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Determinants of capital structure in the banking sector: Empirical evidence from Jordan and Saudi Arabia

Abdullah Ewayed Twairesh[1*], Ayoub Alsarhan[2]

[1]*Department of finance and insurance, College of Business Administration, Northern Border University, ARAR, Saudi Arabia.*
[2]*Dept of Information Technology, Faculty of Information Technology, The Hashemite University, Zarqa, Jordan.*

Corresponding author: Abdullah Ewayed Twairesh (*Email: Abdullah.twairesh@nbu.edu.sa*)

Abstract

The primary aim of this study is to examine the influence of bank-specific factors on the capital structure decisions of commercial banks in Jordan and Saudi Arabia over the period 2009 to 2023. To achieve this, panel data regression techniques were employed, with the fixed effects model selected based on statistical diagnostic testing. The sample consisted of 12 Jordanian banks and 10 Saudi banks, with data extracted from annual financial statements available on official bank websites, the Amman Stock Exchange, and the Saudi Stock Exchange. The empirical results reveal that asset tangibility and growth opportunities exhibit a positive relationship with the capital structure of Jordanian banks but a negative association in the case of Saudi banks. Profitability was found to exert a positive influence on capital structure across both banking systems. Conversely, risk measured in terms of earnings volatility demonstrated a consistent negative impact on capital structure in both countries. Liquidity showed divergent effects, being negatively associated with capital structure in Jordanian banks and positively associated in Saudi banks. The non-debt tax shield variable negatively influenced capital structure in Jordanian banks but appeared to have no statistically significant effect in Saudi banks. Lastly, bank size was positively related to capital structure in both samples. These findings offer practical implications for bank management in both Jordan and Saudi Arabia. Specifically, financial decision-makers should account for the differential effects of bank-specific variables, particularly risk, profitability, and asset structure, when formulating optimal capital structures. Recognizing the inverse relationship between earnings volatility and leverage can support more informed and resilient financing strategies.

Keywords: Capital structure, Jordanian banks, Profitability, Saudi banks, Tangibility.

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1. Introduction

Capital structure remains a central topic in corporate finance, as it encapsulates the financial strategies managers employ, which directly influence a firm's economic value and long-term viability. Determining an appropriate capital structure is therefore essential for ensuring corporate sustainability and financial health. Contemporary discourse on this subject continues to be shaped by two dominant theoretical frameworks: the trade-off theory, introduced by Modigliani and Miller [1] and the pecking order theory, proposed by Myers and Rajan [2].

The trade-off theory emphasizes the strategic use of debt to reduce corporate tax liabilities through interest deductibility. It suggests that firms should evaluate the relative costs and benefits of debt versus equity financing to determine an optimal capital structure. According to this perspective, increased leverage may enhance firm value and shareholder returns due to the tax shield associated with interest expenses. As a foundational model in capital structure literature, the trade-off theory offers a normative framework aimed at value maximization through careful balancing of financing choices. However, it has been criticized for its limited ability to explain empirical anomalies in capital structure behavior. Although the model assumes that managers systematically weigh the advantages of tax savings against the risks of financial distress, such rational trade-offs are not always evident in real-world decision-making.

The development of pecking order theory, largely attributed to the foundational work of Myers and Majluf [3] and Myers [4], centers on the role of information asymmetry in corporate financing decisions. The theory suggests that firms prioritize internal financing first, followed by debt issuance, and resort to equity financing as a last option due to the higher information costs associated with external equity. Jensen [4] through the free cash flow theory, it is further argued that a firm's value can be influenced by its debt levels, even in the presence of financial distress, as leverage may discipline managerial behavior by limiting discretionary cash flow. More recently, Baker and Wurgler [5] introduced the market timing hypothesis, which posits that firms time the market when deciding between equity and debt financing, issuing equity when market valuations are high and debt when valuations are low. Despite their theoretical contributions, neither the pecking order theory nor the trade-off theory fully accounts for the diverse capital structure patterns observed across firms and industries.

