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NON-PERFORMING LOANS AND SELECTED INDICATORS OF BANKING SECTOR RESILIENCE IN REPUBLIC OF SRPSKA: A DESCRIPTIVE-COMPARATIVE ANALYSIS

НЕКВАЛИТЕТНИ КРЕДИТИ И ОДАБРАНИ ПОКАЗАТЕЉИ ОТПОРНОСТИ БАНКАРСКОГ СЕКТОРА РЕПУБЛИКЕ СРПСКЕ: ДЕСКРИПТИВНО-КОМПАРАТИВНА АНАЛИЗА

Summary: *In a dynamic macrofinancial environment, non-performing loans (NPLs) indicate realized deterioration in asset quality. This paper descriptively examines NPL ratios and selected banking-sector resilience indicators in Republic of Srpska in 2020–2025, comparing NPL trends with the Federation of Bosnia and Herzegovina and the EU/EEA aggregate. Official banking-agency reports and EBA publications provide the data. The NPL ratio declined from 5.2% to 3.0% in Republic of Srpska, from 6.4% to 2.3% in the Federation of Bosnia and Herzegovina and from 2.6% to 1.8% in the EU/EEA aggregate. The domestic comparator reveals comparatively slower improvement in Republic of Srpska in 2024–2025, even as the gap with the European aggregate narrowed. The integrated assessment of the NPL ratio, NPL coverage, capital adequacy, and profitability as Indicators of Banking Sector Resilience identifies that the temporary deterioration in the NPL ratio observed in 2024 as a monitoring signal, not evidence of-persistent sector-wide instability. Differences in aggregate coverage limit strict cross-system comparability.*
Keywords*: non-performing loans, asset quality, banking sector resilience, credit risk, supervisory monitoring,*
JEL classification*: G21, G28, G33, F30*

Резиме: *У динамичном макрофинансијском окружењу неквалитетни кредити (НПЛ) указују на већ материјализовано погоршање квалитета активе. У раду се дескриптивно анализирају стопа НПЛ-а и одабрани показатељи отпорности банкарског сектора Републике Српске у периоду 2020–2025, уз поређење са Федерацијом Босне и Херцеговине и агрегатом ЕУ/ЕЕА. Коришћени су подаци надлежних агенција за банкарство и публикација ЕБА. Стопа НПЛ-а смањена је са 5,2% на 3,0% у Републици Српској, са 6,4% на 2,3% у ФБиХ и са 2,6% на 1,8% у ЕУ/ЕЕА. Домаће поређење открива релативно спорије побољшање у Републици Српској током 2024–2025, упркос смањењу разлике у односу на европски агрегат. Заједничко тумачење показатеља НПЛ, са покривености НПЛ-а, капитане адекватности, и профитабилности као индикатора отпорности банкарског сектора, показује да је привремено погоршање НПЛ показатеља 2024. сигнал за праћење, а не доказ трајне нестабилности сектора. Разлике у обухвату агрегата ограничавају директну упоредивост.*
Кључне ријечи: *неквалитетни кредити, квалитет активе, отпорност банкарског сектора, кредитни ризик, супервизорско праћење*
ЈЕЛ класификација*: G21, G28, G33, F30.*

INTRODUCTION

Credit portfolio quality directly affects income, impairment charges, capital, and a bank's capacity to finance the economy. The non-performing loan (NPL) ratio is therefore a key asset-quality indicator. NPLs generally capture credit risk only after the deterioration in repayment capacity has already materialized through default status or another criterion for classification as a non-performing exposure. An increase in the ratio may be the first observable consequence of weaker debt-servicing performance, an adverse macroeconomic environment, or deficiencies in loan origination and monitoring. The interpretation of the NPL indicator requires consideration of its relationship with expected credit loss coverage,

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capital adequacy, profitability, liquidity, and developments in the loan portfolio (European Banking Authority 2018; European Central Bank 2017).

The empirical literature shows that macroeconomic and bank-specific factors drive NPL dynamics. Weak growth, unemployment, interest burdens, and borrower indebtedness may impair debt service, while portfolio composition, lending standards, profitability, and capital affect bank resilience (Louzis, Vouldis, and Metaxas 2012; Beck, Jakubik, and Piloiu 2015; Makri, Tsagkanos, and Bellas 2014). Evidence from European Union countries also indicates that macroeconomic and macrofinancial variables may precede changes in NPLs, supporting their use in early-warning systems, though cross-country and business-model differences warrant caution (Staehr and Uusküla 2021). A recent systematic review of 76 studies confirms that NPLs have no single cause: macroeconomic, bank-specific, and sectoral factors shape their dynamics, so vulnerability signals must be interpreted with other indicators (Alnabulsi, Kozarević, and Hakimi 2023).

