



SELECTED MACRO-ECONOMIC VARIABLES AND FINANCIAL LEVERAGE'S IMPACT ON PERFORMANCE INDICATORS OF QUOTED CHEMICAL FIRMS IN PSX



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ABSTRACT

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This research paper scrutinizes the correlation between one of financial leverage tool i.e. capital structures and financial performance variables of firms with the evidence from quoted companies from chemical sector in Pakistan Stock Exchange (PSX) during 2004-2015. To estimate the relationship between capital structure and performance variables we selected three profitability ratios i.e. net profit margin, return on assets and return on equity, whereas for capital structure an important leverage ratio, D:E is selected as independent variable. Credit to GDP ratio and lending interest rate are also included in model as independent control variables. The results concluded that interest rate has insignificant effect on performance of firms. However, leverage ratio and credit to GDP ratio has relatively significant relationship with all performance variables. The outcomes through this study are consistent with the findings of earlier researches. Forthcoming work can be done to probe different industries using other new financial performance variables.

Contribution/ Originality: This paper contributes in existing literature by reviewing different conditional theories of financial leverage to formulate propositions concerning the determinants of capital structure of firms. Panel econometric techniques are used to investigate the most significant factors that reflects the financial leverage's impact on performance variables.

1. INTRODUCTION

1.1. Background of Study

In any business research regarding performance measures of a firm, the foremost objective of the researcher is to evaluate the dynamics affecting the firms' performance in terms of profit or loss. It is claimed by many economics and business scholars that the variable financial leverage (FL) is the most important factor among all the others which can substantially impact a firm's productivity in terms of financial gain. A firm is dependent on funds to meet its financial obligations and these funds are obtainable by any firm in the form of equity, debt or hybrid

securities. These forms of capital establish the broader source of funds and the firm may decide which form of capital to utilize to meet its capital expenditure and working capital. The firm has an option to look forward towards obtaining debt or utilizing equity to meet the financial requirements. This comprises the understanding and management of capital structure (CS) concepts. Fund managers in pursuing improved financial performance follow strategies to optimize the CS of the firm to gain competitive market advantage. Exploiting the appropriate CS using different levels of equity and debt to finance the projects in the firms is such strategy adopted by the firm's managers. This approach and its impact on profitability indicators have been extensively studied inflexibly by the research scholars (Gleason, Mathur, & Mathur, 2000).

The amount associated with the cost of debt servicing is usually the component of interest which a firm has to pay to the external creditors. FL has interesting behavior in various economic situations. During the booming economic period, greater FL provides higher returns to the firm and on the contrary, during the recession times; FL has an adverse effect on profitability of firms. It causes cash flow glitches during the recession time for the firms due to which they find it difficult to obligate for its cost of capital i.e. interest charges. One of the reasons is that sale volumes are reduced during recession period and the firms are unable to meet the interest expenses accrued towards the lenders. In the past, a number of researches have been conducted by various researchers to understand the behavior of different types of FL on profitability indicators of firms. (Rajan & Zingales, 1995; Titman & Wessels, 1988). There are a number of empirical studies conducted by researchers in previous years to scrutinize the relationship between financial leverage (FL) on performance of firms in various business sectors around the world. However, similar studies in the perspective of industries in Pakistan are very limited and particularly using macroeconomic indicators as controlled variables for firms in the chemical sector. The highlights from the literature are based on three important factors:

- i) The impact of financial leverage on profitability indicators of firms.
- ii) The lending interest rate scenario in Pakistan at a given period and its impact on firms' performance.
- iii) The Impact of domestic credit to GDP ratio on firms' performance.

Most of the research focused either on financial leverage affecting the financial performance of firms or macroeconomic indicators affecting the performance, however, no studies were found which scrutinize the combined effect of these factors on performance measures particularly in the chemical sector of Pakistan. Therefore, this paper will endeavor to fill the gap and contribute in literature by considering the variables of chemical sector firms quoted in Pakistan Stock Exchange (PSX) during a period from 2004 to 2015. Performance of firms can be gauged through a number of profitability indicators, here these dependent variables are considered as performance indicators:

- (i) Return on Assets (ROA).
- (ii) Return on Equity (ROE).

Capital Structure D: E ratio as leverage proxy and macroeconomic indicators are considered as independent variables in this research and are:

- (iii) Debt Equity Ratio (D:E).
- (iv) Lending Interest Rate (IR).
- (v) Credit to GDP ratio (CrPGDP).

