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Risk–Return Analysis of Selected Metal Companies in India

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ABSTRACT: The metal industry is one of the most capital-intensive and volatile sectors of the Indian economy, closely linked with global commodity cycles, infrastructure growth, and macroeconomic conditions. Investors in metal stocks are exposed to substantial fluctuations in returns due to price volatility, regulatory changes, and demand–supply imbalances. This research paper conducts an in-depth risk–return analysis of selected metal companies listed on the National Stock Exchange (NSE), namely JSW Steel Ltd, Tata Steel Ltd, Hindalco Industries Ltd, Hindustan Zinc Ltd, and Coal India Ltd. The study uses daily stock price data for a three-month period from January 1, 2024 to March 31, 2024. Quantitative tools such as average return, variance, standard deviation, and coefficient of variation are employed to evaluate performance and volatility. The empirical results reveal that all selected companies generated negative average returns during the study period, indicating bearish market sentiment. However, significant differences in risk levels were observed across companies. Hindustan Zinc Ltd exhibited the lowest volatility, while Coal India Ltd recorded the highest risk. The study provides meaningful insights for investors, portfolio managers, and policymakers by highlighting sector-specific risk characteristics and emphasizing the importance of risk-adjusted investment decisions in the metal sector.

KEYWORDS: Risk–return analysis, Metal industry, Stock volatility, Variance, Coefficient of variation, NSE

I. INTRODUCTION

The metal industry plays a pivotal role in the economic development of India by acting as a backbone for infrastructure, construction, manufacturing, power generation, and transportation sectors. India is among the world’s leading producers of steel, aluminum, zinc, and coal, with companies such as Tata Steel, JSW Steel, Hindalco Industries, Hindustan Zinc, and Coal India contributing significantly to industrial output and employment generation.

Despite its economic importance, the metal sector is inherently cyclical and volatile. Stock prices of metal companies are highly sensitive to global commodity prices, crude oil prices, interest rates, foreign exchange movements, environmental regulations, and geopolitical developments. Any fluctuation in global demand, particularly from major economies such as China and the United States, directly impacts metal prices and corporate profitability.

From an investment perspective, understanding the relationship between risk and return is essential. The fundamental principle of finance suggests that higher returns are associated with higher risk. However, during periods of market downturns or economic uncertainty, investors may experience high risk without corresponding returns. The first quarter of 2024 witnessed global economic uncertainty, fluctuating commodity prices, and cautious investor sentiment, making it an appropriate period to study risk–return behavior in the metal sector.

This study aims to provide a detailed empirical analysis of the risk and return characteristics of selected metal companies in India. By comparing statistical measures of risk and return, the study seeks to assist investors in identifying relatively stable and risky investment options within the metal industry.

II. REVIEW OF LITERATURE

Risk–return analysis has been widely studied in financial literature across markets and sectors. The following review highlights key studies relevant to the present research.

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Markowitz (1952) introduced Modern Portfolio Theory, emphasizing that investors can minimize portfolio risk through diversification without necessarily reducing expected returns. This theory laid the foundation for quantitative risk measurement using variance and standard deviation.

Sharpe (1964) developed the Capital Asset Pricing Model (CAPM), establishing a linear relationship between expected return and systematic risk measured by beta. The model emphasizes compensation for risk undertaken by investors. Fama (1970) proposed the Efficient Market Hypothesis, arguing that stock prices fully reflect all available information, making it difficult to earn abnormal returns consistently.

Grinblatt and Titman (1999) highlighted the influence of industry-specific factors on stock returns and argued that sectoral analysis is crucial in portfolio management.

Chan et al. (1999) examined momentum strategies and found that transaction costs and market frictions significantly affect realized returns.

Wahal (2002) analyzed institutional trading behavior and concluded that large institutional trades contribute to increased stock price volatility.

Cooper et al. (2004) demonstrated that momentum profitability varies across different market states, particularly during bull and bear phases.

Wen (2012) provided a risk-based explanation for stock return momentum and emphasized the role of volatility in explaining return patterns.

Sosyura (2014) studied information dissemination through media and found that news coverage significantly influences stock price movements.

Bekaert and Harvey (2017) analyzed volatility in emerging markets and concluded that emerging market equities exhibit higher risk compared to developed markets.

Empirical studies on Indian stock markets (Ramesh & Balakrishnan, 2019; Sharma, 2021) have also reported higher volatility in metal stocks compared to defensive sectors. These studies collectively justify the need for a focused risk–return analysis of metal companies.

