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Determinants of Financial Leverage in Oil and Gas Listed Firms: Evidence from Malaysia

(*Penentu Keumpilan Kewangan bagi Firma Minyak dan Gas: Bukti dari Malaysia*)

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ABSTRACT

This paper aims to investigate the influence of firm's characteristics, namely profitability, firm size, asset tangibility, and liquidity, as well as oil price, on the financial leverage of oil and gas listed firms. This study utilises a quantile regression panel data model to analyse 100 observations in the 25th, 50th (median), and 75th percentiles. Data is sourced from Bursa Malaysia over 2012-2021. Three explanatory variables demonstrated their relationship to financial leverage with consistent significance in each percentile, namely profitability, firm size, and liquidity. Firms with higher profits and liquidity have low debts as they use retained earnings and liquid assets for their financial obligations. In addition, bigger firms have larger debts due to their capacity to meet interest obligations. Meanwhile, other variables show inconsistent significance where the asset tangibility is significant in the 25th and 75th percentiles, while the oil price is only significant in the 75th percentile. The approach utilised provides insights into the varying degrees of impact and significance across percentiles. The findings can assist managerial decision-making in determining the optimal debt level for firms' operations while mitigating financial risk. The results also act as a source of reference for policymakers in developing effective policies to stabilise the financial leverage of the oil and gas industry by addressing the volatile nature of firm characteristics and oil prices.

Keywords: Financial leverage; firm characteristics; oil price; oil and gas industry; quantile regression

ABSTRAK

Makalah ini bertujuan untuk mengkaji pengaruh ciri-ciri syarikat, iaitu keberuntungan, saiz syarikat, aset ketara dan kecairan, serta harga minyak terhadap keumpilan kewangan antara syarikat terpilih yang tersenarai di Bursa Malaysia dari tahun 2012 ke 2021. Kajian ini menggunakan model regresi kuantil data panel untuk menganalisis 100 cerapan dalam tiga kuantil iaitu persentil ke-25, ke-50 (median) dan ke-75. Tiga pemboleh ubah penerang iaitu keberuntungan, saiz syarikat dan kecairan menunjukkan hubungan terhadap keumpilan kewangan dengan keertian yang konsisten dalam setiap persentil. Syarikat dengan keuntungan dan kecairan tinggi mempunyai hutang rendah kerana mereka menggunakan pendapatan dan aset cair untuk kewajipan kewangan mereka. Selain itu, syarikat besar mempunyai hutang tinggi kerana kapasiti mereka dalam memenuhi kewajipan faedah. Pemboleh ubah yang lain menunjukkan keertian tidak konsisten yang mana aset ketara signifikan dalam persentil ke-25 dan ke-75, manakala faktor harga minyak hanya signifikan dalam persentil ke-75. Pendekatan kajian yang digunakan berhasil dalam memberikan gambaran mengenai darjah impak dan signifikan yang berbeza merentasi persentil. Dapatan kajian ini dapat membantu pihak pengurusan dalam membuat keputusan untuk menentukan aras hutang optimum bagi operasi syarikat sambil mencegah risiko kewangan. Hasil kajian ini juga menjadi sumber rujukan kepada penggubal dasar dalam membangunkan dasar yang efektif untuk menstabilkan keumpilan kewangan industri minyak dan gas dengan mengambilkira ciri-ciri firma dan harga minyak yang bersifat meruap.

Kata kunci: Keumpilan kewangan; ciri-ciri firma; harga minyak; industri minyak dan gas.

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INTRODUCTION

Financial leverage refers to the degree to which a firm uses borrowed funds, such as loans or bonds, to finance investments or operations (Gill & Mathur 2011). By using borrowed funds, a firm can amplify the potential return of its investment, as

the returns earned on the investment can be higher than the interest rate paid on the borrowed funds. However, financial leverage also increases the potential risk of loss, as the firm must still repay the borrowed funds even if the investment does not perform as well as expected.

In the context of Malaysia's significant oil and gas industry, understanding financial leverage becomes essential for the firms operating within this dynamic industry. The industry's financial landscape is diverse with approximately 3,500 oil and gas companies in the country (Malaysian Investment Development Authority 2020). The level of financial leverage among these companies may vary, influencing their overall stability or shaping their business growth. Some firms may have low financial leverage, indicating a greater reliance on internal funding or equity financing rather than debt financing. However, others may have high financial leverage, indicating that they rely on debt financing to operate.

