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Estimating the Determinants of Bank Profitability: Comparative Study for EU and US Banks

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Background/Purpose: This paper examines the significant differences in market returns between the US and EU banking sectors following the 2008 financial crisis. The analysis reveals that the profitability of US banks, measured by return on equity, is higher than that of European banks, partially explaining the observed differences in returns.
Methodology: The study employs two unbalanced panels of data for EU and US banks covering the period 2008-2022. Static and dynamic estimators were used to identify significant determinants of bank profitability that include the impact of the profitability trend in the observed period on future profitability.
Results: Based on a sample of 250 banks, operational efficiency, diversification, and risk were found to influence the profitability of banks in both regions. For European banks, past profitability, the share of deposits and loans in assets, and inflation were also found to exert influence. On the other hand, American banks exhibit a higher predictive power for these variables, confirming the differences in determinants between the two markets. Although risk partially explains the higher profitability of American banks, other results did not confirm the original hypothesis.
Conclusion: The main contribution of the paper is a direct comparison of the determinants of profitability for EU and US banks using static and dynamic models in the post-2008 financial crisis period. In addition, the existing methodology of static models with dynamic estimators has been extended by WLS models and robust estimators, and it was shown that there are certain determinants influencing their profitability that should be extended and subsequently examined.

Keywords: *Profitability, EU/US banks, Panel data, Static models, Dynamic estimators*

1 Introduction

This paper focuses on the banking sector in the United States of America and the European Union, as there has been a significant divergence in market returns between these sectors over the last fifteen years. Several studies have found that firm profitability, measured by return on equity (ROE) and return on assets (ROA), has a significant impact on stock price performance, i.e. market returns (Purnamasari, 2015; Sukmawati & Garsela, 2016). Research on banks has also confirmed the assumption that ROE/ROA partially explain banks' market returns, with ROE playing a greater role (Nurazi & Usamn, 2016; Hong-Kong, 2017). A further review of the literature motivated by the aforementioned research has revealed that American banks consistently demonstrate higher profitability in terms of ROE compared to European banks, which partially explains the difference in market returns. This paper

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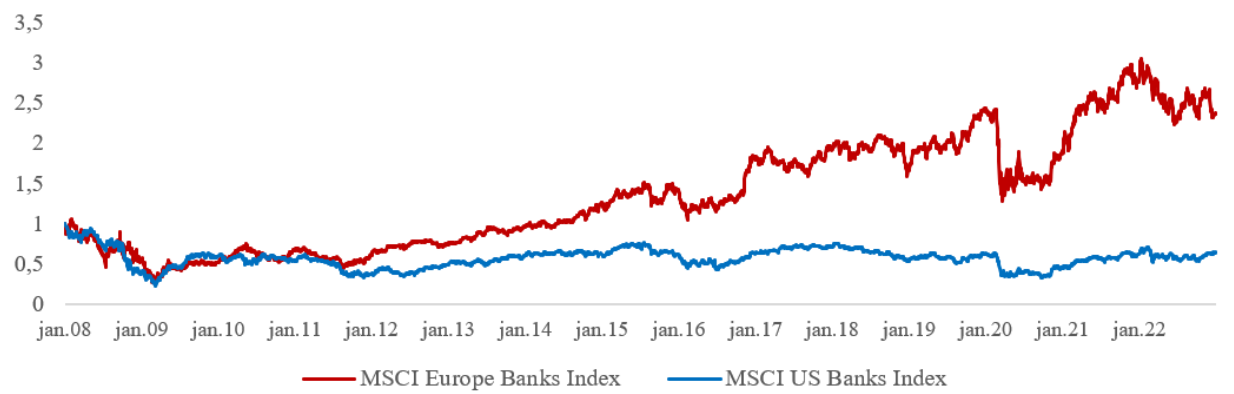
attempts to answer the question of unequal profitability between the two banking sectors.