1.2. Research Objective

The objective of this study is to evaluate chemical sector performance in Pakistan in relation with respect to financial leverage in the presence of financial resource available to private firms as a percentage of GDP along with the lending interest rate during a given time period.

1.3. Scope of Study

In 'developed world' a number of research has been conducted to identify the influence of FL on performance of the firm with respect to various profitability ratios. In Pakistan very limited studies are available to study the relationship between financial leverage, lending interest rate, domestic credit available to private sector firms with respect to GDP% growth and firm performance particularly for chemical the sector in Pakistan.

1.4. Statement of the Problem

Financial leverage has insignificant influence on profitability indicators of firms.

1.5. Hypothesis

- D:E has insignificant influence on ROA of chemical firms in Pakistan.
- D:E has insignificant influence on ROE of chemical firms in Pakistan.

2. LITERATURE REVIEW

2.1. Research Objective

There are number of studies available to gauge the affiliation of financial leverage with respect to performance of firms. [Ahmad. and Ali \(2016\)](#) conducted a research and concluded in their study that there is significantly negative relationship exist between profitability of firms and financial leverage in listed cement sector firms of Pakistan as it was observed that firms with high leverage have lower profitability as compared to the firm with lower financial leverage. The significance of financial leverage and its impact on value of the firm is established especially when return on asset and return on capital employed are used as profitability indicators([Ahmad & Rehman, 2016](#)).

Extensive researches have been done on FL since the formative theory by [Modigliani and Miller \(1958\)](#) as findings of this theory concentrated on testing the consequences of two conventional concepts of capital structure, i.e. the static Trade Off Theory (TOT) of CS and the Pecking Order Hypotheses (POH) by [Myers and Majluf \(1984\)](#). The selection of the type of debt, the cost of obtaining that particular debt, the tax rewards associated with it and the managerial preferences on CS are all based on the theories as postulated by [Modigliani and Miller \(1958\)](#); [Ross \(1977\)](#); [Harris and Raviv \(1990\)](#); [Leland and Pyle \(1997\)](#). A few researchers also tried to create a scorecard to fast track the impact of operating leverage on profitability as a business rationale that cost of debt should be fairly economical and the project should be fairly profitable by formalizing a double condition that cost of equity should be lower than the cost of debt and return on investment should be greater than the cost of equity, if this double condition is relaxed the loan becomes expensive ([Broccardo, Tibiletti, & Vilpas, 2018](#)). Various other studies explored the relation between the level of debt financing and its impact on efficiency by observing the firms following traditional trade off theory by adopting optimal capital structure. A firm having higher debt to equity ratio will require greater rate of return([Marszałek & Piontek, 2010](#)).

[Odit and Gobardhun \(2011\)](#) observed financial leverage of SMEs in the light of capital structure theories namely, The Trade Off Theory (TOT), The Agency Theory (TAT) and The Pecking Order Hypothesis (POH) and found that some of the capital structure theories are very important in determining the financial leverage of SMEs. [Marszale and Sekula \(2010\)](#) observed that TOT may touch an optimum level of CS by trading off the benefits of tax advantages with the cost of debt, therefore more debt portion in the company CS bringing in the more tax advantage and resulting in healthy cash flow statements. Market Timing Theory (MTT) another traditional theory highlights that when market value of a company is at peak they tends to issue equity shares in the market, this theory suggests that in order to adjust the stock price the initial public offering may be offered after the disclosure of abnormal positive returns in the financial statements, therefore this theory articulates that there is no significant relationship between capital cost and capital structure of firm ([Lucas & McDonald, 1990](#)).

POH theory as postulated by [Myers and Majluf \(1984\)](#) that retained earnings if available is the most preferable source of internal funding, debt financing through external sources must be considered as a second option and raising finance through equity should be considered as the last option so as to discourage consenting external owners through issuing shares and becoming the stakeholders. This was also highlighted by [Rupeika-Apoga and Zelgalve \(2013\)](#) that if sources of internal funds are not adequate enough to enter into new venture then the company may opt for external financing in a manner to curtail the cost of funds to its minimum.

