

“The moderating role of firm size and interest rate in capital structure of the firms: selected sample from sugar sector of Pakistan”

AUTHORS

Sarfraz Hussain  <https://orcid.org/0000-0001-9449-1047>
Abdul Quddus  <https://orcid.org/0000-0003-3914-6755>
Pham Phat Tien  <https://orcid.org/0000-0001-9472-5878>
Muhammad Rafiq  <https://orcid.org/0000-0002-1602-4782>
Drahomíra Pavelková  <https://orcid.org/0000-0003-1399-6129>

ARTICLE INFO


Sarfraz Hussain, Abdul Quddus, Pham Phat Tien, Muhammad Rafiq and Drahomíra Pavelková (2020). The moderating role of firm size and interest rate in capital structure of the firms: selected sample from sugar sector of Pakistan. *Investment Management and Financial Innovations*, 17(4), 341-355.
doi:[10.21511/imfi.17\(4\).2020.29](https://doi.org/10.21511/imfi.17(4).2020.29)

DOI [http://dx.doi.org/10.21511/imfi.17\(4\).2020.29](http://dx.doi.org/10.21511/imfi.17(4).2020.29)

RELEASED ON Tuesday, 15 December 2020

RECEIVED ON Wednesday, 15 July 2020

ACCEPTED ON Wednesday, 18 November 2020

LICENSE  This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

JOURNAL "Investment Management and Financial Innovations"

ISSN PRINT 1810-4967

ISSN ONLINE 1812-9358

PUBLISHER LLC "Consulting Publishing Company "Business Perspectives"

FOUNDER LLC "Consulting Publishing Company "Business Perspectives"



NUMBER OF REFERENCES

66



NUMBER OF FIGURES

1



NUMBER OF TABLES

5

© The author(s) 2025. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Received on: 15th of July, 2020

Accepted on: 18th of November, 2020

Published on: 15th of December, 2020

© Sarfraz Hussain, Abdul Quddus,
Pham Phat Tien, Muhammad Rafiq,
Drahomíra Pavelková, 2020

Sarfraz Hussain, Ph.D. Student, Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia. (Corresponding author)

Abdul Quddus, Ph.D. Student, Faculty of Management and Economics, Department of Finance and Accounting, Tomas Bata University in Zlín, Czech Republic.

Pham Phat Tien, Ph.D. Student, Faculty of Management and Economics, Tomas Bata University in Zlín, Czech Republic.

Muhammad Rafiq, Ph.D. Student, Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia.

Drahomíra Pavelková, Dr., Ing., Professor, Head of Department of Finance and Accounting, Faculty of Management and Economics, Department of Finance and Accounting, Tomas Bata University in Zlín, Czech Republic.



This is an Open Access article, distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Conflict of interest statement:

Author(s) reported no conflict of interest

Sarfraz Hussain (Malaysia), Abdul Quddus (Czech Republic),
Pham Phat Tien (Czech Republic), Muhammad Rafiq (Malaysia),
Drahomíra Pavelková (Czech Republic)

THE MODERATING ROLE OF FIRM SIZE AND INTEREST RATE IN CAPITAL STRUCTURE OF THE FIRMS: SELECTED SAMPLE FROM SUGAR SECTOR OF PAKISTAN

Abstract

The selection of financing is a top priority for businesses, particularly in short- and long-term investment decisions. Mixing debt and equity leads to decisions on the financial structure for businesses. This research analyzes the moderate position of company size and the interest rate in the capital structure over six years (2013–2018) for 29 listed Pakistani enterprises operating in the sugar market. This research employed static panel analysis and dynamic panel analysis on linear and nonlinear regression methods. The capital structure included debt to capital ratio, non-current liabilities, plus current liabilities to capital as a dependent variable. Independent variables were profitability, firm size, tangibility, Non-Debt Tax Shield, liquidity, and macroeconomic variables were exchange rates and interest rates. The investigation reported that profitability, firm size, and Non-Debt Tax Shield were significant and negative, while tangibility and interest rates significantly and positively affected debt to capital ratio. This means the sugar sector has greater financial leverage to manage the funding obligations for the better performance of firms. Therefore, the outcomes revealed that the moderators have an important influence on capital structure.

Keywords

profitability, tangibility, Non-Debt Tax Shield, liquidity, exchange rate

JEL Classification

G32, L11, L14

INTRODUCTION

The sugar industry of Pakistan participates in a significant portion of the overall economy. Sugarcane is Pakistan's fourth largest cultivated cash crop. An agriculture-based industry provides employment for the rural landless population and greatly impacts the country's economy. There has been a renewed interest worldwide in identifying the factors affecting optimum capital structure decisions in manufacturing sectors. The main goal of enterprises is to maximize shareholders' wealth using mixed financing sources, including equity capital, retained profits, issuance of ordinary shares, preferred shares, and debt capital. Banks, individuals, financial institutions, and insurance firms have issued debt capital. Borrowing companies may take advantage of the tax shield using debt resources if they have operating profits, but it raises bankruptcy risks. Direct and indirect costs include the risk of bankruptcy. Indirect costs emerged due to shifts in corporate practices concerning long-term investments. Consequently, the potential advantages of leverage are minimized due to bankrupt costs, which are deemed highly leveraged companies to be an incredible risk. Modigliani and Miller (1958) claimed that a company's investment strategy should be focused solely on those factors which would improve a company's net

worth or profitability. They also described a more sustainable capital structure and indicated that leverage and firm value were negligible. Ibrahim and Lau (2019) studied the determinants of financial leverage and suggested that tangibility is a significant positive association to debt ratio while liquidity and profitability observed a significant negative association. In the Pakistani context, which comprises a growing sector of sugar, the key objectives of this study are to contribute and extend the literature in exploring the relationship between macroeconomic factors and capital structure. This study is designed as follows. The following segment will review the literature. Thereafter, the methodology and the proposed theoretical model analyze the empirical results and originate a conclusion based on the findings.

1. LITERATURE REVIEW

Modigliani and Miller (1958) clarified the capital structure value; although this assumption is only effective in perfect market conditions where all shareholders have free access to the financial data. There is no tax difference between zero transaction costs and profits and capital gains. Although several studies have been conducted on the determinants that define the capital structure, Sari and Sedana (2020) interred the effect of profitability and capital structure. They revealed a clear positive association between the variables of profitability and the capital structure of samples taken. Chen and Duchin (2019) noted that operating leverage showed a negative association between profitability and leverage statically. Operating leverage decrease optimal financial leverage and enhance profitability. They demonstrated outcomes using the capital-labor ratio of US enterprises. An. Chakrabarti and Ah. Chakrabarti (2019) revealed a significant negative association between debt ratio and profitability.

Shah and Khan (2017) noted that the leverage ratio is inversely associated with the current ratio and profitability. However, the leverage ratio is favorably influenced by tangibility, firm size, and Non-Debt Tax Shield. The profitability effect is substantially poor, while the impact of tangibility, liquidity, Non-Debt Tax Shield, and size is highly significant. As suggested by Nasution, Siregar, and Panggabean (2017), tangible assets have a positive effect on the capital structure, while Non-Debt Tax Shield and profitability have a negative impact on the capital structure. Besides, these factors together have a major impact on the capital structure. Almendros and Mira (2016) revealed that financial distress has a significant and positive association with Non-Debt Tax Shield. Goh, Tai, Rasli, Tan, and Zakuan (2018) performed research on

the capital structure and its factors in Malaysian firms from 2011 to 2014 and revealed that firm's Non-Debt Tax Shield and profitability are negatively related to firm debt. Lei (2020) also disclosed the important positive relationship between corporate capital structure and Non-Debt Tax Shield.

Vo (2017) suggested the coefficients are significant and negative in the short-term firm leverage. According to Eysimkele and Koori (2019), the debt financing and efficiency of the Nairobi securities exchange-listed agricultural companies, Kenya, has revealed a negative relationship between long-term debt and profits while being stable in the short and medium term. A further negative association is also observed in size, liquidity, and short-term debt. Ibrahim (2017) provides evidence that liquidity, size, profitability, and leverage have a significant negative impact on firm value.

