

What factors impact bank performance on the pre, during and post the crisis? System GMM analysis for US-listed banks

Ali İhsan Akgün

Department of Management, Bakircay University, İzmir, Turkey, and

Burhan Günay

Department of Finance and Banking, Ankara Yıldırım Beyazıt University, Ankara, Turkey

Abstract

Purpose – This study examines the determinants and impact of bank-specific, market-specific and macro-specific factors on bank performance before, during and after the global financial crisis in US-listed firms.

Design/methodology/approach – We use panel data methodology, the ordinary least squares regression model, the dynamic generalized method of moments and Bayesian regression to analyze a sample of 783 listed banks in USA.

Findings – The findings suggest no significant relationship between firm-specific proxy (such as firm size) and bank performance in both the long-term and crisis periods. Additionally, the results show that market-specific proxy (such as market capitalization) have a statistically significant negative impact on bank profitability (measured by return on assets) during the pre-crisis and post-crisis periods, but a significantly positive impact on profitability (measured by return on equity) in the long-term, post-crisis and Dodd–Frank Act (DFA) era. The evidence suggests that market concentration did not contribute to listed banks' performance during and after the crisis, while it had a significantly positive impact on profitability during the DFA period.

Practical implications – Overall, the results provide considerable new insights for US banking literature, as the banking industry performance varies in terms of profitability, competitiveness and efficiency.

Originality/value – This study examines three distinct groups of determinants affecting US banking profitability: bank-specific, market-specific and macro-economic variables.

Keywords Bank performance, The Dodd–Frank act, Global financial crisis, US banking

Paper type Research article

1. Introduction

Bank performance refers to a financial institution's ability to generate returns on investment, sales growth, profitability and market share, all of which are crucial for long-term sustainability and growth (Djalil *et al.*, 2023). However, unexpected adverse events, such as the global financial crisis, have significantly impacted bank performance across financial markets worldwide (Bikker and Vervliet, 2018). For instance, the 2007–2008 financial crisis had severe negative effects on the US banking industry (Menicucci and Paolucci, 2016).

In response to the crisis, the US enacted the Dodd–Frank Act (DFA) in 2010, introducing sweeping financial regulations. Among its provisions, the DFA prohibits bank mergers that would result in a combined entity holding liabilities exceeding 10% of the total consolidated



liabilities of all financial firms, thereby limiting the dominance of large banks (Leledakis and Pyrgiotakis, 2022; De Haan and Poghosyan, 2012b). The crisis reignited interest among bank managers, policymakers, regulators and academics in bank consolidation (Shala *et al.*, 2024) and profitability.

The 2008 financial crisis triggered widespread banking failures, leading to severe operational disruptions, credit reputation damage and employment losses (Boussaada *et al.*, 2023). The pre-crisis period was characterized by moderate interest rates and lenient regulations, while the post-crisis era saw historically low interest rates and stricter oversight, both posing challenges to US banks (Calmès and Théoret, 2023). Consequently, the performance of US-listed banks may exhibit significant variations before, during and after the crisis. This study examines the determinants of bank profitability, including bank-specific (internal), market-specific and macroeconomic (external) factors, while controlling for the pre-crisis, crisis, post-crisis and DFA periods.

Even well-established US banks, such as Citigroup and Merrill Lynch in USA, faced severe difficulties during the recent crisis, suggesting a need to reassess bank performance evaluation frameworks (Afruzianazar *et al.*, 2019). Additionally, high-profile corporate scandals in the early 2000s, particularly those involving financial reporting fraud, contributed to market crashes and subsequent crises (Akgün, 2016). The 2007–2008 crisis further exacerbated bank insolvencies in the USA, directly and indirectly intensifying the downturn (Vazquez and Federico, 2015). The economic shockwave of the crisis placed unprecedented strain on global economies (Quy and Tuan, 2024), including USA. In sum, due to financial globalization, the crisis also affected the firm value and the firm performance (Akgün and Şamiloğlu, 2017) worldwide. Ultimately, this crisis had adverse effects on economic growth, market capitalization, capital adequacy and liquidity of US banks, with impacts that remain difficult to quantify (Ghenimi *et al.*, 2024). Given these challenges, a thorough examination of these factors is critically important.

Bank profitability in the financial sector has gained significant attention among the scholars, bank managers, regulators, investors and shareholders since the period of 2007–2008 financial crisis. The widespread debate on the global financial crisis attributes substantial responsibility to large banks, which significantly affected numerous economies, including the USA (Ali and Puah, 2019). This study provides an analysis of determinants of bank profitability in the US context.

A survey of current studies on the relationship between bank performance and global financial crises reveals several limitations. First, prior studies have predominantly focused on either pre- or post-financial crisis periods in examining bank profitability (Vazquez and Federico, 2015; Atahau and Cronje, 2022; Mateev *et al.*, 2024). Additionally, existing studies have examined macro-variables determinants of bank profitability (Cruz-García *et al.*, 2020; Nam *et al.*, 2022; Oanh *et al.*, 2023), the relationship between market-power and US bank profitability (Smirlock, 1985; Rhoades, 1985; Berger, 1995) and the impact of the DFA on bank profitability (Dolar and Dale, 2020; Killins *et al.*, 2020; McKee and Kagan, 2019) in the US context. However, existing literature has not clearly analyzed the relationship between DFA and bank performance across pre-, during- and post-crisis periods, nor has it comprehensively considered this relationship within the context of firm-level, market-specific and macroeconomic variables. This study highlights the need for further research to clarify these aspects and provide a more comprehensive understanding of how the DFA impacts bank performance during financial crises across different contexts.

We employ an appropriate econometric methodology, specifically the Generalized Method of Moments (GMM) model, to estimate dynamic panel data models and examine previously overlooked characteristics of bank performance. This study provides executives with empirical evidence regarding the impact of bank performance factors during a financial crisis, enabling them to identify key areas for improving bank performance. We investigate the effect of bank-specific, market-specific and macro-economic determinants on the profitability of US-listed banks, with particular attention to financial crisis. To address existing gaps, our

study incorporates an extended analysis period and provide more detailed examination of both the financial crisis and DFA effects on bank profitability. To sum, while existing literature offers a comprehensive analysis of determinants affecting US bank profitability, the specific impact of the global financial crisis on these determinants has not been thoroughly examined in US samples. Thus, our study addresses this crucial gap by examining profitability determinants in the US-listed banking industry. Furthermore, the findings provide valuable insights for US financial regulators, academicians and bankers in assessing regulatory impacts on banking sector health during both the crisis period and the DFA era.

However, our study does not extensively examine other macroeconomic factors (Quoc *et al.*, 2025) and market-based factors that might influence research outcomes, such as global monetary policy changes or unforeseen financial crises. Future research could expand the scope of analysis and employ a broader range of methodologies to deepen the understanding of bank performance impacts during crisis periods, particularly the DFA period. Regarding research methods, prior studies have utilized various approaches, including ordinary least squares (OLS) and system GMM (Boussaada *et al.*, 2023; Molla *et al.*, 2023; Roodman, 2009; Tan and Floros, 2012). A common limitation of these methods is their inability to adequately account for data diversity and their inflexibility in adapting to structural changes without appropriate modifications (Quoc *et al.*, 2025). In contrast, Bayesian regression offers advantages in addressing autocorrelation and endogeneity issues. This method provides a probabilistic framework for examining relationships between bank performance, the DFA and financial crises, accommodating data diversity and yielding more nuanced insights. By combining these methodologies, our study aims to provide a more comprehensive analysis of how the DFA affects bank profitability before, during and after crises in the US context.

Using a Bayesian stochastic frontier model on an unbalanced panel dataset (Quoc *et al.*, 2025; Gargallo *et al.*, 2024), we estimate bank profitability while accounting for the varying impacts of financial crises based on bank-specific characteristics, market-specific factors and the broader macroeconomic context of the USA. Our findings confirm the significant impact of financial crises on banking performance and reveal notable differences in how such crises affect banks of different sizes across the US banking sector.

This study meaningfully fills a gap in the current literature by emphasizing the importance of understanding how financial crises influence bank performance and by informing regulators and policymakers about these implications within a competitive banking environment. The originality and novelty of this study lie in its simultaneous consideration of bank-specific characteristics, market-specific dynamics and macroeconomic factors in determining US banking profitability – an approach that has been largely overlooked in prior research. However, there remains a shortage of comprehensive studies in the literature that integrate these three dimensions when assessing bank performance.

Thus, this study contributes to the existing literature in several ways. First, we examine whether the global financial crisis-including the pre-crisis, credit crisis, post-crisis and DFA periods-affected the profitability of US banks. Although earlier studies have linked financial crises to changes in banking performance, few have analyzed financial performance indicators across all phases of the crisis and in the context of the DFA.

Second, much of the prior studies have primarily focused on bank-specific or internal factors, with less exploration of the effects of the macro-economic variables on bank profitability, as discussed by O'Connell (2023) and market-specific variables (Knezevic and Dobromirov, 2016). Unlike O'Connell (2023) and Knezevic and Dobromirov (2016), our study examines the combined effects of bank-specific, market-specific and macro-economic determinants of bank profitability, specifically in the context of US-listed banks during different phases of the global financial crisis, including the pre-crisis, credit crisis, post-crisis and DFA periods. We extend the existing data set to provide a more comprehensive analysis. Finally, in terms of research methodology, while prior studies have frequently employed econometric techniques such as OLS and GMM, these methods may lead to potentially biased

or inaccurate estimates and conclusions. To address this concern, we incorporate an additional analysis using the Bayesian method, which provides more accurate results and is less sensitive to sample size (Le Quoc *et al.*, 2025).

The remainder of this study is structured as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 outlines the research design, methodology and data used in the study. Section 4 presents the empirical results, and Section 5 provides the discussion and conclusions.

2. Literature review

Prior studies have comprehensively examined various determinants of bank profitability, focusing primarily on advanced countries such as the USA (Rhoades, 1985; Smirlock, 1985; Berger, 1995; Chaudhry *et al.*, 1995; Goddard *et al.*, 2004; Berger and Mester, 2003; De Haan and Poghosyan, 2012; Lee *et al.*, 2015; Chronopoulos *et al.*, 2015; McMillan and McMillan, 2016; Bikker and Vervliet, 2018; Feng and Wang, 2018; Calmès and Théoret, 2023) and European countries (Altunbas *et al.*, 2001; Menicucci and Paolucci, 2016; Feng and Wang, 2018), including commercial banks in Switzerland (Dietrich and Wanzenried, 2011), the UK (O'Connell, 2023), Greek (Alexiou and Sofoklis, 2009) and Spain (Trujillo-Ponce, 2013). These studies suggest that both bank-specific (internal) and macro-economic variables significantly contribute to bank profitability.

For example, Lee *et al.* (2015) find that certain factors negatively affect profitability, as measured by return on asset (ROA) and return on equity (ROE), during the pre- and post-financial crisis periods. However, they observe a significantly positive relationship between profitability and net interest margin (NIM) during the pre-crisis period in US regional banks. Similarly, Calmès and Théoret (2023) report a positive impact on the risk-adjusted ROA for listed US banks. In contrast, Feng and Wang (2018) present evidence that European banks performed worse than US banks during the post-crisis period. Chronopoulos *et al.* (2015) and Bikker and Vervliet (2018) also find that overall bank performance declined in US banking industry. Berger and Mester (2003) show that mergers and the expansion of bank holding companies in the USA had a negative impact on performance. Similarly, Nippani and Ling (2021) find that bank performance indicators such as ROA and ROE declined in the post-financial-crisis era in the USA. Furthermore, they report that listed banks had significantly higher ROA and lower debt ratios, while outperforming smaller banks in terms of NIM. In contrast, Zimon *et al.* (2024) find that the COVID-19 crisis had no significant impact on ROE among large and medium-sized firms.

Additionally, Calmès and Théoret (2023) suggest that the disappearance of securitization fees reduced the risk-adjusted ROA of local US banks. The decline in revenues from trading and deposit-related charges also impaired the performance of global banks. More importantly, Issa *et al.* (2022) find that corporate governance in banking has a significantly positive impact on green banking. They propose that improving corporate governance mechanisms in Iraqi Islamic banking can enhance banks' commitment to green banking practices.

There is also a substantial body of literature that examines the determinants of various factors influencing European bank profitability (Molyneux and Thornton, 1992; Staikouras and Wood, 2004; Goddard *et al.*, 2004; Menicucci and Paolucci, 2016). For example, Staikouras and Wood (2004) provide evidence suggest that bank profitability is influenced not only by bank managerial decisions but also by external macro-economic factors, using both fixed effects and OLS models across European countries. Additionally, Molyneux and Thornton (1992) and Goddard *et al.* (2004) find a statistically significant positive relationship between profitability and market concentration in European banks. Similarly, Menicucci and Paolucci (2016) identify statistically significant positive impacts of various determinants on the profitability of European banks. Trujillo-Ponce (2013) concludes that high bank profitability in Spain is linked with strong cost-efficiency and a high share of loans in total assets.

Several studies have also focused on the determinants of bank profitability in emerging countries. For instance, [Knezevic and Dobromirov \(2016\)](#) find that bank-specific and market-specific factors significantly influence bank profitability in the Serbian banking sector, whereas macro-economic factors do not. [Rakshit \(2021\)](#) reports that a higher level of revenue and cost-efficiency contributes significantly to bank profitability in India. [Bougatef \(2017\)](#) finds that corruption is significantly linked to bank performance, particularly ROA, in Tunisia. [Bitar et al. \(2018\)](#) suggest that highly capitalized banks in OECD countries achieved lower cost and higher profitability, as measured by NIM, during the financial crisis period. [Kumar et al. \(2016\)](#) identify a decline in productivity growth in the Indian banking industry during the period of the global financial crisis. [Ali and Puah \(2019\)](#) observe that the financial crisis had a negative but statistically insignificant effect on profitability in Pakistan. In contrast, [Gulati and Kumar \(2016\)](#) find no adverse impact of the global financial crisis on the profit efficiency in the Indian banking industry. Similarly, [Akgün ve Türkoğlu \(2024\)](#) report that firm performance measured by ROE did not contribute to intellectual capital pre-and post-financial crisis period. However, they also find that common law countries exhibited a statistically significant and positive relationship between firm performance and ROA in the pre-crisis period. Furthermore, [Akgün and Şamiloğlu \(2017\)](#) show that ROA, ROE and operating profit margin for firms listed on BIST 100 index had a statistically significant and positive impact in the post-financial crisis periods compared to the pre-crisis period. More recently, [Baltas \(2025\)](#) finds that profit efficiency indicators, including leverage, are stronger predictors of future profits than conventional current indicators, outperforming other measures of bank risk during the 2007–2009 financial crisis in US commercial banks.

