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DETERMINANTS OF PROFITABILITY OF AUTOMOBILE INDUSTRY IN INDIA

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Abstract *The present study is an attempt to ascertain the determinants of profitability of automobile industry in India by taking a sample of all the automobile firms covering various segments of automobile industry in India viz. commercial vehicles, three wheelers, two wheelers, and passenger vehicles which are listed on Bombay Stock Exchange (BSE), for a period of eleven years from 2003-04 to 2013-14. In order to achieve the objectives of the study, firm-specific factors viz. financial leverage, size of firm, tangibility of assets, growth of firm, liquidity, inventory turnover ratio, debt equity ratio, debtors turnover ratio, total assets turnover ratio, average payment period, and cash liquidity of firm are regressed against return on assets ratio. Firstly correlation analysis and multiple regression analysis are applied to identify the factors affecting profitability of sample firms. Further, to find out the prominent factors that account for the variation in profitability of sample firms, stepwise regression analysis has been carried out. It was found that profitability of automobile industry in India is significantly influenced by the liquidity position of firm, growth of firm, inventory turnover ratio, debt equity ratio, and average payment period.*

Keyword: *Profitability, Automotive, Automobile, Multiple Regression Analysis, Stepwise Regression Analysis, Secondary Data*

INTRODUCTION

The automotive industry in India has come a long way since independence and it has transformed from being a protected, locally-focused industry, to emerging as one of the fastest growing automotive markets in the world.The automobile industry in India is the seventh largest in the world and this sector is described as the next sunrise sector of the Indian economy. According to the report of the working group on automotive sector for the twelfth five year plan (2012-17), the contribution of this sector to the National GDP, has risen from 2.77 percent in 1992-93 to 6percent now and it provides direct and indirect employment to over 13.1 million people. With liberalisation of Indian economy since 1991 the number of manufacturing facilities has grown progressively and this sector produces wide variety of passenger vehicles, medium and heavy commercial vehicles, two wheelers, three wheelers, tractors, and other agricultural equipment etc. According to Automotive Mission Plan (2006-2016) India with its rapidly growing middle class, market oriented stable economy, availability of trained manpower at competitive cost, fairly well-developed credit and financing facilities, and local availability of almost all the raw materials at a competitive cost has emerged as one of the favourite investment destinations for the automotive manufacturers. The present study attempts to identify the factors affecting profitability of automobile industry in India. Profitability is the centre around which all the actions of business take place and profit maximisation is one of the major objectives of a business firm. It is common knowledge that the profitability of manufacturing companies is crucially important for the economic development of a country. Several factors play an important role in determining profitability of firms. Therefore, the purpose of the present study is to identify the factors affecting the profitability of original equipment manufacturers (OEMs) of automobile industry in India. This study is planned as follows: the section following the introduction provides brief review of literature. Third section presents the objectives of the study. Fourth section describes research design and methodology which includes dataset and sample design, description of selected variables, and techniques of analysis. Fifth section mentions limitations of the study. Sixth section presents data analysis and findings of the study. Final section provides conclusion and references of the study.

LITERATURE REVIEW

Bhutta and Hasan (2013) examined the impact of firm-specific factors and macroeconomic factors on profitability of companies in food sector listed on the Karachi Stock Exchange for the period from 2002 to 2006. The firm-specific factors included debt equity, tangibility, growth, and size while macroeconomic factors included food inflation.

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The study found significant negative relation between size and profitability and insignificant negative relation between debt to equity ratio and profitability. The findings of the study also revealed that tangibility, growth of firm, and food inflation were insignificantly positively related to profitability. It was concluded that out of various variables under study size of the firm is the only critical factor which should be considered while making investment decision.

Pratheepan (2014) ascertained the factors determining the profitability of 55 manufacturing companies listed on Colombo Stock Exchange for the period of ten years from 2003 to 2012. The study revealed that size significantly and positively affected profitability of the sample companies while tangibility showed statistically significant and inverse relationship with the profitability of selected listed manufacturing companies in Sri Lanka. So it was concluded that larger companies have the opportunity to negotiate with the material suppliers which results in reducing their cost and increasing the profitability. This study does not found any significant impact of leverage and liquidity on profitability of the sample companies.