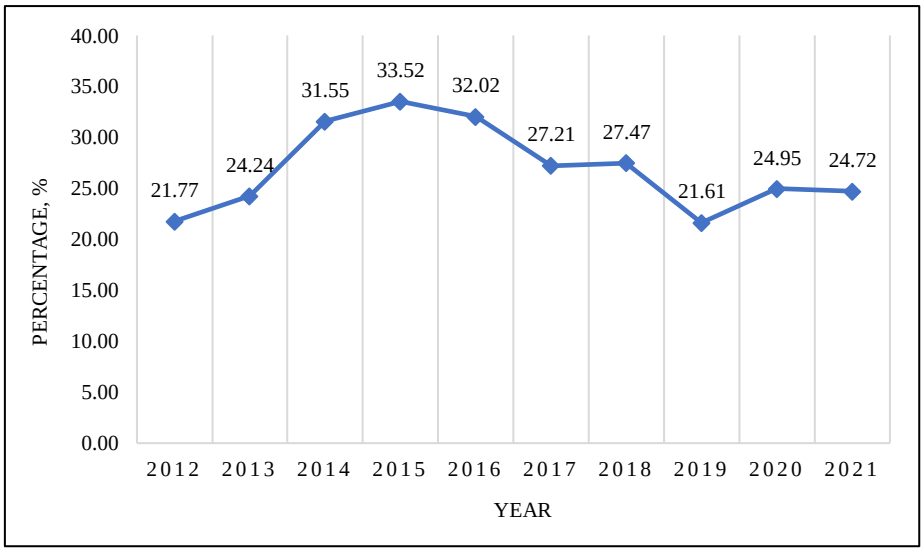

FIGURE 1. The average debt-to-assets ratio among ten listed oil and gas in Malaysia (2012-2021)

Financial leverage is mainly influenced by company-specific traits, including profitability (Frank & Goyal 2009), firm size (Schwartz & van Tassel 1950), tangibility (Moosa et al. 2011), and liquidity (Husaeni 2018). In the oil and gas sector, leverage is also affected by fluctuations in oil prices (Iqbal & Shetty 2018). Such influence can be seen during the oil price plunge in 2014-2016, in which the total debt of the global oil and gas industry was reported to be approximately USD 2.5 trillion, a dramatic increase from USD 1 trillion recorded in 2006 (Domanski et al. 2015). In the same period, oil and gas firms in Malaysia also experienced a significant increase in leverage (see Figure 1), which peaked in 2015.

Determining the optimal level is necessary because although a high level of leverage may lead to improved profits (Lam 2022) and expansion opportunities (Anton 2016), it can also raise financial risk and the likelihood of bankruptcy (Eriotis et al. 2007) if the company is unable to meet its financial commitments. Meanwhile, low financial leverage might result in missed growth opportunities and reduced stakeholder returns. Yet determining the optimal level of leverage to sustain a firm's operations and growth has become difficult for oil and gas firms as they must consider the volatile nature of oil prices and the firm's characteristics.

In assessing firm-specific determining factors of leverage, numerous studies have been undertaken, such as in manufacturing (Zulvia & Roza Linda 2019) and the food and beverage sector (Wahida & Noor Azillah 2015). However, there is a dearth of research on a similar topic for oil and gas firms (Hamzah & Marimuthu 2020). This becomes an important issue to study as the oil market has a different debt usage from the other markets, contributed by the difference in investment risk of oil projects, internal financing, and the direct influence of oil price shocks (Narayan & Nasiri 2020).

Furthermore, prior studies on assessing the impacts of factors on financial leverage, especially concerning firm-related factors, exhibit a lack of consensus, which can be explained by the contradicting notion of trade-off theory (TOT) and pecking order theory (POT). For example, TOT suggests that firm size is positively related to leverage, indicating that larger asset firms can utilize these assets as collateral and obtain loans more efficiently, thereby being viewed as less risky. In contrast, POT contends that the relationship is negative, proposing that larger asset firms may prefer internal financing over external financing, as their higher income allows them to meet their financial obligations adequately.

Thus, the main objective of this research is to investigate how firm characteristics, namely profitability, firm size, asset tangibility, liquidity, and oil prices, influence the financial leverage of oil and gas companies listed in Malaysia. Although the topic has been examined by Marimuthu et al. (2023), it does not capture the distribution trends of the dependent variable. To overcome the limitation, this study used quantile regression analysis by estimating the conditional quantiles of leverage at 25^{th}, 50^{th} (median), and 75^{th} percentiles. This technique allows this study to provide thorough findings and understandings regarding the effect of the explanatory variables at the different leverage levels.

Based on the data collected from Bursa Malaysia dated 2012-2021 involving 10 oil and gas firms, the quantile regression analysis rendered a significant influence of profitability, firm size and liquidity on financial leverage across all percentiles. Meanwhile, the influence of asset tangibility is only significant at 25th and 75th percentiles, while oil price only demonstrated significant influence at 75th percentile.