It has been observed by a number of scholars that significant variations in CS of a firm will lead to alter the firm's financial worth. Conferring to tax benefits in case of high debt it is anticipated that firms would borrow more in order to show better profits thus depicting a higher

value of firm due to the advantage received under tax burden (Vātavu, 2015). Few of the researchers conclude that firms financial performance is the total market value or the aggregate of equity value and other equity options Cole and Mehran (1998) and (Merz & Yashiv, 2007). On the other hand the other scholars deliberate that firms value denotes to operational assets rather than market capitalization (Ang, Cole, & Lin, 2000; Mehran, 1995).

Business scholars has used a number of performance indicators to gauge the effect of CS on profitability of firms. These indicators are commonly used in accounting and financial management practices to measure the financial performance (Majumdar & Chhibber, 1999). These were also observed by Saeedi and Mahmoodi (2011).

Salim and Yadav (2012) observed Malaysian quoted firms in stock exchange to analyze the impact of CS on their profitability using four financial indicator ratios. He analyzed the performance on the basis of ROE, ROA, EPS and Tobin Q and found out that the results suggest that total debt observed that financial leverage adds value to the performance of a firm at any debt level until the net present value (NPV) at equity and NPV at debt both remains positive and if NPV of debt is negative, the levered instrument destroys the economic value of firm.

It has always been an area of great interest among the scholars to study the effects of financial leverage on various profitability indicators of firm. There are several studies available in developed countries assessing the effect of FL and CS on performance of firms, however there are limited studies available in developing countries assessing the effect of capital structure on profitability ratios, as observed by Nawaz and Ahmad (2017). This section explores few of the empirical researches which has been conducted earlier by various other researchers in different business sectors. A number of earlier researches studied the influence of capital structure on financial performance using different profitability measuring indicators, however, they have come to varied conclusions, and few of the results are summarized below:

A firm has an option to choose between debt and equity for its financing, and capital structure as a financing tool helps to delineate the decision. Osoro and Muturi (2015) observes that a firm must take prudent financial decisions and ensure that the borrowing is at optimal level in pursuit of cost minimization and profit maximization.

The Financial leverage is generally considered as investment strategy as to utilize the capital structure in such a way to optimize the financial gains of the firm. The capital structure usually refers leverage ratio and D: E is the recipe of different source of financing where D is used for Debt and E denotes equity financing. The ratio describes the portion of debt and equity as the selection of appropriate ratio for capital structure is the most concerning factor for any firm, as the decision may have an impact on the profitability indicators and overall performance of firms in the long run. (Farooq, Ahsan, Umer, Irum, & Latif, 2013).

In another research Gülhan and Uzunlar (2011) has studied the banking sector in Turkey and analyzed 20 years data from 1990 to 2008 to determine the specific factors affecting the profitability ratios in banking sector. Inflation and GNP% growth rates were observed as dependent and macro-economic variables. The study found positive relation among profitability variables, economic growth and asset quality ratio.

Mahmood, Mansoor, and Zakaria (2007) conducted research on 25 real estate firms in Malaysia where 20 firms were involved in construction during 1990 to 1997. Their findings indicated that the firms having high leverage ratio were underperforming in comparison to firms in the same industry. In another study (Muller & Zimmermann, 2006) analyzed 6,000 SMEs in Germany through conducting a survey and found out that higher equity ratio is in new companies is more profitable and conducive for business operations.

Nikoo (2015) has studied the six years data of 17 banks listed in Tehran Stock Exchange, where she uses ROA, ROE and EPS as profitability measuring variables and capital structure i.e. debt to equity (DE) ratio as an independent variable. Her study shows a positive effect of banks' capital structure on its profitability indicators.

Iheanyi (2016) analyses the data of 11 banks in Nigeria for a period of 12 years from 2002 to 2013 and concluded that the D:E has an inverse effect on ROA while the same has a positive effect on ROE. Overall, they suggests that banks should utilize the debt leverage, but only low cost debt to efficiently improve their financial performance.

2.2. Conceptual Framework

Jabareen (2009) defined conceptual framework defined as a product of qualitative progressions of theorization. He further described it as a grid of interlaced concepts that helps in understanding the phenomenon for model estimation. The concept of this research paper as illustrated in Figure 1: is to analyze the impact of financial leverage under the influence of one financial leverage component, capital structure i.e. D: E as independent variable on financial performance measured by performance variables i.e. ROA and ROE in the presence of macroeconomic indicators such as credit to private sector as GDP% and lending interest as control variables.