This study aims to explore the determinants of capital structure decisions among banks in Saudi Arabia and Jordan, two economies characterized by relatively underdeveloped capital markets, where the banking sector plays a dominant role in financial intermediation. The rationale for this investigation arises from the inconclusive findings of previous research on this topic (e.g., [6-8]) as well as the ongoing financial sector reforms in both countries aimed at enhancing economic development through greater financial liberalization. Accordingly, this study makes several contributions to capital structure literature. First, it provides new empirical evidence on the capital structure behavior of banks in Saudi Arabia and Jordan, sectors that have received comparatively limited attention in the context of capital structure research. Second, it examines the influence of key bank-specific variables on financing decisions using a fixed effects panel regression model. Third, the analysis is based on a longitudinal dataset covering a 15-year period and incorporates seven explanatory variables to capture a comprehensive view of the determinants of bank capital structure in these two economies.

To guide the investigation, the study aims to address the following research question: What are the key factors influencing the capital structure decisions of banks operating in Saudi Arabia and Jordan?

The remainder of the paper is organized as follows: Section 2 presents the literature review; Section 3 describes the data sources and research methodology; Section 4 reports and analyzes the empirical findings; and Section 5 concludes with a discussion of the study’s implications and suggestions for future research.

2. Literature Review of Capital Structure Determinants

Extensive research has investigated the determinants of corporate leverage, with particular attention given to firm-specific characteristics such as size, profitability, asset structure, growth prospects, firm age, non-debt tax shields, business risk, and liquidity. In addition, macroeconomic indicators including inflation rates and gross domestic product (GDP) have been shown to influence capital structure decisions, often varying in significance across different national contexts. The global financial crisis also sparked renewed interest in whether the determinants of capital structure have shifted in response to heightened financial uncertainty and regulatory reforms. In line with this body of literature, the present study focuses on seven bank-specific variables to examine their influence on the capital structure decisions of banks.

2.1. Tangibility (TANG)

Firms frequently leverage their asset structure as collateral when securing external financing. As noted by Rashid et al. [10], companies possessing adequate tangible assets that can serve as collateral are more inclined to adopt higher levels of debt financing. The relationship between corporate performance and asset composition has been widely explored in the literature; however, findings remain inconclusive, with studies reporting positive, negative, or no significant associations.

According to the trade-off theory, a positive relationship exists between fixed assets and a firm’s capital structure, as tangible assets enhance a firm’s ability to obtain debt by reducing lender risk. In contrast, the pecking order theory argues that utilizing tangible assets as collateral mitigates information asymmetry, thus influencing firms' financing preferences. Jensen [4] further contributed to this discourse by suggesting that asymmetric information may lead to equity underpricing, and that issuing collateral-backed debt can reduce agency costs by aligning managerial incentives with those of shareholders.

Empirical findings on the role of asset tangibility in shaping capital structure decisions are mixed. Several studies, such as those by Saif-Alyousfi, et al. [9], Panda and Nanda [10] and Setiawan and Yumeng [11] identified a positive association

between tangible assets and leverage in the banking sectors of Malaysia, India, and China. Similarly, Mardani, et al. [12] highlighted the significance of tangibility as a key determinant of capital structure in Indonesia. On the other hand, a number of studies report a negative relationship. For instance, Khan, et al. [7] found that asset tangibility is inversely related to leverage among banks in Saudi Arabia. Bokpin and Arko [13] also observed a negative correlation between asset structure and leverage, while Shibru, et al. [14] reported a similar pattern in Ethiopian commercial banks. Likewise, Sheikh and Qureshi [8] documented a negative association between tangibility and capital structure.
Hypothesis, H1: Tangible assets exert a positive influence on the capital structure of firms.

2.2. Profitability (ROA)

Capital structure theories offer divergent predictions regarding the influence of profitability on firms' financing decisions. Under the trade-off theory, firms with higher pre-tax earnings are expected to increase their use of debt to capitalize on interest tax shields, thereby suggesting a positive relationship between profitability and leverage. In contrast, the pecking order theory, which accounts for information asymmetry, posits that profitable firms prefer to finance investments through retained earnings to avoid sending negative signals to the market. In cases where internal funds are insufficient, debt may be used, while equity issuance is viewed as a last resort. This theoretical perspective implies a negative association between profitability and capital structure.

Additionally, the free cash flow theory suggests that debt financing can act as a disciplinary mechanism, restricting managerial discretion by obligating firms to meet fixed debt repayments. This, in turn, reduces agency conflicts between managers and shareholders by limiting the potential for opportunistic behavior.

