

THE IMPACT OF MACROECONOMIC FACTORS ON BANK PROFITABILITY: EVIDENCE FROM SELECTED SOUTHEAST EUROPEAN COUNTRIES

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ABSTRACT

This research investigates the impact of macroeconomic factors on aggregated banking sector profitability in nine Southeast European countries over the period from 2012 to 2021. The authors use panel data analysis to examine how GDP per capita, exchange rates, credit risk, competition, and inflation affect Return on Assets (ROA) and Return on Equity (ROE). The findings reveal a significant positive but non-linear relationship between GDP per capita and banking sector profitability, suggesting diminishing returns at higher levels of development. Possibly due to a heightened level of export competitiveness, exchange rates positively affect banking sector performance. Credit risk and competition exhibit negative effects, although they are statistically insignificant, while inflation has a minor negative effect. These results underscore the complexity and predominantly non-linear impact of macroeconomic fundamentals on banking sector profitability in transition economies. More specifically, this research contributes to the existing knowledge regarding the determinants of banking sector profitability in Southeast European countries and their implications for policy and practice. These insights are beneficial for bank management in emerging markets, policymakers, and academic researchers.

Keywords: Bank profitability, ROA, ROE, Southeast European banking, panel data analysis, bank performance determinants

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INTRODUCTION

There has been a considerable shift in the Southeast European banking sector as a result of government reforms in Southeast countries aimed at adapting to a market economy. Such changes must be analyzed in detail, as their consequences are significant for the banking industry and merit in-depth evaluation.

Bank profitability, defined as a bank's ability to generate profit relative to its revenues, costs, and invested capital, is a critical indicator of financial health and stability. Bank profitability not only affects bank performance but also plays a crucial role in maintaining the stability and efficiency of the broader financial system [1][2].

This paper examines the impact of macroeconomic variables on the profitability of banking sectors in nine Southeast European countries: Albania, Bosnia and Herzegovina, Cyprus, Greece, Moldova, Montenegro, North Macedonia, Serbia, and Turkey, over the period 2012–2021. The analysis focuses on two key profitability measures: Return on Assets (ROA) and Return on Equity (ROE). It investigates how these measures are influenced by various factors, including competition, credit risk, GDP per capita, inflation (GDP deflator), and exchange rates.

The research is structured around the following main objectives: to assess the strength and direction of the relationship between macroeconomic variables and banking sector profitability in the selected countries; to analyze how these macroeconomic variables affect banking sector profitability across countries and over time; to explore potential non-linear effects of macroeconomic variables on banking sector profitability, recognizing that these relationships may be more complex than simple linear correlations; and to contribute to the existing literature by providing a comprehensive and up-to-date analysis of the determinants of banking sector profitability in Southeast Europe.

This research uses a logical and comprehensive quantitative methodology and econometric techniques. It employs panel data analysis to capture both cross-sectional and time-series dimensions of the data. Additionally, several econometric techniques are applied, including pooled OLS, fixed effects, and random effects models, to ensure the reliability of the results.

The findings aim to provide valuable insights for policymakers, bank managers, and researchers interested in the dynamics of bank profitability in emerging markets. By identifying key macroeconomic determinants of banking sector profitability, this research can inform strategic decision-making in the banking sector and contribute to the development of effective economic policies in Southeast Europe.

LITERATURE REVIEW

A significant number of studies on profitability and factors affecting profitability highlight the importance of this parameter and its impact on banking sectors in Europe. Molyneux and Thornton [3] pioneered the study of European bank profitability determinants for the period from 1986 to 1989, considering sector-specific factors and inflation. Building on this work, Staikouras and Wood [4] examined EU bank profitability from 1994 to 1998 using OLS and fixed-effects models, highlighting the significant influence of macroeconomic factors.

Particularly relevant to this paper, Athanasoglou et al. [5] investigated bank-specific, industry, and macroeconomic determinants of profitability in Southeast Europe over the period 1998–2002. The authors found that concentration positively correlates with profitability and that inflation has a strong impact, while GDP per capita fluctuations showed no significant effect.

