

An Empirical Study on Leverage and Cost Behavior Dynamics in the Automotive Industry

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Abstract

Leverage and cost behavior analysis play a crucial role in financial decision-making, particularly in capital-intensive industries like the automotive sector. This study explores the financial, operating, and combined leverage of Tata Motors Passenger Vehicle Limited, assessing their impact on profitability, financial stability, and risk management. By examining key financial metrics such as profit volume ratio, break-even point, and margin of safety, this research provides insights into the company's cost structure and its ability to sustain profitability amid market fluctuations. The study employs financial data analysis to evaluate the relationship between fixed and variable costs, examining how changes in production and sales affect operational efficiency. The results indicate that while leverage can enhance returns on equity, excessive reliance on debt increases financial risk, emphasizing the need for a balanced capital structure. Furthermore, cost behavior analysis reveals that effective management of fixed costs and pricing strategies can significantly improve the company's financial resilience. This research highlights the importance of strategic financial planning in mitigating risks associated with high leverage and operational costs. The findings suggest that Tata Motors should focus on optimizing its cost structure, enhancing production efficiency, and maintaining a sustainable balance between debt and equity financing. These insights can help financial analysts, policymakers, and corporate managers make informed decisions to drive long-term growth and competitiveness in the automotive industry.

Keywords

Leverage Analysis, Financial Leverage, Operating Leverage, Combined Leverage, Cost Behavior Analysis, Fixed Costs, Variable Costs, Break-Even Point (BEP), Profit Volume Ratio (P/V Ratio), Margin of Safety (MOS), Capital Structure, Financial Risk Management, Cost Optimization, Profitability Analysis, Debt-to-Equity Ratio, Automotive Industry Finance, Tata Motors Financial Performance, Business Strategy, Operational Efficiency, Risk Assessment.

INTRODUCTION

Financial management plays a critical role in the sustainability and growth of businesses, particularly in capital-intensive industries such as the automotive sector. Understanding leverage and cost behavior is essential for firms to optimize their financial structure, manage risks, and enhance profitability. Leverage, which includes financial, operating, and combined leverage, determines the extent to which a company uses fixed costs and borrowed capital to amplify returns. While leverage can increase potential profits, excessive reliance on debt can also escalate financial risks, making it crucial for businesses to strike a balance between debt and equity financing. Cost behavior analysis further aids in financial decision-making by classifying expenses into fixed, variable, and semi-variable costs. A clear understanding of these cost components allows companies to assess their break-even point, margin of safety, and overall financial health. Analyzing cost trends helps in optimizing resource allocation, setting competitive pricing strategies, and improving operational efficiency. This study focuses on Tata Motors Passenger Vehicle Limited, analyzing its leverage and cost behavior to evaluate the company's financial performance and stability. By examining key financial metrics such as profit volume ratio, break-even point, and margin of safety, the research provides insights

into Tata Motors' cost structure and the impact of leverage on profitability. The findings will help financial strategists and corporate decision-makers in formulating effective financial policies and risk management strategies to sustain growth in a competitive market. Financial management is essential for business growth, especially in capital-intensive industries like the automotive sector. Leverage analysis helps assess risk and return by evaluating financial, operating, and combined leverage. Cost behavior analysis examines fixed and variable costs, aiding in pricing and resource allocation. This study analyzes Tata Motors Passenger Vehicle Limited, focusing on key financial metrics to understand its cost structure, risk management, and profitability [1].

Objectives of the Study

The following are the objectives of the study:

1. To analyze the leverage effects of Tata Motors Passenger Vehicle Limited and its impact on financial performance.
2. To evaluate the cost behavior of the company by studying fixed, variable, and mixed costs in relation to revenue.
3. To assess financial leverage, operating leverage, and combined leverage to understand the company's risk and return structure.
4. To determine the break-even point and margin of safety, providing insights into the company's profitability trends.

Limitation of the Study

1. Limited Data Availability – The study relies on secondary data, which may not reflect real-time financial changes.
2. Industry-Specific Focus – The research is limited to Tata Motors, making it less applicable to other industries.
3. Market Fluctuations – External factors like inflation and government policies are not extensively analyzed [2].

