Effect of automated teller machines and bank branches on the profitability of banking businesses: evidence from Kosovo and North Macedonia

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EFFECT OF AUTOMATED TELLER MACHINES AND BANK BRANCHES ON THE PROFITABILITY OF BANKING BUSINESSES: EVIDENCE FROM KOSOVO AND NORTH MACEDONIA

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Abstract: *The core objective of this study is to explore whether the installation of automated teller machines (ATM) and commercial bank branches (CBB) affects the profitability of the banking systems in Kosovo and North Macedonia. Additionally, several influential variables, such as bank capital-to-assets (BCA), inflation (INF), and GDP growth (GDP_G), were used in the research. More specifically, the research deals with secondary data from 2010 to 2022 using the dynamic data analysis technique generalized method of moments (GMM). The evidence indicates that ATM adoption has a substantial positive influence on bank profitability. Similarly, BCA and GDP_G have a positive influence on bank profitability. Nevertheless, CBB and inflation have had a substantial negative influence on both metrics. The research's scientific merit and novelty are derived from features unique to earlier studies. The study claims to open up new avenues of debate involving scholars and legislative authorities about identifying influencing components of profitability in the banking business.*

Keywords: *Profitability Proxies; Automated Teller Machine; Inflation; Gross Domestic Product; Generalized Method of Moments*

INTRODUCTION

The recent decade's technological innovations have dynamized and influenced every sector, and the banking business cannot remain indifferent to these developments. To achieve economic sustainability, all countries must establish an efficient and fully operational financial system to be productive and obtain economic growth. This argument, at least in theory, has been validated by theoretical literature and empirical research. In other words, based on how the financial system is organized, the operational activities of the financial system could contribute or not to economic improvement and the creation of broader stability. It is now widely acknowledged worldwide that the financial system considerably impacts the economy and overall development (van Horen and Claessens 2012). Since commercial banks are one of the three components of the financial system, their mission is to facilitate the transfer of monetary funds from surplus to deficit units, offer payment services, offer guarantees, and promote economic development (Durguti, Krasniqi, and Krasniqi 2020).

Starting from this perspective, each country's mission inspires to develop the tendency to have a sound banking system on the one hand and an income-generating banking system on the other, which will be able to survive unexpected adverse shocks and contribute to financial stability.

Banks, like any business, prefer to be successful in their business activities, and they realize this through two sources of income: interest income from loans and other financial instruments and non-interest income derived from multiple charges. Compared to European countries, where interest rates typically decrease, the Western Balkan economies, particularly those under examination, have much higher interest rates. Grounded on the data released by the International Monetary Fund (IMF), the two countries during the observed period had a positive return in Kosovo was 2.57 ROA at the end of 2022, and ROE was 20.66, while in North Macedonia at the end of 2022, the return to ROA was 1.61; the return on ROE was 11.25[1].

Both indicators, ROA and ROE, were selected as the dependent variables in the study to meet the stated objective as profitability proxies. In contrast, the other determining variables include bank capital-to-assets, ATMs, CBBs, INF, and GDP growth. The analytical technique to examine these variables was decided upon after carefully studying the characteristics of both economies and the data. This investigation aims to discover the factors influencing profitability, particularly in the countries under evaluation. Within this configuration, the study is premeditated to offer the research questions and, based on them, develop study hypotheses. Next are the study's questions:

RQ_1: Adequate management of capital positions, can it affect the improvement or increase in banks' profitability?

RQ_2: Do the banks in Kosovo and North Macedonia set up a sufficient number of ATMs and the expansion of bank branches to influence profitability?

RQ_3: How would inflation and economic growth influence bank profitability?

Therefore, based on the formulation of the research questions, the basis for the design of the main hypotheses of this study has been established. The hypotheses are:

H_1: The setting up of ATMs by banks has a positive effect on profitability.

H_2: The expansion of bank branches has a positive effect on profitability.