Expanding the geographical scope, Kiganda and Evans [6] studied the macroeconomic impacts on bank profitability in Kenya from 2008 to 2012. Their OLS results showed insignificant effects of GDP, inflation, and exchange rates on profitability, contrasting with some previous findings.

Furthermore, Kalaš et al. [7] examined Central and Southeast European banks over the period 2008–2015, finding that GDP and inflation positively impact ROA and ROE, with inflation having a stronger effect. Their study aligns more closely with the focus and timeframe of the present research.

This paper builds upon the existing literature by examining a more recent period (2012–2021) across nine Southeast European countries and incorporating additional variables such as credit risk and competition. It also explores potential non-linear relationships and applies advanced panel data techniques to provide deeper insights into the complex dynamics of bank profitability in this region.

RESEARCH METHODOLOGY

The conducted research utilizes quantitative panel data analysis to investigate the relationship between macroeconomic factors and banking sector profitability in selected Southeast European countries. The applied methodology employs established econometric techniques to ensure the reliability and robustness of the results.

The research design is based on a panel data framework, allowing for the examination of both cross-sectional and time-series dimensions of the data. As explained by Baltagi [8], this approach offers advantages such as increased degrees of freedom, reduced collinearity among explanatory variables, and the ability to control for individual heterogeneity.

Data for the selected variables were obtained from credible and publicly available sources:

- Dependent variables (ROA and ROE) were obtained from the International Monetary Fund's Financial Soundness Indicators Database [9].
- Macroeconomic variables—GDP per capita in current USD, inflation (GDP deflator), and exchange rate—were obtained from the World Bank's World Development Indicators [10].
- Banking variables—credit risk—were obtained from the IMF's Financial Soundness Indicators Database [9], while competition (HHI) was obtained from the World Integrated Trade Solutions database [11].

The analyzed sample comprises nine Southeast European countries over the period 2012–2021, resulting in a balanced panel of 90 observations, similar to the approach used by Staikouras and Wood [4].

The following variables were selected based on theoretical relevance and existing literature:

Dependent variables:

- Return on Assets (ROA), defined as the ratio of net income to total assets
- Return on Equity (ROE), defined as the ratio of net income to shareholders' equity

Independent variables:

- GDP per capita as a proxy for overall economic well-being
- Inflation (GDP deflator), as it measures price changes in the economy
- Exchange rate, defined as the value of the local currency against the US dollar
- Credit risk, measured as the ratio of non-performing loans to total loans
- Competition, measured using the Herfindahl–Hirschman Index (HHI)

The research is guided by one main research question and several secondary questions accompanied by related hypotheses:

Main research question:

How do macroeconomic variables and conditions impact banking sector profitability in selected Southeast European countries?

Sub-questions and hypotheses:

RQ1: What are the strength and direction of relationships between macroeconomic variables and banking sector profitability?

- *H1a:* There is a positive correlation between GDP per capita and banking sector profitability.
- *H1b:* There is a negative correlation between credit risk and banking sector profitability.
- *H1c:* There is a negative correlation between inflation and banking sector profitability.

RQ2: How do macroeconomic variables influence banking sector profitability across different countries and over time?

- *H2a:* Higher GDP per capita leads to increased banking sector profitability.
- *H2b:* Higher credit risk negatively impacts banking sector profitability.
- *H2c:* Competitive pressures reduce profitability due to tighter margins.
- *H2d:* Exchange rate volatility negatively affects banking sector profitability.
- *H2e:* Inflation has a non-linear impact on banking sector profitability.

RQ3: Do macroeconomic variables exhibit non-linear effects on banking sector profitability?

Following Wooldridge's recommendations [12], the dataset was cleaned and prepared for analysis. Z-score normalization was applied to address differences in units and scales across variables, as described by Gujarati and Porter [13]. After normalization, descriptive statistics and correlation analysis provided insights into variable relationships and addressed potential multicollinearity issues.