The relationship also operates in the opposite direction. Accumulated problem loans tie up managerial and capital resources, reduce the capacity for new lending, and may reinforce the adverse feedback loop between the banking sector and the real economy (Nkusu 2011; Tölö and Virén 2021). At the individual-bank level, their effect on credit supply depends on the capital position and the approach to portfolio management (Gjeçi, Marinč, and Rant 2023). For a small open economy, it is therefore important to distinguish a temporary deterioration from a trend that spreads to NPL coverage, capital, and profitability.

Research on Bosnia and Herzegovina further shows that NPL dynamics are associated with both macroeconomic and bank-specific determinants. Kozarić and Žunić-Dželihodžić (2019) analyze the relationship between NPLs and the financial stability of the banking sector in Bosnia and Herzegovina, while Agić and Jeremić (2018), using quarterly aggregate data for the period 2006–2016, identify associations between NPLs and unemployment, inflation, ROA, and credit growth. Žunić, Kozarić, and Žunić-Dželihodžić (2021) examine the determinants of NPLs and the lagged effects of the COVID-19 pandemic, Džidić, Živko, and Čolak (2022) apply an ARDL approach to quarterly data for 2005–2019, while Alihodžić (2022) investigates the internal and external determinants of NPLs over the period 2008Q1–2020Q4. This literature confirms that asset quality in Bosnia and Herzegovina cannot be explained by a single variable or solely by the level of NPLs.

The regulatory framework distinguishes ongoing risk management, bank recovery, early intervention, and resolution. The guidelines on the management of non-performing and forborne exposures require a strategy, an operational plan, and reliable monitoring, while recovery plan indicators support the timely identification of stress and activation of appropriate recovery options (European Banking Authority 2018; 2021a). The European recovery and resolution framework for credit institutions bases decisions on a broader set of conditions rather than on a single asset-quality ratio (European Parliament and Council of the European Union 2014). The NPL ratio is therefore a trigger for assessment and escalation of supervisory monitoring, not a stand-alone legal or economic criterion for restructuring.

Republic of Srpska is examined as a small open economic and banking system within Bosnia and Herzegovina. The unit of analysis is the aggregate of banks covered by the reporting framework of the Banking Agency of Republic of Srpska. The Federation of Bosnia and Herzegovina serves as a closer domestic comparator, while the EU/EEA aggregate provides a broader European reference, not a normative, threshold or a fully comparable banking system.

The aim is to assess the evolution of the NPL ratio and selected resilience indicators (NPL coverage, regulatory capital, ROAA, and ROAE) in Republic of Srpska over 2020–2025 and compare NPL dynamics with the Federation of Bosnia and Herzegovina and the

EU/EEA aggregate. The research question is: how did asset quality and the selected resilience indicators evolve, and how does the choice of comparator affect interpretation of NPL dynamics?

The analysis uses six annual observations and draws descriptive, not causal, conclusions. A related study assessed a broader set of supervisory indicators for the banking sector of Republic of Srpska in 2020–2024 and identified the 2024 deterioration in NPL coverage as a reason for enhanced monitoring, without finding evidence of sector-wide distress (Vujičić-Stefanović 2026). The present paper extends the analysis to 2025 and systematically compares NPL dynamics with two benchmarks—the Federation of Bosnia and Herzegovina and the EU/EEA aggregate—to examine how the choice of comparator affects the interpretation of asset-quality developments. The contribution a two-level comparative interpretation of the 2020–2025 NPL dynamics: the Federation of Bosnia and Herzegovina provides a closer institutional comparator, whereas the EU/EEA aggregate supplies broader context. Combining NPL dynamics with coverage, capital–and profitability highlights the distinction between a temporary sector-level warning and persistent multi-indicator deterioration. The analysis does not identify causes or assess the condition of individual banks.

