A Nexus between Capital Structure, Inventory and Firm Performance: A Study of Leading Indian Automobile Sector

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Abstract

The automobile sector is one of the most and growing and contributing sectors to the Indian economy. The Indian automobile sector companies' fund's composition and their velocity of operational activities or manufacturing velocity are significantly different. There are absolute and relational differences that have been seen in the context of their resources and their composition and frequency of utilization of the resources in the leading companies of the Indian automobile sector. The study considers the capital structure, inventory turnover, and its impact on the financial performance of the Indian automobile sector companies. The pooled regression, panel fixed, and random-effects models were applied to analyze the impact of capital structure and inventory turnover data on the financial performance of the Indian automobile sector companies for the period 2012 to 2020. The study considers the panel results with fixed and random effects in two models with ROA (return on assets) and ROCE (return on capital employed) as dependent variables. The study extracted the negative relationship between the D/E (debt-equity) ratio and financial performance while the positive relationship between the assets turnover ratio and the financial performance of the Indian automobile companies. The study is fruitful for the finance manager in defining the optimum capital structure in the Indian automobile sector and production manager in the optimization of the inventory.

Keywords: Capital structure, inventory turnover, financial performance, return on assets, return on capital employed, debt-equity ratio, Indian automobile sector.

Introduction

The financial performance of the firm can be measured in absolute and relative terms. The absolute terms reflect the level of production while the relative financial performance reveals the efficiency of the business organization. The level of inventory in the business organization indicates the level of financial performance of the firm in form of the physical production of the business organization. The velocity of the

usage of the inventory also indicates the managerial efficiency and the relative performance of the firms of the same industry. Also, the capital structure or composition of the firms' fund plays a vital role in the financial performance of the business organization as the fund manages the liquidity to buy the fixed resources to establish a firm and smooth running of the operational activities. The capital structure defines the firms' fund structure in form of internal and external sources. The internal sources belong to the real owners/shareholders while external sources of funds are the long-term liabilities to the business organization. There are no fixed charges to utilize the internal funds in the business organization. Only, there is a certain expectation of the shareholders associated with the return on equity funds. But, there are certain charges to use the external funds in a business organization. Irrespective of profit or loss, the business organization has to pay the contractual rate of external for utilization in business activities. The external fund is beneficial for the business organization while the rate of the return on overall funds is higher than the contractual rate of the external funds. Negatively, the utilization of the external funds for the business is negative while the average rate of the return on the business activities is lower than the contractual rate of the external funds. Hence, the capital structure can influence the profit of the business organization while the inventory turnover affects the profit and profitability of the firm. The Indian automobile industry is the growing sector among all the manufacturing industries in India. The leading Indian automobile companies have different capital structures and their velocity of inventory is different, mutually. So, there is a need to know the impact of the capital structure and inventory turnover on the financial performance of the leading companies of India.

Literature Review

Chen and Zhang (2013) found in their research the linkage between brand equity and capital structure. They associated the firm's performance with the brand equity and suggested that the companies with the higher brand equity can utilize the external funds in the cost composition. Karadagli (2013) suggested that the cash conversion cycle governs the profitability of the firm positively. He found that the companies can enhance the firm performance by shortening their cash conversion cycle. Chadha and Sharma (2015) analyzed that there is no impact of the financial leverage on the performance of the companies listed on the Bombay stock exchange. In the Indian manufacturing sector the financial performance is governed by the age, size growth of sales, turnover, and ownership structure of the manufacturing companies. Lee et al. (2015) found the positivity between the inventory turnover and the innovative methods of inventory management. The product processing innovation has a long-term impact while product innovation has the sort term impact on the performance of the firm, ultimately. Gaur and Kesavan (2015) analyzed that the growth rate of the sales is governed by the inventory turnover but the growth rate of the firm depends on the size of the firm. Prempeh (2015) found that raw material plays a vital role in inventory management and enhances the profitability of the manufacturing firms in Ghana. He recommended efficient inventory management to boost the profitability of the manufacturing firms of Ghana. Warrad and Al Omari (2015) carried out one study about the impact of turnover ratio on the service sector of Saudi Arabia and found that there is no significant impact turnover ratio on the ROA and ROE of Jordanian service sector firms. They found that in the Jordanian service sector educational services sector runs its activities utilizing the lowest while the health services sector applies the highest working capital in the activities. Transpiration and hotels and tourism sector has the lowest fixed turnover ratio and returns on assets ratio. Bin Syed et al. (2016) established that there is a significant and positive relationship between the ROA and shortening of the inventory days. Dada and Ghazali (2016) used Tobin's Q to analyze assets and fixed and tangible resources impact on to impact on Nigerian firm performance. They found that the assets turnover has a positive correlation with the Tobin Q. Further, they added that the age of the firm is negative while sales growth is positively related to the Return on assets. Elking et al. (2017) found the moderating relationship between the lean management of the inventory and financial performance. Jaisinghani and Kanjilal (2017) found that the firms exceeding the size limit benefited by the use of the debts in their capital structure. The firms

