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Impact of Capital Structure and Liquidity Conditions on the Profitability of Pharmaceutical Sector of Pakistan

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ABSTRACT

This study was conducted to find the impact of capital structure and liquidity condition on the profitability of pharmaceutical firms listed with Pakistan Stock Exchange (PSX). The dataset was comprised of eleven years 2010 to 2021. To assess profitability level, to dimensions return on assets (ROA) and gross profit margin (GPM) were used. The capital structure was measured through debt-to-equity ratio (DER) and debt to total funds (DTF). The liquidity level was measured through current ratio (CR) and acid test ratio (ATR). The OLS regression, fixed and random effect models were used for analysis. The findings proved that high debt to equity ratio significantly and negatively affect the profitability. The liquidity conditions have positive association with profitability of firms. The study suggested that owners and company managers should use optimal value of debt and liquidity conditions for profit maximization and to reduce the cost associated with debt capital.

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1. Introduction

Pakistan is an emerging economy and 6th most populous country of world. By the end of 2021, the population of Pakistan is approximately 225.18 million, along with annual growth rate of 1.95 % (Economic Survey of Pakistan, 2021). Health facilities are underutilized as well as are below the desired level to outweigh the pressure of communicable and non-communicable diseases. Therefore, more than 80% health expenditure of Pakistan is being spent on the purchase of medicine. The pharmaceutical industry has a very vibrant growth potential in Pakistan. To cope with the requirements of quality medicine of this rapidly increasing population, many multinational pharmaceutical companies began its manufacturing and distribution activities in Pakistan (Rehan, Karaca, & Alvi, 2020).

Capital structure refer to the combination of investment funds contributed by numerous investors and shareholders in form of debt and equity. It is considered as permanent investment collected through different sources of long-term debt and preferred stock (Trisha 2016). The capital structure helps to extend the size of business. Each component of capital structure has its unique cost to firm's financial performance. If the cost of capital structure is lower than normal rate of return than, the profitability of firm will

be positively affected. The profitability of an enterprise varies according to the size and level of its business operations. Profitability is the base of any firm to assess its success.

Liquidity of any enterprise refer to its ability in paying back the short term liabilities. For smooth functioning and to determine the level of profitability the measurement of liquidity provide very helpful information for internal and external investors (Zygmunt, 2013). Quick ratio and current ratios are generally used as measurement tool of liquidity. High value of current ratio depicts a better ability of a firm to return short term liabilities whereas low value means firm face difficulty to pay back its liabilities on time. Quick ratio measures how quickly a firm can convert its assets into cash without loss.

The financial decisions are vital tools for financial healthiness of any enterprise. Many factors influence this critical task that how firm chooses between debt and equity (Scott, 1974). In any enterprise, the selection of optimal capital structure is one of the key elements of firm's financial success. The financing decision if have been made incorrectly then the worth of firm will be affected and it will be presumed that firm's performance is going to in bad conditions. The main objective of any business firm is to maximize shareholders dividends, so mangers are expected to achieve an optimal financial decision i.e. financing debt and equity (Ukaegbu et al., 2012).

Profitability of a firm provide a crucial information for investors, managers and financial analysts making decision about investment and dividends payment. For the evaluation of financial performance, all commercial units of a company should keep observing the profitability and liquidity. Firms with low profit can effectively contribute in economic development but firms without liquidity soundness cannot. Therefore, for growth and survival of firms, the optimal mix of profitability and liquidity are important (Nassirzadeh, Rostami, & Review, 2010).

The aim of this study was to examine the impact of capital structure and liquidity on the financial profitability of pharmaceutical companies in Pakistan. The specific research objectives are as follow:

- To analyze the impact of debt equity and debt to total funds ratio on firms' profitability.
- To examine the impact of current ratio and acid test ratio on firms' profitability.

2. Literature Review

Vatavu, Cramariuc, and Schipor (2015) in his study found that the company profitability (ROA and ROE) are directly affected with capital structure (combination of debt and equity). The data of Bucharest Stock Exchange was used for cross sectional regression analysis. The results of this study provided an evidenced that when debt contribution in capital structure is low, firm showed a higher profitability. (Amarjit, Budhiraja, Chandramouleeswari, Anita, & JCDR, 2013) conducted a study on the data of 272 companies listed on New York Stock Exchange. The regression and correlation tools reveals a positive relationship of short term debt with profitability.