Céspedes, Chang, and Velasco (2017) suggested that the real exchange rate could affect credit constraints, and a novel leverage ratio also affects. As per the study, uncertainty in the exchange rate influences foreign trade in the lengthy period and seems to have no impact in the short term (Nguyen & Do, 2020). Submitter, Sari, Siska, and Sulastri (2019) studied the moderating effect of size and revealed that size offers a moderating influence on the link between profitability, tangibility, liquidity, and capital structure efficiency, and this moderation is significant in large corporations. L. Chen and S. Chen (2011) suggested that firm size is the moderator variable and affects the relationship between leverage and profitability. In the first stage, the moderating effect happens. Mirza (2015) noted that firm size positively affects firm leverage. Muigai and Muriithi (2017) study the capital structure and indicated that firm size has a major moderating impact on the combination of financial instability and corporate capital structure.

Al-Hunnayan (2020) found that the leverage relates positively to the company's size and is negatively linked to its competitiveness and tangibility. Li, Krause, Qin, Zhang, Zhu, Lin, and Xu (2018) examined interest rate regulations and accomplishing transparency. The finding of the study indicates that transparency of earnings increases firm leverage and the additional research indicated that such shock occurs as a means of raising the cost of debt financing. Although information disclosure can reduce the effect of the interest rate on the capital structure, Guo and Zhao (2017) examined the capital structure determinants and showed that size and tangibility are positively related. In contrast, Non-Debt Tax Shield and profitability have a negative impact on the determinants. Yazdanfar, Öhman, and Homayoun (2019) noted that profitability, tangibility, size, and financial

crises explained the changes from the perspective of debt ratio. Rao, Khursheed, and Mustafa (2020) also explained that borrowing showed significant tangibility and firm size is negatively associated with debt ratio. Iqbal and Usman (2018) suggested that a high amount of debt and interest rates decrease equity value. Leland (1994) examined capital structure debt values and revealed that the debt ratio is explicitly linked with interest rate. Staking and Babbel (1995) focused on studying the role of capital structure and interest rate and noted that interest rate and debt have opposite effects. Bokpin (2009) examines the effect of macroeconomics variables and capital structure using a panel data unrelated regression approach of 34 emerging market countries. He indicated that the interest rate has a beneficial impact on businesses to replace long-term debt with short-term debt

Table 1. Empirical literature review

Author(s)	Sample	Dependent variable(s)	Independent variable(s)					Empirical methodology
Current study	29 companies in the sugar sectors	Debt to capital ratio	PA	TB	NDTS	LQ	REER	Two-step dynamic panel GMM system, robust standard error, PCSE technique, AR (1), and AR (2) for auto-detection Sargan test
Al-Hunnayan (2020)	12 banks	Leverage	–	–		+		Multivariate regression analysis using panel data
An. Chakrabarti and Ah. Chakrabarti (2019)	141 energy firms	Total debt ratio	–	IS	IS	–		Panel data techniques
Goh et al. (2018)	174 manufacturing firms	Leverage	–		–	IS		Fixed-effect regression with robust standard errors
Shah and Khan (2017)	10 non-financial firms	Leverage ratio	–	+	+	+		Fixed-effect panel estimation
Nasution et al. (2017)	36 manufacturing firms	Debt ratio	–	+	–			Multiple linear regression
M'ng et al. (2017)	475 Malaysian firms	Leverage	–	+				Ordinary Least Squares (OLS) model with fixed-effect regression
Arsov and Naumoski (2016)	172 non-financial firms	Leverage	–	–	–	–		Panel data with fixed-effect regression
Zulvia and Linda (2019)	56 manufacturing firms	Debt to equity ratio	IS	IS				Panel data, multiple linear regression analysis
Mayuri and Kengatharan (2019)	20 manufacturing firms	Debt to total assets ratio	–	–	IS	–		Fixed-effect panel estimation
Muigai and Muriithi (2017)	40 non-financial firms	Financial distress						Panel regression model for Fixed Effects and Feasible Generalized Least Squares (FGLS)
Yildirim et al. (2018)	1,406 firms	Book leverage and market leverage	–	+				Panel fixed-effect estimator on the static regression model
Ur Rehman (2016)	All textile firms	Leverage			+		–	Panel data regression (fixed-effects model)
Submitter et al. (2019)	170 manufacturing firms	Debt ratio	+		+			Panel data regression

over equity. Goel (2019) studied the determinants of the capital structure of 255 non-financial companies using panel regression and observed negative relationship between interest rate and debt level. This study aims to fill this information gap by analyzing whether and if so, the study moderator variables, i.e., the company's interest rate and scale, have a direct impact on the capital structure by using other macroeconomic variables in 29 companies in the sugar sector of Pakistan, as these variables were not used before as moderator in this type of research in Pakistan according to the best knowledge of authors. Table 1 Empirical literature review shows other studies conducted on capital structure and the signs of findings.

Several abbreviations were used to save space in creating a table of studies in the literature. PA = profitability, TB = tangibility, NDTs = Non-Debt Tax Shield, LQ = liquidity, REER = exchange rate. The positive sign (+) in the table indicates a positive association here between variables and the response variable, whereas the negative sign shows a negative relationship between the dependent variable(s) and the variables. The IS abbreviation (Insignificant) shows that a significant result is not obtained.

2. HYPOTHESES OF THE STUDY

Based on the previously discussed aims, the following hypotheses concerning the sugar sector are described:

- H_1 : *There is a positive relationship between debt to capital ratio and profitability of the Pakistani sugar sector.*
- H_2 : *The interest rate has a significant moderating influence on the relationship between*

debt to capital ratio and profitability of sugar firms.

H_3 : *The firm size has a significant moderating influence on the relationship between debt to capital ratio and profitability of sugar firms.*

H_4 : *There is a positive correlation between debt to capital ratio and liquidity of the Pakistani sugar sector.*

H_5 : *There is a significant relationship between debt to capital ratio and the Non-Debt Tax Shield of the Pakistani sugar sector.*

H_6 : *There is a positive correlation between the debt to capital ratio and the exchange rate of the Pakistani sugar sector.*

3. METHODOLOGY

This section of the study describes analytical techniques for examining patterns, variables, the development of research assumptions, and the interdependence of interest rate and firm size on its capital structure.

3.1. Data and sample

The study sample included 29 registered Pakistani businesses working in the sugar sector. The first sugar sector was undertaken to avoid specious findings or some situations, such as the impact of interest rate on the firms' capital structure formation. The major focus of the study here is the moderating effect of the firm size and interest rate on capital structure, the net decision on profitability and tangibility, and the focus of macroeconomic variables (exchange rate and interest rate) on debt to capital ratio. They tend to be influenced and

Source: Authors.

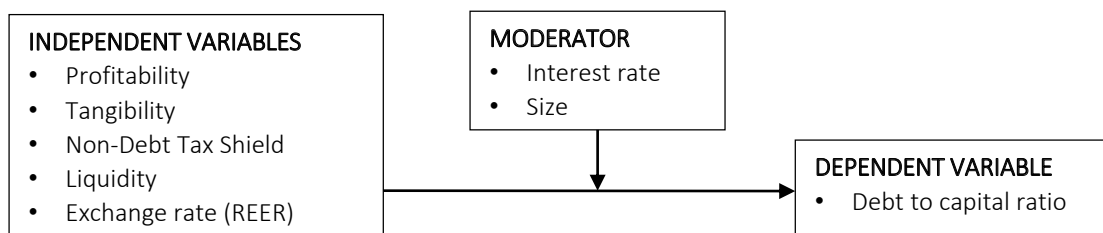


Figure 1. Conceptual framework

involve business administration regarding debt management and other decisions regarding capital structure, which can fluctuate around different manufacturing sectors. All selected firms are listed on the Karachi Stock Exchange (KSE). The selected sample describes six years from 2013 to 2018, and the data were collected from the State Bank of Pakistan Department of Statistics.

