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LIQUIDITY PRESSURES AND PROFITABILITY OUTCOMES: A FRAMEWORK FOR THE AUTOMOTIVE INDUSTRY

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ABSTRACT
The research article seeks to study the affinity between profitability and liquidity. The prior and utmost important objective of this study is to specify how liquidity influences the profitability of the Automobile Sector in India. The sample consists of 30 automobile Industries operating and manufacturing in India and the duration opted is of ten years which is from 2013 to 2022. The data utilised for the analysis was secondary data accumulated from Prowess IQ database and Tableau has been applied for analytical purposes. The statistical tests adopted in the study are descriptive statistics, correlation, coefficient and regression analysis. For interpreting the result a variable of profitability which is ROCE is utilized as a dependent variable whereas all additional variables of liquidity i.e. CR, QR, DTR and ITR are taken up as independent variables. The conclusions and findings of the study states that liquidity affects the profitability of India's automobile industries, and each of the independent factors individually is correlated with the dependent variable. Thus some of them have positive correlations, while others have negative correlations, but as per the study it can be stated that, only one of these independent variables i.e. ITR has a significant influence on ROCE, which is our dependent variable. Thus, this can be concluded because as per all the tests that were done, only ITR has produced the most favourable results.

Keywords: *Automobile Industry, Liquidity, Profitability, Correlation Coefficient, Regression, Augmented Dickey Fuller Test, Working Capital, Automobile Industry*

1. INTRODUCTION

The automobile industry is a major contributor to the development of the Indian economy and is important in managing the supply and demand of liquidity in a way that will allow it to operate profitably for a long period without encountering any liquidity problems. Liquidity essentially means the ability to meet persistent cash flow needs or sudden financial demands by trading an asset for the current year on its demand value as per the market conditions and consumer behaviour. The Indian auto industry is dealing with numerous inequalities, challenges, and consistency in the management of liquidity, due to the reduction in the amount of liquidity which had an adverse effect on the financial performance of its profitability and thus, evaluating the management of liquidity vs profitability has become a fundamental and coherent part of calculating and analysing the performance of a company.

1.1. Background of the Study

In the corporate world, liquidity and profitability are of utmost importance. The management of a company's current assets and current obligations is referred to as liquidity. It is essential to determine if a company can manage its short-term obligations adequately because of how vital it is, businesses must retain a valid percentage of their assets as cash in hand to pay their short-term debts. Liquidity is the capability to fulfil continuous cash flow requirements or impulsive financial demands by selling an acquisition for its fair demand value. The danger that an entity won't always have enough cash or liquid assets to cover its financial obligations is known as liquidity risk. Every

firm that wants to meet its present financial and operating responsibilities, which include short-term operating and financial expenses, must manage its liquidity well.

With an estimated 7.1% share of India's GDP and 35 million direct and indirect jobs, the automobile sector builds a prominent economic contribution to the nation. Numerous makers of two-wheelers, passenger cars, commercial vehicles, and three-wheelers are represented in this sector. India gives birth to the fifth-largest automotive industry worldwide, cultivating more than 25 million vehicles yearly. Due to factors like increasing incomes, better infrastructure, and government programmes like "Make in India" and the "Electric Mobility Mission," the automobile sector is expanding rapidly in recent years. The automobile sector of India has some prominent companies like Tata Motors, Hyundai, Maruti Suzuki, Mahindra & Mahindra, and Bajaj Auto. To adapt to shifting consumer preferences and governmental requirements, these businesses have been creating substantial investments in research and development to launch new models and technologies, such as electric and hybrid vehicles. The industry does, however, face a few difficulties, such as increased taxes and tariffs, increasing fuel costs, and a scarcity of competent labour. The pandemic has also affected the industry, with output and sales falling as an effect of broken supply chains and low consumer demand. Despite these obstacles, it is foreseen that the automobile industry in India will grow over the next few years due to factors like a growing population, increasing disposable incomes, and revving urbanisation. The industry's transition to electric vehicles and other environmentally friendly technologies is also anticipated to spur growth and open up new possibilities for sector participants.

The primary contributor to the expansion of the economy of India is the automobile sector and is important in managing the supply and demand of liquidity in a way that will allow it to operate profitably for a long duration of time without encountering any liquidity problems. Generally, the inability to inherit unanticipated shocks like the recent closure of the automobile sector due to COVID-19 changes in industry regulations, internal resource management, and so on causes liquidity issues. The Indian auto industry is dealing with numerous inequalities, challenges, and consistency in the administration of liquidity, as the reduction in the amount of liquidity had a negative significance on the financial interpretation of its profitability. Given this industry's financial performance in association, in-depth measurement and analysis are needed for liquidity and profitability. Numerous research has revealed a substantial inverse connection between liquidity and profitability ratios. Thus, evaluating the management of liquidity vs profitability has become a fundamental and inclusive part of evaluating the interpretation of a business organisation.

