Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/17331
DOI URL: http://dx.doi.org/10.21474/IJAR01/17331

RESEARCH ARTICLE

STUDY OF WEAK FORM OF MARKET EFFICIENCY IN INDIA

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Manuscript Info

Manuscript History
Received: 31 May 2023
Final Accepted: 30 June 2023
Published: July 2023

Key words:-
Weak Form, Market Efficiency, Liquidity Traders, National Stock Exchange (NSE), Filter Rule, Runs Test, Serial Correlation

Abstract

A security's current market price already accounts for all of its prior trading volumes and prices, according to India's lax form of market efficiency. An investor cannot generate spectacular returns by only relying on the analysis of previous price movements because any relevant information about the security would already be reflected into its present price. The accuracy and promptness with which prices reflect information about the market is known as market efficiency. All the information from prior prices and traded volume is included in the weak version of the market's current prices. Furthermore, future prices cannot be predicted by looking at past prices. Everyone has access to past prices, even though some people can obtain them more easily than others. Liquidity traders may sell their stocks, generating price volatility, without considering the shares' fundamental value. The market price reflects the intrinsic value as a result of the buying and selling of information traders. The filter rule, runs test, and serial correlation are used to assess market efficiency. Run tests have been used in this research to identify market efficiency. Information on stock prices for the selected companies was gathered from the National Stock Exchange (NSE).

Introduction:-

The global stock markets help asset owners access liquidity and contribute to the continuing, competitive pricing determination process. As a result, efficient stock markets are essential. An effective stock market, in its broadest definition, is a place where investors may choose from a range of securities that signify ownership of corporate operations and businesses can decide on their production investments. The efficacy of the stock market, particularly in relation to stock markets in emerging countries, is a key topic of research in financial economics.

This is due to the fact that market efficiency is essential to the functioning of the capital market, particularly considering the fact that it serves to stimulate investors' interest in market activity. It is believed that investor behaviour can explain the stock market's activity. Due to the fact that stock prices are a reflection of investor views and expectations, stock market forecasting is typically judged more on its shortcomings than on its successes.

To predict stock values, a great amount of work has gone into econometric modelling approaches. Stock prices exhibit a long-term tendency, according to Fama and French (1988), with several years of upswing followed by slower periods.

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A stock market that witnesses independent price changes over time is by definition a random walk market, according to Fama (1965; 1995). Particularly when it comes to stock prices, a random walk implies that price changes are completely independent of profits and losses. The independence assumption underlying the random walk hypothesis is true as long as it is not possible to increase predicted benefits by taking advantage of knowledge of the prior behaviour of the series of price changes. If price changes for a particular security happen in discrete waves, timing purchases and sales of that security is also not a difficulty.

The efficient market hypothesis has its roots in 1900. The Efficient Market Hypothesis was first put forth by a French mathematician by the name of Louis Bachelier in 1900. In his dissertation "The Theory of Speculation," he argues that price changes are random and don't follow any particular pattern. In 1956, this topic received further attention when Paul Samuelsson became interested in Bachelier's work and shared it with economists. Samulson was the first to offer a formal economic defence of a market that is competitive. In 1965, Fama gave the definition of "Efficient Market". Fama first explained to technical and financial experts the challenges the EMH concept poses.

That year was 1970.Fama divided the Efficient Market Hypothesis into three groups based on the amount of information that market prices reflected. Weak Form, Semi Strong Form, and Strong Form are the three forms of Market Efficiency.

Weak Form of Market Efficiency
The type of information used in the Weak Form of Market Efficiency is information on previous price and volume data. Given that stock prices represent all trade information that is widely available and can be extrapolated from market data, such as historical price, trading volume, etc., nobody should be able to outperform the market by using information that everyone else is aware of. When the markets are inefficient, it is impossible to consistently make money using technical trading concepts.

Semi Strong Form of Market Efficiency
Under Semi Strong Form, publicly accessible data is included into the current stock values. Publicly available information includes historical price information, company annual reports, company announcements, and a number of other macroeconomic factors (such as inflation, unemployment, etc.). Certain information is discounted (to the extent anticipated in advance) before an event is disclosed and even before it occurs.