The study aims to contribute numerous ways to answer the research questions and confirm the hypotheses presented. First, considering the relatively small number of investigations dealing with the selected parameters, it aims to contribute to extending the scientific literature by using parameters that have received little research attention until now. Second, the examination covers 2010 to 2022, employing the generalized method of moments (GMM) technique, aiming to generate robust and credible information. Finally, regarding policy implications, it intends to contribute to the reform or updating of present legislation to identify the factors that affect or harm the degree of profitability in Kosovo and North Macedonia.

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[1]The web link where the data for ROA and ROE is accumulated is: https://data.imf.org/?sk=51b096fa-2cd2-40c2-8d09-0699cc1764daandsid=1390030341854

THEORETICAL BACKGROUND

Banking Performance Proxies

The current research stage will focus on in-depth analyses conducted in earlier years on the metric of bank profitability, alongside the defining factors of profitability, which will be addressed in the following section. Nearly every research study conducted up until now has employed financial parameters that are referred to as quantitative metrics for evaluating bank profitability rather than only bank profitability. The success or failure of the banks' operations is described as the key driver of the profit earned by their regular operations. At the worldwide scale, the most widely employed financial ratios for such evaluation are ROA and ROE, which were likewise employed in conceptualizing this research.

From a financial analysis perspective, such financial indicators interpret the accounting value based on cost principles. As such, it is considered that their measurement is not in real-time compared to the market value. Each of these predictors offers insights into the effectiveness and operational success by expressing the proportion of net profit to assets, respectively equity (Tan and Floros 2012; Durguti 2020; Ysayas 2022). Bucevska and Misheva (2017) employed ROA and ROE metrics through the GMM method to discover the factors contributing to bank profitability in the context of the Western Balkans, particularly several selected economies. Employing similar evaluators, the authors Qehaja-Keka, Ahmeti, and Aliu (2023) examined the influence of multiple variables on profitability in Kosovo and Albania, adopting the static regression approach.

Characteristics of Determining Variables

Many researchers have attempted to analyze various determinants influencing profit and risk exposure accurately. Generally, as explained in the preceding paragraphs, they are evaluated via ROA and ROE. To evaluate their influence, numerous researchers analyzed determinants described as bank indicators on the one hand and macroeconomic indicators on the other. Short (1979) steered one of the earliest investigations, exploring the components determining bank profitability (BP).

The overall outcomes of this investigation demonstrated that market concentration, corporate leadership, and asset growth all exerted a statistically positive influence on BP. Based on this premise, a comprehensive empirical evaluation is made by Brouke (1989), who analyzes a considerable number of bank-specific factors (general expenses, asset growth, liquidity, and equity) and macroeconomic factors (concentration, inflation, and interest rates) to evaluate the influence on BP. Based on the study's discoveries, all internal factors (bank-specific) and market concentration considerably influence ROA and ROE.

In light of this background, the latest studies confirm the substance of the earlier perspectives but now advance it with new factors offered due to innovation and modern technology. Within this mindset, Almaskati (2022) analyzed a sample of 1,245 banks in 66 nations across the globe from 2000 to 2019. The revision comprised a combination of inside and outside factors in over 20 factors, applying the dynamic method to conduct the analysis, and the conclusions of this study indicate that the inside factors are of greater importance than outside factors in predicting profitability. From a different standpoint, Le and Do (2020) examined the influence of credit cards,

ATMs, points of sale, capital-to-assets, non-performing loans, market concentration, GDP growth, and inflation through a cross-country analysis. This analysis has been separated into two panels: developed and developing countries. The research outcome indicates that credit cards, ATMs, and capital-to-equity positively influence BP, whereas inflation and GDP growth have an adverse influence.

Many worldwide and local processes were rendered ineffective by the 2009 economic crisis, and as a result, the legislative framework for monitoring financial organizations was entirely revised (Spahiu, 2022). In this instance, the authors Gržeta, Žiković, and Žiković (2023) examined 433 European banks from 2006 to 2015 to evaluate the effectiveness and BP regulated according to the Basel III framework.