Empirical findings largely support the predictions of the pecking order theory. Numerous studies, including those by Alsadan and Kerrouche [15], Setiawan and Yumeng [11], Mardani, et al. [12] and Panda and Nanda [10] have consistently reported a negative relationship between profitability and leverage. These results suggest that firms with higher profitability tend to rely more heavily on internal financing rather than external debt.
Hypothesis, H2: Profitability has a negative effect on capital structure.

2.3. Growth (BGR)

Sales growth is widely recognized as a key determinant of capital structure. Firms experiencing substantial growth often generate the internal funds necessary to support future investments in productive assets, which are critical for sustaining long-term profitability. Within the framework of trade-off theory, firms characterized by high growth potential, often in the form of intangible assets, are expected to rely less on debt financing compared to firms that possess substantial tangible assets, which can be pledged as collateral.

The pecking order theory and agency theory both predict a negative relationship between growth opportunities and leverage. From the pecking order perspective, growing firms prefer internal financing to avoid the costs associated with asymmetric information and adverse market signaling. Similarly, agency theory suggests that firms may limit debt issuance to retain greater flexibility for exploiting future investment opportunities without incurring agency costs linked to debt.

As with other determinants of capital structure, empirical evidence on the relationship between growth and leverage is mixed. Studies such as those by Vo [16], Rashid, et al. [17], Khan, et al. [7] and Chen [18] have identified a positive relationship, indicating that firms anticipating growth tend to increase their leverage. Conversely, research by Al-Hunnayan [6], Sheikh and Qureshi [8] and De Jong, et al. [19] reports a negative association, arguing that firms with substantial growth prospects prefer to maintain lower debt ratios to preserve financing capacity for future investments. In line with this, Shibru, et al. [14] also found a negative, though statistically insignificant, correlation between growth and leverage.
Hypothesis, H3: Growth opportunities have a negative effect on capital structure.

2.4. Earning Volatility (RSK)

Empirical research suggests that as earnings volatility increases, firms tend to reduce their reliance on debt in pursuit of an optimal capital structure. Both trade-off theory and pecking order theory support the notion of a negative association between earnings variability and leverage. According to the trade-off theory, firms with stable earnings are better positioned to service debt, making them more inclined to use leverage. Conversely, companies with unstable or volatile earnings may avoid debt financing due to the heightened risk of financial distress. In line with the pecking order theory, firms experiencing unpredictable cash flows are more likely to rely on internal financing to avoid the potential costs and risks associated with external funding. As Fama and French [20] observed, "firms with more volatile net cash flows are likely to exhibit lower dividend distributions and reduced leverage," reinforcing the argument that earnings volatility discourages debt financing.

Building on the implications of earnings volatility on capital structure, it is essential to consider how security and cognitive wireless networks intersect with corporate financial decision-making, particularly in technologically driven industries. Firms operating in sectors reliant on advanced wireless communication, such as cognitive wireless networks, face distinct challenges related to both operational uncertainty and cybersecurity threats. The dynamic spectrum access and decentralized architecture of cognitive wireless systems introduce risks that can exacerbate earnings volatility due to potential service disruptions, data breaches, Alqura'n, et al. [21], Aljaidi, et al. [22], Alsarhan and Agarwal [23] and Hussain, et al. [24], or compliance failures. As a result, companies in these environments may adopt more conservative financial strategies, reducing reliance on debt to maintain financial flexibility amid operational uncertainty. From a theoretical standpoint, both the trade-off and pecking order theories remain applicable, as firms adjust their leverage in response to the additional variability and security challenges associated with these emerging technologies. Therefore, the

integration of security considerations [25, 26] within cognitive wireless networks [23] further amplifies the cautious approach firms take toward external financing under volatile earnings conditions.

Despite the theoretical expectations, empirical studies present conflicting findings. For instance, Khan, et al. [7] reported a positive relationship between earnings volatility and leverage in Saudi Arabia's banking sector. Similar results were found by Ghasemi and Ab Razak [27] in Jordanian service firms and [8] in Saudi conventional banks. Chen [18] noted no statistically significant relationship between earnings volatility and leverage. On the other hand, Albayrak [28] and Friend and Lang [29] provided evidence of a negative association, aligning with theoretical predictions that firms with greater earnings instability maintain lower leverage levels to reduce the likelihood of financial distress.

Hypothesis, H4: Risk (Earnings Variability) has a negative effect on capital structure.

