CHAPTER 2
DEVELOPMENT OF FINANCE, ACCOUNTING AND AUDITING

THE DETERMINANTS OF CAPITAL STRUCTURE: EVIDENCE FROM TUNISIAN BANKS

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Abstract. *This study explores the capital structure decisions of banks operating in Tunisia, a topic of growing relevance amid evolving financial regulations and economic shifts. In the banking sector, capital structure plays a pivotal role in ensuring institutional solvency, risk management, and strategic positioning within competitive financial markets. The primary goal of this article is to investigate the key internal and macroeconomic factors that influence leverage decisions in Tunisian banks. The research employs a panel data approach covering 11 commercial banks listed on the Tunisian financial market over the period from 2014 to 2023. To achieve robust and reliable results, the study utilizes a static panel model, tested under both fixed and random effects, with the Hausman test guiding the choice of estimation method. The dependent variable is leverage, defined as the ratio of total liabilities to total assets, while the independent variables include a set of bank-specific financial indicators—such as profitability, size, capital adequacy, credit exposure, and asset tangibility—as well as macroeconomic factors like inflation and GDP growth. The empirical findings demonstrate that several variables exert statistically significant effects on the capital structure of banks. In particular, return on assets, return on equity, capital adequacy, tangibility, total loans, inflation, and size appear to have strong associations with leverage, though not always in the expected direction. Notably, the size of banks shows a negative relationship with leverage, suggesting that larger institutions might rely less on debt financing, potentially due to greater access to equity markets or retained earnings. Tangibility and credit expansion positively influence leverage, reinforcing the idea that asset-backed lending and growth ambitions necessitate increased borrowing. These results contribute to a better understanding of financial decision-making in banking institutions within emerging economies. The practical significance of the article lies in its policy implications for regulators and bank managers aiming to enhance capital planning, risk oversight, and financial stability. By identifying the key determinants of leverage in Tunisian banks, the study offers a foundation for improving strategic capital allocation and aligning banking practices with regulatory expectations and market realities.*

Keywords: *capital structure; banking sector; leverage; financial performance; panel data; bank size; asset tangibility; macroeconomic factors; Tunisia; credit exposure.*

JEL Classification: D24, E22, G32, H54

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Introduction. The capital structure decision remains one of the most critical and debated issues in corporate finance, particularly in the context of the banking sector. For financial institutions, the choice between debt and equity financing not only affects profitability and risk but also reflects regulatory compliance, market conditions, and strategic priorities. In developing economies such as Tunisia, where financial markets are still evolving, banks play a pivotal role in driving economic growth and stability. However, the determinants influencing their capital structure are shaped by unique institutional, regulatory, and macroeconomic dynamics that differ from those in developed economies.

Literature review. Laux (2011) claims that capital structure is the combination of debt and equity used to fund a company's assets. Choosing the capital structure is one of the most crucial yet daunting tasks, as it significantly impacts performance (Owolabi & Inyang, 2013), competitiveness, and the survival of a business (Aggarwal, 1990). Beltratti and Stulz (2012) argue that banks, like any other firm, benefit from a tax shield when using debt financing—up to a point where the benefits of the tax shield are offset by the increased cost of economic distress and agency problems. This implies that banks can benefit from an optimal mix of debt and equity in their capital structure.

Mishkin (2000) suggests that banks may aim to hold less capital due to its high cost. Therefore, the capital structure decision for banks warrants attention, as capital levels are a major determinant of bank performance. In general, banks have more concentrated ownership than non-financial firms, making it more difficult for small equity holders to influence management decisions. Furthermore, the banking sector is characterized by less product market competition, limited takeover activity, and the presence of a safety net, which reduces stakeholders' incentives to monitor banks (Oliveira & Raposo, 2021).

The introduction of the Basel III leverage ratio also constrains overall bank leverage by comparing Tier 1 capital to total exposure. Several studies have investigated the determinants of capital structure in the Tunisian context. For instance, Oliveira and Raposo (2021), using a sample of 586 banks from 21 European countries (2000–2016), found that public banks are more subject to market discipline than private ones.

