, it can be used to test the hypothesis that the elements of the sequence are mutually independent. Runs tests can be used to test: the randomness of a distribution, by taking the data in the given order and marking with + the data greater than the median, and with – the data less than the median; (Numbers equalling the median are omitted.) whether a function fits well to a data set, by marking the data exceeding the function value with + and the other data with −. For this use, the runs test, which takes into account the signs but not the distances, is complementary to the chi square test, which takes into account the distances but not the signs.

Serial Correlation Test

Autocorrelation refers to the correlation of a time series with its own past and future values. Autocorrelation is also sometimes called "lagged correlation" or "serial correlation", which refers to the correlation between members of a series of numbers arranged in time. Positive autocorrelation might be considered a specific form of "persistence", a tendency for a system to remain in the same state from one observation to the next. It is used to detect non-randomness in data and to identify an appropriate time series model if the data are not random

Analysis and Interpretation

Descriptive statistics

It is important to find the normality of the data which can be found out by statistical description of the data. Table-1 presents statistical description of NSE energyindex. Statistical description is

being calculated on the basis of the everyday opening and closing prices of NSE index. The Skewness and kurtosis is being used determine the normality of the data.

Skewness is a measure of asymmetry of the distribution of a series around its means. The Skewness of a symmetric distribution, such as the normal distribution, is zero (0). Kurtosis measures the flatness of the distribution of a return series.

The Kurtosis of a normal distribution is 10.The calculated value of skewness for NSE Energy Index is**-0.319**and value of kurtosis error is **0.098**. The values from the table show that neither the skewness nor the kurtosis of both the indices shows normality of the data.

Table 1

Mean	0.0469
Median	0.07
Maximum	16.70
Minimum	-14
Standard Deviation	1.73161
Skewness	-0.319
Kurtosis	10

Runs Test

Non-parametric analysis is made using Runs test. Z-values are calculated tocompare the critical value ±1.96 in order to find out whether the difference between the actual number of runs and expected number of runs is significant or insignificant.

In case of NSE Energy Index (Table 2) it is noted that the z-value is computed as 0.607. The value lies inside the 95% confidence interval and so null hypothesis can be accepted. This implies that the succeeding price changes move in an independent manner and so NSE Energy Index follows the random walk model.

Table 2

Total Runs	1234
Positives	1218
Negatives	1275
Total Observations	2493
Variance	2.998
Standard Deviation	1.73
Z at 5%	1.96
Z Statistics calculated	0.607

Serial Correlation

Under the weakest version of the random walk the increments or first-differences of the level of the random walk is uncorrelated at all leads and lags. Serial correlation test measures the correlation coefficient between a series of returns and lagged returns in the same series, whether the correlation coefficients are significantly different from zero. The autocorrelation in returns of CNX Energy are tested whether returns can be characterized by serial dependence. As 0.065 is less than critical value 3.84 we accept null hypothesis i.e. there is randomness and reject alternate hypothesis.

