

The Impact of Electronic Financial Services on the Profitability of the Banking Sector in Kosovo

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ABSTRACT: This study investigates the impact of electronic financial services on the profitability of the banking sector in Kosovo. The investigation is based on the premise that adopting electronic channels enhances operational efficiency, reduces transaction costs, and supports the diversification of revenue sources. A quantitative approach is employed, using monthly time-series data. An index of electronic financial services is constructed from Google Trends, while other indexes capture key dimensions of bank performance. Principal Component Analysis (PCA) is applied to develop the indexes, and their impact on profitability is estimated using Ordinary Least Squares (OLS) regression. The findings indicate that electronic financial services, liquidity, and GDP positively affect bank profitability, while risk negatively affects it. In contrast, market share and loan portfolio size are statistically insignificant. These results offer practical insights for banks and policymakers, highlighting the benefits of investing in electronic capabilities, promoting customer adoption, and safely expanding digital services. By providing a novel assessment of electronic financial services in Kosovo's transitional banking environment, this study contributes to the broader literature on digital finance and bank performance.

KEYWORDS: Profitability, e-financial services, bank efficiency, banking sector, Kosovo.

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Introduction

Technological innovation has become a key driver of change in the global banking industry. Electronic financial services (e-financial services), such as online banking, mobile applications, digital payments, and electronic lending platforms, have transformed how banks deliver services, interact with customers, and generate income. These services reduce transaction costs, provide 24/7 access, and create new revenue channels, thereby positively impacting bank profitability (Carbo-Valverde, 2017; Deloitte, 2018).

Traditionally, banks relied on interest income from lending, with operating models remaining unchanged for decades. The 2008 global financial crisis exposed the limitations of these models, prompting banks to pursue more stable and diversified sources of profit. Research indicates that electronic financial channels lower costs, expand access, and increase fee-based income, enhancing profitability through efficiency gains (Angor et al., 2019; Al-Khayyat et al., 2025).

Kosovo stands for a unique case of this transformation. Since the early 2000s, its banking sector has expanded rapidly and increasingly adopted electronic channels to align with international standards (Mazreku et al., 2016; Mustafa et al., 2005). The number of ATMs, POS terminals, and e-banking accounts has grown substantially. Mobile banking has emerged as the primary transaction channel, and integration with Google Pay and Apple Pay positions Kosovo alongside European digital banking standards (CBK, 2024_a; CBK, 2025).

Despite these advancements, the intensity and sustainability of the impact of e-financial services on bank profitability in Kosovo remain underexplored. Most existing research focuses on developed banking systems, leaving transitional economies underrepresented (Hernando and Nieto, 2007; Lee and Ngo, 2020; Lee et al., 2021). While banks in Kosovo have adopted electronic channels to expand services and maintain competitiveness, the financial benefits have not yet been systematically quantified.

This research gap presents both theoretical and practical implications. Academically, it limits understanding of how e-financial services influence bank profitability in transitional economies. Practically, managers and regulators require empirical evidence to guide digital strategies that foster sustainable profit growth.

Research Aim and Research Questions

The primary aim of this study is to investigate the impact of electronic financial services (e-financial services) on the profitability of banks in Kosovo, with particular attention to cost efficiency, process automation, and customer outreach. The study aims to provide systematic evidence on how digital financial channels influence bank performance in a transitional economy.

To achieve this aim, the study addresses the following research question:

RQ: Do electronic financial services positively impact bank profitability in Kosovo, and if so, to what extent?

Based on this research question, the following hypothesis is formulated:

H₁: Electronic financial services have a positive impact on the profitability of banks in Kosovo.

This hypothesis is grounded in the assumption that e-financial services enhance profitability by reducing operating expenses, streamlining internal processes, and expanding customer reach.

The magnitude of this impact is expected to vary depending on the level of client adoption and the effectiveness of integrating these services into banks' business models.

The findings of this study are intended to advance academic understanding and provide practical guidance for banking professionals and regulators, supporting the design of digital strategies that improve efficiency, improve customer engagement, and enhance overall financial performance.

