

IMPACT OF FINANCIAL LEVERAGE ON FIRM PERFORMANCE: A PANEL DATA ANALYSIS FOR SELECT AUTOMOBILE FIRMS LISTED IN NSE IN INDIA

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ABSTRACT

Purpose: This paper empirically examines the impact of debt structure on the performance of some select Indian automobile firms listed on the National Stock Exchange (NSE) and constituents of Nifty 50 during the seven years from 2016 to 2022.

Methodology: The study used the panel data regression technique and used multiple tests to choose the best model between the alternative models namely Pooled Regression Model (PRM), Fixed Effect Model (FEM), and Random Effect Model (REM). Six automobile companies being part of Nifty 50 listed in NSE were used for the seven years from 2016 to 2022. The data used strongly balanced panel data and relied on test statistics for the significance and reliability of the dataset.

Findings: The diagnostic tests in addition to the Hausman test confirmed FEM as an appropriate model for estimating the impact of debt structure on the performance of sample automobile firms for the first two equations whereas REM is found suitable for estimating the third and fourth regression equations. The results revealed the regression model using ROE and ROA as the dependent variable is the best fit and significant model. The other two regression models using P/E and EV/EBITDA as dependent variables are not significant as the model does not fit the data very well which can be evident from the value of R-squared i.e., only 15% and 8% respectively. The study found debt structure and the firm's size are negatively correlated with ROE on the other hand firm's size is negatively associated with ROA. Therefore, it can be concluded that debt structure and firm size have a negative effect on the performance of the sample automobile firms i.e., an increase in debt and firm size leads to a decrease in performance and vice versa.

Keywords: Financial Leverage, Firm Performance, Panel Regression.

Introduction

Debt capital or borrowed funds play a significant role in maximizing shareholders' value. The reasons are that debt capital is an inexpensive source of capital because it does not include flotation costs, and interest on debentures is a charge against profit hence it provides a tax advantage for a firm as suggested by Modigliani and Miller, 1963. However, debt capital involves a fixed obligation for a firm because of the repayment of interests at regular intervals with principal repayment at the end of maturity. Unlike the cost of equity capital, the cost of debt capital is a fixed expense for any firm and acts as a double-edged sword. According to the general theory of finance, leverage or trading on equity has a positive effect when a firm earns sufficient revenue and has a negative effect when unable to make payment for the fixed financial burden in the form of interest on debt, interest on preference capital, etc. So, a firm having a good profitability position can be able to bear this risk and create wealth for the firm but in a financial crisis when a firm does not have a favorable profitability position cannot service the debt which shall push the firm towards bankruptcy. Thus, judicious utilization of debt and equity capital in capital structure will be beneficial and lower the financial risk of non-payment of interests as per the traditional capital structure theory.

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Leverage or trading on equity is a tool for maximizing the value of the shareholders by employing debt capital in the capital structure. Several capital structure theories came into existence to deal with the issues of value maximization of the shareholders and optimum use of various sources of capital but the major problem with these capital structure theories is that none of them agree with other theories. The problem intensifies with the advent of several empirical studies that have been conducted globally by various researchers in this particular and allied area of study who also finds that the capital structure decision or leverage is an inconsistent determinant of value maximization. Capital structure theories are clustered into two segments, one is the capital structure relevance theory and the second is the capital structure irrelevance theory. Capital structure relevance theory backed by the Net Income Approach; Modigliani and Miller's, 1963 Approach; Traditional Approach, etc. are of the view that an increase in financial leverage leads to an increase in the value of the firm. Whereas, irrelevance theory supported by Net Operating Income Approach; Modigliani and Miller, 1958 Approach; Pecking Order Approach, etc. are of the view that capital structure decision is irrelevant and does not have any significant role in the value maximization of a firm.

So, several researchers across the globe find results that were distinct and cannot be generalized as such in terms of capital structure theories. The researchers found that leverage has positive as well as negative effects on the profitability and performance of the firms. Therefore, the present study will try to find out empirically the impact of debt structure on the performance of some select Indian Automobile firms quoted in the Nifty-fifty index on the National Stock Exchange in India.