The empirical methodology employed in the breakdown was GMM, which analyzed specific and macroeconomic factors given bank size through examination. The researchers revealed that the Basel III requirements have a diverse impression on effectiveness and productivity in large and medium-sized banks; however, small banks have negative consequences. Through this sense, the Basel III outline places greater importance on corporate governance in terms of efficient leadership based on best practices. In addition, as a result, the authors Durguti and Kryeziu (2021) addressed the case of Kosovo in their study of the role and relevance of corporate governance and their influence on BP, employing the combined OLS and 2SLS method. The research paper examined financial metrics as well as corporate governance components (board size, gender diversity, sovereign committees, and others), and the study's findings revealed that corporate governance components have a positive influence on BP. Practically a comparable technique was employed by the writers Durguti and Gashi (2022) when examining the different aspects of corporate governance as they affect the protection of bank assets. Findings from the investigation reveal that the size of the board, the sovereign committees, and the net interest margin collectively positively influence the bank's asset protection. In the circumstances of North Macedonia, the authors Ćurak, Poposki, and Pepur (2012), through dynamic panel analysis, have applied a sample of 16 banks involving specific and macroeconomic factors. Due to the authors' interpretations, solvency risk and liquidity risk possess a positive influence on BP.

In contrast, macroeconomic factors, economic growth, and banking system reform positively influence BP. Finally, the authors of the paper Spaseska, Odzaklieska, Hristoski, Risteska-Jankuloska, and Risteska (2022) observed the effect of Covid-19 on BP in North Macedonia. Assumptions from the study demonstrated that, despite facing numerous challenges, banks could keep their stability and assistance for clients while capturing a higher level of profit than in earlier periods.

RESEARCH METHODOLOGY

Data and Sample

The empirical analysis designed to verify the research premises is based on a sample of 26 observations (T=26) covering the economies of Kosovo and North Macedonia. The data available was gathered through two reliable sources (IMF and World Bank) and spans years from 2010 through 2022. The inclusion of these two economies is because they are close neighbors with solid political, social, and economic relations and numerous economic characteristics associated with them. The justification for focusing on this particular period is caused by two circumstances: initially, banks

started setting up ATMs after 2009, and secondly, data for other variables were inaccessible in the context specified by the IMF. The IFM dataset gathered data for the variables ROA and ROE alongside the World Bank dataset, which was used to gather data regarding BCC, ATM, CBB, INF, and GDP_G. The selection of specific indicators of the banking industry and macroeconomics has been constructed by analyzing the previous studies of the authors (Durguti 2020; Chhaidar et al. 2022; Fejza-Ademi et al. 2022; Albort-Morant et al. 2022). Lastly, most of these variables are expressed in percentages, except for ATM and CBB, which are expressed in absolute numbers per 100,000 residents.

Variables

Based upon an examination of specific academics and empirical sources, the research aims to analyze the influence of ATM adoption, CBB, and other variables on the profitability of the banking system for the economy of Kosovo and North Macedonia. Recent developments in technological innovation over the previous decade have altered the strategy of financial businesses and customer behavior to adapt to the new dynamics. Starting within the framework mentioned above, this research intends to evaluate the influence of the parameters selected on the banking system's profitability in two different economies (Table 1 presents the selected metrics).

Table 1: Description of Variables (Source: Author's compilation)

| Description	Denominations	Abbreviations	Data sources
Dependent Variable	Return on assets	ROA	IMF
	Return on equity	ROE	IMF
Bank Specific Indicators	Bank capital-to-assets	BCA	WB
	Automated teller machine	ATM	WB
	Commercial bank branches	CBB	WB
Macroeconomic Indicators	Inflation	INF	WB
	GDP growth	GDP_G	WB

Generally, there is consensus among academics on the definition of profitability measurements, but there is diversity among them when using the measurement method. As a result, the last component of the study evaluates financial indicators, including bank-specific metrics and macroeconomic parameters. Following that, we will highlight a number of the authors who endorse this perspective (Christaria and Kurnia 2016) tested the equity-to-capital and GDP growth (Linares-Mustarós, Coenders, and Vives-Mestres 2018) and similarly applied the GDP growth to evaluate its influence on bank profitability, (Meriç, Kamışlı, and Temizel 2017; Durguti, Arifi, Gashi, and Spahiu 2023) have employed the inflation. ATMs and CBB parameters have been investigated by (Holden and El-Bannany 2004; Valvedere and Humphrey 2009; Durguti, Gashi, and Spahiu 2023; and Le and Ngo 2020). In the same vein, the authors Jolevski and Dicevska (2020) used specific criteria for banks in the setting of North Macedonia.

