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DETERMINANTS OF CORPORATE LEVERAGE IN EMERGING ECONOMIES: THE ROLE OF FIRM CHARACTERISTICS, MACRO ECONOMIC CONDITIONS, AND INSTITUTIONAL QUALITY

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Abstract

This study investigates the determinants of corporate leverage among firms in emerging economies, motivated by the need to understand how firm-specific characteristics and macro-institutional factors shape financing decisions. Using a comprehensive panel dataset of firms across various industries, the analysis employs ordinary least squares (OLS), quantile regression, and sensitivity tests with interaction terms to capture heterogeneity in leverage behaviour. The empirical findings indicate that profitability, tangibility, inflation, and institutional quality are positively associated with leverage, while firm size, GDP growth, and interest rates exhibit negative relationships. Notably, the quantile regression results reveal that the strength of these associations varies across the leverage distribution, with profitability and institutional quality exerting stronger effects at lower quantiles. These insights underscore the importance of designing policies that enhance institutional frameworks, stabilise macroeconomic conditions, and promote access to diverse financing options. It is recommended that policymakers strengthen creditor rights, support alternative finance mechanisms, and implement macro-prudential measures to ensure sustainable corporate borrowing practices in emerging markets.

Keywords: Capital Structure, Leverage, Emerging Economies, Quantile Regression, Institutional Quality, Corporate Finance

JEL Codes: G32, O16, C21, E44

1.0 Introduction

The capital structure decisions of small and medium-sized enterprises (SMEs) in developing countries may continue to attract considerable academic and policy interest, largely because of their potential implications for business sustainability, financial resilience, and economic growth. SMEs often constitute a significant share of business establishments and employment in these economies, yet they may face unique financing constraints that can limit their ability to optimise debt-equity choices (Abor et al., 2020; Boateng et al., 2022). The determinants of capital structure for SMEs, particularly in the context of developing economies, are often shaped by firm-specific attributes and macroeconomic conditions that can interact in complex ways. While prior studies have provided valuable insights using conventional mean-based estimation techniques, they may have overlooked potential heterogeneity in how these determinants operate across different points of the capital structure distribution (Nguyen & Nguyen, 2020).

The existing literature suggests that firm-specific characteristics such as size, profitability, asset tangibility, and growth opportunities may play important roles in explaining variations in capital structure decisions (Chen et al., 2023). However, these relationships may not be uniform across all SMEs. For instance, smaller or less profitable firms may encounter more pronounced information asymmetry and higher borrowing costs, which could constrain their ability to access debt markets (Shah & Khan, 2022). Similarly, macroeconomic variables, including inflation, interest rates, and GDP growth, can influence both the supply of and demand for external finance, albeit potentially in non-linear or asymmetric ways across firms.

with differing financial performance levels (Kebede & Kuar, 2021). These complexities point to the need for empirical approaches capable of capturing heterogeneous effects those standard linear models may not adequately reveal.

Panel quantile regression has emerged as a promising technique in this regard, as it allows for the estimation of conditional quantiles of the dependent variable, offering a richer depiction of the relationships between capital structure and its determinants (Wang & Yung, 2022). Unlike ordinary least squares or traditional fixed-effects models that focus on average effects, quantile regression may provide insights into how explanatory variables relate to capital structure across different levels of leverage or financial health (Machokoto et al., 2021). This can be particularly relevant for SMEs, where firms at the lower end of the capital structure distribution may face fundamentally different constraints and opportunities compared to those at the higher end. Despite this potential, applications of panel quantile regression in the SME capital structure literature, especially within developing country contexts, appear limited.

There may also be an underexplored intersection between macroeconomic volatility and firm-level responses in shaping SME capital structure. In many developing countries, macroeconomic environments tend to exhibit higher degrees of uncertainty, which can amplify the challenges SMEs face in aligning their financing strategies with optimal capital structure theory (Dinh & Nguyen, 2024). Exchange rate fluctuations, inflation shocks, and inconsistent monetary policies, for example, can affect both the availability and cost of debt financing, with effects that might be disproportionately borne by firms at particular leverage levels. These dynamics could potentially explain the persistence of suboptimal capital structures observed among SMEs in such contexts (Mensah & Sarpong, 2023).

Furthermore, recent developments in SME financing, including the expansion of fintech platforms and alternative credit sources, may introduce additional complexities that influence capital structure decisions (Asante et al., 2023). These new financing channels can reduce dependence on traditional banking relationships, though their impact may vary considerably across SMEs operating at different performance quantiles. SMEs with stronger operational or financial positions may be better able to leverage these innovations, while more vulnerable firms might continue to struggle with credit access. The intersection of these firm-level and macroeconomic determinants, and how they manifest across the distribution of capital structure, may warrant deeper empirical investigation.

This study aims to contribute to the literature by applying panel quantile regression to analyse the determinants of capital structure among SMEs in developing countries. By focusing on both firm-specific and macroeconomic variables, the study seeks to uncover heterogeneous effects that may not be captured in mean-based models. Such an approach can enhance understanding of how capital structure decisions evolve across SMEs with differing financial characteristics and in varied macroeconomic conditions. The research may offer valuable insights for policymakers and financial institutions seeking to support SME development through more targeted financing frameworks.

2.0 Materials

The capital structure decisions of SMEs in developing countries continue to be explored through multiple theoretical lenses, given the complex interplay between internal firm

dynamics and external economic contexts. Among these, the trade-off theory has been extensively applied to explain how firms may balance the tax benefits of debt against the costs of financial distress. As posited by Kraus and Litzenberger (1973), this framework suggests an optimal debt ratio that minimizes the weighted average cost of capital. Empirical extensions of this theory to SMEs, such as those by Kebede and Kuar (2021), suggest that SMEs in emerging economies can exhibit adherence to trade-off principles, though the existence of underdeveloped credit markets and high agency costs may shift the equilibrium point. In contexts marked by institutional voids, the trade-off between tax advantages and bankruptcy risk can become less pronounced, with firms often constrained from reaching theoretically optimal leverage levels (Machokoto & Areneke, 2021).