3.2. Tools and techniques

For assessing the impact of interest rate and firm size as moderate with debt to capital ratio, mean, standard deviation, and coefficient of variance are used. The coefficient of correlation is applied to get the association between firm size and debts to capital ratio and interest rate with debt to capital ratio. In the case of a static panel, to manage the robust standard error, a PCSE technique is used, where it covers the problem of autocorrelation and a heteroscedasticity problem after applying the correlation(ar1). During the analysis with linear and nonlinear regression analysis, to test the regression T-test results instead of the Z-value, the “small” option is used in system GMM regression. For “robustness,” PCSE helps manage the heteroscedasticity and autocorrelation consistency (HAC) problem as well. The no-diff Sargan command is used to prevent the recording of a certain difference in Sargan statistics. An orthogonal option is used for transmitting orthogonal variations transform rather than the first difference.

3.3. Variables

An experimental variable counts in the investigation and it is considered during the experiment. The experimental variable replies to the explanatory variable. It is determined because it “depends” on the fluctuations in an explanatory variable. In this research, the debt to capital ratio (DCR) is used as the scope of the business capital structure, and hence it is the response variable. The idea of applying this variable is because the research attempted to connect the organization’s operational success or failure besides an operational ratio, and it has extreme relation with other operational variables. DCR is calculated as non-current liabilities plus current liabilities to capital employed. This study tries to relate exactly how much debts a firm can obtain through their investment in cur-

rent assets, manage their current liabilities. It may be desirable to start by concentrating on observing each component of a debt capital ratio because profitability is the output of any firm’s profit and loss account. Normally net profit is obtained after the calculation of all tax and interest expenses calculations. The primary purpose of this study is to find profoundly capital structure in the context of financial needs and the outcomes of this balancing situation between internal and external funds into a business operation, so it should be focused on profit and loss account sincerely because it has roots to increase the firm’s economic productivity. Predictor or regressor variables are average profitability, firm size, tangibility, Non-Debt Tax Shield (NDTS), and liquidity. Profitability is a proxy of return on equity, calculated as (net profit before tax / total assets), whereas the size is calculated natural log of net sales. Liquidity is the ratio between current assets to current liability. Tangibility is (fixed assets after depreciation / total assets), but NDTS is the output of depreciation expenses of fixed assets / total assets. The exchange rate is a real effective exchange rate (REER) and revolves around the economy, while the interest rate is offered by the different commercial banks of the economy-related data collected from the State Bank of Pakistan.

3.4. Empirical model

The paper explores how variables impact the company’s debt to capital ratio (*DCR*) using the panel data analysis of cross-sectional time-series data ended in 2013–2018. *DCR* will be used as a response variable with a combination of variables; hence, *DCR* can be interpreted as follows:

$$DCR = F \left(\begin{matrix} \text{Profitability, Tangibility,} \\ \text{Non-Debt Tax Shield,} \\ \text{Liquidity, ExR, Size, Irate} \end{matrix} \right). \quad (1)$$

3.4.1. Static panel model

A simple linear regression equation is as follows:

$$Y_{it} = \alpha_{it} + \beta_{it} (X) + \varepsilon_{it}. \quad (2)$$

Static linear models stand accessible in the subsequent empirical equations (3) and (4):

$$\begin{aligned}
 DCR_{it} = & \beta_{it} + \beta_1 (\text{Profitability}_{it}) + \\
 & + \beta_2 (\text{Size}_{it}) + \beta_3 (\text{Tangibility}_{it}) + \\
 & + \beta_4 (NDTS_{it}) + \beta_5 (\text{Liquidity}_{it}) + \\
 & + \beta_6 (\text{ExR}_{it}) + \beta_7 (\text{Irate}_{it}).
 \end{aligned} \quad (3)$$

3.4.2. Static model interest rate as the interaction effect

$$\begin{aligned}
 DCR_{it} = & \beta_{it} + \beta_1 (\text{Profitability}_{it}) + \\
 & + \beta_2 (\text{Size}_{it}) + \beta_3 (\text{Tangibility}_{it}) + \\
 & + \beta_4 (NDTS_{it}) + \beta_5 (\text{Liquidity}_{it}) + \\
 & + \beta_6 (\text{ExR}_{it}) + \beta_7 (\text{Irate}_{it}) + \\
 & + \beta_8 (\text{Irate} \cdot \text{Size}_{it}) + \varepsilon_{it}.
 \end{aligned} \quad (4)$$

where i ($i=1 \dots 29$) is the intercept for every firm, t ($t=2013-2018$) characterizes the years examined, and β are the coefficients for each regressor variable, including ε_{it} as the disturbance term. Different approaches will be used to examine the static panel models examined: Pooled Ordinary Least Squares (PLS), Random Effects (RE), Fixed Effects (FE) with n firm-specific intercepts. Fixed-effects models investigate the relationship between input variables and output variables in different things, considering that the business has its characteristics that influence the association of concerning variables. On the other hand, random-effects models indicate random variation across organizations, unassociated with input variables. Breusch and Pagan multiplier test tells us that the random-effects model is appropriate between OLS and Random Effects, while the Hausman test explains the finest model from the second twofold model. Ultimately, to fix autocorrelation and heteroscedasticity problems, 5th to 7th regression models were used, especially regression with two-step system GMM required getting improvements in the estimated model. Tables 4 and 5 (see column 4) show a regression for Panel Correction Standard Error (PCSE).

3.4.3. Dynamic panel model

Many businesses, banking, economics, and finance matters are character-driven and use panel data arrangements to agree with adjustments. It is essential to allow dynamics in the primary pro-

cess for the constant estimation of other parameters. The dynamic connections are described by the carriage of a lagged dependent variable with the regressors, i.e.

$$Y_{it} = \delta Y_{i,t-1} + \beta x_{it} + \mu_{it}, \quad (5)$$

$$\begin{aligned}
 DCR_{it} = & \beta_{it} + \beta_1 (\text{Profitability}_{it}) + \\
 & + \beta_2 (\text{Size}_{it}) + \beta_3 (\text{Tangibility}_{it}) + \\
 & + \beta_4 (NDTS_{it}) + \beta_5 (\text{Liquidity}_{it}) + \\
 & + \beta_6 (\text{ExR}_{it}) + \beta_7 (\text{Irate}_{it}) + \mu_{it}.
 \end{aligned} \quad (6)$$

3.4.4. Dynamic model interest rate as the interaction effect

$$\begin{aligned}
 DCR_{it} = & \beta_{it} + \beta_1 (\text{Profitability}_{it}) + \\
 & + \beta_2 (\text{Size}_{it}) + \beta_3 (\text{Tangibility}_{it}) + \\
 & + \beta_4 (NDTS_{it}) + \beta_5 (\text{Liquidity}_{it}) + \\
 & + \beta_6 (\text{ExR}_{it}) + \beta_7 (\text{Irate}_{it}) + \\
 & + \beta_8 (\text{Irate} \cdot \text{Size}_{it}) + \mu_{it},
 \end{aligned} \quad (7)$$

where δ is a scalar, x_{it} is $1 \cdot K$, and β is $K \cdot 1$. The μ_{it} go when a one-way disturbance component model $\mu_{it} = \lambda_i + \varepsilon_{it}$ the error term μ_{it} is de-integrated into λ_i and ε_{it} , where λ_i is the individual specific effect to cover the specific heterogeneity and ε_{it} is the error term. The empirical model is considered to promote investment variables. Because equity can range from investment to firm equity to debt in both directions and vice versa, these restrictions can be synchronized through the error term. Time-oriented firm individualities (unobserved specific effects λ_i), such as demographics and geography, can remain integrated through descriptive variables. The presence of the lagged measured variable leads to autocorrelation. There are at least two reasons for a small period measurement ($T=6$), then a firm's measurement ($N=29$) in the panel data set: the possibility of simultaneous error control makes it possible for some predictor variables to be endogenous (associated). Controlling the firm's exact impact, which is due to the dynamic assembly of the regression calculation, the firm's specific dummies cannot be used.