Vatavu (2014) studied the *determinants of profitability in 126 Romanian companies listed on the Bucharest Stock Exchange, over a period of ten years i.e. from 2003 to 2012. Return on assets was taken as proxy for performance while the explanatory variables included debt, asset tangibility, size, liquidity, taxation, risk, inflation, and crisis. So the study included both the firm-specific factors as well as the macro level factors. The results of cross sectional regressions revealed thatasset tangibility, business risk, the level of taxation and periods of unstable economic conditions, reflected by high inflation rates had a negative impact on the performance of the selected companies. The regression results also indicated that profitable companies used to operate with limited borrowings.*

Farah and Nina (2015) examined factors affecting profitability of Small Medium Enterprises (SMEs) firm listed in Indonesia Stock exchange by taking a sample of twenty two companies listed in Indonesian stock exchange market for the period from 2007 to 2012. Return on assets ratio was taken as dependent variable while independent variables included firm size, firm age, growth, lagged profitability, labour productivity, and industry affiliation. It was found that the variables viz. firm size, growth, and lagged profitability have significantly and negatively affected profitability while labour productivity and industry affiliation have significantly and positively affected the profitability of the selected companies. It was suggested that to improve the performance of a company the manager should define a strategy to increasing profitability with focusing on labour productivity and industry affiliation.

Al-Jafari and Al-Samman (2015) studied determinants of profitability for industrial firms in Oman by taking a sample of seventeen industrial companies listed on Muscat securities market covering a period of seven years from 2006 to 2013. Results of panel ordinary least squares model revealed that independent variables viz. firm size, growth, fixed assets, and working capital showed a significant and positive relationship with profitability. On the other hand the average tax rate and financial leverage showed a negative relationship with profitability. However this relationship was significant only for the financial leverage variable. It was concluded that large growing companies that manage their working capital efficiently command higher profits while increasing risk by using more debt will increase the required returns and could negatively impact profitability.

OBJECTIVES OF THE STUDY

The study aims to achieve the following objectives:

1. To ascertain the determinants of profitability of automobile industry in India by taking Return on Assets ratio (ROA) as dependent variable.
2. To determine the nature and extent of relationship (if any) between profitability of automobile industry in India with other selected independent variables.

RESEARCH METHODOLOGY

This segment of research paper discusses about the firms taken as sample for the study, the selected variables, period of the study and the statistical techniques used to ascertain the factors affecting profitability of the sample firms.

Dataset and Sample Design

In order to study the determinants of profitability of automobile Industry in India, data have been collected from CMIE PROWESS database. The study covers a period of eleven financial years from 2003-04 to 2013-14. The sample of the study consists of all the firms covering various segments of automobile industry in India viz. commercial vehicles, two wheelers, three wheelers, and passenger vehicles which are listed on Bombay stock Exchange. Fourteen firmssatisfy the above criteria and are included in the sample viz. Ashok Leyland Ltd., Tata Motors Ltd., S M L Isuzu Ltd., Atul Auto Ltd., Scooters India Ltd., Bajaj Auto Ltd., Eicher Motors Ltd., Hero Motocorp Ltd., LML Ltd., TVS Motor Co. Ltd., Force Motors Ltd.,Hindustan Motors Ltd., Maruti Suzuki India Ltd., and Mahindra & Mahindra Ltd.

Variables Used in the Study

In order to achieve the objectives of the study firm-specific factors viz. Financial Leverage, Size of firm, Tangibility of

assets, Growth of firm, liquidity, Inventory Turnover Ratio, Debt Equity Ratio, Debtors Turnover Ratio, Total assets turnover ratio, Average Payment Period, and Cash Liquidity of firm are regressed against Return on Assets ratio. The description of the variables used in the study is given below:

Dependent Variable

Return on Assets = (Profit before Interest and Tax/ Total Assets)*100

Independent/Explanatory Variables

Table 1: Independent/Explanatory Variables

Variables	Formulae used for computation
Financial Leverage (FL)	Earnings before interest and tax/ Earnings before tax
Size of Firm (Size)	Logarithm of Total Assets
Tangibility of Assets (TOA)	Gross Fixed Assets/ Total Assets
Growth Rate of firm (Growth)	(Total Assets$_t$ - Total Assets$_{t-1}$)/ Total Assets$_{t-1}$
Liquidity of Firm (Current Ratio, CR)	Current Assets/ Current Liabilities
Inventory Turnover Ratio (ITR)	Cost of goods sold/ Average Stock
Debt Equity Ratio (DER)	Debt/ Equity
Debtors Turnover Ratio (DTR)	Net Sales/ Average Debtors
Total Assets Turnover Ratio (TATR)	Net Sales/Total Assets
Average Payment Period (APP)	365/Creditors Turnover Ratio
Cash Liquidity (CL)	Sum of Cash and Cash Equivalents

Note: Compiled by the researcher on the basis of previous studies

Tools used for Analysis

The descriptive statistics like mean and standard deviation are used to see the effect of individual variables. Besides this, correlation analysis and multiple regression analysis are used to see the effect of selected variables on profitability of selected automobile firms. To find out the prominent factors that account for the variation in profitability of sample firms, stepwise regression analysis have also been carried out.