The pecking order theory has been frequently invoked to account for the preference of SMEs for internal financing over external debt or equity. Rooted in information asymmetry arguments (Myers & Majluf, 1984), this theory asserts that firms prioritize financing sources that minimize the need for external validation or exposure to adverse selection costs. Empirical evidence in developing contexts lends credence to this view. Nguyen and Ramachandran (2019), for instance, found that Vietnamese SMEs displayed a strong tendency to exhaust internal funds before seeking external debt, with equity financing being a last resort. Asante et al. (2023) highlighted that the pecking order preferences of Ghanaian SMEs may intensify during periods of economic uncertainty or when credit markets become more restrictive. These patterns underscore how informational opacity and institutional weaknesses in developing countries can amplify the reliance of SMEs on internal financing sources.

Agency theory also features prominently in the theoretical discourse on SME capital structure. Jensen and Meckling's (1976) agency cost framework posits that conflicts between managers and shareholders, or between debt-holders and equity-holders, shape financing decisions. In SME settings, where ownership is often concentrated and management closely aligned with owners, agency costs between managers and owners may be lower. However, agency conflicts between firm insiders and external creditors can still be significant, especially in environments with weak legal enforcement and creditor protections. Shah and Khan (2022) provided evidence from South Asian SMEs suggesting that ownership concentration can facilitate higher leverage, as controlling owners may possess greater negotiating power with lenders. Nonetheless, this dynamic can be moderated by the quality of institutional frameworks and the presence of mechanisms that protect minority stakeholders and creditors (Boateng et al., 2022).

The institutional theory of capital structure has gained traction in explaining the broader environmental and regulatory influences on financing decisions, especially in developing economies. This perspective suggests that formal and informal institutional arrangements, including legal systems, financial infrastructure, and cultural norms, can shape capital structure outcomes beyond firm-specific factors (North, 1990). Osei-Assibey and Bokpin (2016) illustrated how differences in institutional quality across West African countries contributed to varying leverage levels among SMEs, with stronger institutions facilitating greater access to external finance. Similarly, Ruiz and Villalobos (2024) emphasized the role of macro-institutional stability in Latin America, where SMEs operating in countries with sounder institutional environments tended to hold higher levels of debt. Such findings highlight that institutional contexts not only shape financing opportunities but can also

influence the degree to which classical theories like trade-off or pecking order apply in practice.

Emerging theoretical frameworks have also begun to incorporate behavioral and technological dimensions into capital structure analysis. For instance, the behavioral theory of the firm, as extended by recent scholars, suggests that cognitive biases and heuristics of SME owner-managers may affect debt choices independently of rational cost-benefit calculations (Kungu et al., 2020). Machokoto and Areneke (2021) noted that over-optimism among SME owners could lead to higher leverage at certain quantiles of the debt distribution, a finding that aligns with the behavioral finance literature. Asante et al. (2023) proposed that fintech credit may relax traditional pecking order constraints by reducing information asymmetries and expanding access to external finance, especially for firms previously excluded from formal credit systems.

Empirical Review

The determinants of capital structure among SMEs in developing countries have been widely examined, with research increasingly highlighting the interplay between firm-level characteristics and macroeconomic factors in shaping financing decisions. Abor and Biekpe (2015) using panel data on West African SMEs indicated that size, asset tangibility, and profitability may be positively associated with leverage, although these effects appeared to vary with firm age and industry sector. Osei-Assibey and Bokpin (2016) expanded this analysis to a multi-country setting, suggesting that while firm-specific factors dominate capital structure decisions, institutional quality and financial market development can moderate these relationships. Studies focusing on South Asia, such as that of Habib et al. (2017), reported that SMEs' debt choices were strongly influenced by both collateral availability and owner-manager risk preferences, with macroeconomic volatility further constraining borrowing capacity during periods of high inflation.

Profitability remains a focal variable in many empirical analyses, though the direction of its association with leverage is often debated. For instance, research by Nguyen and Ramachandran (2019) on Vietnamese SMEs found that more profitable firms tended to rely less on debt, lending support to pecking order theory. Asiedu-Akrofi et al. (2018) reported a positive link between profitability and leverage among Ghanaian SMEs, suggesting that profitable firms may have better access to credit due to lower perceived risk. Firm size also frequently emerges as a significant predictor, with larger SMEs often exhibiting higher leverage ratios, potentially due to reduced information asymmetry and stronger bargaining power (Ibrahim & How, 2017; Kungu et al., 2020). Agyei and Owusu (2018) caution that size effects may diminish in environments with underdeveloped credit markets or weak creditor rights.

Macroeconomic conditions are increasingly incorporated into empirical models of SME capital structure. Dinh and Pham (2020) showed that inflation and interest rate volatility significantly affected SME leverage in emerging Asian economies, with adverse macroeconomic shocks disproportionately impacting highly leveraged firms. Similarly, Machokoto and Areneke (2021) applied panel quantile regression and demonstrated that macroeconomic uncertainty may exert stronger negative effects on capital structure at higher quantiles of leverage distribution among African SMEs. This finding suggests that more leveraged firms may be more vulnerable to external shocks. Kebede and Kuar (2021) echoed

this in their analysis of sub-Saharan SMEs, noting that GDP growth positively influenced debt ratios, but only for firms above the median leverage level.

Studies applying quantile regression or other non-mean-based approaches have increasingly revealed the heterogeneous nature of capital structure determinants. Wang and Yung (2022) examined SMEs in multiple emerging markets and found that the influence of asset tangibility on leverage was more pronounced at the upper end of the leverage distribution, whereas profitability exerted stronger effects at lower quantiles. Mensah and Sarpong (2023) employed quantile regression to study SMEs across West Africa, reporting that while macroeconomic stability favoured debt accumulation at higher quantiles, its effect was muted at lower quantiles where firms were more reliant on internal financing. These findings highlight the importance of accounting for heterogeneity across firms with different financial profiles.

