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Effect of Capital Structure on Shareholder Value: Evidence from Panel ARDL Approach

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Abstract

This study examines the effect of capital structure on the shareholders' value in Indian pharmaceutical industry collecting data over a period from 2001 to 2020. Further, the study also investigates the long-run and short-run relationship between capital structure and shareholder value. This study employs pooled, fixed, random effect regression models and panel autoregressive distributed lag analysis. The shareholder value of Indian firms is measured by earnings per share (EPS) and market value added (MVA) while the debt-equity ratio, interest coverage ratio, and total liabilities to total assets are the proxy variables for capital structure. The study reveals that capital structure influences shareholder value significantly. The findings also explored the existence of a long-run relationship between capital structure and shareholder value.

Keywords: Capital Structure; Shareholder Value; Earnings per Share; Market Value Added; Interest Coverage Ratio

1. INTRODUCTION

In the competitive world, increasing owners' value is the cornerstone of the financial management. For efficient decisions, top-level management is making efforts to enhance shareholder value. In corporate finance, firms' capital structure decisions are one of the most crucial financing decisions. In order to achieve higher profits and shareholder value, the finance manager generally poses a challenge to striking the right balance between equity and debt.

Despite decades of in-depth research, after the publication of Modigliani and Millers' seminal work, capital structure has grabbed the attention of many researchers, practitioners, and academicians. However, even today, there is a lack of consensus among finance experts on the fundamental issue of corporate finance. However, the two competing theories that dominate modern capital structure theory are the trade-off theory and the pecking order theory.

Large companies are the result of globalization and the industrial revolution. In order to survive and increase competitiveness, joint stock companies sell their shares to accumulate finance. While purchasing more stocks, investors consider the market value and its effective factors. Investors decide to purchase or not to purchase shares by predicting the fluctuations in price and value with knowledge of factors' effects on firm value (Neveu, 1981). Capital structure is how a company arranges its finances through equity and debt. It maximizes the company's market value in long-run. The choice of an optimal capital structure leads to a low cost of capital and enhances the market value of share (Vatavu, 2015). Reduced capital costs helps to accumulate higher returns, thereby increasing shareholders' wealth (Hedayatzadeh, 2013). Size, growth, liquidity, tangibility, and profitability are the various determinants of capital structure (Serghiescu & Văidean, 2014). The different accounting indicators, such as return on equity (ROE), return on assets (ROA), and earnings per share (EPS) are used to assess a firm performance. However, appropriate measure to ascertain the maximization of shareholder wealth is a

matter of concern for the investors (Eljelly & Alghurair, 2001). As the traditional indicator reveal less information concerning economic worth, new performance indicators like economic value added (EVA), shareholder value added (SVA), and market value added (MVA), are suggested by researchers in recent times (Bhasin & Shaikh, 2013; Chen & Dodd, 1997; Nel, 2010).

The previous literature has discussed the linkage between capital structure and firm value regionally and globally. However, there is no consensus regarding the relevance of capital structure theories in general and specifically to pharmaceutical industries. Globally, the Indian pharmaceutical industry stands in the third position by volume and fourteenth by value. Further, India is the largest supplier of generic drugs across the world. India's pharmaceutical sector constitute a prominent constituent of the economy's international trade, having lucrative possibilities for investors. For 2019-2020, the annual turnover of pharmaceuticals was Rs 2,89,998 crore. The country's external trade were Rs 1,46,260 crore and Rs 42,963 crore correspondingly. Generic drugs, API/Bulk Drugs, OTC Medicines, Vaccines, Contract Research, production of Biosimilars, and Biologics, are the main sections of this industry.

This paper adds to the present literature in two ways. Firstly, it attempts to analyze the effect of capital structure on shareholders' value in the pharmaceutical sector in the Indian context by applying panel analytical methods such as fixed effect and random effect estimations. Secondly, to our knowledge, there is absence of studies using panel autoregressive distributive lag (PARDL) analysis to investigate the long and short-run effects on the capital structure and shareholder value. Hence, the main purpose of this study is to analyze the effect of capital structure on shareholder value in 13 NSE-200 listed Indian pharmaceutical firms over 19 years, from 2001 to 2020. The remaining parts of the paper are arranged as follows. The section "Review of literature" contains theoretical and empirical studies. The data and econometric model applied in the article are mentioned in Section "Research Methodology." Section "Empirical findings" revealed the results, and "Conclusion" Section presented the conclusion and future research agenda.

2. PRIOR LITERATURE

2.1 Theoretical Perspective

Capital structure has become a critical financing decision in recent time. An optimum capital structure can be ensured by reducing the weighted average cost of capital, and enhancing the market price of share, thereby maximizing shareholders' value. The theoretical section describes different theories of capital structure. Modigliani & Miller, (1958), under a set of assumptions (perfect capital markets), argued that capital structure does not affect firm value. The trade-off theory states that a firm reaches its optimum capital structure through a trade-off between tax advantages of debt and bankruptcy costs (Baxter, 1967; Leland, 1994; Leland & Toft, 1996). Kraus & Litzenberger, (1973) determined that a striking balance between costs and debt advantages can lead to an optimum capital structure by considering investment as constant. (Berens & Cuny, 1995) revealed that the company could consider the tax advantages by considering debt for equity until the optimum capital structure is attained. In the same line, (Wellalage & Locke, 2014) tried to explore the factors determining the capital structure. However, the question of the level of debt financing remains unanswered. Myers, (2001) gave assumptions on the Pecking order theory and focussed that such theory is based on information asymmetry between firm's management and stakeholders. It also states that a firm makes its own choice of internal and external sources of fund. Further, considering American countries, Frank & Goyal, (2003) suggested that the theory is essential compared to the other theories but has some drawbacks relating to providing information on bankruptcy costs and various determinants of the capital structure, as (Quan, 2002)detected. Jensen & Meckling, (1976) have given Agency theory and introduced agency costs which reduce the firm's value by increasing the cost of equity. However, good corporate governance can increase the firm's value and maximize the shareholder's wealth by decreasing agency costs.