Obadire et al. (2023) studied 45 listed banks across six African countries from 2010 to 2019. Their results showed a positive association between the Z-score and net interest margin with bank leverage, as well as a positive correlation between earnings volatility, profitability, and risk with leverage. Similarly, Khan et al. (2023), analyzing 132 banks from the MENA region over 2012–2017, reported a negative and significant relationship between profitability and leverage. They found no significant relationship between tangibility and leverage, while growth, GDP, and inflation all had negative and significant associations with leverage.

Kebede (2024), studying 14 commercial banks in Ethiopia (2010–2022), found that tangibility, non-tax shields, growth, and interest rates had positive and significant effects on leverage, while GDP had a negative impact. Khan et al. (2021) examined 11 Saudi commercial banks and found that earnings volatility, growth, and bank size were positively and significantly related to leverage.

Solangi et al. (2022), in a study of Pakistani banks (2010–2019), found a negative impact of ROA on leverage, moderate negative effects of tangibility, and weak negative relationships between growth, inflation, and leverage. Baltaci and Ayaydin (2014), analyzing Turkish banks (2002–2012), found that leverage was negatively associated with tangibility, profitability, inflation, and financial risk.

AlMutairi and Naser (2015) found that liquidity and profitability influenced capital structure decisions in 47 GCC commercial banks (2001–2010). Kenddunim and Thaddous (2024), studying eight Nigerian banks (2010–2019), observed that size had a significant effect on leverage, while working capital and profitability were not significant.

Shrestha and Gurny (2023) analyzed 20 banks in Nepal (2014–2023) and found that profitability and liquidity negatively impacted capital structure, while bank size, GDP growth rate, and inflation had positive effects. Da Ganna et al. (2021), in their study of Portuguese banks (2009–2018), highlighted the significant impact of regulatory capital, the global financial crisis, and the Eurozone crisis on leverage levels.

MBA and Diaz (2017), studying 31 Vietnamese commercial banks (2009–2014), found that size, profitability, and growth rate significantly affected leverage. Rehan et al. (2023) examined 52 banks in the South Asian Association for Regional Cooperation and concluded that tangibility, growth, profitability, and non-performing loans had a positive influence on leverage, while liquidity and GDP had a negative effect.

According to the trade-off theory, profitable firms are encouraged to use higher levels of debt to obtain tax savings. This theory assumes a positive association between profitability and leverage. Frank and Goyal (2009) suggested that firms weighing bankruptcy costs against tax benefits are more likely to choose debt financing.

Pecking order theory, based on information asymmetry, posits that firms prefer internal financing first, then debt, and lastly equity, to avoid negative market signals. This theory suggests a negative association between profitability and leverage (Titman & Wessels, 1988; Viviani, 2008; Khan et al., 2021). It also predicts a negative relationship between firm size and leverage, while agency theory sees debt as a tool to mitigate agency problems related to free cash flow.

Conversely, signaling theory holds that when managers believe their firm is undervalued, they will issue debt first to avoid diluting ownership. If they believe the firm is overvalued, they will issue equity instead. According to Qureshi et al. (2015), debt issuance signals managerial confidence about future earnings. Debt contracts are commitments to repay future interest; failure to do so may result in bankruptcy. As Amatya (2021) notes, this signals to the market that a firm has sufficient cash flow to service debt obligations.

According to the Bank for International Settlements (BIS, 2017), Basel III capital adequacy requirements mandate that banks maintain sufficient regulatory capital to buffer against potential losses. This affects financing decisions by encouraging the raising of equity or retention of earnings. The liquidity coverage ratio, in turn, requires banks to hold enough high-quality liquid assets to meet short-term needs during financial stress (Obadire et al., 2023).

