

Banking Sector Resilience in the Maghreb Countries: A Comparative Study of Algeria, Morocco, and Tunisia Using Financial Soundness Indicators (2017–2023)

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Abstract---This study aims to analyze and compare the Financial Soundness Indicators (FSIs) of the banking sector in three Maghreb countries Algeria, Morocco, and Tunisia over the period 2017–2023. The research adopts a descriptive and analytical approach, relying on secondary data from the International Monetary Fund (IMF) and national central banks, focusing on five key indicators: Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL) ratio, profitability indicators (ROA and ROE), Net Interest Margin (NIM), and the Liquidity ratio. The findings reveal significant disparities among the three countries. Algeria recorded high levels of capitalization and liquidity but faced weak asset quality and low profitability. Morocco demonstrated a more balanced and stable performance across most indicators, while Tunisia showed relative fragility, reflected in low capital adequacy and liquidity levels, coupled with high non-performing loans, despite maintaining moderate profitability supported by higher interest margins. The study concludes that enhancing banking sector resilience in the Maghreb requires country-specific structural reforms, including reducing non-performing loans, strengthening capitalization, and improving risk and liquidity management, along with greater regional coordination among monetary authorities to support sustainable financial stability.

Keywords---Banking sector, Financial Soundness Indicators, Maghreb countries

JEL Classification: G21, G28, G32, E44, O55.

How to Cite:

Thameur, O., & Berra, H. R. (2025). Banking sector resilience in the Maghreb Countries: A comparative study of Algeria, Morocco, and Tunisia using financial soundness indicators (2017–2023). *The International Tax Journal*, 52(5), 2744–2756. Retrieved from <https://internationaltaxjournal.online/index.php/itj/article/view/280>

The International tax journal ISSN: 0097-7314 E-ISSN: 3066-2370 © 2025

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Submitted: 16 July 2025 | Revised: 19 September 2025 | Accepted: 20 October 2025

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Introduction

The banking sector plays a pivotal role in financing economic activity by mobilizing savings and channeling them toward investment. However, the effectiveness of this role depends on the soundness of banks and their ability to withstand financial and economic shocks. In this context, Financial Soundness Indicators (FSIs) constitute a fundamental tool for assessing the stability of banking systems. These indicators include capital adequacy, asset quality, profitability, net interest margin, and liquidity.

The importance of these indicators is particularly evident in emerging economies, as they help identify strengths and weaknesses in the banking sector and assess its resilience. In the case of Maghreb countries, significant differences emerge among the three banking systems, whether in terms of structure, degree of alignment with international standards, or capacity to cope with crises. Accordingly, this study aims to analyze the evolution of FSIs in Algeria, Morocco, and Tunisia over the period 2017–2023, with the objective of identifying similarities and differences, and providing practical recommendations to strengthen financial stability and support economic development.

Study Problem:

Despite the reform efforts undertaken in the banking systems of Maghreb countries, Financial Soundness Indicators (FSIs) continue to reveal significant differences between Algeria, Morocco, and Tunisia. This raises the central research question:

To what extent has the banking sector in Maghreb countries demonstrated resilience during the period 2017–2023, and what are the main similarities and differences among these countries according to FSIs?

Based on this main problem, the following sub-questions are proposed:

- What are the trends in the development of FSIs (CAR, NPL, ROA/ROE, NIM, and Liquidity) in Algeria, Morocco, and Tunisia during the period 2017–2023?
- What are the most significant differences among the three countries in these indicators, and what factors explain them?
- What is the nature of the relationship between FSIs in Algeria, Morocco, and Tunisia?

Study Hypotheses:

To answer these sub-questions, the following preliminary hypotheses are formulated:

- The trends of FSIs differ across Algeria, Morocco, and Tunisia during the period 2017–2023.
- The Moroccan banking sector demonstrates more balanced indicators compared to Algeria and Tunisia.
- There are strong correlations between FSIs that reflect the interdependence between stability, profitability, liquidity, and asset quality.