1. METHODOLOGY

1.1. Research Design and Data Sources

The study uses a non-experimental descriptive-comparative design based on publicly available official secondary data. The primary unit of analysis is the aggregate banking sector of Republic of Srpska, comprising the banks covered by the reports of the Banking Agency of Republic of Srpska. Two reference levels are used for comparison of the NPL ratio: the banking sector of the Federation of Bosnia and Herzegovina, as reported by the Banking Agency of the Federation of Bosnia and Herzegovina, and the EU/EEA banking aggregate reported in publications of the European Banking Authority (EBA). The 2020–2025 period covers the pandemic shock, the normalization of business activity, the period of rising interest rates, and the latest available annual observation. The data refer to year-end positions.

For Republic of Srpska, annual reports of the Banking Agency of Republic of Srpska for 2021, 2023, and 2025 were used; they also provide comparative data for earlier years (Banking Agency of Republic of Srpska 2022; 2024; 2026). For the Federation of Bosnia and Herzegovina, data from the Banking Agency of the Federation of Bosnia and Herzegovina as of year-end 2022, 2024, and 2025 were used (Banking Agency of the Federation of Bosnia and Herzegovina 2023; 2025; 2026). The EU/EEA designation refers to a weighted aggregate of the sample of banks which, measured by total assets, covers more than 80% of the EU/EEA banking sector. It does not represent a census of all banks, an average across countries, or an average of national banking systems. The comparisons therefore serve a descriptive rather than a normative purpose.

1.2. Indicators

The main indicator is the gross NPL ratio, defined as gross non-performing loans divided by total gross loans and multiplied by 100. In the reports of the Banking Agency of Republic of Srpska, non-performing loans correspond to credit exposures classified in credit risk stage 3. Reports of the Banking Agency of the Federation of Bosnia and Herzegovina

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also identify NPLs and the loan portfolio within credit risk stage 3, making this entity-level banking system a methodologically closer comparator than the EBA aggregate, although differences in portfolio and market structure remain. Comparative gaps are calculated as the NPL ratio of Republic of Srpska minus the corresponding ratio for the Federation of Bosnia and Herzegovina or the EU/EEA and are expressed in percentage points. Changes over the period are presented as both absolute and relative changes compared with the initial year, and the differences serve an exclusively descriptive purpose. For contextual assessment, the analysis uses the NPL coverage ratio based on expected credit losses, the regulatory capital ratio, return on average assets (ROAA), and return on average equity (ROAE). Resilience in this paper is assessed descriptively through the joint dynamics of asset quality, loss coverage, capitalization, and profitability. NPL coverage indicates the share of the problem portfolio absorbed by recognized loss allowances; regulatory capital measures the capacity to absorb unexpected losses; and ROAA and ROAE capture the capacity to generate earnings. These indicators do not provide an institution-specific diagnosis, but they reduce the risk of interpreting the NPL ratio in isolation.

1.3. Analytical Method and Assessment Criteria

Descriptive statistics, comparative analysis, and trend analysis were applied. For each year, the NPL ratios of Republic of Srpska, the Federation of Bosnia and Herzegovina, and the EU/EEA aggregate were compared and the gap was calculated; the initial and final levels, direction of change, and temporary deviations were then analyzed. All reported calculations are based on values obtained from the cited institutional sources and can be reproduced using the data presented in the paper. The strength of the sector-level warning signal is assessed descriptively by examining whether a deterioration in NPLs occurs simultaneously with weaker NPL coverage, capitalization, or profitability. Recovery, early intervention, and restructuring are not assessed on the basis of this set of aggregate data.

1.4. Research Limitations and Transparency

The comparison has three main limitations. First, although the banking sectors of Republic of Srpska and the Federation of Bosnia and Herzegovina operate in a closer institutional setting, they differ in size, portfolio structure, concentration and bank composition; the EBA EU/EEA weighted sample is still less directly comparable. Second, sectoral aggregates conceal heterogeneity between banks, customers and portfolios. Third, six annual observations are insufficient for causal inference, formal hypothesis testing or estimating bank-specific restructuring probabilities. Consequently, findings concern descriptive sector-level monitoring and cannot establish whether any individual institution needs recovery, early intervention or resolution.

