

## **Does Bse Bankex Walk Randomly? An Innovative Investment Approach**

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Indian economy has changed radically since last two decades. This drastic change has brought significant impact, especially, in financial sector. The banking sector, the core financial sector of the economy has undergone a major reform since the conception of liberalization. Rapid growth rate, industrial and e-technological advancement, innovative banking, increase in Indian middle class population, financial inclusion, innovative financial products and services, etc., helped the banking sector to step forward and look ahead. Measures under taken by the government to regulate the financial sector are expected to have noteworthy impact on the market capitalization of banking stocks, depending on the market efficiency, having an influence over the investment strategy. Investors are expected to adopt innovative investment approach while investing. For this, market efficiency is to be judged. Market efficiency indicates the ability of the market to receive, incorporate and reflect the relevant information in the share prices quickly and accurately. Testing weak form of market efficiency states that price changes in the stock market are always random and independent of one another. The paper is an attempt to provide some empirical evidences on the market efficiency of BSE Bankex Companies by testing its weak form. The market efficiency of the BSE Bankex Companies is empirically tested by employing Runs Test, Autocorrelation and Unit Root Test, to suggest on the randomness of the price movements of the banking companies, so that one can take financial decisions accordingly.

**Key Words:** Weak Form of Market Efficiency; BSE Bankex Companies; Runs Test; Auto Correlation Test; Unit Root Test.

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### **Introduction**

Indian economy has observed the different phases since last two decades. Financial Sector being the key player in market and economy was influenced significantly. The Indian financial sector is the reservoir of commercial banks, financial institutions, stock exchanges. It has undergone a momentous structural transformation since the conception of financial liberalization, in turn, the banking sector evolves as a prime dominated financial sector. One of the major objectives of financial liberalization was to make the financial institutions more efficient and competent.

Banking industry being the core financial sector has undergone reform process, to be more efficient and competent to prove its objectivity, thus, it is helping the banking sector to step forward and move ahead.

The sectoral analysis quantifies the key parameters of the economy. It explains the economic growth report covering different industries. The sectoral analysis of Indian economy focuses on the key points of the latest reforms initiated by the Government of India. The analysis of different sectors of economy facilitates the Government to use it as the reference and guide for the formulation of new economic policy. The banking

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industry reforms were part and package of financial sector reforms, they were initiated to make Indian banking industry more efficient, strong and dynamic. The banking industry plays a decisive role in accelerating the rate of economic growth in Indian economy. The impact of reforms in banking sector is expected to reflect itself on the face of the banking companies. One can judge any banking companies efficiency by judging its equity. The banking industry can be judged for its efficiency by judging its market efficiency in the stock market.

### **Market Efficiency**

Market efficiency indicates the ability of the market to receive, incorporate and reflect the relevant information in the share prices quickly and accurately. The concept of an efficient market describes a market consisting of a large number of rational, profit maximizers actively competing with each other to predict future market values of individual securities, and where, important current information is almost freely available to all participants (Fama, 1965). Market inefficiency has influence over resource allocation, as price signals understate or overstate the effects of information transmitted to the trading parties in the market. The capital market is a vital institution as it facilitates economic development, so, many parties are interested in knowing the efficiency of the capital market. The retail investors can be motivated to save and invest their savings in the capital market only if the securities in the market are appropriately priced. For a capital market to be efficient, stock prices must always fully reflect all relevant and available information. A market is considered to be a sensitive processor of all new information with prices fluctuating in response to such information. In inefficient market it takes a considerable time for the information to be disseminated across the market so the prices do not reflect the market efficiency. A more modern definition is that asset prices in an efficient market 'fully reflect all available information' (Fama, 1991).

