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A STUDY ON RISK AND RETURN ANALYSIS OF METAL INDUSTRIES

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ABSTRACT

Five mining and steel companies—JSW Steel Ltd., Tata Steel Ltd., Hindalco Industries Ltd., Hindustan Zinc Ltd., and Coal India Ltd.—have their risk-return profiles examined in this study. The results show that the companies' levels of risk differ, with Hindustan Zinc Ltd. showing the lowest risk and Coal India Ltd. showing the greatest, based on statistics on average returns, variance, risk, and coefficient of variation. Companies with lesser variances, such as JSW Steel Ltd and Hindustan Zinc Ltd, show more steady returns, even though the average returns are negative across the board. However, the higher risk associated with Tata Steel Ltd and Hindalco Industries Ltd indicates that these companies may provide bigger returns, but they are also more volatile. The study highlights the significance of conducting thorough analyses that take into account several elements such as risk and return, market dynamics, and individual investing goals in order to make well-informed investment decisions. Another tactic to lessen the blow of investment portfolio losses is diversification.

INTRODUCTION

Various ways of thinking influence investment decisions. There are times when passing on an investment is the wisest course of action. When it comes to the uncertainty of investing, this adage says it all. Financial experts might choose from a variety of investing paths nowadays. Different people's goals in contributing are different. The need for a positive rate of return is the captivating investment for the majority of financial specialists. Whatever the case may be, experts in the field of finance cannot deny the inherent dangers of investing. Return responsibility and risk are not the same thing. Generally speaking, investing in value is considered riskier than investing in debentures and bonds. Some risks are uncontrollable (unsystematic risk) and some are wild (efficient risk), according to a closer examination of risks.

Send back:

To assess the performance of the investment supervisor, it is necessary to estimate acknowledged (verifiable) returns, since the round of contributions is about returns (after considering risk). It's also common practice to use chronicled returns as a substantial input when assessing coming returns.

REVIEW OF LITERATURE

ARTICLES

1. Aditya Joshi and S. Rohitraj (2025)

Authors used statistical methods including beta, standard deviation, alpha, and Sharpe ratio to analyse the risk and return characteristics of certain metal sector equities listed on NSE. The research compared metal stock indices with the Nifty Metal and Nifty 50 indexes using monthly data from 2019 to 2024. Investors should diversify their portfolios since metal sector stocks offer strong profits but are more volatile and expose them to market risk.

2.Raj Milan and Sakshi Raghuvanshi (2024)

The purpose of this research was to examine the application of stochastic optimisation and DCC-GARCH models, two forms of advanced financial analytics, to assess the risk-reward dynamics of various business sectors. Researchers found that investors in cyclical industries, such as metals, can benefit from dynamic risk modelling since it enhances portfolio decision-making and clarifies market volatility.

3. V. Lakshmi Suneetha, Sreenivasulu Sunkara, and Harish N. (2023)

Silver, palladium, copper, lithium, platinum, and other non-gold metal investments were compared by the researchers. Metal investments provide diversification benefits, according to the study's analysis of ten years of market data. However, the study also revealed that metal investments are quite vulnerable to changes in the global economy and commodity cycles.

4, in 2022, Vishal Patel and Kumar Aditya

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This research looked at the metals business in India and how ESG policies correlated with financial results. The results showed that companies with high ESG scores had more trust from investors, were more profitable, and had more consistent returns even when the market was volatile.

5. Simrit Kaur and Megha Jain (2021)

Energy intensity trends in India's metallic industries from 2010 to 2020 were the focus of this research. The authors found that energy management and operational efficiency had a major impact on the profitability and investment returns of companies. Lower operational risk and enhanced financial stability were observed in firms with superior energy efficiency.

6. Riddhi Ambavale and Shefali Dani (2020)

Gold and silver were among the precious metals that the authors researched in India, along with investor preferences and risk-return analyses. In times of market volatility, precious metals offer protection from inflation and stock market swings, according to the study's authors.

7.Authors of Inderscience Research (2019)

The study looked at the potential profits and losses of various Indian businesses, including the metal industry. Compared to defensive industries, metal industries have a high level of financial and economic risk, according to the research. Nevertheless, when the economy is doing well, metal stocks can also yield big gains.

8. Mining Real Options Researchers (2018)

Methods for valuing real options in metal mining projects were the focus of this literature study. The authors stressed that investment cost and commodity price unpredictability greatly impacts the profitability of mining projects. For mining investments with a lengthy time horizon, real option methods worked well.