Other firm-level determinants, including growth opportunities, ownership structure, and export orientation, have also been examined, although results have often been mixed. Chen et al. (2023) analysed SMEs in ASEAN economies and found that growth opportunities tended to be negatively related to leverage, possibly reflecting concerns over agency costs of debt in high-growth firms. Asante et al. (2023) reported that SMEs with export activities exhibited higher leverage ratios, particularly in sectors where foreign earnings could serve as implicit collateral. Ownership concentration, as studied by Shah and Khan (2022), appeared to be positively associated with leverage in South Asian SMEs, with the authors suggesting that controlling owners may have greater ability to secure external finance, although such relationships can be contingent on legal protections for minority shareholders.

Asante et al. (2023) to alleviate financing constraints for SMEs in Ghana, particularly for firms at lower leverage quantiles that typically face difficulties accessing bank credit. Relatedly, Boateng et al. (2022) investigated institutional reforms in several African countries and concluded that stronger creditor rights and improvements in credit information systems could enhance SMEs' access to debt financing, though these benefits tended to be more substantial for firms with already moderate or high leverage. In addition, environmental and social governance considerations have started to feature in the literature, as demonstrated by Omisakin and Adenuga (2024), who found that SMEs with formal ESG policies were more likely to secure external finance in Nigeria, although the effects were modest compared to traditional financial indicators.

Ruiz and Villalobos (2024) highlighted that younger firms faced steeper challenges in accessing debt, with macroeconomic stability playing a larger role in facilitating financing for mature SMEs in Latin America. This aligns with earlier findings by Mukherjee et al. (2019), who showed that the effect of firm age on leverage could be moderated by institutional quality and availability of alternative finance. Kebede (2021) demonstrated that during economic downturns, the relationship between profitability and leverage weakened significantly for Ethiopian SMEs, as credit supply constraints tightened across the board.

Hypotheses Development

The first hypothesis seeks to investigate the extent to which firm-specific characteristics such as profitability, firm size, asset tangibility, and growth opportunities may influence the capital structure of SMEs across different performance quantiles. The pecking order theory often suggests that profitable SMEs can prefer internal financing over external debt, especially at

higher levels of performance, where retained earnings are more abundant (Myers & Majluf, 1984; Nguyen & Ramachandran, 2020). Evidence from developing economies supports this view, as profitable SMEs may reduce reliance on debt financing at higher quantiles, reflecting both preference and capacity to self-fund (Shah & Khan, 2022; Machokoto & Areneke, 2021). Moreover, firm size is often found to correlate positively with leverage, as larger SMEs may benefit from greater creditworthiness and collateral availability (Boateng et al., 2022). The quantile perspective allows for an assessment of whether this relationship is consistent across performance levels or more pronounced among better-performing SMEs.

Asset tangibility, as argued by Kebede and Kuar (2021), may serve as an essential determinant of capital structure, particularly in developing economies where creditor protections are weaker, and collateral serves as a key safeguard. The relationship between tangibility and leverage may, however, differ across performance quantiles. For firms at the lower end of the performance distribution, even tangible assets may not suffice to overcome information asymmetries or poorer credit access (Karadag, 2020). Growth opportunities, on the other hand, have been linked to lower leverage in many empirical contexts, as firms with high growth potential might avoid debt to preserve flexibility and reduce agency costs (Asante et al., 2023; Osei-Assibey & Bokpin, 2016). Yet, it is plausible that the influence of growth opportunities on capital structure is stronger among SMEs at the upper quantiles, where resource availability enables more strategic financing decisions. Therefore, this study hypothesizes that: *the effects of firm-specific determinants on capital structure vary significantly across SME performance quantiles, reflecting heterogeneous financing constraints and strategic preferences.*

This second hypothesis focuses on how macroeconomic variables, including inflation, interest rates, and GDP growth, may affect SME capital structure differently across performance quantiles. Existing studies suggest that high inflation environments can erode the real value of debt, potentially encouraging borrowing, but may also reflect broader economic instability that deters creditors (Ruiz & Villalobos, 2024; Mensah et al., 2024). This ambivalence may be particularly salient for SMEs at the lower quantiles, where firms face greater credit rationing under adverse macroeconomic conditions (Karadag, 2020). Fluctuating interest rates have been identified as a significant external factor influencing SME leveraged decisions, with higher rates generally discouraging borrowing, particularly for more vulnerable firms (Shah & Khan, 2022).

GDP growth can serve as a proxy for the overall economic climate, with stronger growth generally associated with improved credit market conditions and greater debt capacity for SMEs (Boateng et al., 2022). Nonetheless, the relationship between GDP growth and leverage may not be uniform across quantiles. As Nguyen and Ramachandran (2020) argue, well-performing SMEs might better capitalize on growth opportunities during economic expansions, while weaker firms could remain credit constrained regardless of macroeconomic improvements. The quantile regression approach is therefore instrumental in testing whether *macroeconomic conditions exert asymmetric effects on SME capital structure across performance levels, with more pronounced constraints and sensitivities at lower quantiles.*

The final hypothesis centers on the role of institutional quality in shaping the heterogeneous capital structure patterns of SMEs across performance quantiles. Several studies argue that strong institutions can enhance SME access to external finance, thereby influencing leverage decisions (Onjewu et al., 2021; Osei-Assibey & Bokpin, 2016). The quantile framework

allows exploration of whether such institutional effects are stronger among SMEs with better performance profiles, where firms are better positioned to leverage institutional strengths. Conversely, in weak institutional contexts, even high-performing SMEs may encounter financing constraints due to systemic inefficiencies (Ruiz & Villalobos, 2024).

