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THE DETERMINANTS OF PROFITABILITY: AN EMPIRICAL INVESTIGATION USING INDIAN AUTOMOBILE INDUSTRY

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ABSTRACT
The profit of a business may be measured by studying the profitability of investment in it. It is the test of efficiency, powerful motivational factor and the measure of control in any business. Profitability is highly sensitive economic variable which is affected by host of factors operating through a variety of ways. The objective of this study is to examine the determinants of profitability of selected Automobile Industry. Determinants of profitability are analyzed using the techniques of ordinary least squares. It is evident from the results that size is the strongest determinants of profitability of Indian Automobile Industry followed by the variables vertical integration, past profitability, growth rate of assets and inventory turnover ratio. The study concluded that industry should consider all these possible determinants while considering its profitability.

KEYWORDS
Automobile Industry, Corporate Profitability, Determinants of Profitability, Profitability and Leverage and Vertical Integaration.

INTRODUCTION

Industrialization has an important role to play in the economic development of a country. The corporate sector is the backbone of the Indian Economy so far as it provides a vital, effective and organized system for the growth of the Industrial as well as non-industrial sectors of the economy. The contribution of the corporate sector towards the balanced development of various areas of an organized economic activity can easily be seen in the combined efforts of various companies in achieving the goal of industrialization and increased production. Ultimately, the gross domestic product and the tax revenue to the Government in the form of both direct and indirect taxes are maximized. The rapid growth of the corporate sector in India and the increasing scale of its operations and investments have turned it into the most dominant form of economic organization. Therefore, corporate sector have attracted several academicians, professional institutions, researchers and administrators to conduct diversified studies in the area.

A Joint-stock company is not only an institution for the maximization of the shareholders wealth, but also an administrative and social organization processing the capacity for initiating its own growth. Such growth is based on its success and profit is the primary test of the success of an enterprise. The growth of a company can be measured. And it can be determined in terms of a change in investment or sales leading ultimately to profit. Profitability refers to the profit in relation to the sales, investment etc. Thus, growth in profitability means all round growth of a business enterprise. Hence, an analysis of profitability in the corporate sector is felt relevant.

The question of determination of profit is of great importance. The profit of a business may be measured by studying the profitability of investment in it. Profitability is a relative term and its measurement can be achieved by profit and its relation with the other objects by which the profit is affected. It is the test of efficiency, powerful motivational factor and the measure of control in any business. Actually profitability is highly sensitive economic variable which is affected by a host of factors operating through a variety of ways. Some of them affect product prices and quantities; some affect the cost of production while others make changes in capital stock, size, market share and growth of the firm. Further, corporate policy relating to various functions will affect profitability. Some of them are relevant in short run while others have impact in the long run. It is doubtful to build a theory of profitability, which accounts for all such factors. Because of these difficulties, it is quite natural to analyse the variation in profitability by taking the partial approach i.e., to find the effect of certain major variables, ignoring the implications of other left out independent variables at a time. The present study is a step towards this direction.

THEORETICAL BACKGROUND AND THE DEVELOPMENT OF HYPOTHESES

The study of how and why firms attain profitability levels has been the main pre-occupation of Industrial organization economists for the last five decades. In determining factors influencing performance (profitability) diversity, literature dealing with such work suggests that industrial performance and performance differences among firms can be explained as arising from various characteristics; those which are firm – specific and those which are industry specific **(Capon, Farley & Hoenig, 1990).** Many of the theoretical and empirical developments on the determinants of corporate profit margin emanate from the two basic paradigm notions, i.e., Collusion hypotheses and the efficient market Hypotheses.

The traditional notion or the collusion hypotheses follows the Structure – Conduct – Performance (SCP) Paradigm. According to this hypothesis, firm profitability depends to monopolistic conduct, and these conduct dependents on industry structure. This conduct enables firms to set prices above the costs, thus, making abnormal profit **(Bain 1951).** Industry organization economists point to industry effects (i.e., concentration levels, Industry Growth, Barriers of entry) using the Structure – Conduct – Performance model (SCP) as the main factor determining firm profitability. **(Scherer, 1980; Conyon and Machin, 1991; Porter, 1981; James Ted Mc Donald, 1997; Simon feeny, 2000).**