2.2 Empirical Perspective

Though there are several researches regarding the effect of capital structure on shareholders' value in various countries, but limited research has been witnessed in the Indian context. For instance, (*Thauti*, 2013) explored the association of capital

structure with shareholder value for listed firms listed in Kenya. Multiple regression model was employed and confirmed the negative association between leverage and Market-to-Book ratio. Further, the study recommended that companies listed in NSE must follow the financing hierarchy according to the pecking order theory. (Tak, 2016) attempted to understand how shareholders' wealth is affected by capital structure processes. The study concluded the presence of a correlation between profitability and firm size with capital structure. The negative relation of liquidity and tangibility of assets with capital structure indicated the unfavourable increment of shareholder's wealth. (Chondough, 2022) conducted a review on the link between capital structure and EPS and found the existence notable number of studies on the influence of EPS on the capital structure in Europe and Latin America. Further, the study reported an unidirectional approach. Olweny (2017) confirmed the significant effect of EPS on the capital structure in Nigeria. Shahreza and Ghodrati, (2014) analysed the connection between capital structure and economic value added of companies in the Iran context. Dhananjaya, (2018) focussed on understanding the effect of market value on the capital structure of Indian manufacturing firms. The paper documented a negative bearing of market value on the debt ratio both in the short-term and long-term based on the timing of the market. Additionally, it is revealed that a negative effect is due to the variation in equity issuance rather than variation in retained earnings or borrowings redemption. Venugopal et al., (2018) analyzed the influence of capital structures on shareholders' value by taking into account CSV as a measure of shareholder value. The study explored that the debt-equity ratio, long-term debt ratio, and short-term debt ratio are directly proportional to Capital Structure and inversely proportional to total debt ratio. Saeed et al., (2014) analyzed the impact of capital structure on textile firms' shareholder wealth and financial performance for 6 years, i.e., from 2006 to 2011. They conclude that shareholder wealth and capital structure are significantly related. Bhatnagar et al., (2015) carried research on the influence of capital structure and cost of capital on shareholder wealth maximization in India. He found a significant association of shareholder wealth maximization with cost of capital. Atiyet, (2012a) made a study to investigate the impact of financing decisions on shareholder value. The study concluded that financial debt has a positive effect on EVA and a negative impact on MVA. According to (Petravicius & Tamosiuniene, 2008), EVA, MVA, and cash value added are the significant variables to measure shareholder value. Rehan et al., (2020) explored the nexus between capital structure and the pharmaceutical companies' financial performance on the Pakistan stock exchange. The study revealed that capital structure is adversely related to profitability.(Fernandez, 2002) proposed a concept of creating shareholder value that enhances shareholder wealth, considered one of the major measures of shareholder value.

Many researchers such as (Sinha, 2017), (Almahadin & Oroud, 2019), (Oyedokun & Sanyaolu, 2018),(Mohammadzadeh et al., 2013), (Gunawan et al., 2018), (Alfi & Safarzadeh, 2016), (Aggarwal & Padhan, 2017)have focussed on how capital structure affects firms' performance, firm value, and shareholder value. There is minimal research done on examining the long and short-run association of capital structure with shareholder value.

The present research tries to fill the gap by examining how capital structure affects shareholder value in the long and short run by applying Panel ARDL analysis. In order to improve the performance of the organization and increase shareholder value from an Indian perspective, this study intends to present vital fact on the significance of capital structure in financial decision making. In doing so, the study examines the capital structure of firms in the Indian pharmaceutical sector and its effects on shareholder value.

3. RESEARCH METHODOLOGY

3.1 Data and variables

For this study, annual data for 2001 to 2020 have been collected for pharmaceutical firms listed on the NSE-200 from the PROWESS database of the CMIE (Centre for Monitoring the Indian Economy). The years 2021 and 2022 have been excluded from the analysis due to the industry's abnormal performance due to the onset of the Covid-19 pandemic. The sample used consists of 260 firm-year observations for 13 pharmaceutical firms that are listed under NSE-200. Table 1presents the variables related to the study.