The aim of the paper is to explore the reasons why American banks achieve higher profitability, identify the main determinants of profitability in the two banking sectors, and analyze the differences between them. A review of the literature has revealed that many papers do research into the determinants of profitability, though most do not focus on the banking sector. Research on banks reveals a notable lack of relevant literature. The research conducted focused on a single country, such as O'Connell (2023) for the UK, or the region (Messai et al., 2015; Căpraru & Ihnatov, 2014; Karadžić & Đalović, 2021; Petria et al., 2015), Europe (Bikker & Vervliet, 2018; Chukwuogor et al., 2021) or the US. The conclusions of the aforementioned studies highlight key profitability ratios approximated by ROE/ROA/NIM (net interest margin) and analyzed by more complex regression models such as OLS/POLS/GMM. The common goal of the research was to identify the determinants of profitability ratios. The results of the studies conducted show similarities, with minor variations depending on the time frame and the countries analyzed, and with certain variables having a significant impact on the results in most studies, regardless of whether they focus on the analysis of EU or US banks. Key variables include the ratio of capital to total assets, the ratio of liquid assets (cash/liquidity equivalents) to total assets, the ratio of deposits to assets, the size of the bank, the Herfindahl-Hirschman index, inflation, and interest rates. However, there is a lack of comparison in the literature between the European and US banking sectors in terms of the determinants and the extent to which they influence profitability. Therefore, this paper makes academic contributions on multiple levels. The first contribution is reflected in the research and identification of the determinants of profitability in the EU/US banking sector during the period 2008□2022. Another contribution lies in both the analysis of the differences in profitability determinants between the observed banking sectors and a possible answer to the question: Why do American banks achieve higher profitability than European banks?

The paper consists of 6 section. After the introduction, the paper provides a detailed explanation of the problem, including an overview of the specific features of the EU and US banking markets. A review of the literature highlights the main variables identified as determinants of bank profitability. Furthermore, the methodology used in the research is outlined, and the research results are presented and interpreted. The last section of the paper gives conclusions and recommendations for future research.

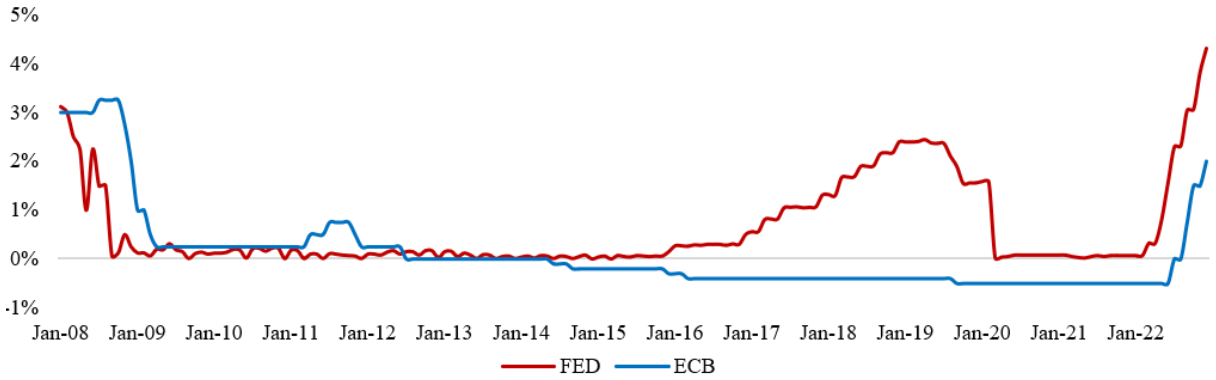
1.1 EU/US banking sector

The banking systems in the EU and the US have undergone numerous structural and regulatory changes since the 2008 crisis. The responses to the crisis in the US were similar to those in Europe, involving comparable instruments such as government guarantees, capital and liquidity injections, and asset protection. Monetary policy and bank rescue measures have also become increasingly interlinked (Stolz & Wedow, 2010). It can be argued that these measures have had a positive impact on American banks since the 2008 crisis, while simultaneously placing a burden on their European competitors (Weigand, 2015). In addition to their full recovery from the crisis between 2008 and 2022, American banks consistently achieved better market returns than European banks in 2008 (Figure 1).



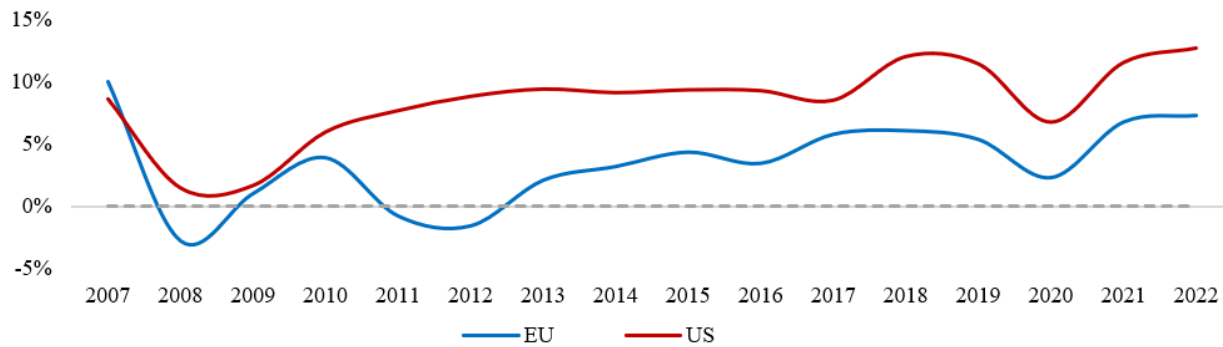
Source: Bloomberg (2023)