2. RESULTS

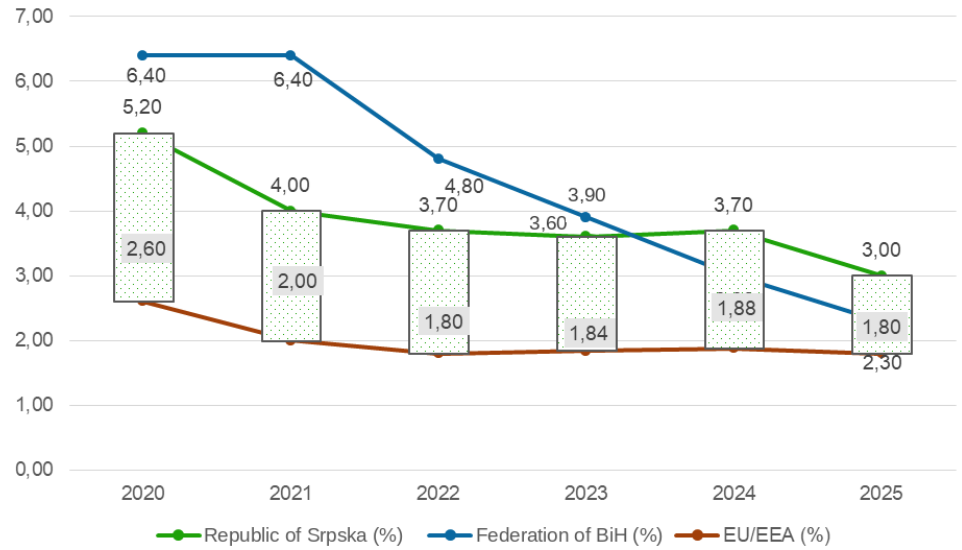
2.1. NPL Ratios in Republic of Srpska, the Federation of Bosnia and Herzegovina and the EU/EEA

Figure 1 shows a pronounced decline in the NPL ratio in both entity-level banking systems, while the European aggregate remained at a lower level throughout the entire period. In Republic of Srpska, the ratio decreased from 5.2% in 2020 to 3.0% in 2025, corresponding to a decline of 2.2 percentage points or 42.3%. In the Federation of Bosnia and Herzegovina,

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it fell from 6.4% to 2.3%, a decrease of 4.1 percentage points or 64.1%. In the EU/EEA aggregate, the decline amounted to 0.8 percentage points, from 2.6% to 1.8%, or 30.8%. The gap between Republic of Srpska and the EU/EEA narrowed from 2.6 to 1.2 percentage points. Compared with the Federation of Bosnia and Herzegovina, Republic of Srpska recorded a lower NPL ratio from 2020 to 2023, whereas, following the stronger improvement in the Federation of Bosnia and Herzegovina, its NPL ratio was 0.7 percentage points higher in both 2024 and 2025.

Figure 1. Comparative Trends in NPL Ratios in Republic of Srpska, the Federation of Bosnia and Herzegovina and the EU/EEA Aggregate, 2020–2025 (%)



Source: Author's compilation based on the Banking Agency of Republic of Srpska 2023; 2026; the Banking Agency of the Federation of Bosnia and Herzegovina 2023; 2025; 2026, the European Banking Authority 2024; 2025

The domestic comparison alters the interpretation of the trend. Republic of Srpska recorded a 0.1 percentage-point increase in the NPL ratio in 2024, unlike the contemporaneous reduction in the Federation of Bosnia and Herzegovina. Although the ratio improved in Republic of Srpska in 2025, it remained higher than in the Federation of Bosnia and Herzegovina. The temporary increase in 2024 alone does not establish a persistent deterioration predict future stress.

3.2. NPL Coverage, Capitalization, and Profitability

The supplementary indicators do not point to a simultaneous weakening across the observed dimensions of sectoral resilience. The regulatory capital ratio ranged from 19.2% to 21.1% and stood at 20.8% in 2025, well above the 12% regulatory minimum reported by the Agency. At the aggregate level, this confirms the stability of the stated sector-level indicator, but it does not allow an assessment of protective buffers, additional supervisory requirements, or the available capital headroom of individual banks. Profitability improved: ROAA increased from 0.6% to 2.4%, and ROAE from 5.1% to 16.8%. The slight decline in ROAE in 2025 relative to 2024 was accompanied by neither a decline in ROAA nor a deterioration in the NPL ratio.