DATA ANALYSIS AND FINDINGS

Descriptive Analysis

Table 2: Descriptive Statistics

Variable	Mean	Std. Deviation	N
Return on Assets (ROA)	5.7000	16.71324	154
Financial Leverage(FL)	0.6279	6.49507	154
Size of firm(Size)	4.2403	0.82702	154
Tangibility of assets (TOA)	0.6447	0.41045	154
Growth of firm (Growth)	0.1291	0.24813	154
Liquidity of firm (CR)	0.8319	0.48322	154
Inventory Turnover Ratio (ITR)	11.0016	8.33165	154
Debt Equity Ratio (DER)	0.6203	0.93644	154
Debtors Turnover Ratio (DTR)	30.0986	31.53291	154
Total Assets Turnover Ratio (TATR)	1.3647	0.51478	154
Average Payment Period (APP)	92.8982	111.90999	154
Cash Liquidity (CL)	3793.2423	6501.43409	154

Correlation Analysis

Table 3: Correlations

		ROA	FL	Size	TOA	Growth	CR	ITR	DER	DTR	TATR	APP	CL
	ROA	1.000											
	FL	.035	1.000										
	Size	-.063	.098	1.000									
	TOA	-.139	-.031	-.330	1.000								
	Growth	.220	.142	.223	-.262	1.000							
	CR	.279	.020	-.307	-.197	-.104	1.000						
	ITR	-.224	.058	.499	-.402	.224	-.303	1.000					
	DER	-.165	.043	-.094	.129	-.092	.006	-.261	1.000				
	DTR	-.136	.039	.112	-.118	.140	-.358	.508	-.222	1.000			
	TATR	-.067	.060	-.181	-.111	.123	.040	.382	-.134	.178	1.000		
	APP	-.140	-.107	-.204	.593	-.246	-.204	-.347	-.015	-.133	-.423	1.000	
	CL	.078	.049	.640	-.276	.188	-.065	.255	-.135	.001	-.171	-.137	1.000

Multiple Regression Analysis

Sophisticated multiple regression techniques has been applied to study the determinants of profitability of automobile industry in India. The results of multiple regression and stepwise regression analysis are presented as follows:

Model Specification

To enable the examination of the relationship between dependent and independent variables, the paper specifies the following definitional model.

ROA= F (FL, Size, TOA, Growth, CR, ITR, DER, DTR, TATR,APP, CL)

The above equation when expressed in explicit econometric form gives

$ROA_{it} = \alpha + \beta_1 (FL_{it}) + \beta_2 (Size_{it}) + \beta_3 (TOA_{it}) + \beta_4 (Growth_{it}) + \beta_5 (CR_{it}) + \beta_6 (ITR_{it}) + \beta_7 (DER_{it}) + \beta_8 (DTR_{it}) + \beta_9 (TATR_{it}) + \beta_{10} (APP_{it}) + \beta_{11} (CL_{it}) + et.$

where the variables are discussed above in Table 1, i= 1, 2, 3 …. 14 firms, t= Time 1,2,3 …11 years, α is the constant or intercept, β_1 to β_{11} are the coefficients of the selected variables and et is error term.

Table 4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.505[a]	.255	.197	14.97496	1.395

a. Predictors: (Constant), Cash Liquidity, Debtors Turnover Ratio, Financial Leverage, Average Payment Period, Debt Equity Ratio, Growth of firm, Liquidity of firm, Total Assets Turnover Ratio, Tangibility of Assets, Inventory Turnover Ratio, Size of firm

b. Dependent Variable: Return on Assets

Table 4 shows that the multiple correlation coefficient between dependent and independent variables taken together is 0.505. The value of coefficient of determination (R square) is 0.255 which indicates that 25.5 percent of variation in dependent variable is explained by joint variation in independent variable. Durbin Watson statistic is used to detect the presence of auto correlation. Here the value of Durbin Watson statistic is 1.395 which is less than 2, it means there exists a positive serial correlation among the variables.

Table 5: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10894.405	11	990.400	4.417	.000[b]
	Residual	31843.431	142	224.250		
	Total	42737.836	153			

a. Dependent Variable: Return on Assets

b. Predictors: (Constant), Cash Liquidity, Debtors Turnover Ratio, Financial Leverage, Average Payment Period, Debt Equity Ratio, Growth of firm, Liquidity, Total Assets Turnover Ratio, Tangibility of Assets, Inventory Turnover Ratio, Size of firm

Table 5 shows that the F ratio and p value are 4.417 and 0.000 respectively. So the F value is significant. Thus there is significant relationship between Return on assets and the independent variables as a group.