Study Objectives:

- To analyze the evolution of FSIs in Algeria, Morocco, and Tunisia during the period 2017–2023.
- To conduct a quantitative and qualitative comparison between the three countries in order to identify similarities and differences.
- To assess the resilience of the Maghreb banking systems in facing shocks.

Study Methodology:

The study adopts a descriptive-analytical approach, as it is the most appropriate for examining economic and financial phenomena using available quantitative data. This approach makes it possible to

describe and analyze the evolution of Financial Soundness Indicators (FSIs) in the countries under study, while also conducting a comparative analysis between Algeria, Morocco, and Tunisia.

Study Tools:

The analysis relies on Financial Soundness Indicators (FSIs) published by the International Monetary Fund (IMF) and national central banks, which represent the primary tool for assessing the robustness of banking systems. The indicators used in this study include: Capital Adequacy Ratio (CAR), Non-Performing Loans ratio (NPL), Profitability (ROA and ROE), Net Interest Margin (NIM), and Liquidity ratio.

I. Theoretical Foundations of Financial Soundness Indicators and Banking Stability:

Banking sector stability constitutes one of the key pillars of financial and economic stability. International regulatory bodies, led by the Basel Committee on Banking Supervision, have adopted a set of standards aimed at strengthening the resilience of banks by focusing on capital adequacy, asset quality, risk management, and transparency (BIS, 2011). In this context, Financial Soundness Indicators (FSIs) have emerged as an important tool for assessing the robustness of banking systems and their ability to withstand systemic shocks (IMF, 2006). These indicators typically include ratios related to capital adequacy, non-performing loans, profitability, interest margins, and liquidity, each reflecting a different dimension of banking stability. (Čihák & Podpiera, 2008)

1. Capital Adequacy and Financial Resilience:

Numerous studies highlight the importance of capital adequacy ratios in ensuring bank stability, as they enable institutions to absorb unexpected losses and continue financing during crises. However, some scholars argue that excessively high ratios may reflect inefficient resource allocation, with funds being locked instead of channeled into productive lending (Agoraki, Delis, & Pasiouras, 2011). In developing economies, compliance with Basel standards has been shown to enhance investor confidence and reinforce the financial safety net. (Barth, Caprio, & Levine, 2013)

2. Asset Quality and Non-Performing Loans:

The non-performing loans (NPL) ratio is considered one of the most critical indicators of banking sector fragility. Higher NPL levels constrain lending, erode profitability, and threaten financial stability (Beck, Jakubik, & Piloju, 2015). Several studies in emerging markets confirm that weak credit risk management and excessive reliance on financing state-owned enterprises are key drivers of rising NPLs (Nkusu, 2011). In North Africa, the World Bank has stressed that persistently high NPL levels, particularly among public banks, represent a structural impediment to financial sector development. (Bank, 2021)

3. Profitability (ROA and ROE):

Profitability indicators such as Return on Assets (ROA) and Return on Equity (ROE) measure banks' ability to generate sustainable earnings. Empirical evidence suggests that higher profitability strengthens stability by fostering internal capital accumulation and enhancing loss-absorbing capacity (Athanasoglou, Brissimis, & Delis, 2008). Conversely, persistent low profitability raises default risk and undermines competitiveness. In the Maghreb context, differences in profitability across countries are often attributed to variations in financial structures, regulatory strictness, and exposure to economic volatility. (IMF, Morocco: 2022 Article IV Consultation—Country Report, 2022)

4. Net Interest Margin and Intermediation Efficiency:

The Net Interest Margin (NIM) reflects the efficiency of banks in managing the spread between lending and deposit rates. A stable NIM indicates balanced pricing policies, whereas excessively high margins may imply higher financing costs for households and firms (Maudos & de Guevara, 2004). Comparative studies show that banks in low-income economies often rely on higher interest margins to offset elevated credit risk and limited diversification (Claessens & Laeven, 2005). In Tunisia, for instance, recent reports indicate that banks maintain a relatively higher NIM compared to regional peers as compensation for pressures stemming from weak asset quality and liquidity constraints. (BCT, 2023)

