Asset Utilisation Efficiency And Inter-Segment Performance Differences In The Indian Automobile Industry

[1]Dr.V.Gurumoorthi, [2] Dr.M.Thamarai Selvi

[1] Assistant Professor, [2] Assistant Professor,

[1]Department of Commerce, [2] Department of Corporate Secretaryship

[1]The Government Arts and Science College, Thittamalai, Nambiyur, Erode district, Tamil Nadu.

[2] Nandha Arts and Science College, Erode, Tamil Nadu, India.

Abstract

The Indian automobile sector plays a pivotal role in the country's manufacturing output, employment generation and technological progress. However, the sector has experienced significant structural and operational changes during the post-pandemic period, influenced by supply chain disruptions, rising input costs, regulatory transitions, and the progressive shift toward electric mobility. This study evaluates the financial efficiency of selected automobile companies listed on the BSE across three major segments: commercial vehicles, passenger cars & multi-utility vehicles, and two & three wheelers. The analysis covers a five-year period from 2020–21 to 2024–25, employing key asset utilisation ratios including Total Assets Turnover, Fixed Assets Turnover, Working Capital Turnover, Inventory Turnover and Debtors Turnover. Descriptive statistics (Mean, Standard Deviation, and Coefficient of Variation), Compound Annual Growth Rate (CAGR) and ANOVA are applied to assess performance variations between companies and across years.

The results reveal significant inter-company differences in Total Assets Turnover, Fixed Assets Turnover, Inventory Turnover and Debtors Turnover, indicating varied strategic approaches to asset use, production scale, and credit policies. However, Working Capital Turnover exhibited no significant differences across companies or time periods, suggesting sector-wide stabilization in cash conversion cycles. Passenger car manufacturers demonstrated the highest efficiency in asset utilisation, while two & three-wheeler firms showed stronger productivity in fixed asset use. The study concludes with targeted managerial recommendations for improving capital productivity, working capital governance, and operational efficiency.

Keywords: Automobile Industry; Financial Efficiency; Asset Utilisation; Working Capital; ANOVA; India.

1. Introduction

The automobile industry is one of the most dynamic and strategically significant sectors in the Indian economy. It contributes substantially to industrial output, supply chain linkages, and export competitiveness, while supporting millions of direct and indirect jobs. Over the past decade, the sector has undergone rapid technological advancement, increasing automation, and a shift in consumer preferences driven by affordability, fuel efficiency, and sustainability. However, the years 2021–2025 represent a distinctive period for the industry, marked by post-pandemic recovery, volatile input markets, logistics constraints, and the acceleration of electrification and digital manufacturing ecosystems.

Financial efficiency is a crucial indicator of a firm's operational health and strategic effectiveness. In manufacturing industries such as automobiles, where high fixed capital investment and complex supply chain coordination are involved, asset utilisation ratios provide meaningful insight into how effectively companies convert investments into revenue. Ratios such as Total Assets Turnover and Fixed Assets Turnover reflect the efficiency of capital deployment, whereas Working Capital, Inventory, and Debtors Turnover ratios indicate the speed and discipline of short-term financial and operating cycles.

The Indian automobile sector consists of heterogeneous sub-segments—commercial vehicles, passenger cars, and two & three wheelers—each characterized by different market structures, production technologies, and demand patterns. Studying the comparative efficiency among these segments supports both financial evaluation and policy analysis. Moreover, the sector's renewed focus on electric vehicle production, supply chain localization, and value engineering has increased the strategic importance of efficiency benchmarking.

Given this context, the present study evaluates financial efficiency through asset utilisation ratios across selected listed automobile companies. The findings aim to support strategic decision-making for corporate managers, investors, policymakers, and researchers concerned with capital productivity and operational performance.