On the other hand, efficient market hypothesis argued the traditional theory (efficient market theory) postulating that firms' profitability depends on a proxy relationship between superior efficiency, market share and concentration. **(Porter, 1981)** has noted that firm profitability can be decomposed in to effects steaming from industry structural characteristics and the firms strategic positioning within its industry. On the other hand, the resource – based view **(Barney, 1991; Peteraf, 1993; Nagarajan & Barthwal, 1990; Grinyer & McKiernan, 1991; Peter H.Grinyer and Peter McKiernan, 1991; Chandrasekaran, 1993; Geroski et al., 1997; Kaur, 1997; Sindhu and Bhatia, 1998; Vijayakumar, 1998; Fenny and Rogers, 1999; Simon Feeny, 2000; Kaen and Baumann, 2000; Kakani et al., 2001; Vijayakumar, 2002; Arthar S.Leahy, 2004; Claver et al., 2006; Ho and Fukao, 2006; Agiomirgianakis Voulgaris and Papadogonas, 2006; Thirumavalavan, 2006)** suggests that the explanation for the existence of more or less profitable firms within the same industry must be found in the internal factors of each company (for example market share, firm size, R & D expenses, capital intensity, inventory management, growth of sales, past profitability, diversification, age etc.,). These firms – effect factors favour the achievement and maintenance of competitive advantages of each firm, which eventually lead to different profitability levels among firms belonging to the same industry **(Amato & Wilder, 1990).**

Despite the influence, either negative or positive on the firms' profitability, specific strategic responses might strengthen in prevailing serious impediments to firm success. Other firm specific factors such as Leverage, Current ratio, Inventory turnover ratio, Fixed Assets turnover ratio, Operating expenses to sales ratio, Vertical Integration and Growth rate of assets also affect profitability. Extending the argument, this study is a logical approach to add to this literature, in studying the determinants of profitability by examining the major factors such as firm size, Leverage, Current ratio, Inventory Turnover Ratio, Fixed Assets Turnover ratio, Operating Expenses to sales ratio, Vertical Integration, Past profitability and Growth rate of assets. The following is a separate discussion for each factor leading to the development of the hypotheses.

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PROFITABILITY

Many researchers use different measures of firm profitability in the analysis of the determinants of profitability. Among, return on assets **(Hall & Weiss, 1967; Shepherd, 1972; Bothwell et al., 1984; Amato & Wilder, 1990;)** and Return on sales **(Samuels and Smyth, 1968; Nagarajan and Barthwal, 1990; Amit Mallick and Debasish Sur, 1998; Vijayakumar, 2002)** are widely used measures of profitability – It is assumed that management may be concerned with effective utilization of all resources and these two measures could be proper in this line of arguments. The profit rates measured by sales will give a short-term perspective of profitability because sales are annual flows. On the other hand, the return on assets will give us long- term perspective of profitability. In this study, ratio of profit margin on sales is used as dependent variable in the specified model.

SIZE

Firm size is one of the most acknowledged determinants of a firm's profits in terms of its effect on competitive market power in given industry **(Beard & Dess, 1981)**. Economies of scale, raw material costs and production strategy are a few of the benefits larger firms employ because their structure allows for the minimization of operational costs **(Sidhu and Bhatia, 1998)** and higher returns on account of access to capital market **(Hall and Weiss, 1967)**. Hence, generally a positive hypothesis is set for size – profitability relationship. The size – profitability relationship is perhaps best explained as a curvi – linear relationship where beyond a certain point, scale economies cease to exist and the relationship then may reverse owing to the problems associated with size (enlarged demand, imperfections, increased tariff protection and inflationary conditions in the Economy). Therefore, impact of firm size on profitability can not be determined a priori. Thus, from this theoretical background, the study advances the following hypothesis.

H$_0$ 1: Firm size is significantly associated with profitability.

The existing literature mentions an array of alternative measures of firm size. Generally, two sizes measures are employed, they are assets **(Shepherd, 1972; Amato & Wilder, 1990; Sidhu & Bhatia, 1998)** and sales turnover **(Amirkhalkhali et al, 1993; Abdurahman et al., 2003; Vijayakumar 2002)**. Assets express amount of resources utililsed for producing output whereas sales is an output variable. Sales are an annual flow depending upon output produced and sold in the market. Therefore, in this study the log of total assets as the measure of size has been employed.