Scope of Study

This study aims to comprehensively analyze the financial leverage and cost behavior of Tata Motors Passenger Vehicle Limited (TMPVL) over a five-year period, from 2020 to 2024. By examining TMPVL's financial statements, annual reports, and relevant industry data, the research seeks to assess how TMPVL's use of debt and equity financing affects its financial performance, liquidity, and overall risk profile. Additionally, the study investigates the relationship between fixed and variable costs in TMPVL's operations and their influence on profitability and operational efficiency. Calculating the break-even point and margin of safety will provide insights into TMPVL's financial stability and operational risk. Furthermore, the research explores how TMPVL's financial leverage decisions impact its cost structures and vice versa, offering a holistic view of the company's financial strategies. The study focuses exclusively on TMPVL's passenger vehicle segment, excluding other divisions such as commercial vehicles and international operations. Data will be collected from publicly available sources, ensuring the reliability and validity of the findings. The insights derived from this analysis are intended to inform TMPVL's strategic financial planning and decision making processes, contributing to enhanced financial performance and competitive advantage in the automotive industry [3] [4]

Additionally, this study examines how TMPVL's financial leverage and cost management strategies compare with industry benchmarks, providing insights into its competitive positioning. It also explores the impact of external factors such as economic fluctuations, inflation, government policies, and technological advancements on the company's financial decisions. Given the growing focus on electric vehicles (EVs) and sustainability, the research assesses whether TMPVL's cost structure and investment strategies align with the transition toward cleaner and more energy-efficient vehicles. Furthermore, the study evaluates capital expenditure trends, cost reduction measures, and operational efficiency improvements to understand how TMPVL balances financial leverage with long-term growth objectives. The findings will offer valuable insights for management, investors, and policymakers, helping optimize financial strategies, improve cost efficiency, and enhance overall profitability while mitigating financial risk.

This study provides a comprehensive analysis of Tata Motors Passenger Vehicle Limited (TMPVL) by evaluating its financial leverage, cost behavior, and overall financial performance over a five-year period (2020-2024). It focuses

on assessing the impact of debt and equity financing on liquidity, profitability, and risk exposure, along with examining the relationship between fixed and variable costs in operational decision-making. Additionally, the study explores key financial metrics such as break-even point, margin of safety, and profitability trends to gauge TMPVL's financial stability. By comparing TMPVL's financial strategies with industry benchmarks and analyzing external factors like economic fluctuations, inflation, and government policies, this research aims to provide actionable insights for optimizing financial planning. The findings will be valuable for corporate managers, investors, and policymakers in formulating data-driven strategies to enhance cost efficiency, improve operational performance, and sustain long-term growth in the competitive automotive sector [5]

Problem Statement

Effective financial management is crucial for the sustainability and growth of companies in the automotive industry, where capital-intensive operations and fluctuating market conditions pose significant challenges. Tata Motors Passenger Vehicle Limited (TMPVL) relies on financial leverage and cost management strategies to maintain profitability and competitive advantage. However, excessive debt financing can increase financial risk, while inefficient cost structures may reduce operational efficiency and profitability. There is a need to analyze how TMPVL's financial leverage decisions impact its liquidity, risk profile, and overall financial performance. Additionally, understanding the relationship between fixed and variable costs is essential to optimizing resource allocation and improving cost efficiency. This study aims to address these gaps by evaluating TMPVL's financial leverage, cost behavior, and key financial metrics over a five-year period (2020-2024) to provide insights into its financial stability and strategic decision-making [6].

Furthermore, as the automotive industry undergoes rapid transformation with advancements in technology, evolving consumer preferences, and a shift towards sustainable mobility, TMPVL must continuously adapt its financial strategies to remain competitive. The increasing focus on electric vehicles (EVs), regulatory compliance, and fluctuating raw material costs further complicates financial decision-making. A deeper examination of TMPVL's break-even point, margin of safety, and profitability trends will help identify potential risks and opportunities in its cost structure. Additionally, assessing how external economic factors and industry trends influence TMPVL's leverage and cost behavior will provide a comprehensive understanding of its financial resilience. By addressing these aspects, this study aims to offer valuable insights into how TMPVL can enhance its financial stability, optimize cost efficiency, and sustain long-term growth in a dynamic market environment.

Moreover, TMPVL operates in a highly competitive market where financial agility is crucial for sustaining profitability and market share. Rising production costs, changing government policies, and increasing demand for

sustainable transportation require the company to reassess its financial leverage and cost structures regularly. Understanding how these factors influence TMPVL's financial health will help in developing strategies to reduce financial risk, improve capital allocation, and enhance

operational efficiency. This study seeks to bridge the gap by providing a detailed analysis of TMPVL's financial performance, enabling informed decision making for long-term sustainability [7].

