



# CVP Forecasting Analysis for Managerial Decision Making (Financial Modeling Study)

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**Abstract** – This study presents a comprehensive Cost-Volume-Profit (CVP) forecasting analysis for TATA Steel Ltd., aiming to support managerial decision-making through financial modeling and performance forecasting. Historical data from FY2020 to FY2024 shows a strong upward trend in sales, with significant growth in FY2021 and FY2022, followed by a slight decline in FY2024. Using a CAGR of 23.58%, future sales are projected to reach ₹406,369.72 Cr by FY2029, offering a reliable basis for long-term financial planning and investment strategies. EBIT and contribution margin forecasts, derived through the marginal costing equation and CAGR method, indicate continued operational scalability. EBIT is expected to reach ₹55,538.28 Cr by FY2029, despite pressures from rising fixed and variable costs. The declining P/V ratio—from a peak of 57.24% in 2022 to a projected 37.34% in 2029—signals reduced margin efficiency, underscoring the need for vigilant cost control and strategic pricing. Rising fixed costs have pushed break-even sales higher, growing at an estimated 22% annually, reinforcing the importance of cost structure optimization in sustaining profitability. Despite these challenges, the Margin of Safety (MoS) is projected to increase significantly, reflecting enhanced financial resilience. Furthermore, a gradual decline in the Degree of Operating Leverage (DOL) from over 3.0 to 2.73 suggests a shift toward a more stable and scalable business model. Together, these insights enable TATA Steel to better manage risk, align growth with profitability, and make informed, forward-looking decisions in a competitive market environment.

**Keywords** – Contribution, P/V Ratio, BEP, Profit Planning, Forecasting, Decision Making

## I. INTRODUCTION

Since it directly affects a company's capacity to set reasonable profit goals, allocate resources efficiently, and adapt to shifting market conditions, profit planning is an essential component of business strategy. A crucial technique in profit planning, marginal costing aids businesses in separating fixed and variable expenses and assessing the profitability of goods and services. With an emphasis on crucial aspects including cost control, pricing strategies, and decision-making, this study attempts to examine how well marginal costing procedures optimize profit planning decisions.

Accurate profit forecasting is vital for businesses aiming to thrive in today's competitive and unpredictable markets. With fluctuating demand, dynamic cost structures, and evolving consumer preferences, companies must adopt strategic tools to anticipate future financial outcomes and make informed decisions. Marginal costing, a key managerial accounting technique, plays a crucial role in this context. By distinguishing between variable and fixed costs, marginal costing allows businesses to evaluate the direct impact of production changes on profitability, enabling precise and flexible profit forecasting.

Unlike traditional absorption costing, marginal costing attributes only variable costs to products, treating fixed costs as period expenses. This distinction is critical for short-term decision-making, where management needs to

understand how changes in sales volumes affect profits. The technique emphasizes the concept of contribution margin, which represents the portion of sales revenue that exceeds variable costs and contributes toward covering fixed costs and generating profits. Analyzing this margin helps businesses forecast profits more effectively, especially when planning production, pricing strategies, and resource allocation.

Profit forecasting using marginal costing techniques involves applying financial models to project future revenue and profitability. These models incorporate various scenarios, including best-case, worst-case, and least-case outcomes, to ensure a comprehensive analysis of potential financial trajectories. The least-case method, which focuses on conservative estimates, is particularly valuable in uncertain environments, as it provides a safety net for decision-making and financial planning.

Incorporating marginal costing into profit forecasting not only enhances accuracy but also supports strategic agility. It allows businesses to respond swiftly to market changes, optimize pricing decisions, and allocate resources efficiently. This capability is especially important for industries with high fixed costs, such as manufacturing, where minor shifts in production volumes can have significant financial implications. By leveraging marginal costing, organizations can gain deeper insights into cost behavior and make proactive decisions that safeguard profitability.



## 1. Problem Statement

In today's highly dynamic and cost-sensitive industrial landscape, steel manufacturing companies like TATA Steel Ltd. face growing pressure to balance growth, cost control, and profitability. While past studies such as Drury (2013) and Horngren et al. (2014) have emphasized the significance of Cost-Volume-Profit (CVP) analysis in managerial decision-making and financial planning, there remains a gap in applying advanced forecasting models that integrate CVP elements with realistic growth trajectories, particularly in capital-intensive sectors.

TATA Steel's performance from FY2020 to FY2024 reveals both promising growth and emerging financial pressures, including rising fixed and variable costs, a declining P/V ratio, and increasing break-even sales. Although projections based on the Compound Annual Growth Rate (CAGR) method estimate continued sales and EBIT growth through FY2029, the erosion in margin efficiency raises critical concerns about the sustainability of profitability. Previous research (e.g., Bhattacharyya, 2011; Nair, 2015) has noted that without precise forecasting and margin management, even high-revenue firms can experience strategic misalignment and operational inefficiencies.

## 3. Objectives of the Study

- To analyze the historical sales performance of TATA Steel Ltd. from FY2020 to FY2024 and project future sales trends using the CAGR method for strategic planning and investment evaluation.
- To examine the relationship between sales, EBIT, and contribution margin using marginal costing and forecasting techniques to assess profit planning efficiency and operational scalability.
- To evaluate trends in the P/V ratio from 2020 to 2029 and assess its implications on pricing strategy, cost management, and profit optimization.
- To investigate the growth trajectory of fixed costs and break-even sales and their impact on the company's financial stability and decision-making under rising cost structures.
- To assess the Margin of Safety (MoS) as an indicator of financial resilience and risk buffer, and explore its role in supporting flexible and sustainable business planning.
- To analyze the Degree of Operating Leverage (DOL) to understand the sensitivity of EBIT to sales changes, and its implications for managing operational risk and ensuring long-term profitability.