The econometric model is based on the research of Greene [14] and Asteriou and Hall [15]:

$$Y_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 INF_{it} + \beta_3 EXC_{it} + \beta_4 CR_{it} + \beta_5 HHI_{it} + \mu_i + \varepsilon_{it}$$

where:

Y_{it} represents the dependent variable (ROA or ROE) for country i at time t ;

GDP_{it} represents GDP per capita;

INF_{it} represents the inflation GDP deflator;

EXC_{it} represents the exchange rate;

CR_{it} represents credit risk;

HHI_{it} represents the competition measure;

μ_i denotes unobserved country-specific effects;

ε_{it} denotes the error term.

Following the approach of Croissant and Millo [16], the authors employ pooled OLS, fixed effects, and random effects models. Diagnostic tests, including the Breusch–Pagan Lagrange Multiplier test and the Hausman test, were used to select between these models [17].

To account for non-linear effects and interaction terms, squared terms for inflation and interaction terms between GDP per capita and other macroeconomic variables were introduced.

The performed robustness checks include the Breusch–Pagan test for heteroskedasticity, the Wooldridge test for autocorrelation, the Pesaran CD test for cross-sectional dependence, and the Im–Pesaran–Shin test for unit roots. Based on these tests, the authors implement robust standard errors, Driscoll–Kraay standard errors, alternative model specifications with lagged independent variables, and subsample analyses for different periods. These robustness checks follow the widely accepted recommendations of Angrist and Pischke [18] and Verbeek [19], thereby improving the credibility of the results.

Data analysis was conducted using R statistical software (version 4.1.0) [20] and the packages *plm*, *lmtest*, and *pcse*.

The authors acknowledge that potential research limitations may arise from omitted variable bias and endogeneity issues; however, these concerns are mitigated through careful variable selection and rigorous robustness checks. Finally, ethical considerations are upheld by using publicly available data and ensuring the confidentiality of any sensitive information.

RESEARCH RESULTS AND FINDINGS

The key findings from the panel data analysis of macroeconomic determinants of banking sector profitability in selected Southeast European countries over the period from 2012 to 2021 are presented in this section. The findings are organized to systematically address the research questions and hypotheses.

Table 1 presents the descriptive statistics of the selected variables. The results reveal substantial variation in both dependent and independent variables across the sample. ROA and ROE exhibit considerable fluctuations (ROA: mean = 0.89, SD = 0.95; ROE: mean = 7.42, SD = 8.13), indicating diverse profitability levels among banks in the region. This variability is consistent with the findings of Staikouras and Wood [4], who observed similar heterogeneity in European bank profitability.

Table 1: Descriptive Statistics of Original and Normalized Variables

Variable	Original Values							Normalized Values						
	Mean	SD	Median	Min	Max	Skew.	Kurt.	Mean	SD	Median	Min	Max	Skew.	Kurt.
Dependent Variables														
ROA	0.70	1.32	0.95	-4.60	2.95	-1.72	3.86	0.00	0.95	0.22	-2.55	1.93	-0.52	-0.35
ROE	3.66	13.49	6.44	-63.96	20.13	-3.06	11.32	-0.00	0.95	0.19	-2.63	1.77	-0.56	-0.51
Independent Variables														
Credit Risk	14.40	11.11	11.15	2.64	47.75	1.29	1.00	-0.00	0.95	-0.19	-1.89	2.37	0.17	-1.12
GDPpc	10,327.91	7,816.56	6,736.97	2,749.55	32,745.84	1.36	0.56	-0.00	0.95	-0.24	-1.69	2.16	0.46	-0.70
Inflation GDP Deflator	3.19	4.50	1.78	-2.05	28.97	2.75	11.08	0.00	0.95	-0.17	-1.65	2.62	0.71	0.08
Exchange Rate	32.05	42.89	3.33	0.75	125.96	1.00	-0.68	0.00	0.95	0.05	-1.65	1.97	-0.26	-1.17
Competition	0.09	0.06	0.07	0.03	0.25	1.22	0.12	-0.00	0.95	-0.19	-2.11	2.53	0.25	-0.61