Javed, Younas, Imran, and Sciences (2014) applied a pool regression model on 63 companies listed on Karachi Stock Exchange and analyzed the impact of capital structure on profitability. The study revealed positive relationship between profitability and capital structure. (Safarova, 2010) studied several factors such as business risk, cash on hand, employees' performance, tangibility, firm size, and sales growth affecting a firms' profitability. However, capital structure is main factor that is associated with financial performance. Shah (2015) found that an increase in debt share in capital stricture cause a decrease in profitability. Regression analysis and correlation matrix were used to compute the results. The findings showed that a negative significant impact of debt to equity on financial performance. A positive and significant impact was found on debt to assets on interest.

Modern indices such as: net liquid balance index, comprehensive liquidity and cash conversion cycle have been used for measuring liquidity (Tripathi & Ahamed, 2016; Ware & Management, 2015; Yasdanfar & Öhman, 2014). To analyze the relationship among variables the above referred studies have used the descriptive statistics as well as

regression techniques. Their conclusions indicated that profitability ratios (ROA, ROE and ROI) are negatively affected by the liquidity conditions.

Tailab and Invention (2014) studied the profitability of energy companies of United States. The study found that debt has significant impact on ROA and ROE. The impact on ROA is increased by leverage account. Profitability is positively influenced by the liquidity volume. No significant relationship was found between size of assets and ROA. Gill et al. carried out a study on services and manufacturing companies of New York. The results of this study revealed that short-run debt to total assets have positive impact on capital structure and profitability.

DAO, NGUYEN, and Business (2020) found that firm size, sales growth, firm age and working on equity affect the profitability of business organization. (Ali & AbuTheeb, 2018) found through a study of petrochemical sector of Saudi Arabia that financial performance was negatively affected due to global economic recession. The business organizations should focus on cost minimization and top management strategy affect the financial performance.

Chakraborty and finance (2010) showed a positive relationship between profitability and capital structure. As the capital structure of business organization is the arrangement of investment funds to run main elements of business operations. For capital structure, the debt and equity are two main classes. Firm profits are meaningfully related with interest coverage ratio and debt to asset ratio. Financial performance is negatively correlated with debt and equity ratio (Chisti, Ali, Sangmi, & Administration, 2013).

Niresh and research (2012) studied that bank capital structure is also similar to non-financial sector. Although there exist many differences due the unique nature of each business. The study tested that profitability is related to risks and operations performed by a company. Excess of investment in working capital affects both profitability and liquidity. The financial ratios analysis can be used to understand between profitability and investment decisions. Therefore, management take help from this analysis to achieve the goal of profit maximization and cost minimum. Moreover, the inventory turnover ratio are to be maintained at higher levels for better profitability.

Ahmed, Ahmed, and Kanwal (2018) investigated the impact of working capital management on corporate profitability of pharmaceutical sector of Pakistan. The dataset covered the period of six years from 2011 to 2016. The current assets to total assets and current ratio were the independent variables and return on assets was taken as dependent variable. The panel regression analysis provides evidence that current ratio and cash conversion cycle have insignificant impact on pharmaceutical firms' profitability.

Katharina, Wijaya, Juliana, Avelina, and Vol (2021) conducted a study on the real state sector of Indonesia. The study found the impact of capital structure, liquidity debt policy, company size on profitability. Data of 23 construction companies listed on the Indonesia Stock Exchange for the year 2016-2019 was used for analysis. The results showed that capital, liquidity, debt and company size and profitability have significantly influence the value of company in property and real estate sector.

3. Research Methodology

3.1. Data and Sample Size

The study focused to analyze the financial performance of 34 pharmaceutical companies registered with Pakistan Stock Exchange (PSX). Due to non-availability of complete data, 15 companies were selected for this study. Some companies were also excluded because they contain outliers in their data. Secondary data has been collected from the firms' annual reports and financial statements for eleven (11) years from 2010 to 2021. The relevant information was also collected from the website of Pakistan Stock Exchange and Standard Capital Database.