According to Blundell and Bond (1998), based on system GMM estimator, level and differ-

Table 2. Descriptive statistics

Statistics Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
DCR	1.64	1.21	27.52	0.13	2.72	7.26	63.61
Profitability	26.41	12.51	328.74	0	46.43	4.05	21.72
Size	15.12	15.16	17.76	11.69	0.99	-0.22	4.27
Tangibility	0.536	0.51	0.948	0.17	0.189	0.14	2.138
NDTS	0.284	0.238	1.007	0	0.186	1.422	5.406
Liquidity	1.078	0.916	7.934	0.064	1.018	4.317	26.621
ExR	4.65	4.663	4.706	4.593	0.039	-0.187	1.66
Irate	0.08	0.075	0.095	0.065	0.013	0.083	1.403

ential equations have been merged. The rear differential of the regressors is used as an extra instrument for level equations. Here are two types of GMM estimator: one-step and two-step. Academically, two-step estimation is much more effective than one-step estimation since it practices the maximum weight matrix. A minor cross-section measurement might (1) cause standard errors, (2) influence estimation parameters (Windmeijer, 2005), and (3) cause a weak extraordinary identification test (Bowsher, 2002). Rodman (2009) explained that the source of these difficulties is device expansion, an answer that cuts the measurement of the adjustable instrumental combination. Blundell and Bond (1998) and Alonso-Borrego and Arellano (1999) show that if the dependent and explanatory variables determined and running continuously over time or almost behaving a random walk, the variance of these components, in differences is performing as a weak instrument for regression (Nyblom, 1989). This is either due to the autoregressive approximation of the parameter union or the variability of the separate impact rises, increasing when idiosyncratic error varies. Therefore, to reduce the potential error and barriers related to difference estimators, Blundell and Bond (1998) projected a GMM method by merging differences and regressions crosswise levels.

In calculating the regression of differences, the means on behalf of regression in levels are lagged differences (transformed), in which the reliability of GMM estimation is contingent on double descriptive diagnostics tests. Sargan tests of excessive instrument restrictions are valid and fail to throw away the hypothesis will mean instruments used in the model are correct, and the

research model is properly well-defined. Serial correlation tests are for the error term (Arellano & Bond, 1991). One must reject H_0 that means the absence of first-order autocorrelation (AR (1)), and not rule out the nonappearance of 2nd order serial connection (AR (2)). Windmeijer (2005) derives a close derivation of this limited sample bias and applies it to the two-step GMM estimation variable variance-covariance matrix (VCE) defining VCE (robust). Reliable estimates of what has been corrected are robust to heteroscedasticity. The output of the Sargan test does not indicate that when the errors are heteroscedastic, the Sargan stat is not presented after the description of the VCE (robust). A healthy form of the Arellano-Bond test for autocorrelation has been developed after defining VCE (robust).

3.5. Descriptive statistics

Table 2 summarizes the values used in the current work as descriptive statistics for the variables employed in the study. The average debt to capital ratio for the sample is 1.64, which deviates within the range of 2.72, while the average profitability is 26.425. The capital structure measure shows that sugar companies have a moderate debt ratio. The mean value of size is 15.118, the average value of the exchange rate is 4.65 and interest rate is 0.08, while tangibility, NDTs, and liquidity have mean values of 0.536, 0.28, and 1.08, respectively. Tangibility suggested that the sugar sector of Pakistan owns a very low volume of fixed assets to current assets. The skewness of leverage of 7.26 shows that the distributions of leverage are approximately symmetric, while size and exchange rate are negatively skewed. The kurtosis leverage values lie between 63.61 and 1.40 for the whole sample.

Table 3. Correlation matrix

Variables	DCR	Profitability	Size	Tangibility	NDTS	Liquidity	ExR	Irate
DCR	1.000							
Profitability	0.296***	1.000						
Size	-0.364***	-0.089	1.000					
Tangibility	0.227**	-0.073	-0.273**	1.000				
NDTS	0.050	-0.051	-0.120	-0.072	1.000			
Liquidity	-0.256***	-0.119	-0.043	-0.439***	0.338***	1.000		
ExR	-0.062	-0.083	-0.015	0.006	0.047	0.058	1.000	
Irate	0.146	0.036	0.046	-0.086	-0.135	-0.061	-0.421***	1.000

3.6. Correlations

The correlation analysis Results are presented in Table 3 where debt to capital ratio is a dependent variable and independent variable, are as follows: profitability, size, tangibility, NDTS, liquidity, exchange rate, and interest rate. To explore the correlation between DCR and profitability, it has a positive and significant impact, while liquidity has a significant and negative association with DCR. Overall variables significantly correlated with DCR. Tangibility, NDTS, and interest rates are positively correlated with DCR, while exchange rate, liquidity, and size are negatively and significantly correlated.

4. RESULTS AND DISCUSSION

Panel A, Panel B, and Panel C employ simple static patterns. Results are presented in Table 4, which are consistent with my reported findings the linear regression model using one static panel and dynamic panel analysis where the debt to capital ratio is used as a dependent variable. In contrast, profitability, tangibility, NDTS, liquidity, exchange rate, size, and interest rate are used as the empirical research model's dependent variables. At the same time, size and interest rate are used as interaction with debt to capital ratio. Multicollinearity tests were obtained through variance inflation factor (VIF) to the panel data where the mean value of $VIF > 10$ means there is a multicollinearity problem in the panel (Singla, 2020). The initial reports of different independent variables are the results in the first column for Pooled Ordinary Least Squares (OLS), second column Random Effects (RE), then in the third column, the Fixed Effects (FE) regressions at the second stage. One uses the techniques to robust the standard error with the techniques of autocorrelation parameter is high,

and the standard errors are large than for model exclusive of serial correlation, which is to be possible if there is a serial correlation. Column 4 (Hambuckers & Ulm, 2020) makes a case in contradiction of estimating panel exact AR parameters instead of one autocorrelation (AR) parameter for all panels. Outcomes from the two-step system GMM regression are included in the last column. The coefficient of determination, known as adjusted R -squared, suggests that different explanatory variables best explain the statistical models, and the model is best fit to data, and there are no multicollinearity problems in all the sample data as indicated by the variance inflation factor (VIF) statistics values. Profitability, size, NDTS, liquidity, ExR, have a negative influence on debt to capital ratio, while tangibility and interest rate has a positive effect on debt to the capital ratio in case of a fixed-effects model. Using the PCSE technique to manage the problem of serial correlation, it was reported through the Wooldridge test and heteroscedasticity test as significant. It was then adjusted with PCSE in static panel data and reported that profitability and NDTS had changed their signs from negative to positive. It shows that PCSE effectively covers the problem of serial correlation and heteroscedasticity. In the case of system GMM, the value profitability rotates position and becomes positive, which means that one can infer after applying system GMM with a positive influence on debt to capital ratio.