2. Objectives

- To evaluate the financial efficiency of selected automobile companies using key asset utilisation ratios such as Total Assets Turnover, Fixed Assets Turnover, Working Capital Turnover, Inventory Turnover and Debtors Turnover.
- To compare and analyze efficiency performance across three major automobile industry segments: Commercial Vehicles, Passenger Cars & MUVs, and Two/Three Wheelers.
- To assess the degree of variation in efficiency between companies and across the study period using descriptive statistics and ANOVA.
- To examine the stability of operational and working capital practices through Coefficient of Variation and trend measures (CAGR).
- To provide managerial insights and strategic suggestions for improving capital productivity and operational efficiency in the sector.

3. Research Methodology

3.1 Research Design

The present study adopts a descriptive and analytical research design to examine the financial efficiency of selected automobile companies in India. The analysis focuses on asset utilisation performance and operational efficiency using established financial ratio metrics, supported by statistical testing to identify the significance and magnitude of variations across firms and time.

3.2 Period of the Study

The study covers a period of five financial years, from 2020–21 to 2024–25. This time frame was selected as it reflects the post-pandemic restructuring phase of the automobile industry, marked by supply chain realignment, cost pressures, and strategic transformation including EV adoption and production modernization.

4. Scope of the Study

The present study focuses on selected automobile companies listed on the Bombay Stock Exchange (BSE), representing three major industry segments: Commercial Vehicles (such as Tata Motors, Ashok Leyland, and Eicher Motors), Passenger Cars and Multi-Utility Vehicles (including Maruti Suzuki, Mahindra & Mahindra, and Hyundai Motor), and Two/Three Wheeler manufacturers (such as Bajaj Auto, Hero MotoCorp, and TVS Motor). The scope of the study is confined to evaluating the financial efficiency of these firms based on asset utilisation ratios. The analysis is primarily based on secondary data sourced from company annual reports, stock exchange disclosures, CMIE/Capitaline databases, and other published financial statements. The findings derived from the study are applicable to listed firms and may not be fully generalizable to small-scale or unlisted automobile manufacturers

5. Limitations of the Study

The study is based on secondary financial data, and hence variations in disclosure practices among companies may affect the comparability of results. Additionally, working capital components are subject to short-term fluctuations, which may not always capture the firms' long-term operational strategies. In cases where detailed breakdowns were not available, Cost of Goods Sold (COGS) and credit sales figures were standardized to maintain consistency across firms. The study also does not separately account for external macroeconomic influences such as semiconductor shortages, interest rate movements, or export market variations, which may have impacted company performance during the study period. Moreover, the analysis includes only selected listed automobile companies, and therefore, the findings may not be generalizable to the entire Indian automobile industry, especially small-scale or unlisted manufacturers.

6. Result and Analysis:

6.1 Statistical Analysis of Efficiency Differences

To examine whether the differences in financial efficiency among the selected automobile companies are statistically meaningful, a one-way Analysis of Variance (ANOVA) was conducted for each of the asset utilisation ratios. The ANOVA compares the mean ratio values across companies as well as across the five-year study period to determine whether the observed variations are due to random fluctuations or reflect systematic differences in operational and capital management practices. The results provide insight into whether efficiency levels are company-specific or industry-driven, and whether they have changed significantly over time. The table below presents the F-ratios and corresponding decisions regarding the null hypotheses for both inter-company and inter-year comparisons.

Table 1: ANOVA Summary for Asset Utilisation Ratios

S.No	Asset Utilisation Ratio	F-Ratio (Between Companies)	Decision (H_0)	F-Ratio (Between Years)	Decision (H_0)
1	Total Assets Turnover Ratio	24.56	Rejected	1.70	Accepted
2	Fixed Assets Turnover Ratio	60.86	Rejected	1.05	Accepted
3	Working Capital Turnover Ratio	0.824	Accepted	1.37	Accepted
4	Inventory Turnover Ratio	145.34	Rejected	1.78	Accepted

S.No	Asset Utilisation Ratio	F-Ratio (Between Companies)	Decision (H_0)	F-Ratio (Between Years)	Decision (H_0)
5	Debtors Turnover Ratio	17.59	Rejected	1.12	Accepted

Interpretation

The ANOVA results show that there are statistically significant differences between companies in four out of five efficiency ratios: Total Assets Turnover, Fixed Assets Turnover, Inventory Turnover, and Debtors Turnover. This indicates that the level of efficiency varies across companies, reflecting differences in production capacity utilisation, inventory management policy, credit terms, and operational strategy.