Research Methodology

This study examines the impact of electronic financial services (e-financial services) on bank profitability using econometric analysis of monthly time-series data from August 2010 to December 2024. The data were collected from the Central Bank of Kosovo, the Kosovo Agency of Statistics, and the International Monetary Fund.

Ordinary Least Squares (OLS) regression was employed, with the profitability index as the dependent variable. The independent variables include indexes of liquidity, risk, growth, credit, and e-financial services, while the logarithm of GDP (ln_GDP) is included as a control variable.

To construct the composite indexes, Principal Component Analysis (PCA) was applied. The adequacy and suitability of the dataset were assessed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test (Mazziotta and Pareto, 2016; Boudt et al., 2022). Table 1 summarizes the components and purpose of each index.

Table 1

Composite Indexes

Index	Components	Description / Purpose
Profitability Index (Pi)	- Return on Assets, - Net Profit Before Tax, - Net Profit After Tax, - Net Profit, - Invers Cost/Income	Captures overall bank profitability, combining efficiency and performance
Liquidity Index (Li)	- Loan-to-Deposit Ratio, - Liquidity Ratio, - New Loans / New Deposits	Measures the liquidity position of banks
Risk Index (Ri)	- Non-Performing Loan, - Capital Adequacy Ratio, - Tier 1 Capital Ratio	Assesses bank risk, credit risk management, and stability
Growth Index (Gi)	- Deposit Growth Rate, - Total Asset Growth Rate	Captures the growth dynamics of the bank
Credit Index (Ci)	- Loan Growth Rate, - New Loans / New Deposits	Measures the expansion and management of bank credit
Macroeconomic Control (ln_GDP)	Logarithm of GDP	Controls of the overall economic environment

Source: Author's compilation based on Rekik and Kalai (2018), Borroni and Rossi (2019), Bod'a et al. (2021), Dong et al. (2020), and Nguyen (2021).

Among these, the e-financial services index is central to this study. It is constructed from monthly Google Trends search data and synthesised using PCA (Dong et al., 2020; Nguyen, 2021). Table 2 outlines the method for constructing the e-financial services index.

Table 2

Calculation Process of the e-Financial Services Index

Step	Description	Source / Notes
Foundation Lexicon	Seven keywords selected based on banking functions: digital payments, P2P lending, online investment platforms, robo-advisors, cybersecurity, RegTech, omnichannel services	Reflects payments, credit allocation, investment, and network channels
Keyword Frequency	Monthly search frequency obtained from Google Trends as a proxy for public interest and adoption	Used to measure digital activity in banking
Screening Keywords	Search frequencies standardized and assessed for correlation with overall bank performance	Only strongly correlated keywords kept for the index
Index Integration	Factor analysis applied to synthesize selected keywords into a single EFi index	Captures overall adoption and activity of digital financial services

Source: Author's compilation based on Dong et al. (2020) and Nguyen (2021).

The impact of e-financial services on bank profitability is estimated using OLS regression. This method is widely employed in banking and finance research due to its robustness in time-series analysis (Di Febo and Angelini, 2022; Dong et al., 2020).

The functional form of the profitability model is expressed as:

$$Pi_t = f(Li_{t-1}, Ri_{t-1}, Gi_{t-1}, Ci_{t-1}, EFi_{t-1}, \ln_BPV_{t-1})$$

In its linear specification, the OLS model is written as:

$$Pi_t = \beta_0 + \beta_1 x Li_{t-1} + \beta_2 x Ri_{t-1} + \beta_3 x Gi_{t-1} + \beta_4 x Ci_{t-1} + \beta_5 x EFi_{t-1} + \beta_6 x \ln_BPV_{t-1} + \varepsilon_t$$

Where:

- Pi_t - profitability of the banking sector at time t (dependent variable). Li_{t-1} , Ri_{t-1} , Gi_{t-1} , Ci_{t-1} , EFi_{t-1} , and $\ln_BPV_{t-1}$, lagged independent variables capturing liquidity, risk, growth, credit, e-financial services, and bank performance volume, respectively.
- β_0 - intercept term,
- β_1 – β_6 slope coefficients measuring the marginal impact of each independent variable on profitability.
- ε_t - error term, accounting for unobserved factors not included in the model.

