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A Study On The Weak Form Efficiency Of Metals & Mining Sector In Bse

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ABSTRACT

This study has been conducted to observe whether the weak form of efficiency holds true when the Metals & Mining sector is examined for the same. Data is collected for a 5 year period which ranges from 1st April 2014 to 31st March 2019. A total of 1232 observations have been taken from the three selected companies of the Metals & Mining sector of the BSE, namely, Coal India Ltd, Hindustan Zinc Ltd and JSW Steel Ltd. Jarque-Bera test is used to check whether the data is normally distributed or not. Augmented Dickey Fuller test has been used to establish whether the data series possesses stationarity or not. Finally Runs test and Autocorrelation tests are used to check whether the Metals & Mining sector of BSE is weak form efficient or not through the three representative companies. Upon analyzing the data through Runs Test, except for JSW Steel Ltd, the other two companies are identified to contain randomness in their data series. Autocorrelation test also suggests that the future stock prices can be predicted only to a minimal extent for the three representative companies. Based on the derived results, it is concluded that the Metals & Mining sector of BSE does not contain any statistical dependencies between its past and future stock prices and it is found to be weak form efficient.

INTRODUCTION

Market efficiency is defined in relation to information that is reflected in security prices. Three levels of market efficiency are,

1) Weak form of market efficiency suggests that when the past records of prices and volumes are taken into consideration, it is still not possible to earn abnormal returns as the current prices reflect the same. No trend or a pattern can be identified within a data series which would help in the prediction of the future stock prices.
2) Semi-strong form of market efficiency suggests that an investor cannot use any publicly available information to earn abnormal returns as the stock prices respond faster to any publicly available information than the investor does.
3) Strong form of market efficiency suggests that the possession of both- the public as well as privately held information will not help an investor to earn abnormal returns.

Some of the misconceptions regarding the Efficient Market Hypothesis are clarified below,

1) Misconception: The efficient market hypothesis implies that the market has perfect forecasting abilities.
   Clarification: The efficient market hypothesis merely implies that the prices impound all available information. This does not mean that the market possesses perfect forecasting abilities.
2) Misconception: As prices tend to fluctuate, they would not reflect fair value.
   Clarification: Unless prices fluctuate, they would not reflect fair value. Since the future is uncertain, the market is continually surprised. As prices reflect these surprises, they fluctuate.
3) Misconception: Inability of institutional portfolio managers to achieve superior investment performanceimplies that they lack competence.
   Clarification: In an efficient market, it is ordinarily not possible to achieve superior investment performance unless a high level of risk is taken.
4) Misconception: The random movement of stock prices suggests that the stock market is irrational.
   Clarification: Randomness and Irrationality are two different matters. If investors are rational and competitive, price changes are bound to be random.

REVIEW OF LITERATURE

Zabiulla (2001) examinedthe Bombay Stock exchange for weak from efficiency. Unit root tests, runs test and Autocorrelation test were used. It was concluded that the exchange was not weak form efficient.

P.Srinivasan (2010) studied the weak form efficiency of India's two major exchanges. Augmented Dickey fuller test and Phillips Perron tests were used. It was established that the two exchanges were not weak form efficient.

A.Q.Khan, Sana Ikram and MariyamMehtab (2011) tested BSE and NSE for weak form of market efficiency using Runs test. The results stated that the two exchanges were not weak form efficient.

HartikaArora (2013) studied the weak form efficiency of S&P CNX NIFTY for the period from 1st January 2000 to 31st December 2011. The result of the research established that the market was weak form inefficient.

Ravi Kumar Gupta (2014) in his study made use of Unit Root test, Runs test and Kolmogorov–Smirnov test (K–S test) through software Eviews5. The results state that although the Indian Stock market shows signs of weak form of efficiency, it is inconsistent in following it.

Neeraj Kumar Gupta and AshwinGedam (2014) selected a few companies stock to study the weak form efficiency in the NSE. For all the companies except one, i.e., Tech Mahindra, the future stock prices were found independent of past stock prices.

Dr. SrikanthParthsarthy (2016) in his research studied the major stock markets in India and the results show no sign of weak form efficiency which means that the investors could earn abnormal returns through analyzing the past stock prices.

Prof. Mrityunjaya B Chavannavar and Poonam V. Patel (2016) in their research used Runs test and Autocorrelation test and found that the Indian Stock Markets were consistent in the weak form and semi strong form of market efficiency.

