

Unveiling the Changing Capital Structure Dynamics in the Oil and Gas Industry: Evidence from Pakistan

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ABSTRACT

Firm-specific factors affect decisions about capital structure. Recent research has examined the financial leverage impact on firm performance. Most studies have considered only non-financial firms and the textile industry. A few investigations have been done in Pakistan's oil and gas sector. As this sector attracts investors, the factors influencing capital structure choices must be considered. In this research, we study firm-specific factors. Specifically, we examine the effect of asset structure, financial distress (earning volatility), non-debt tax shield, liquidity, firm size, profitability, and firm growth on capital structure decisions. For this analysis, data ranging from 2007 – 2021 of the firms in Pakistan's oil and gas sector are used. The pool regression approach is applied. As per the results, tangibility and liquidity have a negative connection, non-debt tax shields, and firm size directly affect profitability, and growth does not impact the capital structure.

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INTRODUCTION

The amount of debt compared to equity funding is known as the capital structure. It shows debt financing of assets as a percentage of equity. The role of capital structure in making long-term financial choices and the worth of a corporation is pivotal. Capital structure also determines the firm value (Hirdinis, 2019). Initially, the significance of capital structure was covered by Modigliani and Miller (1958). Afterward, scholars have widely utilized it to assess the importance of capital structure. Different industries' ideal capital structures are still up for debate (Saeed et al., 2021). Most studies explore non-financial firms' capital structure determinants (Amatya, 2020; Shah et al., 2004) or small and medium firms (Bas et al., 2009; Daskalakis & Psillaki, 2008). Some scholars have looked into how financial leverage (FL) impacts a company's performance and used it as a descriptive variable (Hussain et al., 2021; Nguyen & Nguyen, 2020). As per the authors' knowledge, limited empirical research has looked at the variables influencing capital structure in Pakistan, particularly in the oil and gas sector. Hence the question arises, what can be the optimal capital structure in the oil and gas industry? This study is unique in this context.

The share price of the oil industry has been the focus of many investors because of its high growth and high return. Oil companies in Pakistan are considered a blue chip for investment. Fund providers in Pakistan have numerous opportunities to participate in various industries. The oil and gas industry is among the most reliable and effective selections because its positive performance and sustainable growth in the market attract investors. Natural resources abound in Pakistan, and the oil and gas industry contribute significantly to the country's economy. Many companies are working with the sector and contributing to the economy.

The factors that determine capital structure have been extensively studied, yet as per the authors' limited knowledge, not much work has been done on the oil and gas industry, and there is still a need to contribute to the literature. Secondly, the companies can be distinguished into high-growth, highly profitable firms, and small and medium enterprises. Much work has been done regarding the elements that influence the capital structure of small and medium-sized businesses, but the firms with rapid expansion have not been given any weight. Why the high-growth firms are neglected is still a question mark, as no solid reason is found in the literature. These motivate us to explore the factors that determine Pakistan's oil and gas sector's capital structure.

We have chosen the businesses represented on the Pakistan Stock Exchange (PSX) to ascertain the elements that impact the oil and gas sector capital structure. In addition, many external factors have an impact on the organization's capital structure. We have limited this study to only company-specific variables such as asset structure (AS), financial distress (EV), non-debt tax shield (NDTS), liquidity (LQTY), firm size (FS), profitability (PFTY), and growth.

The remainder of the paper includes sections explaining the literature review, data and methods, findings, explanation, and discussion.

LITERATURE REVIEW

Capital structure

A company's capital structure is the combination of sources to finance its assets. Companies typically have two options for financing their assets: either through retained earnings as an internal source or an outside source split into equity and debt.

Leverage in finance is the percentage of capital that is backed by debt. A financial manager's decision is crucial in this regard. Research has investigated the FL impact on firm performance and value and used it as a proxy to measure capital structure (Hussain et al., 2021; Nguyen & Nguyen, 2020). Taebi Noghondari and Taebi Noghondari (2017) explained that due to the possibility that an increase in the debt ratio may raise financial risks and capital costs, FL is one of the most challenging concerns the financial manager must consider when making decisions. Therefore, businesses should enhance their use of financial resources to boost PFTY.