Source: Authors' calculations

Figure 1 illustrates the correlation matrix of the analyzed variables. The most notable findings include the following:

- There is a strong positive correlation (0.94) between ROA and ROE, as expected and consistent with previous studies [4, 15].
- There is a moderate positive correlation between GDP per capita and both ROA (0.43) and ROE (0.35), supporting hypothesis H1a and confirming the findings of Anbar and Alper [21].
- There is a negative correlation between credit risk and profitability measures (ROA: -0.49; ROE: -0.43), aligning with hypothesis H1b and the results of Kalaš et al. [7].
- There is a weak negative correlation between inflation and profitability, partially supporting hypothesis H1c, although the effect is less pronounced than in previous studies.

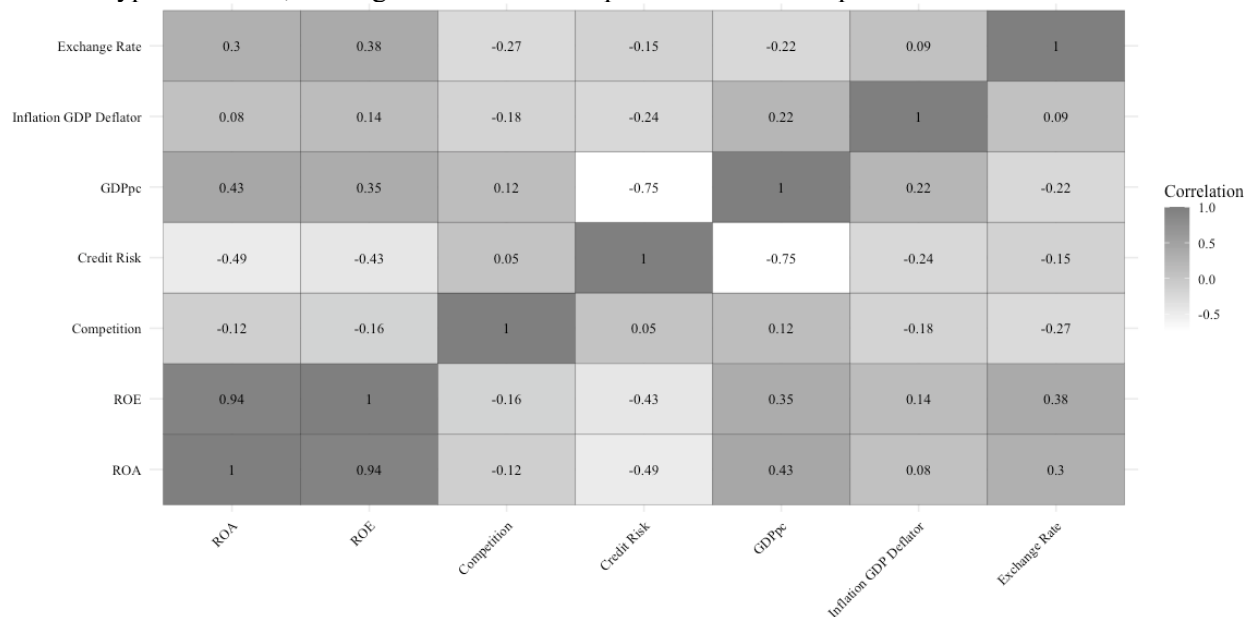


Figure 1: Correlation Heatmap

Based on the diagnostic tests, the random effects model was deemed the most appropriate specification for both ROA and ROE analyses, consistent with the approach adopted by Horobet et al. [22]. Table 2 presents the results of the panel data regression analysis.