However, for the Working Capital Turnover Ratio, the null hypothesis is accepted, showing no significant difference between companies. This suggests that most firms in the sector follow similar working capital and cash management practices, possibly due to standardised supply chain credit terms and vendor financing norms common across the industry.

Across the five-year period, the F-ratios for all five financial efficiency indicators show no significant difference over time, meaning year-to-year variations are not statistically significant. This implies that efficiency patterns remained relatively stable during the study period, likely because post-pandemic recovery strategies were implemented uniformly industry-wide.

6.2 Sector-wise Financial Efficiency Metrics Ratio-wise Performance

To compare the financial efficiency of firms across different segments of the Indian automobile industry, the key asset utilisation ratios were computed and summarized for the three broad categories of companies, namely Commercial Vehicles, Passenger Cars & Multi-Utility Vehicles, and Two/Three Wheelers. The sectoral averages for the five-year period from 2021 to 2025 were derived using mean values, while variability was assessed using the Coefficient of Variation (CV), and efficiency trends over time were evaluated using Compound Annual Growth Rate (CAGR). To further examine statistical significance, t-values were also computed for each ratio. The consolidated results presented in the following tables provide a sector-wise performance comparison, highlighting differences in asset utilisation, working capital management, inventory efficiency, and debtor turnover across the three segments. These tables serve as the basis for analyzing operational strengths and efficiency trends within the Indian automobile sector.

Table 2: Sector-wise Financial Efficiency Metrics

6.2.2 Total Assets Turnover Ratio

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
Mean	2.30	2.45	2.05	2.35
Coefficient of Variation (CV %)	16.0	12.5	11.0	11.8
CAGR (%)	2.4	3.1	1.8	2.6
t-Value	0.88	1.15	0.72	0.94

6.2.3. Fixed Assets Turnover Ratio

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
Mean	3.50	2.40	7.60	3.10
Coefficient of Variation (CV %)	24.0	12.0	10.5	14.8
CAGR (%)	2.1	3.8	2.9	2.8

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
t-Value	0.82	0.89	-3.10	0.98

6.2.4. Working Capital Turnover Ratio

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
Mean	5.50	10.80	-2.10	9.90
Coefficient of Variation (CV %)	210.0	260.0	-60.0	240.0
CAGR (%)	-3.5	5.2	2.0	3.1
t-Value	-0.70	1.20	0.40	0.55

6.2.5 Inventory Turnover Ratio

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
Mean	6.80	8.20	9.70	7.90
Coefficient of Variation (CV %)	12.8	12.2	6.0	12.4
CAGR (%)	2.0	3.4	2.6	2.6
t-Value	0.82	2.10	3.60	0.11

6.2.6 Debtors Turnover Ratio

Metric	Commercial Vehicles	Passenger Cars & MUVs	Two/Three Wheelers	Industry Average
Mean	36.00	24.50	25.20	32.40
Coefficient of Variation (CV %)	45.0	16.0	60.0	33.0
CAGR (%)	1.5	2.7	2.1	2.1
t-Value	0.92	-0.44	-2.40	0.66

Interpretation

6.2.2 Total Assets Turnover Ratio

The mean Total Assets Turnover Ratio is highest in the Passenger Cars & MUVs segment (2.45), followed by Commercial Vehicles (2.30) and Two/Three Wheelers (2.05). This indicates that passenger car manufacturers convert their asset base into sales more efficiently than the other two segments. The Coefficient of Variation (CV) values show that Two/Three Wheeler companies (CV = 11.0%) maintain the most consistent performance, whereas Commercial Vehicle firms show comparatively higher fluctuation (CV = 16.0%). The t-values (all < 2) confirm that the differences are not statistically strong at the industry level, although ANOVA already found significant variation between firms, meaning differences are company-specific rather than sector-wide.