Figure 1: Normalized total market returns (with reinvested dividends) of EU and US banks



Source: ECB Data Portal, FRED economic data 2007–2020, BankRegData 2021–2022

Figure 2: Comparison of ROE of EU/US banks



Source: Bloomberg (2023)

Figure 3: ECB and FED interest rates in the period between 2008 and 2022

The question arises as to why the market rewards American banks so highly and penalizes their European counterparts. One of the key indicators important to investors is profitability, which is measured using various proxies, with return on equity as one of the basic indicators. When looking at the data for EU/US banks, it can be seen that American banks consistently achieve higher profitability than European banks (Figure 2).

The EU banking sector faces the challenge of being structurally less profitable than the US banking sector. This trend is reflected in the market valuation of European banks, where the price-to-book ratio of EU banks' capital has remained well below one over the last decade, and the market capitalization of European banks has declined relative to their US counterparts. This disparity can be explained by the structural differences between these two markets (EBF, 2023). This section of the paper aims to explain the observed structural differences affecting the profitability of EU/US banks. As banks' performance is largely dependent on the general macroeconomic situation, the most important factors are monetary policy and economic growth. Compared to the US, economic growth in the EU has been much slower. Over the past 15 years, GDP in the US has grown by an average of 1.6% per year, while GDP in the EU has increased by only around 1% per year. This slower economic growth in Europe has led to fewer lending opportunities, lower bank profits, and ultimately lower returns on capital and profitability (EBF, 2023).

Given the deflationary pressures and limited growth of the EU economy, this trend is also reflected in the macroeconomic policy of the ECB, whose interest rates are significantly lower than those of the FED (Figure 3). Although low interest rates and quantitative easing had a stimulating effect on the economy, they had a negative impact on

banks' interest income and margins (ECB, 2015).

In addition to macroeconomic factors, there are also structural differences in market composition. In particular, the EU banking sector is significantly less concentrated than its counterpart in the US. According to IMF estimates, the EU faces the challenge of an oversized banking sector, disproportionately large relative to the overall economy. This issue is evident in various indicators, including the ratio of banking assets to GDP. In the EU, this ratio stands at approximately 280%, compared to around 91% in the US. It is important to emphasize that these data should be interpreted taking into account the different structures of bank balance sheets. The difference in banking sector concentration is also reflected in the number of branches per employee. In Europe, for example, there are 44 branches per 100,000 inhabitants, compared to 26 in the US – nearly half as many (EUROFI, 2019). Another example of the difference in concentration is the consolidation process in the banking sector. The five largest US banks currently have a market share of around 40%, compared to a much lower share of 20% in the EU. This difference in banking sector concentration results in lower prices for European loans and banking services, but it also leads to higher operating costs for banks and limited opportunities to achieve economies of scale (Edelmann, 2021).

Although similar in theory, differences in banking regulations are one of the key factors contributing to differences in profitability. According to a study by the European Banking Federation (EBF, 2023) and the consulting firm Oliver Wyman, over the past three years, European banks have held an average of 3.1 percentage points more CET1 capital relative to risk-weighted assets (RWA) than American banks. Of this, 1.3 percentage points were reserved due to higher capital requirements under the European regulatory framework. Specifically, during the period 2020-2022, average capital requirements for European banks amounted to 10.9% of risk-weighted assets, compared to 9.7% in the US. Beyond formal regulatory requirements, European banks generally take a more cautious approach to capital management, maintaining a 1.8 percentage point higher CET1 capital. This conservative approach stems from both formal and informal pressure from regulators. European banks assume that the ECB expects additional safety capital and align with these expectations to maintain dividend stability and meet Pillar 2 requirements. Another aspect of this issue is raising capital. With a significantly weaker appetite for investment in Europe compared to the US , raising additional capital is both difficult and costly for European banks. As a result, European banks tend to hold additional capital as a hedge against uncertainty, while American banks often reach for new capital in turbulent times.