The OLS model explains profitability, size, tangibility, NTDS, liquidity, exchange rate, and interest rates to explain the disparity in debt to capital ratio. The fixed-effect model revealed that profitability, size, and NDTS are negative, while tangibility and interest rates significantly positively affect the debt to capital ratio as it is the best choice. PCSE is always a good technique to overcome the problem with heteroscedasticity and serial corre-

Table 4. Linear regression model

Variables	(1)	(2)	(3)	(4)	(5)
	OLS	RE	FE	PCSE AR (1)	Two-step system GMM
DCR = L					−0.226*** (0.124)
Profitability	0.0144*** (0.00437)	0.00176 (0.00520)	−0.0268*** (0.00691)	0.00419** (0.00208)	0.0100 (0.0110)
Size	−0.885*** (0.212)	−1.088*** (0.269)	−1.718*** (0.476)	−0.805*** (0.308)	−4.922*** (0.761)
Tangibility	1.057 (1.254)	2.189 (1.391)	6.100*** (1.851)	1.863*** (0.609)	11.83*** (3.150)
NDTS	1.950* (1.141)	1.170 (1.373)	−3.594* (2.124)	0.845 (0.557)	−6.168* (3.511)
Liquidity	−0.653*** (0.235)	−0.512** (0.254)	−0.335 (0.288)	−0.504*** (0.109)	−0.598 (0.636)
ExR	2.500 (5.523)	0.628 (4.740)	−1.552 (3.998)	−3.938*** (1.124)	−3.149 (6.915)
Irate	38.47** (17.55)	34.13** (15.29)	32.54** (13.01)	17.45*** (2.928)	45.73* (23.37)
Constant	−0.481 (26.63)	11.44 (23.02)	31.04 (19.81)	29.91*** (6.970)	83.13** (33.31)
Observations	142	142	142	142	113
R-squared	0.301	0.277	0.395	0.146	
Number of firms	29	29	29	29	29
Diagnostic checks					
Breusch and Pagan LM test for random effects					(10.65***)
Hausman test					(100.77)***
Multicollinearity test (VIF)					1.26
Heteroscedasticity test					14030.39***
Wooldridge test					1.033/ (0.3186)
Sargan test $\chi^2(8)$ / (p-value)					(7.715) (0.462)
Arellano-Bond test AR (1) (Z) p-value					(−1.458) (0.145)
AR (2) (Z) p-value					(−1.085) (0.278)

Notes: Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is DCR representing debt to capital ratio, profitability means firm financial performance, measured by net profit before tax / total assets; size represents the log of total assets of the firms; tangibility represents fixed assets after depreciation / total assets; Non-Debt Tax Shield (NDTS) represents the output of depreciation expenses of fixed assets/total assets; liquidity represents a firm's liquid position, measured by the ratio between current assets to current liability; EeR represents a Pakistani rupee vs. USD exchange rate real effective exchange rate (REER); Irate is the interest rate (KIBOR) offered by commercial bank calculated by State Bank of Pakistan and beta represents a firm's systematic risk. The numbers presented in Table 3 for each variable are coefficients. Column 3 shows the main effect of DCR; column 4 tests PCSE for the interaction effect of size and Irate; column 5 shows the main effect of the two-step system GMM.

lation with the error term and check the panel data robust standard error correction, where it was observed that the coefficients of all the variables are similar like in the fixed-effects model, except liquidity and exchange rate for the firms getting reproduced (Reed & Ye, 2007). One has applied the Breusch and Pagan Lagrange multiplier test and reported that RE is more consistent (Grozdić et al., 2020; T. Nguyen, V. Nguyen, & Tran, 2020). After it, one applied the Hausman test, which reveals that the FE model is more consistent than RE. This is all about the static panel. Hereafter

dynamic regression model techniques are applied where it covers the problem of heteroscedasticity and serial correlation more accurately (Roodman, 2006; Baum, Schaffer, & Stillman, 2003; Reed & Ye, 2011). One estimates the debt-to-capital formula specified in equations (6) and (7) use GMM system estimator (Blundell & Bond, 1998). The dependent variable has been taken lagged value to mitigate endogeneity problems and Irate*Size used as the interaction variable, asymmetry and non-linearity were analyzed using the relationship Irate*Size between and capital structure. The sig-

nificance of dependent lagged variables shows that system GMM is a reliable model (Heid, Langer, & Larch, 2012; Çoban & Topcu, 2013; Nguyen & Do, 2020). In column 6, tangibility and interest rate have significant value and positively influence debt to capital ratio (Bokpin, 2009). The regression findings with adjusted *R*-squared values show that for all models, the specified independent variables have meaningfully explained the variance in debt to capital ratios (Mulyadi & Sihabudin, 2020). AR (1) and AR (2) are insignificant, whereas the

Sargan test also has a consistent value. The selection of system GMM is the best fit for the selected sample data to infer the outcomes (Zhang & Wang, 2020). This model is tested using the Sargan / Hansen method for over-identification restrictions (Chatterjee, 2020). The AR (1) estimates were insignificant, whereas those for AR (2) were insignificant. The Sargan test results were insignificant, suggesting that the null hypothesis of jointly valid instrumental variables has not been ignored (Ma & Fu, 2020).

Table 5. Nonlinear regression

Variables	(1)	(2)	(3)	(4)	(5)
	OLS	RE	FE	PCSE AR (1)	Two-step system GMM
DCR = L					−0.145*** (0.122)
Profitability	0.0159*** (0.00416)	0.00601 (0.00499)	−0.0219*** (0.00709)	0.00949*** (0.00218)	0.0163 (0.0107)
Size	4.188*** (1.290)	3.207*** (1.177)	0.626 (1.111)	2.949*** (0.996)	1.119 (1.994)
Tangibility	1.076 (1.190)	2.178* (1.321)	6.025*** (1.814)	1.518*** (0.568)	10.37*** (3.060)
NDTS	1.761 (1.083)	1.117 (1.296)	−3.453 (2.082)	1.164*** (0.396)	−4.870 (3.396)
Liquidity	−0.550** (0.225)	−0.403* (0.244)	−0.233 (0.286)	−0.486*** (0.157)	−0.145 (0.625)
ExR	3.590 (5.247)	1.852 (4.587)	−0.671 (3.936)	−2.167*** (0.787)	−2.541 (6.643)
Irate	970.6*** (234.7)	818.6*** (211.4)	471.4** (189.3)	719.6*** (175.4)	1,042*** (309.6)
Irate*Size	−61.61*** (15.47)	−51.76*** (13.92)	−28.93** (12.45)	−46.20*** (11.45)	−65.42*** (20.28)
Constant	−82.38** (32.58)	−59.52** (29.15)	−8.827 (25.90)	−35.40** (15.05)	−11.88 (43.42)
Observations	142	142	142	142	113
<i>R</i> -squared	0.375	0.404	0.424	0.245	
Number of firms	29	29	29	29	29
Diagnostic checks					
Breusch and Pagan LM test for random effects					(9.29***)
Hausman test					(61.49)***
Multicollinearity test (VIF)					1.26
Heteroscedasticity test					14727.13***
Wooldridge test					0.46/(0.51)
Sargan test $\chi^2(8)$ / (<i>p</i> -value)					(10.999) (0.2017)
Arellano-Bond test AR (1) (Z) <i>p</i> -value					(−1.639) (0.101)
AR (2) (z) <i>p</i> -value					(−0.863) (0.388)

Notes: Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is DCR representing debt to capital ratio, profitability means firm financial performance, measured by net profit before tax / total assets; size represents the log of total assets of the firms; tangibility represents fixed assets after depreciation / total assets; Non-Debt Tax Shield (NDTS) represents the output of depreciation expenses of fixed assets/total assets; Irate*Size represents an interaction term of interest rate and size; liquidity represents a firm's liquid position, measured by the ratio between current assets to current liability; EeR represents a Pakistani rupee vs. USD exchange rate real effective exchange rate (REER); Irate is the interest rate (KIBOR) offered by commercial bank calculated by State Bank of Pakistan and beta represents a firm's systematic risk. The numbers presented in Table 4 for each variable are coefficients. Column 3 shows the main effect of DCR; column 4 tests PCSE the interaction effect of size and Irate; column 5 shows the main effect of two-step system GMM.

