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A STUDY ON RISK AND RETURN ANALYSIS OF AUTOMOBILE INDUSTRY

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ABSTRACT
The Indian automobile industry is a key contributor to the country's GDP, employment, and industrial growth, with strong linkages to related sectors. However, it remains vulnerable to economic cycles, fuel price fluctuations, government policies, and technological shifts like electric and autonomous vehicles. This study, titled "Risk and Return Analysis of Selected Automobile Companies in India," evaluates the financial performance of ten listed companies from 2020 to 2024 using tools like Beta, Standard Deviation, Sharpe Ratio, Treynor Ratio, and Jensen's Alpha.

The findings reveal diverse risk-return profiles: Tata Motors showed the highest return but also the highest risk, suiting aggressive investors; Maruti Suzuki and Toyota offered stable, low-risk returns ideal for conservative investors. Mahindra & Mahindra and TVS Motor provided a balanced risk-return mix, while Hero MotoCorp showed poor risk-adjusted performance. Companies like Bajaj Auto, Eicher Motors, and Ashok Leyland were found suitable for risk-neutral investors.

The study also highlights the impact of COVID-19 and semiconductor shortages on supply chains, emphasizing the need for stronger risk management. The shift toward green and electric mobility further adds complexity to investment decisions. Overall, the research offers strategic insights for investors, corporate managers, and policymakers in navigating the evolving auto sector.

KEY WORDS: *Return, Risk, Sharpe ratio, Trenyor ratio, Jensen's ratio*

1.INTRODUCTION

In the modern financial landscape, investment decisions are no longer driven by intuition or speculation but are instead shaped by analytical frameworks that balance risk and return. For investors—both institutional and individual—the pursuit of optimal investment outcomes involves careful evaluation of these two critical parameters. Risk, in financial terms, refers to the possibility of a negative or less-than-expected return on an investment, while return signifies the gain or profit generated from an investment. These two elements are inherently linked, forming the cornerstone of all investment decisions. In this context, analysing risk and return becomes essential for achieving long-term financial objectives.

The importance of risk and return analysis becomes even more pronounced when examining sectors that are highly sensitive to economic fluctuations and technological changes. One such sector is the automobile industry. Globally, the automobile industry plays a pivotal role in shaping economic activity. It acts as a catalyst for growth by stimulating demand in related sectors such as steel, rubber, glass, and electronics. In India, the automobile sector is a key contributor to GDP, employment, and industrial growth. However, despite its contributions, the industry is also exposed to a multitude of risks stemming from volatile fuel prices, stringent government regulations, changing consumer preferences, and rapid technological disruptions like electric mobility and automation.

The Indian automobile industry has undergone significant transformation over the last two decades. From being a closed, license-controlled market in the pre-liberalization era to becoming one of the fastest-growing automotive markets globally, the journey has been remarkable. However, the road has also been fraught with challenges. Economic slowdowns, policy shifts, regulatory interventions (such as BS-VI emission norms), and the advent of electric vehicles have collectively reshaped the risk landscape. The COVID-19 pandemic further intensified these challenges by disrupting supply chains, reducing consumer demand, and altering investment patterns.

In such an uncertain environment, the decision to invest in automobile stocks cannot be made without a thorough analysis of the underlying risks and potential returns. Investors need reliable metrics and analytical tools to

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understand how different automobile companies perform under varying market conditions. This study seeks to address that need by evaluating the risk-return profile of selected automobile companies listed on the Indian stock market. Through the use of quantitative financial tools and performance measures, the study aims to provide a comprehensive picture of how automobile stocks fare in terms of returns relative to the risks involved.

2. LITERATURE REVIEWS

Markowitz, H. (1952): "Portfolio Selection" introduced diversification as a strategy to manage risk and optimize returns. This theory helps investors construct balanced portfolios and is foundational in understanding risk-return trade-offs in evaluating automobile stocks.

Sharpe, W. F. (1964): "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk" developed the CAPM model, linking expected return to systematic risk (beta), which is essential for assessing automobile stock performance against market and risk-free returns.

Bansal, V. P. (2018): "A Study on the Risk and Return Analysis of Selected Automobile Companies" analyzed how macroeconomic factors impact the risk-return profiles of Indian auto stocks, providing insights for investors in the sector.

Singh, S. (2021): "Supply Chain Disruptions and Stock Volatility in the Indian Auto Industry" examined how raw material shortages and production delays increase stock volatility, offering insights into the resilience of automobile firms.

Kapoor, M., & Reddy, P. (2023) : "The Risk-Return Paradigm in the EV Market" analyzed how the shift to electric vehicles affects the risk-return profiles of traditional automakers and EV startups, highlighting both opportunities and challenges.

