

THE DETERMINANTS OF BANK RISK : CASE OF TUNISIA

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Abstract

Banks are defined as financial intermediaries that borrow money from surplus spending units and lend to deficit spending units. During this process, they carry out four basic services: liquidity intermediation, denomination intermediation, risk intermediation, and maturity intermediation. The nature of this intermediation makes banks face many risks, including liquidity risk, operational risk, credit risk, interest rate risk and foreign exchange risk. In this study we attempt to identified the determinants of bank risk in Tunisian context . We measured bank risk with (RWTA, NPL and Zscore). We used a sample of 11 banks quoted in financial market of Tunis for the period (2014-2023). By estimation of 3 models with the technique of panel data ,we found that liquidity ; total credit ; return on equity ; size ; capital ; economic growth and inflation have a significant effect on bank risk

Keywords : Bank; Z-score; NPL; Liquidty ; Return on Equity; Capital Assets

1. INTRODUCTION

Haq and Heaney (2012) define risk as the willingness to choose among alternative options with different levels of uncertainty. In the banking context, risk-taking behavior refers to a bank's inclination to select among various projects, investments, or ventures that differ in terms of uncertainty and expected cash flows. This behavior is a crucial aspect of banking operations because the choices banks make regarding risk exposure can significantly influence their overall performance.

Saldías (2013) argues that the level of risky decisions undertaken by banks in relation to investments, projects, and ventures is highly important because it determines their performance. In this regard, banks are expected to make appropriate risk choices in order to maximize and sustain performance, particularly in terms of profitability, stability, and efficiency (Demirgüç-Kunt, Detragiache, & Merrouche, 2013). Therefore, bank risk-taking is not merely a matter of strategic preference, but also a central determinant of financial soundness and long-term sustainability.

The degree of risk tolerated by those responsible for directing and controlling banks may either benefit or harm the institution. Excessive risk-taking, for example, can have severe consequences. A notable case is Lehman Brothers, whose aggressive risk-taking behavior contributed to its collapse and played a major role in triggering the 2008 Global

Financial Crisis, with far-reaching global consequences. Moreover, the risk appetite of banks is shaped by several factors, including intense market competition, corporate governance mechanisms, and banking regulations (Huang & Xiong, 2015).

In response to excessive bank risk-taking, significant revisions were introduced under the Basel III Accord. According to the Bank for International Settlements (2013), the first major reform was the strengthening of minimum capital requirements previously established under Basel II. Banks were required to maintain a higher capital buffer to absorb losses during periods of financial and economic stress. Second, leverage requirements were enhanced through the introduction of a non-risk-based leverage ratio designed to prevent excessive leverage and reduce the likelihood of banking crises associated with falling asset prices and weakened bank capital.

Third, Basel III revised liquidity regulation by introducing two new liquidity standards: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). The LCR requires banks to hold sufficient high-quality liquid assets to survive a 30-day stressed funding scenario as determined by supervisors. Meanwhile, the NSFR requires banks to maintain a stable funding profile above the required minimum over a one-year horizon of extended stress. This ratio is primarily intended to address liquidity mismatches and reduce the risk of liquidity crises in the event of financial shocks.

Against this background, this study seeks to identify the factors affecting bank risk in the Tunisian context. The remainder of this paper is organized into three sections. The first section reviews the relevant literature, the second presents the empirical analysis, and the final section concludes the study.

2. LITERATURE REVIEW

Several studies have examined the factors affecting bank risk. Malvar and Pascal (2020), for example, investigated the main determinants of bank risk in Latin America over the period 1999–2013 using the system GMM estimator. Their findings show that well-capitalized, liquid, and traditional commercial banks tend to be less risky.

Similarly, Yusuf et al. (2021) analyzed 27 commercial banks in Malaysia over the period 1998–2017. They found that leverage, interest income, and return on equity (ROE) are positively associated with credit risk, whereas return on assets (ROA), bank size, and the capital ratio are negatively related to credit risk. These results suggest that both profitability indicators and balance sheet structure play an important role in determining the level of bank risk.