5. Liquidity Ratios and Systemic Risks:

Liquidity is vital for enabling banks to meet sudden withdrawals and ensure continuity of operations. Common measures include the ratio of liquid assets to total assets or to short-term liabilities (Vodová,

2011). While higher liquidity strengthens resilience, excessive holdings of liquid assets may reduce profitability by constraining lending opportunities (Bonner, van Lelyveld, & Zymek, 2015). Research in emerging economies has shown that liquidity imbalances are closely linked to macroeconomic pressures and declining investor confidence. (Allen, Jackowicz, Kowalewski, & Kozłowski, 2012)

II. Analysis of Banking Sector Resilience in Maghreb Countries:

This section aims to examine the resilience of the banking sector in Algeria, Morocco, and Tunisia during the period 2017–2023 through an analysis of the Financial Soundness Indicators (FSIs) published by the International Monetary Fund and national central banks. The analysis covers five key indicators that represent the main dimensions of banking stability: capital adequacy, asset quality, profitability indicators (ROA and ROE), net interest margin (NIM), and liquidity ratio.

1. Capital Adequacy Ratio (CAR):

The Capital Adequacy Ratio is one of the most important supervisory tools used to measure the ability of banks to absorb unexpected losses. Higher levels of this ratio are generally considered a positive signal of banking resilience and the capacity to protect depositors.

It is calculated as follows:

$$\text{car} = \frac{\text{Regulatory Capital}}{\text{Risk Weighted Assets}} \times 100$$

Table 1: Capital Adequacy Ratio (CAR) in Maghreb Countries (2017–2023)

Year	Algeria	Morocco	Tunisia
2017	19.6	13.8	11.7
2018	19.0	14.7	12.5
2019	18.0	15.6	12.7
2020	19.2	15.7	12.9
2021	21.8	15.8	13.3
2022	21.5	15.6	14.0
2023	22.8	15.8	14.5

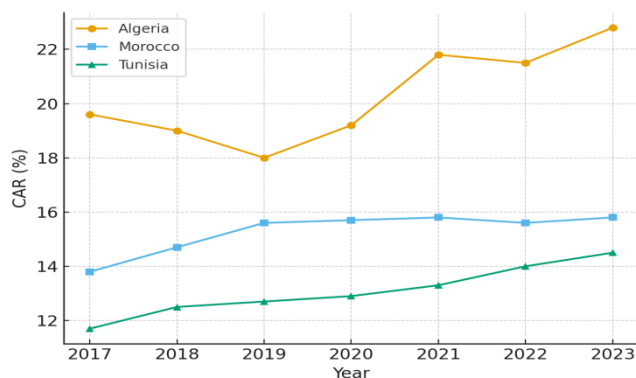


Figure 1: Evolution of Capital Adequacy Ratio in Maghreb Countries (2017–2023)

Source: Author's calculations based on IMF FSI Database and central bank reports.

Moroccan banks displayed stable capital adequacy ratios during the period 2017–2023, ranging between 13.8% and 15.8%. These comfortable levels exceeded the Basel minimum requirement of 8%. Such stability reflects the ability of Moroccan banks to strike a balance between expanding credit activity and maintaining capital adequacy requirements, supported by strict supervision from Bank Al-Maghrib and the gradual adoption of international standards. Even during the pandemic, the banking sector remained resilient.

In contrast, Algeria recorded the highest CAR levels in the region, ranging between 18% and 22.8%, particularly after 2020 when it exceeded 21%. This performance indicates strong capitalization among Algerian banks, driven largely by their concentration in liquid and safe assets such as government securities. While these high levels provide banks with strong shock-absorbing capacity, they may also conceal inefficiencies in channeling resources toward productive lending, thereby limiting the sector's contribution to economic growth.

