

INTEREST RATE SPREAD, PROFITABILITY AND THE TRANSITION TO GREEN FINANCE: EVIDENCE FROM KOSOVO'S BANKING SECTOR

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Abstract. This paper empirically investigates the nexus between interest rate spread (IRS) and bank profitability in the Republic of Kosovo, situating the analysis within an evolving banking sector that is increasingly oriented toward sustainable finance. Using sector-level monthly data spanning 2014 to 2024, the study employs regression analysis to assess whether narrowing interest margins constrain bank profitability (measured by Return on Average Assets, ROAA), particularly amid expectations that banks finance green projects and transition toward environmentally sustainable business models. The results reveal a statistically significant negative relationship between IRS and ROAA, indicating that tighter interest spreads pose profitability challenges. These findings contribute to the sustainable banking literature by illuminating potential trade-offs between financial performance and sustainable finance commitments in a transitional economy. The study offers important implications for banks and regulators in Kosovo aiming to balance financial viability with the sector's growing role in green lending, climate-related disclosures and ESG-aligned investment practices.

Keywords: ROAA, ROAE, IRS, loans, deposits.

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1. Introduction

Commercial banks are pivotal financial intermediaries that facilitate economic development through savings mobilization and credit allocation. Their ability to generate income and maintain profitability hinges significantly on the interest rate spread (IRS), the difference between the interest earned on loans and the interest paid on deposits. In developing economies, such as the Republic of Kosovo, where financial markets are still evolving and alternative revenue sources for banks remain limited, net interest income derived from IRS plays a critical role in sustaining banking sector profitability.

Over the past decade, Kosovo's banking sector has demonstrated considerable resilience, maintaining stable levels of profitability despite regional and global economic fluctuations. According to data from the Central Bank of Kosovo (CBK), average return on average assets (ROAA) and return on average equity (ROAE) for commercial banks have remained strong.

This variability raises important questions about the extent to which IRS influences bank profitability in Kosovo. Although a broader body of literature links IRS to bank performance in other regions, empirical studies focused on Kosovo remain scarce. This research aims to fill that gap by systematically examining the relationship between IRS and profitability indicators, ROAA and ROAE, using monthly time series data from January 2014 to December 2024.

Building upon existing theoretical and empirical frameworks, including the dealership model (Ho & Saunders, 1981), the Klein-Monti model (1971) and more recent post-crisis analyses (Abbassi & Schmidt, 2018) this study adopts an econometric approach using STATA to analyze the causal relationship between IRS and profitability. The findings are expected to offer meaningful insights for bank managers, regulators and policymakers as they navigate interest rate dynamics, risk management and sustainable banking practices in a small, open and transitioning financial market (Asani, 2025; Bytyqi et al., 2025).

This paper proceeds as follows: Section 2 provides an extensive literature review focusing on recent studies. Section 3 outlines the research methodology, Section 4 presents the empirical findings and Section 5 concludes with implications and future research directions.

1.1. Research Problem

Despite the growing body of international literature linking interest rate spread (IRS) to bank profitability, the specific dynamics of this relationship remain underexplored in the context of Kosovo's banking sector. Kosovo's economy, characterized by a relatively small and highly concentrated banking industry, presents unique structural features that may affect how IRS impacts key profitability indicators such as return on average assets (ROAA) and return on average equity (ROAE).

While previous studies in countries such as Kenya, Pakistan and various African and European regions have found significant associations between IRS and profitability, there is no consensus on the magnitude or direction of this effect. Some studies highlight a positive correlation, suggesting that wider spreads improve bank margins, while others emphasize the role of credit risk, macroeconomic instability and policy inefficiencies in weakening this relationship.

In Kosovo, banks continue to rely heavily on traditional intermediation for revenue generation and interest-based income remains their principal source of profitability. However, recent developments, including monetary policy shifts in the Eurozone, changing competitive conditions and increasing regulatory pressures, have altered the spread dynamics, raising questions about the continued relevance and sustainability of this revenue model.

The absence of context-specific empirical evidence for Kosovo creates a research gap that this study seeks to fill. By analyzing a decade's worth of monthly sector-level data from 2014 to 2024, this paper investigates whether IRS is a significant determinant of bank profitability in Kosovo. Addressing this research problem is crucial for informing interest rate policy, guiding strategic decision-making within banks and enhancing financial sector resilience in the country.

As banks are increasingly expected to finance the green transition, through sustainable infrastructure, climate-resilient projects and ESG-screened portfolios, profitability remains a key enabler. Compressed interest rate spreads can reduce the financial flexibility of banks, affecting their ability to invest in or price long-term green loans competitively. This study, although focused on traditional profitability drivers, offers insights that can inform the broader discussion on how financial performance intersects with environmental and social mandates in transition economies like Kosovo.

1.2. Research Objectives

The main objective of this research is to evaluate the extent to which interest rate spread (IRS) determines the profitability of commercial banks in Kosovo over the period 2014-2024.