operating their activities on equity enjoy the benefits of the utilization of the external funds. They suggested that the smaller firms reduce their costs by reducing the external funds in their capital composition. Kwak (2019) observed an insignificant relationship between inventory turnover ratios and other ratios of profitability, productivity, stability, growth, and valuation of the companies. Shrotriya (2019) found that the sales of the firm can be enhanced by the maximum utilization of the total resources. Pandey and Sahu (2019) analyzed the negative effect of the debts on the performance of the firms. Ambadkar (2019) found that short-term debts are the vital mode of financing in foreign direct investment companies. Liquidity positively governs the returns on total investments and negatively governs the return on capital employed. Further, he revealed that the size and age of the firm and growth rate do not govern the profitability of the firm. Danso et al. (2020) observed that the firm's performance is negatively governed by financial leverage. The governance of the firm performance by the capital structure is effective in the larger firms than the smaller firms. Al-ahdal and Prusty (2020) studied the top listed Indian companies and revealed that the board structure index and firm size govern the return on capital employed and assets. Farhan et al. (2020) found that the short-term and long-term debts are negatively associated with the earning per share, return on assets (ROA), return on capital employed (ROA). Abdi and Bayu (2021) analyzed the impact of the large tax-paying organization in Ethiopia and found that the return on equity and short-term debts are positively correlated with the profitability of large construction companies. Bui (2021) studied the leverage and financial performance of the SMEs of Vietnam and found a non-linear relationship between the firm's profitability and debt financing. There is U Shape relationship between profitability and debts. The debts enhance the profitability of the firms up to a certain level and after that starts to decrease.Muhammad et al. (2021) found in their study a negative relationship between capital structure, corporate governance, and firm performance. The bigger board size is negative while independence and managerial ownership are positive for the firm performance. Panigrahi, et al. (2021) found that the inventory management practice positively governs the firm performance. Senan et al. (2021) investigated that the liquidity ratio effectively governs the financial leverage of Indian companies. There are very few studies available regarding the analysis of the combined impact of the capital structure, inventory turnover and their impact on the financial performance of the Indian automobile companies.

Data and Methodology

The current study examines the nexus between inventory, capital structure and firm performance by selecting a sample of eight firms from the Indian automobile sector for the period starting from 2012 to 2020 with 72 observations. The study data has been collected from the annual financial reports of sample companies available on the respective firms' website.

Study Variables

The current study considers Return on Assets (ROA) and Return on Capital Employed (ROCE) as financial performance variables. The Debt-equity (D/E) is usedas an explanatory variable in examining the relationship between capital structure and financial performance, while inventory turnover (ITR) is used to examine the association between inventory and financial performance. Further, the asset turnover (Asset turn) and firm size (Size) are used as control variables.

Study Variables			
S.No.	**Variable**	**Type**	**Formula**
1	Return on Assets (ROA)	Dependent	Net Income/Total Assets
2	Return on Capital Employed (ROCE)	Dependent	Net Income/Capital Employed
5	Debt- Equity (D/E)	Independent	Total Debt/Total Equity
6	Inventory Turnover (ITR)	Independent	Cost of Goods Sold/Average Inventory
7	Asset Turnover (ASSET TURN)	Independent	Total Sales/Total Assets
8	Size	Control	Log(Total Assets)

Hypothesis:

H_1: There is a negative association between capital structure and firm performance

H_2: There is a positive association between inventory turnover and firm performance.

Empirical Model:

The current study examines the association between capital structure, inventory and firm performance using pooled regression model and panel regression with fixed and random effects. The different estimated regression models:

Pooled Regression Model:

$$y_{i,t} = \beta_0 + \lambda_1 X_{i,t} + \varepsilon_{i,t}$$

Panel Regression Models:

$$y_{i,t} = \beta_i + \lambda_1 X_{i,t} + \varepsilon_{i,t} \quad \text{Fixed Effects)}$$

$$y_{i,t} = \beta_i + \lambda_1 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad \text{(Random Effects)}$$

Where y is the variable of financial performance measured in ROA and ROCE, is the constant, is the coefficient of explanatory and control variables, $_i$ = cross-section of firms; $_t$ = time $_i$ and $_{it}$ are the residuals of random effects and firm cross-section. The study uses Hausman test to select fixed effects or random effects model. The study tests model fitness with the help of Adjusted R^2 and F-statistic.