9.Sharma, Chandradew (2016) at

Indian stock markets' valuation patterns and long-term return dynamics were examined in the study. It brought attention to the fact that metals and other cyclical sectors are more susceptible to macroeconomic forces and have more extreme volatility than other businesses.

10. Jeyaprakash Rajesh ADJ, Balasubramanian Senthil Arasu, and Maddikera Vijay (2055)

Indian equities mutual funds were the focus of the study, which also looked at factor-risk shifting and investing approaches. Particularly in highly volatile markets like commodities and metals, the study found that changes in the risk structures of portfolios had a substantial impact on risk-adjusted returns.

11. A Conversation on Reddit About Investments in India (2014)

The cyclical nature of the metal business was examined in an industry report on Indian steel companies. Among the topics covered was the fact that capital intensity raises financial risk and that demand from the infrastructure and automotive sectors has a significant impact on metal stock returns.

12. Analysis of JSW Steel's Value (2013)

The current and projected financial health and expansion opportunities of steel firms were the subject of this valuation-based analysis. According to the results, the risk-return performance of steel stocks is positively affected by raw material availability, government infrastructure spending, and expansion capacity.

13.The 2012 Research Report of Indian Metals & Ferro Alloys Ltd. 13.

The report examined IMFA's financial and operational performance. Investment attractiveness and long-term financial risk can be enhanced by adopting an integrated company model, focusing on exports, and achieving a strong return on invested capital (ROCE).

14.Research on Base Metals on a Global Scale (2011)

Copper, zinc, and lead were among the base metals analysed in this worldwide market research. Metal prices and investor returns are significantly impacted by global demand, industrial production, and geopolitical issues, according to the experts.

15. Researchers in the Commodity Market (2010)

The purpose of the research was to determine whether commodities derivatives can help lower investment risk in the metals sector. According to the results, investors can reduce their losses during times of extreme market volatility by using futures and hedging tactics.

16. Experts in Financial Markets (2009)

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Inflation, interest rates, and currency rates were some of the macroeconomic variables that were investigated in relation to metal stock returns. Stock performance and profitability in the metal industry are directly affected by inflation and global commodity prices, according to the results.

17. Scholars in the field of portfolio management (2008)

The study's authors calculated the diversification gains from owning metal stocks. While metal stocks fare well during commodity booms, the study found that they pose a greater systematic risk during economic downturns.

18. Experts in the Mining Industry (2007)

Uncertainty and valuation techniques in the mining industry were the primary foci of the research. Project profitability and investment decisions are greatly impacted by changes in global metal demand and regulatory policies, as pointed out by the authors.

19.Studies on Investment Risk by Scholars (2006)

Using sophisticated statistical methods, this study looked into metal investment volatility patterns. The results showed that investments in lithium and copper had a lot of room to grow, but they were also very vulnerable to price swings.

20. Those who study the industrial sector 2005

According to the study's analysis of risk-return characteristics across several Indian industrial sectors, the metal industries pose one of the highest levels of market risk. During times of economic and industrial expansion, nevertheless, they also provide better returns than average.

Research Gap

Although numerous studies have examined the risk and return characteristics of stocks in the metal industry, several research gaps remain. Most existing research focuses on broad market indices or a limited number of large metal companies, with insufficient comparative analysis across different segments of the metal industry such as steel, aluminum, copper, and mining. Many studies primarily evaluate historical returns using traditional measures like beta, standard deviation, and Sharpe ratio, while giving limited attention to recent market dynamics, commodity price fluctuations, inflation, interest rates, geopolitical events, environmental regulations, and sustainability initiatives. Furthermore, few studies investigate the impact of global economic uncertainty and technological advancements on the risk-return profile of metal industry stocks, particularly in emerging markets such as India. There is also limited research integrating fundamental and technical analysis to provide a comprehensive assessment of investment performance. Therefore, further research is needed to evaluate the risk and return characteristics of metal industry companies using recent financial data and multiple performance measures to assist investors in making informed investment decisions.

Theoretical Frameworks

The study on **Risk and Return Analysis of Metal Industries** is primarily based on the **Modern Portfolio Theory (MPT)** developed by Harry Markowitz, which emphasizes the optimization of investment portfolios by balancing risk and expected return through diversification. It is further supported by the Capital Asset Pricing Model (CAPM) developed by William F. Sharpe, John Lintner, and Jan Mossin, which explains the relationship between systematic risk (beta) and expected return. The framework also incorporates the Efficient Market Hypothesis (EMH) proposed by Eugene F. Fama, suggesting that stock prices reflect all available information, and the Risk–Return Tradeoff, which states that higher expected returns are generally associated with higher levels of risk. Together, these theories provide a comprehensive foundation for evaluating the performance, volatility, and investment potential of companies in the metal industry by analyzing both risk and return from an investor's perspective.

