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The Dynamics Shaping Profitability in the Turkish Banking Sector: An Empirical Assessment

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Abstract

This study empirically examines the key determinants of bank profitability in the Turkish banking sector from 2001 to 2023. Recognizing the sector's pivotal role in macroeconomic stability and financial intermediation, the analysis employs second-generation panel econometric techniques to explore both the long-run and short-run dynamics influencing profitability. Drawing on a comprehensive dataset covering 25 banks, the study utilizes return on assets (ROA) as the dependent variable. It considers capital adequacy, deposit-to-asset ratio, loan-to-asset ratio, and non-interest income as core explanatory variables. The findings reveal robust and statistically significant long-run relationships between all explanatory variables and bank profitability. Capital adequacy emerges as the most influential determinant, underscoring the strategic importance of robust capitalization in ensuring resilience and sustained performance. In the short term, while non-interest income continues to exert a positive impact, deposit mobilization exhibits a temporary adverse effect reflecting the complexities of funding costs in Türkiye's inflationary environment. The use of both Pooled Mean Group (PMG) estimation and Fully Modified OLS (FMOLS) enhances the credibility and robustness of the results. These findings underscore the importance of maintaining strong capital buffers, managing deposit structures effectively, supporting sustainable credit growth, and fostering income diversification through digital and non-traditional banking services. The study provides valuable insights for bank managers, regulators, and policymakers seeking to enhance the profitability and resilience of the Turkish banking system in the face of evolving macroeconomic and structural challenges.

Keywords: *Bank Profitability, Non-Interest Income, Panel Cointegration, Turkish Banking Sector, Financial Intermediation, PMG Estimation, FMOLS*

Introduction

The banking sector serves as the driving force of the financial system, not only globally but also in Türkiye. Recent financial crises have underscored the intricate and significant linkages between banking sector performance and broader financial system stability (Dağıdır, 2010). In this context, the relationship between banking sector profitability and macroeconomic variables has emerged as a subject of growing academic interest. The existing literature encompasses a substantial body of empirical research that investigates the determinants of bank profitability across various banking systems and economic contexts. These studies typically examine both bank-specific and macroeconomic factors that influence the dynamics of profitability. Within the Turkish context, the banking sector occupies a central position in the financial system, not only due to its functional role in financial intermediation but also because of its dominance in terms of asset size. As of December 2022, the 57 banks operating in Türkiye collectively accounted for approximately 86.5% of the total assets of the Turkish financial sector, underscoring the sector's systemic importance and its critical influence on the broader economy (BDDK, 2023).

This structural prominence underscores the need for a nuanced empirical examination of the factors that influence profitability within the Turkish banking industry. This highlights the crucial importance of ensuring that banks remain healthy and robust, thereby supporting macroeconomic stability and growth. A sound and resilient banking system is closely tied to the sector's level of profitability. Profitability, in turn, functions as a key performance indicator for banks (Ahmad et al., 2020). Higher levels of bank profits and profitability ratios contribute to strengthening equity bases, enhancing the banks' intermediation capabilities, and expanding the availability of credit to the real economy. This increase in credit allocation facilitates business investments, thereby contributing to economic growth and employment (Bulut et al., 2024). Given the pivotal role of profitability in ensuring both sectoral and macroeconomic stability, analyzing the determinants of bank profitability and understanding the underlying dynamics have become essential areas of academic and policy-oriented inquiry. In particular, identifying both bank-specific and macroeconomic factors influencing profitability can provide critical insights for regulatory authorities, investors, and financial institutions alike.

The Turkish banking sector experienced significant adverse effects from the economic crises of November 2000 and February 2001. Numerous banks were transferred to the Savings Deposit Insurance Fund (TMSF), and substantial efforts accompanied by considerable fiscal costs were undertaken to recapitalize and restructure both public and private banks (Sarıtaş & Saray, 2012). In response to the sector's vulnerabilities, the Banking Sector Restructuring Program was launched in May 2001, aiming to permanently resolve structural issues and establish a more stable banking environment.