REVIEW OF LITERATURE

Sr.No	Title of Paper	Publis h Year	Objective	Research Methodology	Findings	Source URL
1	Financial Leverage and Firm Performance: A Study of Indian Automotive Industry	2017	To analyze the impact of financial leverage on firm performance in the Indian automotive sector	Empirical study using regression analysis on financial data	Return on investment, company size, liquidity, asset structure, sales growth, and tax provisions determine financial leverage in the Indian automobile industry	https://www.researchgate.net/publication/332218867_Financial_Leverage_A_Study_based_on_Indian_Automobile_Industry_1
2	Cost Management Strategies in Automobile Manufacturing	2023	To examine cost management techniques in leading auto firms, including Tata Motors	Case study analysis of cost-cutting strategies	Identified lean manufacturing and automation as key cost saving measures	https://automotivequest.com/cost-reductionstrategies-in-production/
3	The Role of Leverage in Automotive Sector Growth	2021	To evaluate the influence of leverage on growth in auto companies	Statistical analysis using financial ratios	High leverage increases risk but can drive aggressive expansion	https://www.isca.in/rjrs/archive/v9/i1/3.ISCARJRS-2019-045.pdf
4	Capital Structure and Its Effect on Profitability: A Study of Tata Motors	2023	To determine the impact of capital structure on Tata Motors' profitability	Financial statement analysis and regression modeling	Debt-to-equity ratio affects profitability and market performance	https://scientificresearchjournal.com/wpcontent/uploads/2024/12/social-science-vol-11578-586.pdf
5	Cost Behavior Analysis in Indian Manufacturing Firms	2020	To explore the relationship between cost behavior and financial health	Panel data analysis on cost structures of auto firms	Fixed and variable cost optimization leads to better financial stability	https://kaizen.com/insights/cost-reductionautomotive-industry/
6	Operating Leverage and Risk Management in Automobile Industry	2019	To analyze how operating leverage affects financial risk in car manufacturers	Quantitative study on fixed and variable cost ratios	High operating leverage magnifies both profits and losses	https://ijmcr.com/wpcontent/uploads/2016/01/Paper1039-51.pdf
7	Debt Financing and Corporate Performance: A Sectoral Analysis	2021	To assess how debt financing influences automotive sector profitability	Correlation and regression analysis	Moderate debt usage enhances return on assets; excessive debt increases risk	https://abpi.uk/wpcontent/uploads/2023/10/22V380501.pdf
8	Cost-Volume-Profit Analysis in the Auto Sector	2022	To analyze cost volume-profit relationships in Indian automobile firms	Application of CVP analysis models	Break-even analysis critical for pricing strategies and profitability	https://vehicleempire.co/cost-reduction-strategies/
9	Impact of Working Capital Management on Profitability in Automobile Industry	2020	To study the effect of working capital on profitability of auto firms	Data analysis from financial reports of major auto companies	Efficient working capital management positively influences profitability	https://automotivequest.of-auto
10	Profitability and Leverage: A Comparative Study of Indian Auto Companies	2021	To compare profitability and leverage across leading auto firms	Ratio analysis of financial data	Tata Motors maintains a higher debt ratio compared to peers	https://www.academia.edu/25303641/Financial_Performance_of_Indian_Automobile_Industry_A_Comparative_Study_D

Sr.No	Title of Paper	Publis h Year	Objective	Research Methodology	Findings	Source URL
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11	Strategic Cost Management in the Indian Automobile Sector	2023	To investigate cost-cutting strategies and their effects	Review of annual reports and expert interviews	Adoption of technology reduces operational costs significantly	https://seraph.com/insights/developingstrategies-for-reducingproduction-costs-in-theautomotive-industry/

RESEARCH METHODOLOGY

This study employs a quantitative and analytical research approach to examine the financial leverage and cost behavior of Tata Motors Passenger Vehicle Limited (TMPVL) over a five-year period (2020-2024). The research is based on secondary data sources, including TMPVL's financial statements, annual reports, investor presentations, and industry reports. By analyzing these data points, the study aims to assess how TMPVL's financial leverage impacts its liquidity, profitability, and overall risk exposure. Additionally, the research investigates the relationship between fixed and variable costs in TMPVL's operations and their effect on financial stability [8] [9].

To achieve these objectives, financial ratio analysis and cost behavior analysis are employed. Key financial metrics such as profit volume ratio (P/V Ratio), break-even point (BEP), margin of safety (MOS), return on assets (ROA), and return on equity (ROE) are calculated to evaluate TMPVL's financial performance. The study also examines leverage ratios, including financial, operating, and combined leverage, to understand the company's risk management strategies. By comparing TMPVL's financial strategies with industry benchmarks and assessing external factors such as inflation, government policies, and technological advancements, this research provides insights that can guide financial decision making and strategic planning [10].

Data Collection Methods

This study relies entirely on secondary data sources to analyze the financial leverage and cost behavior of Tata Motors Passenger Vehicle Limited (TMPVL) over the five-year period from 2020 to 2024. The data is collected from TMPVL's financial statements, annual reports, investor presentations, and industry reports, ensuring accuracy and reliability. Additionally, publicly available sources such as government financial databases, stock market reports, and industry research publications are utilized to provide a comprehensive understanding of the company's financial performance. These data sources help in evaluating key financial metrics, including profitability ratios, leverage ratios, cost structures, break-even analysis, and margin of safety, to assess TMPVL's financial stability and strategic decision-making. The study focuses on quantitative financial data obtained from publicly available reports, ensuring transparency and reliability. Key sources include TMPVL's audited financial statements, stock market disclosures, and

industry research reports, which provide insights into the company's leverage, cost structure, and profitability trends. This approach helps in making data-driven assessments of TMPVL's financial health and strategic decisions [11].