Tunisia, on the other hand, showed the lowest CAR levels in the Maghreb, ranging between 11.7% and 14.5%. Although these ratios remain above the Basel minimum thresholds, they reveal a relative fragility in the face of persistent economic and financial shocks. Nonetheless, a slight improvement was observed after 2020, as the ratio gradually increased to 14.5% in 2023, reflecting banks' efforts to strengthen their capital base, albeit at a weaker level compared to Algeria and Morocco.

2. Asset Quality (NPL ratio):

The asset quality indicator is one of the most important measures of banking sector robustness, as it reflects the level of risks associated with the loan portfolio. The higher the ratio of non-performing loans, the greater the risks threatening financial stability.

$$\text{NPL} = \frac{\text{Non Performing Loans}}{\text{Total Loans}} \times 100$$

Table 2: Asset Quality (NPL) in Maghreb Countries (2017–2023)

Year	Algeria	Morocco	Tunisia
2017	13.4	7.6	13.9
2018	12.5	7.5	13.7
2019	11.4	7.6	13.6
2020	13.1	8.4	12.9
2021	12.7	8.6	13.2
2022	12.4	8.7	14.4
2023	12.2	7.9	15.6

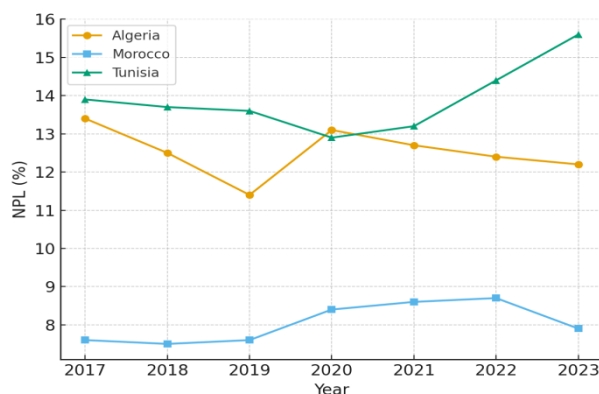


Figure 2: Evolution of Asset Quality (NPL) in Maghreb Countries (2017–2023)

Source: Author's calculations based on IMF FSI Database and central bank reports.

Moroccan banks reported moderate levels of nonperforming loans (NPLs), ranging between 7% and 9% during the period 2017–2023. Although there was a slight increase in 2020 due to the pandemic's impact on borrowers, banks managed to maintain relative stability thanks to effective risk management policies and interventions by Bank Al-Maghrib. These measures helped limit the escalation of defaults and ensured the continued flow of credit to the economy.

In Algeria, the highest NPL ratios in the region were recorded, exceeding 20% in several years. These elevated levels are mainly attributed to the weak loan portfolio quality of public banks, which dominate the system, and their heavy reliance on financing state-owned enterprises with fragile financial performance. This represents a fundamental challenge to the stability of the Algerian banking sector, as it restricts its ability to play an effective role in financing the real economy.

In Tunisia, the NPL ratio gradually increased from around 12.9% in 2020 to 15.6% in 2023, which is relatively concerning. This upward trend reflects the ongoing economic crisis in the country and the weak financial standing of many borrowing firms, particularly in sectors affected by recession and financial instability. Despite banks' attempts to strengthen risk management and improve recovery mechanisms, the rising NPL ratio highlights structural pressures that threaten the resilience of the Tunisian banking sector.

3. Profitability Indicators (ROA & ROE):

Profitability indicators are among the most important tools for evaluating banks' performance and their ability to generate sustainable returns. This is primarily measured through the Return on Assets (ROA), which reflects the efficiency of asset utilization, and the Return on Equity (ROE), which measures the return generated for shareholders.

