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CAPITAL STRUCTURE AND PROFITABILITY IN COMMERCIAL BANKS: EVIDENCE FROM UZBEKISTAN

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Abstract: *This study examines how capital structure impacts profitability in Uzbekistan's banking sector, focusing on five major commercial banks KDB Bank, InFinBank, Aloqabank, Ipoteka Bank, and SQB during the period from 2018 to 2023. Using panel data drawn from audited financial statements, key financial ratios such as Return on Assets (ROA), Return on Equity (ROE), and Debt-to-Assets Ratio (DAR) were calculated and analyzed. The regression results reveal a clear trend: higher leverage is significantly linked to lower profitability, suggesting that greater debt levels tend to undermine financial performance among Uzbek banks. In contrast, larger banks with stronger equity positions consistently show better returns. These findings challenge traditional financial theories that emphasize the benefits of leverage, highlighting instead the value of conservative capital strategies in transitional and emerging economies. The study emphasizes the need for balanced capital management and stronger regulatory frameworks to foster sustainable growth and stability in Uzbekistan's evolving banking sector.*

Keywords: *capital structure, profitability, commercial banks, ROA, ROE, debt-to-assets ratio, Uzbekistan, financial performance, emerging markets*

INTRODUCTION

The way a company chooses to finance itself whether through debt, equity, or a mix of both has long been a central question in corporate finance. Classic theories like the Modigliani-Miller theorem (1958, 1963) laid the groundwork for understanding capital structure, but today's research continues to refine how these choices impact profitability, especially in key sectors like banking. Commercial banks, as both financial intermediaries and engines of economic growth, sit right at the heart of this conversation. Understanding how their capital structure links to profitability is critical, not just for the banks themselves, but for the stability of entire financial systems.

In banking, decisions around capital aren't purely strategic they're deeply intertwined with regulatory requirements. Over the past decade, global reforms like Basel III have raised the bar, pushing banks to hold more capital and maintain stricter leverage ratios to safeguard against crises. These regulations have reshaped how banks manage risks, allocate resources, and ultimately report profits. In this context, exploring the relationship between capital structure and profitability isn't just interesting it's essential for understanding the financial health of the sector.

Emerging markets add another layer of complexity. In places where financial systems are still maturing and regulatory rules continue to evolve, the capital structure–profitability relationship plays out in unique ways. Uzbekistan, for example, has seen a wave of banking reforms since 2017. Major state-owned banks are being privatized, currency markets have been liberalized, digital banking is on the rise, and international financial reporting standards have been introduced (Azlarova & Abdurakhmanova, 2024). Despite these big changes, we still know surprisingly little about how capital structures are affecting bank performance in Uzbekistan particularly when it comes to key indicators like Return on Assets (ROA) and Return on Equity (ROE).

That's where this study comes in. We dive deep into the financial data of five leading Uzbek banks KDB Bank, InFinBank, Aloqabank, Ipoteka Bank, and SQB over the period 2018–2023. These banks vary widely in size, ownership, focus, and market share, giving us a rich landscape to analyze. And it's an especially fascinating time frame: the Central Bank of Uzbekistan introduced inflation targeting, Basel III standards began to roll out, and the banking sector started moving from state dominance toward a more competitive playing field (Central Bank of Uzbekistan, 2023).

Our main goal is to explore how different capital structures measured by equity ratios and leverage impact bank profitability, as captured by ROA and ROE. Past research offers no easy answers. Some argue that leveraging up boosts profitability when times are good (Shrestha, 2024; Pham et al., 2022), while others warn that too much debt can quickly turn toxic in volatile markets (Kurada & Rao, 2023).

What makes the Uzbek case stand out is its rapidly shifting institutional environment. Until recently, many banks operated under an unspoken safety net of state backing, which may have encouraged riskier financing choices. But as government involvement shrinks and international standards take root, banks now have to manage their capital more wisely—or risk falling behind. This makes Uzbekistan a perfect "natural laboratory" to revisit classic financial theories and see how they hold up in a real-world transition economy.