When it comes to bank-specific variables, prior studies present mixed findings regarding the impact of size (SIZE) on bank profitability across different countries. For example, [Bucevska and Misheva \(2017\)](#) report that SIZE is an insignificant determinant of profitability in the selected Balkans countries. [Rakshit \(2021\)](#) finds SIZE has a negative and significant impact on bank profitability, measured by ROA and ROE, in India. In contrast, [Athanasoglou et al. \(2008\)](#) and [Isayas \(2022\)](#) identify a positive relationship between SIZE and profitability. [Goddard et al. \(2004\)](#) suggest a relatively weak connection between SIZE and profitability in the European countries, while [Menicucci and Paolucci \(2016\)](#) find that SIZE and capital ratio are significant bank-specific determinants of profitability in Europe. [Almaskati \(2022\)](#) also highlights the significant role of SIZE, particularly in relation to a country's financial development ranking. Similarly, [Chaudhry et al. \(1995\)](#) and [Chronopoulos et al. \(2015\)](#) find a significant positive effect of SIZE on US bank profitability, while [Smirlock \(1985\)](#) and [Goddard et al. \(2004\)](#) report a negative relationship. In a related finding, [De Haan and Poghosyan \(2012b\)](#) suggest a positive relationship between bank SIZE and earnings volatility during the US financial crisis. [Adelopo et al. \(2018\)](#) conclude that the financial crisis does not significantly impact bank profitability through certain bank-specific variables.

Earnings per share (EPS) has also been used in prior studies as a proxy of bank performance. For example, [Pawar and Munuswamy \(2023\)](#) find a negative and insignificant effect of environmental reporting practices on the EPS in the Indian banking sector. Conversely, [Oanh et al. \(2023\)](#), using Bayesian linear regressions, report that having a higher leverage ratio diminishes bank performance (ROA and ROE), but is positively associated with EPS. Additionally, we employ the capital adequacy ratio (ETA) as a bank-specific variable to assess credit risk. [Akgün \(2022\)](#) finds that ETA has a positive impact for both IFRS-reporting merged banks and local GAAP banks, indicating that higher capitalization helps mitigate agency problems among financial information users.

Another line of study focuses on the impact of the financial crisis on the determinants of bank profitability. Financial crisis can have adverse effects on the banking system in both advanced and emerging economies. These effects vary based on country-specific bank characteristics, market structures and macro-economic and political conditions. For example, [Kiyannmehr et al. \(2023\)](#) find that the COVID-19 crisis has a positive and significant impact on profitability. [Atahau and Cronje \(2022\)](#) suggest that liquidity, credit risk and equity are key

determinants of bank performance and their significance varies between the pre- and post-financial crisis periods and across different types of bank ownership. Similarly, [Vazquez and Federico \(2015\)](#) report that banks with higher leverage and weaker structural liquidity before the crisis were more likely to become insolvency afterward. [Ghenimi et al. \(2024\)](#) find that COVID-19 had a significantly negative effect on the stability of conventional banks, whereas Islamic banks were more profitable and exhibited lower risk during the same period.

Bank profitability has drawn increased attention in the aftermath of the recent financial crisis for several reasons. First, the recent global financial crisis offers a superior quasi-natural experiment compared to the pre- and during-crises periods for studying bank performance. Since the crisis was reasonably exogenous to both the borrowers and lending institutions, it allows researchers to examine whether the same factors influenced bank performance during the crisis as they did in the pre-crisis periods ([Mateev et al., 2024](#)). Second, the performance of banks during the financial crisis can be explained by macro-economic variables and other efficiency-related factors ([Piri et al., 2020](#)). Third, this study focuses on market capitalization and market competition, under the assumption that market structure significantly impacts bank performance during crisis periods.

Finally, [Mateev et al. \(2024\)](#) find that banks in MENA countries experienced reduced profitability during the COVID-19 crisis, as indicated by the negative estimated coefficients. However, they do not find a significant relationship between bank profitability and efficiency during the recent crisis. These findings suggest there may be systematic differences in the relative importance of pre-crisis, credit crisis and post-crisis across the listed banks in our sample.

Consequently, this study contributes to the current empirical literature by addressing the following two research questions:

- RQ1. Is bank profitability during the financial crisis and DFA period dependent on macroeconomic variables and market competition?
- RQ2. How does the impact of the pre-crisis, during-crisis and post-crisis periods differ in shaping the profitability of US banks?

Larger banks, in contrast to smaller ones, are generally better positioned to benefit from economies of scale, which can enhance operational efficiency and improve performance and profit margins. For example, [Quy and Tuan \(2024\)](#) find that cost-efficiency and liquidity risk positively influence the interest rate spread, while bank size does not have a statistically significant impact. [Adelopo et al. \(2018\)](#) find a significant relationship between bank profitability (measured by ROA) and the bank-specific determinant of SIZE across the pre-crisis, during and post-crisis periods. [Chronopoulos et al. \(2015\)](#) report that the global financial crisis increased the persistence of profitability among US banks during the crisis period. [Gulati and Kumar \(2016\)](#) observe a slight deterioration in the profit efficiency of Indian banks during the global financial crisis, followed by a rapid recovery in the post-crisis period. Similarly, [Kumar et al. \(2016\)](#) suggest that liquidity risks increased during the global financial crisis.

EPS, which measures net income per share, is a useful indicator of market efficiency and operational performance. Higher EPS generally reflects stronger bank performance. However, [Ben Abdallah and Bahloul \(2023\)](#) find that EPS does not have a statistically significant impact on financial disclosure. Capital adequacy, meanwhile, reflects a bank's capacity to meet its financial obligations during periods of financial stress. Sufficient capital serves as a buffer against unexpected insolvency. For example, [Majeed and Zainab \(2021\)](#) report that Islamic banks are more highly capitalized, more liquid and less risky compared to conventional banks. In contrast, [Derbali \(2021\)](#) finds that the capitalization ratio is negatively and significantly linked with the ROE, suggesting that higher capitalization may lower ROE, although it does not significantly affect ROA. Based on this discussion, we propose the following hypothesis:

- H1. Bank-specific characteristics have a significantly negative effect on bank performance in the USA during periods of global financial crises.

Among the market-specific factors, [Knezevic and Dobromirov \(2016\)](#) and [Adelopo *et al.* \(2018\)](#) find that bank capitalization has a significant positive impact on profitability. Similarly, [Alhassan *et al.* \(2016\)](#) report that bank capitalization ratio has a statistically significant positive impact on profitability, measured by ROA and NIM, in Ghanaian banks. Their findings suggest that higher bank capitalization reduces the cost of funds. [Molyneux and Thornton \(1992\)](#) and [O'Connell \(2023\)](#) also find that the capital ratios are positively associated with bank profitability. In addition, [Mia \(2023\)](#) shows a statistically significant positive relationship between market capitalization and the cost of financial intermediation, indicating that an increase in market power raises the cost of financial intermediation of Bangladesh banks. Furthermore, [Smirlock \(1985\)](#), [Rhoades \(1985\)](#) and [Berger \(1995\)](#) find a significant and positive relationship between market-power and bank profitability in the USA. [Vu and Nahm \(2013\)](#) suggest that larger bank size enhances profit efficiency in Vietnam; however, poor asset quality and excessively high capitalization levels can increase financial vulnerability. [Shala *et al.* \(2024\)](#) find that an increase in loan loss provisions is linked with a rise in market capitalization (MCTA). Meanwhile, [Pasiouras and Kosmidou \(2007\)](#) report that asset growth is negatively related to profitability in European banks. In contrast, [Molla *et al.* \(2023\)](#) find that while board size positively influences banks' financial performance in Bangladesh, it does not affect the market-specific performance of banks operating in that context. Based on the existing literature, we propose the following hypothesis:

- H2. Market-specific characteristics have a significantly negative effect on bank performance in the USA during periods of global financial crises.

Macro-economic variables also play a significant role in shaping bank profitability. Since the global financial crisis over two decades ago, multiple macroeconomic factors have constrained the NIM of US banks – NIM being one of their primary income sources. In response to the crisis, central banks implemented extensive monetary policies aimed at mitigating its negative effects, of the crisis, which in turn resulted in a prolonged period of historically low interest rates ([Cruz-García *et al.*, 2020](#)).

A relative increase in the inflation rate (INFR) can support stable and sustainable economic development by boosting investment and consumption demand, thereby positively influencing the profitability of US banks. However, while higher inflation may allow banks to impose higher lending interest rates, it can also have a negative impact on performance, as elevated loan rates may burden borrowers and increase credit risk ([Nam *et al.*, 2022](#)). During high inflation periods, firms often experience increased working capital needs and face greater difficulty in securing financial resources ([Akgün, 1996](#)). In addition, high gross domestic product growth (GDPG) is generally expected to positively affect bank profitability, as strong economic performance enhances investment and consumption demand and increases borrowing. For instance, [Nam *et al.* \(2022\)](#) and [Oanh *et al.* \(2023\)](#) find that INFR and GDPG have positive effects on bank profitability. Similarly, [O'Connell \(2023\)](#) and [Tan and Floros \(2012\)](#) report significant positive relationships between INFR and bank profitability in the UK and China, respectively.

However, some studies yield contrasting findings. [Rakshit \(2021\)](#), for example, finds that while GDPG has a positive and significant effect on bank profitability, INFR has a negative and significant impact on ROA and ROE. [Athanasoglou *et al.* \(2008\)](#) also confirm the substantial influence of inflation on bank performance. [Zampara *et al.* \(2017\)](#) show that asset market share and GDPG contribute positively to the financial performance of Greek banks. [Thanh *et al.* \(2022\)](#), using Bayesian regression, demonstrate that macro-economic variables such as GDPG and INFR positively affect bank profitability as measured by ROA and ROE.

[Khoea *et al.* \(2022\)](#) suggest that GDPG has a significantly positive impact on NIM, although it adversely affects NIM during the financial crisis. [Vu and Nahm \(2013\)](#) observe that a combination of high GDP growth and low inflation creates favorable conditions for improved bank profitability in Vietnam. Similarly, [Adelopo *et al.* \(2018\)](#) find a consistent positive relationship between bank profitability and GDPG across pre-crisis, during- and post-crisis

periods. [Isayas \(2022\)](#) confirms the positive and statistically significant effect of GDPG, while reporting a negative but statistically insignificant effect of INFR. Contrarily, [Bucevska and Misheva \(2017\)](#) find no significant impact of either economic growth or inflation on bank performance. [Alexiou and Sofoklis \(2009\)](#), however, report a positive relationship between inflation and profitability, arguing that deposit interest rates typically decline more rapidly than credit interest rates during inflationary periods. Moreover, [McMillan and McMillan \(2016\)](#) find that bank concentration and market power increased during the financial crisis, as measured by the Herfindahl-Hirschman Index (HHI). [Staikouras and Wood \(2004\)](#) also find a positive effect of market concentration and share on bank profitability. Based on these findings, we propose the following hypothesis:

- H3.* Macroeconomic variables have a significantly negative effect on bank performance in the US during periods of global financial crises.

The DFA is a comprehensive financial reform policy designed to enhance transparency in financial transactions and improve the oversight of financial institutions. Assessing the impact of this regulation on US bank profitability is crucial ([McKee and Kagan, 2019](#)). The reforms introduced by the DFA are expected to affect all financial institutions operating directly or indirectly within the banking industry ([Dolar and Dale, 2020](#)). For example, [Leledakis and Pyrgiotakis \(2022\)](#) find that DFA had a significant positive effect on the profitability of small bank mergers during the announcement period. Similarly, [Killins *et al.* \(2020\)](#) report a positive impact of DFA on profitability, as measured by ROA and bank SIZE, for small and medium-sized banks in the USA, although they find no significant effect on larger banks. In contrast, [McKee and Kagan \(2019\)](#) find that compliance costs associated with DFA reduced the profitability of cooperative financial institutions. [Dolar and Dale \(2020\)](#) also note a decline in non-interest cost performance among community banks compared to non-community banks in the post-DFA. Accordingly, we propose the following hypothesis.

- H4.* Bank performance in the USA has been significantly negatively affected by the implementation of the DFA.

3. Research design

3.1 Data

This study investigates the determinants of bank performance across three distinct periods: pre-crisis, during the crisis and post-financial crisis. The data were obtained from multiple reliable sources. The primary source is the Bankscope database, which offers comprehensive financial information on US-listed banks. Additional macroeconomic data, including inflation rate, GDPG and domestic credit to the private sector, were sourced from the World Bank. Data on the HHI, which measures market concentration in the mortgage sector among US commercial banks by region, were obtained from wits.worldbank.org. The full dataset includes firm-level financial statement and ratio information for more than 783 US-listed banking firms. Our analysis focuses on the period from 2000 to 2014, enabling comparisons of bank-specific, market-specific and macroeconomic variables at the firm level before, during and after the global financial crisis. [Figure 1](#) presents the hypothesized research model.

According to [Akgün \(2024\)](#), the global financial crisis that emerged in 2007–2008 resulted in the systematic collapse of numerous banks, including prominent institutions such as Bear Stearns, Lehman Brothers and Merrill Lynch, primarily due to failures in corporate governance. The banking sector, to a significant extent, contributed to the financial crisis through governance-related deficiencies. Given the central role of US banking sector in the global economy, the 2000–2014 period is assumed to be heavily shaped by the crisis and its aftermath. As such, this study utilizes firm-level data from the US banking industry, particularly across the pre-crisis, during the crisis and post-crisis years, to analyze the relationship between profitability and the financial crisis in the context of banking

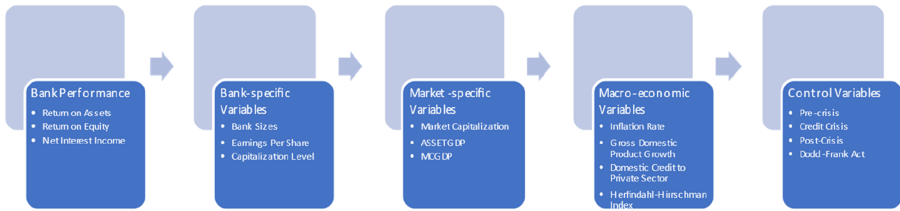


Figure 1. Hypothesized research model. **Source(s):** Composed by authors

performance. Additionally, the selection of US banking sector is justified by the critical role these institutions played in both the onset and consequences of the financial crisis, as well as the significant regulatory and financial reporting reforms that followed. Therefore, this study focuses specifically on the determinants of profitability among US-listed banking firms.

Table 1 presents a descriptive statistic for the variables used in the analysis of the US banking sample. The results indicate overall positive bank profitability across all models, as measured by return on average assets (ROAA), return on average equity (ROAE) and NIM. Specifically, the average ROAA, ROAE and NIM are approximately 0.3%, 15.2% and 0.009%, respectively, over the long term. Regarding firm-specific indicators, SIZE does not appear to significantly contribute to bank performance in the USA. However, the average values of EPS and equity-to-total-assets (ETA) show improvement in profitability during the post-crisis and DFA periods compared to the pre-crisis and crisis periods. Conversely, market-specific indicators such as market capitalization to total assets (MCTA), assets-to-GDP (ASSETGDP) and market capitalization-to-GDP (MCGDP) show a decline in profitability during the pre-crisis and crisis periods compared to the post-crisis and DFA periods. In conclusion, Table 1 highlights the influence of macroeconomic variables on the profitability of listed US banking firms, suggesting that external economic conditions play a substantial role in shaping bank performance over time.