3.2. Selection of Variables

Three major variables were included in the research framework: the dependent variables which was basically the firms' profitability that was measured by two ratios i.e. the return on assets (ROA) and net profit margin (NPM); two independent variables were firms' capital structure which was measured by two ratios i.e. debt to equity ratio (DER) and debt to total funds (DFT) and firms' liquidity that was measured by two ratios i.e. current ratio (CR) and acid test ratio (ATR); and three control variables represented by firms' size (Siz), employees' productivity (EP) and sales growth (SG). The description and measurement of variables has been illustrated in Table 1.

Table 1
Description and Computation of Variables

Variable Type	Description	Abbreviation	Computation
Dependent Variable	Firms' Profitability		
	Return on Assets	ROA	ROA= Net Income/ Total Assets
	Gross Profit Margin	GPM	Gross Profit/Total sales
Independent Variables	Capital Structure		
	Debt Equity Ratio	DER	Debt to Equity Ratio= Total Debt/ Total Equity
	Debt to Total Funds	DFT	Debt to Total Funds= Total Debt/ (Total Assets-Current Liabilities)
	Firms' Liquidity		
	Current Ratio	CR	ırrent Assets/Current Liabilities
	Acid Test Ratio	ATR	Current Assets-Inventory/Current Liabilities
Control Variables	Firm Size	Siz	Natural log of Total Sales
	Employees' Productivity	EP	EP=Net Profit/Employees Number
	Sales Growth	SG	Sale Growth= Sales in (Current year-Sales in previous year)/Sales in previous year

3.3. Research Models

Panel data approach has been applied in this study to analyze the potential impact of capital structure and liquidity on firms' profitability. The fixed and random effects models have applied. The models are constructed as follows:

$$(ROA)_{it} = \propto + \beta_1 DER_{it} + \beta_2 DFT_{it} + \beta_3 CR_{it} + \beta_4 ATR_{it} + \beta_5 SIZ_{it} + \beta_6 EP_{it} + \beta_7 SG_{it} + \varepsilon_{it} \quad (1)$$

$$(GPM)_{it} = \propto + \beta_1 DER_{it} + \beta_2 DFT_{it} + \beta_3 CR_{it} + \beta_4 ATR_{it} + \beta_5 SIZ_{it} + \beta_6 EP_{it} + \beta_7 SG_{it} + \varepsilon_{it} \quad (2)$$

To choose which of the fixed effects (FE) and random effects (RE) models is more precise, the Hausman test (1978) was used. This test evaluates the significance levels between estimators of FE or RE.

4. Results and Discussion

4.1. Descriptive Analysis

The description of all variables included in this study is shown in Table 2. The mean value of ROA is 9.658 with a standard deviation of 6.987. The mean and standard deviation for GPM are 8.654 and 7.417 percent respectively. The minimum and maximum value of current ratio in pharmaceutical companies is 0.27 and 10.86 percent respectively. This is an indication that these companies are highly liquid. Table 2 showed that acid test ratio (ATR) statistics range between 0.06 and 10.55 with standard deviation of 1.07 percent. The mean statistics about debt equity ratio (DER) 2.547 with standard deviation of 4.778 percent. The mean and standard deviation of DTF range from 1.178 to 4.657. The minimum and maximum values of control variables firm size is 3.67 and 12.86 with mean value of 8.27.

The average employees' productivity (EP) ranges between -58778 to 98547 with mean value of 64570. This showed that firms used their human resource in a more productive manner.

Table 2
Descriptive statistics

Variable Name	Minimum	Maximum	Mean	Median	Std.Dev.
ROA	-6.1	23	9.658	9.140	6.987
GPM	-11.26	31.54	8.654	7.950	7.417
DER	-9.45	30.211	2.547	2.145	4.778
DFT	-12.66	31.21	1.178	1.054	4.657
CR	0.27	10.86	1.7	1.30	1.21
ATR	0.06	10.55	1.18	1.02	1.07
SIZ	3.67	12.86	8.27	8.05	1.84
EP	-58778	98547	64570	50240	30457
SG	-56	145	10.67	10.11	26.54
N	165	165	165	165	165

Sources: Authors' data analysis results, 2022

4.2. Correlation Analysis

The statistics in Table 3 shows a correlation matrix explaining the relationship amongst variables. Table 3 revealed a positive association between ROA and profitability of pharmaceutical companies measured by gross profit margin. ROA has inverse association with DER and DTF with 42.6% and 44.6% respectively. ROA has positive association with firm size, employees' productivity and sales growth. Similarly GPM was negatively related with CR and ATR but positively related with EP and SIZ. Overall, correlation analysis confirm an inverse relationship of debt-taking on firm profitability. These results are in consistent with prior literature (Bibi, Amjad, & Accounting, 2017; Rehman, Khan, Khokhar, & Banking, 2015).