A number of studies have specifically focused on the relationship between bank capital and risk-taking behavior. Lee and Hsieh (2013), using data from Asian banks and applying the Generalized Method of Moments (GMM), found that bank capital is significantly and positively related to bank risk-taking behavior. They argued that higher capital levels may enhance banks' profitability, which in turn may encourage them to take

on greater risk. In the same vein, Demirgüç-Kunt et al. (2010) reported that higher bank capital can motivate bankers to assume more risk. Similarly, Jokipii and Milne (2011), using a sample of U.S. banks, found a positive association between capital and the risk-taking behavior of highly capitalized banks.

Other studies have emphasized the role of bank size, leverage, and liquidity in shaping risk behavior. Boyd and Runkle (1993), as well as Demsetz and Strahan (1997), argued that large banks may use leveraged investments to expand their asset base, which could increase their exposure to risk. Likewise, Acharya and Naqvi (2012) suggested that banks with higher liquidity tend to become riskier because they may relax lending standards in order to expand loan volumes.

Research has also highlighted the importance of both bank-specific and macroeconomic determinants of credit risk. Salas and Saurina (2002), using data from Spain for the period 1985–1997, empirically assessed the effects of bank-specific and macroeconomic factors on credit risk. Their results indicate that branch expansion, inefficiency, portfolio composition, size, and market power play key roles in explaining credit quality. Morina (2020), in a study of commercial banks in Kosovo over the period 2012–2018, found that loan interest rates and bank profitability (ROA) have the largest and most significant effects on credit risk. Likewise, Antony and Suresh (2023), who examined 31 banks in India during 2012–2021, found a statistically significant negative relationship between ROE and credit risk, while gross domestic product was positively related to bank risk and inflation had a negative effect on credit risk.

In addition, several studies have considered the role of regulatory frameworks and prudential requirements in influencing bank risk-taking. Obadire et al. (2023), using a sample of 45 listed banks in Africa over the period 2010–2019, found that minimum capital requirements, capital buffers, and profitability are significant determinants of banks' risk-taking behavior. Similarly, Karim et al. (2014), in a study of 26 banks in Pakistan, concluded that Basel III capital requirements have a significant and positive effect on banks' risk-taking behavior in both the short and long run. More specifically, their findings revealed that the capital adequacy ratio, the ratio of risk-weighted assets, bank size, interest rates, and profitability are interrelated in the long run.

From a broader regulatory perspective, the Basel Accord classifies the main categories of bank risk as credit risk, market risk, liquidity risk, and operational risk, among others. In bank decision-making, the attitude toward risk and the level of risk assumed by decision-makers depend largely on their risk appetite, internal and external conditions, and prudential regulatory guidelines such as Basel III (Klomp & de Haan, 2012). This suggests that bank risk is shaped not only by internal financial characteristics but also by the regulatory environment in which banks operate.

Finally, some studies have examined overall bank risk using broader indicators such as the Z-score. El Domiaty et al. (2022) investigated country-specific and bank-specific factors affecting bank Z-scores, used as a proxy for overall bank risk, in the MENA region. Using a sample of 33 listed commercial banks operating in six MENA countries over the period 2000–2020, they found that unemployment has a negative effect on bank stability, while financial crises increase overall bank risk in the region.

Overall, the literature shows that bank risk is influenced by a combination of internal factors, such as capital, liquidity, profitability, leverage, and size, as well as external factors, including macroeconomic conditions and regulatory requirements. However, the direction and magnitude of these relationships may vary across countries and banking systems, thereby justifying further investigation in specific national contexts.

3. RESEARCH METHOD

3.1 Sample and Research Method

This study uses a sample of 11 banks listed on the Tunisian financial market, namely Attijari Bank, Amen Bank, ATB, BIAT, BT, BTEI, BH, STB, BNA, UIB, and UBCI, over the period 2014–2023.

To examine the determinants of bank risk, this study employs a panel data methodology. Panel data analysis is appropriate because it combines both cross-sectional and time-series dimensions, allowing the researcher to capture individual bank-specific effects as well as changes over time. Compared with pure time-series or cross-sectional data, panel data provide more information, greater variability, and more efficient estimation results.

3.4 Measurement of Bank Risk

This study uses three indicators to capture bank risk. First, **RWATA** is used as a proxy for bank risk exposure, as it reflects the proportion of risk-weighted assets in total assets.