OBJECTIVES OF THE STUDY

- The objective is to examine the typical profits made by chosen metal companies throughout a given time frame.
- The objective is to analyse the different return patterns of the chosen companies and what it means for investors.
- In order to evaluate the level of risk linked to investing in these companies and to compare them to industry standards.
- Giving investors, legislators, and business moguls advice based on the results to help them make smart choices.

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DATA ANALYSIS AND INTERPRETATION

STATEMENT SHOWING THAT RISK AND RETURNS OF JSW STEEL LTD

Date	Open Price	Close Price	Returns	Avg Returns	Difference	Diff*Diff
28-Mar-25	827.45	831.35	0.4691	-0.4355	0.9046	0.8183
27-Mar-25	827.95	817.8	-1.2511	-0.4355	-0.8056	0.6490
26-Mar-25	823.7	821.45	-0.2739	-0.4355	0.1616	0.0261
22-Mar-25	811.95	826.25	1.7307	-0.4355	2.1662	4.6925
21-Mar-25	800.25	812.7	1.5319	-0.4355	1.9674	3.8708
20-Mar-25	803.55	794	-1.2028	-0.4355	-0.7673	0.5887
19-Mar-25	803.35	801.25	-0.2621	-0.4355	0.1734	0.0301
18-Mar-25	781.4	804.25	2.8412	-0.4355	3.2767	10.7365
15-Mar-25	784.9	781	-0.4994	-0.4355	-0.0639	0.0041
14-Mar-25	792.95	785.55	-0.9420	-0.4355	-0.5065	0.2566
13-Mar-25	817.85	792.05	-3.2574	-0.4355	-2.8219	7.9629
12-Mar-25	829.95	817.2	-1.5602	-0.4355	-1.1257	1.2649
11-Mar-25	830.45	829.4	-0.1266	-0.4355	0.3089	0.0954
07-Mar-25	837.95	829.75	-0.9882	-0.4355	-0.5527	0.3055
06-Mar-25	823.55	812.75	-1.3288	-0.4355	-0.8933	0.7980
05-Mar-25	826.05	819.4	-0.8116	-0.4355	-0.3761	0.1414
04-Mar-25	841.45	823.25	-2.2108	-0.4355	-1.7752	3.1515
02-Mar-25	841.95	844.25	0.2725	-0.4355	0.7079	0.5012
01-Mar-25	811.4	835.85	2.9252	-0.4355	3.3607	11.2941
29-Feb-25	800	800.15	0.0187	-0.4355	0.4543	0.2063
28-Feb-25	812.2	798.2	-1.7539	-0.4355	-1.3184	1.7383
27-Feb-25	814.85	818.55	0.4520	-0.4355	0.8875	0.7877
26-Feb-25	826.95	808.5	-2.2820	-0.4355	-1.8465	3.4095
23-Feb-25	836.25	820.95	-1.8637	-0.4355	-1.4282	2.0397
22-Feb-25	830.15	828.5	-0.1992	-0.4355	0.2364	0.0559
21-Feb-25	823.55	828.4	0.5855	-0.4355	1.0210	1.0425
20-Feb-25	825.05	820.6	-0.4204	-0.4355	0.0151	0.0002
19-Feb-25	827.75	820.1	-0.9328	-0.4355	-0.4973	0.2573
16-Feb-25	813.15	820.5	0.8958	-0.4355	1.3313	1.7725
15-Feb-25	817	812.15	-0.5972	-0.4355	-0.1617	0.0261
14-Feb-25	799	813.3	1.7583	-0.4355	2.1938	4.8127
13-Feb-25	811.95	813.1	0.1414	-0.4355	0.5769	0.3329
12-Feb-25	816.95	810.4	-0.8082	-0.4355	-0.3727	0.1389