The results achieved by this study provide valuable insights to aid oil and gas firms in understanding the factors that impact financial leverage. Consequently, the findings assist companies in formulating appropriate strategies to maintain a prudent level of debt and effectively manage financial risks. Moreover, the study's findings will benefit policymakers, offering them essential information to develop more effective regulations and policies that ensure the stability of the oil and gas industry. Furthermore, by shedding light on the sensitivities of oil and gas leverage to changes in oil prices, the research illustrates how price movement can affect the debt levels of these companies. This information equips policymakers with a deeper understanding of the risks associated with oil price volatility, enabling them to devise strategies that safeguard these firms from potential adverse effects.

LITERATURE REVIEW

TRADE-OFF THEORY (TOT)

Modigliani and Miller (1958) introduced the trade-off concept in a perfect capital market context. According to this theory, the firm's capital structure, which comprises a mixture of debt and equity financing, does not influence the firm's overall value in an ideal capital market. Instead, the firm's market value is solely determined by its projected future cash flows. This seminal idea is the Modigliani-Miller or M&M Theorem (Preposition I). Modigliani and Miller (1963) introduced the M&M Theorem (Proposition II), expanding on their initial model. This enhanced version considers additional variables, including bankruptcy costs, taxes, and other external variables that could influence the firm's decisions regarding capital structure. By incorporating these elements, the aim was to provide a more comprehensive understanding of how external factors could impact a firm's optimal combination of debt and equity financing. This extension further contributes to analysing capital structure choices, offering insights into the intricate interplay between various external influences and the firm's financial decisions.

Expanding upon the foundational principles of the M&M theorems, Kraus and Litzenberger (1973) introduced the influential concept of the TOT, which has been widely embraced and explored in various research studies. According to their theory, a company can determine its ideal capital structure by conducting a careful evaluation of the advantages of debt financing, such as tax benefits (Graham & Tucker 2006), in comparison to the costs associated with taking on debt, such as potential financial distress (Titman & Wessels 1988). The company aims to maximize its overall value by striking the right balance. The trade-off model postulates that companies actively target a specific amount of debt that aligns with their strategic objectives and continuously adjust their debt levels over time to reach this target. This targeted debt amount may be influenced by factors that offer the most favourable outcomes for the companies, considering how they can effectively maximize their value.

By applying a trade-off model to analyse the best combination and priority structure of bank and market debt, Hackbarth et al. (2007) provided support for the TOT. Their investigation yielded compelling evidence, indicating that the TOT effectively explains the debt composition of both large and small corporations. Similarly, Koksal and Orman (2014) showed that TOT provided a superior explanation for the capital structure of enterprises in their study, which further supported the relevance and applicability of the theory. Collectively, these studies add to the expanding body of research showing the trade-off theory as a practical framework for comprehending enterprises' capital structure choices.

PECKING ORDER THEORY (POT)

The pecking order theory, or POT, developed by Myers and Majluf (1984), introduces a comprehensive model that provides valuable insights into diverse aspects of corporate finance behaviour. Unlike the trade-off paradigm, this theory prefers financing corporate activities primarily through retained earnings rather than seeking external funds through debt or equity issuance. To elucidate further, the theory posits that managers adhere to a hierarchical approach by prioritizing self-financing, issuing non-risky debt, and only resorting to equity issuance as a last option when other avenues have been exhausted.

Along with the idea that the costs and benefits of external funding, as considered in the TOT, are less significant than the costs associated with issuing new securities, this theory also emphasizes the information asymmetry between insiders and outsiders within a business. Additionally, the selection of financing sources is influenced by transaction costs linked to external funding. Consequently, due to lower transaction costs, debt issuance is preferred over equity issuance (Baskin 1989).

Brounen et al. (2006) studied capital structure decisions in the United Kingdom, the Netherlands, Germany, and France, offering support for the pecking order theory. Their findings showed that POT behaviour is present in financing decisions among the 313 chief financial officers in the countries. Similarly, de Haan and Hinloopen (2003) supported the theory when examining financing decisions among 150 Dutch companies. In their study, they developed a model that

supported the POT and static TOT as factors influencing funding decisions. Moreover, they estimated models to determine the optimal finance hierarchy and discovered that it aligns with the one suggested by the POT, with the addition of bond issues.

PROFITABILITY AND FINANCIAL LEVERAGE

Previous research has presented empirical findings demonstrating a significant correlation between profitability and financial leverage. Notably, Frank and Goyal (2009) highlighted the importance of profitability as a crucial factor in explaining both capital structure choices and debt levels. Nonetheless, the nature of this relationship can vary depending on the specific circumstances of each company, leading to differing degrees of positive or negative correlation. Moreover, the two theories employed in this research present contrasting propositions regarding this relationship, further adding to the complexity of understanding the interplay between profitability and financial leverage in different organizational contexts.