Table 3
Correlation Matrix

	ROA	GPM	DER	DFT	CR	ATR	SIZ	EP	SG
ROA	1								
GPM	0.865	1							
DER	-0.426	-0.56	1						
DFT	-0.446	-0.524	0.365	1					
CR	0.289	-0.482	0.279	0.354	1				
ATR	0.265	-0.357	0.234	0.243	0.473	1			
SIZ	0.546	0.365	-0.571	-0.684	-0.341	-0.356	1		
EP	0.891	0.923	-8.34	-0.232	-0.239	-0.247	0.274	1	
SG	0.244	0.195	-0.264	-0.871	0.651	0.453	0.684	0.246	1

Sources: Authors' data analysis results, 2022

4.3. Results of Pooled OLS, Fixed and Random Effects Model for Return on Assets (ROA)

The impact of capital structure (DER & DTF) and liquidity (CR & ATR) on profitability has been examined through two models. The results in Table 4 are for model 1 that establish the relationship amongst ROA, capital structure and liquidity ratios. The estimated results of three regression models. Model 3, the Random Effect (RE) model showed more significant and reliable impact than the results of Fixed Effect (FE) model. The value of Hausman test is more suitable for RE model. In this model, the coefficients of DER and DTF have a negative sign and is significant at the 5% significance level. This revealed that inverse relationship is found between more debt-to-equity decision and profitability. The relationship between sales growth and ROA is positive, confirming significance of results at 5% level. The RE model showed positive impact of liquidity ratios (CR & ATR) on profitability ROA, the results are significant at 5% significance level. The RE model also

showed positive association with EP. The value of adjusted R2 is 35.7 that explained 35.7% variation in ROA due to DER, DTF, CR, ATR, SIZ, EP and SG. The multicollinearity amongst the variables was not found as the value of variation inflation factor (VIF) is less 5.

Table 4
Results of Pooled OLS, Fixed and Random Effects: Model 1

Variables	Model 1 Pooled OLS		Model 2 Fixed Effects		Model 3 Random Effects		Variance inflation factors (VIF)	
C	-13.897	(0.132)	-28.054	(0.143)	-19.147	(0.067)	0.541	1.765
DER	-0.223*	(0.000)	-0.164*	(0.005)	-0.185*	(0.003)	0.356	2.654
DFT	-0.086	(0.115)	-0.224	(0.004)	-0.167*	(0.001)	0.845	3.248
CR	1.554*	(0.000)	1.235	(0.021)	1.684*	(0.000)	0.234	1.354
ATR	1.718*	(0.002)	1.364**	(0.005)	1.247**	(0.004)	0.354	1.784
SIZ	4.581*	(0.000)	6.235*	(0.000)	5.364*	(0.021)	0.965	1.578
EP	2145*	(0.001)	2547*	(0.003)	2247**	(0.024)	2.24	4.57
SG	0.045*	(0.004)	0.0431*	(0.000)	0.047*	(0.041)	0.667	1.327
Adjusted R^2	0.534		0.805		0.357			
F-Statistics	36.435* (0.000)		18.145* (0.000)		20.341* (0.000)			
DW-Statistics	0.547		1.632		1.314			
Hausman Test					4.125 (0.425)			
N	165		165		165			

Sources: Authors' data analysis results, 2022

Overall, negative and significant relationship exist between debt to equity decision and ROA. These findings confirms the hypothesis that debt has negative association with firm financial performance. It concludes that companies that use more debt in their investment portfolio will experience decreased profitability. This study results are in line with previous studies conducted by (Tauseef, Lohano, & Khan, 2015; Zeitun & Saleh, 2015).

4.4. Results of Pooled OLS, Fixed and Random Effects Model for Gross Profit Margin (GPM)

The impact of DER & DTF and CR & ATR has been estimated for another variable of profitability i.e., gross profit margin (GPM). The results in Table 5 are for model 1 that establish the relationship amongst ROA, capital structure and liquidity ratios.