Table 6: Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	18.054	13.977		1.292	.199		
	FL	.031	.191	.012	.164	.870	.955	1.048
	Size	-.508	2.504	-.025	-.203	.840	.342	2.926
	TOA	-2.222	4.193	-.055	-.530	.597	.495	2.021
	Growth	15.972	5.277	.237	3.027	.003	.855	1.170
	CR	5.267	3.203	.152	1.644	.102	.612	1.635
	ITR	-.698	.246	-.348	-2.834	.005	.348	2.870
	DER	-4.197	1.401	-.235	-2.995	.003	.851	1.175
	DTR	-.002	.049	-.004	-.045	.964	.620	1.614
	TATR	-2.332	3.290	-.072	-.709	.480	.511	1.958
	APP	-.025	.016	-.169	-1.577	.117	.458	2.182
	CL	.000	.000	.065	.670	.504	.555	1.802

Dependent Variable: Return on Assets

The result of the multiple regression analysis indicates that three of the eleven variables viz. Growth of firm, Inventory Turnover Ratio, and Debt Equity Ratio are found to be significantly associated with the Return on Assets.

Multicollinearity Test

Multicollinearity is a problem which occurs with the regression analysis when there is high correlation between two or more independent variables. From Table 3 we can see that no two independent variables are highly correlated. To check this problem further, collinearity statistic has been computed in Table 6 which shows that the value of tolerance is not below 0.20 and the value of Variance Inflation Factor (VIF) does not exceed 5, so there is no multicollinearity problem.

Growth of firm and Return on Assets

According to Table 6 there is a significant relationship between growth of firm and return on assets with t=3.027 and p=0.003, because p value is less than 0.05. Table 6 shows that there is a direct relationship between growth of firm and return on assets i.e. if growth rate of firm increases by one percent the profitability of firm measured by return on assets will increase by 15.972 percent when the other variables are held constant.

Inventory Turnover Ratio and Return on Assets

According to Table 6 there is a significant relationship between inventory turnover ratio and return on assets with t=-2.834 and p=0.005, because p value is less than 0.05. Table 6 shows that there is inverse relationship between inventory turnover ratio and return on assets i.e. if inventory turnover ratio increases by one percent the profitability of firm measured by return on assets will decrease by 0.698 percent when the other variables are held constant.

Debt Equity Ratio and Return on Assets

According to Table 6 there is a significant relationship between debt equity ratio and return on assets with t=-2.995 and p=0.003, because p value is less than 0.05. Table 6 shows that there is inverse relationship between debt equity ratio and return on assets i.e. if debt equity ratio increases by one percent the profitability of firm measured by return on assets will decrease by 4.197 percent when the other variables are held constant.

The remaining variables do not contribute significantly.

Stepwise Regression Analysis

To identify the most significant factors that influence the return on assets stepwise regression analysis has been carried out. The results of stepwise regression analysis are presented in Tables 7 to 9.

Table 7: Model Summary[f]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.279[a]	.078	.072	16.10181	
2	.375[b]	.140	.129	15.59756	
3	.425[c]	.181	.164	15.27750	
4	.471[d]	.222	.201	14.93574	
5	.493[e]	.243	.217	14.78445	1.356

a. Predictors: (Constant), CR (Liquidity)
b. Predictors: (Constant), CR (Liquidity), Growth of firm
c. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR
d. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR, DER
e. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR1, DER, APP
f. Dependent Variable: ROA

Table 8: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3329.038	1	3329.038	12.840	.000[b]
	Residual	39408.798	152	259.268		
	Total	42737.836	153			
2	Regression	6001.989	2	3000.994	12.335	.000[c]
	Residual	36735.847	151	243.284		
	Total	42737.836	153			
3	Regression	7727.533	3	2575.844	11.036	.000[d]
	Residual	35010.304	150	233.402		
	Total	42737.836	153			
4	Regression	9499.475	4	2374.869	10.646	.000[e]
	Residual	33238.361	149	223.076		
	Total	42737.836	153			
5	Regression	10387.998	5	2077.600	9.505	.000[f]
	Residual	32349.838	148	218.580		
	Total	42737.836	153			

a. Dependent Variable: ROA
b. Predictors: (Constant), CR (Liquidity)
c. Predictors: (Constant), CR (Liquidity), Growth of firm
d. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR
e. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR, DER
f. Predictors: (Constant), CR (Liquidity), Growth of firm, ITR1, DER, APP