## 4. Importance of the Study

This study is vital for enhancing managerial decision-making and strategic financial planning in capital-intensive industries like steel manufacturing. By examining TATA Steel Ltd.'s historical sales data (FY2020–FY2024) and projecting future trends through the CAGR method, it establishes a reliable basis for long-term investment and growth planning. It also provides critical insights into

profit planning by analyzing the relationship between sales, EBIT, and contribution margin using marginal costing techniques. Through detailed evaluation of the P/V ratio, fixed costs, break-even points, Margin of Safety (MoS), and Degree of Operating Leverage (DOL), the study highlights financial efficiency, operational risks, and resilience. These insights collectively support informed, data-driven decisions to strengthen profitability and sustainability in a competitive market environment.

## 5. Purpose of the Study

The purpose of this research study is to provide a comprehensive Cost-Volume-Profit (CVP) forecasting analysis that supports managerial decision-making and strategic financial planning for TATA Steel Ltd., a leading player in the capital-intensive steel manufacturing industry. By leveraging historical financial data from FY2020 to FY2024 and applying the Compound Annual Growth Rate (CAGR) method to project future trends through FY2029, the study aims to establish a solid framework for long-term investment planning and performance management. Additionally, the research seeks to deepen understanding of profit dynamics by examining the relationships among sales, EBIT, and contribution margin using marginal costing principles. Through focused analysis of key financial indicators—such as the P/V ratio, fixed costs, break-even sales, Margin of Safety (MoS), and Degree of Operating Leverage (DOL)—the study evaluates operational efficiency, cost structures, and financial resilience. Ultimately, this research is intended to equip decision-makers with actionable insights for optimizing profitability, mitigating risk, and aligning financial strategies with sustainable growth objectives in an evolving and competitive business environment.

## 6. Hypothesis

### Hypothesis: 1

- **(H<sub>0</sub>):** There is no significant relationship between sales, EBIT, and contribution margin, indicating that marginal costing techniques do not enhance profit planning efficiency.
- **(H<sub>1</sub>):** There is a significant relationship between sales, EBIT, and contribution margin, indicating that marginal costing techniques enhance profit planning efficiency and operational scalability.

### Hypothesis: 2

- **(H<sub>0</sub>):** Changes in the P/V ratio over the period 2020 to 2029 do not significantly affect pricing strategy, cost management, or profit optimization.
- **(H<sub>1</sub>):** Changes in the P/V ratio from 2020 to 2029 significantly affect pricing strategy, cost management, and profit optimization.

### Hypothesis: 3

- **(H<sub>0</sub>):** The growth in fixed costs and break-even sales does not significantly impact the financial stability or decision-making of TATA Steel Ltd.



- **(H<sub>1</sub>):** The growth in fixed costs and break-even sales significantly impacts the financial stability and managerial decision-making of TATA Steel Ltd.

#### Hypothesis: 4

- **(H<sub>0</sub>):** The Margin of Safety (MoS) does not significantly indicate financial resilience or support sustainable business planning.
- **(H<sub>1</sub>):** The Margin of Safety (MoS) significantly indicates financial resilience and supports flexible and sustainable business planning.

#### Hypothesis: 5

- **(H<sub>0</sub>):** The Degree of Operating Leverage (DOL) does not significantly influence the sensitivity of EBIT to changes in sales or affect long-term profitability.
- **(H<sub>1</sub>):** The Degree of Operating Leverage (DOL) significantly influences the sensitivity of EBIT to changes in sales and affects long-term profitability.

### 7. Limitations of the Study

This study provides a comprehensive Cost-Volume-Profit (CVP) analysis for TATA Steel Ltd., but it has several limitations. The reliance on historical data from FY2020 to FY2024 may not fully capture future market disruptions or external economic factors, such as changes in global demand, raw material prices, or geopolitical risks.

Additionally, the projection of future sales using a Compound Annual Growth Rate (CAGR) of 23.58% assumes a consistent growth pattern, which may be unrealistic in volatile market conditions. The use of marginal costing for EBIT and contribution margin forecasting may overlook complexities in TATA Steel's cost structure, and the declining P/V ratio may not account for all potential cost-saving strategies.

Furthermore, assumptions about financial indicators, like break-even points and margin of safety, may not hold if unforeseen financial or operational changes occur. Finally, the study's projections, while valuable for long-term planning, may not fully reflect short-term market fluctuations or strategic changes. Therefore, while the study provides valuable insights, it is based on assumptions and historical data that may not always align with future realities.

## II. REVIEW OF LITERATURE

A thorough review of existing literature is essential to understand the theoretical foundations and empirical developments related to Cost-Volume-Profit (CVP) analysis and its application in managerial decision-making. CVP analysis serves as a fundamental tool in financial planning, enabling businesses to evaluate how changes in costs and sales volume impact profitability. Over the years, various scholars and practitioners have explored its relevance in different industrial contexts, emphasizing its

role in break-even analysis, contribution margin evaluation, and pricing strategies.

In capital-intensive sectors such as steel manufacturing, where fixed costs are substantial and market conditions are often volatile, CVP analysis becomes even more critical. Research has focused on how forecasting techniques—particularly those using historical financial data and growth models like the Compound Annual Growth Rate (CAGR)—can help managers predict future performance, allocate resources effectively, and mitigate financial risks. This review synthesizes findings from previous studies on CVP modeling, marginal costing, and key financial indicators including the Profit/Volume (P/V) ratio, Margin of Safety (MoS), fixed cost behavior, and Degree of Operating Leverage (DOL). By examining these elements, the literature provides a framework for understanding how strategic financial decisions can be better informed through quantitative forecasting tools. The following section highlights key contributions and gaps in the existing research that this study aims to address, particularly in the context of TATA Steel Ltd. and its long-term financial planning.

Allen, R., & Brinkman (1983): “This review discusses methods for calculating marginal costs in education, focusing on the choice of output unit in higher education. Three fundamental techniques for calculating marginal costs are fixed and variable-cost methods, regression approach, and incremental-cost approach. Definitions, examples, and data are provided for each approach, along with literature reviews. Marginal costs are estimated in higher education and other enterprises.”