Table 5
Results of Pooled OLS, Fixed and Random Effects: Model 2

Variables	Model 1 Pooled OLS		Model 2 Fixed Effects		Model 3 Random Effects		Variance inflation factors (VIF)	
C	-36.897	(0.002)	-38.037	(0.041)	-35.147*	(0.007)	0.541	1.765
DER	-0.243*	(0.000)	-0.064*	(0.000)	-0.131	(0.521)	0.356	2.654
DFT	-0.116	(0.091)	-0.172*	(0.006)	-0.147	(0.061)	0.845	3.248
CR	1.347*	(0.031)	1.514*	(0.031)	1.173	(0.040)	0.234	1.354
ATR	1.124*	(0.060)	1.475*	(0.042)	1.154*	(0.012)	0.354	1.784
SIZ	6.452*	(0.080)	5.146*	(0.046)	6.561*	(0.021)	0.965	1.578
EP	2564*	(0.000)	2847*	(0.002)	9287*	(0.005)	347	952
SG	0.0065	(0.544)	0.0131	(0.068)	0.015	(0.124)	0.667	1.327
			Model Diagnostics					
Adjusted R^2	0.587		0.874		0.253			
F-Statistics	42.145* (0.000)		34.257* (0.000)		18.314* (0.000)			
DW-Statistics	0.637		1.834		1.441			
Hausman Test			21.725* (0.004)					
N	165		165		165			

Sources: Authors' data analysis results, 2022

The value of Hausman test showed that the Fixed effects (FE) model is more suitable than the RE model. The negative coefficients of both debt categories DER and DTF are significant at 1% significance level. This results are robust with the hypothesis that more debt impact firm financial performance inversely. The liquidity ratios (CR & ATR) are positive but significant at 5% significance level. The sales growth, firm size and employees' productivity increase firm profitability positively. The results are significant at 5% significance level. The adjusted R2 explained 87.4% variations in GPM due to the measurement variables included in this model. The value of VIF ranges less than 5, which confirm that no multicollinearity found amongst variables.

In Table 5, the coefficients of all debt categories are negative and it support the hypothesis that debt financing inversely affects firms' profitability. The firm size and positive sale growth helps to enhance the profit margins. These results are also supported by the prior studies conducted by (Chisti et al., 2013; Sadiq, Sher, & Research, 2016). The FE model results showed that pharmaceutical companies that debts depress the NPM due to the high interest rate charged by the financial institutions.

5. Conclusions and Recommendations

The study was carried to investigate the impact of capital structure and liquidity conditions on the financial performance of pharmaceutical firms in Pakistan. The pharmacy sector contributes 1% to the GDP of Pakistan annually. During the pandemic a massive sales growth has been observed in the pharmaceutical sector. The 15 companies have selected and their profitability was analyzed from two perspective i.e., return on assets (ROA) and gross profit margin (GPM). Two models were developed for analysis of these two profitability measures. The capital structure and liquidity ratios along with three control variables were used in these models. The dataset was collected for the years 2010 to 20211 and three regression models. Model 3, the Random Effect (RE) models were applied. The findings of this study showed that the coefficients of DER and DTF have a negative sign and is significant at the 5% significance level. This revealed that inverse relationship is found between more debt-to-equity decision and profitability. The relationship between sales growth and ROA is positive, confirming significance of results at 5% level. The RE model showed positive impact of liquidity ratios (CR & ATR) on profitability ROA, the results are significant at 5% significance level. The results of model for gross profit margin showed that more debt impact firm financial performance inversely. The liquidity ratios (CR & ATR) are positive but significant at 5% significance level. The sales growth, firm size and employees' productivity increase firm profitability positively. Overall, the results suggest that high value of debt-to-equity ratio (DER) and debt to total funds (DTF) badly affects their profitability.

Therefore, this study suggest that company managers and owners should use an optimal debt level as the debt financing significantly and negatively affect firms' profitability. This study also provides an insight to pharmaceutical companies to make rational choices of liquidity conditions to ensure profit maximization and decrease costs involved in debt capital structure.

Authors Contribution

Rukhsana Rasheed: Introduction, Literature Review and hypothesis.
Mehwish Shahid: Purpose of study, Research Methodology, Practical Implication.
Munaza Mukhtar: Conceptual Framework, Conclusion and Limitation & Future Direction
Mazhar Nadeem Ishaq: Discussion, Proofread and submission.

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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