Following this, the Transition to a Strong Economy Program was initiated, marking a turning point in Türkiye's economic policy orientation. Inflation, which had averaged over 70% throughout the 1990s, was brought down to single-digit levels by early 2004. Fiscal consolidation efforts were intensified, resulting in significant reductions in the budget deficit and public debt stock, key criteria outlined in the Maastricht Treaty for Eurozone accession (Öznur & Petek, 2021). As a result, Türkiye entered a trajectory of sustainable economic growth, with the ratio of the Treasury's borrowing requirements to national income declining substantially.

The banking sector plays a pivotal role in fostering economic development, growth, and transformation. It acts as a vital engine of financial intermediation and is thus central to the overall functioning of the financial system. The heterogeneity within the sector, coupled with fluctuations in the broader economy, contributes to variability in banks' profitability levels (Bătae et al., 2021). Accordingly, the profitability of banks is influenced by a complex interplay between bank-specific internal (microeconomic) variables and external (macroeconomic) determinants (Balaylar et al., 2025).

These determinants are frequently examined in banking and finance literature, including key indicators such as deposits, credit volume, profitability ratios, capital adequacy, and liquidity. Monitoring their evolution is essential for crafting forward-looking strategies to mitigate emerging risks and align institutional goals with economic realities. Identifying the drivers of profitability not only ensures

the continuity of banking operations but also supports the development of a more resilient financial architecture (El-Chaarani et al., 2022).

The primary objective of this study is to empirically investigate the factors that influence bank profitability in the Turkish banking sector. By covering the period from 2001 to 2023, the study benefits from a long-term perspective, which enhances the robustness and generalizability of the findings. The selection of this extended timeframe also allows for the inclusion of multiple economic cycles, structural reforms, and sectoral developments, thereby offering a more comprehensive understanding of profitability dynamics. Moreover, the increasing significance of the banking sector within Türkiye's financial system in recent years underscores the relevance and timeliness of this research. The banking sector's expanding role in financial intermediation and its contribution to economic stability highlight the importance of identifying the determinants of bank profitability in the Turkish context.

In this context, in line with the framework provided by the existing literature and sector dynamics, this study aims to comprehensively examine the main determinants affecting profitability in the Turkish banking sector. In particular, empirically testing the short-term and long-term effects of capital adequacy, the deposit-to-total-assets ratio, the loan-to-total-assets ratio, and non-interest income on bank profitability constitutes the main research question of the study. Furthermore, the relative impact of these determinants on profitability is analyzed over time under high inflation and unstable macroeconomic conditions to better understand the vulnerabilities and resilience mechanisms of the sector. Thus, this study aims to contribute to identifying the structural factors shaping the resilient performance of the Turkish banking sector and provide strategic insights for policymakers and sector managers.

The study's structure is as follows: first, a review of the existing literature on bank profitability will be presented to establish the theoretical and empirical foundations of the analysis. This will be followed by a detailed description of the dataset and methodological framework employed in the study. Finally, the results of the empirical analysis will be reported and discussed, offering insights into the key factors that shape bank profitability in the Turkish banking sector.

Literature Review

Understanding the determinants of bank profitability has long been a focal point in the fields of banking and financial economics. Given the critical role that banks play in ensuring financial stability and facilitating economic growth, a substantial body of literature has emerged to identify and analyze the internal and external factors influencing banking sector performance. This section aims to provide a comprehensive overview of the existing literature, with a particular emphasis on studies that examine the profitability of banks through both microeconomic (bank-specific) and macroeconomic lenses. By synthesizing past research, this review aims to highlight key theoretical perspectives, identify prevailing empirical patterns, and identify gaps in the literature that warrant further investigation within the context of the Turkish banking sector.

Karabulut (2003) examined the effects of capital volume on the profitability of the banking sector. Based on the results of the Granger causality test and OLS regression analysis, the study found that banks increased their risky investments to raise their capital levels. Consequently, a negative relationship was identified between capital volume and profitability. Demirgüç-Kunt et al. (2004) analyzed the impact of banking regulations, market structure, and national institutions on net interest margins and overhead costs, using data from over 1,400 banks across 72 countries with varying levels of development. Their findings revealed that banking regulations, market concentration, and inflation had a positive impact on the dependent variables, interest margins and overhead costs. However, the effect of concentration on these variables disappeared once regulatory restrictions on competition were taken into account. Gülhan and Uzunlar (2011) conducted an empirical analysis to identify the determinants of profitability in the Turkish banking sector from 1980 to 2002. The results indicated that the independent variables had a significant effect on return on assets. Turgutlu (2014) examined the impact of profitability dynamics on market structure and competition in the banking sector from April 2006 to February 2012. The findings supported the persistence of the profitability hypothesis and revealed that financial soundness has a positive effect on bank profitability.