Nikkeh, N. S. (2022): “The study explores the impact of costing techniques like marginal and absorption costing on Iraqi financial firms' competitive edge. It examines how cost cutting mediates the relationship between these techniques and the institutions' ability to establish a competitive advantage. The findings suggest a positive link between absorption and marginal costing.”

Ekwue, A. O. (2014): “This study reviews the Long-Run Marginal Costing (LRMC) technique, focusing on its latest uses in U.Oman. It examines two approaches for practical networks: calculating the average incremental cost, marginal incremental costs strategies, and the analysis of costs methodology, finding the latter easier to apply and understand.”

Van Erdeweghe (2019) “The study explores cost measures for a combined heat and power plant with zero marginal cost, including new measures like leveled energy cost. Results show traditional pricing is best for low cost scenarios, while exergy costing produces higher temperatures for heat demands. The study also considers geothermal combined systems.”



Ali-Momoh (2022): "The study examined the impact of marginal costing procedures on Nigerian manufacturing industry performance from 2011 to 2020. Results showed that direct material cost (DMC), direct labor cost (DLC), factory overhead cost (FOC), and administrative overhead cost significantly impacted return on capital employed (ROCE), suggesting the need for IFRS Board's inclusion in financial reporting."

Ismail, M. M. (2023): "This article explores the use of marginal analysis in construction projects, highlighting its features and applications. It provides examples of how marginal analysis can optimize project costs and reviews previous research on its application in the construction industry. Marginal analysis is a valuable tool for assessing additional costs and benefits of minor changes in construction processes."

Wang, A. (2020): "This paper presents a scenario-sampling framework for estimating incremental routing costs in a stochastic supply chain network. The framework converges to true value with statistical guarantee as sample size increases. The authors use real-life scenarios from industrial gas distribution to demonstrate the marginal cost estimation framework. They also develop a tailored branch-price-and-cut algorithm for optimal routing problems."

Gramlich, J. (2015): "Firms often factor fixed costs into pricing decisions, despite economic theory suggesting variable costs should be the primary basis. Full-cost pricing (FCP) can help firms find their optimal price, requiring knowledge of equilibrium return and can be applied in static, dynamic, multiple product, and satisfying objectives."

Wilson, S. J. (2022): "A scoping review of existing academic and gray literature on calculating marginal costs of incarceration found a lack of peer-reviewed methods. The review identified three main approaches and their use, concluding that there is a need for more peer-reviewed literature to assist in program evaluation, policy, and cost forecasting in corrections."

Molinos-Senante, M. (2022): "A study assessing the cost efficiency of drinking water treatment plants (DWTPs) and the marginal cost of reducing GHG emissions found that DWTPs have room for cost savings (61.4%). The study also found that environmental variables, such as facility size and raw water source, significantly influence DWTP performance. This provides insights into the water-energy nexus, aiding in informed decisions towards a more sustainable urban water cycle."

Telles, E. (2013): "This paper proposes a new Transmission Tariff Computation (TTC) approach based on the Long Run Marginal Costs (LRMC) method and the min-max optimization technique to address the issue of dispersion and volatility in transmission tariffs. The

modified LRMC method can be used for generators and loads, based on network topology, and is compared to traditional methods."

Stretcher, R. (2017): "Capital budgeting decisions under a non-constant marginal cost of capital (MCC) paradigm often face endogeneity problems. To address this, a net present value (NPV) maximizing methodology is proposed. This method resolves this issue and demonstrates the potential for investment errors and shareholder wealth destruction when commonly used methods or simplifying assumptions are replaced with this optimizing approach."

Konita, N. (2024): "This study investigates the impact of sales forecasting (SF) and inventory forecasting (IF) on net profit (NP) using an exponential smoothing model. The research uses a quantitative approach and purposive sampling for Telkom Indonesia Tbk. The study found a weak correlation between SF and NP, while IF showed a strong correlation. Both SF and IF had a moderate correlation with NP, explaining and predicting NP variance. SF partially had no effect on NP, while IF had a positive and significant effect on NP forecasting."

Van Calster, T. (2020): "This study presents a profit-driven approach to high-level tactical sales forecasts, comparing various techniques for 35 time series using Coca-Cola Company and publicly available datasets. The approach considers the expected profit created during model building and evaluation, combining forecasting accuracy with business expertise. The study also examines the added value of ML techniques, external factors, and seasonal models. Results show simple seasonal time series models consistently outperform other methodologies, suggesting a profit-driven approach may lead to different forecasting models."

Shirvan, A. E. (2023): "This article compares Regression W and Profit W models for small and medium-sized companies using financial statements from 2011-2021. The study uses an inductive and quantitative research method, using systematic elimination sampling to select a statistical sample. The panel model and Eviuse software were used to extract the proposed model from the principal component analysis approach. The results show that the new model is more effective than the RW and PW models, confirming the ability of regression models in financial and profitability strategies for small and medium-sized companies."

Arellano, F. E. (2007): "The percent-of-sales method is a simple method for estimating cost components and profits in income statements. However, it assumes variable costs and constant profit margins, leading to forecast errors. A short equation incorporates initial profit margin, sales growth rate, and fixed cost ratio."



Arellano, F. E. (2007): “The study examines the financial performance and economic significance of a direct profit forecast trading strategy for trading at-the-money straddles using options on foreign currency futures. This strategy uses a linear projection to forecast the profit of engaging in a straddle, eliminating the need for volatility forecasting and option pricing models. The experimental investigation confirms this notion, showing the direct forecasting strategy is more profitable than the conventional two-step method for all currencies analyzed.”

Sallal, F. F. J. (2022): “The study examines the impact of audit committee characteristics (financial experience, independence, size) on profit forecasting accuracy. Results show a positive correlation between committee independence and size, while no significant effect was found on committee financial experience. The study aims to inform Iranian company boards about the effectiveness of audit committees in forecasting profits.”