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09-Feb-25	823	811.9	-1.3672	-0.4355	-0.9317	0.8680
08-Feb-25	843.95	822.35	-2.6266	-0.4355	-2.1911	4.8010
07-Feb-25	826.95	836.45	1.1358	-0.4355	1.5713	2.4689
06-Feb-25	822.95	819.1	-0.4700	-0.4355	-0.0345	0.0012
05-Feb-25	825	814.25	-1.1974	-0.4355	-0.7619	0.5805
02-Feb-25	809.45	823.8	1.7419	-0.4355	2.1774	4.7412
01-Feb-25	818.65	801.8	-2.1015	-0.4355	-1.6660	2.7756
31-Jan-25	811.05	818.45	0.9041	-0.4355	1.3397	1.7947
30-Jan-25	819.65	811.6	-0.9919	-0.4355	-0.5564	0.3095
29-Jan-25	819.95	811.65	-1.0226	-0.4355	-0.5871	0.3447
25-Jan-25	816.05	816.45	0.0490	-0.4355	0.4845	0.2347
25-Jan-25	791.45	812.45	2.5848	-0.4355	3.0203	9.1221
23-Jan-25	808.2	790.55	-2.2326	-0.4355	-1.7971	3.2296
20-Jan-25	818.05	808.2	-1.2188	-0.4355	-0.7833	0.6135
19-Jan-25	804.05	816.6	1.5369	-0.4355	1.9725	3.8902
18-Jan-25	811.25	803.75	-0.9331	-0.4355	-0.4976	0.2576
17-Jan-25	822.65	812.45	-1.2555	-0.4355	-0.8200	0.6723
16-Jan-25	828	832.35	0.5226	-0.4355	0.9581	0.9180
15-Jan-25	828.45	825.85	-0.4364	-0.4355	-0.0009	0.0000
12-Jan-25	823	825.35	0.2847	-0.4355	0.7202	0.5187
11-Jan-25	834.7	821.75	-1.5759	-0.4355	-1.1404	1.3005
10-Jan-25	822.95	828.8	0.7058	-0.4355	1.1413	1.3027
09-Jan-25	825.15	821.1	-0.4932	-0.4355	-0.0577	0.0033
08-Jan-25	835	822.15	-1.5630	-0.4355	-1.1275	1.2712
05-Jan-25	838.15	829.65	-1.0255	-0.4355	-0.5890	0.3469
04-Jan-25	845.1	836.85	-0.9858	-0.4355	-0.5503	0.3029
03-Jan-25	862.8	837.35	-3.0394	-0.4355	-2.6038	6.7800
02-Jan-25	884.85	870.1	-1.6952	-0.4355	-1.2597	1.5868
01-Jan-25	879.95	877.35	-0.2963	-0.4355	0.1392	0.0194
			-0.4355			114.8439

Average returns=-0.4355

Variance = $\frac{\sum d^2}{n-1}$

= 1.8827

Risk (σ) = $\sqrt[2]{variance}$

=1.372111

Coefficient of variation=risk/return

=1.37211/-0.4355

=-3.15065

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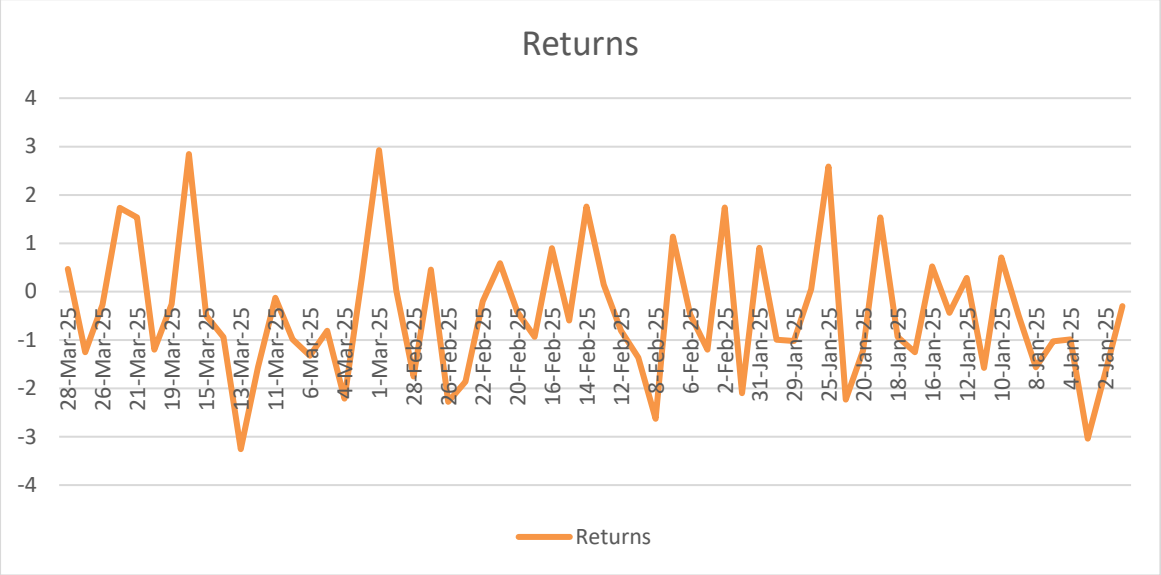
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Graphical representation



INTERPRETATION

For the three months beginning on January 1, 2025, and ending on March 31, 2025, the accompanying graph displays the risk and return for JSW STEEL LTD.The average returns for JSW STEEL LTD are -0.4355, volatility is 1.8827, risk is 1.372111, and the coefficient of variation is 3.15065.