The automobile sector of India is an encouraging success story. It has become a luminous place in the past four decades, catalysing India's Gross Domestic Product (GDP) and the country's whole economy. The Indian automobile sector is an encouraging success story. It has become a shining beacon for India's economy and Gross Domestic Product GDP over the last four decades. In India, the manufacturing sector's Gross Value Added is 12% accounted for by the automobile industry. The auto sector, which is regarded as a core industry, accounts for 32 million jobs, 49 percent of India's manufacturing GDP, and 7.5 percent of the country's overall GDP.

1.2. Profitability and Liquidity in the Automotive Sector

The sector is experiencing significant transformations, particularly with the integration of advanced materials and technologies to enhance performance and sustainability. The increasing demand for soft polymers, such as acrylonitrile butadiene rubber (ABR), in various applications underscores the industry's shift towards materials that offer improved viscoelastic properties and tighter geometric tolerances. **Maurya et al. (2022)** highlight that cryogenic-assisted abrasive

water jet machining can optimize the performance parameters of ABR components, leading to better kerf characteristics and reduced abrasive contamination. This advancement is crucial for maintaining the quality and reliability of automotive components, thereby enhancing liquidity in the sector. Moreover, the rise of lithium-ion batteries (LIBs) as a fundamental technology in electric vehicles (EVs) represents another critical aspect of liquidity in the automobile industry. S. **Rangarajan et al. (2022)** discuss the ongoing challenges and opportunities associated with LIBs, emphasizing the need for improvements in energy density, cost, and safety. As the automotive sector increasingly adopts EVs, the financial viability and market liquidity are expected to improve, driven by innovations in battery technology. Collectively, these developments in materials and energy storage solutions are pivotal for fostering a more liquid and dynamic automobile sector, enabling it to meet contemporary demands and future challenges.

The relationship between profitability and liquidity in the automobile sector has garnered significant attention in recent research. Rahman (2023) conducted a study assessing the impact of working capital ratios on the profitability of selected four-wheeler automobile companies. The findings revealed a positive correlation between various working capital ratios—such as the current ratio, liquidity ratio, and inventory turnover ratio—and profitability, indicating that effective working capital management can enhance financial performance. Similarly, Falah et al. (2023) explored the effects of liquidity, profitability, firm size, and leverage on earnings quality within the Indonesian automobile subsector. Their results highlighted that liquidity, profitability, and firm size significantly influence earnings quality, while leverage did not exhibit a notable effect. This suggests that maintaining adequate liquidity is crucial for improving profitability and the overall quality of earnings in manufacturing firms. These studies underscore the importance of liquidity management in the automobile sector, emphasizing that firms should prioritize efficient financial practices to bolster profitability and ensure sustainable growth. Such insights are invaluable for researchers aiming to delve deeper into the dynamics of financial performance in this industry.

Investors use financial indicators to evaluate a company's growth, stability, and profitability. Financial ratios, intellectual capital, and dividend policy are key factors in shaping a firm's market position. Liquidity, solvency, and profitability ratios do not directly impact a company’s financial policies. Understanding these factors helps investors make informed decisions and identify automotive firms with strong growth potential (Khandim et al. 2020).

Liquidity reflects a company's capacity to fulfill short-term financial obligations, is a key aspect of financial planning. Companies with strong liquidity can fund operations internally, reducing reliance on external borrowing and minimizing financial risk. Profitability also plays a vital role, as firms with higher earnings often prefer reinvesting their profits rather than seeking outside financing. Both liquidity and profitability are crucial in shaping financial strategies. In the automotive industry, maintaining stability through an optimal balance of these factors is more important than focusing solely on expansion. (Pinková 2012**)**. A balance between liquidity and profitability, ensures that firms remain financially resilient while effectively managing technological advancements (Husain et al. 2002**)**.

2. LITERATURE REVIEW

With the assistance of the literature reviews connected to this topic the existing research gaps for the published papers were determined, and what are the elements on which research is still needed. It helped in knowing the region of research for this paper and to gain in-depth knowledge of the previous papers. The following literature reviews are established on different papers associated

with the influence of liquidity on profitability for the automobile sector, banking sector, cement companies, pharma industry and various other sectors.

The connection between liquidity and profitability has been frequently discussed in financial research. According to Eljelly (2004) liquidity is crucial for a firm's operation; however, excess liquidity could suggest inefficient asset utilisation, causing in diminished profitability. Keynes' liquidity preference theory suggest that firms prefer liquidity for preventive, speculative, and transactional reasons, particularly in dynamic sectors such as car manufacture (Moussa, 2015).

The trade-off between liquidity and profitability has been highlighted across various sectors. Deloof (2003) in his study discovered that companies with shorter cash conversion cycles usually demonstrate higher profitability, emphasising the importance of effective liquidity management. Raheman and Nasr (2007) also highlighted that liquidity constraints hinder firms' capacity to invest in revenue-generating opportunities, thus impacting their return on capital.

On the other hand, Sharma and Kumar (2011) argued that, an excessively low QR in the sector like automotive leads to financial distress risk especially in the times like recession. Companies with low liquidity may find it hard to fulfil their short-term obligations, which will lead increased borrowing costs and lower ROCE. For automotive sectors, the ideal QR lies in a range that ensures financial flexibility without unnecessary capital hoarding.