2.1 Research Gap

The study uses secondary data from 2020 to 2024, analyzing the stock performance of ten major automobile companies listed on Indian exchanges. Data includes annual returns, beta, and standard deviation, sourced from Money control, Screener, Yahoo Finance, company websites, and NSE/BSE. Quantitative tools like Sharpe Ratio, Treynor Ratio, and Jensen's Alpha are applied to assess risk-adjusted returns. The analysis offers insights into investment performance during post-pandemic recovery and the shift toward electric mobility.

3.1Need for the Study

Investors require a comprehensive risk and return analysis for informed decision-making in automobile stocks. Helps identify companies offering the best returns at acceptable risk levels. The analysis informs stakeholders about how this effect performance. Assists management in resource allocation, strategic planning, and financial decisions. Enables companies to enhance profitability while managing risk. Policymakers can utilize findings to create supportive, growth-oriented regulations. Aids companies in adopting better risk management practices to improve stability.

3.2 Scope of the Study

- Focus on Indian automobile sector (two-wheelers, four-wheelers, commercial vehicles)
- Includes major companies like Mahindra & Mahindra, Tata Motors, Maruti Suzuki, Hero MotoCorp, Bajaj Auto
- Covers five-year period from 2019 to 2024
- Uses financial metrics: average return, standard deviation, beta, Sharpe ratio, Treynor ratio, Jensen's alpha
- Aims to guide investors and portfolio managers on risk-return trade-off
- Limited to companies listed on Indian stock exchanges.

3.3 Statement of the Problem

The Indian automobile industry significantly contributes to economic growth and employment but is highly affected by policy changes, fuel prices, technology shifts, and market trends. Investors face challenges in balancing risk and return due to the sector's volatility. A major gap exists in the availability of clear, updated, and comparative financial analysis of automobile companies. Traditional investment approaches often neglect critical financial indicators like beta, Sharpe ratio, Treynor ratio, and Jensen's alpha. Hence, there is a pressing need for

a comprehensive risk-return analysis to guide investors, aid company benchmarking, and support strategic decision-making.

3.4 Objectives of the Study

1. To analyse the risk associated with selected automobile companies by measuring their stock price volatility and beta values.
2. To evaluate the return generated by these automobile companies over the study period using average returns and compound annual growth rate (CAGR).
3. To examine the risk-return relationship of the selected companies using financial performance ratios like Sharpe ratio, Treynor ratio, and Jensen's alpha.
4. To assess the impact of market fluctuations and economic changes on the risk and return of automobile industry stocks.
5. To identify trends and patterns in the risk and return of the automobile industry over the past five years.

3.5 Research Methodology

Research Design

This study follows a descriptive and analytical research design. It is descriptive because it aims to describe the risk and return characteristics of automobile companies, and analytical as it involves evaluation using statistical tools and financial ratios.

Sampling Method.

A purposive sampling technique is used to select a sample of leading automobile companies listed on the Indian stock exchanges (NSE/BSE). The selection is based on market capitalization, brand presence, and availability of consistent data.

Period of Study

The study covers a period of 5 years, from April 2019 to March 2024, to observe consistent trends in risk and return.

Sources of Data

The study uses secondary data, collected from:

- Official company websites
- National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) portals
- Trading platforms (e.g., Money control, Investing.com)

Tools for Analysis

Return Calculation (Average return, CAGR)

Return = (Ending Value - Beginning Value) / Beginning Value × 100

Risk Measurement (Standard deviation, Beta)

Risk (Standard Deviation) = $\sqrt{[\Sigma (Ri - \bar{R})^2 / (N - 1)]}$

Sharpe Ratio

Sharpe Ratio = $(Rp - Rf) / \sigma p$

Treynor Ratio

Treynor Ratio = $(Rp - Rf) / \beta p$

Jensen's Alpha

Alpha (α) = $Rp - [Rf + \beta p (Rm - Rf)]$

Data Analysis Techniques

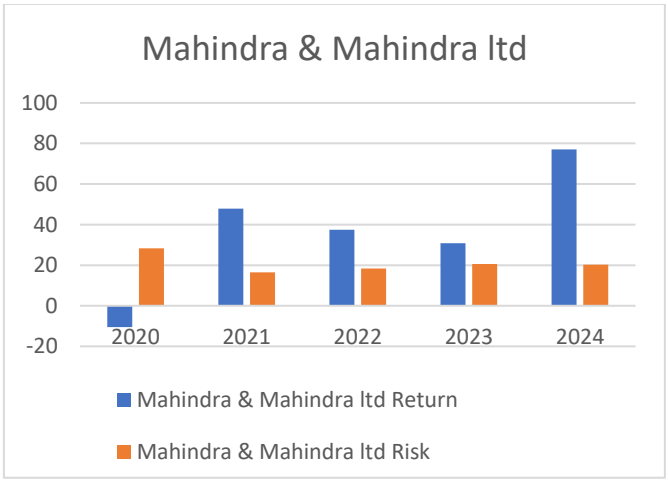
Data is analysed using MS Excel and other statistical software if needed. Graphs, tables, and charts are used for better interpretation and comparison.