Even before the official announcements, the market is impacted by things like earnings reports, bonuses, and rights. The semi-strong form of market efficiency states that because share prices react swiftly to information that is made publicly available, it is impossible for anybody to outperform the market by using information that "everyone else knows."

Strong Form of Market Efficiency
Stock prices reflect various forms of information, including insider company information and public information, with high levels of efficiency. Therefore, current prices are based on a combination of public and private information. This form suggests that even management of organisations cannot profit from inside information; they cannot benefit from internal affairs or crucial decisions or market-beating methods.

Objectives Of The Project Study:-

1. To develop an understanding of the various forms of efficiency of the stock market
2. To find out whether the past prices of the stock are reflected on the future price
3. To identify whether the weak form of efficient market holds true or not

Literature Review:-

Numerous studies have been done to date by different academics to examine the various kinds of capital market efficiency applicable to the Indian stock market. Sharma and Kennedy (1977) employed run tests and spectral analysis to compare the movements of stock indices on the Bombay, London, and New York stock markets between 1963 and 1973. Both experiments confirmed that stock index fluctuations on each of the three major exchanges are random. They got to the conclusion that shares on the Bombay Stock Exchange (BSE) are random walk and weakly efficient.

Ramachandran (1986) tested the weak version of the Efficient Market Hypothesis using weekend prices for 60 scrips from 1976 to 1981. Along with runs tests and serial correlation testing, he used filter rule tests to support the weak form of the EMH.

Yalawar (1988) conducted a thorough research into the Mumbai Stock Exchange's (BSE) effectiveness. He looked at 122 stocks that were listed on the BSE between 1963 and 1982 and their month-end closing prices. He found that stock price behaviour was random by using only non-parametric techniques, such as the Spearman's rank correlation test.

Keasey and Mobarek (2000) examined the weak-form efficiency of an emerging market using data from the Bangladeshi Dhaka Stock Exchange from 1988 to 1997 using both parametric and non-parametric tests. The survey indicates that Bangladesh's Dhaka Stock Market is unreliable and inefficient.

Pandey (2003) investigated the efficiency of the Indian stock markets using three stock indexes. He tested the market's efficiency level for the years from January 1996 to June 2002 using the runs test and the Auto Correlation Function ACF (K).Chigozie and Okpara (2009) examined the performance of the Nigerian Stock Market from 1984 to 2006 using the GARCH (Generalised Autoregressive Conditional Hetroscedasticity) Model, a sophisticated test. The data shows that the Nigerian stock market is efficient and weak.

Reseaech Methodology:-

1. Period of study is from 1st January 2023 to 31st March 2023
2. The stock prices were taken from the NSE (National Stock Exchange)
3. Four companies each from Automobile Industry and IT industry has been selected
4. The sources of data for the research paper are mainly secondary which is collected from the websites, documents, which are in printed form like annual reports etc

Hypothesis

While studying the efficient market hypothesis, hypothesis testing has been taken into account Thus, in context of this research we have,

H0: Past prices are not reflected on the present prices.

H1: Past prices are reflected on the present prices.

Data Analysis Method:-

The study uses the Runs examination to investigate the efficient market hypothesis. Auto correlation is unable to assess the randomness of the series, hence the nonparametric Runs assess is used.

A typical method in the random walk model that ignores the distributional properties is the Runs Test. It has been used to determine how unpredictable the activity on the Indian Stock Market is. Each price change in a run test is considered over a set period of time and is either recorded with a plus (+) for an increase in price or a minus (-) for a decline in price. A run occurs when two changes (either ++ or --) occur back-to-back. if a price adjustment has a different sign, like +-or-+. The run is over, and a new one could start.The number of runs for a given series of price changes is compared with the number in a table of expected values for the number of runs that should occur in a random series to determine whether or not the series is independent. To test the independence of the prices, we require:

Total Number of Runs: (r)
Number of Positive Price Changes: (n1)
Number of Negative Price Changes: (n2)

Once we have the data, the mean and the standard deviation of the mean are calculated by using the formula given below:

$$\text{Mean }, \mu(r): \frac{2(n1\ n2)}{n1+n2+1} \quad (1)$$

$$\text{Standard deviation, } \sigma(r) = \sqrt{\frac{2n1n2\ (2n1n2-n1-n2)}{(n1+n2)\ 2\ (n1+n2-1)}} \quad (2)$$