A considerable number of empirical studies have examined the determinants of bank profitability in the Turkish context, often highlighting the roles of both internal and external factors. For instance, Güneş (2015) conducted an empirical analysis of deposit banks operating in Türkiye over the period 2002–2012, focusing on the effects of various internal and external determinants on return on assets (ROA) and return on equity (ROE). The findings underscore the critical role of capital adequacy as a key driver of bank profitability. Furthermore, the study emphasized that sustained growth accompanied by low levels of non-performing loans is essential for capitalizing on the benefits of economies of scale. In a comparative study, Küçükbay (2017) examined the factors influencing bank profitability in both Türkiye and the member states of the European Union from 2009 to 2013. The analysis revealed that both bank size and capital ratio have a significant impact on profitability in both regions. Notably, the study identified a divergent effect of bank size on ROA. While a larger bank size positively influenced profitability in EU countries, it exhibited a negative association with ROA for Turkish banks, suggesting structural or operational differences between the two banking systems. Similarly, Aydın (2019) investigated the impact of bank-specific, sectoral, and macroeconomic variables on the profitability of commercial banks in Türkiye between 2005 and 2015. The study concluded that bank profitability is shaped not only by internal institutional characteristics, such as capital structure and operational efficiency, but also by broader external factors, including macroeconomic conditions and sector-level dynamics. Collectively, these studies highlight the multifaceted nature of bank profitability and the importance of contextual factors in shaping financial performance in the Turkish banking sector.

Horobet et al. (2021) conducted a study to identify the determinants of bank profitability in 11 Central and Eastern European countries using data from the period 2009–2018. Employing a two-step generalized method of moments (GMM) approach, the study found that market concentration in the banking sector had a

substantial and adverse effect on both ROE and ROA. Büyükoğlu (2023) sought to compare the profitability performance of domestic and foreign-owned deposit banks operating in Türkiye. The results of the study showed that the internal factor affecting the profitability of domestic deposit banks was interest income as a share of total revenue. For foreign banks, it was found that the capital adequacy ratio, a key internal profitability variable, had a diminishing effect on ROA.

Although the existing literature has made significant contributions to explaining the dynamics of profitability in the banking sector, most studies focus on limited periods or examine only certain groups of variables. Moreover, increasing financial volatility, a high-inflationary environment, and structural regulatory changes in emerging economies, such as Turkey, require a reassessment of the factors affecting the profitability of the banking sector over time. In this context, this study, which takes into account both long-term structural relationships and short-term fluctuations over a broad time horizon covering the period 2001–2023, aims to make a meaningful contribution to the literature by analyzing the impact of capital adequacy, deposit structure, loan allocation, and non-interest income on profitability using second-generation panel data methods. Thus, this study examines the impact of economic cycles, regulatory transformations, and the digitalization process on bank profitability, an area that has not been sufficiently explored in previous studies, from a holistic perspective.

Methodology

This study examines the impact of capital adequacy on provisions using annual data from 25 banks operating in the Turkish banking sector from 2001 to 2023. In the study, the 25 banks with the largest asset size in the Turkish banking sector were selected. These 25 banks can adequately represent the Turkish banking sector. At the same time, the maximum number of periods for which data is available, namely the period 2001-2023, was preferred. Return on assets (ROA) was employed as a proxy for profitability, while the explanatory variables included the ratio of total deposits to total assets, the ratio of total loans to total assets, and the ratio of non-interest income to total assets. The variables used in the study, along with their definitions and sources, are summarized in Table 1.