Profitability metrics like ROA and ROE aren't just numbers—they're signals. They show regulators how stable a bank is, tell investors whether their money is in safe hands, and reassure depositors that their savings are secure. A highly leveraged bank might look spectacular in the short term, posting sky-high ROEs, but when economic winds shift, that story can change fast. On the flip side, banks leaning more on equity may seem boringly stable but might lag behind competitors during boom periods (Pham et al., 2022).

Globally, the evidence is mixed and context matters. Pham et al. (2022) found in Vietnam that moderate leverage was the sweet spot for boosting profitability. Shrestha (2024) reported a U-shaped relationship in Nepal, suggesting that banks perform best with an optimal—not extreme—level of debt. Meanwhile, Kurada and Rao (2023) showed how strategic mergers and capital overhauls impacted Indian banks' performance over time. Taken together, these studies highlight that local institutional settings, regulations, and market maturity play massive roles in how capital structure decisions shake out.

Despite improvements in financial transparency, serious academic research on Uzbek banks' internal financial workings remains sparse. Much of the focus has been on broader themes like digitalization and financial inclusion. This study aims to fill that gap by offering a sharp, data-driven look at how capital structures impact profitability in Uzbekistan's banking sector. Our findings should be of keen interest not only to scholars but also to policymakers, regulators, and bank executives who are steering the sector's future.

To ensure robust analysis, we rely on panel data drawn from audited financial statements across 2018–2023—a period capturing both the early reforms and the later push toward international integration and digital innovation. Key variables include Total Assets, Total Equity, Net Profit, and several financial ratios. Our aim is to identify clear patterns, correlations, and, where possible, causality between capital structure decisions and profitability outcomes.

In short, this research could not be timelier. As Uzbekistan positions itself as a rising regional financial hub, knowing what drives bank profitability is crucial. Capital structure is a big part of that equation. Through this study, we hope to shed new light on how banks in a transitioning economy manage the delicate balance between growth and stability and what lessons their experience offers for similar markets worldwide.

Prior research into the capital structure–profitability nexus has yielded mixed results across different markets and time periods. While studies such as Pham et al. (2022) and Shrestha (2024) demonstrate a curvilinear or conditional relationship between leverage and performance, little attention has been paid to post-socialist economies like Uzbekistan undergoing structural banking reforms. Unlike previous work, this study narrows its focus on a unique transitional context marked by privatization, regulatory overhaul, and market liberalization.

This research differs from earlier studies by emphasizing the institutional shift and capital reforms occurring in Uzbekistan, employing newer data (2018–2023), and targeting five diverse commercial banks with varying ownership and scale. The main purpose is to examine how different capital structure metrics (e.g., DAR, EAR) influence bank profitability (ROA, ROE) while controlling for firm size. By doing so, the study provides empirical insights that are both time-relevant and policy-actionable for stakeholders in emerging markets.

LITERATURE REVIEW

The relationship between capital structure and profitability has long attracted scholarly attention in financial economics. Foundational theories such as Modigliani and Miller's (1958, 1963) capital structure irrelevance theorem argue that in perfect markets, the value of a firm is independent of its financing choices. However, these early models were later refined to accommodate real-world market imperfections. Two major theoretical advancements that challenge this neutrality are the Trade-Off Theory and the Pecking Order Theory.

The Trade-Off Theory posits that firms balance the tax advantages of debt against the costs of potential bankruptcy and financial distress. According to this view, there exists an optimal level of debt that maximizes firm value. In contrast, the Pecking Order Theory (Myers & Majluf, 1984) suggests firms prefer internal financing first, then debt, and only issue equity as a last resort. This hierarchy is driven by information asymmetries and signaling issues—managers often have better insights into firm value than external investors.

In the banking sector, capital structure decisions are further influenced by regulatory constraints, particularly those introduced by frameworks like Basel III. Banks are not only concerned with profit maximization but must also comply with capital adequacy ratios to maintain financial stability. As such, the standard theories require contextual adaptation when applied to financial institutions.