6.2.3 Fixed Assets Turnover Ratio

Two/Three Wheeler companies show a substantially higher mean value (7.60) compared to Passenger Cars (2.40) and Commercial Vehicles (3.50). This reflects higher production efficiency and better utilization of plant and machinery in the two-wheeler segment. The lowest CV (10.5%) in this segment also confirms stable performance. The negative t-value for Two/Three Wheelers (-3.10) suggests a structural advantage rather than random variation, supporting the earlier ANOVA rejection of H_0, indicating strong inter-company differences in fixed asset efficiency.

6.2.4 Working Capital Turnover Ratio

Passenger Cars & MUVs exhibit a high mean working capital turnover (10.80), indicating fast conversion of working capital into revenue, supported by efficient inventory and receivables cycles. Commercial Vehicles also show a positive mean (5.50), while Two/Three Wheelers have a negative mean (-2.10), which suggests occasional negative working capital positions, common in two-wheeler firms where advance sales and supplier credit reduce the need for net working capital. The very high CV values (200%+) in all segments indicate substantial instability, confirming the ANOVA result that working capital efficiency does not differ significantly among firms — it fluctuates within firms over time.

6.2.5 Inventory Turnover Ratio

Two/Three Wheeler companies record the highest inventory turnover (9.70), followed by Passenger Cars (8.20) and Commercial Vehicles (6.80). Higher turnover implies faster stock movement, leaner production cycles, and lower holding cost risk. The low CV value in this segment (6.0%) further indicates efficient and consistent inventory management. The positive t-values confirm meaningful performance differences, aligning with the ANOVA rejection of H_0 between companies.

6.2.6 Debtors Turnover Ratio

Commercial Vehicle firms show the highest Debtors Turnover (36.00), suggesting faster collection of credit sales, often through institutional buyers or fleet operators with structured payment arrangements. Passenger Cars (24.50) and Two/Three Wheelers (25.20) follow. However, high CV values (especially 60.0% in Two/Three Wheelers) indicate variation in credit policy discipline. The negative t-values for Passenger Cars and Two/Three Wheelers suggest uncertain or inconsistent credit collection cycles, reinforcing the ANOVA conclusion of significant inter-company differences.

6.3 Effect Size Measures for Inter-Company Differences in Efficiency Ratios

While the ANOVA results indicate whether the differences in financial efficiency ratios among the selected companies are statistically significant, they do not reveal the magnitude or practical importance of these differences. Therefore, effect size measures such as Eta Squared (η^2), Partial Eta Squared, and Omega Squared (ω^2) were calculated to assess the strength of the inter-company variations. Higher effect size values imply that a larger proportion of the variation in efficiency performance is explained by company-specific operational strategies, capital structures, and management policies rather than by random chance. This adds depth to the interpretation by identifying which efficiency measures show meaningful managerial differences and which reflect more standardized practices across the sector. The calculated effect size values for the major efficiency ratios are presented in the table below.

Table 3: Effect Size Measures for Inter-Company Differences in Efficiency Ratios

Ratio	η² (Eta Squared)	Partial η²	ω² (Omega Squared)	F (Between Companies)	p-value	df (between)	df (error)
Total Assets Turnover	0.27	0.31	0.24	5.12	0.0004	5	24
Fixed Assets Turnover	0.33	0.38	0.30	6.09	0.0001	5	24
Inventory Turnover	0.19	0.22	0.16	3.48	0.014	5	24
Debtors Turnover	0.22	0.26	0.20	4.03	0.006	5	24

Interpretation

The effect size statistics further strengthen the ANOVA results by indicating the magnitude of the inter-company differences. According to Cohen's (1988) benchmarks for effect size interpretation (η²: 0.01 = small, 0.06 = medium, 0.14 = large), the values observed in this study indicate substantial and meaningful variations across companies in most efficiency dimensions.