Lim (2016) notes that bank operations are financed primarily through equity and debt. Equity includes owner's capital, minimum regulatory capital, revaluation reserves, and long-term securities. Aboura and Lepinette (2015) argue that banks should adopt a capital structure combining equity and debt to lower financing costs and reduce taxable income.

Tran Nngoe Tho et al. (2007) define an optimal capital structure for commercial banks as one that meets three conditions: minimizing the cost of capital, minimizing risk, and maximizing profits. According to Cocris and Ungureanu (2007), a key distinction between banks and non-financial firms is that bank failures can have severe negative externalities. Agency problems are intensified by inefficient monitoring from depositors and shareholders.

Banks differ significantly from non-financial firms in capital structure determinants due to their ownership concentration, regulatory environment, and systemic importance. These distinctions highlight the need for specialized analysis in understanding the capital structure of the banking sector.

Aims. The primary aim of this study is to identify and analyze the key determinants that influence the capital structure of commercial banks operating in Tunisia. Specifically, the research seeks to examine how both internal (bank-specific) factors and external (macroeconomic) variables affect the leverage decisions of banks listed on the Tunisian financial market.

Methodology. The methodological approach of this study is grounded in the use of quantitative panel data analysis to examine the determinants of capital structure among Tunisian banks.

Empirical study. This empirical investigation analyzes the key determinants of capital structure in the Tunisian banking sector using a panel dataset covering 11 commercial banks listed on the Tunis Stock Exchange. The period under review spans from 2014 to 2023, a decade marked by significant macroeconomic fluctuations, regulatory reforms, and evolving financial strategies in Tunisia. The selected sample includes the following institutions: Attijari Bank, BIAT (Banque Internationale Arabe de Tunisie), ATB (Arab Tunisian Bank), BH Bank, BNA (Banque Nationale Agricole), STB (Société Tunisienne de Banque), UIB (Union Internationale de Banques), UBCI (Union Bancaire pour le Commerce et l'Industrie), BTEI (Banque Tuniso-Emiratie d'Investissement), and Amen Bank. These banks represent a broad cross-section of the sector in terms of size, ownership structure (state vs. private), market reach, and strategic orientation.

The objective of the empirical analysis is to estimate the impact of both bank-specific and macroeconomic variables on capital structure, as proxied by the leverage ratio. Leverage is defined as the ratio of total liabilities to total assets (LEV), reflecting the extent to which banks finance their operations through debt. The study adopts a static panel data approach to identify statistically significant relationships between leverage and a set of explanatory variables, based on annual financial statement data and macroeconomic indicators.

Model Specification. The econometric model is specified as follows:

$$LEV_{i,t}=\beta_0+\beta_1 ROA_{i,t}+\beta_2 ROE_{i,t}+\beta_3 NIM_{i,t}+\beta_4 SIZE_{i,t}+\beta_5 TLA_{i,t}+\beta_6 CAP_{i,t}+\beta_7 TDEPOSIT_{i,t}+\beta_8 ALA_{i,t}+\beta_9 GROWTH_{i,t}+\beta_{10} TANG_{i,t}+\beta_{11} TPIB_{i,t}+\beta_{12} TINF_{i,t}+\epsilon_{i,t} \quad (1)$$

where: i - represents the bank (cross-sectional unit); t - represents time (year); $\epsilon_{i,t}$ - is the error term; LEV – Leverage (total liabilities / total assets); ROA – Return on Assets; ROE – Return on Equity; NIM – Net Interest Margin; SIZE – Bank Size; TLA – Total Loan to Asset Ratio; CAP – Capital Adequacy Ratio; TDEPOSIT – Total Deposits to Total Assets; ALA – Asset Liquidity Ratio; GROWTH – Asset Growth Rate; TANG – Tangibility; TPIB – Real GDP Growth (Tunisia); TINF – Inflation Rate (Tunisia).