### **The Random Walk Model**

The Random Walk Model, basically measures weak form of market efficiency, it is the model proposed for stock price behavior, which states that future stock prices cannot be predicted based on past price movements. The model implies that investment strategies based on past information will not necessarily yield higher returns comparing a portfolio consisting of randomly picked stocks. The more efficient a market is the more random and unpredictable the market returns would be. The basic hypothesis underlying weak form efficiency is concerned with the successive price changes in individual securities are independent and are also random variables. Independence indicates that, the history of a series of changes cannot be used to predict future changes in any meaningful and significant way. This implies that future price movements are determined entirely by information not contained in the price series. Thus, prices must follow a random walk.

### **Indian Banking System**

Indian banking industry, the backbone of the country's economy, has always played a positive key role in prevention the economic disaster from reaching horrible volume in the country. It has achieved enormous appreciation for its strength, particularly in the wake of the latest worldwide economic disasters, which pressed its worldwide counterparts to the edge of fall down. On comparing the business of top three banks in total assets and in terms of return on assets, the Indian banking system is among the healthier performers in the world. The banking sector is tremendously competitive and recorded as growing in the right trend (Ram Mohan and Ray, 2004).

### **Why this Study?**

The investors do analysis of various sectors of the capital market to select better stocks of the better sector for investment. The investors identify most promising sectors and review the performance of companies within the sector to determine which individual stock

would provide better returns and ultimately, be purchased and hold. There are three aspects that would generally affect the performance of a company's stock in the stock market. The first aspect is the performance of the individual company. The second is the performances of the sector to which the company belongs to. The third is the performance of the market as a whole and an integrated entity. The sectoral analysis also covers the testing of market efficiency of different segments of the stock market. The banking industry is one of the core segments of the stock market represented by BSE Bankex. Therefore, the present study undertakes the study of testing of weak form of efficient market theory or Random Walk Theory with respect to BSE Bankex which is the leading index of 14 large banking companies listed on the Bombay Stock Exchange (SSRN, 2012).

### Literature Review

On testing the Warsaw Stock Exchange (WSE) efficiency, filtering rule to 23 shares for a relatively short period (June 1993 - July 1994) was applied and found that, either the weak form efficiency did not apply to WSE or prices did not adequately reflect information at a given point of time, thus, resulting in sufficient time lags of which investors can take advantage. Further, a descriptive approach was used to point out that, the investors' psychology appeared to have more significant role than the one described by the EMH proponents (Gordon and Rittenberg, 1995). To study the behavior of stock price movement in Dhaka Stock Exchange in Bangladesh during a period of 1988-1997, runs test, auto correlation test, auto regression test and ARIMA model were applied which reported market inefficiency. The reasons for inefficiency in the market were longer processing time, huge transaction cost, inefficient communication system and low volume of trade (Mobarek and Keasey, 2000).

Analyzing the behavior of the daily and weekly returns of five Indian Stock Market Indices for random walk

during April, 1996 to June, 2001, concluded that, Indian Stock Market Indices did not follow Random Walk (Pant and Bishnoy, 2001). On testing both Shanghai and Shenzhen Stock Markets of China Stock Market, for efficient market hypothesis using serial correlation, runs test and variance ratio test to index and individual share data for daily, weekly and monthly frequencies, explored out that, Chinese Stock Markets were not weak form efficient (Ma and Barners, 2001). A study conducted to test the market efficiency across the four sectors, namely, banking, industrial, insurances and services in the Amman Stock Exchange, during a period of 1992-2004, using variance ratio and runs test, revealed that the random walk or weak form efficiency hypotheses were rejected for all sample sectors (Mufeed and Squalli, 2005).

Study conducted on Dhaka Stock Market to examine the linear relationship between share prices and interest rate, share prices and growth of interest rate, growth of share prices and interest rate, and growth of share price and growth of interest rate, using ordinary least-square regression, concluded that, in all of the cases, included and excluded outlier, interest rate has significant negative relationship with share price further, growth of interest rate has significant negative relationship with growth of share price in Dhaka Stock Market, thus, Dhaka Stock Market was not weak form efficient (Alam et al, 2007). In a study conducted to test the weak form market efficiency using daily returns of nine sectoral indices, in Malaysian Stock Market during 1996 to 2006, found that, the sectoral indices, except property index, of Malaysian Stock Market were inefficient weak-form (Chin, 2008).

