# Testing Efficiency in Weak Form of Indian Banking Industry

Meenu Baliyan[1], Punjika Rathi[2]

[1,2]Assistant Professor (MBA Dept), IMS Engineering College, Ghaziabad, India

*Abstract :-* **The reflections of any type of information on the stock prices are known as Capital market Efficiency. In this research paper researcher has tried discover the different type of capital market efficiency that Indian stock markets survive. Market efficient in three forms i.e. weak, semi strong and strong. The prospect of investors regarding future cash flows are Market efficiency talks about the accuracy and speed with which the market reflect the prospects into prices reflected in share prices. Hence investor can accordingly plan its approach of investment analysis.**

**Researchers have taken 3 months data to study the stock market prices of top players of banking industry of the India. Study tried to check the dependency between the stock market prices and information. Study is based on secondary data taken from stock market and it try to explore the relation of information and fluctuation in stock prices.**

**This paper would test the type of efficiency of Indian banking industry and its results could be applied for further portfolio management practices.**

*Keywords:* **Market efficiency, oligopoly, fundamental analysis, technical analysis, portfolio management.**

## I. INTRODUCTION OF THE STUDY

The main idea behind the oligopoly market is that few companies rule over many in a particular industry which offering similar types of goods and services. Competition is limited just because of limited players in an oligopoly market. Some examples of oligopoly markets are banking industry, cement industry, Cable Television Services, Entertainment Industries (Music and Film), Airline Industry, Mass Media, Pharmaceuticals, Computer & Software Industry, Cellular Phone Services, Smart Phone and Computer Operating Systems, Aluminum and Steel, Oil and Gas and many more. For the study we have considered the banking industry.

The oligopoly market is when there are few seller and they are selling homogenous or differentiated goods and services. Oligopoly markets exist between the pure monopoly and monopolistic competition, where few sellers lead the market and have control over the price of the product. This study will try to find out that oligopoly markets are not efficient. For the study banking industry has been considered.

Theory of oligopoly market describes that market price increase as the competitive prices and will be higher than the monopoly markets. Particular oligopoly solution concepts propose more exact predictions. This paper defines that the oligopoly concept can be approximate econometrically.

Efficient markets model is concerned with the speed with which information is incorporated in security prices. The hypothesis states that the capital market is capable in processing information. An efficient capital market is one in which security prices equal their intrinsic values at all times, and where most securities are correctly priced. **According to Elton and Gruber, "**when someone refers to efficient capital markets, they mean that security prices fully imitate all available information**".**

The efficient market theory holds the view that in an efficient market, new information is processed and evaluated as it arrives and prices instantaneously adjust to new and correct levels. Therefore, an investor cannot constantly earn excess returns by undertaking fundamental analysis or technical analysis.

The capital market is considered to be efficient in three different forms: the weak form, semi-strong form and the strong form. The weak form deal with the information about the past sequence of security price movements, the semi-strong form deals with the widely available information, while the strong form deals with all information, both public and private(or inside).

*Forms of Market Efficiency*

The capital market is viewed as productive in three unique structures: the weak form, semi-strong form and the strong form. Accordingly, the effective market theory has been sub-isolated into three structures, each managing an alternate sort of data.

*a. Strong efficiency -* This is the most grounded variant, which expresses that all data in a market, regardless of whether open or private, is reflected in a stock rate. Not in any case insider data could offer advantage to the financial specialist

*b. Semi-strong efficiency -* This type of EMH suggests that all open data is reflected into a stock's present offer cost. Neither major nor specialized examination can be utilized to accomplish predominant additions.

c. *Weak efficiency -* This sort of EMH claims that every past cost of a stock are reflected in the present stock cost. In this manner, specialized examination can't be utilized to conjecture and beat a market.

The distinctive types of productive market theory have been tried through a few observational investigations. The tests of

the weak form theory are basically trial of whether all data contained in chronicled price of securities is completely reflected in current costs. Semi-strong form test of the productive market speculation are test of whether freely accessible data is completely reflected in current stock costs. At last, solid frame trial of the effective market speculation are trial of whether all data, both open and private, is completely reflected in security costs and whether any kind of financial specialist can procure overabundance returns

## II. LITERATURE REVIEW

Large number of researchers **have** tested the weak form of market efficiency in different frameworks but got contradictory results. Some have supported the existence of market efficiency while others have rejected it.