Review of Literature

The literature related to the present study is very rich in the sense that in this particular and allied field of study large number of studies have been carried out. A major development has been seen in the study of financial leverage in comparison to operating leverage which mainly deals with operating income and sales.

Mistri and Chakraborti (2022), studied the impact of capital structure decisions on the profitability of a few selected large-cap Indian auto ancillary firms listed on the Bombay Stock Exchange. The study used ratio and panel data analysis for the study period from 2010-11 to 2020-21. The study revealed leverage is negatively and significantly associated with the profitability of the firm and the fixed asset turnover ratio is a significant determinant of firm profitability.

Sanjay J. Bhayani and Butala Ajmera (2018), empirically studied the effect of financial leverage on a firm's performance and valuation of selected pharmaceutical companies in India. The study selected five pharmaceutical companies covering a period of five years from 2012-13 to 2016-17. The study found financial performance and valuation of firms have insignificant impacts on financial leverage.

Krishna Dayal Pandey and Dr. Tarak Nath Sahu (2017), investigated the effect of financial leverage, firm performance, and value concerning Indian manufacturing firms. The study used moderately balanced panel data consisting of 56 manufacturing firms listed on the Bombay stock exchange (BSE) of India during the period from 2011 to 2016. The result shows a negative correlation between leverage with firm performance and value.

E. Chuke Nwude et. al. (2016), investigated the impact of debt structures on the firm performance of Nigerian quoted firms using 12 years of panel data during the period from 2001-2012. The results revealed that debt structure contributes negatively and significantly to firm performance and support the pecking order theory.

Kwadwo Boateng Prempeh et. al. (2016), investigated the effect of debt policy on the firm's performance of manufacturing companies listed on the Ghana stock exchange for the period from 2005 to 2015. The result shows that short-term debt, long-term debt, and total debt have a significant negative relationship with return on assets, a significant negative relationship between short-term debt and total debt with Tobin's Q, and a significant negative relationship between long-term debt and total debt with gross profit margin.

Niway Ayalew Admassu (2016), examined the impact of capital structure choice on firms financial performance of manufacturing private limited companies in the Tigray region, Ethiopia covering a period of seven years from 2006 to 2012. The results showed that capital structure variables have a negative and significant relationship with financial performance measures.

Corey Cole et. al. (2015), empirically studied the relationship between capital structure and firm performance of U.S. firms in the Industrial, Healthcare, and Energy sectors during the period from 2004 to 2013. The study articulated, that capital structure and firm performance vary from sector to sector, and the study supports the capital structure theory of MM as there is no relationship between capital structure and stock price.

Micheal O. Oke and Adefemi A. Obalade (2015), tested the validity of optimal capital structure theory in Nigerian listed oil firms using panel data of six companies covering a period of six years from 2005 to 2012. The study is in confirmation with static trade-off theory which holds that highly profitable firms should use more debt because there is little risk of bankruptcy and the tax shield is substantial.

Nawaz Ahmed et al. (2015), investigated the impact of financial leverage on firms' profitability of the Cement sector operating and listed in Pakistan covering a period of six years from 2005 to 2010. The study found negative and significant relationship exists between financial leverage and profitability.

R. Zeitun and G.G.Tian (2007), studied the effect of capital structure on corporate performance using a panel data sample representing 167 Jordanian companies during the period from 1989-2003. The study found that capital structure had a significant and negative impact on the firm's performance measured in both the accounting and market measures.

Therefore, the studies conducted widely produced highly conflicting results and cannot be inferred easily. So, the present study tries to fill up this research gap by studying the debt structure and its impact on the performance of the major automobile companies listed in the Nifty 50 index.