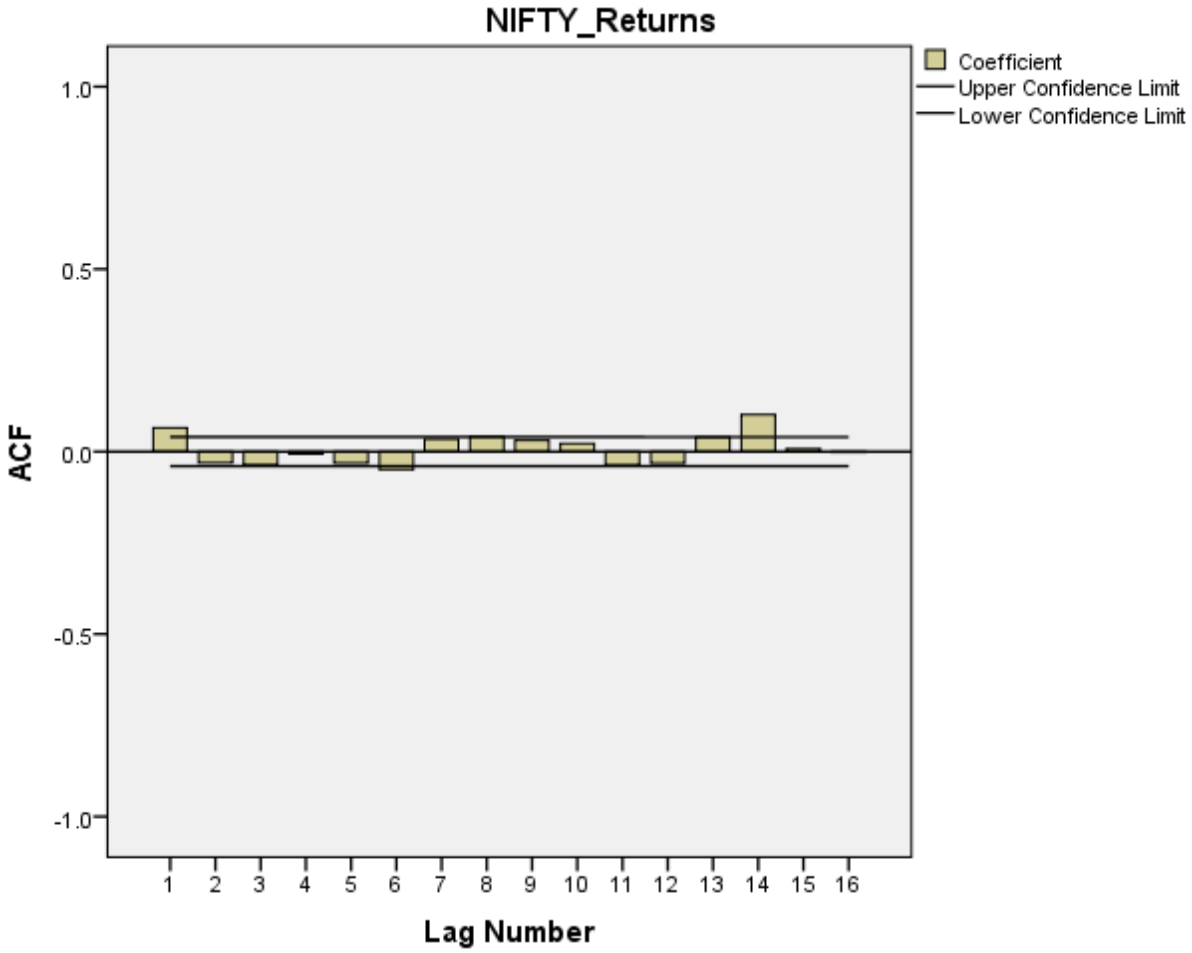
Table 3: Autocorrelations

Series: NIFTY_Returns

Lag	Autocorrelation	Std. Error[a]	Box-Ljung Statistic		
			Value	df	Sig.[b]
1	.065	.020	10.658	1	.001
2	-.031	.020	12.995	2	.002
3	-.036	.020	16.257	3	.001
4	-.006	.020	16.358	4	.003
5	-.031	.020	18.792	5	.002
6	-.049	.020	24.855	6	.000
7	.034	.020	27.823	7	.000
8	.041	.020	32.061	8	.000
9	.031	.020	34.411	9	.000
10	.022	.020	35.648	10	.000
11	-.037	.020	39.064	11	.000

12	-.032	.020	41.637	12	.000
13	.040	.020	45.584	13	.000
14	.102	.020	71.482	14	.000
15	.008	.020	71.634	15	.000
16	-.002	.020	71.642	16	.000

a. The underlying process assumed is independence (white noise).
b. Based on the asymptotic chi-square approximation.



Conclusion

Regarding skewness and kurtosis, everyday return series were found non-normal. Based on runs test andserial correlation test carried out on the sample drawn, we obtained the same results. It is

concluded that the CNX Energy returns follow random walk and they support the weak form of market efficiency. Hence, the empirical study suggests that CNX Energy is weak form efficient and abnormal returns cannot be generated based on past price trends / information. In the earlier studies it is documented that Indian Stock Market is weak form efficient whereas Chinese stock market is not weak form efficient. Unlike India technical analysis can be used to predict future stock prices in case of Chinese stock markets.

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