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4.DATA ANALYSIS AND INTREPRETATION

1. A Statement of Return and Risk of Mahindra & Mahindra Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-10.5129	28.35897
2021	47.91303	16.49837
2022	37.46949	18.41428
2023	30.88283	20.57706
2024	77.09825	20.26405

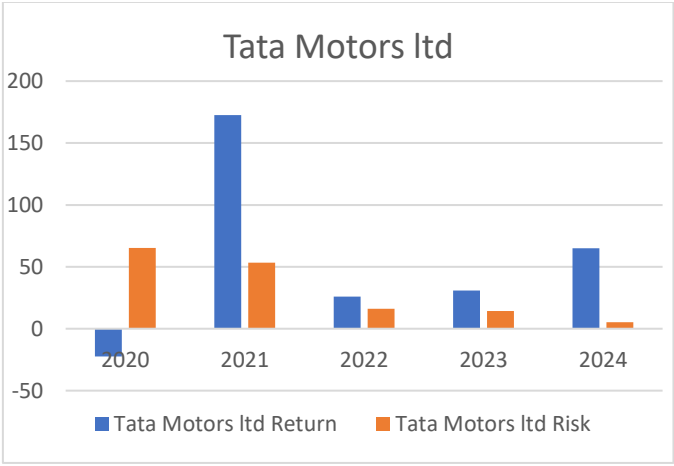


Interpretation

The bar chart shows Mahindra & Mahindra Ltd.'s performance from 2020 to 2024. In 2020, returns were negative with high risk. In 2021, returns rose to ~47% and risk fell to ~17%. Returns remained stable in 2022–2023 with low risk. In 2024, returns peaked at ~78% with moderate risk, indicating strong financial growth.

2. A Statement of Return and Risk of Tata Motors stock during the period 2020- 2024.

Year	Return	Risk
2020	-22.4315	65.33635
2021	172.5852	53.40187
2022	25.96211	16.17856
2023	30.90866	14.254
2024	65.02157	5.30619



Interpretation

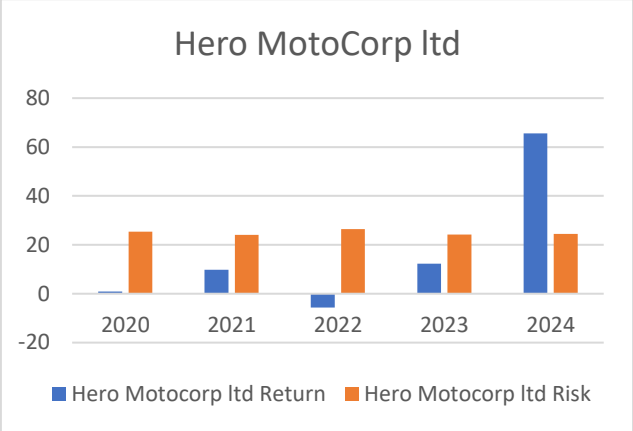
The chart shows Tata Motors Ltd.'s risk and return from 2020 to 2024. In 2020, returns were negative with very high risk ~65. In 2021, returns soared to ~170 with slightly lower risk, indicating high volatility but strong gains.

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Returns stabilized in 2022–2023 ~25–30 with reduced risk ~15. In 2024, returns rose to ~65 and risk dropped below 10, reflecting strong financial health and investor confidence.