2.5. Liquidity (LIQ)

Liquidity serves as a crucial indicator of a firm's ability to meet its short-term obligations and reflects the efficiency with which management handles current assets. According to both the pecking order theory and the liquidity preference theory, firms with greater cash reserves tend to rely less on external financing, especially debt, opting instead to fund operations internally. This suggests a negative relationship between liquidity and leverage, as companies with strong liquidity positions are less dependent on debt to finance their activities.

However, contrasting views exist in the literature. Some argue that highly liquid firms may actually take on more debt due to their enhanced ability to service it, thereby reducing the perceived risk to lenders [30]. This perspective challenges the assumptions of the pecking order theory by proposing a positive relationship between liquidity and capital structure.

Better understanding and reconciling the conflicting perspectives on the relationship between liquidity and leverage, researchers are increasingly turning to machine learning techniques to predict firm behavior [31] based on financial indicators. By analyzing large datasets, machine learning models can uncover complex, non-linear patterns and interactions between liquidity, leverage, and other variables that traditional econometric models may overlook. These predictive models offer valuable insights into how firms with varying liquidity profiles are likely to structure their capital, helping to clarify whether high liquidity leads to increased or decreased debt usage under different economic and industry conditions.

Empirical findings on the relationship between liquidity and capital structure remain inconclusive across different economic and institutional contexts. For example, studies by Widjanarko, et al. [32], Suhardjo, et al. [33], Bernard, et al. [34] and Güner [35] report a negative association between liquidity and leverage. In contrast, Kaur, et al. [36], Rani, et al. [37] and Ghasemi and Ab Razak [27] found a positive relationship. Meanwhile, Laili and Dalimunthe [38] concluded that liquidity does not significantly influence capital structure decisions.

Hypothesis, H5: Liquidity has a negative effect on capital structure.

2.6. Non-Debt Tax Shield (NDA)

The trade-off theory posits an inverse relationship between non-debt tax shields and capital structure. DeAngelo and Masulis [39] argued that the presence of non-debt tax benefits, such as depreciation and amortization, can constrain a firm's capacity to utilize debt-related tax advantages. Firms with substantial non-debt tax shields are less reliant on interest-related tax deductions, thereby reducing the necessity to incur additional debt to gain fiscal benefits. These tax shields serve as alternative mechanisms to optimize the capital structure without increasing financial leverage. According to Ghasemi and Ab Razak [28], such mechanisms enhance financial stability by mitigating exposure to external debt and associated risks. While some empirical studies (e.g., [40-42]) have reported a positive association between non-debt tax shields and leverage, others (e.g., [43-47]) have found a negative correlation, supporting the notion that firms may substitute debt financing with non-debt tax advantages.

H_6: Non-debt tax shields exert a negative influence on capital structure.

2.7. Size

According to the trade-off theory, larger firms typically possess greater access to external financing and, consequently, tend to maintain higher debt ratios. Their extensive operations facilitate diversification, thereby reducing exposure to financial distress. In this context, firm size is often viewed as a negative predictor of bankruptcy risk. Conversely, the pecking order theory posits that larger firms, due to their capacity to generate sufficient internal funds, are more inclined to finance investments internally, leading to a negative relationship between firm size and leverage [48]. From the perspective of agency theory [4] and transaction cost economics [49], large firms often resort to debt financing as a mechanism to mitigate agency problems and control transaction costs. The presence of external creditors and the contractual obligations associated with debt can serve as disciplinary tools, aligning managerial interests with those of stakeholders.

Empirical studies on the relationship between firm size and capital structure have yielded mixed results. Amidu [50] reported a positive association between firm size and both total and short-term debt, with no significant link to long-term debt. Similarly, Khan, et al. [7] in their analysis of major banks in the United States and Europe, identified a positive relationship between firm size and leverage. Supporting this view, Shibru, et al. [14] and Sheikh and Qureshi [8] observed a positive correlation between bank size and debt levels in various banking contexts. Padrón, et al. [30] also emphasized the significance of firm size as a determinant of financing decisions. Furthermore, Setiawan and Yumeng [11] found that firm size significantly influenced leverage in Chinese construction firms. However, contrary findings have also been reported. For example, Titman and Wessels [51] documented a negative relationship between firm size and short-term debt, while Abdeljawad, et al. [52] identified an inverse correlation between firm size and leverage in the context of firms operating in Palestine and Jordan.

$H_{7:}$ Bank size positively influences capital structure.