The interaction method is applied to check the moderator effect of interest rate and firm size on the debt to capital ratio (Youn, Hua, & Lee, 2015). One found understanding of interactions in a nonlinear model is more complicated than in a linear model, where the interaction term marginal effect is approximately equal to the interaction term coefficient. As emphasized in Ai and Norton (2003), the model is nonlinear; the interaction effect cannot be re-evaluated simply by looking at the symbol, significance, or statistical relevance of the interaction term coefficient. The interaction effect may have different signs with different covariate values, and therefore the sign does not necessarily indicate the interaction effect. The interaction term is included in

the model. $Irate*Size$ is expected to capture the joint effects of firm size with interest rate and debt to capital ratio. Its alpha value is compared to the linear model, and here some explanatory variable coefficient value also gets changed, for example, size has a negative value in the linear model, but in the nonlinear, it gets rotate its position become positive. Similarly, the coefficient value of liquidity and exchange rate has changed very severely. Through empirical analysis about the selected sample, it was found that interest rate with firm size have an interaction effect with debt to capital ratio. It was observed from the outputs, and it infers abnormal variation in the coefficient value of different variables, which approves the moderate effect.

CONCLUSION

Researchers have conducted several experiments to determine what defines a firm's capital structure. Similarly, one examined the moderating effect of firm size and the interest rate on the firm's capital structure using panel data from the sugar sector of Pakistan. One has adopted a static and dynamic data panel approach. Interactive data panel models are anticipated to serial connection challenges, heteroscedasticity, and independent variable endogeneity. In this regard, applying static data panels, one uses PCSE, and for dynamic panel models, GMM estimation yields highly accurate regression results and is widely applied in research-based finance sectors. The results showed that firm size and interest rate have a strong and negative effect on its capital structure. Due to the high interest rates offered by commercial banks, large-size firms have enough relationships with consumers. They can manage their funds for loans and capital structure ratios in the firm's best interest. Higher short-term loans can accumulate more money because they lower the risk of liquidity, and it is found that moderator role interest rates affect liquidity. They can set up their funds. The Non-Debt Tax Shield is adversely linked to corporate debt ratios, and the higher Non-Debt Tax Shield is followed by lower levels of debt, thereby creating a certain replacement effect on corporate capital structure. The study findings affirm the effect of Non-Debt Tax Shield on the fundamental hypothesis. A favorable correlation is found between debt to capital ratio and tangibility, where the business collects debt to purchase tangible assets. The sample data from Pakistan is subject to a correlation test, which indicates no high correlations between the independent variables; therefore, no multicollinearity problem exists. Afterwards, it is checked with the command of VIF and found its value is less than 10, which means no multicollinearity in the model. The paper indicates that different influences, including the size, interest rate, profitability, liquidity position, influence the debt to capital ratio of the company. Managers will be considering the interest rate and the proportion of their total assets to debts of the company and other considerations in their debt finance decisions.

AUTHOR CONTRIBUTIONS

Conceptualization: Abdul Quddus, Pham Phat Tien, Muhammad Rafiq, Drahomíra Pavelková.

Data curation: Sarfraz Hussain, Abdul Quddus.

Formal analysis: Sarfraz Hussain, Abdul Quddus, Pham Phat Tien.

Investigation: Sarfraz Hussain, Abdul Quddus, Muhammad Rafiq.

Methodology: Sarfraz Hussain, Abdul Quddus, Pham Phat Tien, Muhammad Rafiq.

Project administration: Abdul Quddus, Drahomíra Pavelková.

Resources: Sarfraz Hussain, Abdul Quddus, Muhammad Rafiq, Drahomíra Pavelková.

Software: Sarfraz Hussain, Abdul Quddus.

Supervision: Drahomíra Pavelková.

Validation: Sarfraz Hussain, Abdul Quddus, Muhammad Rafiq.

Visualization: Abdul Quddus, Pham Phat Tien, Muhammad Rafiq.

Writing – original draft: Sarfraz Hussain, Muhammad Rafiq.

Writing – review & editing: Abdul Quddus, Pham Phat Tien, Drahomíra Pavelková.

LIMITATIONS OF THE STUDY

One wants to make it clear that no study can be free of obstacles, as shown in the following statements:

- The research is limited to six years of data only, i.e., from 2013 to 2018. Accordingly, a complete investigation comprising a normal time may provide somewhat mixed outcomes and could not produce significant inferences.
- This research is based on secondary data collected from the officers of the State Bank of Pakistan, according to which the nature of the investigation depends only on the accuracy of the data and the authenticity of the secondary data. The influence of the data source can affect the results of the estimation and explained the analysis results.

This research is based on twenty-nine companies of the sugar sector in Pakistan, which are also extracted from corporations registered under KSE. Accordingly, the accuracy of the decisions is based on the data of the sampled selected firms. The return can be somewhat contradictory if the potential researcher uses more time about the sampled units.

REFERENCES

1. Al-Hunnayan, S. H. (2020). The capital structure decisions of Islamic banks in the GCC. *Journal of Islamic Accounting and Business Research*, 11(3), 745-764. <https://doi.org/10.1108/JIABR-02-2017-0026>
2. Almendros, J. A. C., & Mira, F. S. (2018). Costs of debt, tax benefits, and a new measure of non-debt tax shields: examining debt conservatism in Spanish listed firms. *Revista de Contabilidad-Spanish Accounting Review*, 21(2), 162-175. <https://doi.org/10.1016/j.rcsar.2018.05.001>
3. Alonso-Borrego, C., & Arellano, M. (1999). Symmetrically normalized instrumental-variable estimation using panel data. *Journal of Business & Economic Statistics*, 17(1), 36-49. Retrieved from <https://www.jstor.org/stable/1392237?seq=1>
4. Arsov, S., & Naumoski, A. (2016). Determinante strukture kapitala: empirijska studija kompanija iz odabranih post-tranzicijskih ekonomija. *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu*, 34(1), 119-146. Retrieved from https://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=237108
5. Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *The Stata Journal*, 3(1), 1-31. <https://doi.org/10.1177%2F1536867X0300300101>
6. Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
7. Bokpin, G. A. (2009). Macroeconomic development and capital structure decisions of firms. *Studies in Economics and Finance*, 26(2), 129-142. <https://doi.org/10.1108/10867370910963055>
8. Bowsher, C. G. (2002). On testing overidentifying restrictions in dynamic panel data models. *Economics Letters*, 77(2), 211-220. [https://doi.org/10.1016/S0165-1765\(02\)00130-1](https://doi.org/10.1016/S0165-1765(02)00130-1)
9. Céspedes, L. F., Chang, R., & Velasco, A. (2017). Financial intermediation, real exchange rates, and unconventional policies in an open economy. *Journal of International Economics*, 108, S76-S86. <https://doi.org/10.1016/j.jinteco.2016.12.012>
10. Chakrabarti, An., & Chakrabarti, Ah. (2019). The capital structure puzzle-evidence from the Indian energy sector.