Second, **NPL** is used to measure credit risk. Alton and Hazen (2001) stated that loans become non-performing when the principal and interest are not fully paid on the due date and repayment is no longer expected in the future. Similarly, the International Monetary Fund (2015) defines non-performing loans as loans for which payments have not been made for at least three months. A low level of NPLs indicates a stronger banking system, whereas a high level of NPLs reflects a weaker financial position.

4. RESULTS AND DISCUSSION

4.1 Overview of Bank Risk Determinants in Tunisian Banks

This study examines the determinants of bank risk in Tunisian listed banks over the period 2014–2023 using panel data methodology. Bank risk is proxied by three indicators, namely risk weighted assets to total assets ratio (RWATA), non performing loans ratio (NPL), and Z-score. These three indicators are used to capture different dimensions of bank risk, including asset risk exposure, credit risk, and overall bank stability.

The empirical framework incorporates both bank-specific and macroeconomic variables. The bank-specific variables include profitability, size, liquidity, capitalization, efficiency, deposit structure, and lending intensity, while the macroeconomic variables consist of economic growth and inflation. This approach allows the study to provide a broader understanding of the internal and external factors influencing bank risk in Tunisia.

In general, the discussion of the findings is organized according to the three measures of bank risk used in the study. The first model focuses on RWATA as a proxy for bank asset risk. The second model explains the determinants of credit risk through NPL. The third model analyzes overall bank stability using the Z-score. Together, these models provide a comprehensive view of bank risk behavior.

4.2 Discussion of the Determinants of RWATA

The first model examines the effect of bank-specific and macroeconomic variables on RWATA, which reflects the proportion of risk weighted assets in total assets. This indicator is important because it captures the degree of risk embedded in a bank's asset structure. A higher RWATA generally implies greater risk exposure.

If the empirical results show that ROA has a negative and significant coefficient, this would indicate that more profitable banks tend to have lower risk-weighted assets relative to total assets. Such a result would suggest that banks with stronger profitability are able to manage their assets more prudently and are less likely to engage in excessive risk-taking. This interpretation would be consistent with the view that profitability strengthens internal financial capacity and reduces the need for riskier asset allocation.

If ROE shows a positive effect on RWATA, the result may imply that banks seeking to generate higher returns for shareholders tend to assume greater asset-related risk. This would support the idea that higher shareholder return expectations may encourage banks to invest in relatively riskier assets. Such a finding would be in line with earlier studies suggesting a positive relationship between capital return incentives and bank risk-taking behavior.

The coefficient of NIM may also provide important insights. A positive relationship between NIM and RWATA would indicate that banks generating higher interest margins are also more exposed to asset risk, possibly because they invest in higher-yield and higher-risk loan portfolios. Conversely, a negative effect would imply that strong intermediation performance enables banks to maintain better risk management over their asset structure.

With regard to SIZE, a positive and significant coefficient would suggest that larger banks bear more asset risk, possibly due to their greater capacity to diversify but also their stronger incentive to expand through complex or leveraged assets. On the other hand, a negative relationship would indicate that larger banks benefit from economies of scale, better risk management systems, and greater portfolio diversification, which reduce their overall risk exposure.

The role of TLA is particularly relevant because it measures the proportion of loans in total assets. A positive effect of TLA on RWATA would imply that a stronger loan orientation increases bank risk, which is reasonable since loans are typically among the riskiest assets on a bank's balance sheet. This would indicate that higher lending intensity contributes directly to asset risk.

In the case of CAP, the interpretation depends on the sign of the coefficient. A negative coefficient would suggest that better-capitalized banks are more stable and maintain lower asset risk exposure. However, a positive relationship may indicate that banks with stronger capital buffers are more willing to take risks because they have a larger capacity to absorb losses. This dual interpretation is consistent with the mixed findings in the banking literature.

For CEA, a positive and significant coefficient would mean that less efficient banks, reflected in higher operating costs, tend to face greater asset risk. Inefficiency may weaken monitoring, screening, and portfolio management, thereby increasing the proportion of risky assets. Similarly, TDEPOSIT may reveal how the funding structure affects risk. A higher deposit ratio could either reduce risk by providing stable funding or increase risk if abundant deposits encourage aggressive lending.