3. Methodology

3.1. Data and Sample

This study investigates the principal factors shaping capital structure decisions in the banking sectors of Jordan and Saudi Arabia. The analysis utilizes secondary data drawn from the audited financial statements, specifically balance sheets and income statements of twelve Jordanian banks and ten Saudi banks. Supplementary data were obtained from institutional and regulatory bodies, including the Saudi Stock Exchange, the Central Bank of Saudi Arabia, the Amman Stock Exchange, and the Central Bank of Jordan (CBJ), as well as from peer-reviewed journals, academic publications, and prior empirical research.

The study covers a fifteen-year period (2009–2023), utilizing a balanced panel dataset to ensure consistency over time and robustness in analyzing financial behavior. The complete dataset includes 330 bank-year observations, with 180 from Jordanian banks and 150 from Saudi banks. Inclusion in the sample was based on a bank's listing on its respective national stock exchange, thereby ensuring data reliability, accessibility, and cross-country comparability.

3.2. Research Methodology

The study explored the capital structure determinants of banks in Jordan and Saudi Arabia, employing a panel regression analysis:

$$LEV = \alpha\, i + \beta 1 TANGit + \beta 2 ROAit + \beta 3 BGRit + \beta 4 RSKit + \beta 5 LIQit + \beta 6 NDAit + \beta 7 SIZEi + \varepsilon it \quad (1)$$

Where:

LEV i, t represents the leverage measure calculated by dividing total debt by total assets of bank i in year t.

TANG i,t: is the tangibility calculated by dividing fixed assets by total assets of bank i in year t.

ROA i,t refers to Return on assets calculated by earnings before interest and tax divided by total assets of bank i in year t.

BGR i,t refers to growth calculated by (Assets of year n + 1 – Assets of year n) / Assets of year n) of bank i in year t.

RSK i,t represents business risk calculated by (Net profit or loss of the year n + 1 – Net profit or loss of the year n) /Net profit or loss of the year n) of bank i in year t.

LIQ i,t: is the bank's liquidity derived from the Cash and bank deposits divided by the total assets of bank i in year t

NDA i,t: is derived from the depreciation divided by the total assets of bank i in year t.

SIZE i,t: is the natural logarithm of the total assets of bank i in year t.

In this study, panel data analysis is employed due to its ability to capture both cross-sectional and time-series variations, offering a robust analytical framework for examining temporal and inter-unit dynamics. The application of panel data is justified when the Lagrange Multiplier (LM) test indicates statistical significance, signifying the presence of time-specific effects that make pooled Ordinary Least Squares (OLS) estimation less suitable. Additionally, the Hausman test serves as a diagnostic tool to distinguish between fixed and random effects models. As discussed in Abdeljawad, et al. [52] a statistically significant Hausman test result favors the adoption of a fixed effects model. Based on the findings of this test, the fixed effects specification is utilized in this study, indicating its superiority over the random effects alternative.

4. Results

4.1. Descriptive Statistics

Table 1 presents a summary of the descriptive statistics for all variables included in the study. The average leverage ratio for Jordanian banks was 86.3%, with a relatively low standard deviation of 0.026, indicating limited variability. In comparison, Saudi banks exhibited a slightly lower mean leverage of 84.3%, accompanied by a higher standard deviation of 0.113, suggesting greater dispersion in debt levels.

With respect to asset tangibility, Jordanian banks reported a mean of 1.8% and a standard deviation of 0.008, whereas Saudi banks had a higher average tangibility of 3.1% and a standard deviation of 0.016. Profitability also showed a marked difference between the two countries: Jordanian banks reported a mean profitability of 1.1% (SD = 0.005), while Saudi banks demonstrated a higher mean of 3.2% with greater variability (SD = 0.056).

In terms of bank growth, the mean growth rate was 11.8% for Jordanian banks (SD = 1.209), closely followed by Saudi banks at 11.7% (SD = 0.629). Risk levels differed substantially, with Jordanian banks exhibiting a mean risk of 4.8% and a standard deviation of 0.360, while Saudi banks recorded a higher mean risk of 8.3% and greater variability (SD = 0.468).

Liquidity indicators revealed that Jordanian banks had an average liquidity ratio of 11.4%, with a standard deviation of 0.044, compared to a lower average of 8.6% and a standard deviation of 0.032 for Saudi banks. Regarding non-debt tax shields, the mean values were closely aligned between the two banking systems: 0.002 for Jordanian banks and 0.003 for Saudi banks, with corresponding standard deviations of 0.001 and 0.003, respectively.