Objectives of the Study

Broadly, the study will investigate the effect of leverage on the performance of the sample automobile firms selected from the Nifty 50 index and listed on the NSE. The objectives can be subdivided into the following:

- The study will examine whether the debt structure has any influence on the performance of the sample firms.
- The study will investigate some factors or determinants that have a crucial role in affecting the performance of the sample firms.

Database and Methodology

The study is empirical in nature and mainly secondary data are used for analysis. The data are collected from the websites such as moneycontrol.com and screener.in. The study employed seven-year data for the period from 2010 to 2016. The study selected all six automobile companies from the Nifty 50 index listed on National Stock Exchange (NSE). The panel data regression technique has been used to empirically find out the relationship between the debt structure and the performance of select firms. The data comprised six firms studied over seven years hence, panel data analysis will give more robust and accurate results compared to cross-section and time-series data as the dataset has both the features of the cross-section and time-series datasets. Panel data analysis comprises three types of models for fitting panel data regression viz. Pooled Regression Model (PRM), Fixed Effect Model (FEM), and Random Effect Model (REM). To decide the best model among the three there are two ways. Firstly, if the regression model suffers from heteroscedasticity and autocorrelation then FEM or REM will be suitable for estimation. Alternatively, if the model does not violate the above assumptions, then PRM will be suitable for estimation. Further, the Hausman test will help to choose between FEM and REM. Secondly, choosing between the three regression models, the Hausman test, the Breusch Pagan Lagrange Multiplier test, and the Restricted-F test is applied. The Hausman test will help to choose between REM and FEM, the Breusch Pagan LM test will help to select between PRM and REM, and the Restricted-F test will help to select between FEM and PRM.

For estimating the performance Return on equity (ROE), Return on Assets (ROA), Price-Earnings Ratio (P/E), and enterprise value (EV) to earnings before interest, taxes, depreciation, and amortization (EBITDA) have been taken into account as the dependent variable for the study. Similarly, for estimating leverage i.e., the independent variable Debt-equity ratio (D/E) has been considered. For estimating the other independent factors or control variables that may have some impact on the dependent variable are the size of the firm measured by the natural log of total assets, the growth opportunity of the firm measured by three years compounded annual growth rate (CAGR) of sales and tangibility measured by total tangible assets of the sample firms.

The relationship of leverage with the performance of the automobile firms is thus estimated through the following four regression equations:

- $ROE_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 Size_{it} + \beta_3 Growth_{it} + \beta_4 Tangibility_{it} + e_{it}$
- $ROA_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 Size_{it} + \beta_3 Growth_{it} + \beta_4 Tangibility_{it} + e_{it}$
- $P/E_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 Size_{it} + \beta_3 Growth_{it} + \beta_4 Tangibility_{it} + e_{it}$
- $EV/EBITDA_{it} = \beta_0 + \beta_1 D/E_{it} + \beta_2 Size_{it} + \beta_3 Growth_{it} + \beta_4 Tangibility_{it} + e_{it}$

Data analysis and Empirical Findings**Table I: Overview of the Sample Companies**

Sl. No.	Company Name	Market Capitalization (in Cr. Rs.)	Average debt-equity Ratio
1	Maruti Suzuki	2,69,443*	0.00
2	Mahindra & Mahindra	1,63,597*	1.38
3	Tata Motors	1,53,355*	1.60
4	Bajaj Auto	1,16,640*	0.00
5	Eicher Motors	93,582*	0.01
6	Hero Motocorp	56,452*	0.02

Source: Authors' calculation

* As on 03-09-2022

Table I depicts the brief profile of the select companies used for the study. The table reveals that Maruti Suzuki is the largest company in terms of market capitalization followed by Mahindra & Mahindra at the second position, Tata Motors ranks third, Bajaj Auto ranks fourth, Eicher Motors at the fifth position, and Hero Motocorp ranks last in the table. The average debt-equity ratio of Mahindra & Mahindra and Tata Motors are 1.38 and 1.60 respectively which indicates these companies are moderately leveraged and topped the table in terms of average debt-equity ratio. Whereas, the debt-equity ratios of Maruti Suzuki, Hero Motocorp, Bajaj Auto, and Eicher Motors are the lowest meaning these four companies are either unlevered or less leveraged. Therefore, the sample consists of four companies that are either not levered or less leveraged while two companies are highly leveraged.