3.2 Variables

In this study, we measure bank financial performance using three dependent variables: return on assets (ROAA), return on equity (ROAE) and NIM. ROAA reflects a bank's ability to generate net income from its total assets, indicating the efficiency of management in utilizing assets for profit. ROAE measures the net income attributable to shareholders' equity, showing how effectively a bank uses its equity base to generate profit (Rose and Hudgins, 2005). NIM is defined as the NIM divided by total assets. It captures the difference between the interest income generated from a bank's lending activities and the interest expenses paid to depositors and creditors, relative to bank's interest-earning assets (Menicucci and Paolucci, 2016). Detailed variable descriptions are presented in Appendix A.

The first group of independent variables includes bank-specific factors, namely bank size (SIZE), EPS and capital adequacy (ETA). Prior studies have consistently identified several bank-specific determinants of bank profitability (Molyneux and Thornton, 1992; Athanoglou et al., 2008), including SIZE, capital strength and liquidity. There is substantial evidence suggesting a mixed relationship between bank SIZE and profitability. Some studies find a positive relationship, arguing that larger banks benefit from economies of scale and are thus more profitable (Molyneux and Thornton, 1992; Athanoglou et al., 2008; Dietrich and Wanzenried, 2011; Knezevic and Dobromirov, 2016; Menicucci and Paolucci, 2016; Fidanowski et al., 2018; Al-Homaidi et al., 2018; Ali and Puah, 2019). Conversely, others observe a negative relationship, suggesting that overly large banks may suffer from inefficiencies or diseconomies of scale (Pasiouras and Kosmidou, 2007; De Haan and Poghosyan, 2012).

EPS is also used as a bank-specific indicator of bank performance. It is calculated by dividing net income by the number of outstanding shares and serves as a key financial ratio for

Table 1. Descriptive statistics

	All sample Mean	Std.dev.	Min.	Max.	Before crisis Mean	Std.dev.	Min.	Max.	During crisis Mean	Std.dev.	Min.	Max.
ROAA	0.310	3.550	−162.8	200.92	0.255	2.903	−162.8	44.31	0.217	1.613	−17.54	32.47
ROAE	15.17	239.90	−706.4	−31.55	3.094	7.583	−141.9	120	30.75	241.55	−477.9	11356
NIM	0.009	0.016	−0.062	0.522	0.008	0.015	−0.019	0.928	0.009	0.015	−0.017	0.093
SIZE	1.78e	1.47e	0	3.27e	1.13e	8.91e	0	1.88e	1.86e	1.43e	0	2.22e
EPS	185.00	4704.52	−94126	236097	34.118	343.28	−8558	19606	171.84	6666.3	−77996	211037
ETA	0.038	0.087	−1.93	0.956	0.031	0.077	−1.36	0.946	0.038	0.080	−0.568	0.892
MCTA	817.33	18837	0	1,726,379	1666.7	27545.9	0	1,726,379	77.861	817.81	0	29884
ASSETGDP	1,060,227	889821	0	2.13e	628584	4,999,890	0	1.06e	1,164,134	8,972,283	0	1.49e
MCGDP	646.24	9334.77	0	564901	1250.9	13616.4	0	564901	93.657	636.56	0	11040
INFR	93.864	9.86355	78.725	108.56	84.556	4.900	78.725	108.56	97.404	1.645	95.087	98.737
GDPG	−0.875	4.5939	−8.308	8.088	−2.065	3.0868	−6.735	1.5822	−5.852	2.7056	−8.308	−2.084
DCPS	181.60	11.456	162.40	206.35	177.86	12.547	162.40	198.28	192.99	9.502	185.13	206.35
HHI	0.063	0.0077	0.0521	0.0763	0.070	0.0035	0.0648	0.0763	0.055	0.0033	0.0521	0.059
Obs.	11,895	11,895	11,895	11,895	5,548	5,548	5,548	5,548	2,379	2,379	2,379	2,379

	After crisis Mean	Std.dev.	Min.	Max.	Dodd-frank Act Mean	Std.dev.	Min.	Max.
ROAA	0.440	5.654	−14.42	209.92	0.443	4.938	−95.95	209.92
ROAE	34.77	477.23	−706.4	22989	22.732	370.41	−706.4	22989.2
NIM	0.010	0.018	−0.306	0.522	0.011	0.018	−0.063	0.522
SIZE	2.58e	2.02e	0	3.22e	2.63e	2.03e	0	3.27e
EPS	391.09	6886.55	−9412	236097	404.06	6284.42	−94126	236098
ETA	0.047	0.100	−1.930	0.952	0.043	0.101	−1.931	0.957
MCTA	65.762	337.06	0	8584.2	71.83	314.29	0	8584.3
ASSETGDP	1,647,222	1.29e	0	2.13e	160218	1.24e	0	2.13e
MCGDP	109.92	694.921	0	10956	131.22	815.844	0	15912.1
INFR	102.816	2.1741	100	105.29	104.77	2.977	100	108.57
GDPG	3.6848	3.1226	1.2087	8.088	3.775	2.666	1.208	8.089
DCPS	177.152	3.3813	174.47	181.92	180.03	4.393	174.47	184.65
HHI	0.055	0.0005	0.0548	0.0559	0.057	0.0022	0.0548	0.061
Obs.	2,379	2,379	2,379	2,379	3,965	3,965	3,965	3,965

Note(s): We used to follow three financial crisis period: before crisis (2000–2006), during crisis (2007–2009), after crisis (2010–2012) and DFA (2010–2014)

Source(s): Composed by authors. Proceed data. 2024

assessing earnings strength (Akğün, 2020). EPS signals the level of return per share and provides important information to potential investors regarding profitability. Higher EPS values tend to attract more investment interest. For instance, Siahaan *et al.* (2021) find a positive and significant relationship between EPS, profitability, with ROA and stock returns.

In addition, we employ capital adequacy (ETA) – measured as the ratio of shareholders equity to total assets – as another bank-specific indicator of bank performance. This ratio reflects a bank's capital strength and capacity to absorb losses (Al-Homaidi *et al.*, 2018). According to Dietrich and Wanzenried (2011), banks with a higher ETA ratio require less external financing, which enhances profitability. Several studies report a significant positive relationship between bank capital adequacy and profitability with ROA and NIM (Ebenezer *et al.*, 2017; Adelopo *et al.*, 2018; Fidanowski *et al.*, 2018). Similarly, Trujillo-Ponce (2013) and Bitar *et al.* (2018) find that higher capital ratios contribute positively to bank profitability. However, contrary findings also exist. For example, Trujillo-Ponce (2013) and Alhassan *et al.* (2016) report a significant negative relationship between capitalization ratio and profitability with ROE in the Spanish and Ghanaian banking sectors, respectively.

The second group of determinants defines market-structure factors that affect bank profitability, which are three market-specific variables as independent variables: market capitalization, asset and market development. First, market capitalization to total assets of the banks (MACTA) performs as a proxy for country financial development and size of financial market, and Knezevic and Dobromirov (2016) find a positive effect of this factor on the profitability of banks. Second, we use the ratio of total assets of the banks divided by gross domestic product (ASSETGDP). Finally, market capitalization to GDP (MCGDP) is a measure of overall market development, which is calculated as market capitalization to gross domestic product. Pasiouras and Kosmidou (2007) findings suggest that MCTA and MCGDP are statistically significant and positively linked to profitability with ROAA in both domestic and foreign banks in the European Union, while ASSETGDP is negatively linked to profitability with ROAA among domestic and foreign banks.

The third group of determinants considers macroeconomic factors that influence bank profitability. The variables included in this group are INFR, GDPG, Domestic Credit to Private Sector (DCPS) and HHI. INFR is one of the important key variables for determining banks' performance. In some of the literature, the relationship between INFR and profitability is positive, while in other studies, the relationship between INFR and profitability is negative. This variable is included to account for economic uncertainty (Kantharia and Biradar, 2023), and therefore, this study will examine the inflation rate's impact on publicly listed banks' performance.

Empirical evidence on the relationship between INFR and bank profitability is mixed. Dietrich and Wanzenried (2011) find a positive and significant relationship, while Adelopo *et al.* (2018) find a significantly negative relationship between INFR and bank performance, but only in the fixed effects model. Additionally, there is a positive and significant relationship between INFR and NIM during the financial crisis. However, Goddard *et al.* (2004) showed an insignificant correlation of bank profits. Fidanowski *et al.*'s (2018) findings show a positive relationship between INFR and bank profitability, suggesting that bank income increases more with inflation than bank costs.

The GDP rate normally varies over time, but in the banking industry, the GDPG rate does not vary as much. Accordingly, it is estimated that the profitability of the banking sector will improve during cyclical upturns; the key reason for this is an increase in credit lending during periods of economic growth. Therefore, we can say that there is a direct relationship between GDPG and profitability, i.e. if the GDP rate grows, bank performance will also increase or vice versa (Kantharia and Biradar, 2023).

For example, Al-Homaidi *et al.*'s (2018) results show a positive link between INFR and the exchange rate, while GDPG has a negative impact on banks' profitability with ROA. However, prior studies find a positive and significant relationship between GDPG and bank profitability, including Athanasoglou *et al.* (2008), Dietrich and Wanzenried (2011) and Adelopo *et al.*

(2018) in the pre-crisis, during and post-financial crisis periods, as well as in the banking sector of Croatia (Fidanoski *et al.*, 2018). Similarly, Ebenezer *et al.* (2017) find a positive and significant impact of GDPG on banks' profitability in the post-crisis, while Bitar *et al.* (2018) find a negative link with bank loan loss reserves.

We also measure the market structure variable in the banking industry by means of the HHI, which is defined as the sum of the squares of the market shares of all banks in the US banking industry. Bitar *et al.* (2018) find that HHI has a positive impact on the bank loan loss reserves ratio in OECD banks. Thus, market concentration measured by HHI plays a significant and positive role in determining bank profitability, such as ROA and NIM, indicating that a more concentrated market contributes to banks' profitability in Croatia (Fidanoski *et al.*, 2018). Berger and Mester (2003) find that the coefficients on HHI suggest that greater concentration is significant and positively linked to the prices of business loans and securities, while Dietrich and Wanzenried (2011) find a negative relationship between market concentration and bank performance. In contrast, Alhassan *et al.* (2016) find an insignificant relationship between bank profitability and HHI.

3.3 Methodology

We first used the fixed effect model and the OLS regressions model and then estimated the System GMM, consistent with the previous literature. Interestingly, however, as our dataset suffers from the problems of heteroskedasticity, first-order autocorrelation and endogeneity, the use of the classical linear OLS model fails to resolve the possible correlation between unobserved effects and explanatory variables, resulting in inconsistent and biased findings (Molla *et al.*, 2023). Therefore, because fixed effect and OLS models constantly face some problems – including measurement errors and omitted variables bias – our study used the GMM model suggested by Blundell and Bond (1998). Recognized as the proper solution for addressing heterogeneity and endogeneity problems, the GMM model provides more robust results compared to the OLS model (Boussaada *et al.*, 2023).

The GMM can effectively address these sources of dynamic endogeneity by utilizing internal data transformation process and lagged values of dependent variables. This study, therefore, employs the dynamic panel data method of GMM estimation. This method is superior to the alternative difference GMM estimator as it permits more instruments and significantly improves efficiency. Unlike the difference GMM, it preserves fixed effects and serves as an unbiased and consistent estimator (Roodman, 2009; Molla *et al.*, 2023). System GMM, which accounts for endogeneity, is widely used in examining bank profitability factors (Tan and Floros, 2012). While fixed-effect models account for cross-sectional differences, they may not fully address potential endogeneity concerning the dependent variable – an issue resolved by system GMM models through their dynamic panel approach (Almaskati, 2022). Thus, the system GMM approach controls for unobserved heterogeneity and accommodates persistence in the dependent variable, providing consistent parameter estimates (Tan and Floros, 2012). Recently, Boussaada *et al.* (2023) demonstrated that their GMM model produced more robust, adequate and efficient results while addressing heterogeneity and endogeneity issues in corporate social responsibility and bank performance compared to traditional fixed or random effects estimators. For these reasons, we employ the GMM model as our primary empirical method. We estimate the following models to examine bank performance determinants:

$$\begin{aligned} \text{ROAA}_{it} = & \beta_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{ETA}_{it} + \beta_4 \text{MCTA}_{it} + \beta_5 \text{ASSETGDP}_{it} \\ & + \beta_6 \text{MCGDP}_{it} + \beta_7 \text{INFR}_{it} + \beta_8 \text{GDPG}_{it} + \beta_9 \text{DCPS}_{it} + \beta_{10} \text{HHI}_{it} \\ & + \beta_{11} \text{CONTROLV}_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

$$\begin{aligned} \text{ROEA}_{it} = & \beta_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{ETA}_{it} + \beta_4 \text{MCTA}_{it} + \beta_5 \text{ASSETGDP}_{it} \\ & + \beta_6 \text{MCGDP}_{it} + \beta_7 \text{INFR}_{it} + \beta_8 \text{GDPG}_{it} + \beta_9 \text{DCPS}_{it} + \beta_{10} \text{HHI}_{it} \\ & + \beta_{11} \text{CONTROLV}_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

$$\begin{aligned} \text{NIM}_{it} = & \beta_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{ETA}_{it} + \beta_4 \text{MCTA}_{it} + \beta_5 \text{ASSETGDP}_{it} \\ & + \beta_6 \text{MCGDP}_{it} + \beta_7 \text{INFR}_{it} + \beta_8 \text{GDPG}_{it} + \beta_9 \text{DCPS}_{it} + \beta_{10} \text{HHI}_{it} \\ & + \beta_{11} \text{CONTROLV}_{it} + \varepsilon_{it} \end{aligned} \tag{3}$$

In the next step, we used a Bayesian regression approach to analyze which indicators, among those suggested by the literature, can better predicted US banks’ profitability. Frequentist methods, such as panel data regression, which depend on *p*-values, have faced criticism from theoreticians for their inability to produce dependable results (Kalia, 2024b; Briggs, 2023). Therefore, beyond using conventional frequentist methods, this study extends its analysis by incorporating Bayesian methods rooted in Bayes’ theorem of probability (Kalia, 2024a). One of the key motivations for using Bayesian regression is that it permits the opportunity to compare estimated values derived from both the GMM and Bayesian approaches in the analyses of the model (Tan and Lakehal-Ayat, 2018).