Specific objectives include:

- To analyze the trend and volatility of interest rate spread and bank profitability indicators (ROAA and ROAE) in Kosovo's banking sector.
- To assess the empirical relationship between IRS and bank profitability using regression analysis.
- To determine whether changes in IRS have a statistically significant effect on ROAA and ROAE.
- To contribute to the regional literature by providing context-specific evidence on IRS-profitability dynamics in Kosovo.
- To inform policymakers, financial institutions and researchers on the implications of interest rate management for sustainable banking sector performance.
- To evaluate how profitability constraints induced by narrowing IRS may influence the capacity of banks to support green lending initiatives and sustainable investment portfolios.

1.3. Rationale of the Study

Interest income, derived primarily through the interest rate spread, remains the cornerstone of profitability for banks operating in emerging and transition economies such as Kosovo. In the absence of diversified revenue channels, Kosovan banks are especially vulnerable to shifts in interest rate dynamics, which can have a profound impact on their profitability and long-term stability. Despite this strategic importance, limited empirical research exists examining how IRS influences profitability within this specific economic and institutional context.

This study is timely and relevant for several reasons. First, it fills a critical gap in the empirical literature by focusing on Kosovo, a country whose banking sector has remained underrepresented in international academic discourse. Second, it leverages a comprehensive dataset spanning an entire decade, enabling a robust assessment of both short-term fluctuations and long-term trends in the IRS-profitability relationship. Third, given ongoing monetary policy debates and the tightening of macro-prudential regulations across Europe, insights from this study are likely to have practical implications for banking strategy and policy formulation.

By providing a rigorous econometric analysis of IRS as a determinant of ROAA and ROAE in Kosovo, this study contributes to both theoretical understanding and practical decision-making. It aims to inform regulators, banking professionals and academic researchers concerned with financial intermediation, interest rate policy and sustainable banking practices in transitional economies.

Moreover, as global and regional financial systems shift toward more sustainable and environmentally aligned practices, the capacity of banks to support green lending, ESG-linked instruments and climate-resilient investments depends significantly on stable profitability foundations. By examining how interest rate spreads influence core profitability metrics, this study sheds light on potential financial constraints that may hinder banks' ability to scale up sustainable finance. As such, the findings are not only

relevant for monetary and prudential policy, but also for advancing the green transition in Kosovo's banking sector.

1.4. Limitations of the Study

While this study provides valuable insights into the relationship between interest rate spread and bank profitability in Kosovo, it is subject to several limitations. First, the analysis is conducted using aggregate monthly sector-level data from the Central Bank of Kosovo, which may obscure individual bank-level variations and limit the granularity of the findings.

Second, the study focuses solely on the impact of interest rate spread, without incorporating other internal and external determinants of profitability, such as operational efficiency, market competition, regulatory compliance costs and technological advancements.

Third, macroeconomic shocks and regional developments that may influence interest rates and banking performance are not explicitly controlled for in the model, potentially introducing omitted variable bias. Additionally, due to data availability constraints, the study does not disaggregate interest rate spreads by product type (e.g., consumer loans vs. business loans), which could further refine the analysis. Finally, the use of linear regression models may not fully capture non-linear relationships or dynamic effects over time.

While the study contextualizes its findings within the broader transition toward sustainable finance, it does not incorporate direct indicators of green lending, ESG-related loan portfolios or climate-related financial disclosures. As such, it does not empirically assess how interest rate spread dynamics interact with banks' capacity to support sustainability-aligned investments. Future studies should explore the intersection of profitability and green finance readiness through integrated models that include environmental and social performance metrics.

These limitations suggest avenues for future research, including bank-level panel studies, incorporation of broader macro-financial indicators and application of advanced econometric techniques such as dynamic panel data models and quantile regression approaches.

2. Literature review

The relationship between interest rate spread (IRS) and bank profitability has drawn increased scholarly attention in recent years, particularly as economic conditions and interest rate regimes have evolved globally. A growing body of empirical research highlights that IRS is not only a source of interest income but also a complex variable influenced by credit risk, macroeconomic policy and institutional frameworks.

Building on contemporary empirical evidence, Claessens et al. (2017) investigate how prolonged periods of low interest rates affect banks' interest margins and overall profitability across a wide sample of countries. Their study finds that "low-for-long" interest rate environments tend to compress net interest margins, thereby reducing bank profitability, especially for smaller and less diversified banks. However, they also highlight that banks operating within strong, stable policy frameworks are better able to withstand margin pressures and maintain profitability. These insights are highly relevant for banking sectors in small, open economies, suggesting that prudent monetary and

regulatory policies can mitigate some of the adverse effects of persistent low-rate environments on financial institutions.

Recent findings support the significance of IRS as a key determinant of profitability in both emerging and developed markets. For instance, Jui et al. (2020) investigated the impact of the interest rate spread (IRS) on bank profitability using data from 30 commercial banks in Bangladesh over the period 2014-2018. Their analysis employed three key profitability indicators, Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM). The study found a statistically significant and positive relationship between IRS and bank profitability, indicating that a wider spread tends to enhance financial performance (Jui *et al.*, 2020).