Finally, the differences also stem from the business models of the banks themselves. The distribution of assets between banks in the EU and the US highlight clear contrasts in their business focus. European banks are more focused on traditional lending, while American banks tend to concentrate more on investment banking and financial market trading. The observed difference is also reflected in the primary sources of income for each: European banks historically rely more on interest income, while American banks rely more on non-interest income such as fees, commissions, and market trading. Despite relatively small differences in the share of cash and cash equivalents in total assets (around 15%), European banks have a larger proportion of loans in their total assets compared to their American counterparts. This reflects the greater role of American banks in credit intermediation and points to different business models. American banks have historically acted as lenders and intermediaries, while European banks have retained a larger share of loans on their balance sheets, especially in 2021. For example, the share of loans in total assets at European banks was 58.4%, significantly higher than the 40.5% at their American counterparts. In contrast, US banks have a higher share of securities in total assets, reflecting their more active role in investment banking and trading. When analyzing the structure of funding sources, it is clear that American banks have a larger share of total deposits. In 2021, deposits accounted for around 60% of the total liabilities of US banks, compared to 47% for European banks. The lower proportion of deposits in Europe makes these banks more dependent on other liabilities, primarily through government and central bank deposits. These differences in balance sheet structure mean that the loan-to-deposit ratio is below 100% for US banks (69%), as they use deposits to finance various business activities other than lending, while this ratio is above 100% for European banks (+23%) (Di Vito et al., 2023).

2 Theoretical literature review

2.1 A theoretical review of the literature on profitability research studies in the EU/US

Numerous studies examine the determinants of bank profitability using individual examples or groups of countries. However, a review of the literature reveals a lack of studies on the determinants of EU/US bank profitability, especially in the period following the 2008 financial crisis. Therefore, this paper presents the most relevant studies on bank profitability in the EU/US that roughly correspond to the observation period covered in this paper. The first section of the paper refers to EU banks for which dynamic and/or static estimation models are used.

O'Connell (2023) analyzed the determinants of bank profitability in the UK using bank-specific, industry-specific and macroeconomic indicators in the period 1998-2018. Using the generalized method of moments (GMM) and

return on average assets (ROAA) as dependent variables, it was found that previous profitability, the capital-to-asset ratio (equity), the ratio of deposits to assets (funding), cash and other liquid assets to total assets (liquidity), income per employee (productivity), bank size to total assets, the 10-year bond rate, short-term interest rates, the consumer price index (CPI), and loan growth were found to be statistically significant variables. All variables, with the exception of funding and CPI, have a positive impact on profitability. The author finds that bank-specific factors and macroeconomic factors have the greatest impact on bank profitability, while industry-specific indicators do not significantly affect the profitability of UK banks.

Messai et al. (2015) also used a dynamic model of panel data analysis by applying the GMM model in analyzing the determinants of profitability in Western European countries. The analysis used a panel dataset from 15 countries over the period 2007-2011, analyzing the indicators in terms of operational efficiency, financial risk and macroeconomic indicators and their impact on profitability, as measured by the NIM/ROAA. The sample is divided into GIPSI countries, i.e. countries affected by the crisis, and other countries, which account for 62.11% of the sample. Compared to the whole sample and profitability measured by NIM, inflation, GDP growth, lagged NIM, and the ratio of net loans to total assets have the largest impact on profitability. Compared to the GIPSI countries, capital and liquidity, measured by the ratio of liquid assets to short-term financing, are additionally important. When profitability is calculated using ROAA, the share of loans in the private sector, lagROAA, capital and credit risk (measured as the ratio of non-performing loans to total loans) have a statistically significant impact on the entire sample. For the GIPSI countries, all variables except the share of loans in the private sector have a significant impact on profitability, as measured by ROAA. The authors found that the determinants of profitability depend on county category and that the equity ratio and credit risk are the most significant determinants of profitability.

Horobet et al. (2021) investigated the determinants of profitability in Central and Eastern European countries. A sample of 11 countries was analyzed in 2 stages using the GMM system over the period 2009-2018, focusing on macroeconomic variables and industry-specific indicators. ROA/ROE/NIM were used as dependent variables in the analysis. The authors claim that the government budget has a strong negative impact on bank profitability, as measured by ROE. In addition, inflation (measured by the harmonized index of consumer prices, HICP) shows a strong negative impact on ROE and a weak positive impact on NIM/ROA. Unemployment has a weak impact on profitability. Sector-specific indicators reveal that bank concentration (measured by the Herfindahl-Hirschman Index, HHI) and credit risk have the most significant and strongest negative impact on profitability. The proportion of loans in the private sector also has a strong and negative impact on ROA, and a weak and negative effect on ROA/NIM.