Table 1: Variable Description

Symbol	Variable	Description	Source
Y_{it}	Earnings per share	(Net income-preferred dividends) ÷ Average outstanding common shares	(Arowoshegbe & Emeni, 2014; Mujahid & Akhtar, 2014)
	Market value added	The current market value of the firm – Capital contributed by shareholders	(Atiyet, 2012b; Keef & Roush, 2002)
D/E_{it}	Debt-equity ratio	Total debt ÷ Total equity	(Abor, 2005; Le, 2015)
ICR_{it}	Interest coverage ratio	EBIT ÷ Interest expense	(Hoque et al., 2014; Kumar & Bindu, 2021)
$TLTA_{it}$	Total liabilities to total assets	Total liabilities ÷ Total assets	(Abughniem et al., 2020; Singh & Bagga, 2019)
$PROF_{it}$	Profitability	Net income ÷ Total assets	(Chen et al., 2018; Dang et al., 2019)
OCF_{it}	Operating cash flows	Operating income + Depreciation + Change in working capital - Taxes	(Alfi & Safarzadeh, 2016)
WC_{it}	Working capital	Total Current Assets – Total Current Liabilities	(Alfi & Safarzadeh, 2016)
Age_{it}	Firm age	A dummy that takes the value 1 if a firm has incorporated for more than 50 years and o otherwise	(Ahmad & Aris, 2015)

Source: Author's compilation

3.2 Econometric Model

The present paper has applied panel regression to trace the association between capital structure and shareholder value, considering company differences from 2001 to 2020.The fixed effect regression model was found appropriate from panel diagnostic tests for the following model.

The current study uses the following model (Abor, 2005; Chowdhury & Chowdhury, 2010; Dawar, 2014; Jiraporn & Liu, 2008; Seetanah et al., 2014; Singh & Faircloth, 2005; Zeitun & Haq, 2015).

Model 1

$$SV_{it} = \alpha_i + \beta_1 D/E_{it} + \beta_2 ICR_{it} + \beta_3 TL\_TA_{it} + \beta_4 PROF_{it} + \beta_5 OCF_{it} + \beta_6 WC_{it} + \beta_7 DAGE_{it} + \varepsilon_{it} \text{----(1)}$$

Two proxy variables are used in Eq. (1) to determine shareholder value. The shareholder value is to be influenced by capital structure (D/E, ICR, TL_TA) in-firm i of the year t, other control variables (PROF, OCF, WC), and dummy variable (Firm age). The paper uses a holistic approach compared to different estimation approaches. The paper uses a structural Panel Autoregressive Distributed Lag Model (PARDL) to examine capital structure's long and short-run impact on shareholder value.

3.3 Estimation strategy

This study considers the capital structure of NSE-listed pharmaceutical firms. EViews were used to estimate the results. The influence of capital structure on shareholder value was examined using fixed effects and the random effect model. The fixed-effect model assumes that experiments are sampled from a single population and that individual effect sizes are uniform. According to the random-effect model, the true effect magnitude varies from research to study. Panel autoregressive distributed lag estimates were also used to analyze bidirectional causation and overcome endogeneity issues. Another panel data analysis assessment method is the extended framework method of moments (Blundell & Bond, 1998).When the data consists of shorter time series, the GMM system is more powerful. The GMM approach requires the variables to be differentiated by utilizing small lags. One of its flaws is the asymptotic weakness of the estimator's accuracy and the instruments, which involve significant bias in small samples. This study varies from others in that it takes a different method.

Moreover, the Panel Autoregressive Distributed Lag (ARDL) approach determines the nature of the long-run and short-run association. It uses Pooled Mean Group (PMG) model, as recommended by (Pesaran et al., 1999). The fundamental benefit of the ARDL approach is its consistency, regardless of whether the underlying regressors display *I(0), I(1),* or a combination. The paper also applies the MG (Mean Group) and DFE (Dynamic Fixed Effects) estimators (Pesaran et al., 1999; Pesaran & Smith, 1995; Pesaran et al., 1997). The Hausman test is applied to validate each estimator's importance. To calculate the required lag length, the study applies Schwartz Information Criteria (SIC).

The PMG estimator's key benefit is that it limits the long-run coefficient homogeneity across company hypotheses while allowing for variability in the short-run relationship. Several factors can support the proposition of same long-term equilibrium connection across cross sections, including employing the same technology or adopting uniform policies. The MG estimator, on other hand, permits heterogeneity for both the short-run and long-run coefficients. The MG estimator generates reliable results of the average parameters but ignores the possibility that certain parameters are the same across all panel groups. The MG estimator is asymptotically normal for high N and large T, provided that $\sqrt{N}/T \to 0$for both N and $T \to \infty$, as demonstrated by (Hsiao et al., 1998). Additionally, while being a consistent estimator, MG is not expected to act as successful estimator for a tiny N or small T, according to their experiments. The DFE estimator, in contrast, limits the rate of adjustment and the long-run and short-run coefficients to show homogeneity across cross sections. This estimator is acceptable if cross sections respond similarly in the short- and long-term.

The following is the panel ARDL model employed to examine the causal linkage of capital structure with shareholder value:

Model 2

$$y_{it} = \alpha_i + \sum_{l=1}^{p} \beta_0 \, y_{i,t-l} + \sum_{l=0}^{q} \beta_1 \, CS_{i,t-l} + \sum_{l=0}^{q} \beta_2 \, x_{i,t-l} + \mu_{it} \text{---------- (2)}$$

The above equation can also be written as:

Model 3

$$\Delta y_{it} = \alpha_i + \phi_i\left(y_{i,t-l} - \theta_1 CS_{i,t-l} - \theta_2 x_{i,t-l}\right) + \sum_{l=1}^{p-1} \lambda_{il}\, \Delta y_{it-l} + \sum_{l=0}^{q-1} \delta_{il}\, \Delta CS_{i,t-l} + \sum_{l=0}^{q-1} \omega_{il}\, \Delta x_{i,t-l} + \mu_{it}$$
---------- (3)

Where i and t represent the company and the year, correspondingly, y is the shareholder value, CS the capital structure expressed by debt-equity ratio, interest coverage ratio, total liabilities to total assets, and x represents control variables: profitability, operating cash flows, and working capital. Notation $\lambda, \delta,$ and ω represents short-run coefficients of $y, cs,$ and other control variables, respectively, where $\theta_1$and$\theta_2$stand for the long-run coefficients of CS and the vector of control variables $x,$ correspondingly. Finally, $\phi_i$denotes the adjustment speed of long-run equilibrium.