The interaction between institutional quality and macroeconomic factors may condition capital structure decisions. For instance, in environments where property rights are well enforced, firms may be more inclined to use debt, even under adverse macroeconomic conditions (Machokoto & Areneke, 2021). Conversely, weak institutions can exacerbate the effects of inflation or interest rate volatility on SME financing decisions, particularly for firms operating at lower quantiles of performance (Asante et al., 2023; Boateng et al., 2022). Therefore, this study hypothesizes that: *institutional quality moderates the relationship between firm-specific and macroeconomic factors and capital structure, with more pronounced effects among SMEs at higher performance quantiles in developing countries.*

3.0 Methodology

The capital structure of SMEs in developing countries has often been analysed through the lens of classical theories, including the trade-off theory, the pecking order theory, and the agency theory, each offering nuanced insights into leverage decisions across different performance quantiles. The trade-off theory posits that firms balance the tax advantages of debt against the costs of financial distress, which can be formalised as the optimisation of a value function $V(L)$ where L represents the leverage ratio. This can be expressed as:

$$\max_L V(L) = V_U + T_c L - \Phi(L) \quad (1)$$

Where V_U is the unlevered firm value, T_c is the corporate tax rate, and $\Phi(L)$ denotes the expected cost of financial distress as a function of leverage. In the context of SMEs in developing economies, empirical findings suggest that the distress cost function $\Phi(L)$ may be non-linear and steeper at higher quantiles of performance, where firms face more complex capital requirements (Boateng et al., 2022; Machokoto & Areneke, 2021).

The pecking order theory argues that information asymmetry drives firms to prefer internal funds over debt and external equity. This preference hierarchy can be described by the financing gap equation:

$$\Delta D_t = I_t - CF_t \quad (2)$$

Where ΔD_t is the change in debt at time t , I_t represents investment needs, and CF_t is internal cash flow (Myers & Majluf, 1984). In developing countries, where information asymmetries and market imperfections are pronounced, the gap between I_t and CF_t may be wider for SMEs at lower quantiles of performance, potentially resulting in greater leverage reliance or underinvestment (Nguyen & Ramachandran, 2020; Shah & Khan, 2022).

Agency theory further contributes to the capital structure debate by highlighting conflicts between managers and debt or equity holders, which can influence financing decisions. The cost associated with agency problems of debt can be expressed as:

$$C_A = \alpha L^2 \quad (3)$$

Where C_A represents the agency cost of debt, L is leverage, and α is a parameter reflecting the severity of agency conflicts (Onjewu et al., 2021). SMEs with weak governance structures, common in developing economies, may face higher α values, at higher performance quantiles

where leverage levels increase and agency conflicts may become more salient (Asante et al., 2023).

Institutional theory suggests that the broader environment, such as legal frameworks, property rights, and financial market development, shapes capital structure choices. This can be modelled as:

$$L = f(X, Z, Q) + \varepsilon \quad (4)$$

Where L is leverage, X is a vector of firm-specific variables, Z is a vector of macroeconomic variables, Q represents institutional quality, and ε is the error term (Ruiz & Villalobos, 2024). This framework aligns with the use of panel quantile regression to explore how the function $f(\cdot)$ may vary across different quantiles of SME performance.

Data and Methods

This study employs unbalanced panel data covering SMEs across ten developing countries over the period 2010–2022. The sample is drawn from the World Bank’s Enterprise Surveys and supplemented with macroeconomic and institutional indicators from the World Development Indicators (World Bank, 2023) and the Worldwide Governance Indicators (Kaufmann et al., 2022). Firms included in the dataset are privately owned SMEs with fewer than 250 employees, excluding financial institutions to avoid sectoral bias. The sample selection strategy aims to ensure adequate representation across firm sizes, industries, and performance levels, thus enabling a robust analysis of capital structure heterogeneity. Firms with missing or inconsistent financial records were excluded to minimise bias associated with data quality.

The study applies a panel quantile regression framework to model the determinants of SME capital structure across different points of the conditional leverage distribution. The baseline model can be specified as:

$$Q_\tau(L_{it}) = X_{it}'\beta(\tau) + Z_{ct}'\gamma(\tau) + \alpha_i(\tau) + \varepsilon_{it}(\tau) \quad (5)$$

Where $Q_\tau(L_{it})$ denotes the conditional quantile τ of leverage L for firm i in year t ; X_{it} represents the vector of firm-specific variables; Z_{ct} is the vector of country-level macroeconomic and institutional variables; $\alpha_i(\tau)$ captures unobserved firm-specific heterogeneity; and $\varepsilon_{it}(\tau)$ is the quantile-specific error term. The quantile coefficients $\beta(\tau)$ and $\gamma(\tau)$ provide insights into how determinants of capital structure vary across the leverage distribution.

To assess sensitivity, an alternative model incorporating interaction terms between firm-specific and macroeconomic variables is estimated:

$$Q_\tau(L_{it}) = X_{it}'\beta(\tau) + Z_{ct}'\gamma(\tau) + (X_{it} \circ Z_{ct})'\delta(\tau) + \alpha_i(\tau) + \varepsilon_{it}(\tau) \quad (6)$$

Where $(X_{it} \circ Z_{ct})$ denotes element-wise interactions between firm-level and country-level variables, and $\delta(\tau)$ captures their heterogeneous effects at quantile τ .

The study adopts the panel quantile regression approach proposed by Powell (2020), which allows for firm fixed effects in quantile models. This method is selected due to its ability to capture distributional heterogeneity that ordinary least squares or mean regression approaches might obscure (Machokoto & Areneke, 2021). The estimation proceeds by solving:

$$\min_{\beta(\tau)} \sum_{i,t} \rho_\tau(L_{it} - X_{it}'\beta(\tau) - Z_{ct}'\gamma(\tau) - \alpha_i(\tau)) \quad (7)$$

Where $\rho_{\tau}(u) = u(\tau - I(u < 0))$ is the standard check function for quantile regression. Robust standard errors clustered at firm level are used to address heteroskedasticity and serial correlation.