Manu et al. (2021), focusing on African economies, utilized a panel ARDL framework and established long-run relationships between IRS and financial profitability. Their model incorporated macroeconomic controls such as inflation, bank credit and savings. They concluded that inflation and non-performing loans mediate the IRS-profitability link, emphasizing the importance of robust risk management.

Shahin et al. (2022) examined the influence of interest rates on bank profitability and how prudential capital moderates this relationship, using panel data from 22 Egyptian banks between 2011 and 2020. Their findings demonstrate a significant positive association between lending interest rates and profitability indicators such as Return on Assets (ROA) and Net Interest Margin (NIM), implying that low-interest rates can reduce banking sector profits. Additionally, prudential capital, measured through the capital adequacy ratio, not only enhances profitability directly but also mitigates the negative impact of low-interest rates. In particular, banks with higher capital buffers were found to be less adversely affected by a low-rate environment. These insights emphasize the importance of strong capital regulation, especially under frameworks like Basel III, in preserving financial stability and supporting profitability during accommodative monetary policy phases (Shahin *et al.*, 2022).

Cepni et al. (2022) provide an important contribution to the Cepni et al. (2022) investigate the predictive role of interest rate uncertainty on pre-provision net revenues (PPNR) across a large panel of U.S. bank holding companies. Employing a linear dynamic panel model that integrates unobserved heterogeneity and an interest rate uncertainty index developed by Istrefi and Mouabbi (2018), the authors find that models augmented with interest rate uncertainty significantly outperform traditional benchmarks that include macroeconomic variables such as the unemployment rate, federal funds rate and yield spreads. Their analysis reveals that the predictive power of interest rate uncertainty is concentrated in the non-interest component of revenues, which they attribute to banks' increasing reliance on nontraditional revenue-generating activities as a hedge against declining interest margins. The study further shows that under simulated stress scenarios, such as a rise in unemployment and rates, the model effectively anticipates declines in overall revenues. Notably, forecast accuracy depends on the estimator used, with the empirical Bayes predictor yielding the most reliable results. These findings suggest that incorporating interest rate uncertainty into stress-testing models can enhance the predictive performance of non-interest income forecasts and contribute to more effective assessments of banks' capital adequacy (Cepni *et al.*, 2022).

Based on the conclusions of the research titled "Moderation of Interest Rate Policy Towards Banking Profitability", it is evident that interest rate spread plays a significant role in influencing bank profitability. The study concludes that interest rate policy has a positive and significant effect on the profitability of banks, especially in small and

medium-sized banks. A rise in lending rates relative to deposit rates (i.e., a wider interest rate spread) tends to boost profitability, particularly because it enhances the net interest income, which is a key income component for banks. However, in the case of large banks, due to their diversified income sources including non-interest income, the moderating role of interest rate policy is weaker or even negative in some contexts (Nurfadillah *et al.*, 2023).

Ndiritu *et al.* (2024) empirically demonstrated a positive relationship between IRS and profitability in Kenya's banking sector, especially through return on assets (ROA). Their panel data model confirmed that interest margins directly support banks' revenue streams. In a related context, Ishaq *et al.* (2022) highlighted similar findings in Pakistan, where interest spreads were strongly associated with all three profitability indicators, ROA, return on equity (ROE) and earnings per share (EPS).

A study conducted by Quy and Tuan (2024) examined the mediating role of Interest Rate Spread (IRS) in the relationship between bank-specific factors and profitability, measured by Return on Assets (ROA) and Return on Equity (ROE), in 25 Vietnamese commercial banks from 2008 to 2020. Using causal mediation analysis, the results confirmed that IRS significantly mediates the impact of Capital Efficiency (CE), Income Diversification (ID) and Ownership Structure (OWS) on both ROA and ROE. The findings highlight IRS as a key mechanism through which internal bank strategies influence profitability (Quy & Tuan, 2024).

Quantile-based approaches have also enriched the analysis of IRS. Bortoluzzo *et al.* (2024) applied quantile regression to 1,200 banks across 101 countries and found that interest spread impacts are more significant for highly profitable banks than for those at the lower end of the distribution. This non-linearity suggests that IRS plays a differentiated role across the profitability spectrum, influenced by internal efficiencies and external risk profiles.

A recent study by Nuhiu *et al.* (2024) further reinforces the role of macroeconomic conditions in shaping interest rate spreads across the Western Balkans (WB6). Their panel VAR model, covering 110 banks from 2005 to 2022, highlights that GDP per capita and unemployment rate are significant drivers of IRS reductions. The research finds that improved living standards, reflected by rising GDP per capita and declining unemployment, are associated with narrower interest margins.

Recent analyses underscore the nuanced impact of interest rate fluctuations on bank profitability. The International Monetary Fund's Global Financial Stability Report (2025) highlights that while rising interest rates have temporarily widened net interest margins, boosting bank profitability, the trend remains vulnerable to external shocks such as global trade tensions and geopolitical instability. The report emphasizes that banks in smaller, open economies like Kosovo are particularly exposed to such dynamics, where compressed margins and heightened credit risks could undermine financial resilience (International Monetary Fund, 2025).