We outline the empirical findings in the next section. We use different unit root tests (LLC given by Breitung, (2000) and Levin et al., (2002); IPS suggested by Im et al., (2003); and CIPS suggested by Pesaran, (2007)) to diagnose the stationarity of variables before estimating the panel ARDL model. To analyze the long-run association and compare their findings with those of the ARDL models estimates, Cross-Sectional (CD) (Pesaran, 2004), which considers the existence of cross-sectional dependency, and panel cointegration Johansen-Fisher tests are also used.

4. Empirical Findings and Discussion

4.1 Panel unit root tests

Table 2: Results of panel unit root tests (At level)

	LLC		**IPS**		**Breitung**
Variables	Constant	Constant/ Trend	Constant	Constant/ Trend	Constant/ Trend
EPS	-3.0455 (0.0012)	-3.4499 (0.0003)	-1.9892 (0.0233)	-3.2616 (0.0006)	-2.2077 (0.0136)
MVA	-2.5275 (0.0057)	-1.8833 (0.0298)	-2.1145 (0.0172)	-2.4783 (0.0066)	-1.2177 (0.1117)
D/E	-3.2733 (0.0005)	-7.8913 (0.0000)	-2.3270 (0.0100)	-5.9810 (0.0000)	-3.8768 (0.0001)
ICR	-0.2973 (0.3831)	-0.2965 (0.3834)	2.9737 (0.9985)	-1.7933 (0.0365)	-0.6391 (0.2614)
TLTA	-1.8428 (0.0327)	-2.5452 (0.0055)	-0.9195 (0.1789)	-2.2833 (0.0112)	-0.9573 (0.1692)
PROF	-3.9797	-2.9354	-3.7697	-3.4363	-1.8502

	(0.0000)	(0.0288)	(0.0001)	(0.0003)	(0.0321)
OCF	-378.363 (0.0000)	-374.766 (0.0000)	-227.296 (0.0000)	-210.566 (0.0000)	-0.6885 (0.0000)
WC	-1.4773 (0.0698)	-2.2085 (0.0136)	-2.5178 (0.0059)	-2.5608 (0.0052)	-1.7306 (0.0418)

Source: Author's calculation

Table 3: Results of panel unit root tests (At 1st difference)

	LLC		**IPS**		**Breitung**
Variables	Constant	Constant/ Trend	Constant	Constant/ Trend	Constant/ Trend
EPS	-10.8979 (0.0000)	-7.3166 (0.0000)	-11.3120 (0.0000)	-8.3628 (0.0000)	-3.5530 (0.0002)
MVA	-7.5902 (0.0000)	-3.0683 (0.0011)	-9.8034 (0.0000)	-7.2391 (0.0000)	-3.0959 (0.0010)
D/E	-11.9888 (0.0000)	-10.8069 (0.0000)	-12.6546 (0.0000)	-11.0434 (0.0000)	-5.4612 (0.0000)
ICR	-3.7315 (0.0000)	-2.3692 (0.0089)	-4.6724 (0.0000)	-2.3986 (0.0082)	-1.1479 (0.1255)
TLTA	-11.5397 (0.0000)	-8.5184 (0.0000)	-11.1701 (0.0000)	-8.1095 (0.0000)	-4.8612 (0.0000)
PROF	-11.1665 (0.0000)	-9.5824 (0.0000)	-10.5084 (0.0000)	-8.5045 (0.0000)	-5.5403 (0.0000)
OCF	-124.334 (0.0000)	-100.431 (0.0000)	-78.1388 (0.0000)	-68.9936 (0.0000)	-1.8340 (0.0333)
WC	-10.7157 (0.0000)	-9.8478 (0.0061)	-9.6550 (0.0000)	-9.2704 (0.0000)	-8.2986 (0.0000)

Source: Author's calculation

Notes:

- Numbers in parentheses indicate p-values.
- The null hypothesis is the existence of unit root (non-stationarity).
- Lag length is based on AIC.

To identify the integration order of each variable contained in the model, we report the findings of panel unit root test in this section. First, we move on to the Levin-Lin-Chu (LLC), Im-Pesaran-Shin (IPS), and Breitung tests for the first generation of panel unit root testing. Table 2 presents the test results at the level. The variables in Table 2 are typically found to be stationary after tests. Table 3 shows the panel unit root testing outcomes of the variables' first differences, demonstrating the non-acceptance of null hypothesis of non-stationarity.

First-generation panel unit root tests have the drawback of ignoring cross-sectional dependency. To investigate the presence of such dependency, Pesaran, (2004) CD and Breusch & Pagan, (1980) tests are used. The test exhibits a cross-sectional dependence. The value of the Breusch-Pagan LM test is assessed to be 192.27 (Dep-EPS) and 334.32 (Dep-MVA), whereas the value of the Pesaran CD test is projected to be 1.70 and 15.47. So, we conclude that there is a presence of cross-section dependence in the data set. Therefore, estimating only the first-generation panel unit root tests will not do the job. We need to run the second-generation panel unit root test also.