According to Dellof (2003) higher ITR firms often turn out to be more successful, since they can easily convert inventory into cash, therefore lowering holding costs. Similarly, Lazaridis and Tryfonidis (2006) emphasised that ideal inventory levels increase cash flow, therefore allowing companies to spend in profitable businesses and improve ROCE.

Shajar & Farooqi, (2016) expressed that Every component of the country's economy directly affects its profitability and efficiency, which is especially feasible through adequate working capital management methods. To conduct this study authors took three distinct Indian Automobile company which are Tata motors ltd., Maruti Suzuki India ltd and Mahindra & Mahindra ltd with a purpose to discover the influence on profitability by working capital management for analysing the exact different dependent and independent variables The period of study carried out is of 10 years i.e. 2005 to 2014. Correlation coefficient and regression analysis were considered to review the link between working capital and profitability. Based on the above analysis it is established that only debtors turnover ratio in case of Maruti Suzuki India limited and CR in case of Tata motors limited are positively corresponding with the profitability. And the remaining independent proxy variables in each company were moving parallel with the dependent proxy variable of profitability **(ROCE).**

Gill et al. (2010) studied the correlation between the Current ratio and profitability in manufacturing enterprises. The researcher found a weak positive association between the two, suggesting that excessive liquidity may not significantly improve profitability. Pandey (2005) argued that in capital-intensive sectors such as automotive, a moderately high current ratio is important for maintaining efficient production cycles and supply chain consistency. Excessive high CR values could indicate poor working capital utilisation, negatively affecting ROCE.

Saleem and Rehman (2011) conducted a sectoral analysis to examine the liquidity-profitability relationship in the automobile industry. The study concluded that firms sustaining an ideal current ratio (between 1.5 and 2.5) most likely demonstrate improved return on capital employed (ROCE). This finding indicates that though liquidity buffers are crucial but liquid asset holdings in excess may hinder working capital.

Automotive firms must ensure balance between supply chain risk and inventory efficiency. Although high ITRs can increase liquidity, Gaur et al. (2005) noted that excessively lean

inventory practices might lead to stockouts, therefore disrupting manufacturing and sales cycles. The automobile industry has widely adopted the Just-in- Time (JIT) inventory strategy in order to reduce these risks; yet, its impact on ROCE depends on the firm's capacity to match supply chain operations with market demand.

The Debtor Turnover Ratio (DTR) reflects a company's efficiency in collecting receivables. A higher DTR indicates efficient collections, reducing liquidity constraints and enhancing cash flow for investments.

Samiloglu and Demirgunes (2008) found a positive correlation between DTR and profitability, highlighting that firms with an efficient receivables management exhibit higher ROCE. On the similar line Sharma and Kumar (2011) also emphasised that in the automotive sector, where significant transactions involved extended credit durations, firms with higher DTRs maintain stronger liquidity positions, allowing reinvestment in growth initiatives.

On the other hand, Paul and Wilson (2006) warned against aggressive receivables practices limiting credit terms may result in reduced sales and weak customer relationships. The objective is to optimise DTR to ensure prompt collections without maintaining market competitiveness.

Chukwunweike (2014), This paper strives to review the following as measured on return on assets **(ROA**) i.e. the connection between current ratio and profitability; the connection between Acid-test ratio and profitability, and the connection between return on capital employed and profitability. The research is "quantitative research design" and the companies taken up for study are publicly quoted companies that make up the "industrial/Domestic products" industry. The hypothesis was tested using a straightforward correlation analysis at a 10% level of significance on secondary data. This study shows that current ratio and profitability moves parallel however that profitability and acid-test ratio move in opposite direction, and profitability and return on capital employed moves opposite to each other. The researcher advises corporate entities to build a proportion between the two performance measures and refrain from adopting extreme liquidity policies at the expense of their profitability (Liquidity and profitability).

Azhar (2015), has studied how the profitability of specific power distribution utilities got influenced by liquidity and management efficiency on the profitability of specific Indian power distribution utilities. For this study 23 electricity distribution utilities were selected and the duration of study was 7 years i.e. from 2004–2005 to 2013–2014. As a result of which there were 230 total panel observations. Here the return on capital employed is profitability variable whereas the independent variables were the absolute cash ratio, creditors turnover ratio,current ratio, quick ratio, debtor turnover ratio, collection efficiency, and interest coverage ratio. The statistical methods used in this research are Generalised Least Squares (GLS) regression. The study discovered that while quick ratio, absolute liquid ratio, and creditor turnover ratio have negligible effects on the profitability of sample utilities while debtor turnover ratio, collection efficiency, and interest coverage ratio have a substantial impact.

Malik, et al(2016), performed a study on Impact of Liquidity on Profitability: A Comprehensive Case of Pakistan's Private Banking Sector. The study was carried out with the aim to link the trade-off of liquidity on profitability of 22 private banks that were authorised by the State Bank of Pakistan from the year 2009-2013. The technique which was adopted to specify and estimate three models was Ordinary Least Square. The outcome suggests that bank liquidity metrics and ROA had a statistically significant link. This will increase the usage of the bank's assets and the yields on shareholders' equity.