Hence, based on this research, we developed the idea of including the abovementioned factors (Table 1) to investigate their influence on bank profitability. Graph 1 outlines the development pattern of these factors in Kosovo and North Macedonia.
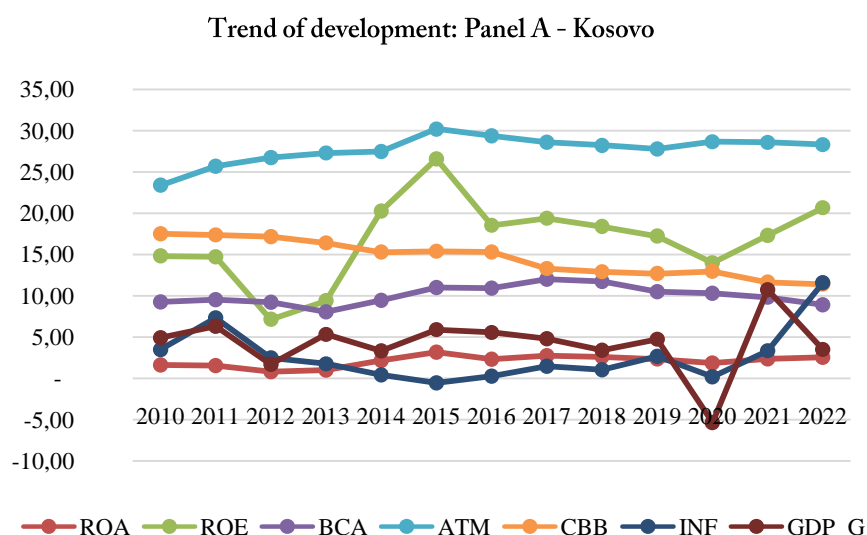
Graph 1: Indicator's Trend (Source: Author's compilation based on data)

According to Graph 1, which represents the instance of Kosovo, the drivers of profitability (ROA and ROE) are constantly increasing, the number of ATMs and CBB has been decreasing in recent years, and two macroeconomic indicators, INF and GDP_G, have a more prominent movement.
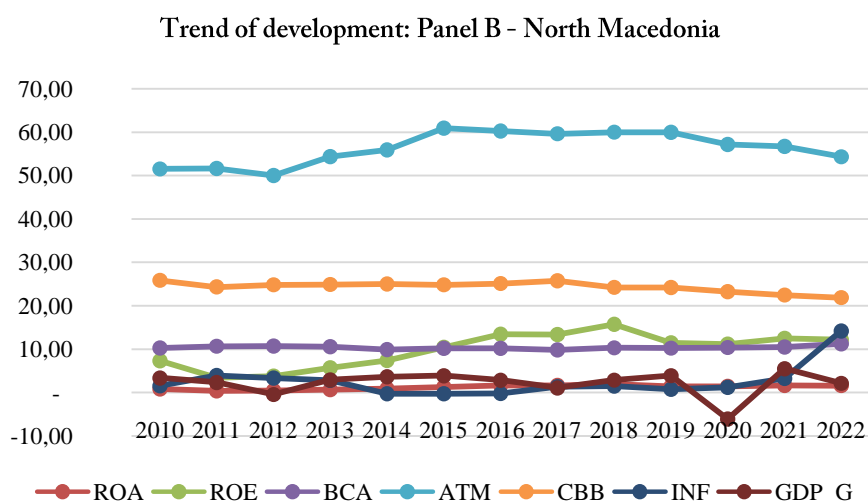
Graph 2: Indicator's Trend (Source: Author's compilation based on data)

Examining Graph 2 in the setting of North Macedonia reveals an identical decreased number of ATMs and CBBs, as well as a more important trend in macroeconomic variables. Meanwhile, the other indicators in the analysis stay unchanged.