Literature review

| Author | Tools Used for study | Findings |
|---|---|---|
| Dipasha Sharma (2018) | Data Envelopment Analysis | Author Studied a model was developed to examine the empirical relationship between market performance indicators and efficiency of the Indian banks. Based on data from 2002 to 2012, the relationship model was tested and a statistically significant association could be found between scale efficiency and stock market return of the Indian banking system whereas technical and pure technical efficiencies were found to exhibit a positive and significant association with EVA and MVA, respectively |
| Baliyan M, Rathi P(2018) | Run Test | Author studied the stock price of cement industry and found that market is inefficient in weak form. |
| David Sam Jayakumar G.S. and Sultan A (2013) | Auto Correlation Function Unit root Test ,Augmented Dickey Fuller Test and Run test | Author find that the investor have good opportunity to invest in banking FMCG and infrastructure Industry as these industries don't follow the random walk pattern and not efficient in the weak form. |
| Dhawan et al (2012) | Root Test , Variance Ratio and Auto correction Analysis | Author studied the weak form of market efficiency of 4 selected stocks of Asian. He found that markets are inefficient under weak form. |
| Muhammad Akbar, Shahid Ali and Muhammad Faisal Khan | Unit Root Test , Co Integration Test | Author studied tha relationship between the Karachi stock exchange index and macroeconomic variables for the time duration of January 1999 to June 2008 and found the there is a long run relationship exists between them |
| Rakesh Gupta and Suneel Maheshwari (2011) | Graach Model , Run Test, Variance-Ratio (VR) tests | methodology<br>Our paper investigates the random walk hypothesis as well as the day of the week effect for CEE stock indices by using parametric |
| | | and non-parametric tests, as well as OLS and conditional variance that the returns of CEE indices are not random walk especially after CEE joined with the EU. Runs test indicates that after joining the EU, CEE stock markets improved their efficiency.<br>Using the Variance ratio test, we find that after the accession to the EU the random walk hypothesis is rejected for two indices, that are the Sax16 and Sofix, out of seven.<br>Results indicate that day-of-the-week effect is not evident in most markets except for some. Overall results indicate that some of these markets are not weak form efficient and an informed investor can make abnormal profits by studying the past prices of the assets in these markets. |
| Khan et al (2009) | Run Test | Studied the efficiency of Indian Capital market.<br>He found that Indian Capital Market is inefficient in weak form. |
| Rakesh Gupta and Parikshit K. Basu (2009) | Run Test and LOMAC variance ratio test | Studied the weak form of efficiency for two equity markets in India. Duration of study was since 1991 to 2006.<br>Study found that this series do not follow the random walk and that is why hypothesis was rejected that weak form is efficient. |
| Worthington and Higgs (2008) | Non-parametric and parametric tests, univariant unit-root tests as well as multiple variance ratio test. | Study found that the weak form market efficiency of several Latin American equity markets. They conclude rejecting the random walks in any stock market investigated. |
| Kenourgios and Samitas, 2008). Analysing emerging countries other than the developed countries may provide support for or against the proposition that these anomalies are a worldwide phenomenon. Kim and Shamsuddin (2008) | Multiple Varience Ratio Test | Study evaluate the stock market efficiency of nine Asian stock markets grouped in developed, emerging and frontier stock markets. They found that the first and the second one group of stock markets show weak-form efficiency, while the last are found to be inefficient |
| Islam and Sofyani (2005) | Unit Root Test, Augmented Dickey-Fuller (ADF) Phillips-Perron (PP) test, Variance ratio (VR) test | Author studied the different factor which is most important to the weak form inefficiency of Dhaka stock Market and found that the weak-form efficiency during the latter period may be explained by the steps taken by the Securities |

| | | |
|---|---|---|
| | | and Exchange Commission to promote transparency and efficiency in the stock market after the crash of 1996. |
| Bhattacharya et al. (2003) | GARCH Model | Study found that returns have significant positive effect on both Thursday and Friday. At the same time the day of the week effect on volatility is observed in both Monday and Thursday |
| Choudhary (2000) | GARCH Model | finds presence of the day of the week in some Asian markets by using GARCH methodology this confirm the proposition that these anomalies of the financial markets characterize not only developed markets but also emerging markets |

*Need of the examination*

1. Because of the Indian capital market (oligopoly) productivity has not been demonstrated yet.
2. There are blended confirmations for feeble type of market effectiveness.
3. The kind of capital Market Productivity proposes whether to utilize principal or specialized or none speculation system

*Empirical Tests of Weak Form Efficiency*

The powerless type of the Effective Market Theory (EMH) says that the present costs of stocks as of now completely mirror all the data that is contained in the verifiable succession of costs. The new value developments are totally irregular. They are delivered by new snippets of data and are not related or reliant on past value developments. In this manner, there is no preferred standpoint in concentrate the chronicled arrangement of costs to increase irregular comes back from exchanging securities. This suggests specialized examination, which depends on outlines of value developments previously, is anything but a significant investigation for making irregular exchanging benefits.