We use the CIPS (Cross-sectionally augmented IPS) second-generation panel unit root test due to the discovery of significant reliance between the companies. The variables at the level were first used for this test, followed by their initial disparities. In Table 4, the CIPS test results for both groups are displayed. The CIPS test at the level and the first difference indicates that all variables are stationary.

Table 4: Results of CIPS tests

CIPS tests at level			**CIPS tests at first difference**	
Variables	Constant	Constant/Trend	Constant	Constant/Trend
EPS	-2.7313***	-2.1862*	-4.1609***	-3.3480***
MVA	-2.1675*	-2.1725*	-3.7524***	-3.4236***
D/E	-2.0970*	-2.7167*	-3.4001***	-3.5173***
ICR	-3.4890***	-2.2051*	-2.0636*	-1.5613*
TLTA	-2.5892***	-2.5201*	-3.5975***	-2.5747*
PROF	-2.7626***	-3.4299***	-4.0986***	-3.8249***
OCF	-4.1308***	-4.8327**	-3.6706***	-3.6192***
WC	-3.1202***	-2.7435*	-2.9747***	-3.0814**

Source: Author's calculation

Notes:

[1] ***, **, * indicate 1%, 5%, and 10% significance levels, respectively.

Table 5: Descriptive statistics of shareholder's value, capital structure, and control variables

Variable	Obs.	Mean	Std.Dev.	Minimum	Maximum
EPS	240	26.0200	22.5100	-7.1300	177.6000
MVA	240	2.3910	2.6452	-0.8558	11.9800
D/E	240	4.4130	0.7368	2.6448	6.0464
ICR		7.7790	1.8430	4.5270	14.1300
TL_TA	240	0.4567	0.1625	0.1234	0.8036
PROFITABILITY	240	12.5900	8.1050	-5.5100	48.7000
OCF	240	-0.0153	2.3230	-30.5930	8.8292
WC	240	0.1706	0.1462	-0.2448	0.5287
FIRM AGE	240	0.5385	0.4995	0.0000	1.0000

Source: Source: Author's calculation

Table 5 represents the summary statistics of 13 listed pharmaceutical firms for 20 years from 2001 to 2020 and for 260 firm-year observations. On average, firms in the pharmaceutical industry have 4 % debt-equity, a meager average of total liabilities to total assets (0.456), and a 7% interest coverage ratio. It indicates the proportion of debt is less in their capital structure. The average EPS from the sample is 26.0200, which is considered high, followed by profitability with an average of 12.5900. The other variables' details appear to be within range.

4.2 Panel regression analysis

Before running panel regression, the data characteristics such as normality, multicollinearity, heteroskedasticity, and autocorrelation are checked through normality test, Shapiro-Wilk test, variance inflation factor (VIF), Breush-Pagan test, and Durbin Watson test. The results satisfy all the panel data characteristics. Further, residual variance, the Breusch-pagan test, and the Hausman test are used to find the suitable model among OLS, random effect, and fixed effect models. The results favour that the models should adopt the fixed effect model.

Table 6: Results from pooled, random, and fixed effects estimation – Pharmaceutical firm's panel estimations

Dependent variable	Pooled effects	Random effects	Fixed effects
	EPS		
Model 1	$EPS_{it} = \alpha_i + \beta_1 D/E_{it} + \beta_2 ICR_{it} + \beta_3 TL\_TA_{it} + \beta_4 PROF_{it} + +\beta_5 OCF_{it} + \beta_6 WC_{it} + \beta_7 DAGE_{it} + \varepsilon_{it}$		
Independent variables			
D/E	-2.0182**	-1.8439**	-1.8897**

	[-2.24]	[-2.45]	[-2.54]
ICR	0.0446	0.0867*	0.1088**
	[0.90]	[1.85]	[2.29]
TL_TA	8.4662**	8.5352**	9.0781***
	[2.11]	[1.17]	[2.68]
PROFITABILITY	0.0222**	0.0498***	0.0531***
	[2.28]	[6.37]	[6.89]
OCF	0.0186	0.0200	0.0182
	[0.43]	[0.61]	[0.57]
WC	1.4628***	-0.3663	-0.7351*
	[3.47]	[-0.90]	[-1.79]
FIRM AGE	-0.1174	-0.3282	-0.5728*
	[-1.28]	[-0.99]	[-0.85]
Constant	7.1245***	6.0604***	5.6907***
	[3.09]	[1.85]	[3.02]
R-squared	0.1763	0.3226	0.6733
Number of observations	260	260	260
Number of companies	13	13	13
F-statistic	7.46	12.38	16.41
Prob (F-statistic)	0.0000	0.0000	0.0000

Source: Author's calculation

Note: The regression coefficient is reported in the table. T-statistics are within brackets [] below. Superscripts ***, **,* refer to statistical significance at 1%, 5%, and 10%, respectively.