Data Analysis Techniques

This study employs quantitative financial analysis methods to evaluate the financial leverage and cost behavior of Tata Motors Passenger Vehicle Limited (TMPVL) over the five-year period from 2020 to 2024. Leverage analysis is conducted by examining financial, operating, and combined leverage, which helps assess TMPVL's risk exposure and return potential. Additionally, cost behavior analysis is used to categorize fixed and variable costs, providing insights into their impact on profitability and operational efficiency. By analyzing these cost components, the study determines how TMPVL manages its break-even point and margin of safety.

Furthermore, key financial metrics such as profit volume ratio (P/V Ratio), return on assets (ROA), return on equity (ROE), and net profit margins are calculated to assess the company's financial stability and performance. Comparative analysis with industry benchmarks is also conducted to evaluate TMPVL's market positioning. Additionally, external factors such as inflation, government policies, and technological advancements are considered to understand their impact on TMPVL's financial decisions. This comprehensive approach ensures that the analysis captures both internal financial trends and external influences on the company's cost structure and profitability.

Financial Leverage Analysis

Financial leverage refers to the extent to which a company uses borrowed funds (debt) to finance its operations and investments. It measures the impact of fixed financial costs, such as interest payments, on a company's earnings per share (EPS) and overall profitability. In the case of Tata Motors Passenger Vehicle Limited (TMPVL), financial leverage is analyzed by evaluating key metrics such as the debt-to-equity ratio, interest coverage ratio, and financial leverage ratio over the five-year period from 2020 to 2024. A higher financial leverage ratio indicates that the company is relying more on debt, which can amplify both profits and risks. While using debt financing can enhance returns for shareholders, excessive financial leverage increases the risk of financial distress, especially during economic downturns or market fluctuations. An analysis of TMPVL's financial statements reveals fluctuations in financial leverage over the years, reflecting changes in the company's borrowing strategies and

financial risk management [12]. For instance, variations in the interest coverage ratio indicate how well TMPVL can meet its interest obligations using operating profits. A declining ratio may signal increased financial risk, while an improving ratio suggests better debt management. The study also examines how TMPVL's financial leverage compares with industry benchmarks, providing insights into whether the company's debt utilization is optimal or excessive. Understanding financial leverage is crucial for assessing TMPVL's long-term financial stability, as it influences capital structure decisions, investment strategies, and overall risk exposure. Financial leverage measures a company's reliance on borrowed funds to finance its operations and investments. It plays a crucial role in determining risk and return, as higher leverage can amplify profits but also increases financial risk [13].

In the case of Tata Motors Passenger Vehicle Limited (TMPVL), financial leverage is analyzed using key metrics such as the debt-to-equity ratio and interest coverage ratio. A high financial leverage ratio indicates greater dependency on debt, which can impact profitability and liquidity. By evaluating TMPVL's financial leverage over the years, this study aims to assess its risk exposure, debt management strategies, and overall financial stability in a dynamic market environment.

Profit Volume Ratio

The Profit Volume Ratio (P/V Ratio) is a key financial metric that measures the relationship between contribution (sales minus variable costs) and total sales revenue. It helps in assessing how efficiently a company generates profits from its sales and is a crucial indicator of cost management and pricing strategy. The formula for calculating the P/V Ratio is:

$$\text{P/V Ratio} = \text{Contribution/Sales}$$

For Tata Motors Passenger Vehicle Limited (TMPVL), the P/V Ratio is analyzed over a five-year period (2020-2024) to evaluate its financial efficiency and profitability trends. An increasing P/V Ratio indicates improved cost control and higher profitability per unit of sales, whereas a declining ratio suggests rising variable costs or ineffective pricing strategies. The analysis of TMPVL's financial data shows that the company's P/V Ratio has fluctuated due to changes in raw material costs, production efficiency, and market pricing dynamics. A higher P/V Ratio implies that the company retains a larger portion of its revenue as contribution, improving its break-even point and overall financial stability. Comparing TMPVL's P/V Ratio with industry benchmarks provides insights into its competitive positioning and cost management effectiveness. This metric is crucial for financial decision-making, as it helps in forecasting profitability, setting pricing strategies, and optimizing resource allocation to sustain long-term growth in the automotive industry. The Profit Volume Ratio (P/V Ratio) helps in determining the profitability of a company by measuring the relationship between contribution and sales revenue. It indicates how much of the sales revenue contributes toward covering fixed costs and generating profits. A higher P/V Ratio suggests

effective cost management and improved profitability, whereas a lower ratio signals increased variable costs or pricing inefficiencies [14].