Study of Indian Stock Market to test the weak form of market efficiency of NSE Nifty Companies concluded that, random movements of shares prices of 42 NSE Nifty companies were irrespective of successive price changes. The corporate events like, declaration of dividend split of shares, mergers and demergers and

also other information which might have effect on the movement or change of share prices have been disclosed to the common investors and that was already included in the share price of that particular company. Thus, it can be inferred that investors while trading for those 42 companies need not be influenced by the previous prices and 91.30% of the sample size proved the random walk theory of weak form of efficient market. It can be concluded that the companies constituting the NSE Nifty were having random movement in share price changes (Totala et al, 2012).

### **Objectives of The Study**

- To study whether the Bankex and share prices of Bankex Banking Companies are stationary or not?
- To study whether the banking companies' stock prices are correlated with Bankex or not?
- To examine the weak form of market efficiency of Banking Companies listed in the BSE Bankex.

### **Scope of The Study**

The study is based on secondary data of the banking sector. The daily prices of the scripts and value of Bankex were taken for five financial years from 1st April 2006 to 31st March 2011 and should be read in the light of prevailing situations in the economy. The study is undertaken in the purview of Runs Test, Autocorrelation Test and Unit Root Test.

### **Hypothesis**

- Ho1: The value of Bankex, and share prices of Banking Companies are not stationary.
- Ho2: There is no significant relationship between BSE Bankex and BSE Bankex Banking Companies.
- Ho3: Weak form of market efficiency does not hold good in BSE Bankex Companies, i.e., successive price changes of shares of BSE Bankex Companies are not random.

### **Research Methodology**

#### **Type Of Study**

The study is an empirical one where share price movements are being tested to prove the weak form of efficient market theory commonly known as Random Walk Theory.

#### **Type and Sources of Data**

The present study is based on secondary data. The daily closing values and share prices of BSE Bankex and BSE Bankex Companies respectively have been used. The available secondary data were collected from the Annual Reports, published research reports by banking industry, etc. and websites like, [www.bseindia.com](http://www.bseindia.com), [www.moneycontrolrediff.com](http://www.moneycontrolrediff.com) and [www.yahoofinance.com](http://www.yahoofinance.com) etc.

#### **Sample Design**

The present study is aimed at finding out the randomness in successive share price changes. All 14 Banking Companies listed on the Index, Bankex of the Bombay Stock Exchange are taken for the study.

#### **Tools Used For Analysis**

##### **Unit Root Test**

Unit Root Test and the extension, Augmented Dickey-Fuller (ADF) Test has been used to check the stationary position of the data. It was examined through software Eviews7.

##### **Autocorrelation**

The Serial Autocorrelation has been used to test the relationship between the time series and its own values at different lags. It was examined through software Eviews7.

##### **Runs Test**

Runs Test has been used to test the weak form of market efficiency. It was examined through software SPSS 18.

#### **Analysis and Interpretation**

##### **Unit Root Test**

The Unit Root Test verifies the stationary mode of the series under consideration. Further, their order of integration is being determined. The results of Augmented Dickey Fuller (ADF, 1979) unit root test are depicted in Table 1 of annexure. The result explored that, critical value is negative thus, stock prices of all the banking stocks follow stationary trend. The ADF study carried out in three situations as, trend, intercept with trend and none. It was found that, all the values are following stationary trends. The stock prices of all the 14 banking companies resulted in the P value (probability) more than 0.05, confirming that, the data follow stationary trends. All these values arrived at varying lags (Table 1 of annexure). The results interpreted by comparing critical value with value at 1%, 5% and 10% level of significance and in which, all the negative signs were not considered but converted and interpreted in terms of absolute value. The corresponding critical values are smaller than the values at 1%, 5% and 10% level of significance, denotes the data are in stationary state. Thus, the null hypothesis that the value of Bankex, and share prices of Banking Companies are not stationary is rejected. It facilitates the study further and states that the data qualifies to be used to check randomness.