LEVERAGE

Leverage has been employed widely as a measure of risk in previous studies of financial performance reflecting a trade – off between shareholders returns and risk **(Hall & Weiss, 1967; Scott & Pascoe, 1986; Pant, 1991)**. The usual supposition is that a leveraged firm with relatively more borrowed capital represents a greater financial risk to equity holders than a firm with relatively low debt **(Bothwell, Cooley & Hall, 1984)**. Depending on the cost of debt, the effect of Leverage may be favorable or unfavorable. When the cost of debt is lower than the company's rate pf return, Shareholders' earnings will be magnified. However, when the rate of return on the company's assets is lower than the cost of debt capital, then the leverage effect will be unfavorable. It seems that the relationship between leverage and rate of return is indeterminate a priori. Based on this theoretical background, the study advances the following Hypothesis:

H$_0$ 2: Leverage is significantly associated with profitability.

The debt equity ratio as the measure of leverage has been employed in this study.

CURRENT RATIO

The management of working capital involves decisions about the amount and composition of current assets and how they are financed. Such decisions involve a trade off between solvency and profitability. In inter-firm comparison, the firm with higher current ratio has better liquidity. A high ratio of current assets to current liabilities may be indicative of slack management practices, as it might signal poor credit management in terms of over-extended accounts receivables. So far as these current assets are kept for meeting the working capital requirements, it may exert positive influence on profitability through growth, otherwise, negative effect on profitability can be expected. Therefore, the study proposes the following hypothesis:

H$_0$ 3: Current ratio is significantly associated with profitability.

INVENTORY TURNOVER RATIO

Another variable, which can influence the profitability is the inventory turnover ratio. It is the ratio of sales to inventory which indicates the number of times inventory is replaced during the year. Instead of taking year end stock of inventory, an average of the opening and closing stock of inventory is considered. A high ratio implies good inventory management. But low inventory will adversely affect the ability of a firm to meet customer demand and in turn will affect profitability. On the other hand, a very low inventory turnover ratio signifies excessive inventory or over investment in inventory and high carrying cost. The sign of inventory coefficient is ambiguous. With the respect to the above line of argument, the study proposes the following hypothesis:

H$_0$ 4: Inventory turnover ratio is significantly associated with profitability.

FIXED ASSETS TURNOVER RATIO

Sarkaria and Shergill (2000) suggest that firms seeking to improve profitability performance must shift from labour intensive to capital intensive methodologies. This would lead to process modernization, improved product quality, wastage reduction and better cost of production. It should be noted however that large investment made in fixed assets may find a firm to a certain business even if the business is declining. Moreover, whether capital intensity increases profitability would also depend on the cost of input **(Sidhu & Bhatia, 1998)**. Based on this argument, the study proposes the following hypothesis:

H$_0$ 5: Fixed Assets Turnover ratio is significantly associated with profitability.

OPERATING EXPENSES TO SALES RATIO

Apart from the above discussed factors operating expenses ratio is included as an explanatory variable in this study. A low operating ratio is by and large a test of operational efficiency. The implication of low operating expenses ratio is that relatively a high percentage share of sales is available for meeting financial liabilities like interest, taxes and dividends. Therefore, a negative relationship is expected with operating expenses and profitability. Therefore, the study proposes the following hypothesis:

H$_0$ 6: Operating Expenses to Sales ratio is significantly associated with profitability.

VERTICAL INTEGRATION

Firm-specific vertical integration motivated by considerations such as the avoidance of costs incurred in using the market of organize production, government policies and also consideration of market power is an important determinant of profitability. The costs of using the market alternatively known as transaction costs include search cost, cost of drawing up contracts, monitoring costs, etc., In our context government policies assume an important role in determining vertical integration. The degree of vertical integration is sought to be measured by the value added to sales ratio in the analysis. Value added is defined as total sales revenue less costs of purchased inputs, repair charges and customs and excise duty. With respect to the research presented above, the study advances the following hypothesis:

H$_0$ 7: Vertical Integration is significantly associated with profitability.