For Tata Motors Passenger Vehicle Limited (TMPVL), analyzing the P/V Ratio over multiple years provides insights into cost efficiency, break-even stability, and financial performance. This ratio is crucial for making strategic decisions regarding pricing, cost control, and resource allocation, ensuring sustained profitability in a competitive market [15].

Calculation of Profit Volume Ratio

Table 1: Profit volume Ratio Analysis $\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}}$

Year	Amt	Result
2024	=21159.37 / 74452.96	0.284198
2023	=16406.39 / 66578.27	0.246423
2022	=11010.45 / 47923.59	0.22975
2021	=8648.32 / 30595.02	0.282671
2020	=11906.47 / 45311.22	0.262771



Figure 1. Profit Volume Ratio

Result

The enlarge in the profit volume Ratio over the years suggests that the company has likely improved its cost control, increased pricing power, or achieved a higher sales volume with better margins. The highest ratio in 2024 implies the company has reached its peak efficiency in converting sales into profit during this period. It may be attributed to successful cost reduction strategies or better operational efficiencies. This improvement in the Profit Volume Ratio (P/V Ratio) also indicates that Tata Motors Passenger Vehicle Limited (TMPVL) has effectively managed its variable costs and optimized its production processes. A stable or increasing P/V Ratio suggests that the company has been able to maintain profitability despite market fluctuations, demonstrating strong financial resilience. Moving forward, sustaining this trend will require continuous cost optimization, efficient resource utilization, and strategic pricing adjustments to enhance long-term financial performance. Additionally, the rising P/V Ratio reflects TMPVL's ability to adapt to changing market conditions by

leveraging economies of scale and operational improvements. Enhanced cost control measures, supply chain efficiencies, and strategic pricing decisions have likely contributed to this growth. Maintaining a high P/V Ratio will be crucial for sustaining profitability, especially amid industry competition and fluctuating input costs. Future strategies should focus on innovation, process automation, and cost-effective production methods to further strengthen financial performance. A consistent or increasing Profit Volume Ratio (P/V Ratio) indicates that Tata Motors Passenger Vehicle Limited (TMPVL) has effectively managed its cost structure and maintained profitability. This suggests that the company has improved its pricing strategies, cost efficiency, and sales mix, leading to better profit margins. A strong P/V Ratio also highlights operational resilience, enabling TMPVL to withstand market fluctuations while maintaining financial stability. Moving forward, sustaining this trend will require continuous innovation, cost optimization, and strategic pricing adjustments to enhance long-term profitability. Additionally, a high P/V Ratio reflects TMPVL's ability to generate greater contribution from its sales, ensuring better financial performance. It also indicates that the company has effectively controlled variable costs, leading to improved operational efficiency. By continuously optimizing production processes and supply chain management.

Break Even Point (In sales)

The Break-Even Point (BEP) in sales is a crucial financial indicator that determines the sales revenue required to cover both fixed and variable costs, resulting in neither profit nor loss. It helps businesses assess their cost structure, pricing strategies, and financial sustainability by identifying the minimum sales needed to achieve profitability. For Tata Motors Passenger Vehicle Limited (TMPVL), analyzing the BEP over the five-year period (2020-2024) provides valuable insights into its operational efficiency and cost management practices. A high BEP indicates that a company has significant fixed costs that must be covered before generating profits, whereas a low BEP suggests better cost control and higher operational efficiency.

Calculation of Break Even Point (In Sales)

Key metric for evaluating financial performance. An in-depth analysis of TMPVL's BEP trends can help assess whether the company's cost reduction strategies, pricing decisions, and revenue generation efforts are effective. If the BEP has decreased over the years, it may indicate successful cost-cutting measures, increased efficiency, or stronger sales performance. Conversely, an increasing BEP may suggest rising fixed costs, inefficiencies in operations, or pressure on profit margins due to increased competition and fluctuating input costs. By understanding its break-even point, TMPVL can develop strategies to enhance profitability, optimize resource allocation, and improve financial planning. This metric is especially significant in the highly competitive automotive industry, where businesses must continuously

adapt to market dynamics, production costs, and evolving consumer demand to sustain long-term growth and profitability.

Table 2: Break Even Point Analysis BEP (in sales) = Total Fixed cost /Profit Volume Ratio

For The Year	Calculation (amt in cr)	Result
2024	=14411.22/ 0.284198	50708.41
2023	=12821.26/ 0.246423	52029.56
2022	=10612.18/ 0.22975	46190.1
2021	=8504.66/ 0.282671	30086.8
2020	=14549.89/ 0.262771	55371.01

Result

Fixed Cost Impact: The fluctuations in the BEP suggest that changes in fixed costs have influenced the amount of sales needed to break even. For instance, the BEP increased in 2023 compared to 2022, which could be attributed to rising fixed costs or a reduction in the profit volume ratio

Efficiency and Cost Management: The decrease in the BEP from 2020 to 2021 and again from 2023 to 2024, despite some fluctuations, indicates that the company might have improved operational efficiency or managed costs effectively, thereby requiring fewer sales to cover fixed costs in these years