Empirical Results:

The current study presents empirical results in terms of descriptive statistics, correlation analysis and pooled regression and panel regression results. The regression results are reported in two models, where model 1 has ROA as dependent variable, while model 2 has ROCE as dependent variable. The descriptive statistics are shown in Table 1.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	SD	Min	Max
ROA	72	11.77	9.33	-11.64	36.12
ROCE	72	21.02	15.18	-16.02	56.17
D/E	72	0.259	0.347	0	1.35
ITR	72	19.56	9.52	5.76	43.43
ASST TURN	72	141.84	52.89	0	262.17
SIZE	72	4.17	0.651	0	4.79

The descriptive results show a mean ROA of 11.77 and mean ROCE of 21.02. The negative sign of both the variables show that some sample firms are facing losses. The range of D/E is between 0 and 1.35 with a mean of 0.26. The range shows that some automobile companies are holding debt more than equity. Further, the range of ITR is between 5.76 and 43.43 with a mean of 19.56. The range shows that the automobile companies holds larger inventories. The asset turnover shows that the automobile companies use total assets to a large extent. The firm size shows that the sample size consists of small and medium size companies.

Table 2: Correlation Analysis

Variable	ROA	ROCE	D/E	ITR	ASST TURN	SIZE
ROA	1.000					
ROCE	0.949	1.000				
D/E	-0.781	-0.736	1.000			
ITR	0.729	0.688	-0.642	1.000		
ASST TURN	0.426	0.424	-0.308	0.479	1.000	
SIZE	-0.426	-0.432	0.158	-0.039	-0.499	1.000

The correlation analysis reported in Table 2 shows that the D/E is negatively related with the performance variables, while the ITR is positively related. Further, one of the control variables is positively related with performance variables, while the relation of other is negative.

Table 4: Result of Pooled Regression Analysis

(A) Model 1A: ROA				
Variable	α	β	t-statistic	p-value
CONSTANT	11.28		2.31**	0.024
D/E		-18.33	-8.92***	0.000
ASST TURN		0.472	3.55***	0.001
SIZE		-0.351	-0.33	0.741
R^2 0.62				
F-statistic 40.19(0.000)				
(B) Model 1B: ROA				
Variable	α	β	t-statistic	p-value
CONSTANT	38.42		7.45***	0.000
D/E		-12.19	-6.45***	0.000
ITR		0.412	6.03***	0.000
SIZE		-7.41	-6.21**	0.000
R^2 0.80				
F-statistic 94.39(0.000)				
(C) Model 2A: ROCE				
Variable	α	β	t-statistic	p-value
CONSTANT	18.98		2.21**	0.031
D/E		-27.55	-7.61***	0.000
ASST TURN		0.081	3.46***	0.001
SIZE		-0.564	-0.30	0.763
R^2 0.56				
F-statistic 30.90(0.000)				
(D) Model 2B: ROCE				
Variable	α	β	t-statistic	p-value
CONSTANT	66.28		6.78***	0.000
D/E		-18.23	-5.09***	0.000
ITR		0.639	4.94***	0.000
SIZE		-12.46	-5.51**	0.000
R^2 0.72				
F-statistic 63.18(0.000)				

The study reports the results of pooled regression estimated in models 1 and 2. Table 4 reports the results of two models where ROA and ROCE are dependent variables. The result shows that the variables of capital structure (D/E) is negative and significant at the 1% level of significance in all the models and asset turnover (ASST TURN) is positive and significant at the 1% level of significance in models 1A and 2A with ROA and ROCE as dependent variables, while the inventory turnover (ITR) is also positive and significant at the 1% level of significance in models 1B and 2B. The firm size is negative in all the models. The adjusted R2 of all the models ranges from 0.56 to 0.72, which shows that the explanatory variables explain more than 50 percent of variation of ROA and ROCE. Furthermore, the F-statistic of all the models is significant at the 1% level of significance showing fitness of the model.