PAST PROFITABILITY

The hypothesis that the level of future profitability of a company will reflect its past profitability is one of appealing simplicity. **(Geoffrey Whittington, 1971)**. However, the future cannot be analyzed; it is only an expectation, and any such expectation, would not be dependable unless based on the past experience. So, Past Profitability (P_{t-1}) may have the relevance as a determinant of current profitability. If profitability depends on the quality of a firm's management, or on the monopoly power which the firm enjoys or on both of these factors, we should expect to find some persistency in the profitability of firms over successive years. **(Singh and Whittington, 1968)**. Since there is usually some continuity of good management and of monopoly power, so we expect that profitability in the previous year will determine the profitability in the current year. But if profitability in the previous years, is purely a chance phenomenon, then it may not affect the profitability in the current year. In order to test this general notion, the study postulates the following hypothesis:

H$_0$ 8: Past profitability is significantly affects profitability.

GROWTH RATE OF ASSETS

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The other variable, which is considered, is growth of firm. Growth is essential to a firm even if it is not among the firm's major objectives. The reason is that growth helps in providing the firm finances for attaining its objective by increasing the size of its profit growth, by providing room for initiatives and exercise managerial ability, stimulates managerial efficiency leading to a lower capital output ratio and consequently higher profit rate. It is thus, likely to have positive association with profitability. Growth rate is measured in this study by the ratio of simple growth rate of assets. Thus, according to this literature, the study postulates the following hypothesis:

H_0 9: Growth rate of assets positively affects profitability.

METHODOLOGY

Keeping in view the scope of the study, it is decided to include all the companies under Automobile Industry working before or from the year 1991-92 to 2003-04. But, owing to several constraints such as non-availability of financial statements or non-working of a company in a particular year etc., it is compelled to restrict the number of sample companies to 18. Therefore, this study is expost facto based on survey method making a survey of eighteen companies in Indian Automobile Industry. There are 26 companies operating in the Indian Automobile Industry. The companies under Automobile Industry are classified into three sectors namely; Commercial Vehicles, Passenger Cars and Multiutility Vehicles and Two and Three wheelers.

For the purpose of the study all the three sectors have been selected. The selected sectors include 26 companies. Out of 26 companies, 5 are under commercial vehicles, 8 under passenger cars and multiutility vehicles and 13 under two and three wheelers sector. Out of 26 companies of the selected sectors, 13 years data is available for 18 companies only. Therefore, all the 18 companies are included in the sample (Table 5). It accounts for 69.23 per cent of the total companies available in the Indian Automobile Industry. The selected 18 companies include 5 under commercial vehicles, 4 under passenger cars and multiutility vehicles and 9 under two and three wheeler sectors. It is inferred that sample company represents 98.74 percentage of market share in Commercial Vehicles, 89.76 percentage of market share in Passenger Cars and Multiutility Vehicles and 99.81 percentage of market share in Two and Three Wheelers. Thus, the findings based on the occurrence of such representative sample may be presumed to be true representative of Automobile Industry in the country.

The period 1991-92 to 2003-04 is selected for this study of Indian Automobile Industry. This 13 years period is chosen in order to have a fairly long, cyclically well balanced period, for which reasonably homogeneous, reliable and up to-date financial data would be available. Further, the span chosen for the study is the period of the beginning of liberalization measures introduced by the Government of India. Hence, the period 1991-92 to 2003-04 is an era of growth of corporate performance in the manufacturing sector, particularly Automobile Industry and has got genuine economic significance of its own.

The study is mainly based on secondary data. The major source of data analysed and interpreted in this study related to all those companies selected is collected from "PROWESS" database, which is the most reliable on the empowered corporate database of Centre for Monitoring Indian Economy (CMIE). Besides prowess database, relevant secondary data have also been collected from BSE Stock Exchange Official Directory, CIME Publications, Annual Survey of Industry, Business newspapers, Reports on Currency and Finance, Libraries of various Research Institutions, through Internet etc. The study required variety of data; therefore, websites like http://indiainfoline.com, www.indiastat.com and www.google.com have been comprehensively searched.

SPECIFICATION OF PROFITABILITY MODEL

In order to explain the profitability determinants of Indian automobile Industry, the study considered the following regression model.

$$PM = \infty 0_{f,y} + \beta_1 (\log size_{f,y}) + \beta_2 (Leverage) + \beta_3 (CR_{f,y}) + \beta_4 (ITR_{f,y}) + \beta_5 (FATR_{f,y}) + \beta_6 (OPES_{f,y}) + \beta_7 (VI_{f,y}) + \beta_8 (PP_{f,y}) + \beta_9 (Growth_{f,y}) + I_{f,y}.$$

Where

PM: Measures the corporations' financial profitability with ratio of profit margin on sales for firm (f) in year (y).