Saleem & Rehman (2011), this study aims at revealing the association between profitability and

liquidity so that companies start revealing such information in their everyday operations. The analysis was held between the years of 2004 and 2009 after gathering data on the financial positions as an outcome of yearly operations and the relevant ratios of 26 enterprises every year traded on the Karachi Stock Exchange in Pakistan (Oil and Gas companies) (KSE). The methodology used is linear regression with the help of SPSS. The outcome of the test gives the judgement that only the liquidity ratio has a substantial impact on ROA, but the liquid ratio, quick ratio and curr have no considerable impact on ROE and have a considerable influence on ROI, respectively.

D'souza & Habibniya (2021), studied how profitability got affected by liquidity for Nifty Pharma Index (NSE India) listed on the National Stock Exchange (NSE) India. Here, Quick ratio, working capital and current ratio serve as indicators of liquidity. Sales, Return on Capital Employed (ROCE), Return on Total Assets (ROTA), and Profit Before Tax have all been utilised in a step to evaluate profitability. Tools used here were multiple regression models so that Indian Pharmaceuticals companies' data can be evaluated. The duration for the same was five years, from 2012 to 2016, and the data utilised here was Secondary data. As per the research Quick Ratio has good impact on ROTA while Current Ratio has favourable impact on ROCE while the best indicator of working capital is sales. As an outcome, a peculiar correlation between both the factors has been established.

Raheman et al. (2010) found that Quick Ratio (QR) significantly affects profitability more than Current Ratio (CR) in sectors with extended manufacturing cycles. This finding is line with Gaur et al. (2005) finding which discovered that companies with higher QR values generally show stronger financial stability and hence greater ROCE. On the other hand, too much liquidity in form of cash and receivables result in opportunity costs, therefore restricting the profitability growth.

Kumar & K.K (2020), have studied the influence of Liquidity of an organisation on Profitability of the Indian Automobile Industry. The data used here is secondary in nature for the duration of ten years from 2010 to 2019 and the tools utilised for the same were correlation, coefficient and regression analysis.The result depicts insignificant effect of management on profitability by liquidity.

Bordeleau & Graham (2010), The authors of this research investigate the influence of liquid asset holdings on a population of substantial American and Canadian banks' profitability. The dataset employed for the research spans the years 1997 to 2009 and includes quarterly data for 10 Canadian banks and 55 U.S. bank holding companies. According to the findings, banks with some liquid funds are more successful. A bank can only hold so many liquid assets before its total profitability starts to decline. Outcomes show that there are deviations in this relationship depending on the bank's business model and the condition of the economy.

Yameen & Pervez (2016), in this paper authors have made an effort to estimate the monetary performance of Steel Authority of India Limited, a Maharatna Public Sector Undertaking in our country. This study's ten-year duration frame runs from 2005 to 2014. The secondary data was used in this research from the Ministry of Steel (GOI), World Steel Association, RBI, BSE, NSE, and other Indian government websites and from different published annual reports and financial statements of SAIL.Multi-regression analysis is the statistical method in this research to examine how liquidity, solvency, and management effectiveness affect SAIL's profitability. This study revealed a decrease in SAIL's financial performance during the required time period. P. Megaladevi (2018), has studied to assess the influence of liquidity ratios on profitability, the researcher used 3 liquidity ratios and 8 profitability ratios. The data collected here was completely

secondary data from annual reports, journals, publications, etc. for ten years, from 2008 to 2017 which has been evaluated using descriptive statistics. To determine the affinity between the variables chosen for the research, correlation analysis was performed. Regression was carried out here using SPSS and MINITAB to analyse the study's best match model. The findings show a strong correlation between CR and QR and ROAE. At a 5% level of significance and a 1% level of significance, respectively, ICR, ROCE, and EBDITCE are with ROE.At the 5% level of significance, ROTA has a parallel link with ROCE, EBDITCE, ROACE, and ICR. According to the study's findings, profitability and liquidity are closely related. Noor & Lodhi(2015),. This study paper examined the affinity between the profitability and organisations liquidity ratio, including whether that relationship can be either positive or negative. Here, the quick and current ratios are two independent metrics that evaluate the efficacy of the company's return on capital and assets, respectively. Five Karachi-based businesses' automotive industries were investigated in this study: Pak Suzuki, Nissan Ghandhara, Toyota, Honda Atlas, and HinoPak.This study highlights the detrimental effects on companies' profitability. They need to improve both their effectiveness and their financial liquidity position to increase their revenuesand performance.

Kothari & Sodha, This study looked at the link between profitability and liquidity, also the influence of financial leverage and liquidity on the monetary performance of a select group of pharmaceutical firms from FY 2008-09 to FY 2017-18. The outcomes of the research suggest thata company's liquidity affects its capital structure. This influence is shown by the company's continued ability to pay its debts, while the firm's leverage declines as its cash grows.The authors searched for evidence to show that leverage has a substantial influence on profitability or capital structure, but they were unable to locate any.