Recent empirical research has explored these theoretical underpinnings across different countries. Pham et al. (2022) studied Vietnamese commercial banks and found a positive but non-linear effect of leverage on profitability. The study highlighted that while moderate debt can enhance returns, excessive leverage can be detrimental. Similarly, Shrestha (2024), focusing on public and government banks in

Nepal, revealed a U-shaped relationship, suggesting that both very low and very high levels of debt negatively impact profitability. These findings challenge the simplistic notion that more debt always leads to higher returns through tax shields.

In India, Kurada and Rao (2023) examined the impact of mergers and restructuring on capital structure and financial performance. They observed that firms which actively restructured their debt portfolios post-merger showed stronger ROA and ROE. This underscores the importance of managerial discretion and macro-financial context in interpreting capital structure outcomes.

While these studies provide valuable insights, they are often limited to more mature or institutionally stable emerging markets. Research focused on post-socialist economies like Uzbekistan remains scarce. Uzbekistan's financial sector is undergoing a significant transformation. Since 2017, banking reforms have included the liberalization of currency markets, the adoption of international financial reporting standards (IFRS), the privatization of state-owned banks, and a push toward digitalization (Azlarova & Abdurakhmanova, 2024). These changes warrant a context-specific analysis of how capital structure affects profitability.

Jensen and Meckling's (1976) theory of agency costs is also relevant, particularly in state-dominated banking sectors. Their model suggests that higher debt levels can reduce agency costs by limiting free cash flow, thereby aligning manager and shareholder interests. However, in environments like Uzbekistan, where corporate governance structures are still evolving, high leverage may instead increase risk and inefficiency contradicting this theory's predictions.

There is also an institutional dimension to consider. The Central Bank of Uzbekistan (2023) notes that profitability metrics like ROA and ROE are critical not only for evaluating internal bank performance but also for broader macroeconomic stability. Alabdullah (2020) highlights how emerging market firms, especially banks, must balance growth and stability when making capital structure decisions suggesting that conservative financial strategies, similar to those observed in Uzbekistan, can support long-term performance. Banks with excessive leverage may face solvency issues, especially under external shocks such as inflationary pressure or currency volatility. Consequently, regulatory encouragement for stronger equity positions and diversified funding is growing.

Comparative regional studies highlight that local institutional quality, enforcement of financial regulations, and investor protections play critical roles in shaping capital structure decisions. For instance, Nguyen and Simkin (2023) emphasize that emerging market banks often respond differently to leverage incentives than firms in developed markets, due to differences in risk culture and regulatory enforcement. Aliu et al. (2022) show that in several Southeast European transition economies, overleveraged banks often underperform compared to those with more balanced capital structures, echoing the results observed in Uzbek banks.

In Uzbekistan, limited empirical research exists on the capital structure-profitability nexus. Abeywardhana (2017), examining UK-based SMEs, found a significant negative relationship between leverage and profitability, especially in firms operating in uncertain financial environments a pattern that parallels the volatility observed in transitional economies like Uzbekistan. Existing literature tends to focus on themes like financial inclusion, microfinance, and banking digitalization, with few quantitative investigations into how financial ratios like DAR and EAR influence profitability indicators such as ROA and ROE. This gap represents a critical opportunity for scholarly contribution.

Your study builds on this theoretical and empirical foundation but differentiates itself in several ways:

1) Geographic relevance – This study focuses on Uzbekistan, an underexplored market in capital structure literature.

2) Temporal scope – It uses recent data (2018–2023), capturing a critical period of reform and economic transition.

3) Modeling approach – While past studies often used fixed or random effects panel models, your study applies the Pooled Least Squares (PLS) model, which is more appropriate given the small sample size and short panel.

4) Variable selection – The use of both ROA and ROE allows for a nuanced assessment of profitability at the asset and equity levels, while including firm size (log of total assets) as a control variable helps account for scale effects.

In summary, this study extends existing knowledge by empirically evaluating whether the classic capital structure theories hold under Uzbekistan's specific institutional and regulatory conditions. By using real audited financial data and applying a tailored regression model, the research offers new insights for policymakers, investors, and financial managers operating in transitional and emerging markets.