$\infty 0_{f,y}$ - Constant term for firm (f) in year (y)

β – Regression co-efficient.

$\log size_{f,y}$ - Logarithms of firm size (total assets) for firm (f) in year (y)

$Leverage_{f,y}$ – Debt equity ratio for firm (f) in year (y)

$CR_{f,y}$ – Current ratio for firm (f) in year (y)

$ITR_{f,y}$ – Inventory Turnover Ratio for firm (f) in year (y)

$FATR_{f,y}$ – Fixed Assets Turnover Ratio for firm (f) in year (y)

$OPES_{f,y}$ – Operating Expenses to Sales ratio for firm (f) in year (y)

$VI_{f,y}$ – Vertical Integration for firm (f) in year (y)

$PP_{f,y}$ – Past Profitability (P_{t-1}) for firm (f) in year (y)

$Growth_{f,y}$ – Growth of assets for firm (f) in year (y)

$I_{f,y}$ - Disturbance term for firm (f) in year (y).

RESULTS AND INTERPRETATION

The model described above has been estimated for all the selected sectors of automobile industry and whole industry and the results are presented in Table 1 to 4. It presents beta co-efficient and t values of the variables.

WHOLE INDUSTRY

For the whole automobile industry, model explains 99 percentage of variation in profitability of firms included in the industry (Table 1). The analysis shows that all the variables except past profitability are found to be statistically significant in explaining profitability of Indian automobile industry. It is evident from the results that size is stronger determinant of profitability followed by vertical integration, current ratio, growth rate of assets, past profitability, leverage, inventory turnover ratio, fixed assets turnover ratio and operating expenses to sales ratio. As expected size, leverage, operation expenses to sales ratio, vertical integration and growth rate of assets did support our hypothesis with the expected sign. However the co-efficient of current ratio, inventory turnover ratio, fixed assets turnover ratio and past profitability did not support our hypothesis rather these appear with opposite sign.

It is evident from the result that co-efficient of size shows the increase of 16.48 percent in profitability as a result of one per cent increase in size, which is statistically significant at 5 per cent level. The co-efficient of leverage indicates that a decrease of 0.49 per cent in profitability as a result of one per cent increase in leverage which is significant at 10 per cent level. It is appeared from the result that value of one per cent increase in current ratio resulted in 10.79 per cent increase in profitability, which is significant at 5 percent level. Further, one per cent increase in inventory turnover ratio, fixed assets turnover ratio and operating expenses to sales ratio shows 0.71 per cent, 3.57 per cent and 9.76 per cent decrease in profitability respectively during the study period. All these co-efficient are statistically significant. It is also apparent from the table that co-efficient of vertical integration and growth rate of assets show 13.05 per cent and 0.20 per cent increases in profitability as the result of one per cent increase, which is significant at 5 per cent level. However, the co-efficient of past profitability shows that 0.07 per cent decrease in profitability as a result of one per cent increase in past profitability. This is not statistically significant.

The overall explanatory power of regression appears to be good. This may be inferred from the co-efficient of determination (R^2) which is the measure of extent of movement in the dependent variable that is explained by the independent variables. It is 99 per cent and the adjusted explanation is around 95 per cent.

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COMMERCIAL VEHICLES

For the commercial vehicles, model explains 94 percentage of variation in profitability of firms included in the industry (Table 2). The analysis shows that all the variables except current ratio and growth rate of assets are found to be statistically significant in explaining profitability of commercial vehicles sector. It is evident from the results that size is stronger determinant of profitability followed by vertical integration, fixed assets turnover ratio, past profitability, growth rate of assets, inventory turnover ratio, leverage, current ratio and operating expenses to sales ratio. As expected size, leverage, current ratio, fixed assets turnover ratio, operating expenses to sales ratio, vertical integration and past profitability did support our hypothesis with the expected sign. However the co-efficient of inventory turnover ratio and growth rate of assets did not support our hypothesis rather these appear with opposite sign.