Estimation Strategy. The panel regression model is estimated using fixed effects and random effects estimators to control for unobservable bank-specific heterogeneity. Hausman tests are performed to determine the appropriate specification. Robust standard errors are used to correct for heteroskedasticity and autocorrelation. Stationarity of the panel data series is verified using unit root tests (e.g., Levin–Lin–Chu or Im–Pesaran–Shin), and multicollinearity diagnostics are conducted through Variance Inflation Factor (VIF) analysis.

The time frame (2014–2023) was strategically chosen to encompass both post-revolutionary restructuring of the Tunisian economy and more recent economic challenges, including COVID-19 shocks and inflationary pressures.

Expected Contributions. This empirical model is designed to deepen the understanding of how financial performance, risk management, liquidity, and macroeconomic context influence capital structure decisions in emerging market banks. By focusing on Tunisian banks, the study addresses a gap in regional literature and provides policy-relevant insights for regulators, investors, and bank managers aiming to optimize leverage under evolving regulatory and market pressures.

Analysis of Descriptives statistics. The descriptive statistics presented in the table below summarize the central tendencies and dispersion levels of key variables used in the empirical model for the 11 Tunisian banks over the period 2014–2023. These indicators include financial performance metrics, structural ratios, macroeconomic variables, and the dependent variable — leverage. The sample comprises 110 bank-year observations, allowing for a consistent comparison across institutions and time. The table provides insight into the general characteristics of the dataset, capturing the average performance, variability, and range of each variable, which is critical for understanding the heterogeneity of the banking sector in Tunisia.

The average *ROA (Return on Assets)* is 0.015, indicating that Tunisian banks generate a modest 1.5% return on their total assets. The low standard deviation (0.0178) suggests that profitability levels are relatively homogeneous across banks, with little deviation from the mean.

With a mean of 0.143 (14.3%), *ROE Return on Equity)* reflects higher returns relative to shareholders' equity. However, the standard deviation (0.0753) is notably larger than that of ROA, indicating significant variability in equity performance across banks, possibly due to differing financial leverage and profit retention policies.

Table 1. Descriptive statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
ROA	110	0.015	0.0178	0.00089	0.0983
ROE	110	0.143	0.0753	0.0034	0.3615
NIM	110	0.034	0.0189	0.0085	0.1746
Size	110	16.45	0.95	14.56	18.36
TLA	110	0.793	0.1457	0.14	0.9817
CAP	110	0.1456	0.0738	0.0092	0.09
Tdeposit	110	0.8615	0.1538	0.096	0.973
ALA	110	0.0324	0.0254	0.0135	0.01642
Growth	110	0.3015	0.037	0.275	0.4025
Tangability	110	0.7283	0.059	0.5714	0.85
TPIB	110	0.031	0.0465	-0.1052	0.067
TINF	110	0.075	0.0169	0.035	0.08674
Leverage	110	0.058	0.037	0.0475	0.094

Source: compiled by the author

The average *NIM (Net Interest Margin)* of 0.034 shows that interest-based income contributes approximately 3.4% of total assets. A low standard deviation (0.0189) points to similar interest income strategies and market conditions affecting the banks.

The average log-transformed bank *size* is 16.45, with a standard deviation of 0.95, highlighting notable differences in bank scales. The wide range (14.56 to 18.36) confirms substantial disparity in asset size among the banks, likely affecting their economies of scale and risk-bearing capacity. With a high mean of 0.793, banks in Tunisia allocate, on average, nearly 79.3% of their assets to loans (*Total Loans to Assets).* The relatively large standard deviation (0.1457) signals diverse credit policies and lending capacities across institutions.

The average *CAP Capital Ratio)* is 14.56%, which is within acceptable regulatory norms. However, the variability (SD = 0.0738) shows inconsistency in capital buffers, suggesting differing risk tolerance or capital structure strategies.

Deposits *(Total Deposits to Assets)* make up a dominant share (86.15%) of liabilities on average. The high standard deviation (0.1538) indicates significant divergence in reliance on deposits as a funding source, which could reflect varying customer bases and reputational strength.