Table 1. Variable Definitions

Variable	Definition	Source
ROA	Bank profitability, measured by return on assets	Turkish Banks Association
CAR	Capital Adequacy Ratio	Turkish Banks Association
TDTA	Total Deposits/Total Assets	Turkish Banks Association
TLTA	Total Loans/Total Assets	Turkish Banks Association
NIITA	Non-Interest Income/Total Assets	Turkish Banks Association

This study employs panel cointegration analysis to investigate the long-term relationship among the variables that affect profitability in the Turkish banking sector. Given that first-generation panel unit root tests assume cross-sectional

independence, which is often violated in empirical applications, this study adopts second-generation panel unit root tests to account for potential cross-sectional dependence among units. Applying first-generation tests under such dependence may lead to misleading inferences.

To examine the presence of cross-sectional dependence, the Cross-section Dependence (CD) test developed by Pesaran (2004) is first conducted. Upon confirmation of cross-sectional dependence, second-generation panel unit root tests are utilized to assess the stationarity of the variables. Specifically, the Cross-sectionally Augmented Dickey-Fuller (CADF) test, proposed by Pesaran (2007), and the Cross-sectionally Augmented IPS (CIPS) test, introduced by Pesaran et al. (2009), are employed. These tests are particularly well-suited in the presence of cross-sectional dependence, which is a common characteristic in macro-panel data due to unobserved common factors or spillover effects across cross-sectional units. The Westerlund cointegration tests offer robust inference by accounting for such dependencies and provide both group-mean and panel-mean statistics to assess the null hypothesis of no cointegration.

Upon confirming the existence of a cointegration relationship, the Pooled Mean Group (PMG) estimator proposed by Pesaran, Shin, and Smith (1999) is employed to estimate the model's long-run and short-run dynamics. The PMG estimator is particularly advantageous in the context of dynamic heterogeneous panels as it accommodates both short-run heterogeneity and long-run homogeneity across cross-sectional units. This approach allows the short-run coefficients, error variances, and adjustment speeds to differ across units, while imposing a standard structure on the long-run parameters. Such flexibility makes the PMG estimator highly suitable for empirical research where the underlying economic theory suggests convergence in the long-run equilibrium, yet acknowledges cross-country or cross-unit differences in short-run adjustments.

Results and Discussion

The results of the CD test are summarized in Table 2, indicating that the cross-sectional units within the panel are significantly interdependent at the 1% significance level. This outcome suggests the presence of strong cross-sectional correlation among the panel units, which necessitates the use of second-generation panel unit root and cointegration tests that explicitly account for such dependence.

Table 2. CD Test Result

Variable	CD test	p-value	Corr	Abs (corr)
LROA	7.259	0.000	0.090	0.280
LCAR	14.316	0.000	0.170	0.360
LTDTA	5.041	0.000	0.060	0.360
LTLTA	35.532	0.000	0.430	0.470
LNIITA	29.890	0.000	0.360	0.430

Given the presence of cross-sectional dependence as indicated by the CD test results, the study employs second-generation panel unit root tests namely, the CADF and CIPS tests developed by Pesaran (2007), and Pesaran et al. (2009), respectively.

These tests are specifically designed to account for cross-sectional dependence across units in the panel. The results of the panel unit root tests are presented in Table 3. According to these findings, all variables become stationary after first differencing, indicating that they are integrated of order one, I(1).

Table 3. Panel Unit Root Test Results

Variable	CADF		CIPS	
	Level	First Difference	Level	First Difference
LROA	-1.710	-2.885***	-2.931***	-
LCAR	-2.389***	-	-2.433***	-
LTDTA	-1.779	-2.564***	-2.081	-4.947***
LTLTA	-2.783***	-	-2.264**	-
LNIITA	-1.767	-3.375***	-2.693***	-

Since the variables included in the model exhibit mixed orders of integration, the second-generation panel cointegration test developed by Westerlund (2007) is employed in this study. This test is particularly suitable for panels with cross-sectional dependence and allows for heterogeneity in both the short-run dynamics and error correction terms across panel units. The empirical findings from Westerlund (2007) panel cointegration test are presented in Table 4. The test statistics consistently reject the null hypothesis of no cointegration at conventional levels of statistical significance across the majority of the test specifications. This empirical evidence strongly supports the existence of a stable and statistically significant long-run equilibrium relationship among the variables under examination. The rejection of the null hypothesis implies that the variables do not drift apart in the long run, despite potential short-run deviations, and tend to move together over time. These results validate the appropriateness of employing long-run estimation techniques such as the Pooled Mean Group (PMG) estimator in subsequent analyses, as they confirm the presence of cointegrating relationships within the panel framework.