Anjumani, R. (2023): “This study aimed to develop a profit forecasting model based on behavioral tax of companies listed on the Tehran Stock Exchange. Data was collected through time series, cross-sectional, and various methods. The statistical population included all companies listed on the exchange and investors. Data was collected using modern databases and questionnaires. The study found that behavioral variables like management overconfidence, stock price information efficiency, and emotional bias affect corporate profits. Economic confidence and information reliability also influenced the interaction between behavioral decisions and corporate profits.”

Nafiisa, B. L. (2023): “The study forecasts profit for the next five years from 2022-2026 using a simple linear regression method. Visualizing data using Microsoft Power BI, it reveals that PT Indocement Tungal Prakarsa, Solusi Bangun Indonesia, and PT Semen Indonesia have increased profits, while PT Semen Baturaja, Wijaya Karya Beton, and PT Waskita Beton Precast have suffered losses.”

Gontarek, A. (2006): “The article discusses the use of simulation techniques to extrapolate long-term financial variables to support savings choices, particularly in uncertain conditions. It uses a stochastic model with random stimulants, focusing on future savings levels after years of secure capital investment. The article also discusses the theoretical reflections and conclusions arising from the analysis, listing both positive and negative effects of using simulation techniques in investment decision rationalization.”

Taghipourian, Y. (2014): “The study investigates the impact of ethical decision-making on profit predictability and forecast accuracy in accountants. Results show that higher ethical decision-making leads to increased profit predictability and accuracy. However, large-sized

companies face more political costs. Accountants often adopt methods that manipulate economic units, ignoring ethical and human values. Creditor-imposed conditions in long-term loan contracts can override ethical values in accounting and financial reporting processes.”

Qianyu, Z. (2021): “This paper uses artificial intelligence to improve accounting information by using Long Short-Term Memory (LSTM) neural network model and financial statement information to forecast company profits. The LSTM model achieves an average accuracy of 88.6%, 13.52% higher than analysts' predictions, and shows no thick tail phenomenon, highlighting its practical significance in financial forecasting.”

Aziz, R. A. (2009): “The paper presents a mathematical model for forecast accuracy and the cost effects of imperfect forecasts, a common oversight in management. The model uses probability distribution against point forecasts, cost function, and Bayesian methodology for sustainable performance. It applies to service and manufacturing industries and considers feedback issues. The study highlights the benefits of simple modeling for business organizations, influencing performance and sustainability. This innovative approach offers a new flavor in operational frameworks for profit forecasting models.”

Meeks, G. (1998): “Financial reporting aids in forecasting a company's income, but many companies don't publish due to familiarity with forecast data and the uncertainty of forecasts being contingent on future economic conditions. This paper explores these challenges and proposes a partial solution”.

### III. METHODOLOGY

#### 1. Research Methodology

This study employs a quantitative approach to analyze the financial performance of TATA Steel Ltd. from FY2020 to FY2024 and project future trends up to FY2029, utilizing Compound Annual Growth Rate (CAGR) and marginal costing techniques. Historical sales data from FY2020 to FY2024 is collected from the company's financial statements and industry reports. The CAGR is calculated to determine the average annual growth rate of sales and EBIT over this period, providing a basis for forecasting future performance. The formula used for CAGR is:

$$\text{CAGR} = (\text{Ending Value} / \text{Beginning Value})^{\frac{1}{n}} - 1$$

Where  $n$  is the number of years. This method assumes a constant growth rate over the period, which is useful for long-term projections but may not capture short-term fluctuations.



## 2. Research Design

The research adopts an analytical and descriptive design that incorporates quantitative methods. The study analyzes historical financial performance, evaluates the impact of variable and fixed costs on profitability, and forecasts future profit scenarios using marginal costing principles. Key variables such as contribution margin, profit-volume ratio, and break-even point are examined to derive insights into profit trends.

In the context of profit forecasting, the study applies least-case scenarios to predict outcomes under conservative assumptions. This approach ensures that businesses can prepare for uncertainties and make informed decisions that minimize financial risk.

## 3. Study Area

The primary focus of this research is Tata Steel Ltd, a leading player in the steel industry. The company's cost structures, sales trends, and financial strategies provide a relevant context for exploring the effectiveness of marginal costing in profit forecasting. Insights from this case study can be generalized to other industries with similar cost dynamics.

## 4. Source of Data

Most of the resources has done with secondary information from the financial statements of the Tata Steel Ltd. Financial information availed from annual reports of Tata Steel Ltd from 2020 to 2024.

## 5. Theoretical Framework

The research is grounded in cost accounting and managerial decision-making theories, emphasizing the role of marginal costing in strategic planning. The contingency theory of management accounting also informs the framework, advocating for flexible and context-specific cost management practices. This theory aligns with the study's objective of tailoring marginal costing techniques to enhance profit forecasting accuracy.

### Contribution Analysis

Contribution refers to the revenue remaining after covering all variable costs, which is then used to offset fixed costs and generate profit. In profit forecasting, understanding the contribution margin is essential for predicting how changes in sales volume affect profitability. The formula used is:

$$\text{Contribution} = \text{Sales} - \text{Variable Costs}$$

This analysis helps determine the break-even point and guides pricing strategies to achieve desired profit levels.

### Profit-Volume Ratio (P/V Ratio)

The Profit-Volume Ratio (P/V ratio) indicates the relationship between contribution margin and sales. It is a critical metric in profit forecasting, as it shows the

proportion of each dollar of sales that contributes to covering fixed costs and profit. The formula is:

$$\text{Profit-Volume Ratio} = (\text{Contribution}/\text{Sales}) \times 100$$

A higher P/V ratio suggests greater profitability potential, making it a valuable tool for assessing the impact of sales changes on profits.