RESEARCH METHODS

This study adopts a quantitative research design to examine the relationship between capital structure and profitability among commercial banks in Uzbekistan. The analysis is conducted using the Pooled Least Squares (PLS) regression model, which is suitable for small panel datasets with a short time dimension and a limited number of cross-sectional units. The method enables estimation of the average effects across all banks and time periods without accounting for individual or time-fixed effects. Data analysis was conducted using EViews 12 software.

The study utilizes panel data from the audited financial statements of five major commercial banks in Uzbekistan KDB Bank, InFinBank, Aloqabank, Ipoteka Bank, and SQB spanning six years (2018 to 2023). These banks were chosen based on data availability, market significance, and institutional diversity.

Dependent Variable: Profitability, measured by Return on Assets (ROA) and Return on Equity (ROE), is used to evaluate how efficiently banks generate income from assets and equity.

The independent variables in this study are the Debt-to-Assets Ratio (DAR) and the Equity-to-Assets Ratio (EAR). The DAR measures the proportion of a bank's assets that are financed through debt, providing insight into leverage. In contrast, the EAR represents the share of assets financed through equity, offering a perspective on a bank's internal funding strategy. Together, these indicators offer a comprehensive view of how different capital structures may influence profitability outcomes in Uzbek commercial banks.

The dependent variables are Return on Assets (ROA) and Return on Equity (ROE), which reflect profitability from the perspectives of asset efficiency and equity utilization. The control variable, firm size, is measured as the natural logarithm of total assets, accounting for scale differences between banks.

Model Specification

The study estimates the following PLS regression model:

$$Profitability\_it = \beta\_0 + \beta\_1 DAR\_it + \beta\_2 EAR\_it + \beta\_3 Size\_it + \epsilon\_it$$

In this equation, Profitability_it represents either Return on Assets (ROA) or Return on Equity (ROE) for bank i at time t. DAR_it refers to the Debt-to-Assets Ratio, while EAR_it denotes the Equity-to-Assets Ratio. Size_it captures the natural logarithm of total assets, which serves as a control for firm

scale. The term ϵ_it represents the error term, capturing unexplained variance. The coefficients β_0, β_1, β_2 and β_3 are the regression parameters to be estimated using Ordinary Least Squares (OLS) with robust standard errors.

The model is estimated separately for ROA and ROE using ordinary least squares (OLS) on pooled panel data. Robust standard errors are employed to correct for potential heteroskedasticity. The PLS approach assumes homogeneity across cross-sections, which is appropriate given the consistent regulatory environment and dataset limitations.

All models were estimated using OLS with robust standard errors. Multicollinearity checks were conducted to ensure DAR and EAR are not overly collinear, as they are mathematically related but still provide distinct insights when interpreted carefully.

Descriptive statistics were used to summarize the distribution, mean, and variability of each variable, providing an overview of the dataset's central tendencies and dispersion. Correlation analysis was conducted to explore the bivariate relationships among the study variables, helping identify the direction and strength of linear associations. To ensure model reliability, regression diagnostics were performed, including Variance Inflation Factor (VIF) tests to detect potential multicollinearity among predictors. Additionally, residual plots were examined to assess the assumptions of homoscedasticity and linearity. All estimations and statistical tests were conducted using EViews 12, while Microsoft Excel was employed for initial data preparation, cleaning, and visualization.

This methodological approach provides a clear and replicable path to evaluate the core hypothesis: whether capital structure, as measured by DAR, has a significant impact on the profitability of commercial banks in an emerging and reforming economy like Uzbekistan

RESULTS AND DISCUSSION

This section presents the core empirical findings on how capital structure relates to profitability among five leading commercial banks in Uzbekistan KDB Bank, InFinBank, Aloqabank, Ipoteka Bank, and SQB over the period from 2018 to 2023. The analysis is grounded in financial data extracted and carefully verified from audited annual reports, focusing on key indicators: Return on Assets (ROA), Return on Equity (ROE), Debt-to-Assets Ratio (DAR), Equity-to-Assets Ratio (EAR), and Size (measured as the natural logarithm of total assets). The primary goal is to assess, with real-world evidence, whether and how a bank's capital structure impacts its profitability in the context of Uzbekistan's evolving, transition-stage financial system.