Together, these studies contribute a comprehensive perspective: while a positive IRS-profitability relationship holds in many cases, its strength, direction and sustainability depend on bank-level characteristics, credit conditions and macroeconomic policies. Therefore, analyzing Kosovo's banking sector with updated empirical methods contributes to a regionally relevant and policy-informative understanding of how IRS functions as a profitability driver.

2.1. Recent Advances: IRS-Profitability in the Green Finance Context

Recent empirical work has extended traditional IRS-profitability analyses to incorporate green lending, demonstrating how sustainable loan portfolios influence interest margins and financial performance. Mirza et al. (2024) examine 2012-2022 data from 20 Eurozone banks and find that exposure to “green and blue” (environmentally beneficial) lending increases interest rate spreads while simultaneously reducing default risk, underscoring a dual profitability and risk-mitigation benefit of sustainable lending. Similarly, in Indonesia, green credit was shown to positively impact bank profitability, particularly among smaller banks, although it did not necessarily improve bank stability (Sutrisno *et al.*, 2024). These findings suggest that ESG-aligned lending strategies may enhance net interest margins and bottom-line results, adding nuance to conventional IRS–profitability frameworks.

Moreover, recent analyses in green banking emphasize that institutional capacity, governance frameworks and data limitations constitute significant barriers to scaling green-transition financing. The Climate Policy Initiative’s 2025 report finds that green banks, specialized institutions aimed at promoting sustainable investment, require robust mandates, strong governance and mission-aligned ecosystems to operate effectively; without such structures, efforts to shift credit toward green sectors often stall (Tandon *et al.*, 2025).

Complementing this, the European Investment Bank’s (2024) working paper on financial sector greening highlights climate-data deficiencies, fragmented regulatory regimes and a lack of standardized ESG reporting in Central and Eastern Europe as critical impediments to banks’ ability to support low-carbon investments. This organizational context is thus central to understanding how IRS dynamics can either enable or limit commercial banks’ strategic reorientation toward green lending.

2.2. Macroeconomic and ESG Drivers of Sustainability in Emerging Markets

On a macroeconomic level, the 2024 G20 Sustainable Finance Report (2024) emphasizes the crucial role of accessible and low-cost finance for emerging markets, noting that tailored financial support is essential to enable climate-aligned investments in developing economies. UNCTAD (2023) documents a sharp rise in national sustainable finance regulations, over 90 new measures since 2023, underscoring an accelerating policy drive toward ESG banking frameworks. At the same time, infrastructure and regulatory constraints, such as the EU’s green asset ratio rules, are slowing capital flows to emerging markets, reinforcing that without aligned macroprudential design, IRS pressures may limit sustainable finance expansion (Hancock, 2024).

2.3. Technology, Data and ESG Integration in Emerging Markets

Technology and data-driven financial approaches are emerging as enablers of sustainable finance. A recent study Faruq and Chowdhury (2025) finds that in developing countries, big data adoption significantly enhances ESG investment, provided inflation remains stable. This insight implies that banks in countries like Kosovo could mitigate IRS-induced profitability constraints by harnessing analytics to identify green investment opportunities that are both efficient and yield-enhancing.

2.4. Trends in Loan Interest Rates in Kosovo's Banking Sector

Between January 2014 and December 2024, the interest rate on loans in Kosovo's banking sector exhibited a significant declining trend. At the beginning of 2014, loan rates were relatively high, standing around 11.70%. Throughout 2014 and 2015, a sharp downward movement was observed, with rates falling to around 7.90% by mid-2015. This downward trend continued steadily into the following years, reaching approximately 6.00% by the end of 2018. Minor fluctuations occurred between 2019 and 2022, but rates remained relatively stable around 6.00%-6.50%, suggesting a period of relative monetary stability and increased competition within the banking sector. By the end of 2024, the interest rate on loans slightly dipped further, closing at 5.90%, reflecting an ongoing easing in loan pricing.

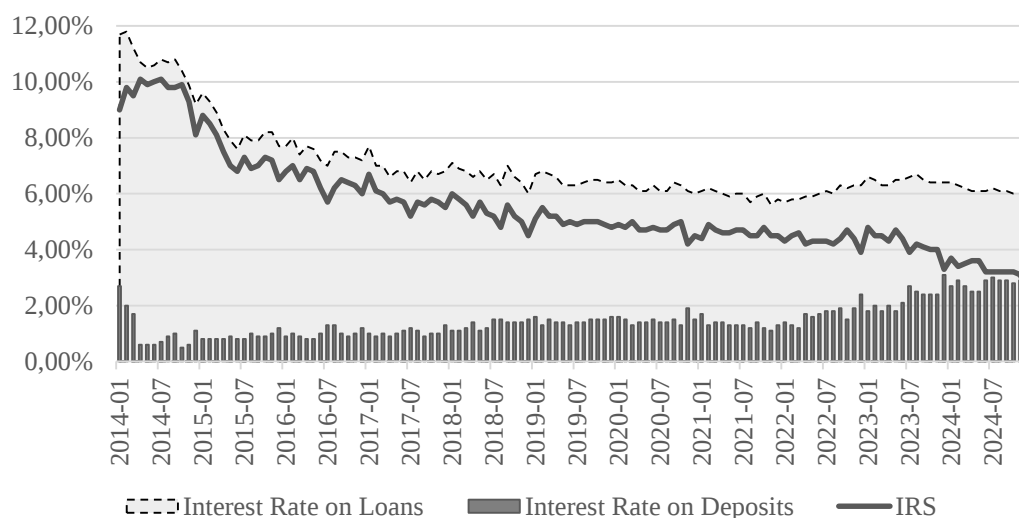


Figure 1. Weighted average interest rate on new loans Jan-2014 - Dec-2024

Source: Data from CBK monthly information report of the financial system and author's calculations