Lastly, in terms of bank size, Saudi banks exhibited a higher average (9.419%) compared to Jordanian banks (8.170%), along with a greater degree of variability, indicating broader dispersion in institutional size within the Saudi banking sector.

Table 1.
Characteristics of Jordanian and Saudi Banks.

Stat.		LEV	TANG	ROA	BGR	RSK	LIG	NDA	SIZE
Mean	Jordanian banks	0.863	0.018	0.011	0.118	0.048	0.114	0.002	8.170
	Saudi Arabia banks	0.843	0.031	0.032	0.107	0.083	0.086	0.003	9.419
Max.	Jordanian banks	0.927	0.038	0.025	15.934	0.958	0.243	0.005	9.016
	Saudi Arabia banks	1.642	0.119	0.433	7.006	4.039	0.210	0.013	10.743
Min.	Jordanian banks	0.806	0.005	0.001	-0.948	-0.950	0.038	0.001	7.238
	Saudi Arabia banks	0.098	0.011	0.003	-0.983	-0.909	0.021	0.000	8.786
S.D.	Jordanian banks	0.026	0.008	0.005	1.209	0.360	0.044	0.001	0.339
	Saudi Arabia banks	0.113	0.016	0.056	0.629	0.468	0.032	0.003	0.408
Obs.	Jordanian banks	180	180	180	180	180	180	180	180
	Saudi Arabia banks	150	150	150	150	150	150	150	150

4.2. Correlation

Table 2 reports the correlation coefficients among the independent variables included in the analysis. The assessment of these correlations was conducted to verify the absence of multicollinearity, which can distort regression estimates and reduce the reliability of inferential statistics. As per the guideline proposed by Tabachnick and Fidell [53] multicollinearity becomes a concern when correlation coefficients exceed 0.80.

For Jordanian banks, the highest observed correlation was 0.511, recorded between liquidity and bank size. This value remains well below the critical threshold, indicating no significant multicollinearity concerns among the explanatory variables. Similarly, for Saudi Arabian banks, the highest correlation was found between asset tangibility and bank risk, with a coefficient of 0.334. This low level of association further confirms that multicollinearity is not a concern in the dataset. Overall, the correlation diagnostics suggest that the independent variables can be reliably included in the regression models without compromising the validity of the results.

Table 2.
Coefficients of correlation between independent variables.

Jordanian banks							
Variables	**TANG**	**ROA**	**BGR**	**RSK**	**LIG**	**NDA**	**SIZE**
TANG	1.000						
ROA	-0.152	1.000					
BGR	-0.092	-0.024	1.000				
RSK	0.014	0.132	0.073	1.000			
LIG	-0.366	0.100	0.108	0.024	1.000		
NDA	0.289	-0.033	-0.113	-0.054	-0.138	1.000	
SIZE	-0.439	-0.052	0.195	0.124	0.571	-0.269	1.000
Saudi Arabia banks							
Variables	TANG	ROA	BGR	RSK	LIG	NDA	SIZE
TANG	1.000						
ROA	-0.056	1.000					
BGR	-0.027	0.103	1.000				
RSK	0.334	-0.046	0.050	1.000			
LIG	-0.192	0.258	-0.092	-0.001	1.000		
NDA	0.060	0.192	-0.185	-0.052	-0.017	1.000	
SIZE	-0.037	-0.376	0.246	0.031	0.030	-0.438	1.000

4.3. Unit Roots Test

To verify whether data series are integrated, we ran the Levin, et al. [54] unit root test developed by Levin, et al. [54]. Table 3, presents the results of unit root tests for all seven independent variables, which are statistically significant at first difference. Therefore, these variables do not exhibit a unit root. Consequently, all independent variables are, in fact, stationary.

Table 3.
Results of the Levin, Lin & Chu unit root test.