As demonstrated by TOT, leverage and profitability are positively related, which also shows that highly profitable companies prioritise investments with outside funding to increase their profits and gain tax advantages. Likewise, Wu and Yue (2009) elucidated that profitable listed companies raise their debt levels when the tax advantages of debt increase. Moreover, Sayilgan et al. (2006) also found evidence supporting a positive association between profitability and leverage. These researchers postulate that a profitable firm would seek a higher level of debt due to its greater borrowing capacity and ability to meet loan repayment obligations.

Conversely, Maghyereh (2005) concluded that profitability and leverage correlate negatively. The author also noted that managers tend to be hesitant in altering external funding and are more inclined to rely on internal financing due to the more significant knowledge asymmetry with creditors. Similarly, Addae et al. (2013) also discovered a negative correlation and attributed the result to the rising costs associated with issuing debt. These study findings align with the predictions of POT, which posits that firms with higher profitability have a higher probability of financing their activities using internal or self-generated funds, reducing their debt ratio.

FIRM SIZE AND FINANCIAL LEVERAGE

Numerous researchers have asserted a possible correlation between leverage and company size. Schwartz and Van Tassel (1950) conducted some of the earliest studies on this association, confirming a positive relationship between business size and leverage. This positive linear relationship is attributed to larger firms being more diversified, providing a greater capacity to fulfil interest obligations (Pandey 2004). Furthermore, larger firms are also stated to have higher collateral values (King 1977), which means that the assets that firms pledge to a lender to secure a debt have higher values. The author also added that larger firms have lower bankruptcy risks. Due to these reasons, larger firms are considered less risky to the lenders and have easier access to borrow money. This positive relationship is in line with TOT.

However, POT presents an opposing viewpoint, suggesting a negative relationship between the firm's size and leverage (Ebel Ezeoha 2008; Fattouh et al. 2008). According to Rajan and Zingales (1995), larger firms may prefer financing through equity over debt because of the relatively lower cost of equity for such entities, driven by their asymmetric knowledge advantage. Additionally, Bany-Ariffin et al. (2010) found that small businesses rely heavily on bank loans to meet their financial needs, resulting in more substantial debt burdens than larger enterprises.

ASSET TANGIBILITY AND FINANCIAL LEVERAGE

Asset tangibility and leverage also have a considerable positive correlation, according to both TOT and POT (Danso & Adomako 2014) where Faturohman and Noviandy (2022) discovered a positive relationship while examining the listed firms in the Indonesian tourism industry.

According to Bradley et al. (1984), firms with significant asset tangibility tend to exhibit higher debt levels. The authors also reasoned that tangible assets could serve as collateral in potential liquidation, making lenders more willing to extend loans to such firms. Similar justifications for the relationship between asset tangibility and financial leverage or the use of debt were offered by Matias and Serrasqueiro (2017). The author stated that tangible assets can provide collateral; hence, they can help mitigate information asymmetry issues between companies and lenders. Thus, more prominent companies are expected to issue more loans.

Wiwattanakantang (1999) provided additional insights, explaining that asset tangibility enables cheaper borrowing, whereas firms with fewer tangible assets may face stringent loan terms. As a result of these limitations, firms with fewer tangible assets are restricted in their capability to borrow more, leading them to opt for equity issuance instead of debt (Scott 1977).

LIQUIDITY AND FINANCIAL LEVERAGE

Thabet and Hanefah (2014) found that liquidity is one of the main predictors of leverage. Similarly, Husaeni (2018) also identified a substantial influence of liquidity on capital structure. The significant relationship between liquidity and leverage stems from the firm's ability to promptly meet its debt commitments (Sheikh & Wang 2018).

According to TOT, companies with higher liquidity (greater availability of cash) are expected to utilize more debt as they experience lower bankruptcy costs. This idea is corroborated by Bukair (2019), whose research findings concluded that liquidity positively affects the leverage ratio, aligning with the principles of the TOT.

Nevertheless, POT postulates that firms with high liquidity tend to borrow less. This notion is supported by studies such as Danso and Adomako (2014), who discovered a significant negative relation between liquidity and leverage when investigating the determinants of capital structure in South Africa. Similarly, de Jong et al. (2008) reached the same conclusion in their study. The negative correlation found by these researchers can be explained by the financing decision of the companies, in which firms would prefer to use their liquid assets first before borrowing money to get more capital (Agyei et al. 2020).