3. A Statement of Return and Risk of Hero MotoCorp stock during the period 2020- 2024.

Year	Return	Risk
2020	0.943963	25.32398
2021	9.835286	24.13362
2022	-5.6946	26.40817
2023	12.35048	24.15934
2024	65.5953	24.49461

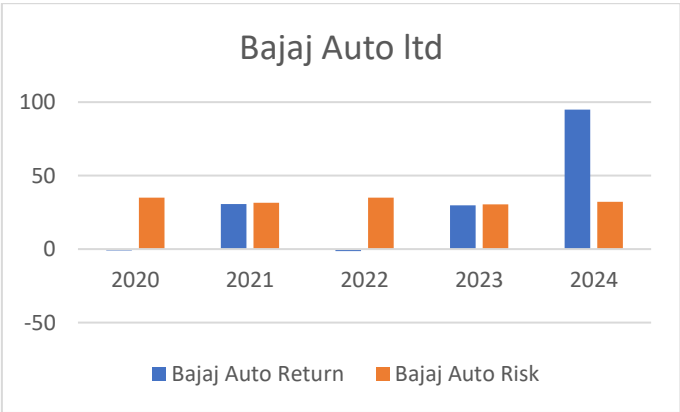


Interpretation

The chart shows Hero MotoCorp's returns and risk from 2020 to 2024. In 2020, returns were minimal with moderate risk ~25. 2021 saw slight improvement in both return ~10 and reduced risk. In 2022, returns fell to -5 with a slight rise in risk, reflecting poor performance. 2023 showed recovery with ~12% return and steady risk. In 2024, returns spiked to ~65 with unchanged risk, marking the most profitable and efficient year.

4. A Statement of Return and Risk of Bajaj Auto Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-0.99676	35.08705
2021	30.66357	31.49117
2022	-1.34557	35.03497
2023	29.70307	30.53281
2024	94.91036	32.16171



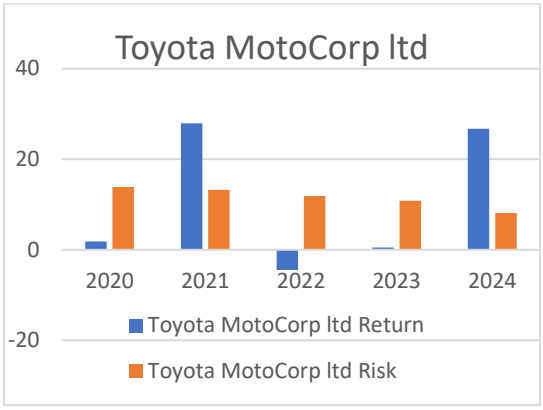
Interpretation

The chart highlights Bajaj Auto Ltd.'s returns and risk from 2020 to 2024. In 2020, returns were near zero with high risk, indicating weak performance. 2021 showed balanced return and risk, reflecting stability. In 2022, returns turned slightly negative with continued high risk. 2023 saw recovery with returns matching risk. In 2024, returns surged to ~95 with steady risk, marking a highly profitable and efficient year.

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5. A Statement of Return and Risk of Toyota Motor Corporation stock during the period 2020- 2024.

Year	Return	Risk
2020	1.845062	13.89234
2021	27.9322	13.22964
2022	-4.43904	11.90495
2023	0.462336	10.80724
2024	26.69465	8.097804



Interpretation

The chart shows Toyota MotoCorp's return and risk from 2020 to 2024. In 2020, returns were low ~2 with high risk ~14. 2021 saw a sharp rise in returns 27 with stable risk. In 2022, returns fell negative -5, despite moderate risk. 2023 showed near-zero returns with slightly reduced risk. In 2024, returns climbed to ~26 with the lowest risk ~8, marking the best risk-adjusted year.

6.A Statement of Return and Risk of Ashok Leyland Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-17.5212	34.35512
2021	87.15203	26.84649
2022	13.20501	7.112457
2023	17.18787	5.7863
2024	31.15976	2.461529



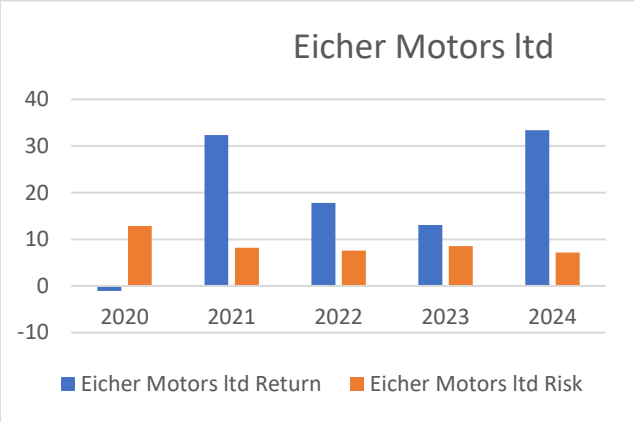
Interpretation

The chart highlights Ashok Leyland Ltd.'s returns and risk from 2020 to 2024. In 2020, the company faced a -20% return with high risk ~35%. A strong recovery followed in 2021, with returns exceeding 85% and reduced risk ~27%. From 2022 to 2024, returns steadily rose from ~15% to ~32%, while risk declined from ~8% to ~3%, indicating improved financial stability and efficient risk control.