Table 2: Panel Data Regression Results (Random Effects Model)

Variable	ROA Estimate (Std. Error)	ROE Estimate (Std. Error)
Constant	4.33e-17 (0.0828)	-1.93e-16 (0.0830)
Competition	-0.0898 (0.0928)	-0.0996 (0.0931)
Credit Risk	-0.1078 (0.1536)	-0.0170 (0.1541)
GDP per Capita	0.4588*** (0.1570)	0.4576*** (0.1575)
Inflation GDP Deflator	-0.0969 (0.0919)	-0.0173 (0.0922)
Exchange Rate	0.3680*** (0.1049)	0.4566*** (0.1052)
R-squared	0.3608	0.3568
Adjusted R-squared	0.3228	0.3185
Chi-square	47.4216***	46.5865***
Observations	90	90
Number of Countries	9	9

Notes: 1. Standard errors are shown in parentheses. 2. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Source: Authors' calculations

Key findings from the regression analysis include the following:

- *GDP per capita*: A significant positive impact on both ROA and ROE ($\beta \approx 0.46$, $p < 0.01$), confirming hypothesis H2a and aligning with the findings of Topak and Talu [23].
- *Credit risk*: A negative but statistically insignificant impact, contradicting hypothesis H2b and the findings of Klein [24].
- *Competition (HHI)*: A negative but insignificant impact, refuting hypothesis H2c and differing from the results reported by Yüksel et al. [25].
- *Exchange rate*: An unexpected but statistically significant positive impact (ROA: $\beta = 0.3680$; ROE: $\beta = 0.4566$; $p < 0.001$), contrary to hypothesis H2d, suggesting that currency depreciation may enhance banking sector profitability.
- *Inflation*: A negative but statistically insignificant impact, providing no support for hypothesis H1c and contrasting with the findings of Kanwal et al. [26].

Figure 2 visualizes the relationships between the independent variables and predicted ROA and ROE. The observed non-linear patterns, particularly for inflation and GDP per capita, support the inclusion of squared terms in the model and are consistent with selected previous findings [27].

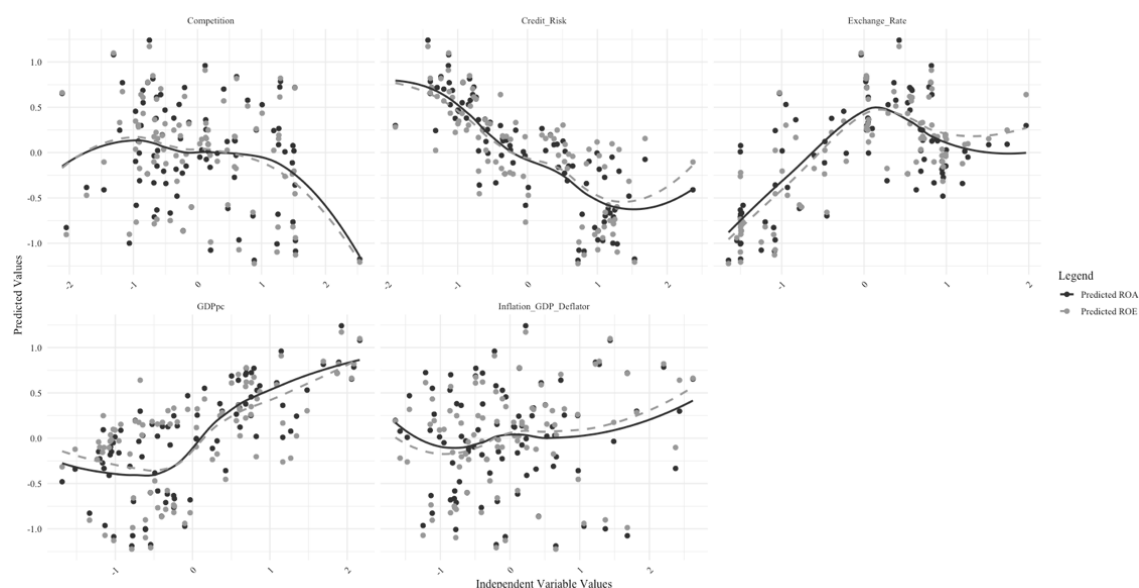


Figure 2: Panel Data Random Effects Model – Predicted ROA across Independent Variables

Table 3 presents the regression results incorporating non-linear terms and interaction effects, thereby addressing research question RQ3 and hypothesis H2e.