They are calculated as follows:

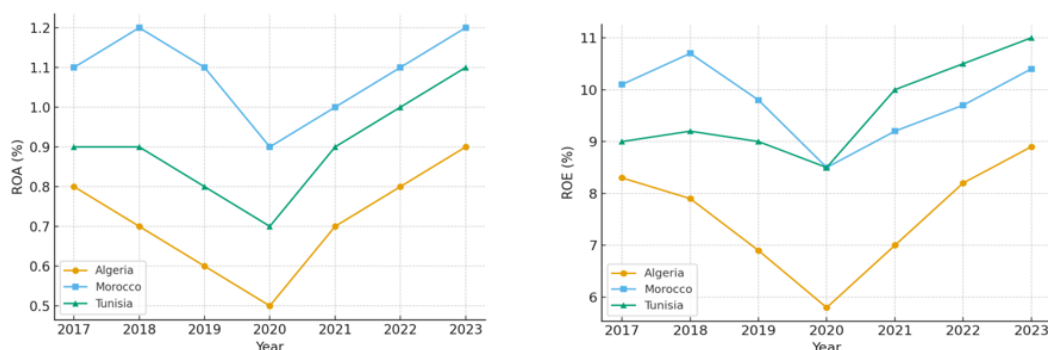
$$\text{ROA} = (\text{Net Income} \div \text{Total Assets}) \times 100$$

$$\text{ROE} = (\text{Net Income} \div \text{Total Equity}) \times 100$$

Table 3: Profitability Indicators (ROA & ROE) in Maghreb Countries (2017–2023)

Year	Algeria (ROA)	Morocco (ROA)	Tunisia (ROA)	Algeria (ROE)	Morocco (ROE)	Tunisia (ROE)
2017	0.8	1.1	0.9	8.3	10.1	9.0
2018	0.7	1.2	0.9	7.9	10.7	9.2
2019	0.6	1.1	0.8	6.9	9.8	9.0
2020	0.5	0.9	0.7	5.8	8.5	8.5
2021	0.7	1.0	0.9	7.0	9.2	10.0
2022	0.8	1.1	1.0	8.2	9.7	10.5
2023	0.9	1.2	1.1	8.9	10.4	11.0

Source: Author's calculations based on IMF FSI Database and central bank reports.

**Figure 3:** Evolution of Profitability Indicators (ROA & ROE) in Maghreb Countries (2017–2023)

Source: Author's calculations based on IMF FSI Database and central bank reports.

Moroccan banks maintained relatively stable profitability levels, with Return on Assets (ROA) ranging between 0.9% and 1.2%, and Return on Equity (ROE) averaging between 9% and 11% during the period 2017–2022. Although there was a temporary decline in 2020 due to the pandemic's repercussions, performance gradually improved thanks to economic recovery and liquidity support measures, reflecting good operational efficiency and the ability to generate sustainable earnings.

In Algeria, profitability remained weak compared to its neighbors, with ROA staying below 1% and ROE fluctuating between 6% and 9% during 2017–2023. This situation highlights the limited ability of Algerian banks to transform resources into profits, largely due to their concentration on financing the public sector rather than the private sector. Moreover, the negative impact of the pandemic in 2020 pushed ROE below 6%, before gradually improving in subsequent years, although it remained below Moroccan levels.

Tunisia, on the other hand, recorded relatively acceptable profitability ratios despite economic challenges, with ROA ranging between 0.8% and 1.1%, and ROE between 9% and 11% during 2021–2023. This reflects Tunisian banks' ability to preserve a certain level of earnings by relying on relatively high interest margins, despite pressures from rising NPLs and weak liquidity. However, profitability remains fragile and exposed to ongoing economic and financial volatility.