Levin, Lin & Chu of Jordanian banks				
Indep. Vari	**Level**		**First difference**	
	Stat.	**Prob.**	**Stat.**	**Prob.**
TANG	-4.386	0.000	-2.366	0.009
ROA	-2.033	0.021	-6.933	0.000
BGR	3.27	0.001	3.132	0.000
RSK	-3.579	0.000	-6.337	0.000
LIG	-0.743	0.228	-2.685	0.003
NDA	-0.699	0.110	-2.576	0.000
SIZE	-1.766	0.058	-3.025	0.002
Levin, Lin & Chu of Saudi Arabian banks				
Indep. Vari.	**Level**		**First difference**	
	Stat.	Prob.	Stat.	Prob.
TANG	-5.981	0.000	-3.908	0.000
ROA	-5.397	0.000	-4.892	0.000
BGR	1.832	0.967	-4.458	0.000
RSK	-3.298	0.001	-5.684	0.000
LIG	-1.468	0.071	-03.522	0.000
NDA	-4.824	0.000	-7.999	0.000
SIZE	-1.648	0.050	-9.707	0.000

4.4. Regression Results

Table 4 reports the results of the fixed effects model applied to examine the determinants of capital structure for banks operating in Jordan and Saudi Arabia over the period 2009–2023. The selection of the fixed effects model is based on the results of the Lagrange Multiplier (LM) and Hausman tests, also shown in Table 4. The LM test confirms that the random effects model is superior to the pooled OLS model. However, the Hausman test indicates that the fixed effects model is more appropriate than the random effects model, suggesting that unobserved heterogeneity across banks is correlated with the explanatory variables. This finding implies that firm-specific characteristics exert a systematic influence on capital structure decisions, justifying the use of fixed effects estimation.

The adjusted R-squared values are 0.83 for Jordanian banks and 0.65 for Saudi banks, indicating that the explanatory variables account for 83% and 65% of the variation in leverage, respectively. The model includes seven explanatory variables hypothesized to influence banks' capital structure.

Regarding asset tangibility, the findings show no significant effect on the leverage of Jordanian banks. This is consistent with Ghasemi and Ab Razak [27] who found no relationship between tangibility and leverage in Jordanian service firms. In contrast, for Saudi banks, tangibility has a negative and statistically significant effect at the 5% level. This aligns with Khan, et al. [7] but contradicts the results of Alsadan and Kerrouche [15], Setiawan and Yumeng [11] and Panda and Nanda [10] who reported a positive and significant relationship. The implication is that Saudi banks may adopt a more conservative approach in utilizing tangible assets to secure debt, consistent with the pecking order theory, whereas Jordanian banks do not heavily rely on collateralized borrowing, challenging traditional capital structure theories such as the trade-off and agency theories.

Profitability exhibits a positive and statistically significant relationship with leverage for both banking systems (coefficients: 0.313 for Jordan and 0.410 for Saudi Arabia). This contradicts the pecking order theory, which posits an inverse relationship, as profitable firms are expected to prefer internal financing over debt. However, the results corroborate findings by Al-Hunnayan [6], Abdeljawad, et al. [52], Rani, et al. [37] and Shah, et al. [55] who observed a positive association between profitability and leverage.

Bank growth (BGR) has a negative and statistically significant influence on capital structure at the 1% level for Jordanian banks and at the 10% level for Saudi banks. The respective coefficients are −0.002 and −0.028, suggesting that a 1% increase in growth corresponds to a 0.2% and 2.8% decline in leverage for Jordanian and Saudi banks. These results align with the trade-off and pecking order theories, which argue that growing firms face higher agency and insolvency costs, leading them to limit external debt usage. The findings are consistent with the original analysis Sheikh and Qureshi [8] and Rajan and Zingales [56] but contradict Setiawan and Yumeng [11] and Saif-Alyousfi et al. [11], who reported a positive relationship between growth and leverage.

Earnings volatility (risk) has a negative but statistically insignificant impact on capital structure in both countries. This suggests that profit variability does not significantly influence leverage decisions. This outcome is consistent with Chen [18] but contrasts with Alipour et al. [58], who reported a significant negative effect. Furthermore, the result contradicts [8], who identified a positive effect of earnings volatility on leverage.

Liquidity is found to have divergent effects. For Jordanian banks, liquidity has a negative and statistically significant effect on leverage (coefficient = -0.076, $p < 0.05$). This implies that banks with greater liquidity tend to rely less on external debt, consistent with the pecking order theory and the findings of El-Diftar [57]. In contrast, for Saudi banks, liquidity

positively and significantly influences leverage, consistent with Daeli et al. [60], who suggest that higher liquidity enables banks to assume more debt. This contradicts [58, 59], who found no relationship.