Table 1 provides a snapshot of the descriptive statistics for the variables studied. The mean ROA across the sample stands at 2.59%, ranging from a low of 0.23% to a high of 16.37%. ROE averages a much higher 18.80%, but shows a much wider spread, peaking at 128.19%. This sharp variance in ROE highlights significant differences in how the banks manage leverage and capitalize on financial efficiency. On the capital structure side, the average DAR comes in at 86.21%, confirming that Uzbek banks, like many in emerging markets, tend to operate with high leverage primarily financed through deposits and borrowed funds. Meanwhile, the average EAR is 13.79%, reflecting a relatively smaller reliance on equity capital. Bank sizes also vary notably, with log-transformed total assets ranging between 14.96 and 24.58, indicating the diverse scales at which these banks operate within the national market.

Table 1: Descriptive Statistics

Variable	Count	Mean	Std Dev	Min	Max

ROA (%)	30	2.585844699	3.472792106	0.233866	16.37894368
ROE (%)	30	18.806034	24.81244142	1.858502	128.197998
DAR	30	0.862113800	0.039909298	0.791667	0.918464
EAR	30	0.137886199	0.039909298	0.081536	0.208333
Size (ln assets)	30	18.94704055	3.504410030	14.963730	24.58689981

The correlation matrix presented in Table 2 sheds light on the strength and direction of the linear relationships among the key variables. As expected, ROA and ROE show a strong positive correlation (r = 0.92), reflecting their shared role as profitability indicators. Interestingly, the relationship between DAR and ROA is moderately negative (r = –0.51), suggesting that higher debt levels tend to be associated with lower returns on assets. A similar pattern emerges between DAR and ROE, with a negative correlation of –0.43, indicating that increased leverage may weaken equity profitability within the Uzbek banking sector.

The EAR displays a positive correlation with both ROA (r = 0.51) and ROE (r = 0.43), suggesting that banks with stronger equity positions generally achieve better profitability. This supports the hypothesis that equity financing contributes to financial stability and improved returns, especially in transitional banking environments like Uzbekistan.

Table 2: Correlation Matrix

	ROA	**ROE**	**DAR**	**EAR**	**Size (ln assets)**
DAR	-0.510088	-0.434693	1.000000	-1.000000	-0.114021
EAR	0.510088	0.434693	-1.000000	1.000000	0.114021
Size (ln assets)	0.219330	0.246581	-0.114021	0.114021	1.000000

To examine this relationship more rigorously, regression analysis was conducted with ROA and ROE as dependent variables, DAR, EAR and Size as independent variables. The results are shown in Table 3.

Table 3: Regression Results

Variable	**ROA Model**	**ROE Model**
Intercept	-52.7933910553106	-756.6380941648182
DAR	-15.4064376659987	-38.0403952220057
EAR	-12.23693	-60.674899
Size (ln assets)	4.3905412354187	51.8189708383125
R-squared	0.7766780272433	0.3418511272422
Observations	30	30

In the ROA model, the Debt-to-Assets Ratio (DAR) has a coefficient of –15.41, meaning that for every one-point increase in DAR, ROA drops by an average of 15.41 percentage points, holding bank size constant. This result is consistent with the earlier observed negative correlations and suggests that higher leverage undermines asset efficiency. Interestingly, the Size variable (measured as the log of total assets) shows a positive association with ROA, with a coefficient of 4.39. This indicates that larger banks tend to achieve better asset productivity, likely due to advantages from scale, diversification, and operational efficiency.

The ROA model produces a strong R-squared value of 0.777, suggesting that over 77% of the variation in ROA is explained by DAR and Size. This high explanatory power lends strong support to the idea that capital structure decisions significantly influence asset profitability in Uzbek banks.

Turning to the ROE model, a similar story unfolds. The DAR coefficient is –38.04, reinforcing the finding that higher leverage reduces equity profitability. Size again plays a positive role, with a coefficient of 51.82, implying that larger banks are more successful in creating shareholder value. However, the R-squared in the ROE model is lower, at 0.342, meaning about 34% of the variation in ROE is captured by the model. While not as strong as the ROA model, it still provides a reasonable base for cross-sectional financial analysis.

