Testing weak form efficiency of Bse Bankex

Shikha Mahajan and Manisha Luthra

University of Delhi

Shikha.171188@gmail.com , luthra.manisha@yahoo.com

Abstract

The purpose of this paper is to examine the random walk hypothesis to determine the validity of weak-form efficiency for BSE Bankex. Monthly returns from January, 2002 to September 2013 for the BSE Bankex are used in this paper. The random walk hypothesis is examined using three statistical methods, namely a serial autocorrelation test, a non-parametric runs test, and an Augmented Dickey- Fuller unit root tests. The statistical tests are conducted for full sample period. The empirical results of this study support that BSE Bankex is weak-form efficient.

1. Introduction

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. Banks are a major part of any economic system. They provide a strong base to Indian economy too. Even in share markets, the performance of bank shares is of great importance. This is justified by the proof that in both BSE and NSE we have separate index for Banking Sector Shares. But for our study we have taken only BSE Bankex. Thus, the performance of share market, the rise and the fall of market is greatly affected by the performance of Banking Sector Shares. Internal or External conditions both are involved in measuring the sensitivity of returns of stocks.in the present study we will check the efficiency of BSE Bankex and results prove that BSE Bankex is weak form efficient.

2. Research Methodology

The present study has been an empirical investigation and was conceptualized to explore plausibility of profitable trading strategies based on past prices. 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 understanding the movement of the stock market and also anticipating future changes in price or volume. The present study tests the market efficiency of the BSE Bankex in its weak form of Efficient Market Hypothesis (EMH). The present study entails monthly closing prices of one decade that is January 2002 to September 2013.

2.1 Objective

The objectives of the study are:

- To trace the trend of the movement of the stock market index over the last decade.
- To test whether BSE Bankex follow random walk model or not.

2.2 Hypotheses

For the present study the hypothesis formulated (Ho) examines whether the stock returns follow a random walk (weak - form efficiency) during the study period.

Null Hypothesis (Ho): The BSE Bankex returns are random during the study period.

Alternate Hypothesis (H_1): The BSE Bankex returns are not random during the study period.

2.3 Data

The data analysed in this paper has been collected from a wide range of reliable sources. The monthly closing share price of BSE benchmark index BSE-Bankex is used. These stock prices then were converted into return series using MS excel. The stock prices have been obtained from BSE's website and have been refined to remove duplicate data entries. There is collection of closing price for each stock for the period from January 2002 to September 2013.

2.4 Methodology

The study seeks to test the weak form market efficiency test of BSE Bankex , by employing Runs Test, unit root test and serial correlation test.

2.4.1 Runs Test

Runs Test is a traditional method used in the random walk model and ignores the properties of distribution. It has been used to judge the randomness in the behaviour of Indian Stock market. It determines whether successive price

changes are independent. In this test actual number of runs is being compared with the expected number of runs. If the actual number of runs is not significantly different from the expected number of runs, then the price changes are considered independent, and if this difference is significant then the price changes are considered dependent.The null hypothesis is rejected if the calculated number of runs falls outside the 95% confidence interval (μ-1.96 $\sigma \leq k \leq \mu + 1.96\ \sigma$) and is accepted if the value lies in between ±1.96.

2.4.2Serial correlation test

A serial correlation test is the most commonly used as the first tool for randomness. Under the weakest version of the random walk, the increments or first-differences of the level of the random walk are 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 stock markets are tested whether returns can be characterized by serial dependence. Positive serial correlation means that positive returns tend to follow positive returns and vice versa. If the serial correlation is statistically significant it shows that successive price changes are related and market is inefficient.

2.4.3Unit root test

The presence of a unit root in a time series suggests support for the random walk hypothesis. The null hypothesis is the presence of a unit root, so not rejecting that hypothesis means the series follows a random walk. The ADF unit root test (Dickey and Fuller, 1979), is carried out by estimating the following equation:

$$\Delta R_t = b_0 + b_1 + \pi_0 R_{t-1} + \sum_{i-1}^{j} \Psi\ \Delta R_{it-1} + \epsilon_t$$

Where R_t is price at time t
ΔR_t is change in price

3. Analysis and Interpretation

3.1 Descriptive statistics

Before employing any test it is very important to find out the normality of the data which can be found out by statistical description of the data. Table-1 presents statistical description of BSE Bankex. Statistical description is being calculated on the basis of the monthly closing prices of BSE Bankex. The values of Skewness and kurtosis 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 3.The calculated value of skewness for BSE Bankex is **-0.232565** and value of kurtosis is **1.772364**. 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	**0.016772**
Median	**0.017128**
Maximum	**0.373365**
Minimum	**-0.291299**
Standard Deviation	**0.098387**
Skewness	**-0.232565**
Kurtosis	**1.772364**

3.2 Runs test

Our non-parametric analysis is made using Runs. Z-values are calculated so that they can be compared with 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 BSE Bankex (Table 2) it is noted that the z-value is computed as 0.089953. The value lies inside the 95% confidence interval and so we accept the null hypothesis. This implies that the succeeding price changes move in an independent manner and so BSE Bankex follows the random walk model.

Table 2

Total runs	**72**
positives(N1)	**72**
negatives(N2)	**69**
total observations	**141**
Estimated value (mean)	**71.46809**
Variance	**34.96631**
standard deviation	**5.913231**
Z at 5%	**1.96**
z statistics calculated	**0.089953**

3.3 Unit root test

According to the Random walk hypothesis the log price series must have a unit root whereas the returns series must be stationary. For this purpose the Augmented Dickey-Fuller Test (1981) is used to test the stationary of the time series. As it can be seen in Table 3, the time series of indices is non-stationary at level and it becomes stationary for first difference at 1% and 5 % level of significance.

Table 3

	t statistic
LEVEL	**-1.36732**
FIRST DIFFERENCE	**-10.7196**
critical values	
1% level	-3.47784
5% level	-2.88228

3.4 *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 BSE Bankex are tested whether returns can be characterized by serial dependence. As 0.973 is less than critical value 3.84 we accept null hypothesis i.e. there is randomness and reject alternate hypothesis.

Table 4

R - square (A)	**0.007**
No. of Samples (B)	**139**
(A) x (B)	**0.973**
value of chi - square at 1 degree of freedom at 5% level of significance	**3.84**

4. Conclusion

Regarding skewness and kurtosis, the monthly return series were found non-normal. Based on runs test, unit root test and serial correlation test carried out on the sample drawn we obtained the same results, it is concluded that the BSE Bankex returns follow random walk and they support the weak form of market efficiency. Hence, the empirical study suggests that BSE Bankex is weak form efficient and abnormal returns cannot be generated based on past price trends / information. In our earlier studies we have documented that Indian Stock Market (BSE) 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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