- International Journal of Energy Sector Management*, 13(1), 2-23. <https://doi.org/10.1108/IJESM-03-2018-0001>
11. Chatterjee, A. (2020). Financial inclusion, information and communication technology diffusion, and economic growth: a panel data analysis. *Information Technology for Development*, 1-29. Retrieved from https://www.researchgate.net/publication/339787685_Financial_inclusion_information_and_communication_technology_diffusion_and_economic_growth_a_panel_data_analysis
 12. Chen, L.-J., & Chen, S.-Y. (2011). The influence of profitability on firm value with capital structure as the mediator and firm size and industry as moderators. *Investment Management and Financial Innovations*, 8(3), 121-129. Retrieved from https://businessperspectives.org/images/pdf/applications/publishing/templates/article/assets/4210/imfi_en_2011_03_Chen.pdf
 13. Chen, Z., & Duchin, R. (2019). *Do non-financial firms use financial assets to risk-shift? Evidence from the 2014 oil price crisis* (Working paper). University of Washington. Retrieved from <https://www.semanticscholar.org/paper/Do-Nonfinancial-Firms-Use-Financial-Assets-to-Take-Chen-Duchin/ec3852e6c67c7d-c440fed2318f567119768868fc>
 14. Chen, Z., Harford, J., & Kamar, A. (2019). Operating leverage, profitability, and capital structure. *Journal of Financial and Quantitative Analysis*, 54(1), 369-392. <https://doi.org/10.1017/S0022109018000595>
 15. Chunrong, A., & Norton, E. C. (2003). Interaction terms in Logit and Probit models. *Economics Letters*, 80(1), 123-129. [https://doi.org/10.1016/S0165-1765\(03\)00032-6](https://doi.org/10.1016/S0165-1765(03)00032-6)
 16. Clemente-Almendros, J. A., & Sogorb-Mira, F. (2016). The effect of taxes on the debt policy of spanish listed companies. *SERIEs*, 7(3), 359-391. Retrieved from <https://www.semanticscholar.org/paper/The-effect-of-taxes-on-the-debt-policy-of-spanish-Clemente-Almendros-Sogorb-Mira/29c9db2203e2fb7da3f9594fdf6bb57eb02b9f04>
 17. Çoban, S., & Topcu, M. (2013). The nexus between financial development and energy consumption in the EU: A dynamic panel data analysis. *Energy Economics*, 39, 81-88. <https://doi.org/10.1016/j.eneco.2013.04.001>
 18. Desai, J., & Desai, R. (2020). Capital Structure and Profitability: Correlation study for Bank NIFTY. *Our Heritage*, 68(22), 16-21.
 19. Eysimkele, A. R., & Koori, J. M. (2019). Financial Leverage and Performance of the Agricultural Companies Listed at Nairobi Securities Exchange, Kenya. *Journal of Finance and Accounting*, 3(5), 76-88. Retrieved from <https://ir-library.ku.ac.ke/handle/123456789/19883>
 20. Galstyan, V., & Velic, A. (2017). Debt thresholds and real exchange rates: An emerging market perspective. *Journal of International Money and Finance*, 70, 452-470. Retrieved from https://www.researchgate.net/publication/301947347_Debt_Thresholds_and_Real_Exchange_Rates_An_Emerging_Markets_Perspective
 21. Goel, S. (2019). Macro-Economic Factors and Capital Structure Decisions of Listed Companies: An Empirical Study for the Indian Economy. *Corporate Governance*, 1(1). Retrieved from https://www.researchgate.net/publication/331062597_Macroeconomic_factors_and_capital_structure_decisions_of_listed_companies_An_empirical_study_for_Indian_economy
 22. Goh, C. F., Tai, W. Y., Rasli, A., Tan, O. K., & Zakuan, N. (2018). The determinants of capital structure: evidence from Malaysian companies. *International Journal of Supply Chain Management*, 7(3), 225-230. Retrieved from https://www.researchgate.net/publication/326253245_The_determinants_of_capital_structure_Evidence_from_Malaysian_companies
 23. Grozdić, V., Marić, B., Radišić, M., Šebestová, J., & Lis, M. (2020). Capital Investments and Manufacturing Firms' Performance: Panel-Data Analysis. *Sustainability*, 12(4), 1689. Retrieved from https://www.researchgate.net/publication/339475594_Capital_Investments_and_Manufacturing_Firms_Performance_Panel-Data_Analysis
 24. Guo, J., & Zhao, C. (2017). Impacting Factors of the Chinese Military Enterprises' Capital Structure and Approaches of Importing Private Capital. *Defence and Peace Economics*, 30(7), 858-876. <https://doi.org/10.1080/10242694.2017.1402245>
 25. Hambuckers, J., & Ulm, M. (2020). *Interest rate differentials and the dynamic asymmetry of exchange rates*. Retrieved from https://orbi.uliege.be/bitstream/2268/236318/5/directional%20forecast%20with%20time%20varying%20skewness_2019.pdf
 26. Heid, B., Langer, J., & Larch, M. (2012). Income and democracy: Evidence from system GMM estimates. *Economics Letters*, 116(2), 166-169. <https://doi.org/10.1016/j.econlet.2012.02.009>
 27. Ibrahim, H., & Lau, T.-C. (2019). The determinants of financial leverage for surviving listed companies in Malaysia. *International Journal of Business and Society*, 20(1), 75-94. Retrieved from https://www.researchgate.net/publication/333249076_The_determinants_of_financial_leverage_for_surviving_listed_companies_in_Malaysia
 28. Ibrahim, M. (2017). Capital Structure and Firm Value in Nigerian Listed Manufacturing Companies: An Empirical Investigation Using Tobin's Q Model. *International Journal of Innovative Research in Social Sciences & Strategic Management Techniques*, 4(2), 112-125. Retrieved from <http://international->

- alpolicybrief.org/images/2017/SEPT-JOURNALS/IRSSMT/ARTICLE9.pdf
29. Iqbal, U., & Usman, M. (2018). Impact of Financial Leverage on Firm Performance: Textile Composite Companies of Pakistan. *SEISENSE Journal of Management*, 1(2), 70-78. Retrieved from https://www.researchgate.net/publication/337148212_Impact_of_Financial_Leverage_on_Firm_Performance
 30. Kinyua, J. B., & Muriu, P. W. (2017). Determinants of Capital Structure of Agricultural Firms in Kenya. *European Scientific Journal, ESJ*, 13(7). Retrieved from https://www.researchgate.net/publication/315754435_Determinants_of_Capital_Structure_of_Agricultural_Firms_in_Kenya
 31. Lei, L. (2020). Research on the Impact of Tax Shield Effect on Corporate Capital Structure – Empirical Analysis Based on A-Share Listed Companies. *Modern Economy*, 11(1), 126-139. Retrieved from https://www.researchgate.net/publication/338626724_Research_on_the_Impact_of_Tax_Shield_Effect_on_Corporate_Capital_Structure_-_Empirical_Analysis_Based_on_A-Share_Listed_Companies
 32. Leland, H. E. (1994). Corporate debt value, bond covenants, and optimal capital structure. *The Journal of Finance*, 49(4), 1213-1252. Retrieved from <https://www.jstor.org/stable/2329184?seq=1>
 33. Li, W., Krause, R., Qin, X., Zhang, J., Zhu, H., Lin, S., & Xu, Y. (2018). Under the microscope: An experimental look at board transparency and director monitoring behavior. *Strategic Management Journal*, 39(4), 1216-1236. <https://doi.org/10.1002/smj.2756>
 34. Li, X., Tian, L., Han, L., & Cai, H. H. (2019). Interest rate regulation, earnings transparency, and capital structure: evidence from China. *International Journal of Emerging Markets*. Retrieved from https://www.researchgate.net/publication/338499457_Interest_rate_regulation_earnings_transparency_and_capital_structure_evidence_from_China
 35. Li, Y., & Singal, M. (2019). Capital structure in the hospitality industry: The role of the asset-light and fee-oriented strategy. *Tourism Management*, 70, 124-133. <https://doi.org/10.1016/j.tourman.2018.08.004>
 36. M'ng, J. C. P., Rahman, M., & Sannacy, S. (2017). The determinants of capital structure: Evidence from public listed companies in Malaysia, Singapore and Thailand. *Cogent Economics & Finance*, 5(1), 1418609.
 37. Ma, X., & Fu, Q. (2020). The Influence of Financial Development on Energy Consumption: Worldwide Evidence. *International Journal of Environmental Research and Public Health*, 17(4), 1428. Retrieved from https://www.researchgate.net/publication/339456485_The_Influence_of_Financial_Development_on_Energy_Consumption_Worldwide_Evidence
 38. Mayuri, T., & Kengatharan, L. (2019). Determinants of Capital Structure: Evidence from Listed Manufacturing Companies in Sri Lanka. *SCMS Journal of Indian Management*, 16(1), 43-56. Retrieved from <https://search.proquest.com/openview/9e31f5e2130b43ca08061b75679145eb/1?pq-origsite=gscholar&cbl=546310>
 39. Mirza, D. (2015). *Capital structure determinants in Europe: The effect of profitability and the moderating role of firm size* (Bachelor' thesis, University of Twente). Retrieved from <https://essay.utwente.nl/67277/>
 40. Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance, and the theory of investment. *The American Economic Review*, 48(3), 261-297. Retrieved from <https://www.jstor.org/stable/1809766?seq=1>
 41. Muigai, R. G., & Muriithi, J. G. (2017). The moderating effect of firm size on the relationship between capital structure and financial distress of non-financial companies listed in Kenya. *Journal of Finance and Accounting*, 5(4), 151-158. Retrieved from <http://www.sciencepublishing-group.com/journal/paperinfo?journalid=171&doi=10.11648/j.jfa.20170504.15>
 42. Mulyadi, D., & Sihabudin, O. S. (2020). Analysis of Current Ratio, Net Profit Margin, and Good Corporate Governance against Company Value. *Systematic Reviews in Pharmacy*, 11(1), 588-600. Retrieved from <http://www.sysrevpharm.org/full-text/196-1581322463.pdf>
 43. Nasution, A. A., Siregar, I., & Panggabean, R. (2017). *The Effect of Profitability, Asset Tangibility, Corporate Tax, Non-Debt Tax Shield, and Inflation upon the Financial Capital Structure of the Manufacturing Companies listed on the Indonesian Stock Exchange*. Paper presented at International Conference on Business and Management Research (ICBMR 2017). Atlantis Press. Retrieved from https://www.researchgate.net/publication/323397769_The_Effect_of_Profitability_Asset_Tangibility_Corporate_Tax_Non-debt_Tax_Shield_and_Inflation_upon_the_Financial_Capital_Structure_of_the_Manufacturing_Companies_listed_on_the_Indonesian_Stock_Exchange
 44. Nguyen, T. T., Nguyen, V. C., & Tran, T. N. (2020). Oil price shocks against stock return of oil and gas-related firms in the economic depression: a new evidence from a copula approach. *Cogent Economics & Finance*, 8(1), 1799908. <https://doi.org/10.1080/2322039.2020.1799908>
 45. Nguyen, V. C., & Do, T. T. (2020). Impact of exchange rate shocks, inward FDI and import on export performance: a cointegration analysis. *The Journal of Asian Finance, Economics, and Business*, 7(4), 163-171. Retrieved from https://www.researchgate.net/publication/340524757_Impact_of_Exchange_Rate_Shocks_Inward_FDI_and_Import_on_Export_Performance_A_Cointegration_Analysis
 46. Nyblom, J. (1989). Testing for the constancy of parameters over time.