### Break-Even Point (BEP)

The Break-Even Point represents the sales level at which total revenue equals total costs, resulting in neither profit nor loss. It is a crucial element in profit forecasting, helping businesses identify the minimum sales volume required to achieve profitability. The BEP is calculated using:

$$\text{BEP} = \text{Fixed Costs}/\text{P/V Ratio}$$

### Margin of Safety

The Margin of Safety (MOS) measures the extent to which actual or projected sales exceed the break-even point. It provides a buffer that protects businesses from losses in case of sales fluctuations. The formula is:

$$\text{MOS} = \text{Actual Sales} - \text{BEP}$$

### Profit Planning

Profit planning involves setting financial goals and developing strategies to achieve them. Marginal costing aids in this process by highlighting how changes in cost structures and sales volumes impact profitability. The profit planning process includes:

- Estimating desired profit levels.
- Calculating the required sales to achieve target profits using the formula:  $\text{Required Sales} = (\text{Fixed Costs} + \text{Desired Profit}) / \text{P/V Ratio}$
- Developing action plans to optimize costs and maximize revenue.

## V. DATA ANALYSIS

### 1. Introduction: 4.0

The data from TATA Steel Ltd.'s income statements (2020–2024) provides insights into key metrics like sales, variable and fixed costs, and operating profit. This data reveals the company's operational efficiency and cost structure trends, offering a clear view of its profitability and financial health. Using this historical data, projections for 2025–2029 can be developed with accuracy. Applying CAGR to sales and costs shows continued growth in both sales and EBIT. The rising contribution margin signals sustained operating leverage, aiding profitability. These projections support strategic decision-making for growth and resource allocation.

### Total Sales (or Revenue from Operations - Net):

- Mar 2024: ₹1,40,987.43 Cr
- Mar 2023: ₹1,42,913.32 Cr
- Mar 2022: ₹1,29,021.35 Cr
- Mar 2021: ₹84,132.92 Cr



- Mar 2020: ₹60,435.97 Cr

**2. Variable Costs**

Year	Material Consumed	Purchases	Inventory Change	Mfg/Operating Exp.	Variable Cost (₹ Cr)
2020	17,407.03	1,563.10	-564.4	13,855.41	32,261.14
2021	20,757.04	1,688.84	2,176.56	14,802.38	39,424.82
2022	35,256.98	4,089.03	-1,820.87	17,645.38	55,170.52
2023	59,948.72	7,424.21	-1,329.69	22,522.65	88,565.89
2024	48,018.48	9,702.30	369.85	22,721.33	80,811.96

**3. Fixed Costs**

Year	Employee Benefits	Admin/Selling	Other Exp.	Depreciation	Finance Cost	Fixed Cost (₹ Cr)
2020	5,036.62	7,024.02	1,252.62	3,920.12	3,031.01	20,264.39
2021	5,741.94	9,251.10	2,591.35	5,409.26	4,541.02	27,594.67
2022	6,365.80	14,791.02	1,564.16	5,463.69	2,792.08	30,976.75
2023	7,220.74	16,513.17	2,342.84	5,956.32	3,974.63	36,007.70
2024	7,402.31	17,192.88	5,746.96	5,969.79	4,178.61	40,490.55

**Sales Analysis Forecasting: Table: 4.1**

Years	Sales Forecasting Analysis (CAGR)	
	Sales (Cr. Rs)	% Change/CAGR
Mar-2020	60,435.97	
Mar-2021	84,132.92	39
Mar-2022	129,021.35	53
Mar-2023	142,913.32	11
Mar-2024	140,987.43	-1
Mar-2025	174,232.27	23.58
Mar-2026	215,316.23	23.58
Mar-2027	266,087.80	23.58
Mar-2028	328,831.30	23.58
Mar-2029	406,369.72	23.58

**Graphical Representation: 4.1**



**Interpretation: 4.1**

The sales data of TATA Steel Ltd. from FY2020 to FY2024 demonstrates a fluctuating yet overall upward trend, with notable spikes in FY2021 (39% growth) and FY2022 (53% growth), followed by moderate performance in FY2023 (11%) and a slight dip in FY2024 (-1%). These variations reflect both market dynamics and internal operational influences. For strategic business planning and informed decision-making, sales forecasting becomes essential, especially for capital allocation, capacity planning, and long-term investment strategies.

Using a Compound Annual Growth Rate (CAGR) approach, the sales from FY2025 to FY2029 have been projected based on a steady CAGR of 23.58%, a rate derived from past performance and assumed to be realistic given the company’s historical growth trajectory and industry outlook. The forecast shows a strong and consistent growth path—reaching ₹406,369.72 Cr by

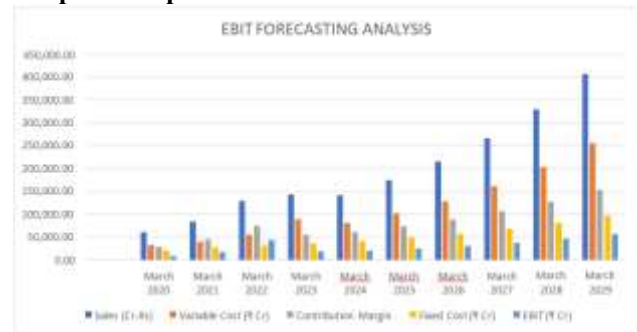
FY2029— which suggests significant revenue expansion opportunities.

This financial modeling technique enables management to anticipate future revenues, set achievable targets, and align strategic initiatives with expected market performance. It also supports scenario planning and sensitivity analysis, crucial for risk mitigation and resource optimization in a volatile business environment. Ultimately, leveraging CAGR-based forecasting aids TATA Steel in crafting a data-driven roadmap for sustainable growth and competitiveness in the coming years.