Table 3: Regression Results with Non-linear Terms and Interaction Effects for ROA and ROE

Variable	ROA Estimate (Std. Error)	ROE Estimate (Std. Error)
Competition	-0.105 (0.092)	-0.115 (0.093)
Credit Risk	-0.058 (0.156)	0.038 (0.157)
GDP per Capita	0.580*** (0.169)	0.579*** (0.170)
Inflation GDP Deflator	-0.052 (0.093)	0.023 (0.094)
Exchange Rate	0.404*** (0.108)	0.497*** (0.108)
GDP per Capita Squared	-0.016652	-0.171 (0.092)
Competition x Credit Risk	-0.042 (0.084)	-0.011 (0.085)
Constant	0.165 (0.116)	0.155 (0.117)
Observations	90	90
R-squared	0.391	0.383
Adjusted R-squared	0.339	0.33
F Statistic	52.689***	50.838***

Notes: 1. Standard errors are shown in parentheses. 2. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Source: Authors' calculations

The inclusion of squared terms for GDP per capita and interaction terms between competition and credit risk reveals several important insights:

- *GDP per capita*: A non-linear relationship with ROA (squared term $\beta = -0.181$, $p < 0.05$), indicating diminishing profitability effects at higher levels of economic development.
- *Linear terms*: GDP per capita and exchange rates retain strong positive significance ($p < 0.001$) for both ROA and ROE, reinforcing the findings of the baseline model.
- *Competition–credit risk interaction*: A negative but statistically insignificant effect, suggesting largely independent impacts on profitability.
- *Model fit*: A slight improvement following the inclusion of non-linear and interaction terms (R^2 increases from 0.361 to 0.391 for ROA and from 0.357 to 0.383 for ROE).

Contrary to hypothesis H2e, inflation does not exhibit significant non-linear effects, which contrasts with previous studies such as Durguti [28]. Exchange rates remain statistically significant, suggesting a relatively direct relationship with banking sector profitability.

These findings underscore the complex nature of banking sector profitability determinants in Southeast Europe, emphasizing the need for nuanced econometric models capable of capturing non-linear relationships and interaction effects. Future research could explore additional non-linear specifications or potential threshold effects.

Figures 3a and 3b present fitted-versus-residuals plots and coefficient estimates with error bars, respectively. These visualizations support the validity of the estimated models and facilitate a clearer comparison of effect sizes across variables.

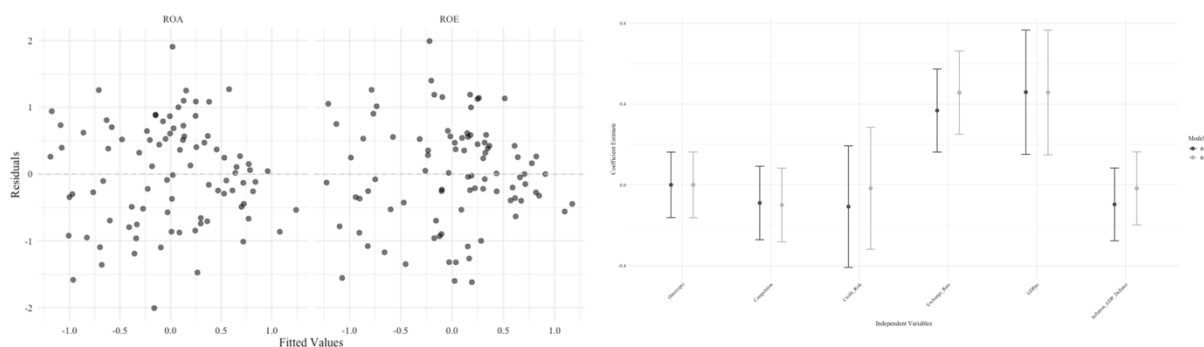


Figure 3a (left): ROA and ROE – Fitted vs. Residuals plots

Figure 3b (right): Coefficient estimates with error bars for ROA and ROE

The robustness checks largely confirm the main findings, including those based on Driscoll–Kraay standard errors and lagged independent variables. Subsample analyses reveal temporal variations in the estimated relationships, particularly in the period following the global financial crisis, echoing the findings of Andrieu et al. [29] regarding the impact of financial crises on bank profitability in the region.