Sharma Rakesh Kumar and Kiran Ravi (2017) in their research concluded that the BSE and NSE, in regard to their monthly returns did not follow random walk and hence were found to be weak form inefficient.

RESEARCH GAP

Entire stock exchanges have been analyzed. However, individual sectoral analysis has not been conducted with regard to the validity of the weak form efficiency. Moreover, the studies found on the weak form efficiency are not conducted in the recent times. Therefore the validity of the weak form efficiency needs to be re-examined.

SCOPE OF THE STUDY

The Metals & Mining sector of the Bombay Stock Exchange has been taken for the study. Three companies as representation have been taken from the Metals & Mining sector, namely, Coal India Ltd, Hindustan Zinc Ltd and JSW Steel Ltd. The period of the study is of 5 years, ranging from 1st April, 2014 to 31st March, 2019. The study is based on the daily closing prices to test the weak form efficiency of the stocks.

OBJECTIVES OF THE STUDY

- To test the weak form efficiency of the Metals & Mining sector in BSE
- To identify the existence of trends and patterns in the share prices of selected companies by using Runs test
- To predict share price movement of the selected companies of Metals & Mining sector listed in the Bombay Stock Exchange by using Autocorrelation test

RESEARCH METHODOLOGY

The aforementioned companies have been selected on the basis of their market capitalization. Data consists of closing prices of the three companies for a period of 5 years. The data contains a total of 1232 observations from each of the three companies. The daily returns have been taken from the Capital Line Database for each of the three companies.

Time series analysis was conducted. Tests were conducted through the Gretl software. Tests conducted for analysis:-

Jarque-Bera test: to measure whether the data is normally distributed

Augmented Dickey Fuller test: to check the stationarity of the data

Runs Test: to test the randomness of time series

Autocorrelation test: to check the correlation of the series with itself

The data is tested at 0.05 level of significance.

RESULTS AND DISCUSSION

Jarque-Bera test

Null hypothesis: The data is normally distributed

Alternate Hypothesis: The data does not come from normal distribution

Company	Frequency	Test Statistic	p-value	Null Hypothesis
Coal India Ltd	Daily	833.442	1.048e-181	Reject
Hindustan Zinc Ltd	Daily	932.149	3.85832e-203	Reject
JSW Steel Ltd	Daily	94.818	2.57353e-021	Reject

As can be seen from the table above, the null hypothesis is rejected for all the three companies during the 5 year period, i.e., the significance value for the test is less than 0.05 in all the cases at the 5% level of significance. Hence, from this analysis, it can be concluded that the stock returns of the three companies during the 5 year period do not follow Normal Distribution under the JarqueBera test.

Augmented Dickey Fuller test

Null Hypothesis: The test has a unit root

Alternate Hypothesis: The data series possesses stationarity

Company	Frequency	Test Statistic with constant	p-value	Null Hypothesis
Coal India Ltd	Daily	-19.7991	5.031e-047	Reject
Hindustan Zinc Ltd	Daily	-26.4668	4.961e-052	Reject
JSW Steel Ltd	Daily	-19.6022	1.18e-046	Reject

The ADF test(with constant) is conducted to check whether the data is stationary. The significance of this test is that if the data is found to be non-stationary, then the Runs test will have to be carried out at First Difference to arrive at a more accurate result. The software assumed 20 lag iterations for Coal India Ltdand Hindustan Zinc Ltd and assumed 24 lag iterations for JSW Steel Ltd.

The null hypothesis(a=1) is rejected, as the significance value(p-value) is less than 0.05 at 0.05 level of significance for Coal India Ltd, i.e., the data series projects stationarity.

The null hypothesis(a=1) is rejected, as the significance value(p-value) is less than 0.05 at 0.05 level of significance for Hindustan Zinc Ltd, i.e., the data series projects stationarity.

The null hypothesis(a=1) is rejected, as the significance value(p-value) is less than 0.05 at 0.05 level of significance for JSW Steel Ltd, i.e., the data series projects stationarity.

Runs Test

Null Hypothesis: Daily stock Returns are random.

Alternate Hypothesis: Daily stock returns are not random.