The decision of managers for the optimal debt-to-equity ratio is dependent on internal as well as external factors. Jorgensen and Terra (2003) concluded that a company's fundamental and macroeconomic forces impact firms. Deesomsak et al. (2004) stated that operational and environmental considerations influence the choices chosen for the capital structure. Shah et al. (2004) discovered that FS, growth, and PFTY are essential for choices regarding capital structures. Daskalakis and Psillaki (2008) explained that capital structure is influenced by AS and PFTY. Teker et al. (2009) demonstrated that AS, growth opportunities, PFTY, and NDTs are relevant for capital structure decisions. Bhat and Periyasami (2021) argue that the most critical factors affecting capital structure are PFTY, FS, growth, and LQTY.

Asset structure and capital structure

AS is of different categories, and one of them is fixed assets. The structure varies in various industries according to their business models. The financing component of capital structure is relevant to its AS, as discussed by different researchers. The study results suggest that PFTY and AS considerably and positively impact capital structure (Mujiatun et al., 2021). AS is inversely correlated with capital structure in the mining, food, and beverages industries; however, it shows a direct relationship in the agriculture sector (Utami et al., 2020). AS negatively affects the company's FL (Yunusa & Prasetyob, 2020). A firm's AS and debt ratio have a positive association. The availability of collateral to the lenders reduces the recovery risk, so they charge lower prices. Companies that cannot offer security will be forced to issue stock rather than debt or pay higher interest rates (Scott, 1977). The debt ratio and asset tangibility correlate positively (Friend & Lang, 1988; Rajan & Zingales, 1995; Teker et al., 2009; Ullah, 2012). Therefore, based on prior studies, we propose the following hypothesis in the context of Pakistan.

Hypothesis 1: Asset structure (tangibility) positively relates to capital structure.

Financial distress and capital structure

EV is the default and bankruptcy risk associated with capital structure decisions. EV is taken as its proxy. Higher earnings volatility increases the probability of EV. That's why a firm first uses its internal funds, followed by outside reserves, to reduce the expense of capital. This is the outcome that trade-off theory and pecking order theory together predict. Thus, it causes an inverse impact on FL. Ghasemzadeh et al. (2021) found that EV significantly and negatively impact capital structure. Utami et al. (2020) found a significant negative correlation between capital structure and EV in the utility, transportation, and infrastructure industries, but they are significantly and positively correlated in the mining sector. Lee and Manual (2019) revealed an opposite and strong relationship between FL and EV, external equity, and asset tangibility. The research outcome reveals that capital structure negatively affects corporate EV (Fredrick, 2018). The same relation is revealed by Shah and Khan (2007). Considering the prior research, we assume that FL is negatively related to EV.

Hypothesis 2: Financial distress (earnings volatility) is inversely related to capital structure.

Non-debt tax shield and capital structure

NDTS includes tax credits for investment and depreciation. There are different views regarding its relationship with FL. According to Rialdy and Fahmi (2023), NDTS affects capital structure in part. Slamet (2023) concluded that capital structure is not greatly impacted by NDTS. Ghani et al. (2023) reveal that the NDTS has a considerable and favorable effect on the debt ratio. Benyamin and Soekarno (2023) studied Indonesian context and found that NDTS does not impact the capital structure decisions of public infrastructure businesses. Bimo and Dahrani (2022) concluded that capital structure is affected by NDTS. Fukuludin et al. (2021) found that the debt-to-asset ratio is unaffected by NDTS, but the ratio of debt to equity is severely impacted. Wulandari and Artini (2019) indicated no connection between FL and NDTS. NDTS and business risks do not affect the capital structure of the automobile industry (Fachri & Adiyanto, 2019). The tax advantages of debt financing can be replaced by NDTS, and a company with more NDTS is likely to use less debt (DeAngelo & Masulis, 1980). The NDTS of Pakistani oil and gas corporations is, therefore, thought to be inversely related to their FL.

Hypothesis 3: Capital structure and non-debt tax shield have a negative relationship.