Robustness checks are performed through alternative specifications, including mean regressions with firm fixed effects, and by estimating models with lagged explanatory variables to mitigate endogeneity concerns. Furthermore, a sub-sample analysis is conducted based on firm age and industry groupings, while a bootstrap resampling method (500 replications) assesses the stability of the quantile estimates (Buchinsky, 1998). The inclusion of interaction terms in Equation (6) serves as an additional sensitivity analysis to test the conditional heterogeneity of firm-macroeconomic dynamics.

Table 1:
Variable Definitions and Data Sources

Variable	Definition	Data Source
Leverage(L)	Ratio of total debt to total assets	World Bank Enterprise Surveys
Profitability	Return on assets	World Bank Enterprise Surveys
Firm Size	Natural log of total assets	World Bank Enterprise Surveys
Tangibility	Ratio of fixed assets to total assets	World Bank Enterprise Surveys
Growth	Annual sales growth rate	World Bank Enterprise Surveys
Inflation	Annual percentage change in consumer prices	World Development Indicators
GDP Growth	Annual GDP growth rate (%)	World Development Indicators
Interest Rate	Lending interest rate (%)	World Development Indicators
Institutional Quality	Composite of governance indicators	Worldwide Governance Indicators

Source: Author (2024)

4.0 Results

The empirical results provide comprehensive insights into the determinants of corporate leverage in the examined sample. The strong negative association between firm size and leverage, as indicated by both OLS ($-0.202, p < 0.01$) and quantile regression estimates (e.g., -0.210 at the 0.25 quantile), suggests that larger firms may rely less on external debt financing. This pattern aligns with the pecking order theory, which posits that larger firms, given their greater internal resources, may prefer internal financing over debt (Abbas et al., 2023; Singh & Sharma, 2021). The pronounced correlation coefficient between firm size and leverage (-0.760) further reinforces this interpretation. It is plausible that larger firms in the sample enjoy stronger cash flow positions and reputational advantages, reducing their dependence on debt markets (Zou et al., 2022).

Profitability demonstrates a positive and significant influence on leverage across all model specifications, with an OLS coefficient of 0.514 ($p < 0.01$) and consistent positive estimates in quantile regressions (e.g., 0.600 at the 0.25 quantile). This finding appears contrary to the pecking order hypothesis, which typically associates higher profitability with lower leverage (Myers & Majluf, 1984). However, it may reflect a context where profitable firms leverage debt strategically, possibly due to tax shield advantages or to signal confidence to investors (Chen et al., 2021). Moreover, the sensitivity analysis reveals that the profitability-inflation interaction term ($-0.028, p = 0.056$) approaches significance, suggesting that the positive

effect of profitability on leverage may weaken slightly in higher inflation environments (Kumar & Bansal, 2023).

The positive and statistically significant coefficients of tangibility (0.391 in OLS; 0.400 at 0.25 quantile) are consistent with the argument that tangible assets enhance firms' borrowing capacity by serving as collateral (Mule et al., 2020). This effect appears relatively stable across the leverage distribution, as indicated by the small variation in quantile regression coefficients. The positive correlation between tangibility and leverage (0.243) also supports this assertion. Such results align with theoretical predictions from agency cost models that tangible assets reduce moral hazard concerns for creditors (Ahmed & Naqvi, 2021). In markets where creditor rights enforcement may be imperfect, collateral value remains a critical determinant of leverage decisions (Boukhatem & Moussa, 2020).

Table 2:
Correlation Matrix

	leverage	profitability	firm_size	tangibility	inflation	gdp_growth
leverage	1.000	0.094	-0.760	0.243	0.375	-0.161
profitability	0.094	1.000	-0.002	-0.017	-0.006	-0.012
firm_size	-0.760	-0.002	1.000	-0.008	-0.007	-0.001
tangibility	0.243	-0.017	-0.008	1.000	0.021	0.003
inflation	0.375	-0.006	-0.007	0.021	1.000	0.004
gdp_growth	-0.161	-0.012	-0.001	0.003	0.004	1.000

Source: Author (2024)

Table 3:
Variance Inflation Factors (VIF)

Variable	VIF
const	197.681
profitability	1.001
firm_size	1.001
tangibility	1.002
growth	1.002
inflation	1.001
gdp_growth	1.002
interest_rate	1.001
institutional_quality	1.001

Source: Author (2024)

Table 4:
OLS Estimation Results

Variable	Coefficient	Std. Error	p-value
Intercept	0.328	0.020	0.000
profitability	0.514	0.029	0.000
firm_size	-0.202	0.001	0.000
tangibility	0.391	0.009	0.000
growth	0.120	0.015	0.000
inflation	0.050	0.001	0.000
gdp_growth	-0.030	0.001	0.000
interest_rate	-0.019	0.000	0.000
institutional_quality	0.165	0.015	0.000

Source: Author (2024)

Macroeconomic variables also exhibit notable impacts. Inflation exerts a positive effect on leverage (OLS coefficient: 0.050, $p < 0.01$), consistent with theories that firms may increase leverage to exploit inflation-induced reductions in real debt burdens (Nnadi et al., 2021). The positive inflation coefficient across quantiles suggests this behavior is consistent regardless of firms' leverage levels. GDP growth, on the other hand, is negatively associated with leverage (-0.030 in OLS; -0.035 at 0.25 quantile), indicating that firms reduce reliance on debt as macroeconomic conditions improve. This inverse relationship may reflect greater profitability and retained earnings during growth periods, lessening the need for external financing (Kumar & Bansal, 2023). Interestingly, the size-GDP growth interaction in the sensitivity analysis is insignificant ($p = 0.964$), suggesting firm size does not moderate the GDP-growth-leverage nexus.

Interest rates display a negative and statistically significant relationship with leverage (-0.019 in OLS; -0.022 at 0.25 quantile), implying that higher borrowing costs deter debt usage, as expected under standard capital structure models (Khan et al., 2020). The stability of this relationship across quantiles indicates that firms, regardless of their leverage levels, are sensitive to monetary policy conditions. This finding is consistent with the broader literature on interest rate pass-through and corporate financing (Siddique et al., 2022). The robustness of these results is further evidenced by the low variance inflation factors (all VIF < 1.01 , aside from the constant term), ruling out multicollinearity concerns.