Model Development

The mathematical modeling technique or approaches employed to examine the interaction of the selected variables, as well as their impact on the profitability of banks in Kosovo and North Macedonia, are presented in this subsection. The method of observation employed is the GMM, which is first adapted to the sample and quantity of observations to acquire the highest-quality, steady results. In this sense, we adopted Le and Ngo's (2020) about selecting parameters and algorithms, but with some modifications by adjusting the data in our actual investigation. When handling panel data via limited observation intervals, GMM is an efficient approach to analyzing undetected variation and degree of endogeneity (Arellano 2000).

The overall algorithm will be demonstrated, and the parameters will be set up accordingly.

$$Y_{it} = \sum_{j=1}^{r} \varphi_j Y_i, t - j + X_{i,t}\beta_1 + w_{it}\beta_2 + \pi_i + \varepsilon_{i,t}$$

Commencing with the overall algorithm, two distinct algorithms will be created based on the parameters specified for the inquiry.

$$ROA_{i,t} = \varphi + \mu(ROA)_{i,t} + \beta_1(BCA_{i,t}) + \beta_2(ATM_{i,t}) + \beta_3(CBB_{i,t}) + \beta_4(INF_{i,t}) + \beta_5(GDP\_G_{i,t}) + \pi_i + \varepsilon_{it}$$

$$ROE_{i,t} = \varphi + \mu(ROE)_{i,t} + \beta_1(BCA_{i,t}) + \beta_2(ATM_{i,t}) + \beta_3(CBB_{i,t}) + \beta_4(INF_{i,t}) + \beta_5(GDP\_G_{i,t}) + \pi_i + \varepsilon_{it}$$

Where: $ROA_{i,t}$ and $ROE_{i,t}$ - symbolize the dependent factors, β_1 to β_5 - symbolize the independent factors used in the evaluation, i - symbolizes the individual effects in the context of the economies, t - the period 2010-2022, and ε_{it} - symbolizes the expected error estimates.

RESULTS AND DISCUSSION

Analyzing the processed data as an initial conclusion, it can be concluded that the banking system in Kosovo and North Macedonia has resulted in a positive return on ROA and ROE during the observed period. This conclusion is based on descriptive statistics where it is observed that the average return for ROA is 1.655 and ROE is 13.314. This indicates that the regulatory authorities and the leadership structures of these institutions are aware of the dynamics of the financial market and risk exposure on an ongoing basis. Table 2 reflects the summary statistics. After analyzing it, we can underline some conclusions. Regarding the return (ROA and ROE), they have a positive return with 1.655, respectively 13.314, with a standard deviation of 0.38 percent, respectively 3.41 percent. This conclusion can be attributed to the strict regulations at the national level but also to the requirements of the European level.

Table 2: Summary Statistics (Source: Author's calculations)

	ROA	ROE	BCA	ATM	CBB	INF	GDP_G
Obs	26	26	26	26	26	26	26
Mean	1.655	13.314	10.221	42.016	19.449	2.634	3.191
Std.D	0.742	5.658	0.852	14.869	5.278	3.498	3.351
Min	0.380	3.410	8.063	23.371	11.403	-0.536	-6.111
Max	3.181	26.59	12.001	60.931	25.84	14.204	10.745

In the case of bank capital-to-assets, it is noted that there is a mean value of 10.221 with a standard deviation of 8.06 percent. From this, it can be concluded that both countries' banking systems are well-capitalized and can withstand possible financial shocks. Meanwhile, in using ATMs during the observed period, the mean value was 42,016, which shows a satisfactory inclusion. The lowest value of inclusion was in 2010 in Kosovo, with only 23.37, while the highest was achieved in 2015 in North Macedonia, with 60.93. Another parameter that is quite debatable in recent times is the expansion or reduction of commercial bank branches, which in our scenario has an average of 19,449 with a standard deviation of 5.27 percent. Furthermore, macroeconomic indicators have resulted in an average of 2.634 inflation respectively 3.191 GDP growth.