Model 1A: ROA				
Variable	Fixed Effects Model		Random Effects Model	
	β	t-statistic	β	t-statistic
CONSTANT	-15.65	-4.41***	-12.00	-2.89***
D/E	-3.96	-1.92*	-6.78	-3.16***
ASST TURN	0.096	6.53***	0.089	5.39***
SIZE	3.57	4.25***	3.11	3.49***
R2	0.25		0.37	
Prob>F	35.81 (0.000)			
Wald chi 2(4)			91.35 (0.000)	
F test	29.30 (0.000)			
Hausman test	Chi 2(3) = -34.57			
Model 1B: ROA				
	β	t-statistic	β	t-statistic
CONSTANT	17.13	1.56	30.93	3.82***
D/E	-7.63	-3.04***	-9.75	-4.31***
ITR	0.283	1.87*	0.417	4.05***
SIZE	-2.06	-0.78	-5.80	-3.09***
R2	0.77		0.80	
Prob>F	5.36 (0.002)			
F test	4.77 (0.000)			
Wald chi 2(4)			71.06 (0.000)	
Hausman test	Chi 2(4) = 5.69, Prob>chi2 = 0.128			
Model 2A: ROCE				
Variable	β	t-statistic	β	t-statistic
CONSTANT	-30.68	-4.37***	-22.20	-2.85***
D/E	-13.00	-3.18***	-17.20	-4.25***
ASST TURN	0.126	4.35***	0.121	4.38***
SIZE	8.92	5.35***	7.29	4.29***
R2	0.28		0.39	
Prob>F	31.93 (0.000)			
F test	21.32 (0.000)			
Wald chi 2(4)			83.92 (0.000)	
Hausman test	Chi 2(3) = 46.17 Prob>chi2 = 0.0000			
Model 2B: ROCE				
Variable	β	t-statistic	β	t-statistic
CONSTANT	-15.29	-0.80	27.96	1.84*
D/E	-15.28	-3.48***	-17.36	-4.15***
ITR	0.801	3.03***	0.769	3.98***
SIZE	5.90	1.27	-4.01	-1.14
R2	0.47		0.68	
Prob>F	11.86 (0.000)			
F test	7.07 (0.000)			
Wald chi 2(4)			59.46 (0.0000)	
Hausman test	Chi 2(3) = 14.33, Prob>chi2 = 0.0025			

The study reports the panel results with fixed and random effects in two models with ROA and ROCE as dependent variables. The results of model 1A and 1B with panel fixed effects shows a negative and significant relationship that the variables of capital structure (D/E) is negative and significant at the 1% level of significance in all the models and asset turnover (ASST TURN) is positive and significant at the 1% level of significance, while the inventory turnover (ITR) is also positive and significant at the 1% level of significance in models 1B and 2B. The firm size is positive along with inventory turnover and negative along with asset turnover.The adjusted R2 of models 1A and 1B is 0.25 and 0.77, while that models 2A and 2B is 0.28 and 0.47, which shows that the explanatory variables explain 44% in an average the variation of ROA and ROCE. Furthermore, the F-statistic of all the models is significant at the 1% level of significance showing fitness of the model. The Hausman test result shows that the random effects model is suggested for models 1A and 1B with ROA as a dependent variable, while fixed effects model is suggested for models 2A and 2B with ROCE as a dependent variable. Furthermore, the F-statistic of all the models is significant at the 1% level of significance showing fitness of the model.

Discussion of Result

The study examined the nexus between capital structure, inventory and firm performance of Indian automobile companies by estimating a regression with pooled, fixed and random effects. The results of pooled regression and panel fixed and random effects models show a negative association between the capital structure (measured by debt-equity (D/E)) and firm performance (measured in terms of ROA and ROCE). The result is in accordance with the previous studies of Pandey and Sahu (2019), Farhan et al. (2020), Jaisinghani and Kanjilal (2017) and Muhammad et al. (2021), whose studies reported a negative and significant association between capital structure and firm performance. Further, all the estimated models show a positive association between the inventory (measured by inventory turnover) and firm performance. The results of inventory confirm the results of previous studies of Gaur and Kesavan (2015), Prempeh (2015), Lee et al. (2015), Bin Syed et al. (2016) and Panigrahi et al. (2021), whole studies reported a positive association between inventory and firm performance. Therefore, the results of current study confirms H1 and H2 hypotheses, that there is a negative association between capital structure and firm performance and a positive association between inventory and firm performance.

Conclusion

The top management of a firm makes significant decisions for the growth of a firm. The financing decision among them is a key decision which comprises of capital structure, and it plays an important role in firms' value maximization. Similarly, the efficient inventory management leads to the firm to enhance its financial performance. The current study examined the effect of capital structure and inventory on the firms' financial performance. The studies in the past have established separate relationships with firm performance, while the current study has established a combined relationship between capital structure, inventory and firm performance by selecting eight firms from the Indian automobile sector during the period 2012 to 2020. The variables, such as Return on Assets (ROA) and Return on Capital Employed (ROCE) were considered as firm performance variables, while debt-equity (D/E) and inventory turnover (ITR) as capital structure and inventory variables. The pooled regression, panel fixed and random effects models were used to report the estimated results. The results report a negative and significant association between capital structure and firm performance and a positive and significant association between inventory and firm performance. The results reported by the study confirm the results reported by the past researches. The study results are useful to the financial managers in designing an optimal capital structure for the automobile companies, and also useful to the production, inventory and sales managers in optimizing the inventory. The study is limited to one sector only, i.e. the Indian automobile sector. The current study can be investigated further by including economic variables such as GDP, inflation, etc and by comparing with other industrial sector.

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