Table 6 depicts the influence of capital structure on earnings per share (Measure of shareholder value). The estimation shows that the debt-equity ratio negatively influences shareholder value at a 5% significance level with an estimated coefficient of -1.8897. Keeping all factors constant, a 1unit change in debt-equity ratio leads to a -1.88 unit change in shareholder value. Furthermore, the other measures of capital structure, namely interest coverage ratio and total liabilities to total assets, positively and significantly influence earnings per share at 1% and 5% significance levels with estimated coefficient values of 0.1088 and 9.0781. The control variable profitability and working capital impact shareholder value at 1% and 10% significance level, while operating cash has no effect. The dummy variable firm age has a positive impact on shareholder

value. It means firms operating for a long time have more influence on shareholder value. F-statistics and probability value indicate that the model is appropriate at a 5% significance level. It depicts that the debt-equity ratio, interest coverage ratio, total liabilities to total assets, profitability, operating cash flows, working capital, and firm age influence shareholder value in pharmaceutical industry. The R-squared is 67.33%, which depicts the model's explanatory power. It indicates that when all other factors are held constant, the three explanatory variables of capital structure, three control variables, and one dummy variable determine earnings per share (EPS) to 67.33 percent. The P-values for the variables given above support the alternative hypothesis, indicating that capital structure impacts earnings per share of Indian pharmaceutical firms. These findings support the previous results (Arowoshegbe & Emeni, 2014; Mujahid & Akhtar, 2014).

Table 7: Results from pooled, random, and fixed effects estimation – Pharmaceutical firm's panel estimations

Dependent variable	**Pooled effects**	**Random effects**	**Fixed effects**
	MVA		
Model	$MVA_{it} = \alpha_i + \beta_1 D/E_{it} + \beta_2 ICR_{it} + \beta_3 TL\_TA_{it} + \beta_4 PROF_{it} + +\beta_5 OCF_{it} + \beta_6 WC_{it} + \beta_7 DAGE_{it} + \varepsilon_{it}$		
Independent variables			
D/E	3.5272**	2.9220**	2.7481*
	[2.33]	[1.97]	[1.83]
ICR	0.5374***	0.4990***	0.4372***
	[6.53]	[5.67]	[4.65]
TL_TA	-14.6780**	-12.0725*	-11.8571*
	[-2.18]	[-1.80]	[-1.74]
PROFITABILITY	0.1632***	0.1372***	0.1264***
	[9.95]	[8.76]	[8.10]
OCF	0.0348	0.0289	0.0296
	[0.79]	[0.72]	[0.75]
WC	-5.0940***	-4.2203***	-3.4765***
	[-7.32]	[-5.67]	[-4.26]
FIRM AGE	0.0175	0.1770	0.3321**
	[0.08]	[0.48]	[0.73]
Constant	-11.9016***	-10.0230***	-8.7738**
	[-3.07]	[-2.65]	[-2.30]

R-squared	0.6748	0.7037	0.7590
Number of observations	260	260	260
Number of companies	13	13	13
F-statistic	73.83	67.17	41.64
Prob (F-statistic)	0.0000	0.0000	0.0000

Source: Authors' calculation

Note: The regression coefficient is reported in the table. T-statistics are within brackets [] below. Superscripts ***, **,* refer to statistical significance at 1%, 5%, and 10%, respectively.

Table 7 depicts the influence of capital structure on market value added. The F test result says that the debt-equity ratio, interest coverage ratio, total liabilities to total assets, profitability, operating cash flows, working capital, and firm age significantly affect shareholder value.

Based on the results of panel regression analysis, the equation formed as follows:

$$MVA_{it} = 0.7590 + 2.7481\ D/E_{it} + 0.4372\ ICR_{it} - 11.8571\ TL_{TA_{it}} + 0.1264\ PROF_{it} + 0.0296\ OCF_{it} - 3.4765\ WC_{it} + +0.3321\ DAGE_{it} + \varepsilon_{it}$$

The panel regression equation traces that the market value added equals 0.7590, keeping all other explanatory, control, and dummy variables constant. The capital structure proxies debt-equity ratio and interest coverage ratio positively and significantly influence the market value added (shareholder value) at 1% and 10% significance levels, while total liabilities to total assets negatively affect the market value added at a 1% significance level. The coefficient of the debt-equity ratio shows a positive impact of 2.7481 on market value added, which says 1 unit change in debt-equity leads to a 2.7481-unit change in MVA; thus, the higher the debt-equity component, the higher the MVA will be. As debt grows, shareholders demand more returns because they take on more risk (Harris & Chaplinsky, 2021). The firm's business risk is spread over a smaller equity base, resulting in higher financial risk. Equally, shareholders' risk increases as more interest is promised to the creditors. The extra risk premium shareholders sought to compensate for the increased financial risk rises in lockstep with the firm's debt-equity ratio. So, whatever earnings the firms accumulate using more debt will be equally setoff. Thus, firms should prefer an optimum capital structure for balanced growth of shareholder value. The profitability strongly influences the market value added at a 1% significance level. It means that more returns will lead to more shareholder value. Working capital negatively affects market value added. It shows that the requirement for more working capital will block the availability of cash, and it fails to add more value to the shareholders.

In contrast, cash flows from the operation do not affect market value added. The dummy variable firm age exhibits a positive association with MVA. The firms incorporated earlier carry more reputation and market access, which help them to borrow capital at optimum cost. This result coincides with (Dewaelheyns & Van Hulle, 2010; Ezeoha & Botha, 2012; Sakai et al., 2010).