### **Autocorrelation**

The data set get stationary within 10 lags at up to 5% level of significance (Table 2 of Annexure). Out of 14 banks and Bankex, eight banks earned significant value (at 5%) in their all the 10 lags, i.e., 1st to 10th lag. The banks are Canara Bank, HDFC Bank, ICICI Bank, IDBI Bank, PNB, SBI, Union Bank and Yes Bank. Thus, it is interpreted that the data are serially and significantly correlated. This indicates that share prices of the eight banks do not walk randomly.

The analysis of Bankex reveals that its value was not significant in first 4 lags but becomes significant in the subsequent 6 lags. In the case of Axis Bank and Kotak Bank, their values were not significant in the first 4

lags, but become significant in the last 6 lags. The case of BOI and BOB, the banks showed non significance in first lag and in the remaining all the lags, they are significant. In case of Federal Bank, its value is not significant up to 6 lags and is significant for remaining three lags. For Indusund Bank, its value is non significant up to first 2 lags, after it is significant for remaining lags. Therefore, The Bankex and six banks namely AXIS Bank, BOI, BOB, Federal Bank, Indusund Bank and Kotak Bank did earn their significant value up to 5% significance level ranging from 2nd to 7th lag. Thus, it is interpreted that the data are serially and significantly correlated, hence, their exist autocorrelation in themselves and the Bankex itself. Thus, the null hypothesis that there is no significant relationship between BSE Bankex and BSE Bankex Banking Companies is rejected. This reveals that they could obtain stationery after words and the Bankex as well as the share prices of the six banks do not walk randomly. In aggregate, as per autocorrelation, the Bankex and all 14 banks forming Bankex, do not walk randomly, i.e., their prices are not independent to each other. Keeping in view the characteristics of autocorrelation, the results of autocorrelation should be read with results of runs test.

### **Runs Test**

The objective of the study was to test whether weak form of efficient market hypothesis holds good or not in BSE Bankex Companies of Bombay Stock Exchange in India. Runs Test was applied on daily closing stock prices of BSE Bankex Companies (Table 3 and 4 of annexure). The test employs the total number of runs in the transformed data. Large significance values ( $>.05$ ) indicate that the data are randomly ordered (Table 4 of annexure). Total 1240 cases were observed for each company. It shows that the Asymp. Calculated (2 tailed) value for all the banking companies, except Canera Bank and Yes Bank, were more than significance values ( $>.05$ ). It indicates that the BSE Banking Companies stock prices follow a random walk

which states that stock price changes are independent of each another. Thus, the null hypothesis viz. weak form of market efficiency does not hold good in BSE Banking Companies i.e., Successive price changes of shares of BSE Bankex Companies are not random have been rejected. They show the random movement of shares prices not being influenced by the successive price changes.

### **Discussion**

By applying Unit Root Test it was found that the different data series are stationary. Hence further could be used for autocorrelation and the runs test. On the basis of autocorrelation it was found that majority of stocks reflects non randomness since inception of their 1st lag and the rest stock prices and the Bankex itself also obtain non randomness in further lags from 2nd to 7th lag. This also indicates that they are also after certain lag tends to be following non randomness. So as conclusion as per autocorrelation it can be concluded that the Bankex and the compositing companies do not follow randomness stating the inefficiency of the market, but observing the runs test it was found that runs test indicates that the Bankex and 12 banking companies follow random walk except Canera Bank and Yes bank. It is further to note that Canera Bank and Yes Bank by autocorrelation and runs test holds position of non randomness. The difference in the results by the two tests opens new vistas for further research even comparing the importance of the two tests to yield random walk.