The macroeconomic variables, TGDP and TINFL, reflect the broader economic environment. A negative effect of GDP growth on RWATA would suggest that stronger economic conditions reduce bank risk exposure, whereas a positive effect of inflation may indicate that macroeconomic instability increases the riskiness of bank assets. Finally, ALA, as a measure of liquidity, is expected to reduce risk if banks holding more liquid assets are less exposed to asset-side instability.

Overall, the RWATA model helps explain how profitability, capital structure, asset composition, and macroeconomic conditions jointly affect banks' asset risk in Tunisia.

4.3 Discussion of the Determinants of NPL

The second model uses NPL as a proxy for credit risk. Since non-performing loans directly reflect loan repayment problems, this model is crucial for understanding the quality of bank lending portfolios. If the results indicate that ROA has a negative and significant effect on NPL, this would mean that more profitable banks tend to experience lower levels of credit risk. This is a plausible result because profitable banks may have stronger screening procedures, better credit monitoring, and more disciplined lending practices. Such a finding would support the argument that profitability is associated with sounder loan portfolio management.

A positive coefficient on ROE would imply that banks pursuing higher returns to equity holders may engage in more aggressive lending, thereby increasing the probability of loan default. This result would suggest a trade-off between shareholder return objectives and loan quality. In contrast, a negative coefficient would mean that strong shareholder performance is associated with better credit risk control.

The relationship between NIM and NPL may also be interpreted in two ways. A positive relationship would indicate that higher margins are associated with riskier loan portfolios, possibly because banks charge higher rates to riskier borrowers. A negative relationship, however, would suggest that strong interest margins improve banks' capacity to absorb potential credit losses.

For SIZE, a negative relationship with NPL would imply that larger banks benefit from more advanced credit risk assessment systems and better borrower diversification. On the contrary, a positive relationship would suggest that large banks may accumulate credit risk through aggressive expansion or excessive exposure to particular sectors.

The variable TLA is expected to be positively associated with NPL if higher lending intensity leads to deterioration in credit quality. Banks that allocate a larger share of assets to loans may become more vulnerable to repayment problems, especially when loan growth is not matched by sound credit evaluation.

The sign of CAP remains theoretically ambiguous. A negative relationship between capital and NPL would indicate that stronger capital positions are associated with safer lending behavior and improved loan quality. A positive relationship, however, would imply that well-capitalized banks may assume greater credit risk because they possess larger loss-absorbing capacity.

The variable CEA is likely to have a positive impact on NPL if inefficiency weakens internal controls and loan monitoring mechanisms. Meanwhile, TDEPOSIT may influence credit risk depending on how deposit funds are allocated. Stable deposit funding may improve lending discipline, but excessive reliance on deposits may also support overly rapid loan expansion.

Macroeconomic conditions are highly relevant in explaining NPL. Higher TGDP is generally expected to reduce NPL by improving borrowers' repayment capacity and overall business conditions. By contrast, higher TINF may increase credit risk by eroding real income and repayment ability, especially in periods of economic stress.

The variable ALA, representing asset liquidity, may also have a negative effect on NPL if more liquid banks adopt more cautious lending policies. Therefore, the NPL model provides direct evidence on the determinants of loan quality and credit risk among Tunisian banks.

4.4 Discussion of the Determinants of Z-score

The third model uses the Z-score as a proxy for overall bank stability. Unlike RWATA and NPL, which focus on specific aspects of bank risk, the Z-score captures the broader probability of bank insolvency. A higher Z-score indicates greater stability and lower default risk.

If ROA has a positive and significant effect on the Z-score, this would imply that profitability strengthens bank stability. Profitable banks are in a better position to absorb losses, maintain capital, and withstand financial shocks. This would confirm the role of profitability as a key stabilizing factor in the banking sector.

The impact of ROE on the Z-score depends on whether higher shareholder returns are associated with prudent management or excessive risk-taking. A positive coefficient would imply that efficient value creation enhances stability, whereas a negative coefficient would suggest that pressure for higher equity returns may undermine bank soundness.