The powerless type of the Proficient Market Speculation is accordingly an immediate refutation of specialized examination.

Two approaches have been used to test the weak form of the efficient market hypothesis.

a. K-S test
b. Runs Test

## III. RESEARCH METHODOLOGY

*Scope of the Study*

- This examination has taken data from June 2019 to June 2020 only.
- This examination is based on only banking industry which is section of capital market of India

- This examination would be dependant only on evidences on weak form of market efficiency.
.

| Objectives | Hypothesis |
|---|---|
| This examination has attempted to test the weak type of market efficiency of the Indian capital market in banking industry from first June 2019 to June 2020. The outcomes would be useful for investors to plan their investment procedure. The existence of weak type of market efficiency denies the utilization of technical analysis investigation to win supernormal returns. . | **Null Hypothesis:** <br> ➢ $H_0$: The subsequent stock indices changes of ICICI, Axis Bank, HDFC, IDBI, SBI, Union Bank and PNB are independent and move randomly. <br> ➢ $H_0$: Indian banking industry i.e. segment of Indian capital market under the investigation are efficient in Weak-Type. <br><br> **ALTERNATE HYPOTHESIS** <br><br> ➢ $H_a$: The subsequent price changes of ICICI, Axis Bank, HDFC, IDBI, SBI, Union Bank and PNB are dependent and do not move randomly. <br> ➢ $H_a$: Indian banking industry i.e. segment of Indian capital market under the investigation are efficient in Weak-Type. |

## IV. DATA COLLECTION AND ANALYSIS

*Sample*

For examining the said objectives, sample which consists of the daily closing values of the chosen indices i.e. ICICI, AXIS Bank, HDFC, IDBI, PNB, SBI, Union Bank been taken from $13^{th}$ June 2019 to $13^{th}$ June 2020.

*Sample Period*

**This research has** taken the closing values of chosen stock indices under study from the $13^{th}$ June 2019 to $13^{th}$ June 2020

*Sample Size*

Following table shows the details of sample size of each selected stock. The data are matched. The sample includes observations of daily closing values of individual stock of selected banks for 1year .The study has considered the selected stocks as they are the frequently considered in many researches.

*Analysis of Descriptive Statistics*

There is an assumption of the random walk hypothesis that the distribution of the stock return series would be normal. In an attempt to test the distribution of the stock return series, the descriptive statistics of the log of stock returns are calculated and given as below:

*Results of Descriptive Statistics for the selected Companies*

Table 1.1: Descriptive Statistics

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic |
| Axis bank | 244 | 303.15 | 818.68 | 6.4192E2 | 143.88789 |
| ICICI Bank | 244 | 284.00 | 549.40 | 4.3789E2 | 75.64571 |
| HDFC Bank | 244 | 767.70 | 1302.40 | 1.1368E3 | 139.58401 |
| IDBI Bank | 244 | 17.80 | 38.75 | 30.2746 | 6.03262 |
| SBI Bank | 896 | 150.85 | 11818.50 | 8.2408E3 | 4893.58280 |
| PNB | 244 | 26.60 | 82.05 | 55.4016 | 15.62013 |
| Union Bank | 244 | 22.85 | 84.85 | 50.3746 | 16.40346 |
| Valid N (listwise) | 244 | | | | |

*Statistical Test Used*

The data has been analyzed by the way of Non Parametric tests mentioned as:

*Runs Test*

This research has applied the Wald-Wolfowitz Runs Test (non-parametric) for the randomness of the stock return. Run testing is a widely used test for analyzing the randomness for investigating serial dependence in share price up and down movements and examine the expected number of runs from a random process with the observed number of runs. The test is non-parametric and is independent of the normality and constant variance of data. A run has been explained as a series of similar signs that are preceded or succeeded by a different sign or no sign at all. It means for a given sequence of observations, the runs test analyses whether the value of one observation affects the values taken by later observations. If the observations are found out independent, the sequence is assumed to be random. Runs test presents the cutting point, the number of runs, the number of cases less than the cutting point, the number of cases above or equal to the cutting point, and the test statistics Z with its observed significance level. The total number of runs is a measurement of chance, since too many or too few runs suggests dependence among observations. According to hypothesis on interdependence of

consecutive price changes, the distribution of the total number of runs is nearly normal.