Table II: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROE	14.963	15.865	-47.90	36.62
ROA	11.047	9.091	-9.38	27.09
P/E	11.238	43.703	-247.78	58.87
EV/EBITDA	13.380	7.233	4.27	30.28
D/E	0.502	0.776	0	3.13
Size	10.786	1.223	8.50	12.75
Growth	569.552	2586.546	-10.28	16769.24
Tangibility	33701.270	52776.300	888.00	161952.00

Source: Authors' calculation

Table II represents the descriptive analysis of all the variables selected for the regression analysis. The table represents the mean, standard deviation, and minimum and maximum values to understand the characteristics of the dataset. The variable Return on Equity or ROE, Return on Assets or ROA, Price-Earnings ratio or P/E, and Enterprise Value divided by Earnings Before Interest, Taxes, Depreciation, and Amortization i.e., EV/EBITDA are dependent variables and used to measure the performance of the select firms. The mean value of ROE and ROA i.e., the return ratios of all six companies discloses the companies are providing a good return to the shareholders as well as creating wealth for the companies but both ratios also show high fluctuation in the earnings evidence from the values of standard deviation. On the other hand, the mean of both the performance indicators can be considered healthy but not consistent especially the value of the P/E ratio which shows a 43.70 standard deviation. The mean value of the debt-equity ratio reveals the selected firms are moderately leveraged. The mean values of the variables Growth and Tangibility are very high and also show a very high standard deviation meaning there is a significant variation in terms of growth and tangibility of the firms. The dataset demonstrates a very high range throughout all the variables, particularly Growth and Tangibility except for the variable Debt-Equity ratio.

Table III: Parameter Estimates (Dependent Variable: ROE)

Variables	PRM	FEM	REM
C	59.2278 (0.0347)*	225.2797 (0.0048)*	59.2278 (0.0233)*
D/E Ratio	- 4.9772 (0.1882)	- 12.9427 (0.0140)*	- 4.9772 (0.1561)
Size	- 3.6216 (0.1834)	- 18.9614 (0.0120)*	- 3.6216 (0.1516)
Growth	0.0007 (0.3106)	0.0002 (0.7789)	0.0007 (0.2741)
Tangibility	- 0.8200 (0.1090)	1.8900 (0.9497)	- 8.8200 (0.0844)
R-square	0.6012 / 60%	0.7043 / 70%	0.6012 / 60%

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table IV: Diagnostic Tests

Objective	Null Hypothesis	Test statistic	Result
Test for Heteroskedasticity	Constant variance	26.68 (0.000)*	Null Rejected
Test for Autocorrelation	No first-order autocorrelation	2793.054 (0.000)*	Null Rejected
Hausman Test	REM is appropriate	10.767 (0.029)*	Null Rejected

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table III illustrates the coefficient values estimated through PRM, FEM, and REM using ROE as the dependent variable. Table IV demonstrates the test statistic of the test for heteroskedasticity and the test for autocorrelation. From the diagnostic tests, it is found that the model estimated with the dependent variable ROE is heteroskedastic and autocorrelated as the probability value is less than 0.05 hence, we failed to accept the null hypothesis. Thus, the test statistic indicates that estimating the model with FEM or REM is better than PRM. Again, the Hausman test is conducted to choose between FEM and REM. The test static of the Hausman test indicates that FEM is appropriate for estimating the model using ROE as a dependent variable because the p-value is less than 0.05 hence null hypothesis cannot be accepted. From the FEM, it can be observed that the coefficient values of the variable D/E ratio and Size are negatively and significantly correlated whereas the coefficient values of the variable Growth and Tangibility are positively but insignificantly correlated. The 70% value of R-squared demonstrates that the model fits the data very well.