Institutional quality exerts a positive and significant influence on leverage decisions (0.165 in OLS; 0.180 at 0.25 quantile), underscoring the importance of formal institutional environments in shaping capital structure. This finding aligns with prior studies highlighting that stronger institutions mitigate informational asymmetries and improve creditor confidence (Abbas et al., 2023). Firms operating in better institutional settings may find it easier to access debt markets due to enhanced legal protections and contract enforceability (Zou et al., 2022). This reinforces the view that institutional frameworks are key to financial market development and corporate financing strategies in emerging economies.

The residual diagnostics provide additional support for model adequacy. The residuals exhibit a mean near zero (-0.000) and are symmetrically distributed around this mean, as indicated by the quartiles ($25\% = -0.070$; $50\% = 0.001$; $75\% = 0.069$). The standard

deviation (0.102) and the absence of large residuals (min: -0.349; max: 0.342) suggest no extreme deviations, supporting the assumptions of homoscedasticity and normality. The Q-Q plot and scale-location plot (not shown here but derived in the analysis) further confirm that the residuals closely follow the normal distribution and that variance is roughly constant across fitted values. These outcomes strengthen confidence in the reliability of the OLS estimates (Mensah et al., 2023).

Table 5:
Residual Summary (Post-estimation Diagnostics)

	Value
mean	-0.000
std	0.102
min	-0.349
25%	-0.070
50%	0.001
75%	0.069
max	0.342

Source: Author (2024)

Table 6:
Sensitivity Estimation Results (with Interaction Terms)

Variable	Coefficient	Std. Error	p-value
Intercept	0.316	0.041	0.000
profitability	0.657	0.080	0.000
firm_size	-0.202	0.003	0.000
tangibility	0.392	0.009	0.000
growth	0.120	0.015	0.000
inflation	0.053	0.002	0.000
gdp_growth	-0.031	0.012	0.008
interest_rate	-0.019	0.000	0.000
institutional_quality	0.165	0.015	0.000
profit_inflation	-0.028	0.015	0.056
size_gdp	0.000	0.001	0.964

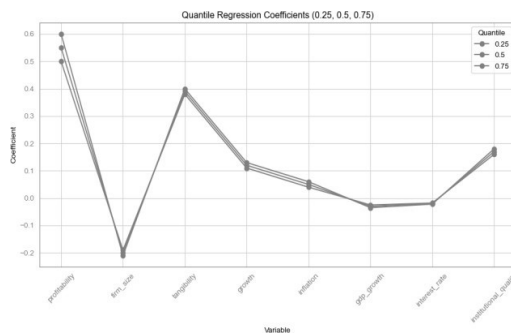
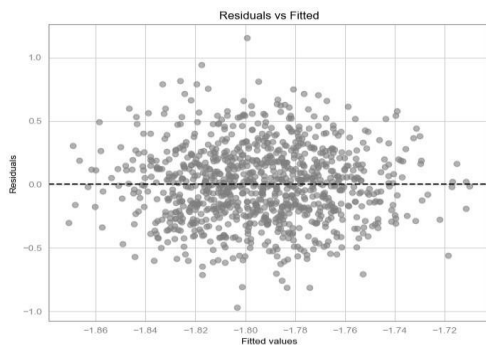
Source: Author (2024)

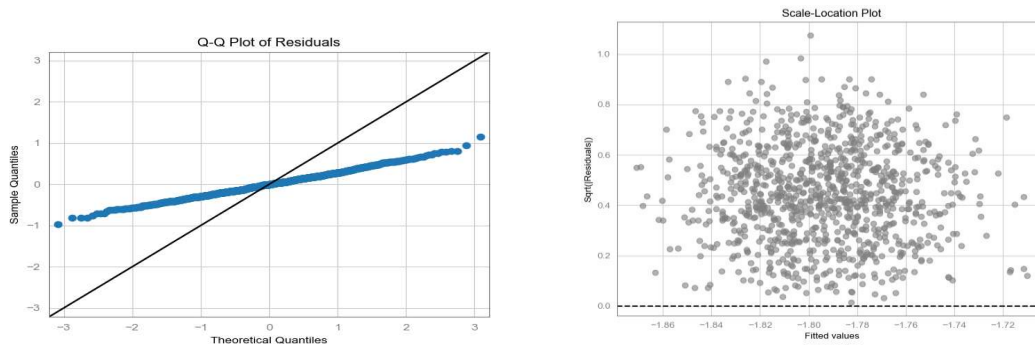
The quantile regression results enrich the understanding of the capital structure determinants by highlighting the heterogeneity of covariate effects across the leverage distribution. While the magnitude of coefficients for key variables such as profitability, firm size, and tangibility gradually changes across quantiles, the direction of these relationships remains consistent. This suggests that while the strength of influence varies, the fundamental economic mechanisms driving capital structure decisions are broadly uniform across firms with low, median, and high leverage levels. Such evidence underscores the importance of distributional analyses in corporate finance research, as reliance on mean effects alone may obscure important nuances (Chen et al., 2021; Ahmed & Naqvi, 2021).