Căpraru & Ihnatov (2014) also investigated the determinants of profitability in Central and Eastern European countries for the period 2004-2011. Profitability was measured using ROAA/ROAE/NIM. The sample consisted of 143 commercial banks from 5 CEE countries and it was analyzed using POLS and POLS models with a "dummy" variable for the 2008 financial crisis. The results of the analysis show that management efficiency (measured by the cost-to-income ratio) has the strongest negative and statistically significant impact on all profitability measures. In addition, credit risk has a strong negative and significant impact on the profitability measures, with the strongest impact on ROE. In contrast, return on net assets (NIM) is in turn the only indicator influenced by a business mix (measured as the ratio of other operating income to assets). The size of the bank also has a significant impact on all profitability ratios (except ROE when a dummy variable was used), but this impact is weak. The only positive impact is seen in relation to equity, which has a strong impact on ROE and a weaker impact on ROA. The research has shown that inflation has a positive impact on ROA/ROE, while GDP growth has a weak positive impact on ROA. Factors such as liquidity risk (measured by the loan-to-deposit ratio) and concentration have no statistically significant impact on profitability, while the "dummy" model shows a significant negative impact on ROA/ROE, with the impact on ROE being significantly larger. The authors state that banks with a higher equity ratio have higher profitability, while large banks exhibit a lower NIM.

Karadžić & Đalović (2021) analyzed the determinants of profitability of large European banks using static and dynamic models. The sample is a balanced data panel consisting of 47 banks from 14 European countries in the period 2013-2018 that was analyzed using static models (FE/RE/pooled OLS) and a dynamic GMM model. The authors claim that POLS proved to be the best model. ROE was selected as a measure of profitability and as the dependent variable for the study. It was found that the concentration of the 5 largest banks, the HHI (which is the most significant), inflation, and GDP growth have a positive and significant impact on bank profitability, while EU membership has a negative and significant impact on bank profitability. The authors state that macroeconomic factors were found to be significant for profitability as measured by ROE, while bank-specific factors were not statistically significant. They also conclude that non-resident banks outside the EU are more profitable.

Petria et al. (2015) examined the determinants of bank profitability in the EU27 Member States using static estimation models. The sample consisted of 1,098 banks in the period from 2004 to 2011, which were summarized into panel data with dependent variables ROAE/ROAA.

The fixed effects (FE) model results show that credit risk, management efficiency, liquidity and the HHI have a significant negative impact on profitability (ROAE), while growth and a business mix have a significant positive impact. The results of the impact on ROAA are similar to ROAE with an additional significant positive impact of size and capital, while inflation has no significant impact on any of the profitability variables.

Bikker & Vervliet (2018) examined the profitability of banks in a period of low interest rates. The sample included all US commercial banks and savings banks in the period from 2001 to 2015, and the dependent variables NIM/ROE/ROA and profit. The authors state that the FE model is the appropriate method for estimating the determinants of profitability in the case of a static model and including the variable for previous profitability because it improves the OLS estimation. Using the POLS model with a lagged profitability variable has shown that in the case of ROE, the variables bank size, previous period profitability, diversification (measured as the ratio of non-interest income/total income), lending (measured as the ratio of total loans/total assets), inflation (measured by the CPI), real GDP growth, the square of the short-term interest rate, and the long-term interest rate have a positive and significant impact on the profitability of the banks in the observed sample. Capital, credit risk (provisions for unpaid loans/total assets), the TCR (measured as the ratio of risk capital to risk-weighted assets), and the short-term interest rate have a negative and significant impact on bank profitability. Credit risk has the strongest impact on ROE (a negative effect), i.e. in the case of NIM/ROA/profit, the previous period's profitability has a positive effect. The authors note that banks' operations were disrupted by the impact of low interest rates on the profitability of US banks, which led to a reduction in NIM.

It can be seen that studies in different parts of Europe with mixed samples led to relatively similar results regardless of the type and form of estimation. However, it should be noted that the literature analyzing the profitability of EU/US banks during the observed period is limited. In all the studies presented, the independent variables can be categorized into bank-specific variables, industry-specific variables, and macroeconomic variables. The selection of models is also specific to the region and the period under study, and it depends on the type of data sample, which is why there are differences in the selection of static and dynamic models. Based on the theoretical background and the classification of the variables, the variables were selected by category, as shown in Table 1.

2.2 A theoretical overview of the literature on research variables

Operational efficiency is the key to achieving a bank's profitability. A commonly used measure of operational efficiency is the ratio of non-interest expenses to total bank income (Buchory, 2015). Successful banks are distinguished from unsuccessful banks by good cost control and a good efficiency ratio. Accordingly, a high ratio of bank operating costs to revenues is associated with lower bank profitability (Petria et al., 2015), hence the hypothesis that the operating efficiency ratio has a negative relationship with profitability.