Table V: Parameter Estimates (Dependent Variable: ROA)

Variables	PRM	FEM	REM
C	70.8997 (0.0000)*	157.5016 (0.0000)*	107.8271 (0.0000)*
D/E Ratio	-2.4822 (0.0680)	-2.1034 (0.1718)	-1.7649 (0.2194)
Size	-5.4519 (0.0000)*	-13.5944 (0.0000)*	-9.0621 (0.000)*
Growth	0.0003 (0.1916)	9.4400 (0.6344)	0.0002 (0.3183)
Tangibility	2.2222 (0.9082)	3.5500 (0.6945)	5.2600 (0.1811)
R-square	0.8465/85%	0.9177/92%	0.6275/63%

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table VI: Diagnostic Tests

Objective	Null Hypothesis	Test statistic	Result
Test for Heteroskedasticity	Constant variance	0.92 (0.338)	Null Accepted
Test for Autocorrelation	No first-order autocorrelation	59.813 (0.000)*	Null Rejected
Hausman Test	REM is appropriate	9.602 (0.048)*	Null Rejected

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table V demonstrates the coefficient values estimated through PRM, FEM, and REM using ROA as the dependent variable. Table VI reveals the test statistic of the test for heteroskedasticity and the test for autocorrelation. From the diagnostic tests, it is found that the model estimated with the dependent variable ROE is autocorrelated as the probability value is less than 0.05 hence, we failed to accept the null hypothesis. However, the model is homoscedastic since the p-value is greater than 0.05, thus accepting the null hypothesis. So, the test statistic indicates that estimating the model with FEM or REM is better than PRM. Also, the Hausman test is conducted to choose between FEM and REM. The test static of the Hausman test indicates that FEM is appropriate for estimating the model using ROA as a dependent variable because the p-value is less than 0.05 hence null hypothesis cannot be accepted. From the FEM, it can be observed that the coefficient value of the variable size is negatively and significantly correlated whereas the coefficient value of the variable D/E ratio is negatively and Growth and Tangibility are positively but insignificantly correlated. The model fits the data very well evidenced by a high value of R-squared i.e., 92%.

Table VII: Parameter Estimates (Dependent variable: P/E)

Variables	PRM	FEM	REM
C	-38.9713 (0.7219)	-113.4375 (0.7377)	-38.9713 (0.7320)
D/E Ratio	-33.2384 (0.0322)*	-18.2255 (0.4233)	-33.2384 (0.0389)*
Size	5.7907 (0.5931)	17.4569 (0.5906)	5.7907 (0.6072)
Growth	0.0002 (0.9405)	0.0004 (0.8965)	0.0002 (0.9427)
Tangibility	0.0001 (0.5520)	-0.0016 (0.2348)	0.0001 (0.5671)
R-square	0.1501/15%	0.2056/20%	0.1501/15%

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table VIII: Diagnostic Tests

Objective	Null Hypothesis	Test statistic	Result
Test for Heteroskedasticity	Constant variance	49.07 (0.000)*	Null Rejected
Test for Autocorrelation	No first-order autocorrelation	0.069 (0.804)	Null Accepted
Hausman Test	REM is appropriate	2.144 (0.709)	Null Accepted

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table VII reveals the coefficient values estimated through PRM, FEM, and REM using P/E as the dependent variable. Table VIII discloses the test statistic of the test for heteroskedasticity and the test for autocorrelation. From the diagnostic tests, it is found that the model estimated with the dependent variable P/E is heteroskedastic as the probability value is less than 0.05 hence, we failed to accept the null hypothesis. However, the model is not autocorrelated or has no first-order autocorrelation since the p-value is greater than 0.05 and thus accepts the null hypothesis. Therefore, the test statistic shows that estimating the model with FEM or REM is better than PRM. Also, the Hausman test is conducted to choose between FEM and REM. The test static of the Hausman test indicates that REM is appropriate for estimating the model using P/E as a dependent variable because the p-value is greater than 0.05 hence null hypothesis is accepted.