It is evident from the results that co-efficient of size shows the increase of 16.11 per cent in profitability as a result of one percent increase in size, which is statistically significant at 5 per cent level. Further, one per cent increase in leverage, current ratio and inventory turnover ratio shows 0.98 per cent, 14.38 per cent and 0.18 per cent decrease in profitability respectively during the study period. All these co-efficient are statistically significant except current ratio. The co-efficient of fixed assets turnover ratio shows the increase of 5.27 per cent in profitability as a result of one per cent increase in fixed assets turnover ratio, which statistically significant at 5 per cent level. The co-efficient of operating expenses to sales ratio decrease to 30.63 per cent in profitability as a result of one per cent increase in operating expenses to sales ratio which is significant at 5 per cent level. Further one per cent increase in vertical integration and past profitability shows 13.32 per cent and 0.38 per cent increase in profitability respectively during the study period. All these co-efficient are statistically significant at 10 per cent level. However, the co-efficient of growth rate of assets shows that 0.02 per cent decrease in profitability as a result of one per cent increase in growth rate of assets. This is not statistically significant.

The overall explanatory power of regression appears to be good. This may be inferred from the co-efficient of determination (R^2) which is the measure of extent of movement in the dependent variable that is explained by the independent variables. It is 94 per cent and adjusted explanation is around 77 per cent.

PASSENGER CARS AND MULTIUTILITY VEHICLES

For the passenger cars and multiutility vehicles, model explains 95 percentage of variation in profitability of firms included in the industry (Table 3). The analysis shows that all the variables except past profitability are found to be statistically significant in explaining profitability of passenger cars and multiutility vehicles sectors. It is evident from the results that size is the strongest determinant of profitability followed by current ratio, fixed assets turnover ratio, past profitability, growth rate of assets, leverage, inventory turnover ratio, vertical integration and operating expenses to sales ratio. As expected size, leverage, fixed assets turnover ratio, operating expenses to sales ratio and past profitability did support our hypothesis with the expected sign. However the co-efficient of current ratio, inventory turnover ratio, vertical integration and growth rate of assets did not support our hypothesis rather these appear with opposite sign.

It is evident from the results that co-efficient of size shows the increase of 84.36 per cent in profitability as a result of one per cent increase in size, which is statistically significant at 5 per cent level. The co-efficient of leverage indicates that a decrease at 2.63 per cent in profitability as a result of one per cent increase in leverage which is significant at 10 per cent level. It is appeared from the result that value of one per cent increase in current ratio resulted in 20.89 per cent increase in profitability, which is statistically significant at 10 per cent level. Further, one per cent increase in inventory turnover ratio, operating expenses to sales ratio, vertical integration and growth rate of assets shows 3.35 per cent, 497.41 per cent, 482.28 per cent and 0.98 per cent decrease in profitability respectively during the study period. All these co-efficient are statistically significant. It is evident from the result that value of one per cent increase in fixed assets turnover ratio resulted in 9.01 per cent increase in profitability, which is significant at 5 per cent level. However, the co-efficient of past profitability shows that 0.13 per cent increase in profitability as a result of one per cent increase in past profitability. This is not statistically significant.

The overall explanatory power of regression appears to be good. This may be inferred from the co-efficient of determination (R^2) which is the measure of extent of movement in the dependent variable that is explained by the independent variables. It is 95 per cent and adjusted explanation is around 79 per cent.

TWO AND THREE WHEELERS

For the two and three wheelers, model explains 94 percentage of variation in profitability of firms included in the industry (Table 4). The analysis shows that all the variables except leverage and growth rate of assets are found to be statistically significant in explaining profitability of two and three wheelers sector. It is evident from the results that size is stronger determinant of profitability followed by inventory turnover ratio, past profitability, growth rate of assets, leverage, vertical integration, fixed assets turnover ratio, operating expenses to sales ratio and current ratio. As expected size, leverage, current ratio, inventory turnover ratio, operating expenses to sales ratio and past profitability did support our hypothesis with the expected sign. However the co-efficient of fixed assets turnover ratio, vertical integration and growth rate of assets did not support our hypothesis rather these appear with opposite sign.

It is evident from the results that co-efficient of size shows the increase of 23.53 per cent in profitability as a result of one per cent increase in size, which is statistically significant at 5 per cent level. The co-efficient of leverage indicates that a decrease of 1.41 per cent in profitability as a result of one per cent increase in leverage. This is not statistically significant. It is appeared from the result that a decrease of 37.66 per cent in profitability as a result at one per cent increase in current ratio, which is statistically significant at 5 per cent level. It is also apparent from the table that co-efficient of inventory turnover ratio and past profitability shows 3.72 per cent and 1.33 per cent increase in profitability as the result of one per cent increase, which is statistically significant. Further, one per cent increase in fixed assets turnover ratio, operating expenses to sales ratio and vertical integration shows 5.53 per cent, 29.34 per cent and 3.71 per cent decreases in profitability respectively during the study period. All these co-efficient are statistically significant at 10 per cent level. However, the co-efficient of growth rate of assets shows that 0.03 per cent decrease in profitability as a result of one per cent increase in growth rate of assets. This is not statistically significant.