Research Results

This section presents the descriptive statistics, correlation analysis, diagnostic checks, and regression results used to evaluate the impact of electronic financial services (EFi) on bank profitability in Kosovo.

To ensure comparability across variables, all indices were standardised to a common scale before analysis. Table 3 reports the descriptive statistics of the dependent variable (Profitability, Pi), lagged explanatory variables, and the control variable ($\ln_GDP$).

Table 3

Descriptive statistics of variables

Variable type	Symbol	Sample size	Std. Dev.	Min	Max	Mean
Dependent variable	Pi	172	1.00171	-2.47	2.03	.0037
Explanatory variables	Li_{t-1}	172	1.00063	-2.25	2.12	.0051
	Ri_{t-1}	172	1.00218	-1.38	2.37	.0029
	Gi_{t-1}	172	.93970	-2.00	2.86	.0000
	Ci_{t-1}	172	.99573	-2.38	2.62	-.0070
	EFi_{t-1}	172	.99251	-1.37	2.43	-.0109
Control variable	ln_GDP_{t-1}	172	.29379	12.47	13.84	13.1888

Note: Variables with (t-1) represent the first lag

Source: Author's calculations

Profitability shows a mean near zero and fluctuates between -2.47 and 2.03, reflecting alternating periods of gains and losses. Lagged explanatory variables – liquidity (Li), risk (Ri), growth (Gi), credit (Ci), and electronic financial services (EFi) also fluctuate around zero, indicating dynamic sector conditions. The credit index shows a slight overall contraction, while the EFi index captures the gradual adoption of digital banking services. The control variable ln_GDP remains stable, suggesting that temporal variations in sector performance primarily reflect banking activity and digital transformation rather than macroeconomic volatility.

Correlation Analysis

Pearson correlation coefficients were calculated to detect potential multicollinearity. Profitability is strongly and positively correlated with EFi ($r = 0.825$, $p < 0.01$) and ln_GDP ($r = 0.843$, $p < 0.01$), showing that higher digital adoption and favourable macroeconomic conditions are associated with greater profitability. Conversely, profitability is strongly negatively correlated with risk (Ri; $r = -0.666$, $p < 0.01$), suggesting that greater risk exposure reduces profitability. Correlations with liquidity (Li; $r = -0.091$), growth (Gi; $r = 0.065$), and credit (Ci; $r = 0.116$) are weak and statistically insignificant, suggesting limited direct effects during the observed period.

Regression Analysis

To test the study hypothesis and quantify the impact of electronic financial services on profitability, an Ordinary Least Squares (OLS) regression model was employed. OLS is appropriate for time-series analysis and widely used in banking research (Onay and Özsöz, 2013; Dong et al., 2020; Di Febo and Angelini, 2022).

Before analysing the regression results, a set of diagnostic tests was conducted to ensure model validity and stability. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with all variables below the threshold of 5, indicating no serious multicollinearity. The normality of the residuals was evaluated using the Jarque-Bera statistic (0.0741), which confirmed normality. Heteroskedasticity was assessed using the Breusch-Pagan test (0.1766) and was not detected. Autocorrelation was evaluated with the Durbin-Watson statistic (1.378), which indicated no significant issues. Overall, these diagnostic results confirm that the regression model meets the main OLS assumptions and is suitable for further analysis.