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7. A Statement of Return and Risk of Eicher Motors Limited stock during the period 2020- 2024.

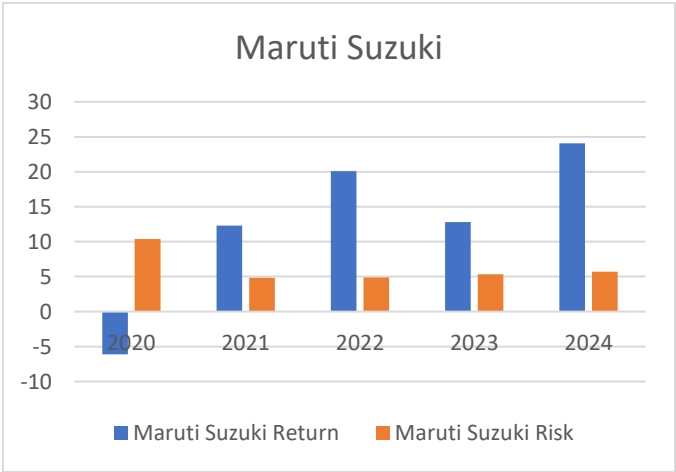
Year	Return	Risk
2020	-1.05715	12.83868
2021	32.36376	8.205763
2022	17.77617	7.584164
2023	13.0434	8.518992
2024	33.36485	7.133322



Interpretation:
The chart shows Eicher Motors Ltd.'s returns and risk from 2020 to 2024. In 2020, returns were slightly negative with high risk ~13%. In 2021, returns jumped above 30% as risk dropped to ~8%. During 2022 and 2023, returns stayed steady ~18% and ~13% with stable risk ~7–9%. In 2024, returns peaked again above 30% with reduced risk ~7%, reflecting strong financial improvement and consistent performance.

8. A Statement of Return and Risk of Maruti Suzuki India Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-6.08186	10.3612
2021	12.32209	4.82071
2022	20.06335	4.888188
2023	12.8059	5.357591
2024	24.08683	5.723785

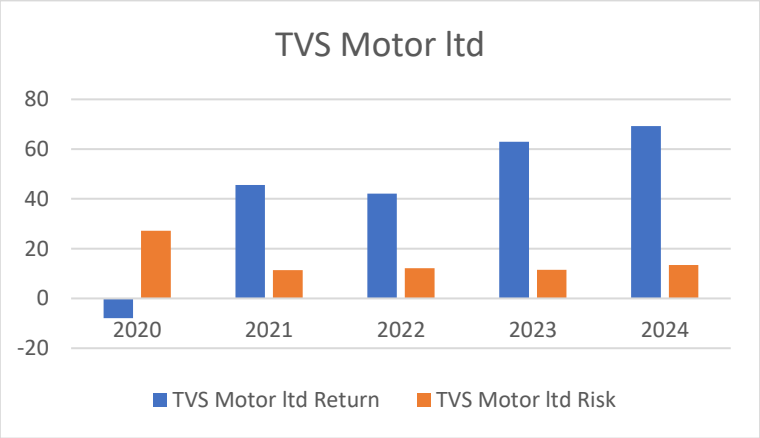


Interpretation:
The chart displays Maruti Suzuki's return and risk from 2020 to 2024. In 2020, returns were negative ~-7 with high risk ~11. A sharp recovery followed in 2021, with returns rising to ~12 and risk halving. In 2022 and 2023, returns stayed strong ~20 with low, stable risk. In 2024, returns peaked at ~24 with minimal risk ~6, indicating steady growth and excellent risk control.

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9.A Statement of Return and Risk of TVS Motor Company Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-7.91358	27.14642
2021	45.5649	11.37404
2022	42.1629	12.11776
2023	62.90725	11.46827
2024	69.28054	13.44007