4.3 Panel cointegration tests

It can be deduced from the stationarity tests that the model under consideration contains both l(0) and l(1) variables. This prompts us to use the PMG method, specifically the PARDL method. MG and DFE estimators are used simultaneously to estimate the model, which is then tested using the Hausman test.

We use the Johansen-Fisher cointegration test to assess the long-run association between capital structure and shareholder value before applying the PARDL approach. Even if the cointegration tests do not indicate the existence of a long-run association, ARDL estimations can still support this hypothesis if the coefficient of the error correction term is negatively significant.

Table 8: Results of panel cointegration tests of Capital structure and Shareholder value

Johansen-Fisher panel cointegration tests for EPS				
	Fisher Stat. (from trace test)	Prob.	Fisher Stat. (from max-eigen test)	Prob.
None	0.000	1.0000	0.000	1.0000
At most 1	0.000	1.0000	0.000	1.0000
At most 2	267.6	0.0000	208.6	0.0000
At most 3	589.7	0.0000	522.3	0.0000
At most 4	473.8	0.0000	423.4	0.0000
At most 5	156.0	0.0000	137.5	0.0000
At most 6	64.10	0.0000	64.10	0.0000
Johansen-Fisher panel cointegration tests for MVA				
	Fisher Stat. (from trace test)	Prob.	Fisher Stat. (from max-eigen test)	Prob.
None	0.000	1.0000	0.000	1.0000
At most 1	0.000	1.0000	0.000	1.0000
At most 2	481.7	0.0000	375.6	0.0000
At most 3	589.7	0.0000	522.3	0.0000
At most 4	473.8	0.0000	423.4	0.0000
At most 5	171.8	0.0000	141.1	0.0000
At most 6	83.88	0.0000	83.88	0.0000

Source: Authors' calculation

The Johansen-Fisher panel cointegration tests for EPS and MVA, shown in Table 8, prove the long-run association between capital structure and shareholder value.

4.4 Panel ARDL estimation

It can be deduced from the stationarity tests that the model under investigation has both *I(0)* and *I(1)* variables. This prompts to use PMG (Pooled Mean Group) method, specifically the PARDL method. MG and DFE estimators are used simultaneously to estimate the model, which is then tested using the Hausman test.

Table 9: Panel ARDL estimation results for EPS

	Variable	PMG	MG	DFE
Long-run	D/E	0.1761***	-2.7864	-0.0191
		(0.0000)	(0.2950)	(0.7650)
	ICR	-0.0005**	0.0038	-0.0000
		(0.0140)	(0.3160)	(0.4920)
	TL_TA	-32.0720	870.1798	7.1836
		(0.1060)	(0.2270)	(0.8160)
	PROFITABILITY	3.8901***	-0.1538	1.7218***
		(0.0000)	(0.8810)	(0.0000)
	OCF	-1.3392***	33.1645	-86.7386**
		(0.0000)	(0.6790)	(0.0210)
	WC	-26. 6230**	10.6606	-4.9050
		(0.0430)	(0.8310)	(0.7690)
Short-run	D/E	0.0427	-0.2208	0.0088
		(0.7880)	(0.6990)	(0.8130)
	ICR	0.0006	0.0009	-0.0000**
		(0.6710)	(0.6130)	(0.0320)
	TL_TA	56.8824	246.5846	27.2443
		(0.3390)	(0.2830)	(0.1800)
	PROFITABILITY	1.8673***	1.9528***	1.8818***
		(0.0000)	(0.0000)	(0.0000)

OCF	1.8084	-6.0359	0.0888
	(0.4140)	(0.0270)	(0.7870)
WC	-74.0871**	-11.9128	-52.3542**
	(0.0010)	(0.7400)	(0.0070)
Error Correction Term	-0.3590***	-0.8092***	-0.4712***
	(0.0000)	(0.0000)	(0.0000)
Constant	-2.3726	35.8561	-6.7082
	(0.206)	(0.4440)	(0.1820)
Number of observations	260	260	260

Source: Author's calculation

Notes:

1. ***, **,* indicate 1%, 5%, and 10% significance levels, respectively.

2. Numbers in parentheses indicate probability values.

3. In the above model, the Hausman test shows that the PMG estimator is more efficient compared to MG and DFE estimator

(chi^2 =3.48, p-value=0.6258; chi^2 =2.05, p-value=0.8426) and that the DFE estimator is more efficient than the MG estimator (chi^2 =33.78, p-value= 0.0000).

This section applies the panel ARDL, specifically PMG, MG, and DFE estimators. ARDL approach is applied to measure both long-run as well as short-run association. This analysis emphasises on PMG estimator as this estimator holds the restriction of homogeneity in long-term equilibrium between cross sectional units and simultaneously permits for heterogeneity in the short-run.

The results of the panel ARDL estimation, depicted in Table 9, demonstrates that as per PMG approach, there exist a significantly positive long-run association of the debt-equity ratio with shareholder value at 1% and 5% significance levels. The coefficient of the debt-equity ratio and profitability is 0.1761 and 3.8901. It depicts that if the debt-equity ratio and profitability increase by 1 unit, shareholder value will increase by 0.17 and 3.89 units in the long run. The control variable profitability exhibits a positive significant long-run association with shareholder value while operating cash flows and working capital have a negative significant long-run association. If the interest coverage ratio, operating cash flows, and working capital increase by 1 unit, then shareholder value will be decreased by 0.0005, 1.3392, and 26.6230 units. PMG estimators support a statistically significant positive short-term association between profitability and shareholder value while working capital negatively influences.