Liquidity and capital structure

LQTY is the power of readily available cash for payment. The results of Afinindy et al. (2021) revealed that the value of a firm is unaffected by LQTY. Companies having high LQTY borrow less. This is endorsed by Sheikh and Wang (2011) in their research while determining Pakistan's manufacturing sector's capital structure. LQTY negatively and significantly affects capital structure (Nurwulandari, 2021). The study's findings demonstrated that PFTY, LQTY, and AS had negative and notable effects on capital structure (Dewi et al., 2021). Doan (2019) reported that foreign ownership, AS, PFTY, and LQTY all have unfavorable relationships with capital structure. Amatya (2020) further discovered an inverse correlation between LQTY and FL. The findings demonstrate that FS, AS, PFTY, LQTY, and sales growth have an adverse and notable impact on capital structure (Rokhayati et al., 2021). Relying on the literature discussed above, we suppose the LQTY factor discourages debt financing, and LQTY and FL are inversely related.

Hypothesis 4: Liquidity is inversely related to capital structure.

Firm size and capital structure

When analyzing the indebtedness ratios, the size of an organization is crucial (Gajdosikova & Valaskova, 2022). Doan (2019) revealed how the Ho Chi Minh Stock Exchange's non-financial companies' present capital structures are positively impacted by FS and historical capital structures. The total assets of the business, total sales, and market value depict the FS. Two conflicting viewpoints exist about the link between FL and corporate size. To take advantage of tax shelter, large enterprises must borrow more money, but they also benefit from reduced agency

costs of lending, proportionally lower follow-up costs, less erratic cash flow, and simpler access to the credit market. Greater diversity and decreased bankruptcy risk are found in larger enterprises (Titman & Wessels, 1988). Rajan and Zingales (1995) assert that bigger corporations have fewer asymmetrical details. This lowers the likelihood that the new share offering will be undervalued, encouraging big businesses to adopt equity financing. When analyzing the indebtedness ratios, the size of an organization is crucial. This indicates that there is a bad association between FS and FL. Relying on the Titman and Wessels (1988) and Doan (2019) study, we presume that FL and FS have a favorable connection.

Hypothesis 5: Capital structure and firm size have a positive relationship.

Profitability of the firm and capital structure

The pecking order theory states, the preference of management is to raise money from the inside to prevent possible ownership dilution. Skulanova (2020) investigated the impact of PFTY on mining companies and found an inverse connection between debt financing and PFTY. Awaliyah et al. (2021) identified a weak, but not statistically significant, correlation between PFTY and FL in the hotel industry. Rahman et al. (2020) found a strong inverse relationship between FL and a company's PFTY. With a higher PFTY ratio, companies borrow less debt (Amatya, 2020). PFTY has a detrimental impact on FL (Sutomo et al., 2020). Return on assets, an indicator of PFTY, is inversely connected (Dewi et al., 2021). Sayilgan et al. (2006) concluded that, for Turkish enterprises' capital structure decisions, PFTY is negatively connected to FL. Therefore, we assume a negative relationship between PFTY and FL in our analysis.

Hypothesis 6: Profitability is inversely related to capital structure.

Growth of the firm and capital structure

The growth is defined as an annual percentage change in earnings. Higher growth potential encourages suboptimal investment or the acceptance of hazardous initiatives that steal money from loan holders. Due to the increased cost of borrowing, expanding businesses are more likely to avoid debt by using internal resources or equity capital. Growth-oriented enterprises will use fewer loans and more equity due to the increasing cost of debt. PFTY, growth, and risk explain the debt ratio (Dakua, 2019). Shikumo (2022) concluded that the FL of non-financial enterprises listed on the Nairobi exchange and the firm's growth were positively and significantly correlated. El Madbouly (2022) discovered a strong correlation between the firm's FL ratio and sustainable growth rate. Naumoski et al. (2022) stated that a company's growth is positively affected by FL. According to Amidu (2007) growth has a detrimental effect on non-current liabilities and a positive and considerable influence on current liabilities. In line with this, Titman and Wessels (1988), Barclay and Smith Jr (1995), and Rajan and Zingales (1995) all discover a contrast between FL and growth potential. When a business expands, its profits improve, which reduces the requirement for debt in the capital structure (Masila, 2019). Based on the aforementioned literature, we hypothesize that growth has an inverse relationship with FL as far as Pakistan's oil sector is

concerned, although there are contradictory opinions regarding the relationship between company growth and FL.