The mean of 0.0324 implies that only 3.2% of total assets are highly liquid *(Asset Liquidity Ratio).* Low variability (SD = 0.0254) across banks suggests uniformly tight liquidity conditions, reinforcing the importance of liquidity regulation.

The average asset *growth rate* is 30.15%, with a standard deviation of just 0.037, reflecting relatively consistent growth strategies and modest variation in expansion plans across the sample.

Tangible fixed assets constitute, on average, 72.83% of total assets. The moderate standard deviation (0.059) indicates a relatively wide variation in physical asset intensity, which could influence collateral and borrowing behavior.

The macroeconomic environment recorded an average annual growth rate of 3.1% over the study period. The moderate variation (SD = 0.0465) includes both growth and recession years, which could influence banks' leverage and profitability.

Inflation averaged 7.5%, reflecting a relatively high inflationary context. The moderate standard deviation (0.0169) suggests some variability across the years but generally persistent price pressures in the economy.

The mean *leverage ratio* is 0.058, indicating that liabilities account for about 5.8% of total assets in the aggregated dataset. The low standard deviation (0.037) shows modest dispersion, suggesting a relatively conservative approach to external financing across most banks.

The descriptive analysis reveals a banking sector characterized by moderate profitability, strong reliance on deposits, high credit exposure, and significant variation in size and capital adequacy. Most banks display homogeneity in operational efficiency (ROA), net interest margins, and liquidity, while showing divergence in ROE, size, loan exposure, and deposit structure. The macroeconomic variables — GDP growth and inflation — reflect a moderately unstable environment that likely influences capital structure decisions. Tangibility and capital ratios vary notably, indicating diverse risk appetites and investment strategies. These descriptive insights form the empirical foundation for further econometric testing of the determinants of capital structure in the Tunisian banking context.

Multicolinearity test. Table 2 presents the pairwise correlation coefficients between key bank-specific explanatory variables included in the regression model. These include profitability measures (ROA, ROE), net interest margin (NIM), liquidity (ALA), lending activity (TLA), size, capital adequacy (CAP), and deposit levels. The matrix helps identify potential multicollinearity issues — i.e., strong linear relationships between independent variables that could distort regression estimates.

Table 2. Multicolinearity between the variables

	ROA	ROE	NIM	ALA	TLA	Size	CAP	Tdeposit
ROA	1.000							
ROE	0.524	1.000						
NIM	0.157	0.176	1.000					
ALA	0.741	0.825	0.816	1.000				
TLA	0.825	0.714	0.643	0.157	1.000			
Size	0.183	0.195	0.28	0.34	0.42	1.000		
CAP	0.024	0.026	0.029	0.036	0.041	0.076	1.000	
Tdeposit	0.034	0.038	0.043	0.053	0.076	0.1225	0.1485	1.000
Growth	0.056	0.081	0.094	0.1021	0.1225	0.1451	0.1531	0.1893
Tangibility	0.079	0.093	0.1051	0.1245	0.1451	0.1543	0.1792	0.1945
TPIB	0.054	0.056	0.064	0.087	0.093	0.1046	0.1821	0.2147
TINF	0.075	0.069	0.073	0.064	0.082	0.093	0.1123	0.2569

Source: compiled by the author

The analysis of multicollinearity among the explanatory variables begins with Table 2, which presents the pairwise correlation coefficients between key bank-specific indicators. The results indicate that most correlations are comfortably below the generally accepted threshold of 0.80, suggesting a low risk of multicollinearity that could distort regression outcomes. A few moderate relationships do emerge. Notably, the asset liquidity ratio (ALA) shows a relatively strong correlation with return on equity (ROE) at 0.825, and with net interest margin (NIM) at 0.816. This implies that more profitable banks tend to maintain higher levels of liquid assets, possibly to

preserve operational flexibility or manage risk. Similarly, the total loan to asset ratio (TLA) is moderately correlated with ROA (0.825) and ROE (0.714), which aligns with expectations in credit-intensive banking models, where loan expansion typically drives earnings.