According to many researchers, bank liquidity, which is measured by the ratio of total loans to total assets, is very important in explaining bank profitability, and the literature usually finds a positive relationship between profitability and liquidity. A bank that holds a high proportion of liquid assets (i.e. a low proportion of loans) is less likely to make high profits, as loans are the primary source of income for banks (Abreu & Mendes, 2002). On the other hand, some studies have shown that a large loan portfolio can have a negative impact on bank profits, depending on the quality of the loan. Such a situation occurs in the case of a high-risk loan portfolio that can potentially lead to losses (Staikouras & Wood, 2004). In this study, such a risk was taken into account as part of the indicator for the risk associated with bank loans. Thus, it can be concluded from the above studies that the size of the loan portfolio has a significant impact on its profitability, and the direction of this impact depends on the quality of the loan portfolio. Despite the contradictory conclusions, the hypothesis is based on the existence of a positive relationship.

Funding as a ratio of deposits to total assets is one of the most important ratios in bank analysis that shows the stability of the bank's funding. The studies that have investigated this ratio are divided. Since banks are heavily dependent on deposits as a basic source of funding, a larger amount of deposits allows banks to have more funds available for lending. Lee & Hsieh (2013) state that additional deposits allow the bank to earn additional profits, while a low level of deposits has a negative impact on profitability. However, this thesis depends on the demand for loans. If a bank can place deposits in the form of loans, the ratio of deposits to total assets has a positive effect on profitability, otherwise it has a negative effect due to funding costs, such as interest on deposits (Menicucci & Paolucci, 2016). Taking into account the fact that the ECB has kept interest rates below those of the FED for a long time (indicating a lower demand for loans), the hypothesis is that funding is negatively correlated with profitability for European banks and positively correlated for American banks.

A bank's diversification reflects its independence from credit income, expressed by the ratio of the bank's non-interest income to total income. Research on this ratio has often yielded different conclusions. However, analyses that have examined this ratio in developed countries and regions such as the EU/US suggest that diversification of bank earnings generally has a positive effect on bank profitability. The positive impact arises from the reduction in business risk, lower dependence on credit demand and economies of scale for large banks (Chiorazzo et al., 2008;

Elsas et al., 2010; Sawada, 2013). The original hypothesis is that diversification of banks in both regions has a positive effect on bank profitability. The context described above, in which American banks have a higher proportion of non-interest income than European banks, must be taken into account, which may be a possible answer to the research question.

To account for the risk of a bank's loans in the analysis, the ratio of provisions for unpaid loans to total loans was used. Credit risk serves as a measure of asset quality, with a higher ratio indicating poorer asset quality and higher risk in the loan portfolio. Although the risk-return hypothesis suggests a positive relationship between risk and return, in this case poor credit quality can have a negative impact on bank profitability (Kosmidou 2008). Numerous studies have confirmed this hypothesis by showing that poor credit quality is one of the main factors in the reduction of margins, the inability to generate profits and even bank failure (Miller & Noulas 1997; Cooper et al., 2003; Duca & McLaughlin, 1990). Although most research shows that higher credit risk leads to lower profitability, there are some studies that disagree with this thesis. Boahene et al. (2012) state that higher credit risk leads to higher interest rates and commissions for the portfolio, which in turn leads to higher profitability. Despite some exceptions, the hypothesis aligns with the majority of research, suggesting that loan risk appetite has a negative correlation with bank profitability. It is important to note that after the 2008 crisis, European banks have consistently shown a much higher bank risk ratio than their American counterparts (Weigand, 2015), which may indicate one of the reasons why American banks achieve higher profitability.

In addition to the previously mentioned variables specific to the banking sector, the influence of the economic environment was also taken into account. This was achieved by using inflation as a macroeconomic variable. Many studies have shown different effects of inflation on the profitability of banks. Messai et al. (2015) state that inflation, as measured by the CPI, has a negative impact on bank profitability (NIM), while profitability, as measured by ROAA, has a positive impact on profitability in GIPSI countries. Horobet et al. (2021) identify inflation, as measured by the harmonized CPI, has a strong negative impact on ROE, while profitability, as measured by NIM/ROA, has a weak positive impact. O'Connell (2023) documents the negative impact of inflation on the profitability of UK banks. Căpraru & Ihnatov (2014), Karadžić & Đalović (2021), and Bikker & Vervliet (2018) report that inflation has a positive impact on bank profitability, while Petria et al. (2015) find in their study that inflation has no statistically significant impact on the profitability of EU27 banks. The hypothesis supports the findings that inflation has a positive impact on the profitability of EU/US banks.