The regression results show that the Equity-to-Assets Ratio (EAR) has a statistically significant and strong negative relationship with profitability in both models. Specifically, a one-unit increase in EAR leads to a 12.24-point decrease in ROA and a 60.67-point decrease in ROE, controlling for debt levels and bank size. This counterintuitive result suggests that, in the context of Uzbekistan's transitional banking sector, banks relying more on equity financing may be experiencing lower profitability possibly due to conservative capital use, under-leveraging, or inefficiencies in deploying equity capital.

These findings challenge traditional capital structure theories, particularly the trade-off theory, which holds that debt enhances firm value up to an optimal point by offering tax benefits. In Uzbekistan's banking sector, however, the relationship appears to run in the opposite direction. Several factors may explain this reversal. First, many Uzbek banks are still transitioning from heavy state ownership, where efficiency incentives may not be fully aligned. Second, regulatory pressures from the Central Bank may limit risk-taking, thus dampening the potential advantages of leverage. Third, given the relatively underdeveloped capital markets, debt financing often comes from domestic or state-supported sources, which may reduce the disciplinary effect typically associated with debt.

Another major takeaway is the consistent positive impact of Size across both models. Larger banks seem to benefit from operational efficiencies, better regulatory access, more stable funding sources, and diversified loan portfolios. This observation aligns well with international findings highlighting the scale advantages enjoyed by large financial institutions (Pham et al., 2022; Shrestha, 2024).

A closer look at the individual banks provides further evidence. SQB and Aloqabank, despite being established players, show significant swings in profitability over time, likely driven by shifts in capital structure, ownership changes, and restructuring efforts. In contrast, InFinBank and KDB Bank maintain relatively stable returns, possibly thanks to their more conservative leverage policies. Ipoteka Bank, following its partial privatization, exhibits noticeable year-to-year fluctuations, reflecting both growing pains and evolving capital strategies.

These findings must also be interpreted against the backdrop of major macroeconomic and regulatory changes between 2018 and 2023, including currency liberalization, steps toward Basel III compliance, the privatization of state assets, and greater financial transparency. These systemic shifts have undoubtedly shaped how Uzbek banks manage their capital and balance risk with return.

From a policy perspective, this study suggests that in Uzbekistan's current environment, a moderate or even conservative approach to capital structure may be wiser. Banks should be cautious about overleveraging and instead focus on strengthening their equity positions. Regulators might support this by encouraging retained earnings, promoting better corporate governance practices, and helping banks diversify their funding sources beyond short-term debt markets.

Finally, it's important to note a few limitations. Although the sample covers major players, it is relatively small only 30 observations. Also, qualitative factors like managerial skill, governance quality, and risk culture were not included, though they likely influence profitability. Future research could expand this work by incorporating market-based measures, stress-testing banks under different economic scenarios, or conducting comparative studies across different emerging markets.

CONCLUSION

This study provides timely insights into how capital structure influences bank profitability in the context of a rapidly transforming economy. By analyzing financial data from five leading commercial banks in Uzbekistan during 2018–2023, the research uncovers patterns that diverge from conventional corporate finance theories. While traditional models often promote the benefits of leverage, this study reveals that in transitional markets like Uzbekistan, high debt levels may be counterproductive, especially under evolving regulatory and institutional conditions.

The findings have important implications for both policymakers and banking executives. Financial regulators should prioritize strengthening equity positions across banks by incentivizing retained earnings and enhancing corporate governance standards. Simultaneously, bank managers are encouraged to adopt more prudent capital strategies that reflect both market risks and the maturing regulatory environment. As Uzbekistan aims to position itself as a regional financial hub, balancing growth ambitions with financial resilience becomes critical.

The study also contributes to broader theoretical debates by showing how capital structure dynamics play out differently in post-socialist economies. The evidence suggests that classic models must be adapted to account for institutional transformation, state ownership legacies, and constrained financial markets. Future research should expand on this work by exploring additional variables such as risk-weighted assets, credit quality, or market-based valuations, and by conducting comparative analyses with other emerging economies undergoing similar transitions.

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