Conversely, the interest rates on deposits followed a more complex and gradual pattern. In early 2014, deposit rates were around 2.70%, but they quickly decreased to under 1.00% during 2015-2017, with the lowest points around 0.50%-0.90%. A modest recovery began in 2018, with rates rising back toward the 1.50% mark. However, a marked upward shift occurred from 2021 onward, aligning with global inflationary pressures and tightening monetary policy. Deposit rates surged significantly, reaching 2.40%-3.40% by the end of 2024. This sharp increase suggests intensified competition among banks to attract liquidity, as well as the banking sector's response to rising interest rates in international markets and regional monetary dynamics.

The interest rate spread (the difference between loan and deposit rates) narrowed substantially over the decade. Early in 2014, spreads exceeded 9 percentage points, but by 2024 the gap reduced to around 2.5-3 percentage points. This convergence indicates increased efficiency, greater competition among banks and possibly tighter regulatory frameworks aimed at fostering better consumer conditions. Nonetheless, the narrowing spread also poses challenges to banking sector profitability, pressing banks to diversify their income sources beyond traditional interest-based earnings.

From January 2014 to December 2024, the data shows a consistent downward trend in the Interest Rate Spread (IRS), declining from around 9-10% to just 2.5%. This

narrowing spread mainly reflects the significant decrease in loan interest rates, while deposit rates have increased slightly, especially after 2022.

Interest rates in the domestic banking sector experienced a gradual decline on loans, influenced by global developments, where most central banks further eased their monetary policies. Meanwhile, banks' need for liquidity and increased interbank competition contributed to higher interest rates on deposits. In December 2024, the average interest rate on loans declined to 5.9% from 6.3% a year earlier. At the same time, heightened interbank competition for attracting deposits contributed to an increase in the deposit interest rate, which rose to 3.4% from 3.1% in the previous year. As a result of the decline in loan interest rates and the increase in deposit interest rates, the interest rate spread between loans and deposits dropped to its lowest level in years, reaching 2.5 percentage points in December 2024, down from 3.2 percentage points in December of the previous year (Central Bank of the Republic of Kosovo, 2025).

Despite the shrinking IRS, banks have managed to maintain a relatively stable Return on Average Assets (ROAA), generally ranging between 2.0% and 2.6% after 2020. However, Return on Average Equity (ROAE) has gradually declined from levels above 20-25% during 2014-2017 to approximately 19-20% in recent years. Overall, the sector's profitability has been resilient, but the tightening margins highlight growing pressure on banks to adapt their business models and diversify their income sources in the coming years.

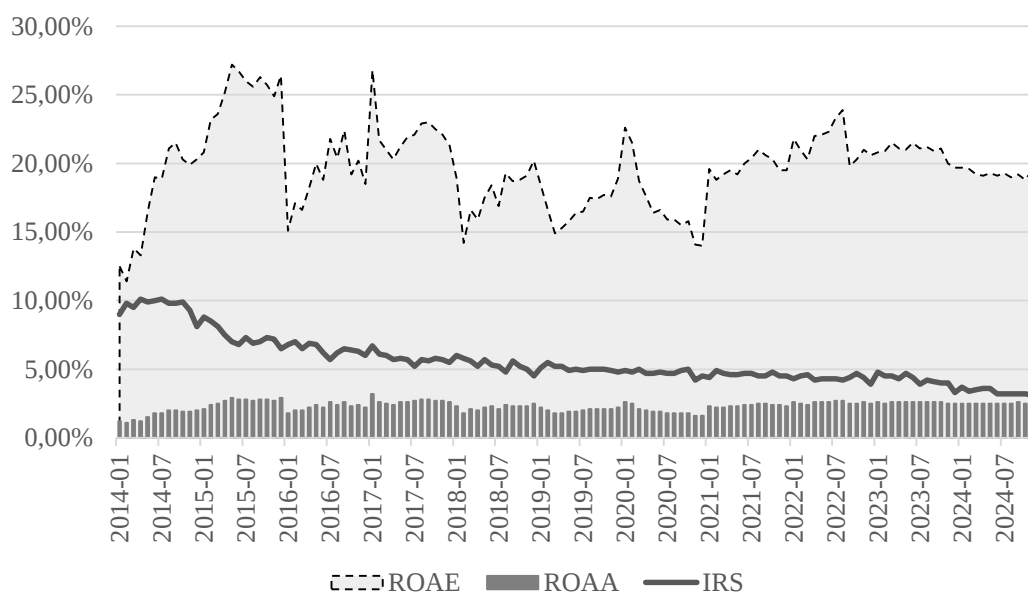


Figure 2. IRS, ROAA and ROAE trends Jan-2014 - Dec-2024

Source: Data from CBK monthly information report of the financial system and author's calculations