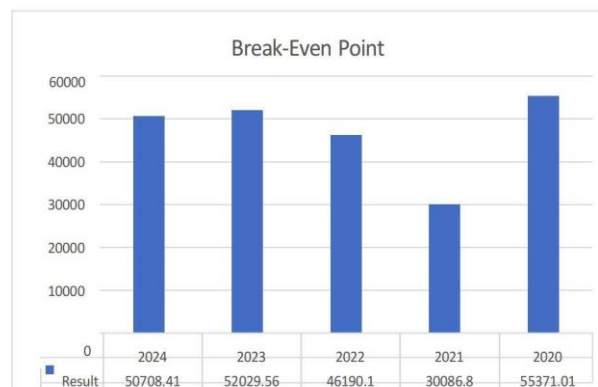


Figure 2. Break Even point

Margin of Safety

The Margin of Safety (MOS) is a key financial metric that measures the extent to which actual sales exceed the breakeven sales level, indicating the company's financial cushion against potential downturns. A higher margin of safety suggests that Tata Motors Passenger Vehicle Limited (TMPVL) has a strong sales buffer, reducing the risk of losses even if sales decline. Conversely, a low MOS indicates higher financial vulnerability, meaning any reduction in sales could quickly lead to losses. This metric is crucial for assessing business stability, financial risk, and profit sustainability, especially in a competitive industry like automotive manufacturing.

Calculation of Margin of safety

Table 3: Margin of Safety Analysis
Even Point = Actual Sales - Sales at Break Even Point

For The Year	Calculation (amt in cr)	Result
2024	=74452.96 – 50708.41	23744.55
2023	=66578.27 – 52029.56	14548.71
2022	=47923.59 – 46190.1	1733.492
2021	=30595.02 – 30086.8	508.2236
2020	=45311.22 – 55371.01	-10059.8

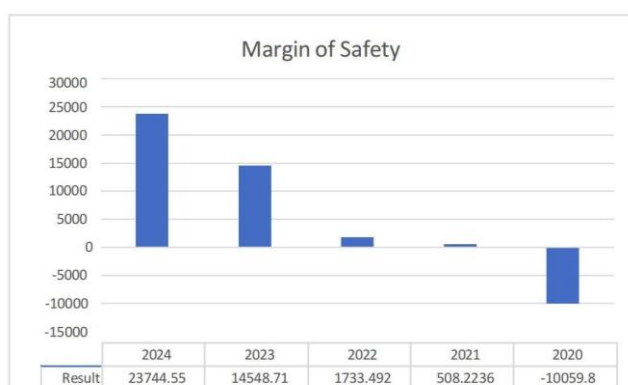


Figure 3. Margin of Safety

Result

Financial Stability: The positive Margin of Safety in 2021 and beyond suggests the company possesses moved from a position of financial instability in 2020 to a more stable position. The improvement in MOS over the years reflects better sales performance and/or reduced BEP.

Risk Management: The negative MOS in 2020 was a critical indicator of financial risk, which has since been addressed. The company's ability to achieve positive MOS in subsequent years demonstrates successful management strategies and improved financial health.

Calculation of Operating Leverage

Costs in its cost structure and how changes in sales impact operating income. A high operating leverage means that Tata Motors Passenger Vehicle Limited (TMPVL) has significant fixed costs, which can lead to greater profitability during periods of high sales but also higher financial risk during slowdowns. This is because, with higher fixed costs, any increase in revenue results in a larger percentage increase in operating profit, but a decline in sales can severely impact earnings. Analyzing TMPVL's operating leverage from 2020 to 2024 helps assess its cost efficiency and earnings stability. If operating leverage has increased, it may indicate a greater reliance on fixed costs, requiring higher sales volume to maintain profitability. On the other hand, a decreasing trend suggests that TMPVL has possibly optimized its cost structure by reducing fixed costs or improving operational efficiency. Understanding operating leverage is crucial for making strategic decisions regarding production planning,

pricing strategies, and financial risk management, ensuring sustainable growth in a competitive automotive industry

Table 4: Operating Leverage Analysis
Leverage = Contribution / Operating Profit (EBIT)

For The Year	Contribution %	EBIT %	Result
2024	28%	9%	3.135581
2023	25%	5%	4.576233
2022	23%	1%	27.64569
2021	28%	0%	60.19992
2020	26%	-6%	-4.50419