Table 3: Correlation Matrix (Source: Author's calculations)

	ROA	BCA	ATM	CBB	INF	GDP_G
ROA	1.0000					
BCA	0.2700	1.0000				
ATM	-0.4862	0.2081	1.0000			
CBB	-0.7034	0.0635	0.9141	1.0000		
INF	-0.0056	-0.0924	-0.0989	-0.1391	1.0000	
GDP_G	0.3136	-0.1049	-0.2989	-0.2832	0.0860	1.0000

A correlation coefficient analysis was performed to discover an interaction between the investigated parameters (see Tables 3 and 4). The discoveries of this research indicate that ROA has an important negative association with ATMs and CBBs ($\beta = -0.4862$ and $\beta = -0.7034$, respectively), compared to a positive interaction discovered within ROA, BCA, and GDP_G.

Table 4: Correlation Matrix (Source: Author's calculations)

	ROE	BCA	ATM	CBB	INF	GDP_G
ROE	1.0000					
BCA	0.1406	1.0000				
ATM	-0.5230	0.2081	1.0000			
CBB	-0.6884	0.0635	0.9141	1.0000		
INF	-0.0061	-0.0924	-0.0989	-0.1391	1.0000	
GDP_G	0.3344	-0.1049	-0.2989	-0.2832	0.0860	1.0000

This analysis was also applied with an additional motive to verify if the data have any concerns regarding multicollinearity. As stated by the authors Nguyen and Do (2020), these sorts of issues arise when the coefficients have a value of $\beta \geq 0.8$, and in our instance, the highest point of the

coefficient is β = -0.7. Therefore, this proves that we have no concerns about the design of our applied approaches. More importantly, the outcomes for ROE measures reinforce an argument about the causal connection between them and multicollinearity.

Apart from these tests, we employed the vector inflation factor (VIF) analysis to reinforce the data stability obtained by the GMM approach further. In cases where panel data is handled, the VIF analysis appears to be one of the most vital, and the outcomes of this analysis have a mean of 3.49, proving that the data do not have any of these concerns. Pituch and Stevens (2016, 75) emphasize that if the outcomes of this test (respectively the coefficient) are more than β ≥ 0.5, the data have multicollinearity obstacles. Beyond that, we incorporated Breusch-Pagan/Cook-Weisberg to determine if the data had a problem with heterogeneity, and the result is (ρ = 0.2826 for ROA, and ρ = 0.5679 for ROE), confirming that their value is more than α ≥ 0.05. Upon the performing of these inspection tests, the Wald test was performed to determine if the data adequately fitted the model (β = 95.18; ρ = 0.0000 for ROA metrics, β = 65.61; ρ = 0.0000 for ROE metrics). The results indicate that the data and the employed approach provide an excellent fit. Lastly, we employed the Sargan J-test to verify whether our review appropriately included the variables' instruments. The outcome should be insignificant.

The proof obtained from the evaluation in both instances resulted in a value higher than α ≥ 0.05, allowing us to conclude that the model is fit and sound.

Table 5: Empirical Results (Source: Author's calculations)

	GMM - ROA		GMM - ROE	
	β	ρ ≥ [z]	β	ρ ≥ [z]
BCA	0.1575	0.063	.4406	0.539
ATM	0.0554	0.002	.2767	0.061
CBB	-0.2437	0.000	-1.500	0.001
INF	-0.0332	0.078	-.2480	0.040
GDP_G	0.0181	0.325	.0853	0.604
_cons	2.4456	0.019	25.5818	0.004
Screening tests				
Observation	26	"_"	"_"	"_"
Wald chi2	95.18	0.0000	65.61	0.0000
χ^2-test	1.151	0.2826	0.331	0.5679
VIF Mean	3.49	"_"	3.49	"_"
Sargan J- test	17.167	0.8414	18.689	0.7683

Note: Significant, correspondingly, at 1, 5, also 10 percent.