Hypothesis 7: Growth is negatively related to capital structure.

Table 1 demonstrates the expected theoretical link between explained and explanatory variables and their measures

Table 1. The assumed theoretical relationships between variables and their measures

Variables	Measure	Expected relationship
AS	Total fixed assets/total assets	+ or direct relationship
EV	Average Δ EBIT	-Or inverse relationship
NDTS	Depreciation/total assets	-Or inverse relationship
LQTY	Current assets/current liabilities	-Or inverse relationship
FS	Natural log of total assets	+ or direct relationship
PFTY	EBIT & depreciation/total assets	-Or inverse relationship
GR	Annual % Δ in earnings	-Or inverse relationship

Theories – an overview

The debate about a firm and appropriate capital structure procedure started with Modigliani and Miller (1958). Under ideal market circumstances, they came to two conclusions: the worth of a company is unaffected by its capital structure, and the cost of equity for a leveraged company is the same as the cost of equity for an unleveraged company plus a surcharge for financial risk. The impact of taxes and risky debt was added as part of an expanded analysis. Debt financing is advantageous under a traditional tax system since interest is deductible from taxes (Modigliani & Miller, 1958). It implies that costs are reduced as the debt-to-capital ratio rises. And finally, there would be no equity at all under the ideal system.

The trade-off theory claims that firm's capital structure is ideal and the cost of financial difficulty outweighs the advantages of a tax shelter. EV is a new variable introduced by trade-off theory and explains that although debt financing has an advantage, benefits from the tax advantage shield that reaps. However, there comes a point where excessive debt creates bankruptcy costs, and when the optimum capital structure level is reached, there is no longer a marginal tax benefit as desirable, as the cost of EV. Because of this, there is a desirable level of debt to equity that businesses should adhere to (Kim, 1978; Kraus & Litzenberger, 1973; Scott, 1977).

The pecking order theory states that equity is an undesirable method of capital raising (Myers & Majluf, 1984). The pecking order theory contends that the management of a corporation knows more about the business than investors to collect the costs of asymmetric information. According to the hypothesis, businesses prioritize their funding options and favor internal over external

funding sources. According to the hierarchy of sources, any time a firm requires additional funding. It tries to raise the stock as a last alternative after exhausting all other options, including retained earnings and loans. Myers and Majluf (1984) say that equity is a less preferable method of capital raising because investors perceive that when management issues fresh shares, they are taking advantage of the firm's overvaluation. Investors will thus give the new equity offering a lesser value.

DATA AND METHODOLOGY

Access to the Data

We use data from the PSX for the purpose of running the analyses and testing our hypotheses. We accessed the audited financial statements of 11 out of the 12 oil and gas companies listed in the PSX. Data were extracted for 15 years (2007-2021) of these eleven companies.

Methodology

Out of the many econometric techniques, we find the pooled ordinary least square (OLS) regression method suitable to run our analyses and test our hypotheses because this method simultaneously analyses the cross-sectional and time-series data. Further to that, we check for the robustness of our findings by using the fixed effects model and random effects model. Finally, we apply the Hausman specification and the Breusch-Pagan Lagrange Multiplier tests to conclude our findings. We use Stata software throughout our empirical analyses. The primary purpose of this study is to uncover the firm-specific factors that influence the capital structures of high-growth firms. The capital structure of the company is measured using FL as a proxy (Taebi Noghondari & Taebi Noghondari, 2017).

The following is one way to write the theoretical model:

$$FL = f(AS, EV, NDTS, LQTY, SZ, PFTY, GR)$$

Econometric model

$$FL_{it} = \alpha_i + \beta_1 AS_{it} + \beta_2 EV_{it} + \beta_3 NDTS_{it} + \beta_4 LQ_{it} + \beta_5 PFT_{it} + \beta_6 GR_{it} + \epsilon_{it}$$

Where:

Explained variable:

FL= financial leverage (total liabilities/total assets).