This research has used runs test to examine the serial independence in return series of selected stock prices to analyze the trend in the succeeding price differences. The weak form of efficiency in the market assumed that the succeeding price variations should be independent. The expected number of runs (M) and the standard error is presented as follows:

$$\text{Expected number of runs (M)} = \frac{\left[ N(N+1) - \sum_{i-1} n_i^2 \right]}{N}$$

$$\text{Standard error } \sigma_m = \left[ \frac{\sum_{i-1} n_i^2 \left\{ = N(N+1) \right\} - 2N \sum_{i-1} n_i^3 - N^3}{N^2 (N-1)} \right]^{\frac{1}{2}}$$

Where N is the total number of price changes and $n_i$ the number of price changes of each sign. Standardized variable Z is calculated to test the significance of the difference between the observed and expected number of runs as under:

$$Z = \frac{(R + 0.5 - M)}{\sigma_m}$$

Where

R = Total observed number of runs of all signs

0.5 = Continuity adjustment factor

*Results of the Runs Test*

Table 1.2: Runs Test

| | Axis bank | ICICI Bank | HDFC Bank | IDBI Bank | SBI Bank | PNB | Union Bank |
|---|---|---|---|---|---|---|---|
| Test Value[a] | 709.15 | 428.76 | 1199.35 | 32.10 | 1.12E4 | 61.43 | 52.77 |
| Cases < Test Value | 122 | 122 | 122 | 122 | 448 | 122 | 122 |
| Cases >= Test Value | 122 | 122 | 122 | 122 | 448 | 122 | 122 |
| Total Cases | 244 | 244 | 244 | 244 | 896 | 244 | 244 |
| Number of Runs | 10 | 17 | 18 | 10 | 426 | 16 | 8 |
| Z[a] | -14.498 | -13.600 | -13.472 | -14.498 | -1.538 | -13.728 | -14.755 |
| Asymp. Sig. (2-tailed)[a] | .000 | .000 | .000 | .000 | .124 | .000 | .000 |

a. Median

The results of Runs test are represented for the returns on companies under study in the above table. The p-value of selected companies is found to be less than 0.05 except SBI Bank. Hence this study rejects the null hypothesis. So the Indian capital market i.e. banking segment under the study is found to be inefficient in weak form.

*Kolmogorov-Smirnov Test:*

This study has used K-S one sample test to test whether the observations for selected sample are taken from normal or uniform distribution.

The non-parametric, Kolmogorov Smirnov Goodness of Fitness Test (KS) is a test to examine whether the observed distribution represent the theoretical normal or uniform distribution. Kolmogorov Smirnov Goodness of Fitness Test (KS) is used to explain whether a random sample of data fits a particular distribution (uniform, normal or Poisson). This research is used for both normal and uniform parameters to test distribution. The sample's cumulative distribution is compared with the standard cumulative function for every distribution. Ai means Cumulative relative frequency and Oi means the comparable value of sample frequency. The K-S test computes the maximum value of the absolute difference between Ai and Oi. The test statistic is given as :

K= Max(Ai-Oi)

The decision to reject the null hypothesis is based on the value of K. Critical value of K is given by $1.36/n^{(1/18)}$.

In other words K can be converted into a normally distributed z statistic and its connected probability can be computed.

*Results of K-S Goodness of fit test (Normal Distribution)*

*Tests of Normality*

**Table 1.3 :Tests of Normality**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | Df | Sig. | Statistic | df | Sig. |
| Axis bank | .257 | 244 | .000 | .786 | 244 | .000 |
| ICICI Bank | .107 | 244 | .000 | .936 | 244 | .000 |
| HDFC Bank | .190 | 244 | .000 | .858 | 244 | .000 |
| IDBI Bank | .159 | 244 | .000 | .891 | 244 | .000 |
| SBI BAnk | .426 | 244 | .000 | .589 | 244 | .000 |
| PNB | .204 | 244 | .000 | .874 | 244 | .000 |
| Union Bank | .138 | 244 | .000 | .937 | 244 | .000 |

Lilliefors Significance Correction
*This is a lower bound of the true significance.