As can be seen from the results of Table 5, of the five parameters applied in the investigation according to the first model (return on assets) with significant positive influence are BCA and ATMs, compared to the second model (return on equity) that we have a change where BCA and GDP_G positively influence. While negatively influencing the bank profitability are CBBs and INF in both approaches. The BCA coefficient (β = 0.1575, ρ = 0.063) proved statistical importance to ROA.

The outcome of this examination demonstrates that the greater this indicator, it will reflect the increase in banks' profitability. The results are consistent with the outcomes of Le and Ngo (2020), who employed the GMM technique to examine the banks of 23 countries with cross-sectoral data from 2002 to 2016. The authors discovered that BCA proved to have a considerable favorable

influence with a significance level of 99.9 percent. ATM usage appears to have an important positive effect on profitability, emphasizing that banks with the greatest number of ATMs may influence the reduction of operational costs, branch maintenance costs, human capital costs, and other associated costs. Based on the ATM coefficients ($\beta = 0.0554$, $\rho = 0.002$ for the ROA estimator, and $\beta = .2767$, $\rho = 0.061$ for the ROE estimator), the results obtained are comparable to the outcomes of the authors Akhisar et al. (2015) as well as Le and Ngo, (2020), who strongly advocate that the widespread utilization of ATMs affects the increase in profitability as a reflection of the reduction of operating costs on the one hand, and the use of bank cards as an innovative product.

The following component is CBBs, which significantly affect profitability based on tests performed and analysis. This inference has its foundation in the coefficient ($\beta = -0.2437$, $\rho = 0.000$ for ROA and $\beta = -1.500$, $\rho = 0.001$ for ROE), which at first indicates that a decrease in the number of branches by banks harms profitability. The phenomenon of commercial banks reducing branches in recent years is also represented in (Graphs 1 and 2), where there is a tendency to decrease in both countries. The findings presented here are consistent with those of Shuli, Yangran, and Yong (2022), who employed the Error Correction Model and the Granger casual assessment. Their conclusions demonstrate that minimizing CBBs and implementing Fintech harms profitability. Additionally, macroeconomic indicators, particularly inflation, revealed substantial negative consequences in both estimators, as demonstrated by the coefficients ($\beta = -0.0332$, $\rho = 0.078$, respectively $\beta = -.2480$, $\rho = 0.040$). Such an outcome was expected, considering that inflation increased at a record rate in the last two years (by 11.58 percent in Kosovo at the end of 2022 and 14.20 percent in North Macedonia at the end of 2022). The study's conclusions are consistent with the early evaluations of the authors Durguti et al. (2023) and Isayas (2023), who argue that any double-digit inflation rate increase harms profitability.

Finally, the GDP_G variable has been found to have an insignificant impact on profitability, as confirmed by the coefficients ($\beta = 0.0181$, $\rho = 0.325$, and $\beta = .0853$, $\rho = 0.604$). Findings for this variable contradict the conclusions of the authors, Isayas (2023) and Durguti (2020), who claim a beneficial connection between these two factors.

Distinctive Outcomes of Kosovo's and North Macedonia's Banking System

An identical empirical approach was employed via GMM to obtain the most accurate information about the degree of profitability of the banking system for each of the two distinct countries in the research. An additional motivation is to examine the countries in panels A and B independently and discover if the characteristics employed in the study reflect a difference between Kosovo and North Macedonia. As demonstrated by the information in Table 5, in Kosovo (Panel A), BCA, ATMs, and GDP_G have an important positive influence, whereas CBBs, even in the individual case, harm profitability. The discoveries of the ROE variable confirm a significant positive connection via BCA, ATMs, and bank profitability. Indeed, when the results of Table 4 are compared, there is no significant difference on the econometric side.