Table 1 Supplementary Indicators for the Banking Sector of Republic of Srpska, 2020–2025 in (%)

Year	NPL coverage ratio	Regulatory capital ratio	ROAA	ROAE
2020	80.8	19.3	0.6	5.1
2021	81.6	19.2	1.3	10.4
2022	73.5	20.2	1.5	11.9
2023	75.6	21.0	2.0	14.9
2024	71.4	21.1	2.4	17.7
2025	78.8	20.8	2.4	16.8

Note: The 2020–2024 observations for these indicators also appear in Vujičić-Stefanović 2026; the 2025 observations extend the series.

Source: Author's compilation based on Banking Agency of Republic of Srpska 2023 and Bankng Agency of Republic of Srpska 2026

NPL coverage was more volatile. It increased from 80.8% in 2020 to 81.6% in 2021, declined to 73.5% in 2022, partially recovered in 2023, and fell to 71.4% in 2024. The developments in 2024 warrant particular attention: the NPL stock increased by 13.1%, the ratio by 0.1 percentage points, and NPL coverage declined by 4.2 percentage points (Banking Agency of Republic of Srpska 2022, 2024, 2026). In 2025, the NPL stock declined by 12.2%, the ratio by 0.7 percentage points, and NPL coverage increased by 7.4 percentage points to 78.8%. Evidence from a European sample shows that NPL coverage often does not adjust at the same pace as deteriorating asset quality and that stronger capitalization supports higher coverage; the two protective layers should therefore be viewed as complementary (Alessi et al. 2021). The combination of indicators confirms that the 2024 warning was relevant for monitoring but did not persist as a cumulative sector-wide deterioration.

3. DISCUSSION

3.1. Interpretation of the Trend and the European Comparison

Comparing with the EU/EEA aggregate indicates a narrowing, but still positive, NPL gap. Because the European benchmark covers a different sample and market structure, the remaining gap cannot be interpreted as a regulatory shortfall. The more informative analytical question is whether domestic asset quality is improving consistently with the closer domestic comparator and with other protective indicators.

The Federation of Bosnia and Herzegovina offers a closer comparison, but not an identical banking system. Its faster NPL reduction changed the relative ranking of the two entity-level sectors 2024–2025. Thus, apparent convergence with the EU/EEA aggregate can coexist with weaker relative progress against a domestic peer; the two benchmarks answer different questions and neither is a supervisory threshold.

The decline in NPLs alongside stable capital and rising profitability is consistent with findings that the consequences of problem loans depend on a bank's capacity to absorb losses and continue lending (Tölö and Virén 2021; Gjeçi, Marinč, and Rant 2023). Evidence from a sample of up to 521 banks in 21 European countries shows that stronger capital and profitability mitigate the constraining effect of NPLs on credit expansion (Thornton and Di Tommaso 2021). The 2024 increase in the NPL ratio and decline in its coverage, already documented in an earlier study (Vujičić-Stefanović 2026), illustrate why the ratio alone is insufficient. Growth in the nominal NPL stock combined with lower coverage provides a more serious signal than a 0.1 percentage-point change in the ratio, because the ratio may

remain stable or decline simply as a result of growth in the total loan portfolio. The analysis should therefore integrate NPL levels, flows, and coverage.

It is important to distinguish an indicator of already materialized credit risk from a leading indicator. NPLs arise after a credit exposure has already crossed the threshold for classification as non-performing, whereas Stage 2 exposures, early arrears, new entries into default status, accelerating credit growth, and relevant macrofinancial variables may provide earlier information about future deterioration. Bank vulnerability models therefore combine asset quality with capital, profitability, liquidity, and macrofinancial conditions (Betz et al. 2014; Staehr and Uusküla 2021).

3.2. From Asset Quality to Supervisory Response

From a regulatory and managerial perspective, it is necessary to clearly distinguish between different levels of response. Routine monitoring covers the level, structure, and flows of NPLs and other credit risk indicators. Enhanced supervision and corrective action are warranted when deterioration is repeated or spreads to NPL coverage, capital, profitability, liquidity, or other relevant indicators. Recovery plans and early intervention measures are activated at the level of an individual bank in accordance with its thresholds, viability, and applicable regulatory conditions, while restructuring or resolution is considered only when broader legal criteria are met. The EBA Guidelines on NPLs and recovery plan indicators specifically emphasize a set of indicators, governance thresholds, and timely escalation rather than automatic action based on a single value (European Banking Authority 2018; 2021a).