The decade-long trends in Kosovo's banking sector reveal a substantial transformation in interest rate dynamics, profitability indicators and competitive behavior. The persistent decline in loan interest rates, coupled with the recent rise in deposit rates, has significantly narrowed the interest rate spread, challenging the traditional profitability models of banks. While the sector has demonstrated resilience in maintaining a stable ROAA, the gradual decline in ROAE signals emerging pressures on capital returns. Moving forward, banks in Kosovo will need to strengthen their strategic

focus on operational efficiency, innovation and diversification of income streams to sustain profitability and ensure long-term financial stability in an increasingly competitive and evolving financial environment.

3. Methodology

3.1. Research model and methods

This study adopts a quantitative research approach to evaluate the impact of interest rate spread (IRS) on the profitability of commercial banks in Kosovo, using monthly sector-level data from January 2014 to December 2024. The research model is designed to examine the relationship between IRS and two key indicators of bank profitability: Return on Average Assets (ROAA) and Return on Average Equity (ROAE).

The methodological framework is based on multiple linear regression analysis, where IRS is treated as the main independent variable. The model aims to determine whether fluctuations in IRS have a statistically significant effect on the dependent variables ROAA and ROAE.

The regression models will be estimated using STATA software. The preliminary analysis will include descriptive statistics and correlation matrices to explore the basic relationships among variables and identify potential multicollinearity. To validate the regression assumptions and ensure the reliability of the estimates, diagnostic tests for normality of residuals, autocorrelation and heteroskedasticity will be performed.

This approach allows for identifying the direction and magnitude of the effect that IRS has on bank profitability in Kosovo. The findings will be interpreted based on statistical significance (p-values), adjusted R^2 for model fit and the sign and size of coefficients. Where appropriate, robustness checks and sensitivity analysis may be incorporated to confirm the consistency of the results.

The following hypotheses are tested:

H₁ There is a statistically significant relationship between interest rate spread and return on average assets (ROAA) in Kosovo's banking sector.

H₂ There is a statistically significant relationship between interest rate spread and return on average equity (ROAE) in Kosovo's banking sector.

3.2. Research instrument

The primary research instrument for this study is a structured data analysis framework applied to secondary quantitative data. Monthly data on interest rates, ROAA and ROAE for the banking sector in Kosovo are obtained from the official publications of the Central Bank of the Republic of Kosovo (CBK). The interest rate spread (IRS) is calculated as the difference between the average lending rate and the average deposit rate reported by CBK each month.

Data will be processed and analyzed using STATA software, which serves as the core analytical tool for running regression models, conducting descriptive and diagnostic tests and generating graphical outputs. The software provides robust econometric features suitable for time series analysis, allowing the researcher to conduct a comprehensive assessment of the IRS-profitability relationship.

All variables used in the model are defined quantitatively and the research instrument is designed to ensure reproducibility, transparency and accuracy of the results.

This instrument is aligned with the study's objective to empirically test the significance of IRS as a determinant of bank profitability in the context of Kosovo's financial sector.

3.3. Sample

The sample for this study consists of monthly sector-level data representing the entire commercial banking industry in the Republic of Kosovo from January 2014 to December 2024. The data is aggregated and published by the Central Bank of the Republic of Kosovo (CBK), which serves as the primary and authoritative source of macro-financial indicators.

By using sector-wide data rather than individual bank-level data, the study ensures a holistic representation of the banking industry's performance, minimizing individual bank-level anomalies or outliers. The sample includes 132 monthly observations per variable, yielding a balanced time series dataset for robust regression analysis.

This sampling strategy allows the researcher to generalize findings to the overall banking sector in Kosovo while maintaining the consistency and comparability of macroeconomic indicators across the time span of the study. The extended 11-year time frame also enhances the validity of the results by capturing both cyclical economic conditions and structural changes in the financial sector.

3.4. Descriptive data

The descriptive statistics for the main variables, Return on Average Assets (ROAA), Return on Average Equity (ROAE) and Interest Rate Spread (IRS), are presented below:

Variable	Mean	Std. Dev.	Min	25th %	Median	75th %	Max
ROAA	0.0231	0.0038	0.011	0.0210	0.0240	0.0260	0.032
ROAE	0.1974	0.0302	0.114	0.1835	0.1975	0.2123	0.272
IRS	5.5318	1.7297	2.500	4.5000	5.0000	6.2250	10.100

4. Findings and discussion

4.1. Reliability analysis

Before conducting regression analysis, a reliability check was performed to assess the internal consistency of the variables and the overall quality of the dataset. Although the dataset consists of secondary monthly macro-level data from the Central Bank of Kosovo, the following diagnostic checks were conducted to validate the reliability of the variables for inferential analysis:

Data Consistency Check: Time series continuity was verified, ensuring that there were no missing months or data gaps between January 2014 and December 2024. The dataset comprises a complete set of 132 monthly observations for each variable (ROAA, ROAE, IRS).