Bayesian regression allows the estimation of the posterior distribution, given the likelihood and prior distributions. The Bayesian process is a probabilistic model that infers hypotheses from the data (Ben Bouheni *et al.*, 2023). This estimator provides more reliable results than conventional maximum likelihood estimators (McNeish, 2016). A key advantage of the Bayesian method is its ability to address statistical problems linked with small sample sizes when modeling data. Prior studies suggest that Bayesian methods are effective in handling both large and small datasets and properly dealing with variable distributions (Ben Bouheni *et al.*, 2023; McNeish, 2016). After that, we used the Bayesian regression approach to analyze and address heterogeneous variables related to endogeneity, autocorrelation and small sample sizes more robustly, testing the impact of the financial crisis on banks’ performance in the USA (Lee *et al.*, 2015; Kalia, 2024a, b; Briggs, 2023; Oanh *et al.*, 2023; Khoa *et al.*, 2022). Consequently, Bayesian linear regression fits our model well, given the complexity of the relationship between bank’s variables and the sample size (Ben Bouheni *et al.*, 2023).

4. Empirical results

Table 2 shows the fixed-effect regression results. The results suggest that there is no significant relationship between firm-specific proxy with SIZE and bank performance, both in the long-term and crisis periods, indicating no efficiency impacts in the US banking industry. This means that listed banks could not increase profitability across the entire sample. Thus, the findings show that bank SIZE is not a critical factor for measuring the profitability of publicly listed US banks, as it is insignificant with both performance indicators in both the long-term and crisis periods. This is consistent with Kantharia and Biradar (2023).

However, EPS has a significant negative impact on bank profitability measured by ROAE at the 5% level before crisis, thereby supporting H1. In addition, EPS has a significant positive impact on bank profitability with ROAE at the 1% level in both the long-term and after crisis and DFA periods, consistent with Siahhaan *et al.* (2021). Meanwhile, EPS has a significant negative impact on bank profitability with ROAE at the 5% level before crisis. ETA has a significant positive impact on bank profitability with NIM at the 5% level in both the long-term and DFA periods, consistent with Knezevic and Dobromirov (2016) and Adelopo *et al.* (2018), while it does not contribute to listed banks’ performance after crisis. In particular, a positive

Table 2. Fixed-effects Driscoll-Kraay results of bank performance

Variables	All sample ROAA	ROAE	NIM	Before crisis ROAA	ROAE	NIM	During crisis ROAA	ROAE	NIM	After crisis ROAA	ROAE	NIM	Dodd-frank Act ROAA	ROAE	NIM
SIZE	−1.18 (5.15e)	0.60 (3.12e)	1.48 (1.48e)	0.88 (1.30e)	2.99 (4.16e)	4.54 (1.18e)	7.26 (8.04e)	2.73 (1.08e)	3.93 (1.13e)	−1.21 (4.96e)	−9.35 (8.63e)	−2.95 (6.13e)	−1.18 (5.15e)	0.60 (3.12e)	1.48 (1.48e)
EPS	1.70 (0.000)	8.81*** (0.000)	4.24 (8.68e)	1.29 (0.000)	−2.47** (0.001)	0.28 (2.40e)	1.65 (6.05e)	−1.40 (0.000)	−0.26 (3.54e)	1.77 (0.000)	25.14*** (0.000)	1.06 (1.87e)	1.70 (0.000)	8.81*** (0.000)	4.24 (8.68e)
ETA	0.42 (13.424)	1.29 (31.30)	2.99** (0.024)	1.45 (18.350)	−0.62 (20.544)	2.09* (0.027)	5.56** (0.764)	0.86 (51.41)	1.01 (0.005)	3.50* (8.05e)	−0.63 (31.82)	1.42 (0.069)	0.42 (13.424)	1.29 (31.30)	2.99** (0.024)
MCTA	−0.39 (0.000)	3.37** (0.002)	−0.53 (3.72e)	−2.37** (4.510)	0.17 (9.90e)	−1.39 (9.34e)	−0.37 (0.000)	1.71 (0.001)	2.11 (2.81e)	−3.12* (0.000)	11.91** (0.000)	−0.66 (4.51e)	−0.39 (0.000)	3.37** (0.002)	−0.53 (3.72e)
ASSETGDP	0.53 (6.81e)	−3.70 (2.86e)	0.70 (9.95e)	−2.73 (5.77e)	−1.06 (9.79e)	−4.76 (2.43e)	−6.31 (1.54e)	−3.62 (5.62e)	−4.73 (1.44e)	−3.73 (9.08e)	0.01 (1.82e)	3.63 (5.84e)	0.53 (6.81e)	−3.70 (2.86e)	0.70 (9.95e)
MCGDP	1.35 (0.000)	−0.66 (0.008)	−2.39 (9.53e)	−0.71 (6.84e)	−1.26 (2.20e)	2.22 (4.11e)	0.84 (0.000)	−2.59 (0.004)	2.32 (1.53e)	0.54 (0.000)	0.50 (0.004)	−1.57 (3.01e)	1.35 (0.000)	−0.66 (0.008)	−2.39 (9.53e)
INFR	−1.13 (0.005)	−325.6*** (0.070)	17.52*** (0.000)	−1.56 (0.049)	3.28*** (0.106)	1.23 (0.000)	−89.13*** (0.004)	244.45*** (0.326)	−7.09** (0.000)	5.29** (0.003)	61.07*** (0.040)	6.89** (0.000)	−1.13 (0.005)	−325.6*** (0.070)	17.52*** (0.000)
GDPG	−1.98 (0.006)	428.80*** (0.032)	13.10 (7.51e)	−0.96 (0.013)	3.43*** (0.024)	2.13* (0.000)	−97.33*** (0.007)	230.06*** (0.728)	−8.39** (0.000)	−6.35** (0.004)	270.31*** (0.046)	2.31 (0.000)	−1.98 (0.006)	428.80*** (0.032)	13.10 (7.51e)
DCPS	−72.32*** (0.000)	−496.0*** (0.037)	−1.95 (5.94e)	2.48** (0.019)	−4.13*** (0.030)	−3.71*** (0.000)	94.98*** (0.002)	−245.65** (0.143)	11.14*** (0.000)	−16.28*** (0.000)	−194.4*** (0.007)	−14.85*** (9.500)	−72.32*** (0.000)	−496.0*** (0.037)	−1.95 (5.94e)
HHI	15.06*** (6.161)	498.30*** (61.213)	−34.33*** (0.013)	2.40** (26.987)	−0.65 (86.057)	−3.98*** (0.101)							15.06*** (6.161)	498.30*** (61.213)	−34.33*** (0.013)
Cons	12.20*** (0.474)	384.98*** (7.642)	−23.88*** (0.000)	−3.61*** (1.979)	0.07 (9.550)	−3.33*** (0.143)							12.20*** (0.474)	384.98*** (7.642)	−23.88*** (0.000)
Obs.	11,892	11,892	11,892	5,548	5,548	5,548	2,379	2,379	2,379	2,379	2,379	2,379	3,965	3,965	3,965

Note(s): The table reports the impacts of the explanatory of listed firms' financial variables and standard errors are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. We used to follow three financial crisis period: before crisis (2000–2006), during crisis (2007–2009), after crisis (2010–2012) and DFA (2010–2014)

Source(s): Composed by authors. Proceed data. 2024

ETA could improve bank profitability, indicating that a strong capital contributes to declining insolvency risk. This result is consistent with [Fidanoski et al. \(2018\)](#).

Additionally, the findings show that market-specific proxies ASSETGDP and MCGDP do not contribute to US-listed banks' profitability, thus not supporting [H2](#). However, MCTA has a negative and significant impact on banks' profitability with ROAA during the pre-crisis and post-crisis, at the 5% and 1% level, respectively, but has a significantly positive impact on profitability with ROAE at the 5% level in the long-term, post-crisis and DFA periods. This positive result is consistent with [Pasiouras and Kosmidou \(2007\)](#).

Regarding macro-economic determinants' impacts on bank profitability, INFR has a significantly negative impact on bank profitability with ROAE at the 1% level both in the long-term and DFA periods, while it has a significantly positive impact on bank profitability with ROAE at the 1% level during the pre-crisis, crisis and post-crisis periods. Similarly, INFR has a notably positive impact on bank profitability with NIM in the long-term, post-crisis and DFA periods. These findings are consistent with studies by [Adelopo et al. \(2018\)](#) and [Fidanoski et al. \(2018\)](#), suggesting that INFR influences bank profitability in the USA.

Our test result also shows GDPG has a crucially positive and significant impact on profitability measured by ROAE at the 1% level for the full sample, which is consistent with the findings from prior studies ([Athanasoglou et al., 2008](#); [Dietrich and Wanzenried, 2011](#); [Adelopo et al., 2018](#); [Fidanoski et al., 2018](#)), suggesting that the US banking industry could benefit from a reliable and strong macro-economic setting. However, the findings also show that GDPG has a negative effect on US bank profitability with ROAA at the 1% level during both in the crisis and post-crisis, which aligns with the findings of [Bitar et al. \(2018\)](#).

Our test results further indicate that DCPS has a significantly negative impact on profitability measured by ROAA and ROAE at the 1% level in the long-term, post-crisis and DFA periods. Additionally, the findings show that DCPS has an adverse effect on US bank profitability with NIM at the 1% level in both in the pre-crisis and post-crisis periods, while it has a positive impact on NIM during the crisis. Likewise, the influence of macro-economic level factor DCPS has a negative impact on profitability measured by ROAE in the pre-crisis period.

The evidence suggests that HHI does not contribute to listed banks' performance during and post-crisis, while HHI has a positive and significant impact on profitability measured by ROAA and ROAE at the 1% level in both the long-term and DFA periods. Thus, HHI plays a significant role in determining the profitability of listed banks in the USA, challenging Hypothesis [H4](#), which suggests that a competitive market is linked to better profitability and efficiency. This positive result is consistent with [Staikouras and Wood \(2004\)](#) and [Fidanoski et al. \(2018\)](#). However, HHI has a significantly negative impact on bank profitability measured by NIM at the 1% level in the long-term, pre-crisis and DFA periods, which is consistent with [Dietrich and Wanzenried \(2011\)](#), thereby supporting both [H3](#) and [H4](#).

[Table 3](#) illustrates the findings for the OLS regression results of the sample. It appears that there are some significant findings regarding the impact of firm-specific and market-specific factors on bank profitability. The OLS results suggest that there is no significant relationship between the firm-specific proxy SIZE and bank performance in both the long-term and crisis periods, indicating that the increase in total assets of listed banks is a more restrictive factor than an improvement for banks' profitability. This result is consistent with [Knezevic and Dobromirov \(2016\)](#). However, EPS has a significant negative impact on bank profitability measured by ROAE at the 1% level before the crisis, therefore supporting [H1](#). In addition, EPS has a significant positive impact on bank profitability with ROAA at the 5% and 1% level in both the pre- and post-crisis periods, respectively, which is consistent with [Siahaan et al. \(2021\)](#). ETA has a significant positive impact on bank profitability with NIM at the 1% level in all models, which is consistent with [Knezevic and Dobromirov \(2016\)](#) and [Adelopo et al. \(2018\)](#). However, during the post-crisis period, ETA has a significant and negative impact on bank profitability measured by ROAA at the 1% level, while in the pre-crisis period, it has a significant positive impact. The coefficient of negative ETA indicates that listed banks could

Table 3. OLS Regression results of bank performance

Variables	All sample			Before crisis			During crisis			After crisis			Dodd-frank Act		
	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM
SIZE	1.63 (1.66e)	1.57 (1.69e)	1.26 (1.05e)	0.23 (3.06e)	2.35 (7.73e)	0.76 (1.40e)	0.99 (3.08e)	-0.01 (5.48e)	0.18 (3.12e)	0.05 (1.39e)	-0.07 (1.23e)	-0.34 (4.78e)	0.07 (5.56e)	1.48 (4.37e)	-0.91 (2.07e)
EPS	0.21 (0.000)	0.17 (0.000)	4.18 (2.90e)	2.01** (0.000)	-3.79*** (0.000)	4.01 (5.11e)	2.18 (4.14e)	-0.15 (0.000)	0.97 (4.19e)	6.68*** (0.000)	0.13 (0.001)	2.83 (5.51e)	0.21 (0.000)	0.21 (0.000)	4.23 (4.42e)
ETA	1.16 (30.303)	1.35 (26.05)	43.62*** (0.002)	19.53*** (0.520)	22.32*** (1.314)	42.97*** (0.002)	28.43*** (0.354)	0.87 (63.044)	22.33*** (0.003)	-7.31*** (1.203)	0.48 (106.43)	7.76*** (0.004)	0.61 (66.683)	0.61 (66.493)	14.15*** (0.003)
MCTA	0.01 (0.000)	-0.07 (0.000)	-2.73 (7.422e)	-7.22*** (1.440)	-4.64*** (3.650)	-7.51 (6.62e)	5.38*** (0.000)	-0.17 (0.006)	0.45 (3.51e)	14.53*** (0.000)	-0.13 (0.031)	0.26 (1.22e)	0.01 (0.021)	0.01 (0.022)	-1.93 (1.01e)
ASSETGDP	-1.53 (2.72e)	-1.48 (2.79e)	-0.81 (1.73e)	-0.08 (5.43e)	-0.12 (1.37e)	-0.07 (2.49e)	-1.51 (4.81e)	0.03 (8.56e)	-0.06 (4.87e)	-0.07 (2.17e)	0.05 (0.000)	0.35 (7.47e)	-1.40 (7.07e)	-1.39 (7.08e)	0.96 (3.35e)
MCGDP	0.07 (0.000)	-0.02 (0.000)	3.45 (1.51e)	0.73 (2.91e)	2.61*** (7.340)	3.09 (1.33e)	4.25*** (0.000)	-0.14 (0.016)	0.42 (8.85e)	1.14 (0.000)	0.14 (0.018)	2.28 (7.32e)	-0.92 (0.009)	-0.93 (0.010)	2.14 (4.67e)
INFR	-3.74*** (0.646)	-3.63*** (0.665)	0.48 (0.000)	-0.59 (0.083)	1.12 (0.209)	0.14 (0.000)							-2.20** (10.372)	-2.20** (10.382)	1.00 (0.000)
GDPG	3.61*** (0.697)	-3.63*** (0.665)	2.24** (0.000)	-0.10 (0.023)	0.79 (0.057)	0.41 (0.000)	-6.40*** (0.141)	6.97*** (25.208)	-1.13 (0.001)	0.02 (0.038)	3.96*** (3.386)	1.69* (0.000)	4.61*** (3.023)	4.60*** (3.026)	0.79 (0.000)
DCPS	-3.33*** (0.208)	-3.24*** (0.214)	0.31 (0.000)	0.95 (0.031)	-0.83 (0.078)	-0.58 (0.000)	6.66*** (0.040)	-7.14*** (7.181)	1.23 (0.004)	-1.38 (0.035)	-0.78 (3.111)	-2.56*** (0.000)	-2.92*** (6.396)	-2.92*** (6.403)	-0.07 (0.003)
HHI	-6.30*** (724.85)	-6.12*** (745.93)	-0.68 (0.046)	0.69 (34.907)	0.50 (88.142)	-1.67* (0.160)							2.31** (21063)	2.31** (21083)	-0.45 (0.999)
Cons	5.79*** (113.503)	5.62*** (116.789)	0.84 (0.007)	-0.60 (4.769)	-0.76 (12.043)	1.58 (0.021)	6.66*** (8.621)	7.14*** (1533.3)	-1.15 (0.087)	1.44 (6.285)	0.74 (556.1)	2.92*** (0.216)	2.92*** (1001)	2.92*** (1002)	-0.29 (0.047)
Obs.	11,892	11,892	11,892	5,548	5,548	5,548	2,379	2,379	2,379	2,379	2,379	2,379	3,965	3,965	3,965

Note(s): The table reports the impacts of the explanatory of listed firms' financial variables and standard errors are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. We used to follow three financial crisis period: before crisis (2000–2006), during crisis (2007–2009), after crisis (2010–2012) and DFA (2010–2014)

Source(s): Composed by authors. Proceed data. 2024

improve their profitability by borrowing external funds and maintaining a balance between shareholders' equity and risk-weighted assets, even at the cost of equity in their financial structure. This result is consistent with [Fidanoski et al. \(2018\)](#).