III. RESEARCH QUESTIONS

1. What are the average daily returns of selected metal companies during the study period?
2. How does the level of risk differ among selected metal companies?
3. Which company provides relatively better risk-adjusted performance?
4. Does the metal sector exhibit unfavorable risk–return trade-off during market downturns?

IV. RESEARCH OBJECTIVES

- To analyze the average daily returns of selected metal companies listed on NSE.
- To measure and compare risk using variance and standard deviation.
- To assess risk-adjusted performance using the coefficient of variation.
- To rank selected companies based on risk exposure.
- To provide practical investment recommendations based on empirical findings.

V. HYPOTHESES

H0: There is no significant difference in risk among the selected metal companies.

H1: There is a significant difference in risk among the selected metal companies.

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VI. RESEARCH DESIGN AND METHODOLOGY

The study adopts a descriptive and analytical research design based entirely on secondary data.

Data Variables

- Opening price
- Closing price
- Daily returns
- Average return
- Variance
- Standard deviation (risk)
- Coefficient of variation

Data Sources

Secondary data were collected from the National Stock Exchange (NSE) website, Moneycontrol, Yahoo Finance, and published company reports.

Sample Size

The sample includes five major metal companies with approximately 60 daily trading observations each, covering the period from January 1, 2024 to March 31, 2024.

Tools and Techniques

- Mean for measuring average return
- Variance and standard deviation for measuring risk
- Coefficient of variation for risk-adjusted performance comparison
- Comparative analysis across companies

VII. DATA ANALYSIS AND INTERPRETATION

Table 1: Risk–Return Summary of Selected Metal Companies

Company	Average Return (%)	Variance	Risk (SD)	Coefficient of Variation
JSW Steel Ltd	-0.4355	1.8827	1.3721	-3.15
Tata Steel Ltd	-0.4204	4.1820	2.0450	-4.86
Hindalco Industries Ltd	-0.4850	3.1748	1.7818	-3.67
Hindustan Zinc Ltd	-0.4020	1.0690	1.0339	-2.57
Coal India Ltd	-0.4024	5.5563	2.3572	-5.86

Interpretation

The table clearly indicates that all selected companies generated negative average returns, suggesting unfavorable market conditions during the study period. Hindustan Zinc Ltd recorded the lowest standard deviation, indicating relatively stable returns. Coal India Ltd exhibited the highest risk, reflecting substantial price volatility. The coefficient of variation reveals that Hindustan Zinc Ltd offers the best risk-adjusted performance among the selected firms.

VIII. RESULTS AND DISCUSSION

The analysis reveals substantial differences in volatility across selected metal companies, leading to rejection of the null hypothesis. Although all companies delivered negative returns, risk exposure varied significantly. Coal India Ltd and Tata Steel Ltd experienced higher volatility due to sensitivity to global energy prices, policy changes, and demand uncertainty. Hindustan Zinc Ltd demonstrated relatively stable performance due to consistent demand and operational efficiency. These findings align with earlier studies highlighting higher volatility in cyclical industries.

Volume 14, Issue 12, December 2025**|DOI: 10.15680/IJRSET.2025.1412137|****IX. FINDINGS OF THE STUDY**

1. All selected metal companies recorded negative average returns during the study period.
2. Coal India Ltd exhibited the highest risk among the selected companies.
3. Hindustan Zinc Ltd showed the lowest volatility and better stability.
4. Risk–return trade-off was unfavorable during the market downturn.
5. Metal stocks demonstrated higher sensitivity to market fluctuations.

X. RECOMMENDATIONS OF THE STUDY

- Risk-averse investors may prefer Hindustan Zinc Ltd due to lower volatility.
- Aggressive investors may consider Tata Steel Ltd and Coal India Ltd with adequate risk management strategies.
- Investors should diversify portfolios across sectors to mitigate risk.
- Long-term investors should consider macroeconomic indicators before investing in metal stocks.

XI. CONCLUSION

The study concludes that the Indian metal sector experienced adverse market conditions during January–March 2024, resulting in negative returns across major metal companies. However, risk levels varied significantly among firms. Risk–return analysis proves to be a valuable tool for evaluating investment opportunities in volatile sectors. The findings emphasize the importance of risk-adjusted investment decisions and portfolio diversification. Future research may extend the study period and incorporate additional risk measures such as beta and value-at-risk.

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