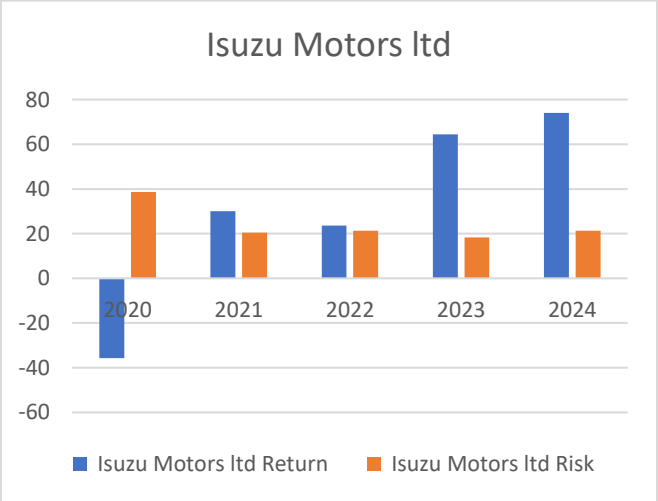


Interpretation

The chart shows TVS Motor Ltd.'s returns and risk from 2020 to 2024. In 2020, the company had a negative return ~-8 with high risk ~27. A strong recovery occurred in 2021, with returns rising to ~45 and risk dropping to ~10. Returns remained strong in 2022 ~42 and 2023 ~63 with low, stable risk. In 2024, returns peaked at ~69 with slightly higher but controlled risk, reflecting sustained growth and efficient risk management.

10. A Statement of Return and Risk of Isuzu Motors Limited stock during the period 2020- 2024.

Year	Return	Risk
2020	-35.7628	38.68416
2021	30.07009	20.43283
2022	23.64337	21.33114
2023	64.47089	18.31149
2024	74.01369	21.36332



Interpretation

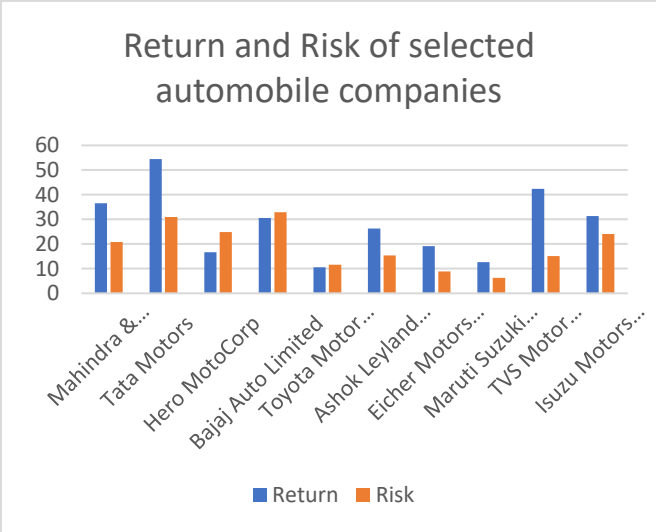
The chart shows Isuzu Motors Ltd.'s returns and risk from 2020 to 2024. In 2020, the company faced a significant negative return with high risk ~40. In 2021, returns improved to ~30 as risk dropped to ~20. This positive trend

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continued in 2022 with slightly lower returns and risk. In 2023 and 2024, returns surged, peaking above 70 in 2024, while risk remained stable ~20–22, reflecting strong growth with controlled volatility.

11. A Statement of Return and Risk of Selected auto mobile companies stock during theperiod 2020- 2024.

S. No	Name of the Company	Return	Risk
1	Mahindra & Mahindra Limited	36.5701	20.8225
2	Tata Motors	54.4092	30.8954
3	Hero MotoCorp	16.6061	24.9039
4	Bajaj Auto Limited	30.5869	32.8615
5	Toyota Motor Corporation	10.499	11.5864
6	Ashok Leyland Limited	26.2367	15.3124
7	Eicher Motors Limited	19.0982	8.85618
8	Maruti Suzuki India Limited	12.6393	6.2303
9	TVS Motor Company Limited	42.4004	15.1093
10	Isuzu Motors Limited	31.2871	24.0246