Explanatory variables:

AS= asset structure (total fixed assets/total assets)

EV= financial distress (average change in earnings before interest and tax)

NDTS= non-debt tax shields (depreciation/total assets)

LQ= liquidity (current assets/current liabilities)

FS= size (natural log of total assets)

PF= profitability (sum of earnings before interest and tax and depreciation/total assets)

GR= growth (annual percentage of change in earnings before interest and tax)

RESULT AND DISCUSSION

Table 2 demonstrates descriptive findings. With an average FL value of roughly 0.6, the industry has a 60% debt-to-equity financing ratio. The industry fixed asset is about 38% on average. It shows that 62% of funds are allocated for other than fixed assets. As the fixed assets ratio is low, the industry has little advantage from NDTs. The high deviation from the mean is traced to EV. The variable is also found insignificant in the regression analysis.

Table 2. Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
FL	165	.2039	1.1309	.5980105	.2551016
AS	165	.0375	.7274	.3766708	.2021901
EV	165	-13.5025	10.4012	.1854259	2.491732
NDTS	165	.0002	.2449	.0274669	.0413717
LQ	165	.4355	6.8702	1.857351	1.567654
FS	165	22.8833	26.2942	24.90751	2.194659
PF	165	-1.1080	.7565	.1562425	.1548186
GR	165	-9.7564	7.4735	.5686096	9.493054

Table 3 shows the empirical findings of the pooled OLS, the fixed effects, and the random effects models, respectively. In addition, we conducted the Hausman test to find the apt model for panel data regression between fixed effects and random effects models. Table 4 presents the results.

The null hypothesis of the Hausman test assumes the consistency of the random effects model, while the fixed effects model's consistency was assessed by the alternate hypothesis. The test yielded a test statistic of 161.94 with a p-value of 0.000. This result rejects the null hypothesis, indicating that the fixed effects model should be chosen over the random effects model. Consequently, the fixed effects model was used to examine the association between the regressor and the regress.

The coefficient value of tangibility ($\beta = -0.0813, p \text{ value} < 0.05$) shows that it has a negative and statistically significant effect on capital structure. The results show that with the increase in the assets' tangibility, the firms use less debt in their capital structure. The coefficient of earning volatility ($\beta = -0.0004, p \text{ value} < 0.01$) shows that it has a negative and statistically significant effect on capital structure. The results show that in case of earning volatility, it becomes difficult for the firms to obtain debt financing, so they focus on equity financing when they have more

volatile earnings. The results show the preferences of the debt providers that they want to minimize their risks and only provide debt financing to stable firms. The coefficient of NDTs ($\beta = 0.3415, p \text{ value} > 0.05$) shows that NDTs has a positive but statistically insignificant effect on the capital structure. The results show that firms do not focus on using NDTs to save taxes but they use other methods to save taxes.

Table 3. Empirical results

Variable	Pooled OLS model (Standard error)	Fixed effects model (Standard error)	Random effects model (Standard error)
Tangibility	-0.0813* (0.0382)	-0.280*** (0.0471)	-0.0813* (0.0382)
Earning Volatility	-0.0004** (0.0029)	-0.0008** (.0022)	-0.0004** (.0029)
Non-debt Tax Shield	0.3415 (.2209)	0.5616** (.2060)	0.3415 (.2209)
Liquidity	-0.0450*** (.0075)	-0.0606*** (.0087)	-0.0450*** (.0075)
Firm Size	0.0165*** (.0036)	0.0228*** (.0030)	0.0165*** (.0035)
Profitability	-0.2815*** (.0753)	-0.2699*** (.0706)	-0.2815*** (.0753)
Growth	-0.0001 (.0008)	-0.0005 (.0006)	-0.0001 (.0007)
Lag Variable	-0.0813* (.0433)	-0.280*** (.0484)	-0.0813* (.0433)
R-squared	0.8823	0.8363	0.8823

“legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ ”

The LQTY coefficient shows a statistically significant and inverse relationship at a 1% significance level. This suggests that firms with higher financial resources or greater LQTY exhibit a reduced propensity to use debt as a means of financing. This phenomenon may be attributed to companies with higher LQTY levels requiring less external funding. The coefficient value of FS ($\beta = 0.0165, p \text{ value} < 0.001$) shows that the size of a firm has a positive and statistically significant effect on capital structure. It means that with the higher FS, it becomes easy for the firms to obtain debt financing. Lenders also consider large firms as less risky and they provide loans to the large firms. At a significance level of 1%, the PFTY coefficient exhibits statistical significance and a negative relationship. This finding indicates a negative relationship between profitability and businesses' utilization of debt financing. Profitable businesses may necessitate reduced external funding. The coefficient for growth is statistically insignificant and negative. This suggests that companies experiencing rapid growth tend to have capital structures characterized by reduced reliance on debt financing. The reason for this may be that growing firms are perceived as riskier and leading financial institutions are hesitant in providing financing to them. At a significance level of 1%, the coefficient for the lag variable is both statistically significant and positive. This finding suggests that a company's historical debt utilization affects its present capital structure. A firm's creditworthiness and ability to finance future debt may be influenced by its past debt usage.

Table 4. The Hausman test

Hypothesis	Test statistic	p-value
Null Hypothesis	161.94	0.0000
Alternative Hypothesis (Fixed effects model is consistent)		

CONCLUSION AND POLICY IMPLICATION

Our findings are in agreement with earlier research. AS, LQTY, FS, and PFTY are statistically significant at a 1% level. AS shows an inverse relationship, so we reject our hypothesis. However, it is consistent with the study (Yunusa & Prasetyob, 2020). This is because the AS of oil firms consists of more current assets than fixed assets. NDTS shows a direct association with the firm's capital structure (Ghani et al., 2023). Results are contrary to our expectations; hence we reject our hypothesis. The oil and gas industry invests more in working capital. In line with earlier studies, LQTY exhibits a negative connection (Rokhayati et al., 2021). FS depicts a positive relationship as expected; hence our hypothesis is not rejected. The results are similar to previous studies (Doan, 2019). This may be because of large capital requirements in oil and gas firms. PFTY also shows a negative relationship, meaning highly profitable firms prefer equity financing. As oil and gas companies are considered blue chip and highly profitable, the findings are consistent with previous research that we relied on (Rahman et al., 2020).

This study analyses panel data of blue-chip companies representing Pakistan's oil and gas sector. This reveals that the industry can be differentiated based on its intensive investment in fixed assets or current assets. Oil and gas companies have intensive utilization of funds in current assets or working capital. AS represented by tangibility and NDTS of such companies portrays the opposite results as expected.

By evaluating the relationship and effect of firm-specific determinants on the capital structure of listed oil and gas companies in Pakistan, we add to the body of literature. The findings demonstrate that each variable is significant other than EV (financial distress). The hypothesis regarding tangibility and NDTS has been rejected; however, these are consistent with Yunusa and Prasetyob (2020) and Ghani et al. (2023), respectively. It is observed that the oil and gas companies use their funds in current assets rather than fixed assets which may be the reason for the unexpected relationship results.

This research has multiple theoretical and practical implications. Our findings support the trade-off theory by arguing that there is an optimal capital structure level because of bankruptcy cost. In this study, it is revealed that the optimal debt financing stands at 60%. The results witnessed that EV or bankruptcy cost has a significant and negative association with FL or the capital structure of the companies. The study is relevant for investors and financial institutions too. As most of the capital is utilized in inventory, inventory turnover, LQTY, and risk factors are important in decision-making by investors and creditors. Managers can also rely on these results while making decisions relating to the evolution of the firm's structure.

The study's scope is limited to only firm-specific factors, as only one sector is considered. However, future research can include other sectors and external factors as well, such as corporate tax and interest rates, etc., and regional analysis of the same sector. Hence future studies can be conducted by expanding the territorial jurisdiction and including external factors.

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