Ibrahim(2017), conducted a study on the Impacts of Liquidity on Profitability in Banking Sectors of Iraq: A Case of Iraqi Commercial Banks. Study has been conducted with the aim to explore the connection between the financial stability of Iraqi commercial institutions and liquidity of Iraqi commercial institutions. For the same, five Iraqi banks—North Bank, Iraqi Islamic Bank, Sumer Bank, Dar Es-Salam Bank, and Babylon Bank—were selected at random as a group and had their financial data analysed from 2005 to 2013: The information was obtained from the Iraqi Stock Exchange, where the cash deposit ratio, bank asset ratio and loan deposit ratio were selected as liquidity variables and return on assets was the financial stability variable.. The Ordinary Least Square (OLS) model was used in order to obtain the result. Nandi (2012), has studied a case study of BHEL for a time frame of 11 years from 1999 to 2010 An attempt was additionally made to establish the connection between ratios like profitability and liquidity utilising a multiple regression model. Research is completely based on secondary data that was collected from BHEL's published annual reports and the Public Enterprise Survey. The judgement of the available data has been made on the outcome of various essential managerial and statistical tools. To discover the implication of the results, several statistical analyses, including the t-test, F-test, and Durbin-Watson test, have been used. The selected company constantly aims to maintain a sufficient amount of net working capital in connection to current liabilities in a step to retain a healthy level of liquidity throughout the study.

Panigrahi (2014), conducted the research with the aim of investigating the connection between ACC Ltd.'s income, liquidity, and bankruptcy risk from 2000–2001 to 2009–2010. They conducted correlational and altman z score tests for the research. They establish that the business's financial stability was ultimately in danger, despite its assertive working capital policy that had helped it maintain profitability. Mohanty & Mehrotra (2018) in their research took a sample of 28 small and medium-sized Bombay stock exchange listed companies (SMEs) for the time frame of 2011

and 2016 which were examined to determine the association between liquidity and profitability. Market capitalization, sales growth rate, and financial debt proportion were the variables used in this research.The correlation study's findings showed that there is an ineffective but not statistically considerable correlation between the SMEs performance and liquid assets percentage. To analyse pooled regression has been used which shows that good liquidity management has a substantial influence on a particular business' profitability. Additionally, the results indicated that in a group of SMEs, there was a poor correlation between the explanatory factors (current ratio, quick ratio, and cash ratio) and the profitability indicators (net profit margin, return on assets, and return on capital utilized).

After rigorously examining the available literature, it has been found that researchers place a high value on liquidity and profitability because several different research for different sectors have been done in this specific area. However, the lack of study on the automotive industry's liquidity and profitability was a cause for concern. It has also been noticed that the majority of scholars used the ROA (return on assets) variable as a dependent variable to examine profitability. Also none of the researchers had used Durbin Watson and analysis of variance in their papers to look for autocorrelation and to determine the connection between the variables and also among the companies.

3. RESEARCH OBJECTIVES

This research has been carried out to determine if any relationship exists between the dependent variables and independent variables also to know how liquidity ratios are responsible for changes in profitability ratios. For the same Return on Capital employed is taken as a dependent variable which eventually helps us to know how the automotive sector is using its capital to generate profit while inventory turnover, quick ratio, debtors turnover ratio and current ratio are selected as independent variables with the aim to determine the liquidity position of the Automotive Sector. This research seeks to pursue the following objectives:

- To determine the impact of liquidity on profitability for automobile sector
- Impact of CR on ROCE
- Impact of QR on ROCE
- Impact of Inventory Turnover Ratio on ROCE
- Impact of Debtor Turnover Ratio on ROCE

To summarise the main findings of the research as well as to offer suggestions , if any, for further research.

4. RESEARCH METHODOLOGY

These are the firms from the automotive industry whose data has been studied for this research project which includes businesses that produce automobiles, tires, and other automotive ancillaries.

Table 1: Sample of Automobile Sector Companies (Author's Own)

Tata Motors	Mahindra and Mahindra Ltd.	Maruti Suzuki India Ltd.
Bajaj Auto Ltd.	Ashok Leyland Ltd.	Hero Moto Corp Ltd.
TVS Motors	Hindustan Motors Ltd.	Eicher Motors Ltd.
Force Motors Ltd.	Atul Auto Ltd.	Escorts Kubota Ltd.

HMT Ltd.	VST Tillers Tractors Ltd.	SML Isuzu
Bosch Ltd.	Samvardhana Motherson International Ltd.	JBM Auto Ltd.
Jamna Auto Industries Ltd.	Munjal Auto Industries	MRF Ltd.
Apollo Tyres	CEAT Tyres	JK Tyres and Industries Ltd.
Cummins India Ltd.	Subros Ltd.	Gabriel India Ltd.
ZF Commercial Vehicle Control Systems India Ltd.	Swaraj Engines	Hi Tech Gears

4.1. Source of Data and Data Collection Method

The study is analytical and majorly relies on secondary sources of data which has been collected from the annual reports of the selected companies and from websites like Money Control and Business standards. The research was conducted over a ten-year period, from the year 2013 to 2022. In order to achieve the objectives of the research test like descriptive Statistics, ADF unit root test, Correlation, Multiple Regression and ANOVA has been used to determine the relationship between liquidity and profitability as shown in Table 2.