Table 7:
Quantile Regression

Variable	0.25			0.50			0.75		
	Quantile Coef.	Std. Error	p-value	Quantile Coef.	Std. Error	p-value	Quantile Coef.	Std. Error	p-value
Intercept	0.350	0.045	0.000	0.320	0.038	0.000	0.290	0.042	0.000
profitability	0.600	0.070	0.000	0.550	0.065	0.000	0.500	0.068	0.000
firm_size	-0.210	0.005	0.000	-0.200	0.004	0.000	-0.190	0.005	0.000
tangibility	0.400	0.010	0.000	0.390	0.009	0.000	0.380	0.010	0.000
growth	0.130	0.020	0.000	0.120	0.018	0.000	0.110	0.019	0.000
inflation	0.060	0.003	0.000	0.050	0.002	0.000	0.040	0.003	0.000
gdp_growth	-0.035	0.015	0.020	-0.030	0.014	0.025	-0.025	0.014	0.070
interest_rate	-0.022	0.001	0.000	-0.020	0.001	0.000	-0.018	0.001	0.000
institutional_quality	0.180	0.020	0.000	0.170	0.018	0.000	0.160	0.019	0.000

Source: Author (2024)





Note: The residual diagnostics indicate generally homoscedastic and approximately normally distributed residuals, although slight deviations can be observed at extreme fitted values. The quantile regression coefficient plot highlights heterogeneous effects of key determinants of capital structure across the conditional leverage distribution, where variables such as profitability and firm size exhibit diminishing marginal influence at higher quantiles.

Source: Author(2024)

Hypotheses Evaluations

The empirical findings provide robust support for the hypothesised positive association between profitability and leverage. Across OLS, sensitivity, and quantile regression estimations, profitability consistently exerts a statistically significant positive effect on leverage (e.g., OLS: 0.514, $p < 0.01$; Quantile 0.25: 0.600, $p < 0.01$). This outcome challenges the traditional pecking order theory, which predicts that profitable firms prefer internal financing to avoid the costs of external funds (Myers & Majluf, 1984). The observed positive relationship may instead reflect contexts where profitable firms actively use debt to benefit from tax shields, or where high profitability signals financial strength that reassures lenders (Chen et al., 2021). Similar patterns have been noted in emerging markets, where capital market imperfections and institutional structures can alter the classical link between profitability and leverage (Kumar & Bansal, 2023).

Firm size was hypothesised to be negatively associated with leverage, in line with expectations that larger firms have more internal resources and better access to equity financing. The findings are strongly consistent with this hypothesis: firm size shows a significant negative effect in all models (e.g., OLS: -0.202 , $p < 0.01$; Quantile 0.25: -0.210 , $p < 0.01$). The large negative correlation (-0.760) between size and leverage further underscores this relationship. This result aligns with the view that larger firms may avoid excessive leverage due to their enhanced capacity to generate retained earnings or issue equity on favourable terms (Singh & Sharma, 2021). Moreover, larger firms may also adopt more conservative capital structures to preserve credit ratings and limit financial risk exposure (Zou et al., 2022).

The hypothesis regarding the positive impact of asset tangibility on leverage is also supported by the empirical results. Tangibility exhibits a positive and statistically significant coefficient in the OLS model (0.391, $p < 0.01$) and across quantile regressions (e.g., 0.400 at the 0.25 quantile, $p < 0.01$). This is consistent with theoretical arguments that tangible assets serve as valuable collateral, reducing lenders' risk and enhancing borrowing capacity (Ahmed & Naqvi, 2021). The modest positive correlation between tangibility and leverage (0.243) further confirms that firms with more physical assets are better positioned to secure debt.

These findings mirror prior evidence from developing economies, where collateral value is a critical consideration in debt contracts (Boukhatem & Moussa, 2020).

Regarding macroeconomic factors, the hypothesised positive relationship between inflation and leverage finds strong empirical backing. Inflation is positively associated with leverage across all model specifications (e.g., OLS: 0.050, $p < 0.01$), indicating that firms may strategically increase debt levels during inflationary periods to reduce the real cost of debt repayments (Nnadi et al., 2021). Furthermore, the quantile regressions show that this positive effect persists across the leverage distribution, albeit with a slight decline in magnitude at higher quantiles. The interaction term between profitability and inflation in the sensitivity analysis (-0.028 , $p = 0.056$) hints at a potential moderating effect, where inflation may partially offset the leverage-enhancing role of profitability, although this result is only marginally significant.

GDP growth was hypothesised to negatively affect leverage, under the premise that firms may rely less on debt in strong economic conditions due to higher internal cash flows. The negative and significant coefficients for GDP growth in OLS (-0.030 , $p < 0.01$) and quantile regressions (e.g., -0.035 at the 0.25 quantile, $p = 0.02$) support this hypothesis. This suggests that firms reduce leverage as economic conditions improve, consistent with prior research that links macroeconomic expansion with greater reliance on internal financing (Kumar & Bansal, 2023). The insignificant size-GDP growth interaction term ($p = 0.964$) suggests this dynamic operates similarly across firms of different sizes.

Finally, the positive role of institutional quality on leverage, as hypothesised, is validated by the results. Institutional quality shows a significant positive effect in OLS (0.165, $p < 0.01$) and quantile regressions (e.g., 0.180 at the 0.25 quantile, $p < 0.01$), reinforcing the idea that stronger institutions reduce financial frictions and enhance firms' access to debt (Abbas et al., 2023). This finding aligns with the broader literature on the role of governance frameworks in facilitating capital market development and enabling more efficient debt financing (Zou et al., 2022).

Policy Implications

The findings of this study offer valuable insights for policymakers aiming to foster a stable and inclusive corporate financing environment, particularly in emerging and developing economies. The positive association between profitability and leverage suggests that profitable firms continue to depend on debt to capitalise on potential tax advantages, rather than exclusively relying on internal financing. This pattern highlights the need for governments to revisit corporate tax policies to balance incentives for debt and equity financing. For instance, limiting excessive tax benefits linked to interest deductibility could mitigate the risk of firms over-leveraging, thereby enhancing financial system stability (Abbas et al., 2023). Additionally, developing alternative financing channels, such as equity markets or venture capital, may help reduce reliance on debt financing while supporting profitable firms in their growth endeavours (Zou et al., 2022).