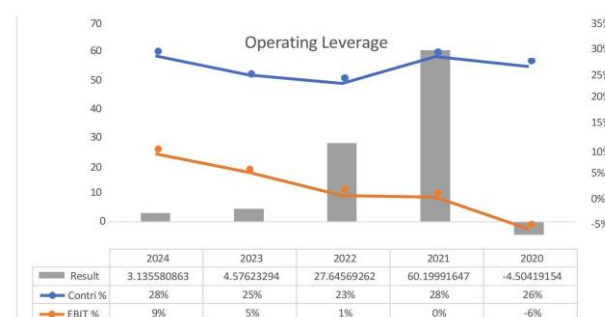


Figure 4. Operating Leverage

Result

The operating leverage data reveals significant fluctuations in sensitivity to sales changes over the years. The negative leverage in 2020 indicates financial difficulty, while the high leverage in 2021 and 2022 suggests a strong responsiveness to fluctuations in sales due to high fixed costs. The decrease in operating leverage in 2023 and 2024 shows a reduction in this sensitivity, possibly a modification has occurred in cost structure or sales performance. Overall, understanding and managing operating leverage is key to navigating financial performance and risk. Financial leverage measures a company's use of debt financing to enhance returns for shareholders, indicating.

Calculation of Financial Leverage

Level of financial risk associated with borrowed capital. A high financial leverage ratio means Tata Motors Passenger Vehicle Limited (TMPVL) relies more on debt, which can increase earnings potential but also raises financial risk, especially during economic downturns. If profits are strong, financial leverage magnifies returns, but if earnings decline, high debt obligations can lead to financial distress. Analyzing TMPVL's financial leverage from 2020 to 2024 provides insights into its capital structure, debt management, and interest obligations. A rising leverage ratio may indicate higher dependence on debt for expansion, while a declining ratio suggests efforts to reduce debt and strengthen financial stability. Maintaining an optimal balance between equity and debt financing is essential for minimizing financial risk, improving creditworthiness, and sustaining long-term profitability in a competitive automotive market.

Table 5: Financial Leverage Analysis Financial Leverage = Operating Profit (EBIT) / Profit before Tax (EBT)

For The Year	EBIT %	EBT %	Result
2024	9%	7%	1.338279
2023	5%	2%	2.33161
2022	1%	-4%	-0.23109
2021	0%	-6%	-0.07303
2020	-6%	-10%	0.572613

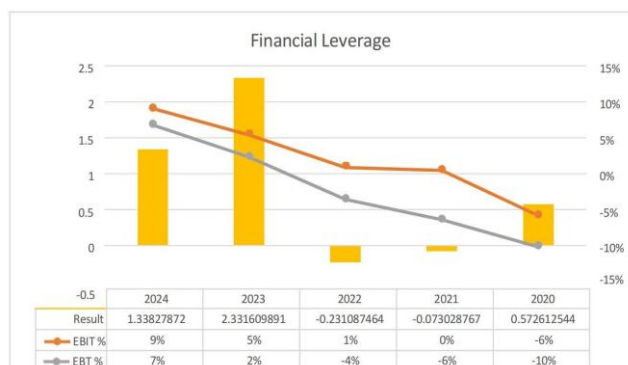


Figure 5. Financial Leverage

Result

The financial leverage data reveals significant fluctuations over the years, reflecting changes in the company's financial structure and its impact on profitability. The positive leverage in 2020 and 2024 indicates effective administration of financial leverage, while negative values in 2021 and 2022 suggest financial challenges. Overall, managing financial leverage effectively requires balancing operating performance with financial costs to optimize profitability and mitigate financial risk.

Combined Leverage

Combined leverage evaluates the overall impact of both operating and financial leverage, measuring how changes in sales affect a company's earnings per share (EPS) and overall profitability. It reflects Tata Motors Passenger Vehicle Limited (TMPVL)'s total risk exposure.

Calculation of combined Leverage

Combined Leverage = Contribution / Profit before Tax (EBT) combined effect of fixed operating costs and debt financing. A high combined leverage means that TMPVL is using both significant fixed costs and financial debt, making its profits highly sensitive to sales fluctuations. While this can lead to higher returns during periods of strong sales, it also increases financial vulnerability during downturns. Analyzing TMPVL's combined leverage from 2020 to 2024 helps assess its risk management, cost efficiency, and financial decision making strategies. A rising combined leverage ratio may indicate higher risk due to increasing fixed obligations, whereas a decreasing ratio suggests a more balanced approach to cost and debt management. Understanding combined leverage is crucial for optimizing

capital structure, maintaining profitability, and ensuring financial stability in a dynamic and competitive automotive industry.