The OLS results show that MCTA has a significantly positive impact on bank profitability measured by ROAA at the 1% level during both the crisis and post-crisis periods. However, the market-specific variable with MCTA shows a significant and negative impact on bank profitability with ROAA at the 1% level in the pre-crisis periods, indicating this may be attributed to the relatively low level of US stock market development, which is consistent with [Knezevic and Dobromirov \(2016\)](#). Additionally, the findings show that the market-specific proxy ASSETGDP does not contribute to US-listed banks' profitability, therefore not supporting [H2](#). In contrast, MCGDP has a significantly positive impact on profitability measured by ROAE at the 1% level in the pre-crisis period and a positive impact on bank performance with ROAA at the 1% level during the crisis. This positive result is consistent with [Pasiouras and Kosmidou \(2007\)](#).

Considering the macro-economic factors, the OLS estimator shows no contribution of the INFR to the profitability of banks during the crisis periods in the USA. In contrast, we find that INFR has a significant and negative impact on bank profitability with ROAA, which is consistent with [Kantharia and Biradar \(2023\)](#) and ROAE at the 1% and 5% level in the long-term and DFA, respectively, which is inconsistent with [Adelopo et al. \(2018\)](#) and [Fidanoski et al. \(2018\)](#). Our test result also shows GDPG has a significant and positive impact on profitability with ROAA at the 1% level during both the crisis and DFA periods, which is consistent with prior studies ([Athanasoglou et al., 2008](#); [Dietrich and Wanzenried, 2011](#); [Adelopo et al., 2018](#); [Fidanoski et al., 2018](#); [Kantharia and Biradar, 2023](#)). However, the findings show that GDPG has a negative effect on US bank profitability with ROAE at the 1% level in the long-term, which is consistent with [Bitar et al. \(2018\)](#). Additionally, GDPG has a significant and positive impact on profitability with NIM in both the long-term and post-crisis periods, at the 5% and 1% level, respectively. Similarly, GDPG has a significant and positive impact on profitability with ROAE at the 1% level during the crisis, post-crisis and DFA periods, while it shows a negative effect on US bank profitability with ROAA at the 1% level during the crisis.

Our test result also shows that DCPS has a significantly negative impact on profitability with ROAA and ROAE at the 1% level in both the long-term and DFA periods. Additionally, the findings show that DCPS has a negative impact on US bank profitability with ROAE at the 1% level during the crisis, while it has a positive impact on ROAA during the same period. The evidence suggests that HHI does not contribute to listed banks' performance during and after the crisis, while HHI has a significantly positive impact on profitability with ROAA and ROAE at the 5% level in the DFA period. This positive result is consistent with [Staikouras and Wood \(2004\)](#) and [Fidanoski et al. \(2018\)](#). However, HHI has a significantly negative impact on bank profitability with ROAA and ROAE at the 1% level in the long-term, and a negative effect on profitability with NIM at the 10% level in the pre-crisis, which is consistent with [Dietrich and Wanzenried \(2011\)](#) and thus supports both [H3](#) and [H4](#).

Overall, the OLS results show that the relationship between bank-specific determinants (ETA), market-specific (MCTA and MCGDP) and macro-economic (DCPS) and bank profitability (ROAA) has a significantly improved effect during the crisis. This result is consistent with the financial crisis, which was generated by a decline in the housing market in the US banking system ([Chronopoulos et al., 2015](#)).

[Table 4](#) shows the system GMM regression results. The results suggest that there is no significant relationship between firm-specific proxy SIZE and bank performance in either the long-term or crisis periods. However, EPS has a drastically significant positive impact on bank profitability with ROAA at the 1% level in the long-term, pre-crisis, during crisis and DFA periods, which is consistent with [Siahaan et al. \(2021\)](#). ETA has a significantly positive impact on bank profitability with ROAA and NIM at the 1% level in the long-term, pre-crisis and DFA periods, which is consistent with [Knezevic and Dobromirov \(2016\)](#) and [Adelopo et al. \(2018\)](#),

Table 4. System GMM results of bank performance

Variables	All sample			Before crisis			During crisis			After crisis			Dodd-frank Act		
	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM
SIZE	−0.08 (3.54e)	1.01 (2.28e)	0.84 (6.30e)	0.06 (2.96e)	1.40 (5.99e)	1.02 (4.20e)	1.50 (2.22e)	−0.09 (1.57e)	0.39 (3.14e)	−1.17 (2.02e)	1.12 (2.16e)	0.44 (4.26e)	−1.43 (1.36e)	0.53 (1.78e)	0.06 (2.68e)
EPS	11.68*** (0.000)	0.37 (0.000)	0.73 (2.41e)	0.21 (0.000)	4.00*** (0.000)	3.93 (4.55e)	3.53*** (0.000)	0.03 (0.003)	0.34 (5.56e)	1.39 (0.000)	0.78 (0.021)	−1.17 (4.10e)	26.46*** (0.000)	0.20 (0.009)	−0.33 (1.45e)
ETA	15.49*** (1.143)	0.28 (76.28)	23.33*** (0.002)	41.09*** (1.387)	−14.10*** (2.696)	15.52*** (0.002)	−10.61*** (3.415)	0.12 (231.06)	−2.64*** (0.005)	−5.52*** (4.932)	0.32 (505.77)	14.72*** (0.011)	−5.99*** (2.458)	0.03 (333.4)	41.73*** (0.005)
MCTA	−1.93 (2.50e)	0.27 (0.000)	−3.13 (4.49e)	−9.88*** (0.000)	5.08*** (0.000)	−3.74 (2.59e)	1.33 (0.000)	0.28 (0.016)	0.35 (3.24e)	2.72*** (0.002)	−0.07 (0.176)	−10.43*** (0.000)	5.43*** (0.001)	0.02 (0.153)	−22.57*** (0.000)
ASSETGDP	−0.45 (5.45e)	−1.33 (3.49e)	−1.09 (9.69e)	−1.90 (6.03e)	−1.11 (1.20e)	−2.12 (8.56e)	−1.16 (3.34e)	0.06 (0.000)	−0.31 (4.73e)	1.01 (2.60e)	−1.17 (0.000)	0.16 (5.48e)	1.89 (1.30e)	−0.62 (0.000)	1.61 (2.55e)
MCGDP	1.48 (6.60e)	0.46 (0.000)	0.58 (1.17e)	0.56 (4.85e)	−0.00 (9.80e)	1.22 (6.88e)	1.78** (0.000)	−0.15 (0.042)	0.49 (8.34e)	2.36** (0.000)	−0.44 (0.074)	−0.71 (1.46e)	1.07 (0.000)	−0.30 (0.072)	−0.34 (1.08e)
INFR	0.90 (0.015)	−4.20*** (0.793)	−14.2*** (0.000)	−2.41*** (0.073)	3.04*** (0.147)	2.89*** (0.000)							0.99 (0.082)	1.73* (10.853)	−0.04 (0.000)
GDPG	0.38 (0.006)	5.45*** (0.766)	4.96*** (0.000)	−2.55*** (0.024)	3.31*** (0.049)	4.24*** (0.000)	3.51*** (0.029)	5.90*** (2.207)	1.11 (0.000)	−0.77 (0.059)	−0.13 (6.387)	1.54 (0.000)	−0.53 (0.026)	2.39*** (3.416)	4.07*** (0.000)
DCPS	72.32*** (0.012)	−2.50*** (0.284)	3.57*** (0.000)	2.91*** (0.027)	−2.25** (0.055)	−3.81*** (0.000)	−0.24 (0.055)	6.61*** (3.979)	1.54 (0.000)	−1.21 (0.033)	−3.00*** (3.579)	0.32 (0.000)	−1.38 (0.034)	−2.50*** (4.544)	0.81 (0.000)
HHI	1.96** (15.312)	−6.32*** (886.59)	−5.86*** (0.025)	0.06 (46.203)	2.54*** (93.580)	−1.49** (0.066)									
Obs.	11,892	11,892	11,892	5,548	5,548	5,548	1,586	1,586	1,586	1,586	1,586	1,586	3,965	3,965	3,965

Note(s): The table reports the impacts of the explanatory of listed firms' financial variables and standard errors are reported in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. We used to follow three financial crisis period: before crisis (2000–2006), during crisis (2007–2010), after crisis (2011–2014) and DFA (2010–2014)

Source(s): Composed by authors. Proceed data. 2024

while it shows a significant negative impact on bank profitability with ROAA at the 1% level during the crisis, post-crisis and DFA periods.

Additionally, the findings show that market-specific proxies ASSETGDP and MCGDP variables do not contribute to the profitability of US-listed banks, except that MCGDP has a positive impact on profitability with ROAA at the 5% level during the crisis and post-crisis, only. However, MCTA has a significantly negative impact on banks' profitability with NIM at the 1% level in both the post-crisis and DFA periods, but a positive and notably significant impact on profitability with ROAA at the 1% level during the same periods. This positive result is consistent with [Pasiouras and Kosmidou \(2007\)](#).

From the macro-economic determinants' impacts on bank profitability, INFR has a significantly negative impact on bank profitability with ROAE and NIM at the 1% level in the long-term, while it has a significant and positive impact on bank profitability with ROAE and NIM at the 1% level in the pre-crisis period. Similarly, INFR has a positive impact on bank profitability with ROAE at the 10% level in the DFA period, which is consistent with [Adelopo et al. \(2018\)](#) and [Fidanoski et al. \(2018\)](#). Our GMM result also shows a positive coefficient for GDPG with ROAE and NIM at the 1% level in the long-term, pre-crisis and DFA periods, suggesting that bank profitability is closely tied to improvements during crisis periods in the US economy. This finding is consistent with [Adelopo et al. \(2018\)](#), [Fidanoski et al. \(2018\)](#) and [Chronopoulos et al. \(2015\)](#). However, the findings show that GDPG has a negative effect on US bank profitability with ROAA at the 1% level in the pre-crisis period, which is consistent with [Bitar et al. \(2018\)](#).

Our GMM result also shows DCPS has a significant and negative impact on profitability with ROAE in the long-term, pre-crisis, post-crisis and DFA periods. The evidence shows a negative coefficient on DCPS, indicating that an increase in domestic credit leads to a lower ROAA, ROAE and NIM. This result is in line with the findings of [Saif-Alyousfi \(2022\)](#) and [Lee and Hsieh \(2013\)](#) in Asian banks. Additionally, the findings show that DCPS has a negative effect on US bank profitability with NIM at the 1% level in the pre-crisis, while it has a positive impact on NIM in the long-term. Likewise, the influence of the macro-economic level factor DCPS has a positive impact on profitability with ROAA in both the long-term and pre-crisis periods.

The evidence suggests that HHI does not contribute to listed banks' performance during the crisis, post-crisis and DFA periods. However, HHI has a significantly negative impact on banks' profitability with NIM at the 1% level in the long-term and at the 5% level in the pre-crisis period, which is consistent with [Dietrich and Wanzenried \(2011\)](#). This result shows that higher concentration leads to diminished profitability, aligning with [Chronopoulos et al. \(2015\)](#). In addition, in the long-term, HHI has a significantly positive impact on profitability with ROAA at the 5% level, while in the pre-crisis period, it has a positive effect on ROAE, which is consistent with [Staikouras and Wood \(2004\)](#) and [Fidanoski et al. \(2018\)](#).

Table 5 shows the system Bayesian regression results for a 95% credible interval. The findings are similar in terms of directional impact of various dimensions of bank profitability on firm-level, market-specific and macro-economic variables. To illustrate, the majority of the bank performance dimensions-ROAA, ROAE and NIM-are found to have a significantly positive impact when measured by firm level, market-specific and macro-economic characteristics. Only the market-specific variable MCTA is found to exhibit a negative impact on bank performance measures across the full sample and DFA periods. The results regarding the control variables in the post-crisis period also remain in line with the baseline frequentist results. Additionally, for both the pre-crisis and credit crisis periods, MCTA is found to exhibit a negative impact on the bank performance measures, while at the firm level, EPS shows inconsistency in its relationship with bank performance. However, the rest of the variables are positively associated.