Level of significance:

To test the weak form of efficiency of the stock market ,the Runs Test is applied at 5% significance level where z=1.96 Calculating lower limit and upper limit:

Here, Lower limit :{ μ-1.96*(σ)} (3)
Upper limit :{ μ+1.96*(σ)} (4)
Where μ=mean, σ=standard deviation

Data Analysis And Interpetation:

Table 1:- showing the Result of Hypothesis testing:

ɔmpany Name					ɒper Limit	ɔwer Limit	ɔserved ıns	**Hypothesis testing at a given level of** Significance
cher Motors	20		.45	.80	.31	0.41	31	H0 Accepted
shok Leyland	29		.93	.33	.49	1.878	23	H0 Accepted
ch Mahindra	31			.38	.90	1.90	26	H0 Accepted
ıta Motors	34		.70	36	.26	.13	36	H0 Accepted

Runs Test Analysis:

Table 2:- Showing the monthly closing stock value and applied runs test of EICHER MOTORS.

Date	**Closing price**	**Price change**	**Date**	**Closing price**	**Price change**
01-02- 2023	3228.85		15-02-2023	3203	-
03-01-2023	3213.45	-	16-02-2023	3329.95	+
04-01-2023	3215.25	+	17-02-2023	3287.05	-
05-01-2023	3257.7	+	20-02-2023	3300	+
06-01-2023	3250.6	-	21-02-2023	3290	-
09-01-2023	3262.55	+	22-02-2023	3270	-
10-01-2023	3167.55	-	23-02-2023	3265	-
11-01-2023	3137.25	-	24-02-2023	3249.9	-
12-01-2023	3103.25	-	27-02-2023	3200	-
13-01- 2023	3162.05	+	28-02-2023	3132	-
16-01-2023	3139.05	-	01-03-2023	3106	-
17-01-2023	3179.95	+	02-03-2023	3155.1	+
18-01-2023	3177.6	-	03-03-2023	3141.15	-
19-01-2023	3166.7	-	06-03-2023	3138	-
20 -01-2023	3150.5	-	08-03-2023	3166	+
23-01-2023	3203.35	+	09-03-2023	3211	+
24-01-2023	3226.55	+	10-03-2023	3134.95	-
25-01- 2023	3213.85	-	13-03-2023	3117	-
27-01-2023	3169.75	-	14-03-2023	3033.4	-
30-01-2023	3191.45	+	15-03-2023	3044.8	+
31-01-2023	3263.35	+	16-03-2023	3021.7	-
01-02-2023	3280	+	17-03-2023	3052	+
02-02-2023	3265	-	20-03-2023	2974.6	-
03-02-2023	3233.4	-	21-03-2023	2966.8	-
06-02-2023	3295	+	22-03-2023	2949.5	-
07-02-2023	3277.05	-	23-03-2023	2942.2	-
08-02-2023	3275	-	24-03-2023	2925	-
09-02-2023	3236.05	-	27-03-2023	2913.6	-

10-02-2023	3225.05	-	28-03-2023	2894.8	-
13-02-2023	3225	-	29-03-2023	2858.5	-
14-02-2023	3261.95	+	31-03-2023	2923.1	+

Evaluation of EICHER MOTORS:

Total runs (r) =31
Number of positive changes (n1) =20
Number of negative changes (n2) =41
Mean (μ) =26.45
Standard deviation (σ)=18.90
Upper limit=63.31
Lower limit=-10.41

Inference:

Since the Observed number of runs falls within the upper and the lower limit, we can conclude that that the prices are independent at 5% level of significance H0 is accepted. Thus, the marketis weakly efficient.

Table 3:- Showing the monthly closing stock value and applied runs test of ASHOK LEYLAND.