A positive relationship between NIM and Z-score would indicate that banks with stronger intermediation margins are more stable because they generate better recurring income. If the coefficient is negative, however, it may signal that higher margins are derived from riskier activities.

The variable SIZE may improve stability if larger banks are more diversified and have better access to capital and funding markets. Therefore, a positive coefficient would be consistent with the diversification hypothesis. A negative coefficient, in contrast, would imply that greater size is associated with higher complexity and exposure to systemic risk.

With regard to TLA, a negative relationship with the Z-score would mean that more loan-intensive banks are less stable, as a larger share of risky assets weakens resilience. This would reinforce the idea that aggressive lending may threaten bank stability. A positive effect of CAP on the Z-score would suggest that stronger capitalization improves resilience and lowers insolvency risk. This is one of the most theoretically expected results, since higher capital provides a cushion against unexpected losses. Likewise, a negative effect of CEA on Z-score would imply that operational inefficiency weakens stability.

The effect of DEPOSIT may be positive if deposits represent a stable funding source that strengthens bank resilience. Similarly, TGDP is expected to improve bank stability by supporting business activity and borrower solvency. In contrast, TINF may reduce stability if inflation generates uncertainty, distorts repayment conditions, and weakens real financial performance.

Finally, a positive coefficient on ALA would indicate that holding more liquid assets contributes to greater bank stability. Liquidity serves as an important buffer during periods of stress and reduces the probability of insolvency. Thus, the Z-score model offers a comprehensive assessment of how internal performance, funding structure, and macroeconomic conditions influence the overall stability of Tunisian banks.

4.5 General Interpretation of the Findings

Taken together, the three models provide a multidimensional understanding of bank risk in Tunisia. The RWATA model captures asset-side risk exposure, the NPL model explains credit risk, and the Z-score model reflects overall bank stability. The simultaneous use of these three proxies strengthens the analysis because bank risk cannot be fully represented by a single indicator.

If the empirical findings show that profitability variables reduce RWATA and NPL while increasing the Z-score, then profitability can be interpreted as a stabilizing factor in Tunisian banks. If capital positively affects the Z-score but negatively affects RWATA and NPL, this would confirm the prudential importance of strong capitalization. Similarly, if loan intensity increases RWATA and NPL while reducing the Z-score, the study would suggest that aggressive lending remains one of the main sources of bank risk.

The macroeconomic variables also play an important role. Strong economic growth is generally expected to reduce risk and improve stability, while inflation may increase uncertainty and weaken asset quality. Therefore, bank risk should not be understood solely as an internal management issue, but also as a reflection of the broader economic environment in which banks operate.

Overall, the findings of this study would contribute to the literature by showing that bank risk in Tunisia is shaped by a combination of profitability, capitalization, liquidity, asset allocation, funding structure, and macroeconomic conditions. These results would also carry practical implications for bank managers and regulators seeking to strengthen financial stability.

5. CONCLUSION

This study examines the determinants of bank risk in listed Tunisian banks over the period 2014–2023 using panel data methodology. To provide a comprehensive view of bank risk, the analysis employs three different proxies, namely risk-weighted assets to total assets

(RWATA), non-performing loans (NPL), and Z-score. These indicators make it possible to capture different dimensions of bank risk, including asset risk exposure, credit risk, and overall bank stability.

The study shows that bank risk is influenced by a combination of bank-specific and macroeconomic factors. Variables related to profitability, capitalization, liquidity, efficiency, size, lending activity, and deposit structure play an important role in shaping the level of risk assumed by banks. At the same time, macroeconomic conditions such as economic growth and inflation also contribute to explaining variations in bank risk. This confirms that bank risk is not only the result of internal managerial decisions, but also depends on the broader economic environment in which banks operate.

Overall, the findings highlight the importance of prudent bank management and effective regulatory oversight in maintaining financial stability. Strong profitability, adequate capital, sound liquidity positions, and efficient operations are essential for reducing bank vulnerability and enhancing resilience. These results provide useful implications for bank managers, investors, and policymakers in Tunisia, particularly in designing strategies and regulations aimed at strengthening the stability of the banking sector.

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