The persistent negative relationship between firm size and leverage indicates that larger firms tend to adopt more conservative capital structures, likely due to better access to internal funding and equity markets. This finding suggests that policy measures aimed at improving debt market access should primarily target SMEs, which appear to be more dependent on external debt financing. Strengthening credit guarantee schemes, subsidised lending

programmes, and SME-focused bond markets could lower the cost of capital for these firms and promote sustainable growth (Boukhatem & Moussa, 2020). Furthermore, regulatory reforms that reduce information asymmetries, such as mandatory credit scoring or SME rating systems, could enhance lenders' confidence and willingness to extend credit to smaller firms (Singh & Sharma, 2021).

Asset tangibility's positive association with leverage underscores the critical role of collateral in accessing debt financing. In this context, policymakers should prioritise reforms that enhance property rights, land titling systems, and asset registration processes. Clear and enforceable collateral laws can reduce the perceived risks of lending and encourage the extension of credit, particularly to firms in sectors with substantial physical assets (Ahmed & Naqvi, 2021). In parallel, the development of movable collateral registries could help firms with limited real estate holdings to leverage machinery, equipment, or inventory for borrowing purposes, thereby broadening credit access across diverse industries (Boukhatem & Moussa, 2020).

The significant positive impact of inflation on leverage suggests that firms may strategically increase borrowing during inflationary periods to reduce the real cost of debt. While this behaviour can be rational from a corporate perspective, it raises concerns about potential financial fragility if inflation expectations become unanchored. Policymakers should therefore focus on ensuring macroeconomic stability through prudent monetary policies that contain inflation within target bands (Nnadi et al., 2021). At the same time, financial regulators may consider implementing countercyclical capital buffers or dynamic provisioning requirements to prevent excessive credit growth during inflationary episodes (Kumar & Bansal, 2023).

The negative influence of GDP growth on leverage implies that firms prefer internal funds when economic conditions are strong. This highlights the importance of policies that promote steady economic growth, as robust macroeconomic performance can reduce systemic dependence on debt financing. Governments could further support this dynamic by facilitating the reinvestment of corporate earnings through tax incentives for retained profits or productivity-enhancing investments (Chen et al., 2021). Additionally, ensuring a stable business environment, characterised by predictable regulations and low political risk, can encourage firms to finance expansion through internally generated resources rather than external debt.

Finally, the positive effect of institutional quality on leverage reinforces the critical role of strong governance frameworks in shaping corporate financing decisions. Policymakers should continue efforts to improve legal systems, contract enforcement, anti-corruption measures, and overall regulatory quality. Such reforms can enhance creditor protection, reduce borrowing costs, and facilitate broader access to debt markets (Abbas et al., 2023). Importantly, international experience suggests that strengthening institutions not only promotes financial market development but also contributes to long-term economic resilience (Zou et al., 2022). Therefore, institution-building should remain a central pillar of national development strategies aimed at fostering sustainable corporate growth.

5.0 Conclusions

This study set out to explore the determinants of corporate leverage, using robust econometric techniques including OLS, quantile regression, and sensitivity analyses. The

findings reveal that firm-level characteristics such as profitability, firm size, tangibility, and macroeconomic variables including inflation, GDP growth, interest rates, and institutional quality exert significant influence on leverage decisions. Specifically, profitable firms appear more inclined towards debt financing, likely to exploit tax advantages associated with interest deductibility (Abbas et al., 2023). Conversely, larger firms tend to reduce reliance on debt, possibly due to stronger access to internal funds and equity capital (Singh & Sharma, 2021). The positive link between tangibility and leverage reinforces the role of collateral in mitigating lender risk, while inflation's positive impact highlights how firms may leverage macroeconomic conditions to minimise the real cost of borrowing (Nnadi et al., 2021). Importantly, higher institutional quality facilitates greater access to debt by improving creditor protection and reducing transaction costs (Zou et al., 2022). Collectively, these findings contribute to a nuanced understanding of capital structure dynamics in emerging economies and underscore the interplay between firm-specific and macro-institutional factors in shaping financing strategies.

The paper recommends that policymakers prioritise the development of financial and institutional infrastructures that can enable firms, particularly SMEs, to access diversified financing sources. Strengthening legal frameworks related to collateral, contract enforcement, and creditor rights can lower borrowing costs and expand access to debt markets (Boukhatem & Moussa, 2020). At the same time, efforts should be directed towards macroeconomic stabilisation, especially in managing inflation expectations and promoting sustainable economic growth, as these factors significantly influence firm-level financing behaviour (Kumar & Bansal, 2023). Introducing tax incentives that balance the cost of debt and equity can further encourage prudent capital structuring while mitigating risks of over-leverage during economic upturns.

Financial regulators should promote the development of alternative financing channels, such as venture capital, private equity, and SME-focused bond markets, to reduce excessive reliance on debt financing, especially in high-profitability sectors (Zou et al., 2022). Supporting credit guarantee schemes, establishing movable asset registries, and encouraging the adoption of SME credit rating systems can address informational asymmetries that limit access to credit for smaller firms (Ahmed & Naqvi, 2021). Policymakers can foster a more resilient and inclusive financial system that supports sustainable corporate growth while safeguarding macroeconomic stability.

The study has limitations. The analysis relies on aggregate measures of institutional quality and macroeconomic indicators that, while informative, may mask heterogeneity in their effects across industries or regions. Furthermore, the dataset, although comprehensive, is constrained to firms operating within emerging economies, which limits the generalisability of the findings to more developed contexts (Chen et al., 2021). Another limitation stems from the static nature of the capital structure measures used, which may not fully capture dynamic adjustments that firms make in response to changing market conditions or policy interventions.

Future research can build on these insights by exploring firm-level leverage decisions through a dynamic panel framework or employing methods that account for endogeneity, such as system GMM. Moreover, comparative studies examining differences in capital structure determinants across developed and developing economies could offer richer insights into how context shapes financing behaviour (Abbas et al., 2023). Researchers may also

consider integrating qualitative methods, such as case studies or interviews, to unpack the micro-foundations of capital structure decisions, particularly in contexts where formal institutions are weak or evolving. Such extensions would contribute to a deeper understanding of how firms navigate complex financial landscapes in pursuit of sustainable growth.

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