Especially, the size of the bank has a strongly positive impact on banking performance as measured by ROAA, ROAE and NIM, suggesting that larger banks have diversified products and services that capture consumer demand, thus providing more opportunities to utilize

Table 5. Bayesian regression results of US bank performance (95% credible interval)

Variables	All sample			Before crisis			During crisis			After crisis			Dodd-frank Act		
	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM	ROAA	ROAE	NIM
SIZE	0.342 [0.007, 45.99]	0.342 [0.007, 45.98]	0.343 [0.007, 45.99]	0.252 [0.008, 30.64]	0.252 [0.008, 30.64]	0.252 [0.008, 30.64]	0.193 [0.008, 22.31]	0.194 [0.009, 22.32]	0.193 [0.009, 22.32]	0.243 [0.008, 29.30]	0.243 [0.008, 29.31]	0.243 [0.008, 29.30]	0.342 [0.007, 45.99]	0.343 [0.007, 45.99]	0.342 [0.007, 45.99]
EPS	0.008 [0.006, 1.308]	0.009 [0.007, 1.37]	0.009 [0.006, 1.414]	-3.79e [0.008, -0.004]	-9.69e [0.009, -0.001]	4.12e [0.008, 0.005]	5.03e [0.009, 0.000]	2.50e [0.009, 0.003]	4.96e [0.009, 0.005]	0.004 [0.009, 0.413]	0.004 [0.009, 0.426]	0.004 [0.009, 0.431]	0.008 [0.007, 1.31]	0.009 [0.007, 1.37]	0.009 [0.006, 1.41]
ETA	0.064 [0.006, 9.469]	0.065 [0.007, 9.57]	0.057 [0.006, 8.239]	0.025 [0.009, 2.89]	0.025 [0.008, 2.91]	0.024 [0.009, 2.77]	0.016 [0.009, 1.79]	0.017 [0.009, 1.89]	0.016 [0.009, 1.80]	0.026 [0.009, 2.92]	0.026 [0.009, 2.92]	0.025 [0.009, 2.83]	0.064 [0.007, 9.47]	0.065 [0.007, 9.57]	0.057 [0.007, 8.24]
MCTA	-0.001 [0.006, -0.188]	-0.001 [0.007, -0.187]	-0.001 [0.007, -0.190]	-0.001 [0.009, -0.11]	-0.000 [0.009, -0.10]	-0.000 [0.008, -0.11]	-0.000 [0.009,- 0.092]	-0.000 [0.009,- 0.089]	-0.000 [0.009,- 0.093]	0.001 [0.009, 0.16]	0.001 [0.009, 0.16]	0.001 [0.009, 0.15]	-0.001 [0.007,- 0.18]	-0.001 [0.007,- 0.18]	-0.001 [0.007,- 0.19]
ASSETGDP	0.345 [0.007, 46.22]	0.345 [0.007, 46.22]	0.345 [0.007, 46.23]	0.269 [0.008, 33.10]	0.269 [0.008, 33.10]	0.269 [0.008, 33.09]	0.201 [0.008, 23.33]	0.201 [0.008, 23.33]	0.202 [0.008, 23.33]	0.233 [0.008, 27.84]	0.233 [0.008, 27.84]	0.233 [0.008, 27.84]	0.345 [0.007, 46.22]	0.345 [0.007, 46.22]	0.345 [0.007, 46.23]
MCGDP	0.247 [0.006, 38.58]	0.247 [0.006, 38.57]	0.247 [0.006, 38.56]	0.079 [0.008, 8.95]	0.078 [0.009, 8.95]	0.078 [0.008, 8.94]	0.092 [0.009, 10.16]	0.092 [0.009, 10.15]	0.091 [0.009, 10.14]	0.065 [0.008, 7.32]	0.065 [0.008, 7.32]	0.065 [0.008, 7.30]	0.247 [0.006, 38.58]	0.247 [0.006, 38.58]	0.247 [0.006, 38.56]
INFR	0.999 [0.000, 3086]	0.999 [0.001, 3085]	0.342 [0.007, 45.99]	0.526 [0.007, 76.54]	0.526 [0.007, 76.53]	0.526 [0.006, 76.53]	0.289 [0.008, 34.29]	0.288 [0.008, 34.30]	0.289 [0.008, 34.29]	0.541 [0.007, 80.08]	0.542 [0.007, 80.08]	0.541 [0.007, 80.08]	0.999 [0.000, 3086]	0.999 [0.000, 3085]	0.999 [0.000, 3086]
GDPG	0.996 [0.000, 2350]	0.996 [0.000, 2350]	0.999 [0.000, 3086]	0.955 [0.002, 464.9]	0.955 [0.002, 464.7]	0.955 [0.002, 465.0]	0.414 [0.007, 54.32]	0.415 [0.007, 54.32]	0.414 [0.007, 54.33]	0.537 [0.007, 78.99]	0.537 [0.007, 78.99]	0.537 [0.006, 78.99]	0.996 [0.000, 2350]	0.996 [0.000, 2350]	0.996 [0.000, 2350]
DCPS	0.998 [0.000, 2997]	0.998 [0.000, 2996]	0.998 [0.000, 2997]	0.483 [0.007, 67.21]	0.482 [0.007, 67.20]	0.482 [0.007, 67.21]	0.303 [0.008, 36.36]	0.303 [0.008, 36.36]	0.303 [0.008, 36.36]	0.465 [0.007, 63.71]	0.465 [0.007, 63.70]	0.465 [0.007, 63.70]	0.998 [0.000, 2997]	0.998 [0.000, 2996]	0.998 [0.000, 2997]
HHI	0.998 [0.000, 2625]	0.998 [0.000, 2623]	0.998 [0.000, 2625]	0.949 [0.002, 415.6]	0.948 [0.002, 414.6]	0.949 [0.002, 415.7]	0.926 [0.003, 339.47]	0.927 [0.003, 339.22]	0.927 [0.003, 339.69]	0.463 [0.007, 63.16]	0.462 [0.007, 63.16]	0.463 [0.007, 63.16]	0.998 [0.000, 2625]	0.998 [0.000, 2623]	0.998 [0.000, 2625]
Obs.	11,892	11,892	11,892	5,548	5,548	5,548	1,586	1,586	1,586	1,586	1,586	1,586	3,965	3,965	3,965

Note(s): Bayesian regression estimates of determinants of profitability by US banks are defined in [Table 5](#)

We used to follow three financial crisis period: before crisis (2000–2006), during crisis (2007–2009), after crisis (2010–2012), and DFA (2010–2014)

Source(s): Composed by authors. Proceed data. 2024

income streams than smaller banks. The findings are consistent with results of [Oanh et al.'s \(2023\)](#) and [Thanh et al. \(2022\)](#). Similarly, for US-listed banks, rising bank size can lead to better credibility with customers, improved market share and diversification of loan and investment portfolios, all of which contribute to superior incomes. The findings are consistent with [Nam et al.'s \(2022\)](#).

EPS has a significantly positive impact on bank profitability. This indicates that when banks use equity effectively, as total shares outstanding improve, the likelihood of ROAE diminishing due to negative impacts can be reduced by up to 95%. This view is consistent with the findings of [Thanh et al. \(2022\)](#). Hence, ETA has a positive impact on bank profitability, indicating that banks operate efficiently and obtain sufficient capital to expand lending activities by improving profitability across the entire sample. This result is consistent with [Thanh et al. \(2022\)](#), implying that banks with higher tolerance for market risks and large equity capital have a cost of capital advantage and benefit from increased customer confidence in their banking services and products, which certainly enhances their cost-efficiency.

The findings also show that market capitalization reduces the ROAA, ROAE and NIM of US-listed banks across the whole sample, except for post-crisis period, which is consistent with [Oanh et al. \(2023\)](#).

For macro-economic factors, INFR and GDPG have a strongly positive impact on banking performance for the whole sample of US-listed banks. When the economy has a high GDPG rate, the demand for credit loans grows and the repayment ability is ensured when customer's business are promising, enabling banks to achieve better profitability. These findings are consistent with [Nam et al.'s \(2022\)](#). Similarly, DCPS has a positive impact on profitability in the pre-crisis, credit crisis and post-crisis periods, as bank lending activities generate additional revenue for listed banks. Consequently, listed banks diminish provisions for non-performing loans, and this cost-saving translates into additional profitability. This result is consistent with [Oanh et al. \(2023\)](#).

[Table 5](#) shows a positive linkage between HHI and the profitability of listed banks in the USA across the whole sample. In the USA, these results suggest that listed banks with significant market share and market structure are the most prominent institutions, playing a leading role in the stability of the banking system and industry.

5. Conclusion

5.1 Practical implications

This study explores the impact of bank-specific variables, market-specific factors, macro-economic indicators and DFA (dummy for financial crisis periods) on the profitability of US-listed banks. The fixed-effect model and OLS regression findings indicate that the bank-specific variable SIZE is not significant in explaining profitability in the USA, suggesting no efficiency impacts in the banking industry. In contrast, the ETA ratio emerges as a crucial and important proxy for listed bank performance. In the USA, listed banks with higher ETA ratios in all models show positive and higher profitability – except for a negative impact on profitability with ROAA after the crisis.

The models presented in this study, which include bank-specific, market-specific and macro-economic variables, along with DFA, contribute to a better understanding of what determines bank profitability. The results show no significant relationship between SIZE proxy and bank performance in both the long-term and crisis periods, indicating that an increase in total assets may restrict rather than improve bank profitability. This finding aligns with [Knezevic and Dobromirov \(2016\)](#). However, EPS has a significant negative impact on bank profitability with ROAE in the pre-crisis, while it has a significant positive impact on bank profitability with ROAA in both the pre- and post-crisis periods, supporting the findings of [Siahaan et al. \(2021\)](#). ETA shows a significant positive impact on bank profitability with NIM at the 1% level across all models, which is consistent with [Knezevic and Dobromirov \(2016\)](#) and [Adelopo et al. \(2018\)](#). ETA also contributes positively to NIM in the long-term and

DFA periods, which is consistent with [Knezevic and Dobromirov \(2016\)](#) and [Adelopo et al. \(2018\)](#), although it does not significantly affect bank performance after crisis. In particular, a positive coefficient for ETA indicates that a strong capital base contributes to improved profitability, by reducing insolvency risk, consistent with [Fidanoski et al. \(2018\)](#).

Furthermore, the findings show that market-specific proxies ASSETGDP and MCGDP do not significantly contribute to the profitability of US-listed banks. However, MCTA has a significantly negative impact on banks profitability with ROAA during the pre-crisis and post-crisis periods, but a significantly positive effect on ROAE in the long-term, post-crisis and DFA periods. This positive relationship is consistent with [Pasiouras and Kosmidou \(2007\)](#). Additionally, MCGDP shows a significantly positive impact on profitability with ROAE in the pre-crisis period and with ROAA during the crisis, further supporting the results of [Pasiouras and Kosmidou \(2007\)](#).

Macro-economic proxies such as INFR, GDPG, DCPS and HHI also play a significant role – either positively or negatively – in determining the performance of US-listed banks. For example, INFR has a significant and negative impact on profitability with ROAE in both the long-term and DFA periods, but a significant and positive effect on ROAE during the pre-crisis, crisis and post-crisis periods. These findings are consistent with [Adelopo et al. \(2018\)](#) and [Fidanoski et al. \(2018\)](#). Overall, the negative coefficient of INFR suggests that the unexpected inflation increases the risk of loan losses, thereby reducing bank profitability in the US, supporting the conclusions of [Rakshit \(2021\)](#).

Our test results also show that GDPG has a significant and positive impact on profitability with ROAA during both the crisis and DFA, while it has a negative effect on US bank profitability with ROAE in the long term. The positive coefficient of GDPG on profitability indicates that the US banking industry could benefit from a strong macro-economic setting, which is consistent with [Fidanoski et al. \(2018\)](#). In addition, the evidence shows a negative coefficient on DCPS, indicating that an increase in domestic credit leads to lower profitability. This finding is in line with [Saif-Alyousfi \(2022\)](#) and [Lee and Hsieh \(2013\)](#). The evidence also suggests that HHI did not contribute to the listed banks performance during and post-crisis, while it had a positive and significant impact on profitability with ROAA and ROAE in the DFA. This positive result is consistent with [Staikouras and Wood \(2004\)](#) and [Fidanoski et al. \(2018\)](#). However, HHI has a significantly negative impact on banks profitability with NIM in both the long-term and pre-crisis periods, which aligns with [Dietrich and Wanzenried \(2011\)](#). This implies that higher market concentration leads to diminished profitability, consistent with [Chronopoulos et al. \(2015\)](#). Additionally, in the long term, HHI has a significantly positive relationship with ROAA, while in the pre-crisis period, it shows a positive relationship with ROAE. These results are consistent with [Staikouras and Wood \(2004\)](#) and [Fidanoski et al. \(2018\)](#). Overall, HHI plays a significant role in determining listed bank profitability in the USA.

The findings suggest that this study has contributed to a better understanding of the impact of bank-specific, market-specific and macroeconomic factors on the profitability of US-listed banks. The results confirm that US-listed banks with larger size and greater market capitalization, being more efficient, tend to enjoy higher NIM, thereby improving their profitability. This outcome is consistent with [Cruz-García et al.'s \(2020\)](#) findings. Particularly in periods of crisis, the findings offer useful insights to bank shareholders, executives and investors, helping them better evaluate the significance of factors affecting profitability. This enables more strategic decision-making in investment planning to enhance business efficiency, consistent with [Thanh et al. \(2022\)](#). The findings also suggest that US banks should efficiently manage adequate financing sources to improve profitability, adapt to extraordinary events and prevent financial crises – briefly supporting the perspective of [Oanh et al. \(2023\)](#).

To be prepared for financial crises and potential future crises (such as COVID-19), bank managers should update the future planning, organization and coordination of their firms by following bank risk management strategies – namely, those based on the determinants of bank profitability. This is consistent with [Akgün \(2021\)](#).

5.2 Limitations and further research

There are two limitations of this study. First, the current study examines the determinants of bank profitability in pre-crisis, during-crisis, post-crisis and DFA periods in US-listed banks over the 2000 to 2014. Second, the models derived from the results may not be generalized to other countries, as the analysis includes data only from US-listed banks. Despite these limitations, this study makes an important contribution to the existing literature by growing our knowledge of bank-specific, market-specific and macro-economic factors as determinants of profitability in the context of the US banking industry. Notably, while prior studies have primarily examined the financial determinants of firm-level profitability, this study incorporates all three determinants of profitability – bank-specific, market-specific and macroeconomic – across different crisis periods. Overall, the study is limited by its focus on listed banks only. Future research could consider exploring the determinants of profitability in the context of mergers and acquisitions and through the inclusion of all financial institutions.

About the authors

Dr Ali İhsan Akgün is Professor of Accounting and Finance at the Business School of Bakırçay University. He earned his PhD in Accounting and Finance from Marmara University in 2007, following a managerial period in the manufacturing and construction industry from 2000 to 2009. He joined Ankara Yıldırım Beyazıt University as a Lecturer in 2011 and was promoted to Assistant Professor in 2011. Dr Akgün holds a BSc in Business Administration from Karadeniz Teknik University (Turkey) and MSc in Accounting and Finance from Kırıkkale University. After receiving his B.S., he worked at Kırıkkale University as a research assistant for five years. Dr. Akgün attended the International Post-Doctoral Research Fellowship Programme at Bangor University's Business School's Banking and Finance Department between May 18, 2013, and September 20, 2015. He also worked for the Audit Board Member Council of Higher Education between July 14, 2021, and July 29, 2024. His research spans working capital management, firm performance, corporate governance, mergers and acquisitions, the global financial crisis and financial reporting standards. The author is also affiliated with Department of Management, Bakırçay Üniversitesi, İzmir, Turkey.

Burhan Günay is Associate Professor at the Department of Finance and Banking, Ankara Yıldırım Beyazıt University Applied Science School. He received his Ph.D. from Karadeniz Teknik University. After receiving his Ph.D., he joined Ankara Yıldırım Beyazıt University as a Senior Lecturer at the Department of Management. His research is related to firm value, financial management and econometric analysis.

Acknowledgments

The authors appreciate the generous research support of the Bangor Business School at Bangor University. The authors thank Prof. Yener Altunbas for their helpful comments.

Supplementary material

The supplementary material for this article can be found online.