The overall explanatory power of regression appears to be good. This may be inferred from the co-efficient of determination (R^2) which is the measure of extent of movement in the dependent variable that is explained by the independent variables. It is 94 per cent and the adjusted explanation is around 75 per cent.

CONCLUSION

It can be concluded from the above analysis that the selected variables explain 99 per cent of variation in profitability in Indian automobile industry, 94 per cent in commercial vehicles sector, 95 per cent in passenger cars and Multiutility vehicles sector and 94 per cent in two and three wheelers sector. It is evident from the results that size is the strongest determinant of profitability followed by the variables vertical integration, past profitability, growth rate of assets and inventory turnover ratio. The selected variables have both positive and negative contribution in variation of profit rate. In nutshell, it can be concluded that firms should consider all these possible determinants while considering its profitability.

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TABLES

TABLE 1: DETERMINANTS OF PROFITABILITY IN INDIAN AUTOMOBILE INDUSTRY

- Multiple Regression Model

[Dependent Variable: Ratio of profit margin on sales (P)]

[P = 32.59 + 16.48 S-0.49 L + 10.79 CR – 0.71 ITR – 3.57 FATR – 9.76

OESR + 13.05 VI – 0.07 PP + 0.20 GRA]

Variables	*Beta* Co-efficient	t value	Significant /Not significant
Constant	32.59	2.878	
Size (S)	16.48	3.625*	Significant
Leverage (L)	-0.49	1.648**	Significant
Current Ratio (CR)	10.79	3.472*	Significant
Inventory Turnover Ratio (ITR)	-0.71	3.215*	Significant
Fixed Assets Turnover Ratio (FATR)	- 3.57	4.416*	Significant
Operating Expenses to Sales Ratio (OESR)	-9.76	4.316*	Significant
Vertical Integration (VI)	13.05	5.759*	Significant
Past Profitability (PP)	-0.07	0.705	Not significant
Growth Rate of Assets (GRA)	0.20	6.054*	Significant
R^2 = 0.99			
Adj R^2 = 0.95			
F = *27.30*			
D.W = *2.03*			

D.W - Durbin - Watson statistics; * - significant at 0.05 level; ** - significant at 0.10 level

Source: Computed

TABLE 2: DETERMINANTS OF PROFITABILITY IN COMMERCIAL VEHICLES SECTOR

- Multiple Regression Model

[Dependent Variable: Ratio of profit margin on sales (P)]

[P = - 26.09 + 16.11 S – 0.98 L - 14.38 CR – 0.18 ITR + 5.27 FATR - 30.63

OESR + 13.32 VI + 0.38 PP - 0.02 GRA]

Variables	Beta Co-efficient	t value	Significant / Not significant
Constant	-26.09	2.275	
Size (S)	16.11	2.922*	Significant
Leverage (L)	-0.98	2.611*	Significant
Current Ratio (CR)	-14.38	1.398	Not significant
Inventory Turnover Ratio (ITR)	-0.18	2.062*	Significant
Fixed Assets Turnover Ratio (FATR)	5.27	3.154*	Significant
Operating Expenses to Sales Ratio (OESR)	-30.63	3.276*	Significant
Vertical Integration (VI)	13.32	1.967**	Significant
Past Profitability (PP)	0.38	2.331**	Significant
Growth Rate of Assets (GRA)	-0.02	1.226	Not significant
R^2 = 0.94			
Adj R^2 = 0.77			
F = *15.38*			
D.W = *2.16*			

D.W - Durbin - Watson statistics; * - significant at 0.05 level; ** - significant at 0.10 level

Source: Computed

TABLE 3: DETERMINANTS OF PROFITABILITY IN PASSENGER CARS AND MULTIUTILITY VEHICLES SECTOR

- Multiple Regression Model

[Dependent Variable: Ratio of profit margin on sales (P)]