Table 9: Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-2.331	2.590		-.900	.369		
	CR	9.653	2.694	.279	3.583	.000	1.000	1.000
2	(Constant)	-5.271	2.661		-1.981	.049		
	CR	10.559	2.624	.305	4.024	.000	.989	1.011
	Growth	16.937	5.110	.251	3.315	.001	.989	1.011
3	(Constant)	.871	3.449		.252	.801		
	CR	8.451	2.684	.244	3.148	.002	.907	1.103
	Growth	19.761	5.112	.293	3.866	.000	.948	1.054
	ITR1	-.432	.159	-.215	-2.719	.007	.871	1.149
4	(Constant)	5.080	3.688		1.377	.170		
	CR	7.850	2.633	.227	2.981	.003	.901	1.110
	Growth	19.213	5.001	.285	3.842	.000	.947	1.056
	ITR	-.550	.161	-.274	-3.417	.001	.812	1.232
	DER	-3.779	1.341	-.212	-2.818	.005	.925	1.081
5	(Constant)	11.460	4.831		2.372	.019		
	CR	5.734	2.810	.166	2.041	.043		1.290
	Growth	16.973	5.073	.252	3.345	.001		1.109
	ITR	-.703	.177	-.351	-3.984	.000		1.514
	DER	-4.231	1.346	-.237	-3.143	.002		1.112
	APP	-.025	.013	-.170	-2.016	.046		1.389

a. Dependent Variable: ROA

If we see the result of the stepwise regression, then we find that there are five significant models in the result. Model 1 suggests that liquidity is the most important explanatory variable that explains the return on assets of the automobile companies in India and liquidity is also sharing a positive relationship with the return on assets. In second step, growth of firm variable was entered in the model and it is also sharing a positive relationship with the return on assets. Next important variables entered in the models are inventory turnover ratio, debt equity ratio, and average payment period. All these variables share a negative relationship with the return on assets. From the model summary table (Table 7) it is found that these five variables in the last model explain 24.3% of variability in the profitability of automobile companies in India measured by return on assets. The R Square value incase of multiple regression amounts to 0.255 and it can be concluded that the difference in the R Square value is 0.012 (0.255-0.243). It is the contribution of the remaining variables to the dependent variable return on assets. That's why the remaining variables are excluded from the models as their contribution in explaining the dependent variable is negligible. From the ANOVA table (Table 8) it can be found that all the models are statistically fit as all the models are having p value of 0.000 respectively.

CONCLUSION

This paper is an attempt to identify the factors that are significantly affecting profitability of automobile industry in India with the help of the correlation analysis, multiple regression analysis, and stepwise regression analysis. Hence eleven explanatory variables are taken into consideration and the results of multiple regression analysis revealed that the profitability of automobile industry in India is significantly influenced by growth of firm, inventory turnover ratio, and debt equity ratio. There is a positive relationship between profitability of automobile industry in India and growth rate of firm while the explanatory variables viz. inventory turnover ratio and debt equity ratio showed negative relationship with the profitability of sample firms during the period of study. According to multiple regression analysis other explanatory variables viz. financial leverage, size of firm, tangibility of

assets, liquidity of firm, debtors turnover ratio, total assets turnover ratio, average payment period, and cash liquidity do not have significant relationship with the profitability of automobile industry in India. Further, to identify the most significant factors that influence the profitability of automobile industry in India measured by return on assets stepwise regression analysis has been carried out. The results of stepwise regression analysis showed that five explanatory variables viz. liquidity of firm, growth of firm, inventory turnover ratio, debt equity ratio, and average payment period are playing a significant role in explaining the profitability of automobile industry in India. The total contribution of these five explanatory variables amounts to 0.243 and the R square value in multiple regression analysis amounts to 0.255. So the difference in the R square values is 0.012 (0.255-0.243). It means the remaining explanatory variables viz. financial leverage, size of firm, tangibility of assets, debtors turnover ratio, total assets turnover ratio, and cash liquidity explain only 1.2% variation in the dependent variable i.e. return on assets. So, it can be said that automobile companies in India should concentrate on liquidity, growth of firm, inventory turnover ratio, debt equity ratio, and average payment period for improving their profitability position.

LIMITATIONS OF THE STUDY

The present study is based on secondary data and the ratios used in the study are taken from CMIE Prowess database.

The sample of the study includes only 14 companies which are listed on Bombay Stock Exchange. Other automobile firms operating in India could not be included in the study because they were not listed on BSE and moreover data were not available with regard to them.

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