Overall, the results provide strong evidence of the significant impact of macroeconomic factors—particularly GDP per capita and exchange rates—on banking sector profitability in Southeast European countries. The findings further highlight the complex and often non-linear nature of these relationships,

underscoring the importance of accounting for both direct and interaction effects in profitability models. By doing so, this research contributes to the existing literature by offering a more comprehensive understanding of the factors shaping bank profitability in Southeast European economies.

DISCUSSION

The conducted analysis demonstrates a significant positive impact of GDP per capita on ROA and ROE, thereby confirming hypothesis H2a and aligning with previous research [23]. However, the diminishing effect indicated by the squared GDP term suggests plateauing benefits at more advanced stages of economic development. Credit risk and competition exhibit negative but statistically insignificant impacts on profitability, contradicting hypotheses H2b and H2c and diverging from some previous findings [24, 25]. This may indicate the presence of effective risk mitigation strategies or unique competitive dynamics within the region.

Contrary to hypothesis H2d, exchange rates exert a positive impact on profitability, suggesting potential benefits arising from currency depreciation. Inflation's statistically insignificant negative effect does not support hypothesis H1c, contrasting with earlier studies [26] and potentially reflecting the resilience of Southeast European banks to inflationary pressures.

The inclusion of non-linear terms improves model accuracy, emphasizing their importance in profitability modeling. Moreover, the statistically insignificant interaction between competition and credit risk suggests that these factors operate largely independently within the analyzed context.

Overall, these findings underscore the complex nature of banking sector profitability determinants in Southeast Europe, with GDP per capita and exchange rates emerging as key drivers. The results highlight the need for adaptive strategies in transitioning markets and provide valuable insights for both policymakers and bank managers. Future research could further explore the temporal evolution of these dynamics and their responses to economic shocks in emerging markets.

CONCLUSION

This paper examined the impact of macroeconomic variables on banking sector profitability in nine Southeast European countries over the period from 2012 to 2021 and yielded several significant findings.

- GDP per capita emerged as a key driver of banking sector profitability, exhibiting a positive but non-linear relationship with ROA and ROE. This indicates that economic development enhances bank profitability, albeit with diminishing returns at higher levels of development.
- Exchange rates, contrary to initial expectations, demonstrated a statistically significant positive impact on profitability. This suggests that currency depreciation may enhance banking sector profitability in these economies, potentially due to increased export competitiveness.
- Credit risk and competition exhibited negative but statistically insignificant impacts on profitability, diverging from some previous studies and suggesting the presence of effective risk management practices within the region.
- Inflation had a weak and statistically insignificant negative impact on profitability, contrasting with earlier research and indicating a degree of resilience of Southeast European banks to inflationary pressures.

These results highlight the complex and non-linear nature of macroeconomic influences on banking sector profitability in transitioning economies. They also differ from certain previous studies, emphasizing the distinctive characteristics of the Southeast European banking sector.

Despite the comprehensive nature of this study, several gaps in understanding remain. Future research could examine the temporal evolution of these relationships, particularly in response to economic shocks, investigate potential threshold effects in the relationship between GDP per capita and profitability, explore the mechanisms through which exchange rate fluctuations positively affect profitability, and analyze the role of bank-specific factors in moderating the impact of macroeconomic variables.

In conclusion, this research contributes to a more comprehensive understanding of the determinants of banking sector profitability in Southeast Europe, underscoring the need for nuanced, region-specific approaches in both academic research and policy formulation.

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