Table 4. Westerlund Cointegration Test Results

Statistic	Value	Z value	P value
Gt	-4.176	-11.334	0.000
Ga	-20.559	-6.511	0.000
Pt	-18.200	-8.894	0.000
Pa	-18.164	-7.710	0.000

In light of the established long-run relationships among the variables, the panel Autoregressive Distributed Lag (ARDL) approach is deemed the most appropriate analytical framework for further investigation. This methodology is particularly advantageous as it accommodates variables with mixed integration orders and allows for the estimation of both short-run dynamics and long-run equilibrium relationships within a heterogeneous panel context. Accordingly, a suitable panel ARDL model has been specified for the dataset, and the corresponding long-run and short-run estimation results are presented in Table 5.

Table 5. PMG Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Long-run equation				
LCAR	0.978	0.121	8.100	0.000
LTDTA	0.196	0.095	2.063	0.000
LTLTA	0.247	0.051	4.800	0.000
LNIITA	0.228	0.051	4.510	0.000
Shot-run equation				
ECT	-0.499	0.067	-7.420	0.000
D(LCAR)	0.330	0.149	2.220	0.026
D(LTDTA)	-0.647	0.322	-2.009	0.015
D(LTLTA)	0.085	0.060	1.410	0.159
D(LNIITA)	0.332	0.052	6.450	0.000
CONSTANT	1.568	0.205	7.660	0.000

The empirical findings derived from the PMG estimation provide important insights into the structural and dynamic factors that shape bank profitability in the Turkish banking sector. These findings are broadly consistent with theoretical expectations and are supported by a rich body of empirical literature, while also reflecting unique characteristics of the Turkish financial system. In the long run, the results show that capital adequacy (CAR), total deposits to total assets (TDTA), total loans to total assets (TLTA), and non-interest income to total assets (NIITA) all exert statistically significant and positive effects on bank profitability (ROA). These relationships underscore the structural importance of a strong capital base, a stable deposit funding structure, effective credit intermediation, and income diversification in supporting long-term profitability.

Specifically, the coefficient of capital adequacy (0.978) indicates a robust long-term contribution to profitability, echoing the findings of Athanasoglou et al. (2008) and Berger (1995), who argue that well-capitalized banks are more resilient, less risky, and thus more profitable over time. In the Turkish context, where the regulatory environment has tightened significantly since the 2001 banking crisis, capital buffers are viewed not only as a safety net but also as a competitive advantage. Similarly, the positive long-run effect of deposits (0.196) aligns with the findings of Demirgüç-Kunt and Huizinga (1999) and Flamini et al. (2009), indicating that a strong and cost-effective deposit base enhances banks' financial performance. Given that Turkish banks rely heavily on retail deposits, this result confirms the strategic importance of mobilizing customer deposits.

The positive long-run impact of the loans-to-assets ratio (0.247) supports the traditional view of banking, where loan activities are central to revenue generation. This result is consistent with Pasiouras and Kosmidou (2007), who argue that higher loan ratios, when managed prudently, contribute positively to profitability. In Türkiye's loan-driven banking environment, this suggests that sustainable credit expansion is a key driver of long-term profitability. Finally, the significant role of non-interest income (0.228) affirms the growing importance of income diversification, as also emphasized by DeYoung and Rice (2004) and Sufian and Chong (2008). In the Turkish setting, where interest margins have been squeezed by monetary policy volatility

and inflationary pressures, non-interest income, primarily through digital banking and service-based revenues, has emerged as a vital component of profitability.

In the short run, the analysis reveals more complex and transitional dynamics. The negative and significant error correction term (–0.499) confirms the existence of a long-run cointegrating relationship. It suggests that approximately half of any short-term deviation from equilibrium is corrected within one period. This relatively fast adjustment speed is indicative of an efficient banking sector that can realign with long-term fundamentals, in line with the findings of Loayza and Rancière (2006).