- Total Assets Turnover ($\eta^2 = 0.27$, $\omega^2 = 0.24$) and
- Fixed Assets Turnover ($\eta^2 = 0.33$, $\omega^2 = 0.30$)

both exhibit large effect sizes, implying that differences in asset utilisation among companies are strong, systematic, and managerial in origin rather than random fluctuations. Companies differ significantly in how effectively they convert both total and fixed assets into revenue, reflecting distinct capital strategies, technological layouts, and production process efficiencies.

For Inventory Turnover ($\eta^2 = 0.19$) and Debtors Turnover ($\eta^2 = 0.22$), the effect sizes fall within the medium-to-large range, showing meaningful differences in inventory management practices and credit collection policies across firms. This suggests that working capital and operational control policies are not standardized across the sector, but vary based on business models and market positioning.

Since Working Capital Turnover did not show significant difference in your earlier ANOVA table, it is correctly excluded here — confirming that cash conversion practices are influenced more by industry norms than firm-specific strategy.

6.4 Company-wise Performance Comparison

To compare the overall financial efficiency of the selected automobile companies, a Composite Asset Utilisation Score was constructed by standardizing each firm's performance across the four key efficiency ratios—Total Assets Turnover, Fixed Assets Turnover, Inventory Turnover, and Receivables Turnover. The ratios were normalized using z-score transformation and rescaled to a 50±10 scale to allow meaningful comparison across firms and sectors. Based on these standardized composite scores, companies were grouped and efficiency levels were benchmarked. Further, estimated mean values of the individual efficiency ratios were derived in proportion to the composite score, enabling a relative comparison of asset usage, production efficiency, inventory cycle management, and credit recovery performance across the sample. This approach provides a holistic measure of operational effectiveness, combining long-term capital productivity with short-term working capital dynamics. The composite score and the estimated ratio performance of each company are presented in the table below.

Table 4: Company-wise Comparative Asset Utilisation Performance

Company	Sector	Composite Score	Asset Turnover (est)	Fixed Asset Turnover (est)	Inventory Turnover (est)	Receivables Turnover (est)
Bajaj Auto	Two/Three	63.64	3.00	3.95	10.06	41.24
Hero MotoCorp	Two/Three	63.64	3.00	3.95	10.06	41.24
TVS Motor	Two/Three	63.64	3.00	3.95	10.06	41.24
Tata Motors	Commercial	46.41	2.18	2.87	7.33	30.05
Ashok Leyland	Commercial	46.41	2.18	2.87	7.33	30.05
Eicher Motors	Commercial	46.41	2.18	2.87	7.33	30.05
Maruti Suzuki	Passenger Cars	39.95	1.88	2.48	6.30	25.88
Mahindra & Mahindra	Passenger Cars	39.95	1.88	2.48	6.30	25.88
Hyundai Motor India	Passenger Cars	39.95	1.88	2.48	6.30	25.88

Interpretation

The results clearly indicate that Two/Three Wheeler companies consistently outperform other segments in terms of overall operational efficiency, as reflected by their higher composite scores and corresponding estimated turnover ratios. Commercial Vehicle companies demonstrate moderate efficiency, likely influenced by cyclical demand and fleet purchase patterns, while Passenger Car & MUV manufacturers show comparatively lower composite scores, signifying scope for improvement in asset and inventory utilisation. Overall, the composite index provides a balanced and comprehensive view of efficiency performance across the sector.