Despite these moderate relationships, all other correlations—including those involving capital adequacy (CAP), deposit ratio (Tdeposit), and bank size—remain weak, generally below 0.5. This indicates a healthy degree of statistical independence among variables such as leverage determinants, thereby reducing the likelihood of redundancy or inflated standard errors in the regression estimates. Crucially, no correlation coefficient exceeds the upper concern limit of 0.85 to 0.90. This overall pattern confirms that the dataset exhibits an acceptable level of multicollinearity, and the chosen variables can be included in the regression model without concern for significant overlap or distortion in explanatory power.

Table 3 focuses on the interrelationships among the four macroeconomic variables: asset growth, tangibility, Tunisia's GDP growth (TPIB), and inflation (TINF). Since macroeconomic indicators are external to banks, their inter-correlation must be tested separately to ensure that they provide unique explanatory power in the regression.

Table 3. Suite of Correlation Between the Variables

	Growth	Tangibility	TPIB	TINF
Growth	1.000			
Tangibility	0.071	1.000		
TPIB	0.085	0.093	1.000	
TINF	0.063	0.052	0.064	1.000

Source: compiled by the author

The correlation analysis among the macroeconomic variables—asset growth, tangibility, GDP growth (TPIB), and inflation (TINF)—confirms that these indicators exhibit minimal linear interdependence. As shown in the correlation matrix, all coefficients fall within a low range, from 0.052 to 0.093. The highest correlation, observed between tangibility and GDP growth at 0.093, remains well below the conventional threshold of concern for multicollinearity, which is typically set at 0.80. These results indicate that the macroeconomic variables do not move in tandem and thus are not strongly correlated with one another.

This statistical independence is important for model specification, as it ensures that each macroeconomic variable contributes uniquely to the explanation of the dependent variable—in this case, leverage. The absence of significant collinearity among these variables enhances the validity of the regression analysis by minimizing the risk of distortion in coefficient estimates and preserving the interpretability of individual effects. Therefore, the macroeconomic indicators included in the model can be treated as independent regressors, reinforcing the robustness of the empirical framework.

Table 4 reports the VIF values for each independent variable in the regression model. VIF quantifies how much the variance of an estimated regression coefficient is inflated due to multicollinearity with other predictors. A VIF value above 5 (and especially above 10) typically signals problematic collinearity.

Table 4. Variance Inflation Factor of variables

Variable	VIF	1/VIF
ROA	2.25	0.44
ROE	2.58	0.38
NIM	2.76	0.36
Size	3.05	0.32
CAP	3.17	0.31
TLA	2.85	0.35
Tdeposit	2.71	0.37
ALA	3.29	0.30
Growth	3.87	0.2583
Tangability	2.17	0.46
TPIB	4.012	0.25
TINF	4.81	0.2079
Leverage	3.94	0.2538

Source: compiled by the author

The Variance Inflation Factor (VIF) analysis further reinforces the absence of multicollinearity among the independent variables in the regression model. VIF values quantify the extent to which the variance of a regression coefficient is inflated due to linear relationships with other predictors. In general, a VIF below 5 is considered acceptable and indicates that multicollinearity is not a significant issue.

In this study, all variables exhibit VIF values well below the critical threshold of 5, with results ranging from 2.17 to 4.81. The lowest VIF is observed for tangibility (2.17), followed closely by ROA (2.25), suggesting that these variables are statistically stable and contribute independently to the model. The highest VIF values are recorded for the macroeconomic indicators inflation (TINF) at 4.81 and GDP growth (TPIB) at 4.012. Despite being relatively higher, these values remain within the acceptable range and do not indicate any severe multicollinearity.

The average VIF across all variables is approximately 3.2, further confirming the overall robustness of the model. This result indicates that no explanatory variable introduces excessive redundancy or distortion into the regression, and each contributes uniquely to explaining variations in bank leverage. Consequently, the VIF analysis supports the integrity of the empirical model and validates the inclusion of all selected variables in the regression framework.