References

- Adelopo, I., Lloydking, R. and Tauringana, V. (2018), "Determinants of bank profitability before, during, and after the financial crisis", *International Journal of Managerial Finance*, Vol. 14 No. 4, pp. 378-398, doi: [10.1108/ijmf-07-2017-0148](https://doi.org/10.1108/ijmf-07-2017-0148).
- Afruzianazar, A., Rezaei, N., Hajiha, Z. and Pakmaram, A. (2019), "Introducing an ERM-based optimal banking performance development model", *Iranian Journal of Accounting, Auditing and Finance*, Vol. 3 No. 1, pp. 47-59.
- Akgün, A.İ. (1996), "Enflasyonun finansal yönetim üzerine etkisi", *Çukurova Üniversitesi İİBF Dergisi*, Vol. 6 No. 1, pp. 263-276.

- Akgün, A.İ. (2016), "The reliability of financial reporting within corporate governance: evidence from Turkey", *Journal of Accounting and Finance/Muhasebe ve Finansman Dergisi*, Vol. 71, pp. 179-199.
- Akgün, A.İ. (2021), "COVID-19'un işletme fonksiyonlarına etkileri: Öğrenci görüşlerine yönelik bulgular", *Journal of Accounting and Finance*, pp. 249-272, August 2021-Special Issue, doi: [10.25095/mufad.933971](https://doi.org/10.25095/mufad.933971).
- Akgün, A.İ. (2022), "Investigating the relationship between bank performance and accounting standards: evidence from M&As in European banking", *Journal of Capital Markets Studies*, Vol. 6 No. 1, pp. 106-124.
- Akgün, A.İ. (2024), "The relationship between the accounting standards and the global financial crisis: empirical analysis of mergers and acquisitions in banking industry", *China Accounting and Finance Review*, Vol. 26 No. 3, pp. 308-332, doi: [10.1108/CAFR-05-2023-0050](https://doi.org/10.1108/CAFR-05-2023-0050).
- Akgün, A.İ. and Şamiloğlu, F. (2017), "Küresel finansal krizin muhasebe ve değer esaslı işletme performanslarına etkisi", *Business and Economics Research Journal*, Vol. 8 No. 3, pp. 453-471, doi: [10.20409/berj.2017.60](https://doi.org/10.20409/berj.2017.60).
- Akgün, A.İ. and Türkoğlu, S.P. (2024), "Intellectual capital and performance of listed firms during the global financial crisis: the effects of legal origin", *International Journal of Organizational Analysis*, Vol. 32 No. 4, pp. 759-785, doi: [10.1108/ijoa-01-2023-3587](https://doi.org/10.1108/ijoa-01-2023-3587).
- Akgün, A.İ. (2020), *Financial Statement Analysis*, Ekin Yayınevi, Bursa.
- Al-Homaidi, E.A., Tabash, M.I., Farhan, N.H.S., Almaqtari, F.A. and McMillan, D. (2018), "Bank-specific and macro-economic determinants of profitability of Indian commercial banks: a panel data approach", *Cogent Economics and Finance*, Vol. 6 No. 1, 1548072, doi: [10.1080/23322039.2018.1548072](https://doi.org/10.1080/23322039.2018.1548072).
- Alexiou, C. and Sofoklis, V. (2009), "Determinants of bank profitability: evidence from the Greek banking sector", *Economic Annals*, Vol. LIV Nos 182/July-September 2009, pp. 93-118, doi: [10.2298/eka0982093a](https://doi.org/10.2298/eka0982093a).
- Alhassan, A.L., Tetteh, M.L. and Brobbey, F.O. (2016), "Market power, efficiency and bank profitability: evidence from Ghana", *Economic Change and Restructuring*, Vol. 49 No. 1, pp. 71-93, doi: [10.1007/s10644-015-9174-6](https://doi.org/10.1007/s10644-015-9174-6).
- Ali, M. and Puah, C.H. (2019), "The internal determinants of bank profitability and stability: an insight from banking sector of Pakistan", *Management Research Review*, Vol. 42 No. 1, pp. 49-67, doi: [10.1108/mrr-04-2017-0103](https://doi.org/10.1108/mrr-04-2017-0103).
- Almaskati, N. (2022), "The determinants of bank profitability and risk: a random forest approach", *Cogent Economics and Finance*, Vol. 10 No. 1, 2021479, doi: [10.1080/23322039.2021.2021479](https://doi.org/10.1080/23322039.2021.2021479).
- Altunbas, Y., Gardener, E.P.M., Molyneux, P. and Moore, B. (2001), "Efficiency in European banking", *European Economic Review*, Vol. 45 No. 10, pp. 1931-1955, doi: [10.1016/s0014-2921\(00\)00091-x](https://doi.org/10.1016/s0014-2921(00)00091-x).
- Atahau, A.D.R. and Cronje, T. (2022), "What drives the performance of different bank-ownership types in Indonesia? The pre-and post-GFC analysis", *International Journal of Productivity and Performance Management*, Vol. 71 No. 8, pp. 3309-3330, doi: [10.1108/ijppm-03-2020-0096](https://doi.org/10.1108/ijppm-03-2020-0096).
- Athanasoglou, P., Brissimis, S. and Delis, M. (2008), "Bank-specific, industry-specific and macroeconomic determinants of bank profitability", *Journal of International Financial Markets, Institutions and Money*, Vol. 18 No. 2, pp. 121-136, doi: [10.1016/j.intfin.2006.07.001](https://doi.org/10.1016/j.intfin.2006.07.001).
- Baltas, K.N. (2025), "The nexus between bank efficiency and leverage", *International Journal of Finance and Economics*, Vol. 30 No. 1, pp. 811-839, doi: [10.1002/ijfe.2941](https://doi.org/10.1002/ijfe.2941).
- Ben Abdallah, M. and Bahloul, S. (2023), "Further evidence on the effect of financial performance and governance on the Islamic banks' disclosure", *Asian Journal of Accounting Research*, Vol. 8 No. 2, pp. 110-121, doi: [10.1108/ajar-09-2021-0156](https://doi.org/10.1108/ajar-09-2021-0156).
- Ben Bouheni, F., Sidaoui, M., Leshchinskii, D., Zaremba, B. and Albashrawi, M. (2023), "Banking-as-a-service? American and European G-SIBs performance", *The Journal of Risk Finance*, Vol. 25 No. 5, pp. 840-869, doi: [10.1108/JRF-10-2023-0263](https://doi.org/10.1108/JRF-10-2023-0263).

- Berger, A.N. (1995), "The profit-structure relationship in banking: test of market power and efficient structure hypothesis", *Journal of Money, Credit, and Banking*, Vol. 27 No. 2, pp. 404-431, doi: [10.2307/2077876](https://doi.org/10.2307/2077876).
- Berger, A.N. and Mester, L.J. (2003), "Explaining the dramatic changes in performance of US banks: technological change, deregulation, and dynamic changes in competition", *Journal of Financial Intermediation*, Vol. 12 No. 1, pp. 57-95, doi: [10.1016/s1042-9573\(02\)00006-2](https://doi.org/10.1016/s1042-9573(02)00006-2).
- Bikker, J.A. and Vervliet, T.M. (2018), "Bank profitability and risk-taking under low interest rates", *International Journal of Financial Economy*, Vol. 23 No. 1, pp. 3-18, doi: [10.1002/ijfe.1595](https://doi.org/10.1002/ijfe.1595).
- Bitar, M., Pukthuanthong, K. and Walker, T. (2018), "The effect of capital ratios on the risk, efficiency and profitability of banks: evidence from OECD countries", *Journal of International Financial Markets, Institutions and Money*, Vol. 53, pp. 227-262, doi: [10.1016/j.intfin.2017.12.002](https://doi.org/10.1016/j.intfin.2017.12.002).
- Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87 No. 1, pp. 115-143, doi: [10.1016/s0304-4076\(98\)00009-8](https://doi.org/10.1016/s0304-4076(98)00009-8).
- Bougatef, K. (2017), "Determinants of bank profitability in Tunisia: does corruption matter?", *Journal of Money Laundering Control*, Vol. 20 No. 1, pp. 70-78, doi: [10.1108/jmlc-10-2015-0044](https://doi.org/10.1108/jmlc-10-2015-0044).
- Boussaada, R., Hakimi, A. and Karmani, M. (2023), "Non-performing loans and bank performance: what role does corporate social responsibility play? A system GMM analysis for European banks", *Journal of Applied Accounting Research*, Vol. 24 No. 5, pp. 859-888, doi: [10.1108/jaar-10-2021-0283](https://doi.org/10.1108/jaar-10-2021-0283).
- Briggs, W.M. (2023), "A partial solution for the replication crisis in economics", *Asian Journal of Economics and Banking*, Vol. 7 No. 2, pp. 180-190, doi: [10.1108/ajeb-03-2023-0027](https://doi.org/10.1108/ajeb-03-2023-0027).
- Bucevska, V. and Misheva, B.H. (2017), "The determinants of profitability in the banking industry: empirical research on selected Balkan countries", *Eastern European Economics*, Vol. 55 No. 2, pp. 146-167, doi: [10.1080/00128775.2016.1260473](https://doi.org/10.1080/00128775.2016.1260473).
- Calmès, C. and Théoret, R. (2023), "Bank performance before and after the subprime crisis: evidence from pooled data on big US banks", *Journal of Economics and Finance*, Vol. 47 No. 2, pp. 472-516, doi: [10.1007/s12197-023-09618-x](https://doi.org/10.1007/s12197-023-09618-x).
- Chaudhry, M., Chatrath, A. and Kamath, R. (1995), "Determinants of bank profitability", *American Journal of Business*, Vol. 10 No. 1, pp. 41-46, doi: [10.1108/19355181199500005](https://doi.org/10.1108/19355181199500005).
- Chronopoulos, D.K., Liu, H., McMillan, F.J. and Wilson, J.O.S. (2015), "The dynamics of US bank profitability", *The European Journal of Finance*, Vol. 21 No. 5, pp. 426-443, doi: [10.1080/1351847x.2013.838184](https://doi.org/10.1080/1351847x.2013.838184).
- Cruz-García, P., Forte, A. and Peiro-Palomino, J. (2020), "On the drivers of profitability in the banking industry in restructuring times: a Bayesian perspective", *Applied Economic Analysis*, Vol. 28 No. 83, pp. 111-131, doi: [10.1108/aea-01-2020-0003](https://doi.org/10.1108/aea-01-2020-0003).
- De Haan, J. and Poghosyan, T. (2012), "Bank size, market concentration, and bank earnings volatility in the US", *Journal of International Financial Markets, Institutions and Money*, Vol. 22 No. 1, pp. 35-54, doi: [10.1016/j.intfin.2011.07.002](https://doi.org/10.1016/j.intfin.2011.07.002).
- De Haan, J. and Poghosyan, T. (2012b), "Size and earnings volatility of US bank holding companies", *Journal of Banking and Finance*, Vol. 36 No. 11, pp. 3008-3016, doi: [10.1016/j.jbankfin.2012.07.008](https://doi.org/10.1016/j.jbankfin.2012.07.008).
- Derbali, A. (2021), "Determinants of the performance of Moroccan banks", *Journal of Business and Socio- economic Development*, Vol. 1 No. 1, pp. 102-117, doi: [10.1108/jbsed-01-2021-0003](https://doi.org/10.1108/jbsed-01-2021-0003).
- Dietrich, A. and Wanzenried, G. (2011), "Determinants of bank profitability before and during the crisis: evidence from Switzerland", *Journal of International Financial Markets, Institutions and Money*, Vol. 21 No. 3, pp. 307-327, doi: [10.1016/j.intfin.2010.11.002](https://doi.org/10.1016/j.intfin.2010.11.002).
- Djalil, M.A., Amin, M., Herjanto, H., Nourallah, M. and Öhman, P. (2023), "The importance of entrepreneurial leadership in fostering bank performance", *International Journal of Bank Marketing*, Vol. 41 No. 4, pp. 926-948, doi: [10.1108/ijbm-11-2022-0481](https://doi.org/10.1108/ijbm-11-2022-0481).

- Dolar, B. and Dale, B. (2020), "The Dodd-Frank Act's non-uniform regulatory impact on the banking industry", *Journal of Banking Regulation*, Vol. 21 No. 2, pp. 188-195, doi: [10.1057/s41261-019-00106-z](https://doi.org/10.1057/s41261-019-00106-z).
- Ebenezer, O.O., Omar, W.A.W.B. and Kamil, S. (2017), "Bank specific and macroeconomic determinants of commercial bank profitability: empirical evidence from Nigeria", *International Journal of Finance and Banking Studies*, Vol. 6 No. 1, pp. 25-38, doi: [10.20525/ijfbs.v6i1.627](https://doi.org/10.20525/ijfbs.v6i1.627).
- Feng, G. and Wang, C. (2018), "Why European banks are less profitable than U.S. banks: a decomposition approach", *Journal of Banking and Finance*, Vol. 90, pp. 1-16, doi: [10.1016/j.jbankfin.2018.02.017](https://doi.org/10.1016/j.jbankfin.2018.02.017).
- Fidanoski, F., Choudhry, M., Davidovic, M. and Sergi, B.S. (2018), "What does affect profitability of banks in Croatia?", *Competitiveness Review: An International Business Journal*, Vol. 28 No. 4, pp. 338-367, doi: [10.1108/cr-09-2016-0058](https://doi.org/10.1108/cr-09-2016-0058).
- Gargallo, P., Moreno, J. and Salvador, M. (2024), "Heterogeneous influence of banking risk on cost efficiency: a bayesian analysis", available at: <https://ssrn.com/=5107779>
- Ghenimi, A., Chaibi, H. and Omri, M.A. (2024), "Risk and performance of Islamic and conventional banks under COVID-19 pandemic: evidence from MENA region", *Arab Gulf Journal of Scientific Research*, Vol. 42 No. 4, pp. 1788-1804, doi: [10.1108/agjsr-03-2023-0098](https://doi.org/10.1108/agjsr-03-2023-0098).
- Goddard, J.A., Molyneux, P.M. and Wilson, J.O.S. (2004), "Dynamic of growth and profitability in banking", *Journal of Money, Credit, and Banking*, Vol. 36 No. 6, pp. 1069-1090, doi: [10.1353/mcb.2005.0015](https://doi.org/10.1353/mcb.2005.0015).
- Gulati, R. and Kumar, S. (2016), "Assessing the impact of the global financial crisis on the profit efficiency of Indian banks", *Economic Modelling*, Vol. 58, pp. 167-181, doi: [10.1016/j.econmod.2016.05.029](https://doi.org/10.1016/j.econmod.2016.05.029).
- Isayas, Y.N. (2022), "Determinants of banks' profitability: empirical evidence from banks in Ethiopia", *Cogent Economics and Finance*, Vol. 10 No. 1, 2031433, doi: [10.1080/23322039.2022.2031433](https://doi.org/10.1080/23322039.2022.2031433).
- Issa, J.S., Abbaszadeh, M.R. and Salehi, M. (2022), "The impact of Islamic banking corporate governance on green banking", *Administrative Sciences*, Vol. 12 No. 190, pp. 1-20.
- Kalia, A. (2024a), "CEO power and stock price crash risk in India: the moderating effect of insider trades", *Asian Journal of Economics and Banking*, Vol. 8 No. 2, pp. 169-198, doi: [10.1108/ajeb-10-2023-0095](https://doi.org/10.1108/ajeb-10-2023-0095).
- Kalia, A. (2024b), "Promoter share pledging and dividend payouts in India: does family involvement matters?", *Asian Journal of Economics and Banking*. doi: [10.1108/AJEB-01-2024-0009](https://doi.org/10.1108/AJEB-01-2024-0009).
- Kantharia, N.J. and Biradar, J. (2023), "What influence the performance of banks? Evidence from public sector banks in India", *Journal of Indian Business Research*, Vol. 15 No. 1, pp. 23-39, doi: [10.1108/jibr-04-2022-0112](https://doi.org/10.1108/jibr-04-2022-0112).
- Khoa, D.D., Phuong, P.T.T., Thach, N.N. and Diep, N.V. (2022), "How credit growth and political connection affect net interest margin of commercial bank in Vietnam: a Bayesian approach", in Thach, N.N., Kreinovich, V., Ha, D.T. and Trung, N.D. (Eds), *Financial Econometrics: Bayesian Analysis, Quantum Uncertainty, and Related Topics*, Springer Nature, Vol. 427, pp. 711-733.
- Killins, R.N., Johnk, D.W. and Egly, P.V. (2020), "The impact of financial regulation policy uncertainty on bank profits and risk", *Studies in Economics and Finance*, Vol. 37 No. 4, pp. 725-752, doi: [10.1108/sef-05-2019-0169](https://doi.org/10.1108/sef-05-2019-0169).
- Kiyanmehr, S., Lari Dashtbayaz, M. and Salehi, M. (2023), "Evaluating the effect of COVID-19 on profitability and bank performance", *Iranian Journal of Accounting, Auditing and Finance*, Vol. 7 No. 3, pp. 67-86.
- Knezevic, A. and Dobromirov, D. (2016), "The determinants of Serbian banking industry profitability", *Economic Research-Ekonomska Istraživanja*, Vol. 29 No. 1, pp. 459-474, doi: [10.1080/1331677x.2016.1174390](https://doi.org/10.1080/1331677x.2016.1174390).
- Kumar, M., Charles, V. and Mishra, C.S. (2016), "Evaluating the performance of Indian banking sector using DEA during post-reform and global financial crisis", *Journal of Business Economics and Management*, Vol. 17 No. 1, pp. 156-172, doi: [10.3846/16111699.2013.809785](https://doi.org/10.3846/16111699.2013.809785).