To take account of competition and bank market saturation, the Herfindahl-Hirschman Index was used as a measure of bank concentration. When analyzing large European banks, Karadžić & Đalović (2021) identified a positive and significant correlation with the profitability of the banks analyzed. However, some other studies report different results. Horbert et al. (2021) and Petria et al. (2015) found that the degree of bank concentration has a significant and negative impact on profitability. To further analyze the effect of bank concentration and profitability, variables were introduced, such as a decomposed HHI measured separately for deposits and loans. The hypothesis states that the impact of concentration on profitability is negative.

3 Research methodology

3.1 Input data

The first step in data collection was a bank search, which was carried out using Bloomberg Terminal (2023) and LSEG Eikon (2023). Listed banks with a particular interest in the primary issue were separated to avoid redundancy, resulting in a total of 93,924 data. Banks were then selected according to the sector classification of the Global Industry Classification Standard, Banking Sector, which yielded 1,543 results. The geographic criterion was applied only to banks in the US and EU Member States, displaying 806 results. The size criterion segmented banks with a market capitalization exceeding €500 million to reduce the sample of small banks with missing data. Macroeconomic data were collected from the World Bank database. The search process resulted in a total of 250 banks, 138 (55%) of which were in the EU, with 1,549 observations, and 112 (45%) of which were in the US, with 1,962 observations. After removing outliers, the sample size is sufficiently large. The missing values for the banks in the EU/US are 0.66% and 5.89%, respectively, which according to Hair et al. (2009, p. 634), corresponds to less than 10% of the observations. The final sample closely resembles the population from which it was drawn, ensuring the relevance of the research in every aspect. The data are organized in an unbalanced panel structure.

3.2 Description of variables

The dependent variable is proxied profitability, using ROE. The independent variables were as follows: operational efficiency, the ratio of loans to total assets, the ratio of deposits to total assets, diversification of bank income, bank risk measured as the ratio of loan loss provisions to total loans, and inflation measured by the consumer price index. A control variable was used to control for differences in bank structure and administrative environment (Lee et al., 2014). Table 1 lists all variables along with their descriptions.

Table 1: List of variables

Variables	Definition	Measurement	Proxy
ROE	Profitability	Return on Equity	
OPEF	Operational efficiency	Non-interest expenses/Total income	Bank-specific
LTA	Liquidity	Total loans/Total assets	
DTA	Funding	Total deposits/Total assets	
DIV	Bank diversification	Non-interest income/Total income	
RISK	Bank risk	Provisions for unpaid loans/Total loans	
lagROE	Lagged profitability	ROE for the previos year	Control variable
INFL	Inflation	CPI	Macro specific
HHI_D	Herfindahl-Hirschman	Calculated with deposits	Industry-specific
HHI_L	Herfindahl-Hirschman	Calculated with loans	

Source: Authors

Certain transformations were applied to the data due to the unbalanced panel containing a whole series of negative values. A major problem was the presence of discontinuous data and values expressed as percentages, which yielded even smaller and more sensitive results after logarithmization. After logarithmization, some data sets appeared to follow a normal distribution. As a rule, the logarithmized values showed a lower R2, suggesting that the transformation of the data did not improve the results as expected, and that insufficient data contributed to achieving a normal distribution. The variables lagROE/Year were not transformed.

3.3 Models

Two unbalanced panels of data for EU/US banks covering the period between 2008 and 2022 were used for the analysis. Static and dynamic estimators were used to identify significant determinants of bank profitability that include the impact of the profitability trend in the observed period on future profitability.

3.3.1 Static models

Weighted least squares (WLS), fixed effects (FE) and random effects (RE) models were used to model the static models of profitability determinants. The equation of these models is as follows:

$$ROE_{i,t} = \beta_0 + \beta_1 OPEF_{i,t} + \beta_2 LTA_{i,t} + \beta_3 DTA_{i,t} + \beta_4 DIV_{i,t} + \beta_5 RISK_{i,t} + \beta_6 INFL_{i,t} + \beta_7 HHID_{i,t} + \beta_8 HHIL_{i,t} + \beta_9 HHIA_{i,t} + u_{i,t}, \quad (1)$$

where i=1,…N stands for individual banks, t=1,…T is the year in which the bank operates, while u_(i,t)= v_i+e_(i,t), where v_i and e_(i,t) describe unobservable individual effects and the error, respectively. The selection of the most optimal static model to determine profitability determinants is based on specific assumptions: (i) the significance of unobservable individual effects, and (ii) the existence of a correlation between unobservable individual effects and profitability determinants. Estimates were performed using FE/RE/FE AR(1)/WLS models.