OIL PRICE AND FINANCIAL LEVERAGE

Narayan and Nasiri (2020) assert that oil prices notably influence corporate leverage decisions. Hamzah and Marimuthu (2020) support this argument, explaining that oil and gas prices can significantly impact companies' earnings as they are susceptible to economic cycles. When oil-producing firms generate higher income from increased oil prices, their leverage rises. This observation indicates a positive relationship between oil prices and leverage driven by profitability, which aligns with the principles of TOT.

However, Domanski et al. (2015) stated that if oil prices decrease, these firms may experience financial difficulties and have issues servicing their debt obligations as they did not generate sufficient earnings, resulting in a larger leverage ratio. In contrast, firms would not see the need to issue debts to fulfil their financial obligations as they generate more earnings when the oil price increases. Consequently, the negative relationship between oil prices and financial leverage, attributed to high profitability, follows POT principles.

Bingilar and Kpolode (2021) found that Nigerian oil and gas firms had the highest financial leverage ratio during declining oil prices. Similarly, during the significant drop in oil prices in the middle of 2014, Ismail and Mazlan (2020) found an inverse relationship between profitability and leverage in Malaysian oil and gas firms. Furthermore, following the 2018 global oil price crisis, the profitability of these companies decreased by 2.17 per cent, and during the same year, their financial leverage increased by up to 13 per cent.

In summary, TOT suggested that firms find their ideal capital structure by evaluating the benefits and risks of debt financing. Through this idea, it is suggested that profitability, firm size, asset tangibility, liquidity and oil price have positive effects on financial leverage. On the other hand, POT argued that firms prefer internal over external financing because of information asymmetry and the cost of acquiring external funds. Due to this preference, all explanatory variables except asset tangibility may have a negative effect on financial leverage.

As briefly discussed in the introduction, past studies on financial leverage particularly in Malaysia mainly focus on manufacturing, food and beverages and other related industries, leaving room for additional exploration in the Malaysian oil and gas (O&G) industry. Furthermore, their findings are limited to the conditional means of leverage despite the possibility that the varied effects as described by the POT and TOT theories may be caused by the different levels of leverage being studied. Thus, the current paper tries to fill the gap by using panel data quantile regression analysis to analyse the determinants across different levels or points of financial leverage in the Malaysian oil and gas industry to understand the relationship extensively.

METHODOLOGY

DATA COLLECTION

The dataset comprises ten oil and gas firms listed on Bursa Malaysia from 2012 to 2021, selected based on data availability. These companies are Dayang, Deleum, Hengyuan, Perdana, Petron, Petronas, Sapura, T7 Global, and Wah Seong. The financial and oil price data are collected from credible sources, including the companies' official websites, Bursa Malaysia, and Bloomberg. Table 1 presents the definitions and measurements of the research variables.

TABLE 1. Research variables and measurements

Variable	Expected Sign	Definition	Measurement
Financial Leverage (LEV)	+	The degree to which a firm employs borrowed funds or debt (Sharma 2018).	Debt-to-Asset Ratio = $\frac{Total\ Debt}{Total\ Asset}$
Profitability (PROFIT)	+	A firm's capability to generate returns or profits from its investments in assets (Agbim & Ononye 2021).	Return on Asset = $\frac{Earnings\ before\ interest\ and\ taxes}{Total\ Asset}$
Size of Firm (SIZE)	+	A company's scale and operations, commonly measured by its total assets (Mohamad Youness 2022).	Log of Total Assets
Asset Tangibility (TANG)	+	The proportion of physical assets with monetary value that a company owns in relation to its overall assets (McLaughin 2022).	Tangibility = $\frac{Total\ Fixed\ Asset}{Total\ Asset}$
Liquidity (LIQ)	+	Firm's availability of cash or equivalent to meet its financial obligations (Banks 2014).	Current Ratio = $\frac{Total\ Current\ Asset}{Total\ Current\ Liabilities}$
Oil Price (BRENT)	+	Brent Crude Oil Price[1].	Average Annual Real Price of Brent Crude Oil (2012-2021)

ECONOMETRIC MODEL

Before regression analysis is employed, all variables are first transformed into natural logarithmic form. However, since some of the observations collected are negative in value, the variables are first converted by using the formula suggested by Busse and Hefeker (2007), where the sign of the observation value is maintained. The panel data regression model for this research is described below (see Equation 1):

$$LEV_{it,\tau} = \alpha + \beta_1 PROFIT_{it,\tau} + \beta_2 SIZE_{it,\tau} + \beta_3 TANG_{it,\tau} + \beta_4 LIQ_{it,\tau} + \beta_5 BRENT_{it,\tau} + \varepsilon_{it,\tau} \quad (1)$$

Where:

$LEV_{it,\tau}$ = Firm i's financial leverage at time t, in τ percentile
α = Intercept
$\beta_1, \ldots \beta_5$ = Coefficients or slope of independent variables
$PROFIT_{it,\tau}$ = Company i's profitability at time t, in τ percentile
$SIZE_{it,\tau}$ = Company i's size at time t, in τ percentile
$TANG_{it,\tau}$ = Company i's asset tangibility at time t, in τ percentile
$LIQ_{it,\tau}$ = Company i's asset tangibility at time t, in τ percentile
$BRENT_{it,\tau}$ = The oil price based on the average Brent crude oil price at time t, in τ percentile
$\varepsilon_{it,\tau}$ = Company i's error term at time t, in τ percentile.