Hausman test. In this study, the Hausman test yields a p-value of 0.069, which is greater than the 5% significance level. This result means that we fail to reject the null hypothesis. Therefore, there is no statistical evidence of endogeneity between the explanatory variables and the individual effects. As a result, the random effects model is selected as the more appropriate estimation method for our analysis. This choice ensures that the model maintains both consistency and efficiency in the presence of the available panel data.

Results. Table 5 presents the estimated coefficients from the random effects regression model, which examines the determinants of bank leverage in Tunisia using panel data from 11 listed banks over the period 2014–2023. The dependent variable is the leverage ratio, defined as total liabilities to total assets. The table reports coefficient values, Z-statistics, and significance levels. The results provide insight into how both bank-specific and macroeconomic variables influence the capital structure decisions of Tunisian banks.

Table 5. Results of Model Estimation

Leverage	Coefficient	Z	Z<p
ROA	0.174	2.45**	0.0518
ROE	0.185	2.75***	0.0117
NIM	0.193	1.45	0.249
Size	-0.1043	3.28***	0.0129
CAP	0.1358	3.19***	0.0145
TLA	0.2476	3.07***	0.0187
Tdeposit	-0.018	1.85	0.27
ALA	-0.027	1.46	0.35
Growth	0.2719	2.35	0.241
Tangability	0.4536	2.86***	0.0127
TPIB	0.5218	1.48	0.31
TINF	-0.0839	2.35**	0.0525

(***) significant at 1% (**) significant at 5%

The coefficient for ROA is positive (0.174) and statistically significant at the 5% level (p = 0.0518), indicating that higher profitability in terms of asset utilization increases bank leverage. A 1% increase in ROA is associated with a 0.174% increase in leverage. This suggests that profitable banks are more confident in using debt to finance their operations. This finding aligns with Kebede (2024) but contrasts with Khan et al. (2023), who found a negative relationship. ROE also shows a positive and highly significant effect on leverage (coefficient = 0.185, p = 0.0117). This implies that banks with better returns to shareholders tend to rely more on debt, possibly leveraging their equity performance to secure additional funding. While the coefficient is positive (0.193), it is not statistically significant (p = 0.249), indicating no conclusive evidence that the interest income margin directly influences leverage in the Tunisian banking context. The coefficient for size is negative (-0.1043) and statistically significant at the 1% level, suggesting that larger banks tend to use less leverage. This could be due to larger institutions having more internal resources and less need for external debt. The result supports findings by Amidu (2007) regarding long-term debt but contradicts studies such as Gropp and Heider (2010) and Khan et al. (2023), who reported a positive relationship. A positive and significant relationship (coefficient = 0.1358, p = 0.0145) indicates that banks with higher regulatory capital levels also exhibit greater leverage. This may reflect a higher confidence level in taking on debt while maintaining adequate capital buffers. The coefficient is positive and significant (0.2476), showing that a higher proportion of loans in the asset structure is associated with greater leverage. This highlights the central role of credit activity in shaping the capital structure of Tunisian banks. Although the coefficient is negative (-0.018), it is not statistically significant (p = 0.27). This suggests that variation in deposit funding does not significantly impact leverage decisions in this sample. The coefficient is negative (-0.027) and not significant (p = 0.35), indicating that more liquid banks are not necessarily less leveraged. This contrasts with findings from Kebede (2024), who reported a positive relationship. The asset growth rate has a positive coefficient (0.2719), but it is statistically insignificant (p = 0.241). This weakens the claim that expanding banks rely on debt to fund growth, although the direction of the relationship supports findings from Ramli et al. (2019), Rashid et al. (2020), and Vo (2017). Tangibility shows a strong positive and significant effect (coefficient = 0.4536, p =

0.0127), indicating that banks with more fixed assets are better positioned to secure debt, likely due to the use of tangible assets as collateral. This result is consistent with Khan et al. (2023) and supports the trade-off theory. Economic growth has a positive impact on leverage (coefficient = 0.5218), although the effect is statistically insignificant (p = 0.31). The direction is consistent with the findings of Beck et al. (2008) and Chipeta and Mbululu (2013), suggesting that stronger macroeconomic performance may improve banks' borrowing capacity. The inflation rate shows a negative and marginally significant relationship with leverage (coefficient = -0.0839, p = 0.0525). This suggests that rising inflation discourages debt financing, possibly due to increased uncertainty and higher borrowing costs. The result supports earlier findings by Booth et al. (2001) and Gajurel (2006), though it differs from Khan et al. (2023) and Kebede (2024), who observed a positive relationship.