**EBIT Forecasting Analysis through Marginal Costing Equation: Table: 4.2**

Years	MARGINAL COSTING EQUATION- EBIT FORECASTING ANALYSIS USING CAGR METHOD				
	Sales (Cr. Rs)	Variable Cost (₹ Cr)	Contribution Margin (₹ Cr)	Fixed Cost (₹ Cr)	EBIT (₹ Cr)
Mar-2020	60,435.97	32,261.14	28,174.83	20,264.39	7,910.44
Mar-2021	84,132.92	39,424.82	44,708.10	27,594.67	17,113.43
Mar-2022	129,021.35	55,170.52	73,850.83	30,976.75	42,874.08
Mar-2023	142,913.32	88,565.89	54,347.43	36,007.70	18,339.73
Mar-2024	140,987.43	80,811.96	60,175.47	40,490.55	19,684.92
Mar-2025	174,232.26	101,603.44	72,570.82	48,143.26	24,427.56
Mar-2026	215,316.23	127,890.09	87,426.14	57,242.34	30,183.80
Mar-2027	266,087.80	160,585.74	105,202.06	68,051.14	37,140.92
Mar-2028	328,831.30	202,394.26	126,437.04	80,924.69	45,512.35
Mar-2029	406,369.72	254,611.98	151,757.74	96,219.40	55,538.34

**Graphical Representation: 4.2**



**Interpretation: 4.2**

The EBIT Forecasting Analysis using the Marginal Costing Equation and CAGR method provides a clear numerical roadmap for profit planning, future forecasting, and managerial decision-making. By applying the marginal costing equation, where EBIT = Contribution Margin – Fixed Costs, the analysis pinpoints how effectively the business converts revenues into operating profits.

Between Mar-2020 and Mar-2024, sales grew from ₹60,435.97 Cr to ₹140,987.43 Cr, showing a CAGR of approximately 23.50%. Over the same period, EBIT rose from ₹7,910.44 Cr to ₹19,684.92 Cr, delivering a CAGR of nearly 26.71%—a sign of strong operating leverage, where profits grow faster than revenues once fixed costs are absorbed.

Using this CAGR, the forecast from 2025 to 2029 projects:



- Sales to reach ₹406,369.72 Cr
- EBIT to grow to ₹55,538.28 Cr, nearly 7 times the 2020 level
- Contribution Margin to rise to ₹151,757.74 Cr, despite variable and fixed cost increases

This consistent EBIT growth reflects effective cost control and scalability. For profit planning, it means management can confidently invest in capacity expansion, knowing that fixed costs (₹96,219.46 Cr in 2029) are being well-leveraged.

From a forecasting and decision-making perspective, the CAGR-based model allows the company to:

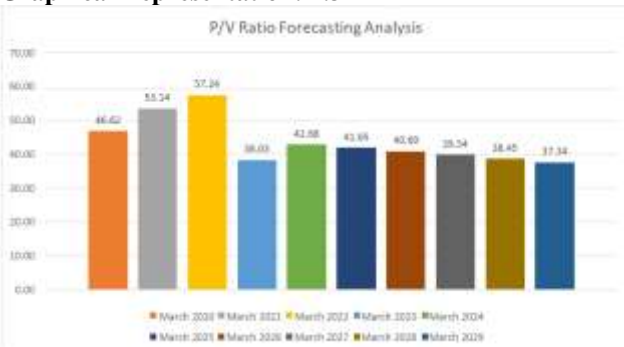
- Project earnings under consistent growth assumptions
- Prepare capital budgeting and resource allocation plans
- Perform sensitivity analysis around costs, volumes, and margins

In conclusion, this EBIT analysis empowers management with quantified insights, helping drive data-backed decisions and build a financially sustainable growth strategy.

**P/V Ratio Forecasting Analysis: Table: 4.3**

P/V Ratio Forecasting Analysis			
Years	Sales (Cr.₹s)	Contribution Margin (₹ Cr)	P/V Ratio %
March 2020	60,435.97	28,174.83	46.62
March 2021	84,132.92	44,708.10	53.14
March 2022	129,021.35	73,850.83	57.24
March 2023	142,913.52	54,387.43	38.03
March 2024	140,987.43	60,175.47	42.68
March 2025	174,252.26	72,570.82	41.65
March 2026	215,316.23	87,426.14	40.60
March 2027	266,087.80	105,202.06	39.54
March 2028	328,831.30	126,437.04	38.45
March 2029	406,369.72	151,757.74	37.34

**Graphical Representation: 4.3**



**Interpretation: 4.3**

The Profit/Volume (P/V) ratio, which reflects the percentage of contribution margin to sales, is a critical metric for guiding a business's future planning and decision-making. TATA Steel's P/V ratio fluctuated over the years, peaking at 57.24% in March 2022 and gradually declining to a projected 37.34% by March 2029. This downward trend suggests that while sales are increasing, the rate at which contribution is being generated per rupee

of sales is decreasing, potentially due to rising variable costs or pricing pressures.

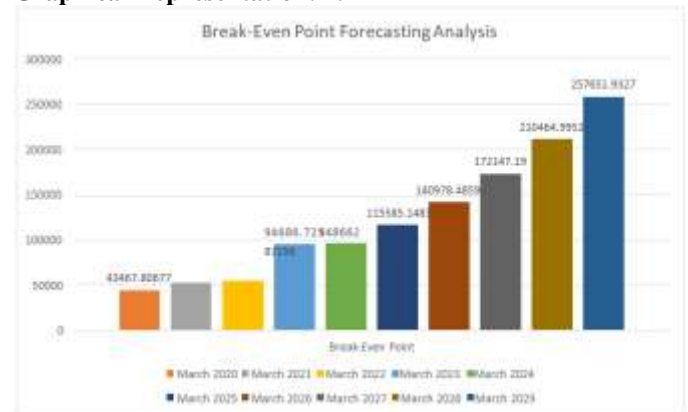
Understanding the P/V ratio allows businesses to assess how efficiently sales translate into profits, which is crucial for profit planning, break-even analysis, and evaluating the impact of cost changes or sales volume adjustments. For instance, a higher P/V ratio provides greater flexibility to absorb fixed costs and withstand market fluctuations, while a lower ratio signals the need to re-evaluate pricing strategies, cost controls, or product mix.

By monitoring P/V ratio trends, TATA Steel can make more informed strategic decisions, such as optimizing operations, adjusting sales targets, or improving cost structures, to enhance profitability and sustain long-term growth.