- Le Quoc, D., Nguyen Quoc, H. and Nguyen Van, H. (2025), "Evaluating the influence of digital financial inclusion on financial crises and economic cycles: a Bayesian logistic regression insight", *Journal of Financial Regulation and Compliance*, Vol. 33 No. 2, pp. 280-301, doi: [10.1108/JFRC-10-2024-0206](https://doi.org/10.1108/JFRC-10-2024-0206).
- Lee, C.-C. and Hsieh, M.-F. (2013), "The impact of bank capital on profitability and risk in Asian banking", *Journal of International Money and Finance*, Vol. 32 No. 2, pp. 251-281, doi: [10.1016/j.jimonfin.2012.04.013](https://doi.org/10.1016/j.jimonfin.2012.04.013).
- Lee, J.Y., Growe, G., DeBruine, M. and Cha, I. (2015), "Measuring the impact of the 2007-2009 financial crisis on the performance and profitability of US regional banks", *Advances in Management Accounting*, Vol. 25, pp. 181-206, doi: [10.1108/s1474-787120150000025005](https://doi.org/10.1108/s1474-787120150000025005).
- Leledakis, G.N. and Pyrgiotakis, E.G. (2022), "U.S. bank M&As in the post-Dodd-Frank Act era: do they create value?", *Journal of Banking and Finance*, Vol. 135, 105576.
- Majeed, M.T. and Zainab, A. (2021), "A comparative analysis of financial performance of Islamic banks vis-a-vis conventional banks: evidence from Pakistan", *ISRA International Journal of Islamic Finance*, Vol. 13 No. 3, pp. 331-346, doi: [10.1108/ijif-08-2018-0093](https://doi.org/10.1108/ijif-08-2018-0093).
- Mateev, M., Sahyouni, A. and Al Masaeid, T. (2024), "Bank performance before and during the COVID-19 crisis: does efficiency play a role?", *Review of Managerial Science*, Vol. 18 No. 1, pp. 29-82, doi: [10.1007/s11846-022-00611-y](https://doi.org/10.1007/s11846-022-00611-y).
- McKee, G. and Kagan, A. (2019), "The differential impact of the Dodd-Frank Act on niche non-metro lenders", *Journal of Banking Regulation*, Vol. 20 No. 4, pp. 291-301, doi: [10.1057/s41261-018-0092-1](https://doi.org/10.1057/s41261-018-0092-1).
- McMillan, D.G. and McMillan, F.J. (2016), "US bank market structure: evolving nature and implications", *Journal of Financial Services Research*, Vol. 50 No. 2, pp. 187-210, doi: [10.1007/s10693-015-0225-y](https://doi.org/10.1007/s10693-015-0225-y).
- McNeish, D. (2016), "On using Bayesian methods to address small sample problems", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 23 No. 5, pp. 2016-2773, doi: [10.1080/10705511.2016.1186549](https://doi.org/10.1080/10705511.2016.1186549).
- Menicucci, E. and Paolucci, G. (2016), "The determinants of bank profitability: empirical evidence from European banking sector", *Journal of Financial Reporting and Accounting*, Vol. 14 No. 1, pp. 86-115, doi: [10.1108/jfra-05-2015-0060](https://doi.org/10.1108/jfra-05-2015-0060).
- Mia, M.D.R. (2023), "Market competition, capital regulation and cost of financial intermediation: an empirical study on the banking sector of Bangladesh", *Asian Journal of Economics and Banking*, Vol. 7 No. 2, pp. 251-276, doi: [10.1108/ajeb-03-2022-0028](https://doi.org/10.1108/ajeb-03-2022-0028).
- Molla, Md.I., Islam, Md. S. and Bin Rahaman, Md. K. (2023), "Corporate governance structure and bank performance: evidence from an emerging economy", *Journal of Economic and Administrative Sciences*, Vol. 39 No. 3, pp. 730-746, doi: [10.1108/jeas-05-2021-0083](https://doi.org/10.1108/jeas-05-2021-0083).
- Molyneux, P. and Thornton, J. (1992), "Determinants of European bank profitability: a note", *Journal of Banking and Finance*, Vol. 16 No. 6, pp. 1173-1178, doi: [10.1016/0378-4266\(92\)90065-8](https://doi.org/10.1016/0378-4266(92)90065-8).
- Nam, P.H., Thach, N.N., Tuan, N.V., Nhat, N.M. and Nhung, P.T.H. (2022), "Does internal control affect bank profitability in Vietnam? A Bayesian approach", in Thach, N.N., Kreinovich, V., Ha, D.T. and Trung, N.D. (Eds), *Financial Econometrics: Bayesian Analysis, Quantum Uncertainty, and Related Topics*, Springer Nature, Vol. 427, pp. 219-238, doi: [10.1007/978-3-030-98689-6_14](https://doi.org/10.1007/978-3-030-98689-6_14).
- Nippani, S. and Ling, R. (2021), "Bank size and performance: an analysis of the industry in the United States in the post-financial-crisis era", *Journal of Financial Research*, Vol. 44 No. 3, pp. 587-606, doi: [10.1111/jfir.12255](https://doi.org/10.1111/jfir.12255).
- Oanh, T.T.K., Nguyen, D.V., Le, H.V. and Duong, K.D. (2023), "How capital structure and bank liquidity affect bank performance: evidence from the Bayesian approach", *Cogent Economics and Finance*, Vol. 11 No. 2, 2260243, doi: [10.1080/23322039.2023.2260243](https://doi.org/10.1080/23322039.2023.2260243).
- O'Connell, M. (2023), "Bank-specific, industry-specific and macroeconomic determinants of bank profitability: evidence from the UK", *Studies in Economics and Finance*, Vol. 40 No. 1, pp. 155-174, doi: [10.1108/sef-10-2021-0413](https://doi.org/10.1108/sef-10-2021-0413).

- Pasiouras, F. and Kosmidou, K. (2007), "Factors influencing the profitability of domestic and foreign commercial banks in the European Union", *Research in International Business and Finance*, Vol. 21 No. 2, pp. 222-237, doi: [10.1016/j.ribaf.2006.03.007](https://doi.org/10.1016/j.ribaf.2006.03.007).
- Pawar, D.S. and Munuswamy, J. (2023), "Does environmental reporting of banks affect their financial performance? Evidence from India", *International Journal of Bank Marketing*, Vol. 42 No. 4, pp. 745-767, doi: [10.1108/IJBM-12-2022-0545](https://doi.org/10.1108/IJBM-12-2022-0545).
- Piri, H., Salehi, M. and Shiri, M.M. (2020), "Management ability, political influence, and financial pressure on deferred claims of Iranian banks", *Journal of Public Affairs*, Vol. 22 No. 1, e2274, doi: [10.1002/pa.2274](https://doi.org/10.1002/pa.2274).
- Quoc, H.N., Le Quoc, D. and Van, H.N. (2025), "Assessing digital financial inclusion and financial crises: the role of financial development in shielding against shocks", *Heliyon*, Vol. 11, pp. 1-14.
- Quy, V.T. and Tuan, P.D. (2024), "Determinants of a bank's profitability with the mediating role of interest rate spread: a case of Vietnam", *Asian Economic and Financial Review*, Vol. 14 No. 5, pp. 339-355, doi: [10.55493/5002.v14i5.5041](https://doi.org/10.55493/5002.v14i5.5041).
- Rakshit, B. (2021), "Assessing the effects of cost, revenue and profit efficiency on bank performance: empirical evidence from Indian banking", *International Journal of Organizational Analysis*, Vol. 31 No. 5, pp. 1867-1898, doi: [10.1108/IJOA-06-2021-2802](https://doi.org/10.1108/IJOA-06-2021-2802).
- Rhoades, S.A. (1985), "Market share as a source of market power: implications and some evidence", *Journal of Economics and Business*, Vol. 37 No. 4, pp. 343-363, doi: [10.1016/0148-6195\(85\)90027-x](https://doi.org/10.1016/0148-6195(85)90027-x).
- Roodman, D. (2009), "How to do xtabond2: an introduction to difference and system GMM in Stata", *STATA Journal*, Vol. 9 No. 1, pp. 86-136, doi: [10.1177/1536867x0900900106](https://doi.org/10.1177/1536867x0900900106).
- Rose, P.S. and Hudgins, S.C. (2005), *Bank Management and Financial Services*, 5th ed., McGraw-Hill/Irwin International Education, London.
- Saif-Alyousofi, A.Y.H. (2022), "Determinants of bank profitability: evidence from 47 Asian countries", *Journal of Economic Studies*, Vol. 49 No. 1, pp. 44-60, doi: [10.1108/jes-05-2020-0215](https://doi.org/10.1108/jes-05-2020-0215).
- Shala, A., Ozili, P.K. and Ahmeti, S. (2024), "Impact of competition and concentration on bank income smoothing in Central and Eastern European countries", *Journal of Economics, Finance and Administrative Science*, Vol. 29 No. 57, pp. 5-20, doi: [10.1108/jefas-11-2021-0250](https://doi.org/10.1108/jefas-11-2021-0250).
- Siahaan, S.M.N., Sadalia, I. and Silalahi, A.S. (2021), "Effect of financial ratios on stock returns with earning per share as moderating variable in banking companies on the Indonesia stock exchange (2012-2017 period)", *International Journal of Research and Review*, Vol. 8 No. 8, pp. 398-406, doi: [10.52403/ijrr.20210855](https://doi.org/10.52403/ijrr.20210855).
- Smirlock, M. (1985), "Evidence on the (non) relationship between concentration and profitability in banking", *Journal of Money, Credit, and Banking*, Vol. 17 No. 1, pp. 69-83, doi: [10.2307/1992507](https://doi.org/10.2307/1992507).
- Staikouras, C. and Wood, G. (2004), "The determinants of European bank profitability", *International Business and Economics Research Journal*, Vol. 3 No. 6, pp. 57-68, doi: [10.19030/iber.v3i6.3699](https://doi.org/10.19030/iber.v3i6.3699).
- Tan, Y. and Floros, C. (2012), "Bank profitability and inflation: the case of China", *Journal of Economic Studies*, Vol. 39 No. 6, pp. 675-696, doi: [10.1108/01443581211274610](https://doi.org/10.1108/01443581211274610).
- Tan, T.-K. and Lakehal-Ayat, M. (2018), "A big data Bayesian approach to earnings profitability in the S&P 500", *PSU Research Review*, Vol. 2 No. 1, pp. 35-58.
- Thanh, B.D., Thach, N.N. and Tuan, T.A. (2022), "Determinants of bank profitability in Vietnam", in Thach, N.N., Kreinovich, V., Ha, D.T. and Trung, N.D. (Eds), *Financial Econometrics: Bayesian Analysis, Quantum Uncertainty, and Related Topics*, Springer Nature, Vol. 427, pp. 517-530.
- Trujillo-Ponce, A. (2013), "What determines the profitability of banks? Evidence from Spain", *Accounting and Finance*, Vol. 53 No. 2, pp. 561-586, doi: [10.1111/j.1467-629x.2011.00466.x](https://doi.org/10.1111/j.1467-629x.2011.00466.x).
- Vazquez, F. and Federico, P. (2015), "Bank funding structures and risk: evidence from the global financial crisis", *Journal of Banking and Finance*, Vol. 61, pp. 1-14, doi: [10.1016/j.jbankfin.2015.08.023](https://doi.org/10.1016/j.jbankfin.2015.08.023).

- Vu, H. and Nahm, D. (2013), "The determinants of profit efficiency of banks in Vietnam", *Journal of the Asia Pacific Economy*, Vol. 18 No. 4, pp. 615-631, doi: [10.1080/13547860.2013.803847](https://doi.org/10.1080/13547860.2013.803847).
- Zampara, K., Giannopoulos, M. and Koufopoulos, D.N. (2017), "Macroeconomic and industry-specific determinants of Greek bank profitability", *International Journal of Business and Economic Sciences Applied Research*, Vol. 10 No. 1, pp. 3-22, doi: [10.25103/ijbesar.101.02](https://doi.org/10.25103/ijbesar.101.02).
- Zimon, G., Salehi, M. and Kalateh Arabi, S. (2024), "COVID-19 and CFO performance: evidence of large and medium-size companies", *Journal of Facilities Management*, Vol. 23 No. 2, pp. 311-329, doi: [10.1108/JFM-05-2023-0054](https://doi.org/10.1108/JFM-05-2023-0054).

Corresponding author

Ali İhsan Akgün can be contacted at: aliihsan.akgun@bakircay.edu.tr