Table 5: Empirical Results for Panel A and B (Source: Author's calculations)

| | Panel A - GMM | | | | | Panel B - GMM | | | |
| | ROA | | ROE | | | ROA | | ROE | |
	β	ρ ≥ [z]	β	ρ ≥ [z]		β	ρ ≥ [z]	β	ρ ≥ [z]
BCA	0.4742	0.002	3.7596	0.024	BCA	0.6869	0.008	3.2582	0.079
ATM	0.2601	0.067	2.9634	0.069	ATM	0.1416	0.059	0.9454	0.090
CBB	-0.1631	0.036	-0.1890	0.816	CBB	0.0257	0.871	0.2038	0.878
INF	0.0529	0.269	0.6454	0.221	INF	0.1216	0.177	0.6385	0.047
GDP_G	0.0212	0.072	0.1906	0.441	GDP_G	0.0563	0.096	0.2768	0.542
_cons	6.7075	0.056	90.6618	0.101	_cons	0.9206	0.014	19.4583	0.093
Screening tests									
Obs	11	„‾"	11	„‾"	Obs	11	„‾"	11	„‾"
Wald chi2	67.33	0.0000	33.15	0.0000	Wald chi2	30.83	0.0001	22.41	0.0022
χ^2-test	2.722	0.0990	1.567	0.2111	χ^2-test	2.563	0.4546	2.642	0.4248
VIF Mean	2.22	„‾"	2.22	„‾"	VIF Mean	3.26	„‾"	3.26	„‾"
Sargan J-test	3.3625	0.9963	3.3679	0.9962	Sargan J-test	2.8751	0.9983	2.8378	0.9985

Note: Significant, correspondingly, at 1, 5, also 10 percent.

In North Macedonia, however, they proved a more substantial difference than the data reported in Table 4. According to the outcome of Panel B, it is evident that the predicted variable ROA drives an imperative connection between BCA, ATMs, and GDP_G. Conversely, Commercial bank branches have proven to be insignificant compared to the instance of Kosovo, as well as the conclusions displayed in Table 4. A further examination that supports Panel A's evidence and matches up to the instance of North Macedonia in terms of the dependent variable ROE has revealed significant positive associations between BCA, ATMs, and GDP_G.

CONCLUSION

The overall objective of this study was to examine the influence of determining parameters on the banking sector's profitability in Kosovo and North Macedonia, with a particular emphasis on the time frame from 2010 to 2022. The study employed a mixture of factors characterized as banking industry-specific and two macroeconomic features. This study provides a new theoretical and empirical insight in light of a shortage of literature on these two countries, particularly for decisive applied factors. Both dependent factors, ROA and ROE, were computed employing the GMM estimation method, whereas the explanatory factors, BCA, ATMs, CBBs, INF, and GDP_G, offered us a few essential statistical insights. The degree of importance and reliability of ROA, ROE, and other components involved in the study have been disclosed by the GMM. The examination revealed that BCA, ATMs, and GDP_G, according to both metrics (ROA and ROE), have a statistically positive important effect on profitability. In the meantime, the statistical examination of CBBs and INF exposed a statistically important adverse association versus return on assets and equity.

Furthermore, the study was more motivated to compare Kosovo and North Macedonia if the selected parameters might have caused notable differences between them. The outcomes reported in

Table 5 demonstrate that Kosovo's instance is almost entirely consistent with the results presented in Table 4. In contrast, the instance of North Macedonia differs slightly from the overall analysis in Table 4. This investigation's discoveries benefit various actors, including legislators, supervisory bodies, banking leadership structures, and other stakeholders. The study discoveries of each of these highlighted categories will be beneficial in explicitly recognizing the features that influence profitability. Undoubtedly, the paper has limits, highlighting that it only briefly comprises two countries. However, it analyzes it in a highly accurate method and assesses the tendency of these factors. Finally, the research recommends that future research incorporate additional financial ratios, such as specific and macroeconomic statistics, and include other countries with similar features. Those mentioned above will enable us to conduct even more accurate and long-term research on the factors that affect profitability.

COMPLIANCE WITH ETHICAL STANDARDS

Statement of Human Rights:

This article does not contain any studies with human participants performed by any authors.

Statement on the Welfare of Animals:

This article does not contain any studies with animals performed by any authors.

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