**Break-Even Point Forecasting Analysis Table: 4.4**

Break-Even Point Forecasting Analysis			
Years	Fixed Cost	P/V Ratio %	Break-Even Point
March 2020	20,264.39	46.62	43,467.81
March 2021	27,594.67	53.14	51,928.40
March 2022	30,976.75	57.24	54,118.04
March 2023	36,007.70	38.03	94,686.72
March 2024	40,490.55	42.68	94,866.87
March 2025	48,143.26	41.65	115,585.15
March 2026	57,242.54	40.60	140,978.49
March 2027	68,061.14	39.54	172,147.19
March 2028	80,924.69	38.45	210,465.00
March 2029	96,219.46	37.34	257,651.93

**Graphical Representation: 4.4**



**Interpretation: 4.4**

From 2020 to 2024, the company's fixed costs nearly doubled, growing from \$20,264.39 to \$40,490.55 — a compound annual growth rate (CAGR) of approximately 18.8%. This significant increase indicates either an expansion of operations, investments in infrastructure, or rising overhead. During the same period, the P/V (profit-volume) ratio, which measures contribution margin, initially improved from 46.62% in 2020 to a peak of 57.24% in 2022, before declining sharply to 38.03% in 2023 and modestly rebounding to 42.68% in 2024. This volatility suggests that while early cost structures were efficient, the company began experiencing pricing pressure



or increasing variable costs from 2023 onward. Consequently, the break-even point more than doubled from \$43,467.81 in 2020 to \$94,866.87 in 2024, indicating a shrinking profit cushion and a higher revenue threshold just to avoid losses. For profit planning, this historical trend shows a shift from a stable, profitable foundation to a more fragile position by 2024, with rising costs and tighter margins.

Projecting forward from 2025 to 2029 using the CAGR method, fixed costs are expected to rise at a rate of 18.3% annually, reaching \$96,219.46 by 2029. At the same time, the P/V ratio is forecasted to steadily decline to 37.34%, reflecting continued margin compression. These combined trends result in a sharp rise in the break-even point, which is projected to reach \$257,651.93 by 2029, with a CAGR of approximately 22.2% from 2025. This exponential growth in break-even sales indicates mounting financial pressure: the company must generate significantly more revenue each year just to cover its costs, let alone make a profit. For strategic profit planning, this underscores the urgency of improving cost efficiency and preserving or enhancing contribution margins, as sales growth alone may not be sufficient to maintain profitability under current trends.

From a risk analysis standpoint, the data reveals a business increasingly exposed to operating leverage risks. As fixed costs dominate the cost structure, any underperformance in sales directly threatens the bottom line. Simultaneously, a falling P/V ratio reduces per-unit profitability, narrowing the margin for error. These trends elevate the company’s vulnerability to market downturns, demand shocks, or supply chain disruptions. Without intervention, the company may face liquidity pressures or declining returns, especially if market conditions become more competitive or volatile. Therefore, financial resilience will depend on scenario planning, cost containment strategies, and enhancing operational flexibility.

The broader business situation suggests a company in an expansionary or transformational phase, likely investing heavily to scale operations or enter new markets. However, the rapid cost escalation without corresponding improvements in efficiency poses long-term sustainability concerns. If the break-even point continues to rise at this pace, the firm may find itself in a precarious position where even moderate shortfalls in revenue lead to operational losses. Going forward, the business must realign its growth strategies with tighter financial discipline — balancing investment with operational control, pricing strategy, and margin management — to ensure that growth translates into sustainable profitability.

**Margin of Safety Forecasting Analysis Table: 4.5**

Margin of Safety Forecasting Analysis			
Years	Sales (Cr.Rs)	Break Even Sales	Margin of Safety
March 2020	60,435.97	43,467.81	16,968.16
March 2021	84,132.92	51,928.40	32,204.52
March 2022	129,021.35	54,118.04	74,903.31
March 2023	142,913.32	94,686.72	48,226.60
March 2024	140,987.43	94,866.87	46,120.56
March 2025	174,232.26	115,585.15	58,647.11
March 2026	215,316.23	140,978.49	74,337.74
March 2027	266,087.80	172,147.19	93,940.61
March 2028	328,831.30	210,465.00	118,366.30
March 2029	406,369.72	257,651.93	148,717.79

**Graphical Representation: 4.5**



**Interpretation: 4.5**

The Margin of Safety (MoS) Forecasting Analysis provides key insights into the company’s financial buffer over time, helping inform business planning and strategic decision-making. From 2020 to 2024, the MoS increased from ₹16,968.16 Cr to ₹46,120.56 Cr, reflecting steady growth in actual sales over break-even levels. This positive margin indicated a relatively healthy operational cushion, even during periods like 2023 and 2024, when break-even sales rose sharply due to rising fixed costs and declining P/V ratios. Despite the pressure on margins, the business maintained enough excess sales to remain profitable.

Looking forward from 2025 to 2029, MoS is projected to grow significantly—from ₹58,647.11 Cr in 2025 to ₹148,717.79 Cr in 2029—at a compound annual growth rate of over 25%. This suggests that, while break-even points continue to rise, forecasted sales are expected to grow at a faster pace, improving the company's risk buffer. Strategically, this growing MoS enhances decision-making flexibility: it allows management to take calculated risks, invest in innovation, or expand operations with less immediate threat to financial stability.