This research utilizes a panel data quantile regression model to get the viewpoints outside the data's mean and involves minimizing the sum of absolute residuals from the estimated quantile function (Koenker & Bassett 1978).

The choice of this analysis is motivated by the potential for independent variables to have diverse impacts at different points within the conditional distribution of financial leverage. Unlike the conventional regression analysis commonly used in earlier studies, which mainly centres on calculating the conditional mean function, quantile regression presents an alternative approach by assessing the complete conditional quantile functions of the dependent variable (Buhai 2005). By employing this technique, the analysis explores the entire conditional distribution of leverage and examines how the effects of profitability, firm size, asset tangibility, liquidity, and oil price differ across various leverage quantiles. Specifically, this study estimates the conditional quantiles of leverage at the 25th, 50th, or median, and 75th percentiles[2]. This enables a more comprehensive understanding of the factors influencing leverage at various levels, providing valuable insights into the relationships between the explanatory variables and leverage across the distribution.

Quantile regression allows for examining relationships between variables beyond the mean of the data (Hao & Naiman 2007), thereby enabling a deeper understanding of dependent variables that deviate from a normal distribution and exhibit non-linear associations with independent variables (Cook & Manning 2013; Mun et al. 2022). Additionally, it proves advantageous for situations involving heteroscedastic models (Koenker & Bassett 1982). Given the possibility of unequal sample sizes in the dataset under investigation, the study employs the quantile regression for panel data (QRPD) proposed by Powell (2022) to address this issue effectively. This approach considers the panel structure of the data, making it well-suited for analyzing the relationships across different quantiles while accommodating the complexities arising from varying sample sizes.

For the robustness check in ensuring the reliability of the study, a different measurement is used to represent financial leverage: the asset-to-equity ratio. This ratio shows the extent to which the shareholders fund a company's assets.

RESULTS AND DISCUSSION

DESCRIPTIVE STATISTICS

TABLE 2. Statistical data descriptions of variables

	N	Minimum	Maximum	Mean	Standard Deviation
LEV	100	0.000	0.623	0.269	0.169
PROFIT	100	-0.332	0.276	0.013	0.082
SIZE	100	8.234	11.804	9.519	0.909
TANG	100	0.034	0.891	0.404	0.193
LIQ	100	0.096	4.135	1.486	0.872
BRENT	100	171.140	387.910	273.293	64.625

Note. LEV: Financial Leverage, PROFIT: Profitability, SIZE: Firm Size, TANG: Asset Tangibility, LIQ: Liquidity, BRENT: Brent Crude Oil Price.

Table 2 exhibits the statistical data descriptions of the research variables in their respective values. For leverage, the mean is 0.269, with a standard deviation (SD) of 0.169. This mean value suggests that firms' assets are financed to approximately 26.9 percent through debt, with the highest leverage value being 0.623 and the lowest at 0.00. Regarding profitability, the average value for oil and gas companies is 0.013, with an SD of 0.082. This indicates that, on average, the firms can generate a profit of approximately 1.3 percent of total assets. In other words, for every Ringgit Malaysia of assets the companies own, they earn RM 0.013 in net profit. The highest profitability value is 0.276, while the lowest value is -0.3318.

The firm size variable confirms that the average firm size of oil and gas companies is 9.519, with an SD of 0.909. The highest firm size value is 11.804, and the lowest is 8.234. On the other hand, TANG shows that, on average, 0.404 or 40.4% of the companies' total assets are tangible assets, with an SD of 0.193. The highest asset tangibility value observed is 0.891, and the lowest is 0.034.

Next, the mean value for liquidity is 1.486, with an SD of 0.872. This means that, on average, the companies have current assets that are 1.486 higher than their current liabilities. The highest liquidity value is 4.135, while the lowest value is 0.096.

Lastly, the arithmetic mean value of oil price is 273.293, with a standard deviation of 64.625. This indicates that the average annual price of Brent Crude oil from 2012 to 2021 was RM273.293 per barrel. The highest recorded value for the oil price variable is MYR 387.910, whereas the lowest observed value is RM 171.14.