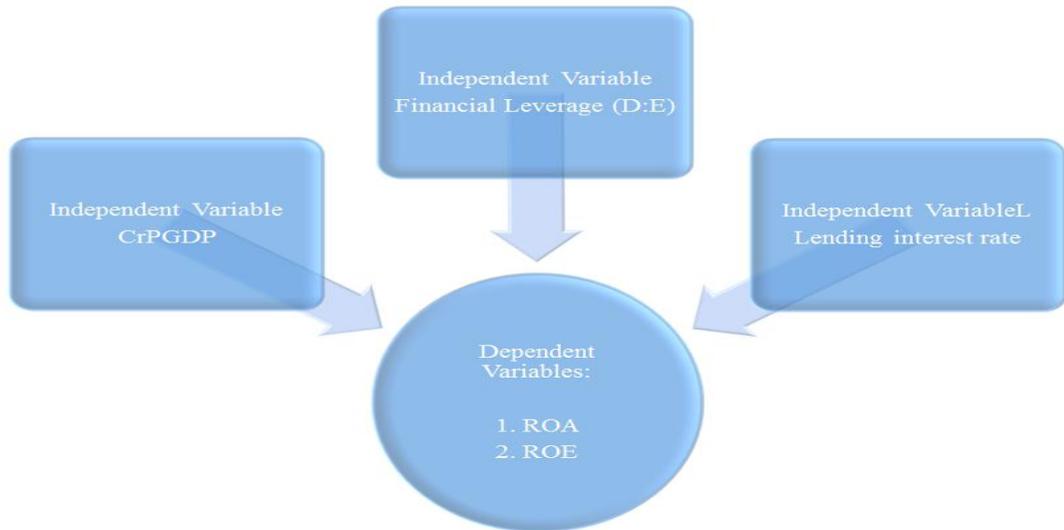


Figure-1. Conceptual framework of the study.

3. METHODOLOGY

3.1. Data

A careful analysis of 12 years audited financial reports of 32 listed companies in Pakistan Stock Exchange from the period 2004-2015. Data for debt equity ratio, net profit margin, return on equity and return on assets were collected from audited financial statements reported in State Bank of Pakistan. Similarly date for domestic credit to private sector was collected from World Bank data and lending interest rate for 12 years were collected from journals of SBP.

3.2. Variables

The IVs used in this paper for parameter estimation are capital structure specifics, i.e. debt to equity ratio D: E and two control variables as independent variable such as credit to private sector (CrPGDP) and lending interest rate (LIR), whereas the performance variables i.e. ROA and ROE are utilized as dependent variables in our model.

3.2.1. Return on Assets

The ratio, return on asset (ROA) is a performance measurement ratio which calculates the total net profit produced by engaging the total assets during a given period by comparing the net profit with the average of total assets. It is commonly calculated as per the formula given below:

$$\text{ROA} = \text{Net Profit} / \text{Average of Total Assets}$$

ROA indicates the amount of money earned per currency unit of an asset, therefore higher ROA means the business is more efficient and profitable (Rao, 2011).

3.2.2. Return on Equity

The Return on Equity (ROE) is another performance measurement ratio which computes how competently a company generates net income through engaging equity investments by means of

comparing net income to shareholders' equity during a given period of time. It is calculated as per the formula given below:

$$\text{ROE} = \text{Annual Net Income} / \text{Shareholders' Equity}$$

ROE is quite complicated term as it can be used to calculate different financial ratios.

Usually this ratio is calculated by dividing net income by shareholders equity of a company during a given period (Rao, 2011).

3.2.3. Debt Equity Ratio

Debt to Equity ratio is a form of leverage ratio used to measure the financial leverage of firms. It indicates the volume of debt a firm is using, to fund its assets relative to shareholder equity value (Rao, 2011). It is calculated as per the formula given below:

$$\text{Debt/Equity Ratio} = \text{Total Liabilities} / \text{Shareholders' Equity}$$

3.2.4. Credit to GDP Ratio

Credit to GDP ratio is defined as the percentage share of domestic credit to private sector in a given period of time. It indicates banks funding to private sector during a given period. It is one of the key indicators to gauge the role of commercial banks in advancing loans to private sector (Edge & Meisenzahl, 2011).