The non-debt tax shield (NDA), measured via depreciation, is statistically insignificant for both Jordanian ($t = -1.148$, $p = 0.253$) and Saudi banks ($t = 1.259$, $p = 0.221$). These findings imply that NDA does not significantly affect capital structure decisions, contradicting prior research by Luthfi, et al. [60] who reported a positive association.

Finally, bank size demonstrates a positive and statistically significant effect on leverage in both contexts, with coefficients of 0.165 for Jordan and 0.219 for Saudi Arabia. Larger banks appear to have greater access to debt financing due to lower default risk and enhanced creditworthiness, as supported by the trade-off theory. These findings are consistent with those of Yousef [61], Singh [62], Chatterjee and Eyigungor [63] and Bashir [64] who argue that size is a key determinant of capital structure due to economies of scale and diversified operations that mitigate risk.

Table 4.
Fixed Model Test Result.

Dependent variable: Leverage						
Indep. Var.	**Jordanian banks**			**Saudi Arabian banks**		
	Coeff.	**t-stat.**	**Prob.**	**Coeff.**	**t-stat.**	**Prob.**
C	-0.679	-5.528	0.000	-1.016	-1.527	0.129
TANG	0.325	1.171	0.244	-1.302	-2.105**	0.037
ROA	0.313	2.035*	0.073	0.410	1.901*	0.074
BGR	0.002	-2.988***	0.003	-0.028	-1.861*	0.065
RSK	- 0.001	0.288	0.174	-0.005	-0.245	0.117
LIG	-0.076	-2.418**	0.017	1.157	2.937***	0.004
NDA	-2.082	-1.148	0.253	5.269	1.259	0.211
SIZE	0.165	12.832***	0.000	0.219	2.708***	0.008
Adj. *R*2	0.80			0.65		
F-stat.	23.415			18.702		
Prob(F-stat.)	0.000			0.000		
Lagrange multiplier test	162.32			145.41		
Prob. (Lagrange multiplier test)	0.000			0.000		
Hausman test Chi-square	12.24			13.45		
Prob (Hausman test)	0.034			0.042		
No. of observe.	180			150		
Cross-section included	12			10		

5. Conclusions

This study examined the influence of bank-specific factors on the capital structure of commercial banks in Jordan and Saudi Arabia. The analysis utilized secondary data from 12 Jordanian banks and 10 Saudi banks listed on the Amman Stock Exchange and the Saudi Stock Exchange (Tadawul), covering the period from 2009 to 2023. The empirical investigation employed panel data techniques, with the fixed effects model identified as the most appropriate estimation method based on diagnostic tests. Data were collected from banks' audited annual reports, official publications of the Amman Stock Exchange and Tadawul, as well as statistical releases from the Central Bank of Jordan and the Central Bank of Saudi Arabia.

The empirical findings indicate that asset tangibility and bank growth are positively associated with the capital structure of Jordanian banks, while they exhibit a negative relationship in the case of Saudi banks. Profitability was found to exert a positive influence on capital structure in both countries. Conversely, risk (measured by earnings volatility) negatively affects the capital structure of both Jordanian and Saudi banks. Liquidity demonstrates a negative impact on leverage among Jordanian banks, whereas it shows a positive relationship for Saudi banks. The non-debt tax shield is negatively associated with leverage in Jordanian banks but appears to have no significant effect in the Saudi context. Lastly, bank size is positively related to capital structure in both banking sectors, suggesting that larger institutions have greater access to debt financing.

5.1. Theoretical and Managerial Implications

The study contributes significantly to the literature on capital structure by providing a deeper understanding of how bank-specific variables impact the capital structure decisions of Jordanian and Saudi banks. Based on the study's results, we introduce some recommendations that have important research and policy implications.

Bank managers of Jordanian and Saudi banks should consider the inverse association between earnings volatility and capital structure when financing their operations. Additionally, banks with higher earnings volatility need to adopt a conservative capital structure policy and rely on retained earnings to avoid insolvency.

Bank managers of Jordanian and Saudi banks should create an optimal capital structure based on bank-specific variables that significantly impact banks' capital structure.

5.2. Limitations of the Study

Our study has some limitations:

1. The study relied on bank-specific variables as determinants of the capital structure of Jordanian and Saudi banks.
2. Generalizing the study's findings is challenging since it was restricted to Jordanian and Saudi banks.

5.3. Further Investigation Is Required

Future research may analyze the impact of macroeconomic variables, such as gross domestic product (GDP) and inflation, on capital structure decisions.

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