Correlation Matrix: Preliminary correlation analysis revealed a statistically meaningful linear association between the interest rate spread (IRS) and the two profitability indicators (ROAA and ROAE), confirming a theoretically grounded basis for proceeding with regression analysis.

To assess the reliability of the linear regression results examining the impact of interest rate spread (IRS) on return on average assets (ROAA), both classical and robust estimations were conducted. The initial ordinary least squares (OLS) regression showed

a significant negative relationship between IRS and ROAA ($\beta = -0.0008941$, $p < 0.001$). However, diagnostic tests indicated violations of key regression assumptions: residuals were heteroskedastic (Breusch-Pagan $p = 0.0001$), autocorrelated (Breusch-Godfrey $p < 0.0000$; Durbin-Watson = 0.385) and non-normally distributed (Skewness/Kurtosis test $p = 0.0008$). To correct for these violations, two robustness checks were performed. First, heteroskedasticity-robust standard errors (Huber-White) were used, yielding a consistent and still significant coefficient ($\beta = -0.0008941$, $p < 0.001$). Second, a Newey-West estimator with lag(1) was applied to correct for both autocorrelation and heteroskedasticity. The coefficient remained significant ($p = 0.001$), although standard errors increased slightly due to the correction. These findings confirm the stability and reliability of the model, supporting the conclusion that a higher interest rate spread is significantly associated with lower bank profitability.

To evaluate the reliability of the regression model where return on average equity (ROAE) was the dependent variable, robust estimation techniques were employed to account for violations of classical linear regression assumptions. Initially, the relationship between interest rate spread (IRS) and ROAE was found to be statistically insignificant ($\beta = 0.0000778$, $p = 0.960$), with an R-squared of virtually zero. Diagnostic testing revealed that, although the residuals were normally distributed ($p = 0.547$), they exhibited both heteroskedasticity (Breusch-Pagan $p = 0.0000$) and first-order autocorrelation (Breusch-Godfrey $p = 0.0000$; Durbin-Watson = 0.394). To address these issues, two corrective methods were applied. The robust standard errors (Huber-White) and the Newey-West estimator with one lag confirmed the lack of significance of the IRS coefficient, with p-values of 0.961 and 0.970, respectively. These robustness checks reinforce the conclusion that interest rate spread does not have a meaningful impact on ROAE, in contrast to its significant effect on ROAA.

4.2. Formula

The general regression equations are structured as follows:

ROAA Model:

$$ROAA_t = \beta_0 + \beta_1(IRS_t) + \varepsilon_t$$

ROAE Model:

$$ROAE_t = \beta_0 + \beta_1(IRS_t) + \varepsilon_t$$

Where:

$ROAA_t$ and $ROAE_t$ represent profitability indicators at time t ,

IRS_t is the interest rate spread at time t , measured as the difference between average lending and deposit rates,

β_0 is the intercept,

β_1 is the coefficient estimating the effect of IRS,

ε_t is the error term.

5. Conclusions

This study investigated whether interest rate spread (IRS) is a significant determinant of bank profitability in the Republic of Kosovo over the period 2014-2024. Using monthly sector-level data and applying linear regression analysis, the research aimed to test the impact of IRS on two key profitability indicators: Return on Average Assets (ROAA) and Return on Average Equity (ROAE).

The results of the regression in the first model (ROAA) demonstrate a statistically significant negative relationship between the interest rate spread (IRS) and return on average assets (ROAA) in the banking sector of Kosovo. The coefficient of IRS was negative and highly significant across all specifications, including ordinary least squares (OLS), heteroskedasticity-robust standard errors and the Newey-West estimator, which adjusts for both heteroskedasticity and autocorrelation. Despite violations in normality, homoskedasticity and serial independence in the residuals, the consistency and significance of the negative IRS coefficient under robust corrections confirm the stability of the relationship. These findings suggest that a higher interest rate spread is associated with lower asset-level profitability, potentially reflecting reduced intermediation efficiency or increased funding costs. The model provides reliable evidence for policy and managerial implications regarding pricing strategies and market competition in the banking sector.

In contrast, the regression results in the second model (ROAE) reveals no significant relationship between the interest rate spread (IRS) and return on average equity (ROAE). The IRS coefficient was statistically insignificant in the baseline OLS regression ($p = 0.960$) and remained insignificant after adjusting for heteroskedasticity and autocorrelation using robust and Newey-West standard errors. Although the residuals passed the normality test, the presence of severe autocorrelation and heteroskedasticity weakened the model's reliability. Even after accounting for these issues, the lack of statistical significance persisted. These results indicate that variations in the interest rate spread do not materially affect equity-level profitability in Kosovo's banking sector, implying that other factors, such as capital structure, leverage or shareholder strategy, may play a more dominant role in explaining ROAE fluctuations.