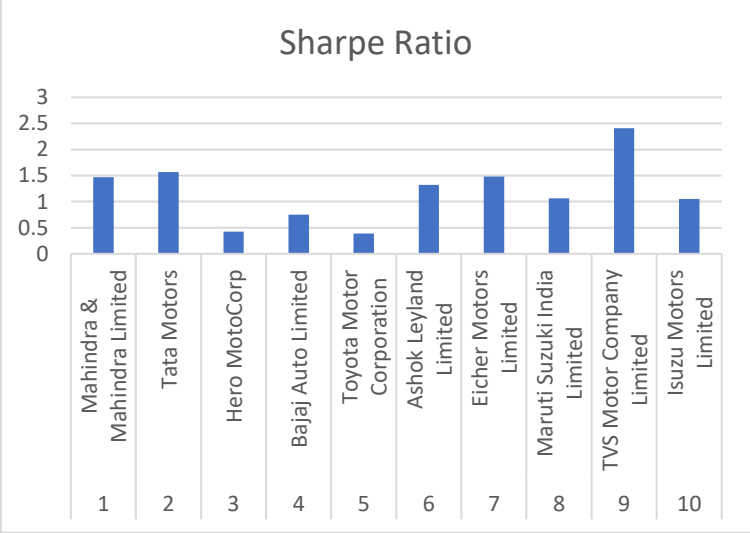
Interpretation

The analysis highlights a varied risk-return profile among the companies. Tata Motors leads with the highest return (54.41%) but also the highest risk (30.90%), suiting aggressive investors. Mahindra & Mahindra (36.57% return, 20.82% risk) and TVS Motor (42.40% return, 15.11% risk) offer a strong balance of profitability and stability. Bajaj Auto shows high returns (30.59%) with significant risk (32.86%). Toyota and Maruti Suzuki provide low-risk, modest returns, ideal for conservative investors. Eicher Motors offers steady returns (19.10%) with low risk (8.86%). Overall, the sector presents options for both risk-takers and risk-averse investors.

12. A Statement of Sharpe Ratio of Selected auto mobile companies stock during the period 2020- 2024.

S. No	Name of the Company	Sharpe Ratio
1	Mahindra & Mahindra Limited	1.468126805
2	Tata Motors	1.566874099
3	Hero MotoCorp	0.425879802
4	Bajaj Auto Limited	0.74819781
5	Toyota Motor Corporation	0.388303796
6	Ashok Leyland Limited	1.32159084
7	Eicher Motors Limited	1.478989552
8	Maruti Suzuki India Limited	1.06564195
9	TVS Motor Company Limited	2.409136929
10	Isuzu Motors Limited	1.052548902

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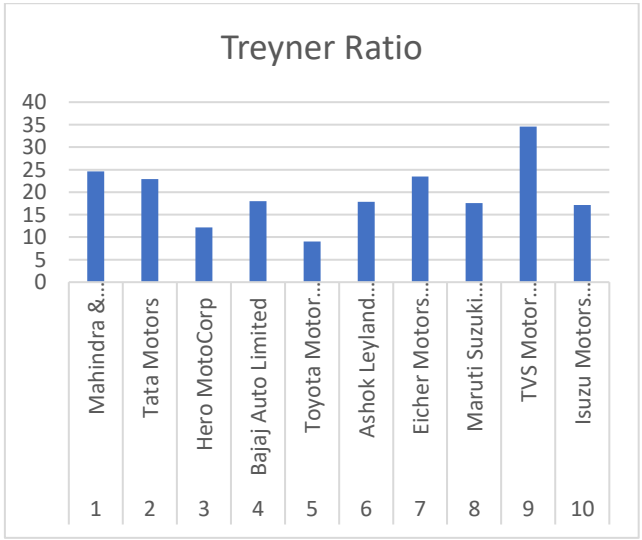


Interpretation

The Sharpe Ratio analysis reveals TVS Motor Company as the top performer (2.41), offering the highest return per unit of risk, ideal for risk-averse investors. Tata Motors (1.57), Eicher Motors (1.48), and Mahindra & Mahindra (1.47) also show strong risk-adjusted returns. Ashok Leyland follows with a solid 1.32. In contrast, Hero MotoCorp (0.43), Toyota (0.39), and Bajaj Auto (0.75) deliver weaker risk-adjusted performance. Maruti Suzuki and Isuzu Motors offer moderate balance (~1.05). Overall, TVS, Tata, and Eicher emerge as the most efficient on a risk-return basis.

13. A Statement of Treynor Ratio of Selected auto mobile companies' stock during the period 2020- 2024.

S. No	Name of the Company	Treynor Ratio
1	Mahindra & Mahindra Limited	24.58251906
2	Tata Motors	22.87877192
3	Hero MotoCorp	12.19098001
4	Bajaj Auto Limited	18.02750578
5	Toyota Motor Corporation	9.002997155
6	Ashok Leyland Limited	17.83702753
7	Eicher Motors Limited	23.47033287
8	Maruti Suzuki India Limited	17.60600965
9	TVS Motor Company Limited	34.55670951
10	Isuzu Motors Limited	17.12093646



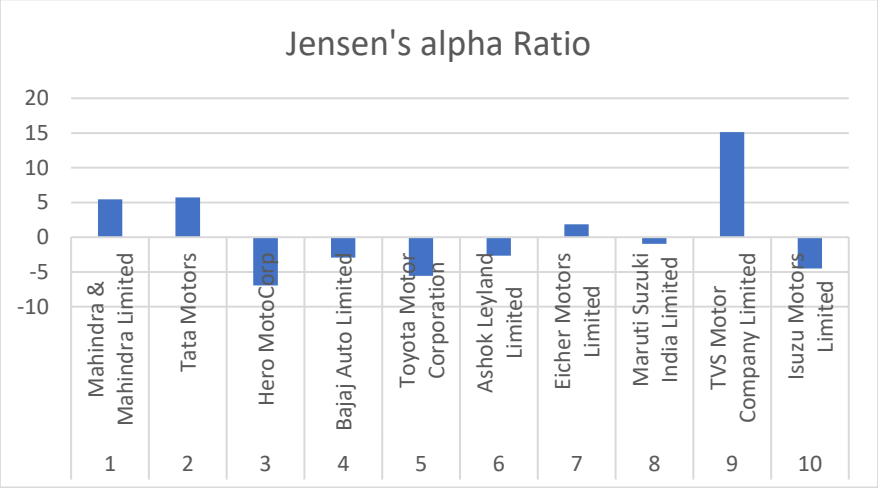
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Interpretation