Here two tests for normality are run. For dataset less than 2000 elements, the Shapiro-Wilk test is applied, otherwise, the Kolmogorov-Smirnov test is to be applied. In this study, since there are less than 2000 elements, the Shapiro-Wilk test has been applied.

The Shapiro- Wilk table (except for ICICI) indicates p-value < 0.05 at the 5% level of significance, in case of normal distribution. The results evidently indicate that the frequency distribution of the daily values of the stock returns in given research do not fit normal distribution. Hence this study rejects the null hypothesis. The subsequent stock price changes are dependent and do not move randomly. So the Indian capital market ie banking segment under the study is found to be inefficient in weak form.

## V. FINDINGS AND CONCLUSION

The results of Runs test for the returns on stocks under the study are indicating the p-value of all the stock exchanges are less than 0.05. Hence this study rejects the null hypothesis. So the Indian capital market ie banking segment under the study is found to be inefficient in weak form. The Kolmogorov Smirnov Goodness of Fit Test (KS) shows p-value < 0.05 at the 5% level of significance, in case of normal distribution. The results evidently indicate that the frequency distribution of the daily values of the stock returns in given research do not fit normal distribution. Hence this study rejects the null hypothesis. The subsequent stock price changes are dependent and do not move randomly. So the Indian capital market ie banking segment under the study is found to be inefficient in weak form.

This research suggests the evidence of weak form of inefficiency of Indian capital market in banking industry during the selected sample period. Taken as whole, results from the empirical analysis recommends that the stock market i.e. banking industry (oligopoly market) shows market inefficiency in weak form.

Since the selected oligopoly market is inefficient in weak form, this implies its inefficiency in semi-strong and strong form as well. Hence it is concluded that selected Indian oligopoly market shows market inefficiency. The implication of presence of capital market inefficiency for analysts is that there is use of technical analysis for investment decisions.

## REFERENCES

[1]. Al-Loughani N. & Chappell D. ,On the validity of the weak-form efficient markets hypothesis applied to the London stock exchange, Applied Financial Economics, Volume 7, Issue 2,pages 173-176
[2]. Ashutosh Verma, The study of the weak form informational efficiency in Bombay Stock Market, Finance India, 19(4), (2005), 1421.
[3]. Chaudhuri S.K.(1991) , Short-run Share Price Behaviour: New Evidence on Weak Form of Market Efficiency
[4]. Cumhur Buguk and B Wade Brorsen (2003)Testing weak-form market efficiency: Evidence from the Istanbul Stock Exchange. International Review of Financial Analysis,Volume 12, Issue 5, Pages 579–590
[5]. Gupta, R., & Basu, P. K. (2011). Weak form efficiency in Indian stock markets.International Business & Economics Research Journal (IBER), 6(3).
[6]. Islam, A. and Khaled, M. (2005), Tests of Weak-Form Efficiency of the Dhaka Stock Exchange. Journal of Business Finance & Accounting, 32: 1613–1624.
[7]. Khan, A. Q., Ikram, S., & Mehtab, M. (2011). Testing weak form market efficiency of Indian capital market: A case of national

stock exchange (NSE) and Bombay stock exchange (BSE). African Journal of Marketing Management,3(6), 115-127.

[8]. Mishra P.K. (2010), Indian Capital Market – Revisiting Market Efficiency

[9]. Moustafa M.A., Testing the Weak-Form Efficiency of the United Arab Emirates Stock Market , International journal of business, 9(3),

[10]. Olowe, R. A. (1999). Weak form efficiency of the Nigerian stock market: further evidence. African Development Review, 11(1), 54-68

[11]. Patel, N. R., Radadia, N., & Dhawan, J. (2012). An empirical study on weak-form of market efficiency of selected Asian stock markets. Journal of Applied Finance & Banking, 2(2), 98-148.

[12]. Poshakwale, S. (1996). Evidence on weak form efficiency and day of the week effect in the Indian stock market. Finance India, 10(3), 605-616.

[13]. Rao, Krishna N (1988). "Stock Market Efficiency: The Indian Experience," Proceedings of National Seminar on Indian Securities Market: Thrust and Challenges (March 24-26,1988), University of Delhi.

[14]. S.Kevin , Eleventh Edition (2012), "Security Analysis and Portfolio Management", Ashok K. Ghosh , Connaught Circus , New Delhi- 110001.

[15]. Sharma, G. D., & Mahendru, M. (2009). Efficiency Hypothesis of the Stock Markets: A Case of Indian Securities. International Journal of Business and Management, 4(3), P136.

[16]. www.nse.com