The regression model demonstrates strong explanatory power: $R = 0.907$, $R^2 = 0.823$, adjusted $R^2 = 0.816$, indicating that over 80% of the variation in profitability is explained by the included variables. variation statistically significant ($F = 126.954$, $p < 0.001$), confirming that the regressors collectively account for profitability vain profitability

Table 4

Regression coefficients for the profitability model

Variable	Coefficient B	Std. Error	t	Sig.	95% CI Lower	95% CI Upper
Constant	-26.2136	3.015	-8.695	0.000	-32.166	-20.261
L1 Li	0.0911	0.035	2.638	0.009	0.023	0.159
L1 Ri	-0.2982	0.042	-7.148	0.000	-0.381	-0.216
L1 Gi	-0.0601	0.038	-1.588	0.114	-0.135	0.015
L1 Ci	-0.0653	0.035	-1.867	0.064	-0.134	0.004
L1 EFi	0.1839	0.071	2.576	0.011	0.043	0.325
L1_GDP	1.9880	0.229	8.700	0.000	1.537	2.439

Source: Author's calculations

The regression results indicate that bank profitability (P_i) is explained by lagged liquidity (Li), risk (Ri), economic growth (Gi), the credit/loan portfolio (Ci), electronic financial services (EFi), and macroeconomic activity (GDP). Liquidity (Li ; $B = 0.091$, $p < 0.01$) and electronic financial services (EFi ; $B = 0.184$, $p < 0.05$) exhibit positive, statistically significant effects, suggesting that higher liquidity and greater adoption of electronic financial services enhance bank performance. In contrast, risk (Ri ; $B = -0.298$, $p < 0.01$) exerts a significant negative impact, confirming that increased risk reduces profitability. Growth/market share (Gi ; $B = -0.060$, $p = 0.114$) and the credit/loan portfolio (Ci ; $B = -0.065$, $p = 0.064$) display weaker negative effects, indicating limited influence during the observed period. Macroeconomic activity (GDP ; $B = 1.988$, $p < 0.01$) has a highly significant positive impact, highlighting the critical role of broader economic conditions.

These findings confirm that electronic financial services positively influence bank profitability in Kosovo. Incremental increases in the EFi index are associated with measurable improvements, with a one-point rise in the EFi index corresponding to a 0.18-point increase in profitability. The benefits of electronic financial services adoption are amplified under favourable macroeconomic conditions, while elevated credit and operational risks diminish profitability, emphasising the need for effective risk management and liquidity strategies (Psaila, 2019; Tölö, 2021).

Regional evidence corroborates these results. Studies in Albania, North Macedonia, and Serbia show similar positive relationships, with improvements occurring gradually (Topalli dhe Molishti, 2025). In advanced European markets, the effects are stronger due to higher digital maturity and supportive regulatory frameworks (Carbo-Valverde, 2017). Other factors, including loan quality, interest rates, and credit volumes, further shape profitability outcomes (Qehaja-Keka et al., 2023). Overall, these results suggest that electronic financial services are increasingly central to performance in Kosovo's banking sector, extending beyond operational efficiency to reshape competition and sustain profits in a small but digitally evolving economy (Cucinelli, 2013; Di Febo and Angelini, 2022).

Conclusions

This study demonstrates that electronic financial services have a positive, statistically significant impact on the profitability of Kosovo's banking sector. Digital channels—including mobile banking, online platforms, and ATMs—enable banks to reduce operational costs, enhance efficiency, and expand their customer base. Profitability is maximised when these services are integrated with sound liquidity management and effective risk control measures. Furthermore, broader macroeconomic conditions play a pivotal role: GDP growth supports higher returns, while elevated credit and operational risks diminish profitability.

The findings have practical and policy implications. First, the Central Bank of Kosovo should foster a supportive yet secure regulatory environment for electronic banking. Clear frameworks governing data protection, cybersecurity, and licensing of electronic financial products will allow banks to innovate while mitigating systemic risks. Second, banks should recognise electronic financial services as strategic drivers of sustainable profitability rather than solely operational tools. Achieving this requires continued investment in technology, robust fraud detection, advanced cybersecurity measures, and real-time monitoring of liquidity flows.

Third, access to electronic financial services should be broad. Offering simple, low-cost, and user-friendly products in local languages can enhance financial inclusion, strengthen customer trust, and expand the deposit base. Finally, partnerships with regional and international providers, along with shared infrastructure for electronic identity verification and credit information, can reduce costs and improve risk management. Continuous monitoring of key indicators linking the use of electronic financial services to profitability will enable both regulators and banks to align strategy, investment, and risk mitigation effectively.

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