- Journal of the American Statistical Association*, 84(405), 223-230. Retrieved from <https://www.jstor.org/stable/2289867?seq=1>
47. Rao, M., Khursheed, A., & Mustafa, F. (2020). The impact of concentrated leverage and ownership on firm performance: a case in Pakistan. *LogForum*, 16(1). Retrieved from <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.ekon-element-000171579074>
 48. Rao, P., Kumar, S., & Madhavan, V. (2019). A study on factors driving the capital structure decisions of small and medium enterprises (SMEs) in India. *IIMB Management Review*, 31(1), 37-50. <https://doi.org/10.1016/j.iimb.2018.08.010>
 49. Reed, W. R., & Ye, H. (2007). *A Monte Carlo evaluation of some common panel data estimators when serial correlation and cross-sectional dependence are both presents*. Retrieved from <https://ideas.repec.org/p/cbt/econwp/07-01.html>
 50. Reed, W. R., & Ye, H. (2011). Which panel data estimator should I use? *Applied Economics*, 43(8), 985-1000. <https://doi.org/10.1080/00036840802600087>
 51. Roodman, D. (2006). *How to do xtabond2: an introduction to 'Difference' and 'System' GMM* (Stata Center for Global Development Working Paper, 103). Retrieved from <https://ideas.repec.org/a/tsj/stataj/v9y2009i1p86-136.html>
 52. Roodman, D. (2009). Practitioners corner a note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135-158. Retrieved from <https://www.semanticscholar.org/paper/PRACTITIONERS'-CORNER-A-Note-on-the-Theme-of-Too-C3%85-Roodman/078b6dad32a8cdc16ce11c111c1f875b2927dd8b>
 53. Sari, I. A. G. D. M., & Sedana, I. B. P. (2020). Profitability and liquidity on firm value and capital structure as an intervening variable. *International Research Journal of Management, IT and Social Sciences*, 7(1), 116-127. [https://doi.org/10.21511/imfi.17\(4\).2020.29](https://doi.org/10.21511/imfi.17(4).2020.29)
 54. Shah, M. H., & Khan, A. (2017). Factors determining the capital structure of Pakistani non-financial firms. *International Journal of Business Studies Review*, 2(1), 46-59. Retrieved from <https://mp.ra.ub.uni-muenchen.de/82015/>
 55. Singla, H. K. (2020). Does VAIC affect the profitability and value of a real estate and infrastructure firms in India? A panel data investigation. *Journal of Intellectual Capital*. Retrieved from https://www.researchgate.net/publication/339411119_Does_VAIC_affect_the_profitability_and_value_of_real_estate_and_infrastructure_firms_in_India_A_panel_data_investigation
 56. Staking, K. B., & Babbel, D. F. (1995). The relation between capital structure, interest rate sensitivity, and market value in the property-liability insurance industry. *Journal of Risk and Insurance*, 690-718. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=6955
 57. Submitter, G., Sari, M., Siska, N., & Sulastri, S. (2019). Firm Size as Moderator to Capital Structure-Its Determinants Relations. *J. Fin. Bank. Review*, 4(3), 108-115. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3511558
 58. Tran, T. N., Nguyen, T. T., Nguyen, V. C., & Vu, T. T. H. (2020). Energy consumption, economic growth and trade balance in East Asian - A panel data approach. *International Journal of Energy Economics and Policy*, 10(4), 443-449. <https://doi.org/10.32479/ijeep.9401>
 59. Ur Rehman, Z. (2016). Impact of macroeconomic variables on capital structure choice: a case of the textile industry of Pakistan. *The Pakistan Development Review*, 227-239. Retrieved from <https://ideas.repec.org/a/pid/journal/v55y2016i3p227-239.html>
 60. Vo, X. V. (2017). Determinants of capital structure in emerging markets: Evidence from Vietnam. *Research in International Business and Finance*, 40, 105-113. <https://doi.org/10.1016/j.ribaf.2016.12.001>
 61. Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25-51. <https://doi.org/10.1016/j.jeconom.2004.02.005>
 62. Yazdanfar, D., Öhman, P., & Homayoun, S. (2019). The financial crisis and SME capital structure: Swedish empirical evidence. *Journal of Economic Studies*, 46(4), 925-941. <https://doi.org/10.1108/JES-04-2018-0147>
 63. Yildirim, R., Masih, M., & Bacha, O. I. (2018). Determinants of capital structure: evidence from Shari'ah compliant and non-compliant firms. *Pacific-Basin Finance Journal*, 51, 198-219. <https://doi.org/10.1016/j.pacfin.2018.06.008>
 64. Youn, H., Hua, N., & Lee, S. (2015). Does size matter? Corporate social responsibility and firm performance in the restaurant industry. *International Journal of Hospitality Management*, 51, 127-134. <https://doi.org/10.1016/j.ijhm.2015.09.008>
 65. Zhang, D., & Wang, H. (2020, January). Research on Threshold Effect of Housing Price on Real Estate Inventory. In *5th International Conference on Economics, Management, Law, and Education (EMLE 2019)* (pp. 295-300). Atlantis Press. Retrieved from <http://gb.oversea.cnki.net/KCMS/detail/detail.aspx?filename=ISCA201910001051&dbcode=IPFD&dbname=IPFDTEMP>
 66. Zulvia, Y., & Linda, M. R. (2019). The Determinants of Capital Structure in Manufacturing Companies Listed on the Indonesia Stock Exchange with the Firms' Size as a Moderating Variable. *KnE Social Sciences*, 715-735. <http://dx.doi.org/10.18502/kss.v3i11.4046>