### **Conclusion**

On the basis of Autocorrelation the Bankex and the Banking companies do not walk randomly. On the basis of Runs Test, and the discussion it can be concluded that the Bankex and the majority of the banking companies' stock prices walk randomly. Finally it can be concluded that the market of share prices of Bankex Companies in BSE lies in between inefficiency and weak form of market efficiency.

### **Suggestions**

As the market of Bankex companies lies in between in state of inefficiency and weak form of efficiency, it is suggested that the banking companies needs more and quick information revilement to all stakeholders. It is also suggested that SEBI, RBI, market governing institutions and other regulatory bodies should prepare further guidelines stating more transparency in the banking companies and banking sector.

### **Implications**

It implies that Bankex being representative of banking sector, the market efficiency of banking shares fall in between inefficiency and weak form of market efficiency. The status of the market segment also implies that the investors should cautiously and carefully invest in to banking stocks and should try to get updated information on continuous basis from all sources before making any decision.

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**ANNEXURE****TABLE 1: UNIT ROOT TEST**

<b>Critical Value of Augmented Dickey Fuller Test (Level 0)</b>						
<b>BANKEX COMPANIES</b>	<b>Intercept</b>					
	<b>Lag</b>	<b>Critical Value</b>	<b>Prob.</b>	<b>1%</b>	<b>5%</b>	<b>10%</b>
AXIS BANK	6	-0.714477	0.8411	-3.435436	-2.863674	-2.567956
BOI	6	-1.409934	0.5787	-3.435436	-2.863674	-2.567956
BOR	5	0.790697	0.9939	-3.435432	-2.863672	-2.567955
CANERA BANK	4	-0.178870	0.9386	-3.435428	-2.863670	-2.567954
FEDERAL BANK	8	-1.087000	0.7229	-3.435445	-2.863678	-2.567958
HDFC	9	-0.477074	0.8930	-3.435449	-2.863679	-2.567959
ICICI	8	-1.598903	0.4828	-3.435445	-2.863678	-2.567958
IDBI	4	-1.652057	0.4555	-3.435428	-2.863670	-2.567954
INDUSUND BANK	16	0.377388	0.9820	-3.435479	-2.863693	-2.567966
KOTAK	16	-2.279948	0.1787	-3.435479	-2.863693	-2.567966
PNB	7	-0.127436	0.9446	-3.435440	-2.863676	-2.567957
SBI	8	-1.002904	0.7541	-3.435445	-2.863678	-2.567958
UNION BANK	4	-0.440800	0.9887	-3.435428	-2.863670	-2.567954
YES BANK	5	-0.875914	0.7961	-3.435432	-2.863672	-2.567955



BANKEK COMPANIES	Trend & Intercept					
	Lag	Critical Value	Prob.	1%	5%	10%
AXIS BANK	6	-1.716854	0.7435	-3.965500	-3.413457	-3.128770
BOI	1	-3.389268	0.0532	-3.965470	-3.413442	-3.128762
BOR	5	-1.175632	0.9140	-3.965494	-3.413454	-3.128769
CANERA BANK	4	-1.603225	0.7916	-3.965488	-3.413451	-3.128767
FEDERAL BANK	8	-1.532695	0.8181	-3.965512	-3.413463	-3.128774
HDFC	9	-1.748442	0.7290	-3.965518	-3.413466	-3.128776
ICICI	8	-1.682449	0.7587	-3.965512	-3.413463	-3.128774
IDBI	4	-2.076582	0.5579	-3.965488	-3.413451	-3.128767
INDUSUND BANK	16	-1.381169	0.8662	-3.965561	-3.413487	-3.128788
KOTAK	16	-2.175889	0.5021	-3.965561	-3.413487	-3.128788
PNB	8	-1.787847	0.7103	-3.965512	-3.413463	-3.128774
SBI	8	-1.944658	0.6302	-3.965512	-3.413463	-3.128774
UNION BANK	5	-2.414035	0.3709	-3.965488	-3.413451	-3.128767
YES BANK	4	-1.499157	0.8298	-3.965494	-3.413454	-3.128769
	None					
BANKEK COMPANIES	Lag	Critical Value	Prob.	1%	5%	10%
AXIX BANK	6	1.147272	0.9356	-2.566837	-1.941080	-1.616527
BOR	6	0.588829	0.8435	-2.566837	-1.941080	-1.616527
BOI	5	2.215104	0.9940	-2.566836	-1.941080	-1.616527
CANERA BANK	4	0.918412	0.9047	-2.566834	-1.941080	-1.616527
FEDERAL BANK	8	0.463351	0.8146	-2.566840	-1.941081	-1.616526
HDFC	9	1.308778	0.9523	-2.566842	-1.941081	-1.616526