FINDINGS

1. The average returns for JSW STEEL LTD are -0.4355, their variance is 1.8827, their risk is 1.372111, and their coefficient of variation is 3.15065.

2.-0.4204 for average returns, 4.18201 for variance, 2.0449966 for risk, and -4.86437 for coefficient of variation for TATA STEEL LTD.

3. Hindalco Industries Ltd. has a -0.485 return on average, a 3.17481 variance, a 1.7818 risk, and a 3.6745 coefficient of variation.

4, HINDUSTAN ZINC LTD The average returns for COAL INDIA LTD are -0.4025, variance is 5.556273, risk is 2.357175, and coefficient of variation is -5.8575. The variables used to calculate these numbers are risk, average return, variance, and coefficient of variation..

SUGGESTIONS

The following recommendations are derived from the supplied data on average returns, volatility, risk, and coefficient of variation for various mining and steel companies:

The company involved is JSW Steel Ltd.

According to its coefficient of variation, JSW Steel Ltd is not as risky as some of the other firms on the list, even if it has a negative average return.

Looking for a somewhat reliable investment opportunity in the steel industry? JSW Steel Ltd. could be a good choice for investors."Tata Steel Ltd."

The larger coefficient of variation for Tata Steel Ltd indicates that it is riskier than JSW Steel Ltd.

A company like Tata Steel Ltd. can be a good fit for risk-takers looking to increase their investment returns. Having said that, they need to be ready for further investment volatility.The company known as Hindalco.

The moderate risk level posed by Hindalco Industries Ltd is lower than that of Tata Steel Ltd, but more than that of JSW Steel Ltd.

Investors looking for a middle ground between risk and profit can consider Hindalco Industries Ltd.Hiranandani Zinc Company:

With a smaller coefficient of variation, Hindustan Zinc Ltd shows a lower risk level when compared to Tata Steel Ltd and Hindalco Industries Ltd.

Consider Hindustan Zinc Ltd. if you are an investor seeking mining-related prospects with minimal risk.Energy India Ltd.:

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The biggest coefficient of variation among the listed firms is attributable to Coal India Ltd, suggesting a higher level of risk.

Coal India Ltd has a higher risk profile than average, so investors should proceed with caution and consider whether the possible rewards are worth the risks.

CONCLUSION

Several inferences can be derived from the data supplied for JSW Steel Ltd, Tata Steel Ltd, Hindalco Industries Ltd, Hindustan Zinc Ltd, and Coal India Ltd:

The coefficients of variation show that the companies' levels of risk are different. Of the firms on the stock exchange, Hindustan Zinc Ltd. has the lowest risk and Coal India Ltd. the worst.

All of the listed companies have negative average returns. This indicates that investing in these companies may have resulted in losses rather than gains during the time under consideration.

Companies' variance and risk levels differ significantly. Higher variations indicate more return volatility for Tata Steel Ltd and Coal India Ltd, whilst lower variances for JSW Steel Ltd and Hindustan Zinc Ltd indicate somewhat more stable returns.

Due to lesser risk and substantially lower variations, investors seeking stability may find Hindustan Zinc Ltd and JSW Steel Ltd more enticing. Conversely, investors who are ready to take on more risk in the hopes of potentially greater rewards might look into Tata Steel Ltd and Hindalco Industries Ltd, although they should proceed with caution owing to the elevated risk profiles of these companies.

Even while it's useful for gauging risk-adjusted return, it's worth noting that companies with a negative coefficient of variation, like Tata Steel Ltd and Coal India Ltd, may be facing an unsavoury risk-return tradeoff. Before putting their money into these assets, potential buyers should think long and hard about whether the potential rewards are worth the danger.

Finally, before making any investment decisions, investors should undertake comprehensive studies, considering not just the risk-return profiles of these companies but also larger market trends and their personal investing goals. To further reduce portfolio risk, it is recommended to diversify across different industries and asset types.

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