3.2.5. Lending Interest Rate

Lending interest rate is the bank rate according to the monetary policy to meet the financing requirements of the private sector. This financing requirement is usually based on short and medium term financing needs (Jha, 2011).

3.2.6. Inclusion Criteria

There were 42 listed companies in PSX during 2004-2015 in chemical sector, as few of the firm were delisted from PSX and put into the 'defaulters list' in some of the years considered here. Therefore, the above mentioned 32 firms were selected after a careful review of financial statements as reported by State Bank of Pakistan.

3.3. Data Collection Instruments

Data for D: E and performance indicators i.e. ROA and ROE were collected from reports on Financial Statement Analysis (FSA) and Balance Sheet Analysis (BSA) of State Bank for non-financial sector (2012), (2009) and (2015) whereas the data for credit to GDP ratio and lending interest rate were retrieved from World Bank data.

3.4. Statistical Technique

Panel regression technique was used to estimate the relationship among the dependent or explanatory variables (i.e. ROA and ROE) and independent variables (i.e. D: E as Capital structure variable, Credit to GDP ratio and lending interest rate). The data for analysis of this research paper was extracted from audited financial statements and annual reports of individual chemical sector firms for a period from 2004 to 2015.

Following model has been used to analyse the impact of capital structure on firms' performance in the presence of CrPGDP and LIR as control variables.

$$Y = \beta_0 + \beta (\text{Independent variables}) + \epsilon \quad (i)$$

Equation i explains the liner relationship between quantitative input variables β and output response variables denoted by Y.

$$Y = \beta_0 + \beta_1 DE_{it} + \beta_2 CrPGDP_{it} + \beta_3 LIR_{it} + \epsilon \quad (ii)$$

Where,

Y = Dependent variables (i.e. ROE, ROA and NPM)

β_0 = Constant / Deterministic value

$\beta_1 DE_{it}$ = Coefficient x Independent variable (DE: Debt Equity ratio)

$$\beta_2 \text{CrPGDP}_t = \text{Coefficient x Independent variable (CrPGDP: Credit to GDP ratio)}$$

$$\beta_3 \text{LIR}_t = \text{Coefficient x Independent variable (Interest: Average lending Interest rate)}$$

$$\epsilon_t = \text{Residual variable / error term}$$

Equation ii explains the parameters of D:E, Credit to GDP ratio & lending interest rates with the outcomes ROE, ROA and NPM

4. RESULTS AND DISCUSSION

4.1. Descriptive Analysis

Table-1. Descriptive statistics.

Statistics	ROE	ROA	LIR	DE	CRPGDP
Mean	17.1841	9.8107	11.8532	1.5664	22.1586
Median	17.5050	7.9500	11.7700	1.0250	21.9550
Maximum	174.2800	53.1300	14.5400	13.6500	28.7400
Minimum	-613.8500	-76.2800	7.2000	0.1300	15.3100
Std. Dev.	47.4309	15.3016	2.1545	1.8451	5.4543
Skewness	-6.2875	-0.4240	-0.6327	3.5384	0.0086
Kurtosis	85.5538	7.1736	2.5840	18.5104	1.2825

Table 1 represents 384 observations of all the variables in this study. It illustrates that the mean DE leverage of the selected 32 chemical sector listed companies was 1.57 times when a mean lending rate was 11.85% and the mean credit to private sector as a percentage of GDP was 22.15% during the period. The mean return on equity was 17.18% while mean return on assets was 9.81 % during the period.

4.2. Correlation

The correlation specifies the direction and strength of correlation between two variables where positive or negative sign represents the direction of relationship and numeral indicates the strength, the number closer to absolute 01 indicates a stronger correlation. Here in Table 2 dependent variables ROE & ROA indicates moderately negative correlation with DE.

Table-2. Correlation.

Variables	ROE	ROA	LIR	CrPGDP	DE
ROE	1.0000	0.7719	0.0167	0.0600	-0.3159
ROA	0.7719	1.0000	-0.0066	0.0929	-0.3779
LIR	0.0173	-0.0066	1.0000	-0.3860	-0.0526
CRPGDP	0.0600	0.0929	-0.3860	1.0000	0.1299
DE	-0.3159	-0.3779	-0.0526	0.1289	1.0000

4.3. Regression Analysis

We are using Balanced pooled regression model therefore we can analyse the results using fixed effect model (FEM) or random effect model (REM). We will use Hausman test to select the appropriate model for our data. Here the Null Hypothesis is: REM is appropriate i.e. if the probability value is greater than 5% we will retain the null hypothesis and will select random effect model.