**Table 3: Runs Test (Descriptive Statistics)**

<b>Bank Name</b>	<b>N</b>	<b>Mean</b>	<b>S. D.</b>	<b>Minimum</b>	<b>Maximum</b>
Axis Bank	1240	0.161757699	3.244693303	-14.19249630	20.35183525
Bank of India	1240	0.159218338	3.346097441	-12.56571102	22.27617073
Bank of Baroda	1240	0.154691893	2.842729869	-11.96298027	19.74875832
Canera Bank	1240	0.112443931	2.981471699	-14.71956921	17.72251320
Federal Bank	1240	0.096329312	2.737114341	-22.41306686	12.54520130
HDFC Bank	1240	0.120086038	2.483870834	-11.26174068	16.39164352
ICICI Bank	1240	0.104064523	3.313838696	-19.71334076	23.01331711
IDBI Bank	1240	0.105728842	3.440069900	-20.30405426	18.66028786
Indsund Bank	1240	0.213972500	3.926295153	-18.11704826	17.16524124
Kotak Mah. Bank	1240	0.112899513	3.760324817	-47.20932770	19.83356476
Punjab Nat. Bank	1240	0.113170216	2.669440849	-11.30839157	12.49456596
S.B.I.	1240	0.120682074	2.736583635	-12.68217182	20.24766541
Union Bank	1240	0.127901966	2.954668940	-14.32098770	21.94452858
Yes Bank	1240	0.150660717	3.505780189	-20.70116806	20.52539444

**Table 4: Runs Test (Results Using Mode\*)**

Bank Name	Test Value	Cases<Test Value	Cases>=Test Values	Total Cases	No. of Runs	Z Values	Asymp. Sig.
Axis Bank	20.3518353	1239	1	1240	3	0.040193394	0.967938945
Bank of India	.0000000	582	658	1240	614	-0.266401813	0.789929769
Bank of Baroda	.0000000	609	631	1240	613	-0.443603796	0.657329061
Canera Bank	.0000000	599	641	1240	559	-3.486373342	0.000489617
Federal Bank	.0000000	610	630	1240	592	-1.639016761	0.101209769
HDFC Bank	16.3916435	1239	1	1240	3	0.040193394	0.967938945
ICICI Bank	23.0133171	1239	1	1240	3	0.040193394	0.967938945
IDBI Bank	.0000000	596	644	1240	594	-1.483554190	0.137927230
Indsund Bank	.0000000	603	637	1240	628	0.424538297	0.671173282
Kotak Bank	0000000	582	658	1240	589	-1.692240243	0.090600176
PNB	.0000000	608	632	1240	607	-0.782564340	0.433882989
SBI	20.2476654	1239	1	1240	3	0.040193394	0.967938945
Union Bank	.0000000	602	638	1240	587	-1.903763348	0.056941012
Yes Bank	.0000000	633	607	1240	577	-2.485647065	0.012931614

\*There are multiple modes. The mode with the highest data value is used.