4. Net Interest Margin (NIM)

The Net Interest Margin is a key indicator of banking intermediation efficiency, as it reflects the difference between interest income earned and interest expenses paid. A moderate increase in NIM enhances stability, while excessive levels may indicate weak competition and higher financing costs.

$$\text{NIM} = \frac{\text{Interest Income} - \text{Interest Expenses}}{\text{Total Assets}} \times 100$$

Table 4: Net Interest Margin (NIM) in Maghreb Countries (2017–2023)

Year	Algeria	Morocco	Tunisia
2017	3.0	3.1	3.8
2018	2.9	3.0	3.9
2019	2.9	2.9	4.0
2020	2.8	2.7	4.0
2021	3.0	2.8	4.1
2022	3.1	3.0	4.0
2023	3.0	3.1	4.0

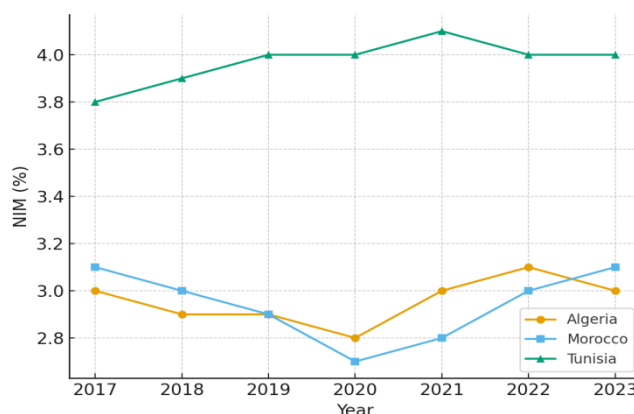


Figure 4: Evolution of Net Interest Margin (NIM) in Maghreb Countries

Source: Author's calculations based on IMF FSI Database and central bank reports.

In Morocco, the banking sector maintained stable levels of net interest margin (NIM), ranging between 2.7% and 3.1% during 2017–2022. Despite a slight decline in 2020 due to accommodative measures taken by Bank Al-Maghrib to mitigate the effects of the pandemic, the indicator gradually recovered as economic activity resumed. This reflects Moroccan banks' ability to effectively manage the balance between lending returns and deposit costs.

In Algeria, NIM ratios were close to those observed in Morocco, fluctuating between 2.8% and 3.1% during 2017–2023, with a slight drop in 2020 due to slower lending during the pandemic. This stability highlights the reliance of Algerian banks on a traditional pricing model, where the spread between lending and deposit rates remains relatively constant. While this ensures stable revenues, it may also indicate limited financial innovation.

In Tunisia, although annual data are less detailed compared to Morocco and Algeria, available figures indicate that the banking intermediation margin reached around 4% in 2023, which is higher than the levels recorded in the two neighboring countries. This reflects Tunisian banks' reliance on higher interest margins to offset pressures from rising nonperforming loans and weak liquidity. However, this elevated level may also suggest higher borrowing costs for households and firms, thereby weakening the role of banks in supporting investment and economic growth.

5. Liquidity Ratio:

Liquidity represents a fundamental element in ensuring banking stability, as it reflects the ability of banks to meet short-term obligations and withstand sudden withdrawals. High levels of liquidity provide a safety buffer, but they may also limit profitability if maintained at the expense of productive lending.

$$\text{Liquidity} = \frac{\text{Liquid Assets}}{\text{Total Assets}} \times 100$$

Table 5: Liquidity Ratios in Maghreb Countries (2017–2023)

Year	Algeria	Morocco	Tunisia
2017	40.0	31.0	-
2018	39.0	30.5	-
2019	38.5	30.2	-
2020	41.0	31.5	9.5
2021	40.5	30.8	9.8
2022	39.5	30.0	9.6
2023	38.8	29.8	9.7