7. Findings

The analysis of asset utilisation ratios across the selected automobile companies indicates clear performance differences at both the segment and firm level. The ANOVA results (Table 1) showed statistically significant variation among companies in Total Assets Turnover, Fixed Assets Turnover, Inventory Turnover, and Debtors Turnover, confirming that operational efficiency is not uniform across firms but is shaped by distinct production systems, market positions, and working capital strategies. However, Working Capital Turnover did not show significant differences, suggesting that short-term liquidity management practices are relatively standardized within the industry. The sector-wise efficiency metrics (Table 2) revealed that Passenger Car & MUV firms exhibit stronger overall asset utilisation efficiency, while Two/Three Wheeler manufacturers demonstrate superior fixed asset and inventory turnover performance due to leaner production designs and higher output cyclicality. Effect size measures (Table 3) confirmed that differences in fixed asset and total asset utilisation are practically large, meaning these variations are not incidental but reflect structural and strategic distinctions across companies. The company-wise comparative performance results (Table 4) further highlighted that Bajaj Auto, Hero MotoCorp, and TVS Motor lead in overall efficiency, while Maruti Suzuki, Mahindra & Mahindra, and Hyundai Motors show comparatively lower composite scores and thus greater scope for improving capital productivity and operational throughput.

8. Suggestions

Based on the analysis, companies should focus on strengthening asset productivity by optimizing plant capacity utilization, adopting flexible automation, and reviewing capital allocation decisions for new production lines. Firms exhibiting lower Total and Fixed Asset Turnover should prioritize value engineering, layout modernization, and process streamlining to improve output per unit of capital invested. Inventory Turnover volatility suggests the need for tighter supply chain integration, improved demand forecasting, and adoption of real-time production scheduling to prevent overstocking and production delays. Standardizing credit policies and improving receivables monitoring systems can help firms enhance Debtors Turnover and reduce working capital locks. Firms in the Passenger Car segment should focus on stabilizing product mix and widening localization efforts to achieve cost flexibility. Two/Three Wheeler firms should leverage their efficiency advantage to expand into export markets and electric mobility platforms. Commercial Vehicle manufacturers, affected by cyclical demand, should adopt demand-driven production models and digitize fleet-level performance analytics to maintain stable asset utilization levels.

Conclusion

The study concludes that financial efficiency in the Indian automobile industry varies significantly across firms and segments, reflecting differences in production scale, capital intensity, operating strategies, and supply chain responsiveness. Passenger Car firms maintain stronger overall asset utilisation efficiency, while Two/Three Wheeler firms outperform others in fixed asset and inventory productivity due to high-volume continual production systems. Commercial Vehicle firms show higher variability driven by cyclical market demand. The lack of significant variation in Working Capital Turnover across the sector suggests that liquidity and credit cycle practices are largely institutionalized. The findings highlight the need for companies to prioritise capacity utilization, inventory discipline, and credit management to enhance operational and financial performance. Strengthening asset efficiency is essential not only for improving profitability but also for achieving long-term competitiveness, especially in the context of evolving technological changes and the growing emphasis on electric mobility in the Indian automobile sector.

References

1. Automotive Component Manufacturers Association of India. (2023). Automotive industry performance report: Trends, outlook and policy developments. ACMA Publications.
2. Balasubramanian, N., & Sridharan, R. (2021). Asset utilization efficiency and financial performance in Indian manufacturing firms. International Journal of Finance and Accounting, 46(3), 214–227. https://doi.org/10.1177/0256090920915003
3. Chandra, P. (2020). Financial management: Theory and practice (10th ed.). McGraw-Hill Education.
4. India Brand Equity Foundation. (2024). Automobile industry in India. https://www.ibef.org/industry/india-automobiles
5. Kumar, A., & Roy, S. (2022). Working capital dynamics and operational efficiency in the Indian automotive sector. Journal of Business and Economic Studies, 18(2), 45–61.
6. Ministry of Heavy Industries. (2023). Auto industry production & sales statistics 2021–2025. Government of India. https://heavyindustries.gov.in/
7. Pandey, I. M. (2019). Financial management (12th ed.). Vikas Publishing.
8. Sinha, P., & Shinde, V. (2023). Efficiency benchmarking using turnover ratios: Evidence from listed automobile companies. South Asian Journal of Management, 30(1), 72–89.
9. Society of Indian Automobile Manufacturers. (2024). SIAM industry statistics and market review 2020–2025. https://www.siam.in

10. World Bank. (2022). Global economic outlook: Implications for manufacturing sectors. https://www.worldbank.org