PANEL QUANTILE REGRESSION ESTIMATION

TABLE 3. Results of analysis

Percentiles	25th	50^{th} (median)	75th
	β	β	β
PROFIT	-0.0065***	-0.0079***	-0.0087***
	(0.0005)	(0.0005)	(0.0000)
SIZE	0.0470***	0.0602***	0.0477***
	(0.0051)	(0.0085)	(0.0002)
TANG	0.2214***	-0.0018	0.1067***
	(0.0212)	(0.0715)	(0.0018)
LIQ	-0.0602***	-0.1099***	-0.0855***
	(0.0039)	(0.0055)	(0.0002)
BRENT	-0.0003	-0.0017	-0.0002***
	(0.0003)	(0.0030)	(0.0000)

****Significant at 1% level. **Significant at 5% level. *Significant at 10% level.*

Note. PROFIT: Profitability, SIZE: Firm Size, TANG: Asset Tangibility, LIQ: Liquidity, BRENT: Brent Crude Oil Price. Value in the parentheses () is the standard error.

Table 3 demonstrates that the relationship between profitability and financial leverage is significant in all percentiles, suggesting that profitability is critical in influencing the debt utilization of listed oil and gas firms in Malaysia[3]. All coefficients exhibit negative values, suggesting that higher profitability corresponds to a decrease in financial leverage for these firms. Hence, firms across all quantiles appear to adhere to the POT theory. This implies that companies with higher profits tend to rely less on leverage as they can generate sufficient internal funds to support their business operations, as Oztekin (2015) and Frank and Goyal (2009) noted.

Moreover, the coefficient values, being less than one, signify an inelastic relationship, indicating that financial leverage has limited sensitivity to changes in firm profitability. Specifically, a 100 per cent increase in profitability leads to only a 0.65 to 0.87 per cent reduction in financial leverage. Interestingly, at higher quintiles, the sensitivity of leverage to profitability increases.

The findings indicate a substantial but relatively inelastic relationship between firm size and financial leverage in all percentiles. Furthermore, the coefficient values in all chosen percentiles show positive signs and indicate that the relationship obeys TOT instead of POT. It is demonstrated that when a firm size increases by 100 per cent, the financial leverage is expected to increase by around 4.70 to 6.02 percent.

This suggests that as firms grow larger, their financial leverage also increases. The rationale behind this trend is that larger firms benefit from greater diversification, which enhances their capacity to borrow money or issue more debts. Additionally, larger firms tend to exhibit less earnings volatility, making them less susceptible to potential financial difficulties and bankruptcy than smaller firms. These observations align with similar findings by Gill and Mathur (2011) and Biger et al. (2008).

Regarding asset tangibility, the relationship with financial leverage appears insignificant at the 50th percentile. This insignificance is probably due to financial information transparency and the nature of their tangible assets (Camisón et al. 2022). Nevertheless, the results reveal a significant relationship at the 25th and 75th percentiles, displaying a positive correlation. This suggests that firms in these percentiles follow both the TOT and POT theories, which aligns with the studies conducted by Ab Wahab and Ramli (2014). This means that firms with a higher proportion of tangible assets are more inclined to acquire more debts, as these tangible assets can serve as collateral to reduce default risk and bridge the information gap between firms and lenders.

Moreover, all values being less than one suggest an inelastic relationship between tangibility and leverage, indicating that an increase in liquidity has a relatively modest effect on financial leverage. Specifically, a 100 percent rise in tangible assets is expected to increase a firm's debt usage by 10 to 22 percent, with leverage displaying higher sensitivity to asset tangibility at the lower quintile. Notably, the coefficient value of asset tangibility stands out as the highest among all variables, underscoring its relative importance.

Meanwhile, the relationship between liquidity and financial leverage demonstrates statistical significance in all percentiles at the 1 percent level. The negative sign of the coefficients indicates that liquidity exerts an inverse and inelastic influence on the financial leverage of oil and gas firms. As all coefficient values are negative, it suggests that firms in these percentiles adhere to the POT, where an increase in liquidity causes the financial leverage of these firms to move in a similar direction. Additionally, a 100 percent rise in liquidity is anticipated to decrease financial leverage by 6.02 to 10.99 percent. As firms have more liquidity, they will use their liquid assets for their financial obligation before issuing debts due to the risk in this type of financing (Almanaseer 2019; Zafar et al. 2019).

Finally, the association between oil price and leverage is only significant at the 75th percentile, where a 100 percent increase in oil price is anticipated to lead to a decrease in financial leverage by 0.02 percent. This means these firms reduce their reliance on debt issuance for funding investments in their operations and instead utilize their retained earnings. Similar findings have been reported by Endri (2021), who also observed that oil prices negatively impact the financial leverage of firms in other economies. Meanwhile, the firm's financial leverage is indicated to be unresponsive towards oil prices at the lower quantiles. In addition, financial leverage postulates minimal interaction towards oil price movement relative to the firm characteristics, as evident from the lower coefficients.