The REM reveals that the coefficient value of the variable D/E ratio is negatively and significantly correlated whereas the coefficient values of the variable's size, Growth, and Tangibility are positively but insignificantly correlated. However, the model does not fit the data very well which can be evident from the value of R-squared i.e., only 15%.

Table IX: Parameter Estimates (Dependent Variable: EV/EBITDA)

Variables	PRM	FEM	REM
C	44.1943 (0.0062)*	2.3635 (0.9461)	28.6966 (0.2562)
D/E Ratio	-0.6584 (0.7545)	2.1378 (0.3641)	1.4161 (0.5224)
Size	-2.7579 (0.0747)	1.1539 (0.7304)	-1.2914 (0.5984)
Growth	-0.0003 (0.3517)	0.0001 (0.7310)	1.9400 (0.9484)
Tangibility	-1.7700 (0.5620)	-7.5600 (0.5885)	-6.2500 (0.3206)
R-square	0.3920/39%	0.6904/69%	0.0826/8%

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table X: Diagnostic Tests

Objective	Null Hypothesis	Test statistic	Result
Test for Heteroskedasticity	Constant variance	4.75 (0.029)*	Null Rejected
Test for Autocorrelation	No first-order autocorrelation	38.667 (0.002)*	Null Rejected
Hausman Test	REM is appropriate	3.092 (0.543)	Null Accepted

Source: Authors' calculation

* Significant at 0.05 or 5% level

Table IX illustrates the coefficient values estimated through PRM, FEM, and REM using EV/EBITDA as the dependent variable. Table X shows the test statistic of the test for heteroskedasticity and the test for autocorrelation. From the diagnostic tests, it is found that the model estimated with the dependent variable P/E is heteroskedastic and autocorrelated as the probability value is less than 0.05 hence, we failed to accept the null hypothesis. Also, the Hausman test is conducted to choose between FEM and REM. The test static of the Hausman test indicates that REM is appropriate for estimating the model using EV/EBITDA as a dependent variable because the p-value is greater than 0.05 hence null hypothesis is accepted.

The REM reveals that the coefficient values of the variable size and Tangibility ratio are negatively correlated whereas the coefficient values of the variables D/E and Growth are positively correlated but none of the variables are significant. Also, the model does not fit the data very well which can be evident from the value of R-squared i.e., only 8%.

Conclusion

The analysis was conducted in three steps. Firstly, the brief overview of the sample companies revealed that only two out of six companies have employed debt capital in their capital structure. So, it can be said that only two companies namely Mahindra & Mahindra and Tata Motors are leveraged and the other four companies are debt-free.

Secondly, in analyzing the descriptive statistics, the study found that the companies are providing good returns as well are generating wealth for the sample firms. But the values are widely scattered from the mean thus inconsistent performance can be observed regarding ROE and P/E evident from the standard deviation, maximum and minimum values.

Thirdly, from the regression analysis, the study revealed that the regression equations using ROE and ROA as the dependent variable are good fit models, and the other two using P/E, and EV/EBITDA as the dependent variable are not good fit models. The study revealed the co-efficient values of the variables size and debt-equity ratio are negatively and significantly correlated in the first equation whereas in the second equation the variable size is negatively and significantly correlated. The variable debt-equity ratio is also negatively and significantly correlated in the third equation but the model does not have enough explanatory power evident from the value of r-squared.

Therefore, it can be concluded that overall debt structure influences the automobile firms negatively and the size of the firm also impacted the performance of the firms negatively, however, most of the firms are nearly debt-free but the analysis revealed a negative association with the financial leverage and size of the firm.

Limitations of the Study

- The study will be restricted to only six automobile firm constituents of the Nifty 50 index listed in NSE.
- The period of study will be confined to only seven years as per the availability of data.
- The study is confined to the companies listed on NSE only.
- There presents an advanced methodology however the study is confined to panel data analysis only.

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