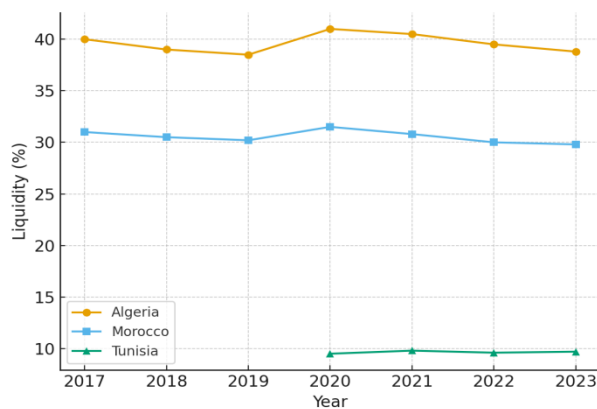


Figure 5: Evolution of Liquidity Ratio in Maghreb Countries

Source: Author's calculations based on IMF FSI Database and central bank reports.

Moroccan banks demonstrated stable liquidity levels during the period 2017–2022, with the ratio of liquid assets to total assets ranging between 29% and 32%. The ratio slightly increased in 2020 due to precautionary measures associated with the pandemic and higher reserves, before returning to around

30% in 2022. This stability reflects the ability of Moroccan banks to maintain a sound balance between liquidity and the allocation of resources for lending.

In Algeria, liquidity levels were much higher, fluctuating between 38% and 41% during 2017–2023. This increase reflects a strong reliance on liquid assets such as cash and short-term government securities, which provides banks with a solid capacity to absorb sudden shocks or large withdrawals. However, such elevated levels may also indicate inefficiencies in channeling savings into productive loans, thereby reducing the banking sector's contribution to financing the real economy.

In Tunisia, banks exhibited relatively low liquidity levels, with the ratio standing between only 9% and 10% during 2021–2023. This weak level highlights the structural pressures facing the Tunisian banking sector, which struggles to maintain sufficient liquid assets. As a result, banks remain highly vulnerable to economic shocks and financial crises. This indicator, in particular, underscores the limited resilience of Tunisian banks compared to their Moroccan and Algerian counterparts.

6. Correlation Analysis of Financial Soundness Indicators in Maghreb Countries:

The correlation analysis aims to highlight the nature of the relationships between financial soundness indicators, in order to reveal the degree of interconnection between capitalization, asset quality, profitability, liquidity, and net interest margins in the banking sector of Maghreb countries during the period 2017–2023.

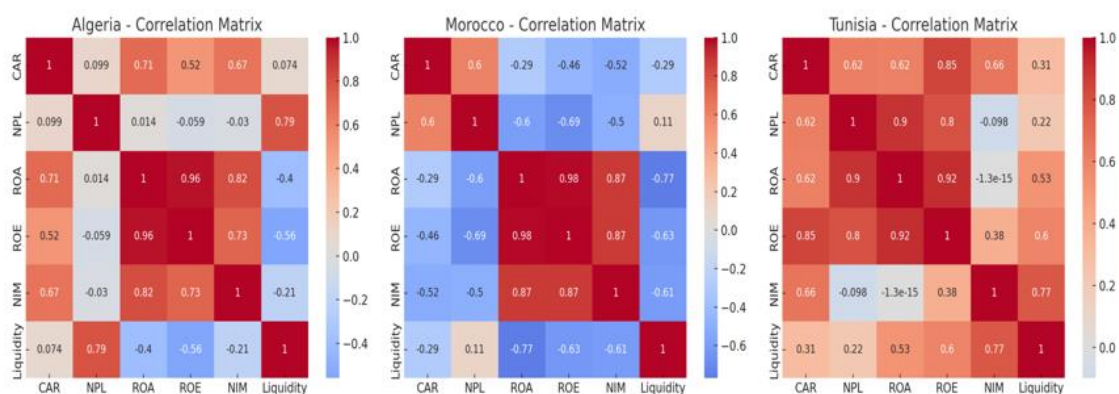


Figure 6: Heatmaps of Correlation Coefficients of Financial Soundness Indicators

Source: Author's calculations based on collected data

In Algeria, there is a strong negative correlation between asset quality (NPL) and profitability (ROA and ROE), indicating that an increase in nonperforming loans leads to a decline in earnings. The relationship between capital adequacy (CAR) and profitability was weak, suggesting that higher capitalization in Algeria did not necessarily translate into better financial performance. Liquidity, however, showed a positive correlation with capital adequacy, reflecting that banks with stronger capital bases also maintained higher liquidity levels.