For practical monitoring purposes, it is useful to consider at least five groups of information: (1) the NPL ratio and nominal NPL stock, inflows into and outflows from the NPL category, and Stage 2 exposures; (2) NPL coverage by expected credit losses and the structure of collateral; (3) regulatory capital, applicable capital buffers, and bank-specific requirements; (4) ROAA, ROAE, cost of risk, and the capacity for internal capital generation; and (5) liquidity indicators and relevant macrofinancial conditions. At the sector level, such a set of indicators serves to identify whether deterioration is concentrated or broadly based, whereas decisions on recovery, early intervention, or resolution require institution-specific data and assessment.

The joint reading of the indicators does not suggest persistent, simultaneous deterioration in the observed aggregate dimensions in Republic of Srpska over 2020–2025. The 2024 combination of a modest NPL-ratio increase and weaker coverage nevertheless illustrates why a single ratio is an incomplete warning signal. Sector-level stability cannot be generalized to, each bank or used to rule out institution-specific recovery or restructuring needs.

3.3. Implications for the Supervisor and Banks

For the supervisor, comparison with the Federation of Bosnia and Herzegovina may provide a more useful peer-benchmarking function because of the more similar institutional framework and macroeconomic environment, while the EU/EEA aggregate should be retained as a supplementary broader benchmark. Neither of these aggregates can replace domestic thresholds and the distribution of indicators across banks, business models, and credit portfolios. A favorable sectoral average may conceal concentrated risk at an individual institution. A regional stress test of 141 banks in 18 Central, Eastern, and Southeastern European countries found satisfactory aggregate capital resilience but substantial cross-sector and cross-bank differences (Kozak 2021). This confirms that supervisory assessment must consider each bank's risk profile, including migrations between credit risk stages, forborne exposures, large-

borrower concentrations, and stress-test results. Material deviations should be assessed together with NPL reduction plans and available recovery plan options.

For banks, the results underscore the preventive value of credit risk management before the deterioration fully materializes in the NPL category. Early identification of Stage 2 exposures and arrears, timely communication with borrowers, portfolio segmentation, realistic valuation of collateral recoverability, adequate recognition of expected credit losses, and monitoring the viability of modified contractual arrangements can reduce the likelihood that an early warning develops into severe stress (European Central Bank 2017; European Banking Authority 2018). Measures should be tailored to the underlying cause and segment, because the same aggregate NPL ratio may conceal different patterns among households, microenterprises, and large corporates.

CONCLUSION

This descriptive-comparative analysis of Republic of Srpska for 2020–2025 shows that NPL assessment depends on the comparison level and on joint interpretation with protection and earnings indicators. The EU/EEA comparison suggests narrowing of the NPL gap, whereas the closer comparison with the Federation of Bosnia and Herzegovina reveals relatively slower domestic improvement in 2024–2025. The simultaneous examination of coverage, capital and profitability adds context to the temporary asset-quality deterioration recorded in 2024; it does not establish a causal relationship or a bank-specific diagnosis.

The specific contribution of this paper is to extend the NPL analysis to 2025 and show that, although the NPL ratio and its coverage in Republic of Srpska improved after 2024, its relative NPL position against the Federation of Bosnia and Herzegovina remained less favorable even as the gap with the EU/EEA narrowed. Its application is limited by only six annual observations, aggregation across banks and portfolio segments, and differences in definition, coverage and composition relative to the weighted EU/EEA benchmark. Future research should extend the time series, use bank-level and portfolio-level observations, test the robustness of the comparison to reporting definitions, and examine Stage 2 exposures, inflows into NPLs, risk costs, liquidity and macrofinancial determinants. These extensions would enable a more granular assessment of warning signals without equating NPL levels with automatic recovery or resolution triggers.

Statement on the Use of Generative Artificial Intelligence and Author Responsibility: During the preparation and revision of the manuscript, ChatGPT by OpenAI was used as an auxiliary tool. The tool assisted with identifying potentially relevant literature, editing language and style, translating between Serbian and English, and organizing references. The AI tool did not supply original observed banking data or replace the author's academic and professional judgment. I have reviewed and verified the AI-assisted output and the cited sources, data, calculations, tables, and figures. I assume full responsibility for the accuracy of the cited sources, the interpretation of the results, the conclusions, and the originality and ethical integrity of this research paper.

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