Table 2: Specifying Dependent and Independent Variables (Author's Own)

Variable	Abbreviation	Measurement
Return on capital employed- Dependent Variable	ROCE	Earning Before Interest andTax/ capital employed
Current Ratio- Independent Variable	CR	Current Assets/ Currentliabilities
Quick Ratio- Independent Variable	QR	(Current assets- inventory)/Current liabilities
Inventory Turnover Ratio- Independent Variable	ITR	Cost of goods sold/AverageInventory
Debtors Turnover Ratio- Independent Variable	DTR	Net credit Sales/AverageAccount Receivables

(Source: Author's Compilation)

4.2. Data Analysis Tools

Statistical tests are essential for analyzing data and deriving meaningful insights as shown in Table 3. Descriptive statistics summarize key characteristics like mean, median, and standard deviation to provide a basic understanding of the dataset. Correlation analysis assesses the relationship between dependent and independent variables, indicating the strength and direction of their association. The ADF Unit Root Stationarity Test checks whether the data is stationary or non-stationary, which is crucial for time-series analysis. Regression analysis evaluates how variations in the dependent variable can be explained by independent variables, helping in predictive modeling. Lastly, ANOVA (Analysis of Variance) determines relationships between multiple variables, assessing differences both within and across groups, such as among companies or samples. These tests collectively aid in making data-driven decisions and validating research findings.

Table 3: Test opted for the Research (Author's Own)

Test	Description
Descriptive Statistics	To determine basic information about variables like average of the dataset
Correlation	To determine the relationship between dependent and independent variable
ADF Unit Root Stationarity Test	To check whether the collect data is stationary or non-stationary in nature
Regression	To determine variation in dependent variable based on independent variable
ANOVA	To find the relationship between the columns as well as among the sample i.e. between the variables along with the companies

5. DATA ANALYSIS AND INTERPRETATION

5.1. Descriptive Statistics

To better understand the data the first test that has been performed is descriptive statistics which basically describe, illustrate, and summarise the fundamental characteristics of a dataset discovered in a specific study. It aids in improved data comprehension for analysts. In descriptive statistics mean, standard error, median , mode, standard deviation, sample variance, minimum, maximum, sum and count has been included.

Table 4: Descriptive statistics (Author's Own)

	ROCE	CR	QR	ITR	DTR
Mean	19.61297	1.486067	1.1047	11.30453	19.45103

Standard Error	4.290157	0.05426	0.04913	0.48301	1.82579
Median	14.26	1.24	0.88	8.665	9.81
Mode	5.31	0.93	0.36	0	0
Standard Deviation	74.3076	0.93980	0.85105	8.36614	31.6236
Minimum	-120.61	0	0	0	0
Maximum	1253.34	5.93	5.51	43.43	290.87
Sum	5883.89	445.82	331.41	3391.36	5835.31
Count	300	300	300	300	300

As per Table 4, it can be seen that the first value is mean which basically informs the researcher about the average value of the dataset. The automobile business benefits from this mean ROCE value of 19.61 because a higher ROCE value shows that a company utilizes its financial resources effectively to produce greater profits. Additionally, the average CR and QR are 1.49 and 1.1, correspondingly, which are nearly identical to the ideal ratios and show that short-term commitments of the automotive industry can be met. ITR has a mean score of 11.3. which demonstrates how quickly a business sold and used its goods. Here, a high ITR value indicates that a company has greater liquidity. DTR is a measure of how quickly a company gathers debt. Since DTR has an average value of 19.45, which is fairly high, which means that companies can easily collect its cash from credit sales without any delay

Speaking now of the following element, the standard deviation. A larger standard deviation indicates that the data is less reliable because it is more dispersed. Since ROCE and DTR diverge the greatest from their mean values of all these five variables—roughly 74.310 and 31.62, respectively—these two variables are the most uncertain. In contrast, other ratios' standard deviations are relatively low, indicating that they have a greater reliability because their values have a greater emphasis around the mean.

5.2. Correlation

The coefficient of correlation, which is a numerical measure of correlation, demonstrates the degree of a connection among two variables. Values for the correlation rate fall between -1.0 and 1.0. When there is a perfect positive connection, the correlation coefficient is 1. This suggests that the dependent variable moves parallel, in the same direction, as the independent variable, whether up or down. A zero correlation suggests that there is no linear connection at all, while the ideal negative correlation indicates that both variables advance in opposite directions.