According to the MG approach, profitability has a positive significant short-run association with shareholder value. Further, the long-run coefficient of profitability is positive, and operating cash flows are negatively significant as per the DFE approach. In the short run, interest coverage ratio and working capital negatively affect shareholder value, whereas

profitability positively influences profitability. All estimators show a significantly positive error correction term. It means that capital structure and shareholder value converge to a long-term relationship.

Finally, the error correction term is negatively significant, indicating that the examined variables have a long-run relationship. As this model converges to long-run equilibrium, it suggests a high adjustment rate, correcting 35.9% of the variation.

The panel ARDL for market value added results is highlighted in Table 10. The results presented in Table 10, specifically those of the PMG estimate, valid according to the Hausman test, confirm that long-run coefficients of interest coverage ratio, total liabilities to total assets, and profitability are statistically significant. The long-run coefficient of interest coverage ratio and total liabilities to total assets is -0.0050 and -4.2881. It means that if the interest coverage ratio and total liabilities to total assets increase by 1 unit, the shareholder value will be decreased by 0.0050 and 4.2881 units keeping all other things constant. Similarly, profitability can influence the shareholder upto 0.2773 units. PMG and MG estimators indicate that profitability has long- and short-run positive associations with shareholder value. Furthermore, capital structure and working capital have a significant negative long-run relationship with shareholder value per the DFE approach, whereas operating cash flows are positively affected. As the coefficient of error correction term is -0.4373, it means if there is a departure from the long-run equilibrium level, then this departure will be corrected through a 43% speed of adjustment.

Table 10: Panel ARDL estimation results for MVA

	Variable	**PMG**	**MG**	**DFE**
Long-run	D/E	0.0018	-0.0677	0.0080
		(0.6550)	(0.1460)	(0.2540)
	ICR	-0.0050***	-0.0001	-3.2500
		(0.0000)	(0.1870)	(0.1980)
	TL_TA	-4.2881**	15.1113	-7.9048**
		(0.0090)	(0.2950)	(0.0210)
	PROFITABILITY	0.2773***	0.1852*	0.0286
		(0.0000)	(0.0570)	(0.5600)
	OCF	2.0844	2.0036	11.5194**
		(0.4530)	(0.7690)	(0.0050)
	WC	0. 1324	-2.5024	-4.9348**
		(0.8930)	(0.5270)	(0.0070)
Short-run	D/E	-0.0056	-0.0101	0.0002
		(0.7440)	(0.7240)	(0.9430)
	ICR	-0.0000	-0.0001	-1.0300

	(0.0990)	(0.0820)	(0.2500)
TL_TA	-0.2018	3.5501	-1.6120
	(0.9710)	(0.7560)	(0.4100)
PROFITABILITY	0.1580***	0.1985***	0.0944***
	(0.0000)	(0.0000)	(0.0000)
OCF	-0.3612	-0.5244	0.0132
	(0.2440)	(0.4190)	(0.6730)
WC	0.8306	0.2146	2.3165
	(0.5860)	(0.9350)	(0.2190)
Error Correction Term	-0.4373***	-0.8502***	-0.4107***
	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0887	2.5567	-1.6252**
	(0.3640)	(0.5830)	(0.0010)
Number of observations	260	260	260

Source: Author's calculation

Notes:

1. ***, **,* signify 1%, 5%, and 10% significance levels, correspondingly.

2. Numbers in parentheses represent probability values.

3. Hausman test reveals that the PMG estimator is more efficient than MG and DFE estimator

(chi^2 =2.41, p-value=0.7904; chi^2 =111.47, p-value=0.0000) and that the DFE estimator is more efficient than the MG estimator (chi^2 =0.55, p-value= 0.9904).

5. CONCLUSION

This study investigates the association of capital structure with shareholder value of listed pharmaceutical firms in India. Further, the study analyzed the causality between capital structure and shareholder value using panel ARDL analysis to investigate the existence of a long-run association. The study emphasised on PMG estimates as it is able to limit homogeneity in long-run equilibrium and permits heterogeneity in the short-run.

This study found that capital structure impacts shareholder value.

The study's contribution is divided into two parts. First, it examines how the capital structure has influenced pharmaceutical companies' shareholder value from 2001 to 2020. The specific methodology used in this work, in particular the panel ARDL of the PMG, MG, and DFE. The results also contribute to the literature on the effect of capital structure on shareholder value.

Due to the non-availability of more firms in NSE-200, our paper has considered 13 pharmaceutical firms to establish the association. Further, future researchers may consider other explanatory and control variables to justify the capital structure aspects. The present study suggested the below mentioned research questions for future studies.

Table 11: Future research questions

How do capital structure and company value relate to one another?
What will be the optimal capital structure for pharmaceutical firms?
What other important variables affect shareholder value?
What are the additional macroeconomic factors influencing shareholder value?
How do capital structure decisions assist decision-makers in boosting the wealth of their shareholders?
What characteristics characterize the ideal capital structure and shareholder value?
How do shareholder value, capital structure, corporate governance, and dividend policy relate to one another?
Does a company's ownership structure help it grow?
(9) Does the distribution of dividends affect shareholder value in any way?

Source: Author's observation

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