The Treynor Ratio analysis highlights TVS Motor Company as the top performer (34.56), delivering the highest return per unit of market risk. Mahindra & Mahindra (24.58) and Eicher Motors (23.47) follow closely, showing strong systematic risk-adjusted returns. Tata Motors ranks fourth (22.88), with high returns balanced by higher market risk. Companies like Bajaj Auto, Ashok Leyland, Maruti Suzuki, and Isuzu show moderate performance, while Hero MotoCorp (12.19) and Toyota (9.00) trail behind. Overall, TVS, Mahindra & Mahindra, and Eicher Motors offer the most efficient risk-reward profiles.

14. A Statement of Jensen's alpha Ratio of Selected auto mobile companies stock during the period 2020- 2024.

S. No	Name of the Company	Jensen's alpha Ratio
1	Mahindra & Mahindra Limited	5.473606696
2	Tata Motors	5.7082156
3	Hero MotoCorp	-6.951273876
4	Bajaj Auto Limited	-2.93705752
5	Toyota Motor Corporation	-5.585949521
6	Ashok Leyland Limited	-2.659314705
7	Eicher Motors Limited	1.835694247
8	Maruti Suzuki India Limited	-0.971034381
9	TVS Motor Company Limited	15.14269247
10	Isuzu Motors Limited	-4.519611913



Interpretation

Jensen's Alpha highlights TVS Motor Company as the top performer with a value of 15.14, reflecting strong excess returns and superior management. Tata Motors (5.71) and Mahindra & Mahindra (5.47) also show positive alpha, indicating returns above market expectations. Eicher Motors reports a modest positive Alpha (1.84). In contrast, companies like Hero MotoCorp (-6.95), Toyota (-5.59), Bajaj Auto (-2.94), and Isuzu (-4.52) underperform the market. Overall, TVS, Tata, and Mahindra & Mahindra demonstrate strong value creation beyond market benchmarks.

5.FINDINGS, SUGGESTIONS AND CONCLUSION

5.1 Findings

- TVS Motor emerged as the best risk-adjusted performer with consistent returns and low risk.
- Tata Motors offered the highest returns but with the highest risk, suitable for aggressive investors.
- Mahindra & Mahindra maintained a balanced performance, ideal for moderate-risk investors.
- Maruti Suzuki and Toyota delivered low-risk, stable returns, attractive for conservative investors.
- Hero MotoCorp had high risk but low returns, reflecting operational inefficiencies.
- Isuzu Motors showed high volatility with improving returns but persistent risk.

- External factors like EV transition, chip shortages, and economic recovery influenced performance across companies.

5.2 Suggestions

- Continue leveraging its EV leadership (e.g., iQube), focus on international expansion, and maintain operational efficiency to sustain its competitive edge.
- Expand EV offerings (especially through JLR), strengthen global presence, and reduce volatility by improving cost control and supply chain resilience.
- Enhance its position in SUVs and farm equipment, invest more in EVs, and explore global markets for sustained, moderate-risk growth.
- Accelerate hybrid and EV development, maintain cost leadership, and target fuel-efficient compact SUVs to retain appeal among risk-averse investors.
- Improve product innovation, cut operational inefficiencies, and strengthen its EV portfolio to regain investor confidence and improve returns.
- Focus on domestic market growth, enhance operational stability, and develop risk mitigation strategies to improve consistency in performance.
- All companies should invest in R&D, adopt digital tools for supply chain resilience, and align with government EV policies to remain competitive amid external challenges.

5.3 Conclusion

India's automobile sector offers varied investment options for different risk profiles. TVS Motor and Mahindra & Mahindra provide balanced returns with moderate risk, while Tata Motors suits aggressive investors. Maruti Suzuki and Toyota appeal to conservative investors due to low volatility. Future growth will rely on innovation, electrification, and risk management. Success will depend on company adaptability, informed investor decisions, and supportive government policies to ensure long-term industry sustainability.

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