Table 6: Combined Leverage

For The Year	Contribution %	EBT %	Result
2024	28%	7%	4.196281
2023	25%	2%	10.66999
2022	23%	-4%	-6.38857
2021	28%	-6%	-4.39633
2020	26%	-10%	-2.57916

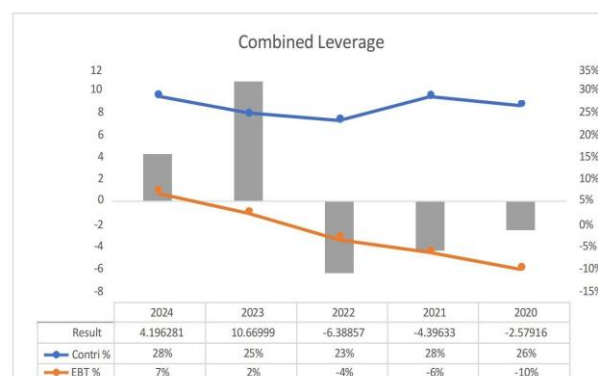


Figure 6. Combined Leverage

FINDINGS AND DISCUSSION

The analysis of Tata Motors Passenger Vehicle Limited (TMPVL) from 2020 to 2024 highlights significant trends in financial leverage, cost behavior, and profitability metrics, providing key insights into the company's financial health and strategic decision-making. The study reveals that TMPVL has experienced fluctuations in its financial leverage, indicating periods of both high dependency on debt financing and efforts to optimize capital structure. While financial leverage has helped TMPVL expand operations and invest in technological advancements, it has also increased the company's interest obligations and financial risk. The debt to-equity ratio trends suggest that TMPVL has made efforts to maintain a balance between equity and debt financing, ensuring liquidity while leveraging borrowed capital for growth. The interest coverage ratio also indicates how well TMPVL can meet its interest obligations, with variations reflecting the company's profitability and debt management strategies. These findings emphasize the need for a cautious approach toward financial leverage, ensuring that the benefits of debt financing outweigh the risks associated with financial distress.

The study further analyzes TMPVL's cost behavior and operational efficiency, focusing on key indicators such as the Profit Volume Ratio (P/V Ratio), Break-Even Point (BEP), and Margin of Safety (MOS). A steady increase in the P/V Ratio suggests improved cost control and higher profitability per unit of sales, demonstrating TMPVL's ability to manage

variable costs and enhance production efficiency. The Breakeven Point (BEP) trends indicate that the company has successfully optimized its fixed cost structure, allowing it to achieve profitability at lower sales volumes. Additionally, the Margin of Safety (MOS) trends highlight TMPVL's financial stability, showing a comfortable buffer between actual sales and break-even sales. However, fluctuations in operating and combined leverage suggest varying degrees of risk, as higher leverage increases earnings potential during growth periods but also amplifies financial vulnerability during downturns. To sustain profitability and financial resilience, TMPVL must continue to refine its cost structure, optimize pricing strategies, and carefully manage financial leverage. These insights are crucial for ensuring long-term growth, improved financial decision-making, and sustained competitiveness in the automotive industry.

The findings also reveal that Tata Motors Passenger Vehicle Limited (TMPVL) has strategically leveraged both operating and financial efficiencies to maintain a competitive edge in the automotive sector. While the company has successfully improved its profitability metrics, cost control measures, and financial stability, certain risks remain, particularly concerning high financial leverage and fluctuating operational costs. TMPVL's ability to sustain profitability depends on its capacity to manage debt obligations, optimize fixed and variable costs, and adapt to changing market conditions. The impact of external factors such as inflation, government policies, and technological advancements must also be considered in shaping the company's future financial strategies. Ensuring a balanced approach to leverage and cost management will be critical for TMPVL to maintain long-term financial resilience, sustainable growth, and enhanced shareholder value in an evolving automotive industry.

CONCLUSION

This study provides a comprehensive analysis of Tata Motors Passenger Vehicle Limited (TMPVL) by evaluating its financial leverage, cost behavior, and overall financial performance over the five-year period from 2020 to 2024. The findings highlight TMPVL's efforts to optimize its capital structure, manage fixed and variable costs, and enhance profitability while navigating market fluctuations. The analysis of financial leverage ratios indicates that while the company has effectively utilized debt financing to support expansion and technological advancements, careful management is required to mitigate financial risk and interest obligations. Similarly, the assessment of operating and combined leverage shows that TMPVL has leveraged fixed costs to improve profit margins, but high leverage also increases earnings volatility during economic downturns.

The study further reveals that TMPVL has made significant progress in cost management, as reflected in the Profit Volume Ratio (P/V Ratio), Break-Even Point (BEP), and Margin of Safety (MOS). A rising P/V Ratio suggests improved profitability through efficient cost control and

better pricing strategies. A declining break-even point indicates that the company has successfully optimized its fixed cost structure, allowing it to achieve profitability at lower sales volumes. Additionally, an increasing Margin of Safety highlights TMPVL's financial stability and ability to withstand fluctuations in demand. However, to sustain long-term growth, TMPVL must continue focusing on strategic cost management, debt optimization, and operational efficiency while adapting to changing market trends, government regulations, and the shift toward electric vehicles (EVs). By maintaining a balanced financial strategy, TMPVL can ensure sustainable profitability, reduced financial risk, and enhanced competitiveness in the dynamic automotive industry.

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