Date	Closing price	Price change	Date	Closing price	Price change
02-01- 2023	148.65		15-02-2023	149.95	+
03-01-2023	147.4	-	16-02-2023	150.95	+
04-01-2023	145.8	-	17-02-2023	148.9	-
05-01-2023	148.45	+	20-02-2023	148.55	-
06-01-2023	147.75	-	21-02-2023	145.5	-
09-01-2023	151.31	+	22-02-2023	143.4	-
10-01-2023	151.9	+	23-02-2023	140.6	-
11-01-2023	149.45	-	24-02-2023	141.3	+
12-01-2023	146.8	-	27-02-2023	141.25	-
13-01- 2023	147.05	+	28-02-2023	145.5	+
16-01-2023	146.75	-	01-03-2023	143.95	-
17-01-2023	146.85	+	02-03-2023	145.15	+
18-01-2023	147.4	+	03-03-2023	145.05	-
19-01-2023	145.95	-	06-03-2023	146	+
20 -01-2023	144.05	-	08-03-2023	145.95	-
23-01-2023	147.35	+	09-03-2023	144.85	-
24-01-2023	147.05	+	10-03-2023	145.4	+
25-01- 2023	146.35	-	13-03-2023	140.9	-
27-01-2023	149.35	+	14-03-2023	138.7	-
30-01-2023	144.3	-	15-03-2023	138.1	-
31-01-2023	149.5	+	16-03-2023	139.75	+
01-02-2023	147.7	-	17-03-2023	139.5	-
02-02-2023	152.05	+	20-03-2023	135.95	-
03-02-2023	153.9	+	21-03-2023	135.4	-
06-02-2023	152.85	-	22-03-2023	138.75	+
07-02-2023	147.35	-	23-03-2023	137.3	-
08-02-2023	148.5	+	24-03-2023	137.65	+
09-02-2023	148.85	+	27-03-2023	134.6	-
10-02-2023	147.35	-	28-03-2023	134.65	+
13-02-2023	149.15	+	29-03-2023	136.45	+
14-02-2023	149.25	+	31-03-2023	139.2	+

Evaluation of ASHOK LEYLAND:

Total runs (r) =23
Number of positive changes (n1) =29

Number of negative changes (n2) =32
Total mean (μ) =29.93
Standard deviation (σ)=21.33
Upper limit=71.49
Lower limit=-11.878

Inference:
Since the Observed number of runs falls within the upper and the lower limit, we can conclude that that the prices are independent at 5% level of significance (H0 is accepted). Thus, the marketis weakly efficient.

Table 4:- Showing the monthly closing stock value and applied runs test of Tech Mahindra.

Date	Closing price	Price change	Date	Closing price	Price change
02-01- 2023	1009.5		15-02-2023	1071.4	+
03-01-2023	1023.8	+	16-02-2023	1130.25	-
04-01-2023	1020.3	-	17-02-2023	1129.2	-
05-01-2023	1011.65	-	20-02-2023	1144.2	+
06-01-2023	986.15	-	21-02-2023	1134.45	-
09-01-2023	1015.25	+	22-02-2023	1125.7	-
10-01-2023	1002.65	-	23-02-2023	1128.8	+
11-01-2023	1006.35	+	24-02-2023	1119	-
12-01-2023	1001.55	-	27-02-2023	1113.95	-
13-01- 2023	1003.15	+	28-02-2023	1100.25	-
16-01-2023	1034.45	+	01-03-2023	1126.9	+
17-01-2023	1046.05	+	02-03-2023	1109.8	-
18-01-2023	1048.35	+	03-03-2023	1085.15	-
19-01-2023	1053.3	+	06-03-2023	1090.05	+
20 -01-2023	1046.5	+	08-03-2023	1078.3	-
23-01-2023	1065.3	+	09-03-2023	1060	-
24-01-2023	1070.6	+	10-03-2023	1061.25	+
25-01- 2023	1051.15	-	13-03-2023	1133.8	+
27-01-2023	1030.1	-	14-03-2023	1115.3	+
30-01-2023	1036.1	+	15-03-2023	1114.4	-
31-01-2023	1015	-	16-03-2023	1117.75	+
01-02-2023	1023.75	+	17-03-2023	1127.15	+
02-02-2023	1016.65	-	20-03-2023	1109	-
03-02-2023	1011.3	-	21-03-2023	1095.65	-
06-02-2023	1005.35	-	22-03-2023	1099.6	+
07-02-2023	1002.45	-	23-03-2023	1099.45	-
08-02-2023	1011.05	+	24-03-2023	1101.95	+
09-02-2023	1016	-	27-03-2023	1103	+
10-02-2023	1017.35	+	28-03-2023	1070.3	-
13-02-2023	1002.5	-	29-03-2023	1081.1	+
14-02-2023	1012.05	+	31-03-2023	1101.85	+