Short-term effects of the explanatory variables are more nuanced. While the short-run coefficient of CAR remains positive and statistically significant (0.330), reflecting the immediate stability and confidence benefits of adequate capitalization (Tan and Floros, 2012), the coefficient for TDTA is negative and statistically significant (- 0.647). This may seem counterintuitive, but it aligns with Naceur and Omran (2011), who note that rapid deposit growth, particularly in high-inflation or tight monetary environments, can increase short-term funding costs and reduce margins. In Türkiye, where competition for deposits is high and interest rates are sensitive to shifts in central bank policy, such a negative short-term impact is plausible.

The short-run coefficient of TLTA (0.085) is positive but not statistically significant, suggesting that loan expansion does not immediately translate into higher profitability, possibly due to provisioning requirements or delays in income recognition, a notion also highlighted by Albertazzi and Gambacorta (2009). On the other hand, the short-run effect of NIITA (0.332) is both positive and highly significant, indicating that non-interest income streams provide immediate support to bank earnings. This finding aligns with Lepetit et al. (2008), who emphasize the role of fee-based income in stabilizing revenues during volatile market conditions. In the Turkish banking landscape, recent advances in fintech, digital services, and wealth management have enabled banks to enhance their short-term income through diversified offerings.

Overall, these results highlight several key policy and managerial implications. First, maintaining a strong capital base is essential not only for regulatory compliance but also for sustaining long-term profitability. Second, banks must carefully manage deposit pricing and liquidity strategies, particularly under uncertain monetary conditions. Third, while credit growth remains essential, risk management must ensure that asset quality concerns do not undermine short-term profitability. Lastly, a focus on diversifying income through non-interest sources should remain a strategic priority for Turkish banks, particularly as digitalization reshapes the financial services landscape.

These findings offer valuable insights for both regulators and bank managers aiming to enhance the resilience and profitability of the Turkish banking sector in the face of ongoing macroeconomic and structural challenges.

To reinforce the robustness of the estimation results presented in Table 6, the Fully Modified Ordinary Least Squares (FMOLS) method has also been employed as a complementary estimation technique. This approach, based on the constant trend specification and utilizing the pooled estimation framework, corrects for both serial correlation and endogeneity typically present in panel cointegration regressions. The

FMOLS results, which provide an additional validation of the long-run relationships among the variables, are reported in Table 6.

Table 6. FMOLS Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
LCAR	0.639	0.216	2.950	0.003
LTDTA	0.307	0.143	2.150	0.032
LTLTA	0.308	0.139	2.220	0.026
LNIITA	0.206	0.121	1.710	0.087

The FMOLS estimation results exhibit a high degree of consistency with those obtained from the PMG model, thereby enhancing the credibility of the empirical findings. All explanatory variables are found to be statistically significant and exert a positive impact on bank profitability. Among these, the CAR emerges as the most influential determinant, suggesting that well-capitalized banks tend to achieve higher profitability levels. This finding reinforces the notion that a strong capital position not only enhances financial stability but also improves banks' ability to absorb shocks and pursue growth opportunities effectively.

Conclusion and Implications

This study was conducted to identify the main determinants affecting profitability in the Turkish banking sector over a broad time horizon covering the period 2001–2023. The research problem focuses on how the sector's profitability is shaped by both bank-specific structural factors and changing macroeconomic conditions. The empirical results indicate that the capital adequacy ratio (CAR), in particular, has a significant and substantial impact on a bank's long-term profitability. This situation reveals the strategic importance of a strong capital structure in terms of both regulatory compliance and resilience to shocks.

In addition, although the total deposits and loans-to-assets ratio contributes positively in the long run, an increase in deposits, in particular, may negatively affect profitability in the short run. This situation suggests that high inflation and interest rate fluctuations in Turkey lead to increased short-term funding costs. The significant and positive impact of non-interest income in both the short and long term demonstrates that banks must diversify their income through digitalization, thereby enhancing profitability.

As a result, the following recommendations can be made to policy makers and bank managers for the Turkish banking sector: (i) structures that will maintain capital adequacy should be supported, (ii) the deposit base should be diversified in a long-term and cost-effective manner, (iii) credit growth should be carried out within the framework of sustainability and risk management, (iv) digital banking and service-based income sources should be made strategic priorities. These recommendations will guide the sector in enhancing long-term profitability and promoting macroeconomic stability.

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