From a business planning perspective, this upward MoS trend reflects a shift toward stronger financial resilience and improved forecasting confidence. However, it also assumes that revenue growth targets will be met, meaning that ongoing performance monitoring, demand forecasting, and sales execution will be critical. Decision-makers should interpret this expanding MoS as both an



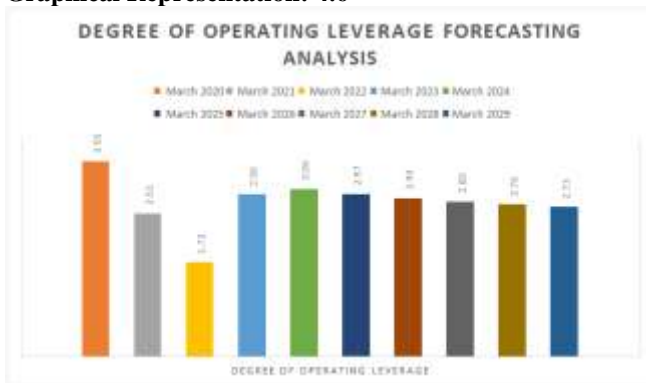
opportunity and a responsibility—leveraging it to fuel growth, while ensuring that cost discipline and market responsiveness remain strong to sustain this financial advantage.

falters. Maintaining operational efficiency and carefully managing cost structures will be essential to sustain the long-term benefits of a favorable DOL trajectory.

**Operating Leverage Forecasting Analysis Table: 4.6**

Operating Leverage Degree Forecasting Analysis			
Years	Contribution Margin	EBIT (₹ Cr)	Degree of Operating Leverage
March 2020	28,174.83	7,910.44	3.56
March 2021	44,708.10	17,113.43	2.61
March 2022	73,850.83	42,874.08	1.72
March 2023	54,347.43	18,339.73	2.96
March 2024	60,175.47	19,684.92	3.06
March 2025	72,570.82	24,427.56	2.97
March 2026	87,426.14	30,183.80	2.90
March 2027	105,202.06	37,140.92	2.83
March 2028	126,437.04	45,512.35	2.78
March 2029	151,757.74	55,538.28	2.73

**Graphical Representation: 4.6**



**Interpretation: 4.6**

The Degree of Operating Leverage (DOL) is a critical financial metric that measures how sensitive a company's operating income (EBIT) is to changes in sales, reflecting the impact of fixed costs on profitability. From 2020 to 2022, the DOL declined from 3.56 to 1.72, indicating reduced financial risk and greater efficiency as EBIT increased faster than contribution margin—signaling that earlier investments or expansions were paying off. However, in 2023 and 2024, DOL spiked back up to 2.96 and 3.06, driven by a drop in contribution margin and slower EBIT growth, suggesting that the company again became more sensitive to fluctuations in revenue, possibly due to rising fixed costs or operational inefficiencies.

Looking ahead from 2025 to 2029, the DOL is forecasted to gradually decline from 2.97 to 2.73, suggesting a more stable operating structure with improved scalability. This downward trend implies that while fixed costs remain high, EBIT is expected to grow consistently alongside contribution margin, reducing the volatility of earnings in response to sales changes. Strategically, this trend supports a more predictable and resilient profit model, enhancing planning confidence and allowing the business to better absorb market fluctuations. However, decision-makers must remain cautious: operating leverage, while decreasing, still implies risk if revenue growth

**VI. FINDING AND CONCLUSION**

The sales data of TATA Steel Ltd. from FY2020 to FY2024 shows a generally upward trend with sharp growth in FY2021 and FY2022, followed by moderate growth and a slight decline in FY2024. To support strategic planning and investment decisions, future sales from FY2025 to FY2029 have been projected using a CAGR of 23.58%, reflecting historical trends and industry outlook. This consistent growth forecast—reaching ₹406,369.72 Cr by FY2029—provides a solid foundation for financial modeling, helping the company plan effectively, manage risks, and drive long-term sustainable growth.

The EBIT Forecasting Analysis using the Marginal Costing Equation and CAGR method offers a clear, data-driven approach to profit planning, future forecasting, and strategic decision-making. From 2020 to 2024, sales and EBIT grew at CAGRs of 23.50% and 26.71% respectively, reflecting strong operating leverage. Forecasts for 2029 project sales at ₹406,369.72 Cr, EBIT at ₹55,538.28 Cr, and contribution margin at ₹151,757.74 Cr, despite rising costs. This growth highlights cost efficiency and scalability, enabling better capital planning, sensitivity analysis, and long-term financial strategy development through consistent, realistic projections.

The P/V ratio, showing the contribution margin as a percentage of sales, is key for-profit planning and strategic decision-making. TATA Steel's P/V ratio peaked at 57.24% in 2022 but is projected to decline to 37.34% by 2029, indicating reduced profit efficiency per unit of sales. This trend highlights the impact of rising variable costs or pricing pressure. Monitoring the P/V ratio helps assess profitability, plan for break-even points, and guide pricing or cost control strategies, enabling TATA Steel to make informed decisions to sustain growth and improve operational efficiency.

From 2020 to 2024, the company's fixed costs nearly doubled while profit margins tightened, leading to a sharp rise in the break-even point—a trend projected to continue through 2029 based on CAGR forecasts. With fixed costs and break-even sales expected to grow over 18% and 22% annually, respectively, and contribution margins declining, decision-making must now prioritize cost control, margin improvement, and scenario planning. These financial signals highlight the urgent need for leadership to reassess growth strategies and ensure future investments are aligned with sustainable profitability under rising financial pressure.

The Margin of Safety (MoS) Forecasting Analysis highlights a strengthening financial buffer, with MoS growing from ₹16,968.16 Cr in 2020 to a projected



₹148,717.79 Cr by 2029, indicating that sales are increasingly outpacing break-even levels despite rising fixed costs. This trend suggests improved financial resilience and supports greater flexibility in business planning and strategic decision-making. While it presents an opportunity for calculated growth and investment, it also demands continued focus on meeting revenue targets, managing costs, and maintaining market responsiveness to sustain and capitalize on this expanding margin.

The Degree of Operating Leverage (DOL) reflects how sensitive EBIT is to sales changes, with a decline from 3.56 in 2020 to 1.72 in 2022 indicating improved efficiency and lower financial risk. However, the rise in DOL to over 3.0 in 2023–2024 points to renewed sensitivity due to margin pressure and rising fixed costs. Forecasts for 2025–2029 show a gradual decline in DOL, suggesting a more stable and scalable cost structure. This supports better financial planning, but continued focus on revenue growth and cost control is vital to mitigate operating risk and sustain long-term profitability.

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