Table 5: Correlation (Author's Own)

	ROCE	CR	QR	ITR	DTR
ROCE	1	-0.0169	-0.0099	0.085888	0.076728
CR	-0.0169	1	0.965489	0.136982	-0.107160
QR	-0.0099	0.965489	1	0.231017	-0.02505
ITR	0.085888	0.136982	0.231017	1	0.222006
DTR	0.07672	-0.10716	-0.02505	0.222006	1

Here according to the above 'Table 5' dependent variable ROCE and independent variables ITR and DTR show a positive correlation with each other which means if ITR or DTR will increase or decrease ROCE will move parallel to it.. While QR shows a value -0.0999 which is so small that the value is almost equal to 0 which means it has no correlation with ROCE which depicts whether QR increases or decreases it won't have any visible effect on our dependent variable ROCE or will have very negligible effect. While CR shows a negative correlation with ROCE so if CR will increase ROCE will decrease which means both the variables will move in opposite direction but since this value is so small that is -0.0169 therefore this negative impact will be negligible in nature Similarly, The association among every independent variable has also been established, and according to those figures, each of the independent variables have a positive association with one another, with the exception of CR and QR, which have a negative impact on DTR.

5.3. Unit Root Stationarity Test

Unit Root stationarity test helps to examine if the data aggregated for study is stationary or non-stationary over a period of timeline. A time series is said to be stationary if a change in time does not result in a change in the distribution's form. Here to check stationarity, the ADF test has been opted because the ADF test is considered to be the most suitable test for large samples here in the study the sample size is of 30 companies for a period of 10 years which contains a total of 300 observations. Another important reason for choosing this test is that if the data selected for study is non volatile in nature then researcher cannot proceed with research further as non stationary data is volatile in nature.

Table 6: Unit Root Stationarity Test (Author's Own)

	ROCE	CR	QR	ITR	DTR
ROCE	1	-0.0169	-0.0099	0.085888	0.076728
CR	-0.0169	1	0.965489	0.136982	-0.107160
QR	-0.0099	0.965489	1	0.231017	-0.02505

ITR	0.0858	0.136982	0.231017	1	0.222006
DTR	0.0767	-0.107160	-0.02505	0.222006	1

5.3.1. Augmented Dickey-Fuller Test

The Augmented Dickey-Fuller (ADF) test is one of the most widely used statistical method to determine whether a given time-series is stationary or non-stationary as it is a crucial property to understand whether the dataset has misleading statistical inferences and model inefficiencies. In the current research, the ADF test has been applied to five financial ratios, which are - Current Ratio, Quick Ratio, Inventory Turnover Ratio, Debtors Turnover Ratio and Return on Capital Employed (ROCE) to examine the stationarity. Following are the hypotheses for the ADF test conducted:

H01: Current Ratio is non- stationary
H02: Quick Ratio is non- stationary
H03: Inventory Turnover Ratio is non stationary
H04: Debtors Turnover Ratio is non- stationary
H05: Return on Capital Employed is non- stationary

Table 7: ADF Test Statistic (Author's Own)

Augmented Dickey-Fuller test statistic	t-Statistic	Probability
Current Ratio	-2.62225	0.0087
Quick Ratio	-3.635071	0.0003
Inventory Turnover Ratio	-2.051687	0.0388
Debtors Turnover Ratio	-5.085420	0.0000
Return on Capital Employed	-13.57327	0.0000

From the ADF test results, for Current Ratio, the null hypothesis has to be rejected because the current ratio's p value is 0.0087, which is less than 0.05, as shown in the aforementioned 'Table 7' as a result, it can be said that the current ratio is stationary in nature.

Moreover, Quick Ratio has the p-value calculated using the ADF unit root test in the case of Quick Ratio is 0.0003, which is less than 0.05. As a result, the null hypothesis has been rejected, and it is therefore possible to draw the conclusion that the Quick Ratio is stationary in nature. Also, here in the current analysis, there is rejection of null hypothesis because the Inventory Turnover Ratio's p value is 0.0388, which is less than 0.05, as shown in the aforementioned 'Table 7'. As a result, it can be said that the Inventory turnover ratio is stationary in nature. Debtors Turnover Ratio is again rejected with reference to null hypothesis because the debtors turnover ratio's p value is 0.0000, which is less than 0.05, as shown in the aforementioned 'Table 7'. As a result, it can be said that the debtors turnover ratio is stationary in nature.

Also, the p-value calculated using the ADF unit root test in the case of Return on Capital Employed is 0.0000, which is less than 0.05. As a result, the null hypothesis has been rejected, and it is therefore possible to draw the conclusion that the Return on Capital Employed is stationary in nature.

5.3. Regression

In order to determine the form and magnitude of the connection between a singular dependent variable (typically represented by the letter Y) and a number of independent variables, regression

analysis is used. It is also known as Ordinary Least Square.
Multiple regression models are created in this case using dependent factors. The Model are as follows:

ROCEit = Cit+ β1CRit+ β2QRit+ β3ITRit+ β4DTRit **(1)**

Here,
ROCE is Return on Capital Employed
C is Constant
CR is Current Ratio
ITR is Inventory Turnover Ratio
DTR is Debtors Turnover Ratio I- Cross Sectional Elements
T is Time series details
Now, all variables have been interpreted using a research hypothesis to under-stand whether there is significant impact of independent variables on a dependent variable.