A. Evaluation of TECH MAHINDRA:
Total run (r) =26
Number of positive price changes (n1) =31
Number of negative price changes (n2) =30
Mean (μ) =30
Standard deviation (σ) =21.38
Upper limit=71.90
Lower limit=-11.90

Inference:
Since the Observed number of runs falls within the upper and the lower limit, we can conclude that that the prices are independent at 5% level of significance (H0 is accepted). Thus, the marketis weakly efficient.

Table 5:- Showing the monthly closing stock value and applied runs test analysis of Tata Motor.

Date	Closing price	Price change	Date	Closing price	Price change
02-01- 2023	394.8		15-02-2023	444.15	+
03-01-2023	393.9	-	16-02-2023	441.6	-
04-01-2023	385.6	-	17-02-2023	439.9	-
05-01-2023	386.9	+	20-02-2023	443	+
06-01-2023	382	-	21-02-2023	436.5	-
09-01-2023	389.45	-	22-02-2023	429.45	-
10-01-2023	412.9	+	23-02-2023	433.2	+
11-01-2023	418.2	+	24-02-2023	427.75	-
12-01-2023	412.25	-	27-02-2023	417.95	-
13-01- 2023	411.5	-	28-02-2023	420.7	+
16-01-2023	413	+	01-03-2023	426	+
17-01-2023	415.3	+	02-03-2023	420.45	-
18-01-2023	408.4	-	03-03-2023	428	+
19-01-2023	400.75	-	06-03-2023	440.1	+
20 -01-2023	403.15	+	08-03-2023	439.3	-
23-01-2023	408.4	+	09-03-2023	432.2	-
24-01-2023	422.15	+	10-03-2023	435.85	+
25-01- 2023	419.05	-	13-03-2023	422.4	-
27-01-2023	445.6	+	14-03-2023	416.65	-
30-01-2023	443.65	-	15-03-2023	411.35	-
31-01-2023	452.1	+	16-03-2023	415.7	+
01-02-2023	394.8	-	17-03-2023	419	+
02-02-2023	393.9	-	20-03-2023	410.75	-
03-02-2023	385.6	-	21-03-2023	412.55	+
06-02-2023	442	+	22-03-2023	416.1	+
07-02-2023	435.45	-	23-03-2023	419.15	+
08-02-2023	440.1	+	24-03-2023	416.5	-
09-02-2023	436.75	-	27-03-2023	412.05	-
10-02-2023	445.85	+	28-03-2023	401.6	-
13-02-2023	441.05	-	29-03-2023	409.2	+
14-02-2023	440.55	-	31-03-2023	420.8	+

Evaluation of TATA MOTORS:
Total runs(r) =25
Number of positive price changes (n1) =28
Number of negative price changes (n2) =33
Mean (μ) =29.80
Standard deviation(σ)=21.24
Upper limit=71.43
Lower limit=-11.824

Inference:
Since the Observed number of runs not fall within the upper and the lower limit, we can conclude that that the prices are independent at 5% level of significance (H0 is accepted). Thus, the marketis weakly efficient.

Suggestion:-

1. Concentrate on Fundamental Analysis: Since past prices and patterns have already been taken into account in present pricing, investors can concentrate on examining the fundamental elements that have an impact on a

company's profits potential, such as financial statements, managerial calibre, and market trends.

2. Long-Term Investment: Weak form efficiency means that short-term price changes are arbitrary and unpredictably, therefore investors should concentrate on long-term investment strategies based on the fundamentals of the company and anticipated growth possibilities.
3. Why Avoid Technical Analysis: In an inefficient market, technical analysis, which forecasts future prices based on previous price patterns, is unlikely to be successful. Investors should refrain from basing all of their investment choices solely on technical analysis.
4. Diversify your portfolio: In any kind of market, diversification is crucial. Investors can gain from diversification their portfolio across many industries and asset classes in a weak or inefficient market.
5. Track market developments and news: Investors can gain important insights into the shifting economic and industry trends that could affect the company's future prospects by keeping up with market news and changes.

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