TABLE 4. Robustness analysis

Percentiles	25th	50th (median)	75th
	β	β	β
PROFIT	0.0017	-1.6851**	-0.1345
	(0.0259)	-0.7523	(0.7616)
SIZE	0.0649***	2.9195***	4.3708**
	(0.2192)	(0.5488)	(1.3774)
TANG	0.0963***	-2.3327**	-0.2888***
	(0.0984)	(0.8125)	(0.2384)
LIQ	-0.5412***	-0.5542***	-0.3959***
	(0.0088)	(0.1074)	(0.0951)
BRENT	-0.0207*	-1.6398***	-1.3086*
	(0.0107)	(0.4952)	(0.7862)

****Significant at 1% level. **Significant at 5% level. *Significant at 10% level.*

Note. PROFIT: Profitability, SIZE: Firm Size, TANG: Asset Tangibility, LIQ: Liquidity, BRENT: Brent Crude Oil Price. Value in the parentheses () is the standard error.

Table 4 shows the results of the robustness test where the financial leverage measured by asset-to-equity ratio reveals approximately similar findings. Minor differences are exhibited in the significance of the variables compared to the main findings. Notably, the profitability variable becomes insignificant at the 25th and 75th percentiles while the asset tangibility variable turns significant with negative signs at the 25th and 75th percentiles. Meanwhile, the oil price effects become significant at the 25th and 50th percentiles, although the coefficient sign remains the same. The current paper believes that similar findings, albeit minimal differences, postulate the validity of the main findings across different points of leverage.

CONCLUSION

Determining the right level of leverage with minimum risk becomes challenging for managers in the oil and gas industry due to its dynamic nature. This study investigates the determinants of financial leverage, namely profitability, firm size, asset tangibility, liquidity, and oil price, among listed oil and gas firms in Malaysia. The panel data quantile regression analysis revealed that the significance and magnitudes of the relationships vary across different percentiles. The profitability, firm size, and liquidity effect on leverage show consistent results across all percentiles—however, asset

tangibility and oil price display inconsistency. The influence of asset tangibility on leverage is significant at the 25th and 75th percentiles, while the effect from oil price is only significant at the 75th percentile. These differences highlight the importance of assessing the relationship at quantile levels, as it offers valuable insights into the independent variables' diverse impact across different segments of the distribution.

The findings also showed that firms with higher profitability tend to borrow less as they prefer to use retained earnings, hence the negative relationship with financial leverage. In addition, as firms grow larger so does their capacity to meet interest obligations, thus they are more likely to acquire more debts. Lastly, the negative relationship between liquidity and leverage is due to a firm's financing behaviour in choosing their liquid assets first to get more capital before resorting to debts.

Since debt financing is a prevalent approach among oil and gas firms to procure additional funds for pursuing growth opportunities, this study offers valuable insights to managers. By identifying the importance of the variables in influencing the optimal level of debt for their operations, managers can make informed decisions concerning their capital structure. The findings of this research serve as a practical guide for managers to strike a balance between leveraging debt for growth and maintaining financial stability.

Moreover, these research findings hold significant implications for policymakers by enabling them to formulate well-informed and effective policies and regulations tailored to Malaysia's oil and gas companies. The insights gained from this research also provide policymakers with a valuable understanding of the potential benefits of intervening during economic downturns by implementing energy subsidies or tax relief. Through these interventions, policymakers can instil a sense of assurance among the oil and gas firms, facilitating their ability to generate profits and sustain operations through retained earnings rather than resorting to potentially risky debt financing amidst economic uncertainties. Such strategic intervention can contribute to the stability and resilience of the oil and gas sector during challenging economic circumstances.

Despite the potential benefits for oil and gas firms' managers and policymakers, this study has limitations. Due to data constraints, some relevant factors are not included as explanatory variables. In addition, the sample data mostly comes from the firms operating in the midstream sector of the oil and gas industry. It is suggested for future research to include a balanced number of firms from upstream, midstream, and downstream sectors.

NOTES

1 Berk (2014) conducted a comprehensive analysis and determined that Brent crude oil stands as the superior global oil price benchmark, providing greater reliability in representing the dynamics of the oil industry.

2 By using only three percentiles, the difference in the results for the effect of the explanatory variables on the different levels of responding variables can be more clearly displayed (Yu et al., 2003).

3 Diagnostic tests employed indicate that the model is free from heteroscedasticity and multicollinearity issues.

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