In Morocco, the results showed that the relationship between capital adequacy and profitability (ROA and ROE) was positive, reflecting balance in the banking system where solid capitalization contributed to improved financial performance. Nonperforming loans exhibited a moderately negative correlation with profitability, suggesting that while such loans partially constrained bank efficiency, they remained under control. In addition, the net interest margin (NIM) correlated positively with profitability, underscoring the role of intermediation efficiency in supporting bank returns.

In Tunisia, a strong negative correlation was found between nonperforming loans and profitability, confirming that NPLs represent the major challenge for Tunisian banks. The relationship between capital adequacy and return on equity (ROE) was weak, highlighting the limited capacity of capitalization to enhance shareholder returns under risk pressures. Conversely, the net interest margin (NIM) was positively associated with both ROA and ROE, as relatively high margins helped offset some of the adverse effects of weak asset quality. Liquidity also displayed a weak positive correlation with profitability after 2020, which may indicate modest improvements in risk management.

This concise reading suggests that Algeria faces a dilemma of high capitalization alongside weak profitability, Morocco benefits from a relative balance between capitalization and profitability, while Tunisia suffers from the burden of nonperforming loans despite some support provided by higher interest margins.

Conclusion

The findings of the study revealed that the banking sector in Maghreb countries reflects significant structural disparities between Algeria, Morocco, and Tunisia during the period 2017–2023. While Algeria was characterized by high levels of capitalization and liquidity, the data exposed major weaknesses in asset quality and low profitability. By contrast, Morocco demonstrated a more balanced and stable performance, with comfortable capital adequacy ratios, acceptable profitability, and moderate asset quality. Tunisia, however, suffered from the lowest levels of capitalization and liquidity and rising nonperforming loans, despite managing to maintain relative profitability supported by higher interest margins. These results underscore the urgent need for structural reforms in some countries and enhanced regulatory efforts in others to ensure greater resilience and sustainability of the banking sector in the region.

Study Results:

- Algeria exhibited high levels of capital adequacy and liquidity during 2017–2023, reflecting the capacity of Algerian banks to absorb financial shocks.
- The rise of nonperforming loans in Algeria and Tunisia highlighted weak asset quality, with ratios exceeding 20% in Algeria and 15% in Tunisia, exposing fragile loan structures in both countries.
- Moroccan banks maintained stable capital adequacy ratios around 15–16%, reflecting a balance between credit expansion and compliance with regulatory requirements.
- In terms of profitability, Morocco achieved acceptable performance, with ROA close to 1% and ROE between 9–11%, whereas profitability remained weak in Algeria and modest in Tunisia.
- The net interest margin remained stable in both Morocco and Algeria at around 3%, while in Tunisia it reached about 4%, indicating reliance on higher margins.
- Tunisia recorded the lowest liquidity levels in the region, not exceeding 10%, reflecting clear fragility in its ability to withstand sudden pressures compared to Morocco and Algeria.

Study Recommendations:

- Algeria should undertake comprehensive reforms of public banks and strengthen risk management practices in order to reduce high levels of nonperforming loans.
- Morocco should continue the implementation of Basel III standards and broaden financial innovation to further support banking sector stability.
- Tunisia needs to strengthen its capital base and increase liquidity through alternative financing instruments and the development of the money market.
- Improving asset quality in Algeria and Tunisia is essential, through promoting productive lending and encouraging firms to enhance their financial performance.

- Greater regional coordination among monetary and supervisory authorities in the Maghreb is necessary to build a more resilient and sustainable banking sector.

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