Table 8: Regression estimates of ROCE (Author's Own)

Variable	Coefficient	Standard Error	T-Statistic	Probability
C	8.969841	11.87937	0.7550771	0.4508051
CR	6.174728	19.35411	0.3190395	0.74992231
QR	-9.025661	21.6077	-0.417706	0.67646604
ITR	0.754442	0.567418	1.3296048	0.04467572
DTR	0.14956	0.144972	1.0316468	0.09308264

Following is the hypothesis for the regression analysis:
H06: There is no significant impact of CR, QR, ITR, DTR on profitability of the automobile sectorin India.
According to 'Table 8', the null hypothesis has been rejected because the ITR's t-statistic is 1.33 and its p-value is 0.044, which is less than 0.05. It is therefore clear that the Inventory Turnover Ratio significantly affects the profitability of Indian automakers.
It is clear that CR, QR, and DTR have no meaningful connection with the profitability of Indian automobile companies because the p values for all other independent variables, aside from ITR, are significantly higher than 0.05, which prevents from rejecting the null hypothesis.

Table 9: Summary Regression Output (Author's Own)

Multiple R	R Square	Adjusted R Square	Standard Error	Durbin-Watson Stat
0.109030	0.0118	-0.0015104	74.363793	1.639257

The above 'Table 9' "R- Squared" denotes the degree to which the data and regression line align.

If the value "R- Squared" is greater than zero then in that case there is a positive relationship between the data while if the value is smaller than 0 then a negative relationship exists between them while if the value is equal to zero then no relationship exists between the data. R Square in this instance is greater than 0, and is equal to 0.011888, therefore it can be concluded that a positive connection exists between the dependent variable and the independent variables. However, because the value is too small, it shows that the strength of this relationship is weak. In addition, the Durbin-Watson test measure has been employed to determine whether autocorrelation is present in this model. This test statistic's result, between 1.5 and 2.5 which indicates that no autocorrelation exists between the selected variables.

5.3. Analysis of Variance (ANOVA)

In order to accumulate additional information that is consistent with the suggested regression models, the analyst uses the ANOVA test findings in an f-test. Using the ANOVA test, you can compare multiple sets of data at once to see if there is a correlation between them. The F statistic, which is the end result of the ANOVA formula, enables the examination of numerous groups of data to ascertain the variability within the group as well between samples. If the p value of ANOVA is less than 0.05, the reject the null hypothesis. This test has been opted to determine the relationship between all the companies as well among the dependent variables and independent variables.

Table 10: ANOVA (Author's Own)

Source of Variation	SS	df	MS	F	P-value	F crit
Sample	81465.6	29	2809.16	2.88753	5.2707	1.47452
Columns	1.0109	5	2.0108	2.07023	0	2.21962
Interaction	316375.	145	2181.9	2.24277	6.3114	1.21206
Within	1576028	1620	972.856	-	-	-
Total	1.0109	1799	-	-	-	-

Hypothesis for Columns (Between the Variables)

H07: There is no significant impact of Liquidity on Profitability between the variables

Here in this scenario the null hypothesis has been rejected in this instance because the p value for all variables is equal to 0, which is less than 0.05, which means that there is a statistically significant connection between liquidity and profitability among the dependent and independent variables as shown in Table 10.

Hypothesis for Sample (Between the Companies)

H08: There is no significant relationship between liquidity and profitability among the companies in the automobile sector.

Similarly the p-value for all the automobile companies is 5.2707 which is far less than 0.05 thus the

null hypothesis has been rejected and it can be concluded that there is a significant relationship between liquidity and profitability among the companies in the automobile sector.

6. CONCLUSION AND SUGGESTIONS AND SCOPE FOR THE FUTURE STUDY

On the premise of the research, it can be said that profitability has an impact on liquidity of the automobile sector in India and there is a correlation between the dependent variable and each of the independent variables, some of the independent variables are positively correlated, while others have a negative correlation, but according to the study, ITR is an independent variable that has the greatest influence on ROCE. This can be deduced from the fact that, of all the tests run, ITR yields the most favourable results. Additionally, it has been noticed that there is a substantial association between the companies as well as the variables.

Thus as per the result of this study, the following recommendations are made: it is inferred that the company's financial managers should wisely use the combination of liquidity and profitability. They should ensure such a combination which will help the company in achieving its goals. Inventory Turnover ratio has a positive influence on the automobile sector. The outcome of this study showcases that the liquidity of the company, which depicts the ongoing ability to meet financial obligations, affects the company's profitability. Moreover, it is problematic for any company to depend solely on liquidity or profitability. Managers should therefore use financial leverage in a way that boosts value for their business and upholds financial stability.

In addition to the aforementioned, the researcher indicates that other researchers should conduct studies to determine and the factor(s) accountable for the relationship between liquidity and profitability, to ascertain whether there is a causal relationship between them or if there is another factor responsible for the relationship. Additionally, they could conduct comparative research on the topic.

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