Company	Frequency	Number of Runs	Test Statistic	p-value	Null Hypothesis
Coal India Ltd	Daily	625	0.457527	0.647292	Accept
Hindustan Zinc Ltd	Daily	607	-0.566757	0.570879	Accept
JSW Steel Ltd	Daily	652	1.99669	0.043552	Reject

Runs test is found appropriate for the analysis as it is a non-parametric test and as stated previously the collected data does not follow Normal Distribution. The Run test is used to test and identify statistical dependencies (randomness). Also not only does the Runs test checks the presence of randomness in the data series, a high negative test statistic shows that there is a high degree of positive correlation and a high positive test statistic suggests that there is a high degree of negative correlation.

The null hypothesis for Coal India Ltd is accepted at 0.05 level of significance with p-value (0.647292). It implies that the daily stock returns of Coal India Ltd do appear random.

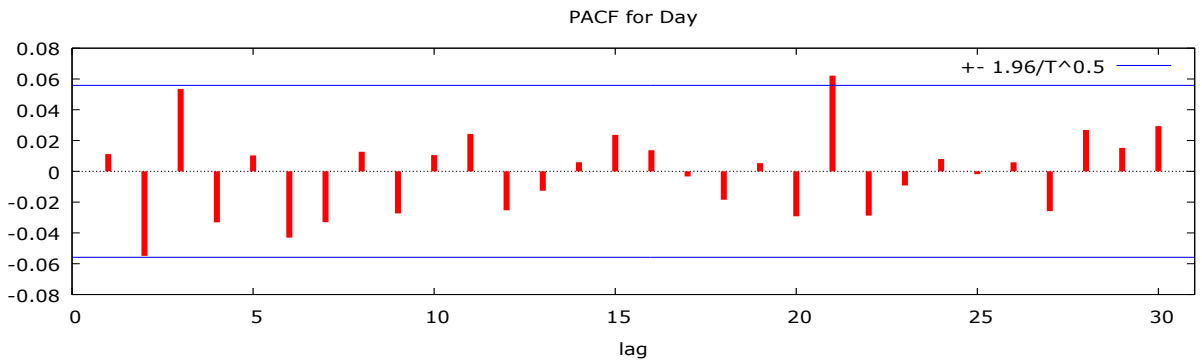
The null hypothesis for Hindustan Zinc Ltdis accepted at 0.05 level of significance. It implies that the daily stock returns of Hindustan Zinc Ltd appear random.

The null hypothesis for JSW SteelLtd is accepted at 0.05 level of significance. It implies that the daily stock returns of JSW Steel Ltd do not appear random.

When the test statistics are taken into consideration, they are neither very high nor very low, which signifies the existence of a very low correlation.