Overall, the comparative analysis of the two profitability indicators, ROAA and ROAE, demonstrates that the interest rate spread plays a significant role in determining asset-level profitability but not equity-level profitability in the banking sector of the Republic of Kosovo. While the ROAA model confirms a consistent and statistically significant negative relationship with IRS, the ROAE model reveals no meaningful association. These findings highlight the importance of examining different dimensions of bank performance and suggest that IRS influences operational efficiency more than shareholder returns. This distinction has practical implications for policymakers, bank managers and regulators in shaping interest rate policies, optimizing asset allocation and improving financial intermediation.

Furthermore, as Kosovo's banking sector increasingly aligns with regional and global sustainability agendas, the implications of declining asset-level profitability must be considered in the context of green finance readiness. Narrow interest spreads may constrain banks' ability to absorb the costs associated with ESG integration, sustainable lending and climate-related risk management. Therefore, maintaining profitability is not only a financial imperative but also a precondition for mobilizing private capital toward green transitions. These findings underscore the importance of coordinated regulatory frameworks, incentive mechanisms and strategic innovation to ensure that profitability and sustainability objectives are pursued in tandem.

5.1. Implications

The findings of this study carry several important implications for financial institutions, policymakers and researchers:

For Commercial Banks: The demonstrated negative relationship between interest rate spread and return on average assets (ROAA) highlights the importance of optimizing loan pricing, managing deposit costs and aligning interest rate policies with risk-adjusted profitability objectives. These insights can support more effective balance sheet strategies focused on enhancing operational efficiency.

For the Central Bank and Regulators: The results underscore the value of maintaining a stable and well-calibrated interest rate environment to support sustainable banking sector performance. Monetary and macroprudential tools should aim to ensure that interest rate spreads remain within levels that promote resilience without discouraging credit expansion.

For Policymakers: Interest rate spread should be monitored as a key indicator of financial intermediation efficiency and sectoral health. Integrating IRS analysis into broader financial stability frameworks can strengthen early warning systems and support macro-financial stability.

For Researchers and Academics: This study contributes to the empirical literature by exploring the determinants of bank profitability in Kosovo, especially ROAA. Future research could expand the analysis by incorporating bank-level panel data, alternative profitability metrics and more advanced econometric methods to deepen understanding.

Overall, the study emphasizes that while interest rate spread significantly influences asset-level profitability (ROAA), its effect on equity-level profitability (ROAE) appears limited in the Kosovo banking sector. This distinction is crucial for tailoring effective policy and strategic responses.

The findings carry significant implications for the implementation of sustainable banking strategies in small and transitioning economies. As interest rate spread compression negatively affects asset-level profitability, banks may face reduced flexibility to finance long-term, lower-yielding green projects. Therefore, promoting sustainable finance may require complementary measures such as green credit guarantee schemes, blended finance models and tax or regulatory incentives to offset margin pressures. Furthermore, supervisors and central banks should explore integrating IRS-profitability diagnostics into their ESG risk assessments to identify systemic constraints to green lending expansion. Building profitability buffers through operational efficiency may be essential for banks to meet both financial and environmental mandates under emerging EU and regional sustainability disclosure frameworks.

5.2. Limitations and future research directions

Although this study provides important insights into the role of interest rate spread (IRS) in shaping bank profitability in Kosovo, it is not without limitations. First, the analysis relies on sector-level aggregate data, which, while useful for identifying macro trends, may obscure heterogeneity across individual banks in terms of risk exposure, pricing strategies or business models. Future research using bank-level panel data could offer more granular insights into how IRS influences profitability across different institutions.

Second, the study focuses on IRS as a single explanatory variable. While this approach effectively isolates the relationship between IRS and profitability, it does not account for other key internal (e.g., cost efficiency, credit quality, liquidity management) or external (e.g., inflation, economic growth, regulatory environment) determinants that likely impact bank performance. Including such variables could enhance the explanatory power and realism of the models.

Third, the use of linear regression models assumes a constant relationship over time and across the distribution of the dependent variable. Advanced techniques such as panel regressions, dynamic modeling, vector autoregression (VAR) or quantile regression could reveal potential non-linearities, lag effects and asymmetric responses. This is especially important for understanding profitability dynamics during periods of monetary or financial stress.

Fourth, the study is limited to a single-country context. Comparative analyses involving neighboring countries or other transition economies could offer broader regional perspectives and improve the generalizability of findings.

Finally, future studies should consider integrating multivariate models and robust identification strategies to explore potential causal effects and better capture the complex and evolving determinants of bank profitability in small, open and developing economies such as Kosovo.

Moreover, this study does not explicitly incorporate indicators related to green lending, ESG scoring or climate-related financial disclosures. Given the global transition toward sustainable finance, this omission limits the analysis of how profitability constraints, such as narrowing interest rate spreads, might affect banks' ability or willingness to allocate capital toward environmentally sustainable investments.

Future research should aim to integrate sustainability-linked financial metrics into profitability models. This could include exploring whether banks with higher ESG exposure or greener loan portfolios experience different IRS-profitability dynamics compared to their peers. Additionally, qualitative studies may complement quantitative models by examining institutional readiness, regulatory incentives and market demand for green products within the banking sector. Such research would offer more comprehensive insights into the synergies and trade-offs between financial performance and the green transition.

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