[P = 256.59 + 84.36 S - 2.63 L + 20.89 CR - 3.35 ITR + 9.01

Variables	Beta Co-efficient	t value	Significant / Not significant
Constant	256.59	2.488	
Size (S)	84.36	2.682*	Significant
Leverage (L)	-2.63	1.683**	Significant
Current Ratio (CR)	20.89	1.787**	Significant
Inventory Turnover Ratio (ITR)	-3.35	2.843*	Significant
Fixed Assets Turnover Ratio (FATR)	9.01	2.369*	Significant
Operating Expenses to Sales Ratio (OESR)	-497.41	3.062*	Significant
Vertical Integration (VI)	-482.28	2.992*	Significant
Past profitability (PP)	0.13	0.274	Not significant
Growth Rate of Assets (GRA)	-0.98	3.046*	Significant
R^2 = 0.95			
Adj R^2 = 0.79			
F = *11.02*			
D.W = *1.93*			

FATR - 497.41 OESR - 482.28 VI + 0.13 PP - 0.98 GRA]

D.W - Durbin - Watson statistics ; * - significant at 0.05 level; ** - significant at 0.10 level

Source: Computed

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TABLE 4: DETERMINANTS OF PROFITABILITY IN TWO AND THREE WHEELERS SECTOR

- Multiple Regression Model

[Dependent Variable: Ratio of profit margin on sales (P)]

[P = 70.63 + 23.53 S – 1.41 L – 37.66 CR + 3.72 ITR – 5.53 FATR - 29.34

OESR – 3.71 VI + 1.33 PP - 0.03 GRA]

Variables	Beta Co-efficient	t value	Significant / Not significant
Constant	70.63	2.112	
Size (S)	23.53	1.998**	Significant
Leverage (L)	-1.41	0.634	Not significant
Current Ratio (CR)	-37.66	2.364*	Significant
Inventory Turnover Ratio (ITR)	3.72	2.268**	Significant
Fixed Assets Turnover Ratio (FATR)	-5.53	1.667**	Significant
Operating Expenses to Sales Ratio (OESR)	-29.34	1.639**	Significant
Vertical Integration (VI)	-3.71	1.652**	Significant
Past Profitability (PP)	1.33	3.682*	Significant
Growth Rate of Assets (GRA)	-0.03	0.647	Not significant
R^2 = 0.94			
Adj R^2 = 0.75			
F = 11.65			
D.W = 2.12			

D.W-Durbin -Watson statistics ; * - significant at 0.05 level; **- significant at 0.10 level

Source: Computed

TABLE 5: LIST OF SAMPLE COMPANIES INCLUDED IN THE PRESENT STUDY

Sl. No.	Sectors / Companies	Year of Incorporation	Ownership	Market share (%)	Total market share (%)
	Commercial Vehicles (5)				
1.	Ashok Leyland Ltd	1956	Hinduja Group	35.62	
2.	Tata Motors Ltd	1956	Tata Group	34.22	
3.	Bajaj Tempo Ltd	1958	Firodia Group	11.50	
4.	Eicher Motors Ltd	1982	Eicher Group	10.65	
5.	Swaraj Mazder Ltd	1983	State and Private Sector	6.75	98.74
	Passenger Cars and Multiutility Vehicles (4)				
6.	Hindustan Motors Ltd	1942	Birla C.K.Group	8.31	
7.	Mahindra and Mahindra Ltd	1945	Mahindra and Mahindra	42.17	
8.	Maruti Udyog Ltd	1981	Private (Foreign)	36.60	
9.	Daewoo Motors India Ltd	1983	Private (Foreign)	2.68	89.76
	Two and Three Wheelers (9)				
10.	Bajaj Auto Ltd	1945	Bajaj Group	18.80	
11.	LML Ltd	1972	LML Group	11.58	
12.	Maharashtra Scooters Ltd	1975	Bajaj Group	7.80	
13.	TVS Motor Company Ltd	1982	T.V.S. Group	12.93	
14.	Kinetic Motor Company Ltd	1984	Firodia Group	11.75	
15.	Hero Honda Motors Ltd	1984	Hero (Munsals) Groups	10.54	
16.	Kinetic Engineering Ltd	1970	Firodia Group	9.72	
17.	Majestic Auto Ltd	1986	Hero Group	9.04	
18.	Scooters India Ltd	1972	Central Govt. Commercial Enterprise	7.65	99.81

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