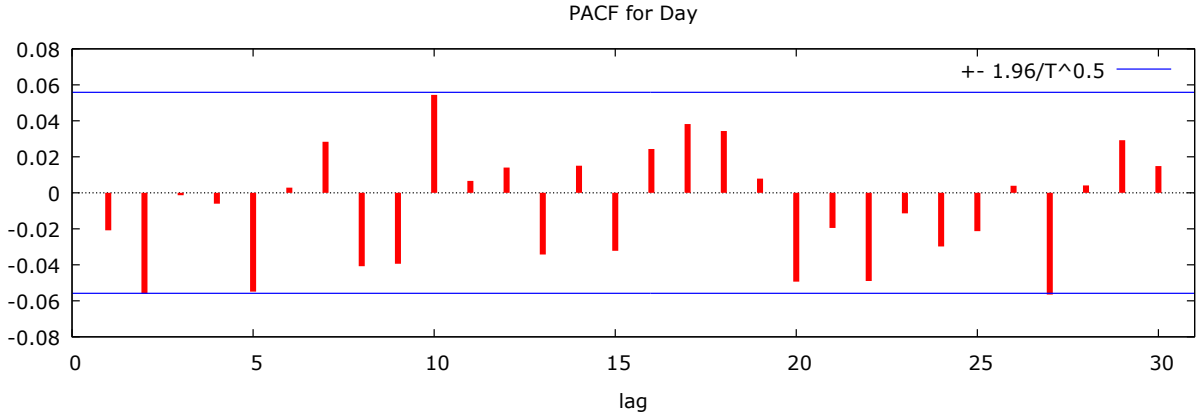
Autocorrelation

COAL INDIA LTD



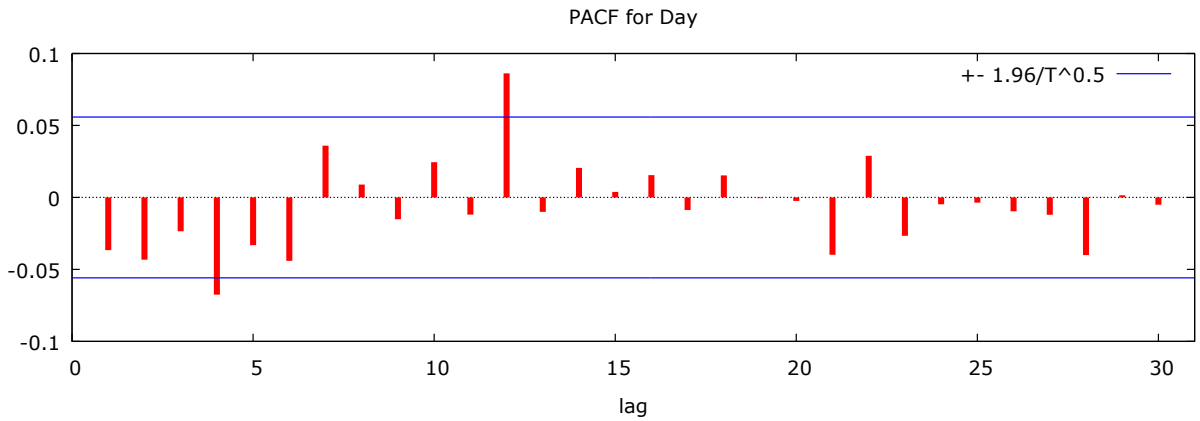
Significant Autocorrelation can be observed at 21st month(r= 0.0621, Q stat= 22.1058). Prediction of the present value can be done based on 21stlag to a very minimal extent since the correlation value is really low. Supporting randomness again even though the stationarity is there.

HINDUSTAN ZINC LTD



Significant Autocorrelation can be observed at 2nd month(r= -0.0561, Q stat= 4.3630) and27th month lag(r= -0.0565, Q stat= 37.0848). Prediction of the present value can be done based on 2nd and 27thlag to a very minimal extent since the correlation value is really low. Supporting randomness again even though the stationarity is there.

JSW STEEL LTD



Significant Autocorrelation can be observed at 4th month(r= -0.0675, Q stat= 9.3594) and 12th month lag(r= 0.0862, Q stat= 24.3716). Prediction of the present value can be done based on 4th and 12th lag to a very minimal extent since the correlation value is really low. Supporting randomness again even though the stationarity is there.

CONCLUSION

In this study, the researcher primarily tests the weak form efficiency of the Metals & Mining sector of BSE for a 5 year period. Three representative companies from the Metals & Mining sector in BSE are taken on the basis of their market capitalization. A series of tests including the Jarque-Bera test, Augmented Dickey Fuller test, Runs test and Autocorrelations test is used.

The result from the Jarque-Bera test states that the data is not normally distributed for all the three companies. Therefore, a non-parametric test such as the Runs test is appropriate to verify the Weak Form Market Efficiency of the sector. Augmented Dickey Fuller test was conducted to check whether the data was stationary. The data was found to be stationary for all the three companies. Hence, it was established that Runs test could be conducted without taking the First Difference. Finally, Runs test was conducted to check the existence of randomness in the data series. Through Runs test, it was found that there exists a pattern in the stock prices series of JSW Steel Ltd, however the other two companies are found to be following random walk. Thus, it can be concluded that there exist no statistical dependencies of future stock prices on past stock prices except for one company, i.e., JSW Steel Ltd. The Autocorrelation test, for all the three companies, shows that there exists a very minimal correlation of the series with itself. Thus, it can be concluded that the Metals & Miningsector of BSE is Weak Form Efficient.

The investors generally look at identifying a pattern in the past stock prices so as to predict the future stock prices. But as to what extent such an analysis helps an investor so that he does not leave any room for a loss in the transaction remains a question. Answering this using the efficient market hypothesis provides a good basis for developing an understanding as to how a stock market acts and reacts to its dynamic environment.

Therefore it can be said that simple technical analysis will not fetch the investors any abnormal gains. Rather a fundamental analysis is needed for the same which would incorporate various other factors like the earnings level, growth prospects and risk exposure in order to earn a high level of return. Thus a three stage process can be followed comprising of (1) Analysis of the economy, (2) Industry level analysis, (3) Company Analysis.

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