Table-3. Correlated random effect – hausmantest (ROE; ROA).

Effect Test	Chi-Square Statistic	Chi- Square d.f.	p-Value
Cross section random	0.000	3	1.000

Table 3 illustrates that the probability value is more than 5% so we have to retain null hypothesis and will select random effect model for both of our dependent variables.

According to Random effect model relationship of ROE; ROA with DE and Credit to GDP ratio is highly significant as p-value is found to be less than 0.05

Table-4. Regression result between dependent variable (ROE; ROA) and performance variables (DE, CrPGDP, Interest %).

Variables	ROE – (RandomEffect)			ROA – (RandomEffect)		
	Coeff.	t-Stat.	Prob.	Coeff.	t-Stat.	Prob.
Constant	-4.254	-2.300	0.818	1.788	0.358	0.720
DE	-8.861	-6.597	0.000	-2.331	-6.395	0.000
CRPGDP	1.058	0.416	0.011	0.399	3.689	0.000
LIR	-1.001	0.959	0.338	0.239	0.271	0.379
Adj. R ²	0.102			0.106		
F-value	15.542			16.211		
Sig	0.000			0.000		

4.4. Inferential Analysis

4.4.1. Dependent Variables (ROE; ROA)

Table 4 explains the regression analysis after applying the model on our dependent variable ROA. The adjusted value of coefficient of determination R² is 0.102 and 0.106 for ROE and ROA respectively which explains that 10.2% of variations in ROE and 10.6% of ROA is explained by the variations in these three explanatory variables. Value of Adjusted R² is rather low here, but we have cross sectional data of 384 observations with varying values of dependent variables and explanatory variables. In such diverse settings the R² values are typically low (Gujarati, 2012) whereas the overall model is highly significant with p value = 0.000 for F-stat for both the dependent variables. Relationship between ROE and CrPGDP is highly significant as t-stat = 0.416 with p value = 0.011. Relationship between ROA and CrPGDP is also highly significant with t-stat = 3.689 with p value = 0.000. Similarly relationship between ROE and D:E is highly significant with t-stat = -6.597 and p value = 0.000. Relationship with ROA with D:E is also highly significant with t-stat -6.395 and p value 0.000, therefore null hypothesis for both the dependent variables are rejected.

4.5. Hypotheses Assessment Summary

Table-5. Summary of hypotheses.

Sr. No.	Hypotheses	Sig. Value	Result
01	D:E has insignificant influence on ROA of chemicalfirms in Pakistan	0.000	Reject
02	D:E has insignificant influence on ROE of chemicalfirms in Pakistan	0.000	Reject

Results as summarized in Table 5 explains that firm's D: E is inversely and significantly related to financial performance of firms as measured by profitability ratios, therefore we have to reject the hypothesis that D:E has insignificant influence on ROA & ROE of chemical firms in Pakistan.

5. CONCLUSION

This study scrutinizes the influence of the FL tool i.e. D:E on firm performance particularly for chemical sector firms listed in PSX. Outcomes of our study reveals that firm's D: E is inversely and significantly related to financial performance of firms as measured by profitability ratios (ROA, and ROE variables). Al-Najjar and Belghitar (2011) also found that there is significantly inverse relationship between leverage ratio and ROA. This shows that engaging high level of debt negatively effects on dependent variables ROA and ROE. The study also shows that the dependent variables have significant relationship with one of the independent and control variables i.e. Credit to GDP ratio and an insignificant relationship with lending interest rate. Our empirical findings reveal that leverage ratio D: E is an important determinant of capital structure and has negative

impact on performance of firms with respect to profitability yields as also observed by Khan, Sajid, Waseem, and Shehzad (2016) and Arulvel and Ajanthan (2013). The findings indicate that the high leverage ratio has caused a reasonable outflow of yield in servicing 'debt financing' and these findings are also consistent with the results as shown by Nassar (2016).

This study scrutinize the performance of only 32 listed companies in Pakistan Stock Exchange, therefore for a better understanding of how financial leveraging tools affect the financial performance of firms in Pakistan, other financial and operating leveraging tools should be applied on more firms in other business sectors, besides other variables should also be incorporated to gauge the effect on financial performance of firms in varied situations.

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