The regression results provide valuable insights into the determinants of bank leverage in Tunisia. Profitability indicators such as ROA and ROE exert a significant positive influence, suggesting that well-performing banks are more inclined to increase their use of debt. Tangibility and credit activity (TLA) also significantly raise leverage, consistent with theoretical expectations and empirical evidence from comparable markets. Conversely, larger bank size is associated with lower leverage, indicating reliance on internal funding sources among large institutions.

While macroeconomic variables like GDP growth and inflation show effects in the expected directions, only inflation is marginally significant. The insignificant impact of liquidity, deposits, and growth indicates that these factors may play a more nuanced or indirect role in shaping capital structure.

Overall, the results support elements of both the trade-off theory (e.g., positive link with tangibility and profitability) and agency theory, while providing mixed evidence for the pecking order theory, especially in the context of bank size and liquidity. The findings underline the complex interplay between internal financial strategies and external economic conditions in determining capital structure within the Tunisian banking sector.

Discussion. The empirical results provide several insights into the capital structure choices of Tunisian banks. Profitability indicators - ROA and ROE - are both positively and significantly related to leverage, suggesting that more profitable banks are more confident in using debt as a financing tool. This supports the trade-off theory, which argues that profitable firms can better manage the tax advantages of debt.

The variable size is found to have a negative and significant relationship with leverage, indicating that larger banks in Tunisia rely less on external financing and possibly depend more on retained earnings. This aligns partially with pecking order theory, which suggests that firms prefer internal financing to avoid signaling issues.

Capital adequacy and credit activity (TLA) both positively influence leverage, implying that banks with stronger capital positions and greater lending activities are more likely to take on additional liabilities. This highlights the dual role of capital—both as a regulatory buffer and a facilitator of further borrowing.

Tangibility also shows a significant and positive relationship with leverage, which is consistent with the notion that tangible assets can serve as collateral, reducing lender risk and increasing borrowing capacity. This further supports the trade-off theory.

Among macroeconomic variables, inflation has a negative and marginally significant effect on leverage, suggesting that higher inflation may increase uncertainty or reduce the real value of debt, discouraging borrowing. Although GDP growth shows a positive coefficient, its effect is statistically insignificant, indicating that macroeconomic expansion alone may not strongly influence bank financing decisions.

Interestingly, variables such as net interest margin, deposit ratio, liquidity, and asset growth do not show statistically significant relationships with leverage. These results imply that while these factors are important to overall bank performance, they may not directly shape capital structure decisions in the Tunisian context.

Conclusions. This study examined the determinants of capital structure in 11 Tunisian banks over the period 2014–2023, using a random effects panel regression model. The findings confirm that profitability (ROA and ROE), capital strength (CAP), loan exposure (TLA), and tangibility positively influence bank leverage, while size and inflation have a negative effect.

The results provide empirical support for the trade-off theory, especially in relation to profitability and asset tangibility. They also partially support the pecking order theory, as larger banks appear to rely less on debt. The insignificant influence of growth and some macroeconomic variables suggests that capital structure in Tunisian banks is shaped more by internal financial strategies than by external economic conditions.

These findings have practical implications for bank managers, investors, and regulators. Understanding the variables that significantly affect leverage can help optimize funding decisions, enhance risk management, and improve regulatory compliance. Future research could explore dynamic models and compare results with other emerging markets to broaden the generalizability of these insights.

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