3.3.2 Dynamic models

To express the dynamic component of the impact on profitability, i.e. the impact of previous profitability on current profitability, a residual variable of profitability was added and GMM models were used according to Nunes et al. (2009):

$$ROE_{i,t} = \beta_0 + \rho ROE_{i,t-1} + \beta_1 OPEF_{i,t} + \beta_2 LTA_{i,t} + \beta_3 DTA_{i,t} + \beta_4 DIV_{i,t} + \beta_5 RISK_{i,t} + \beta_6 INFL_{i,t} + \beta_7 HHID_{i,t} + \beta_8 HHIL_{i,t} + \beta_9 HHIA_{i,t} + v_i + e_{i,t}, \quad (2)$$

where ρ is the autoregressive coefficient: ρi,t−1 is the one-period lagged profitability at k parameter, and ρ is the speed of adjustment to the equilibrium. A value of $0<\rho<1$ implies the persistence of profitability in the industry but tends to return to the normality level. According to Islam & Nishiyama (2016), a value of $\rho\sim0$ (high speed) suggests a fairly competitive market, while $\rho\sim1$ (slow adjustment) implies a less competitive market. The bias in the above model arises from (i) correlations between individual effects with profitability in the previous period, and (ii) correlations between errors with profitability in the previous period.

4 Results

4.1 Descriptive statistics

Table 2 shows the results of the descriptive statistics, based on 3,511 observations from 250 banks over a 14-year period. The data reveal that bank profitability is asymmetric due to the inversely proportional relationship of the descriptive variables, with the EU banks showing considerable instability (SD>Mean). The minimum and maximum ROE values range from a significantly negative spectrum, particularly for EU banks, to uniformly positive values. This difference may indicate inadequate utilization of equity to generate profits. Examining the values of independent variables, the volatility of the EU/US banks is not particularly high due to (SD□Mean) with the exception of RISK/INFL/lagROE. These results show that the banking systems are well capitalized in accordance with Basel III requirements. Furthermore, the SD values are reasonably close to the average values.

4.2 Diagnostic tests

The following diagnostic tests were performed: (1) the normality test with the Shapiro-Wilk/SK test, (2) the linearity test with Pearson, (3) the Durbin-Watson statistic for autocorrelation together with the Breusch-Godfrey LM, (4) the test of multicollinearity assumption (VIF/ Collinearity diagnostic), (5) heteroscedasticity using the Breusch-Pagan/Cook-Weisberg test and the White test, and (6) cross- sectional independence test with the Friedman test. The data are not-normally distributed, heteroscedastic, and there is a problem of serial correlation between the errors, as suggested by Tables 2-4. Muhoro & Mungai (2018, p. 118) argue that financial data have elements of a non-normal distribution as they assume a random walk distribution due to leptokurticity of financial data and large tails.

A histogram was used to compare normal and logarithmic data to combine different variables. Extremely high VIF values were indicated by HH indices, especially for US banks, so variables greater than 10 were discarded. As a rule of thumb, a VIF value above 5 or a tolerance threshold below 0.2 is considered indicative of extreme collinearity with other explanatory variables (Mei et al. 2019, p. 79). Examining the relationship between the independent variables, the results indicate that multicollinearity is not a problem for the application of analysis techniques, as confirmed by the VIF test. Correlation coefficients represent the relationship between variables, whereby values above 0.6 may lead to collinearity, and all values above 0.8 are excluded from further tests (Kanwal & Nadeem, 2013). Autocorrelation tests confirm the problem of opposite serial correlation between the error terms. In the ROE model, the null hypothesis of no heteroscedasticity was tested for all regressors at a significance level of 5%. The chi-square value has a probability exceeding the 5% significance level. The tables above show that the p-values of the test for regression analysis are well below 0.05, indicating the presence of heteroscedasticity. We therefore reject the null hypothesis of constant variance.

Table 2: Descriptive statistics

Banks	EU banks					US banks				
Variables	*Observation*	*Mean*	*SD*	*Minimum*	*Maximum*	*Observation*	*Mean*	*SD*	*Minimum*	*Maximum*
$ROE_{i,t}$	1,549	.0484561	.488821	−17.3674	2.094116	1,962	.825075	.1311681	−2.64731	2.03696
$OPEF_{i,t}$	1,549	.4885356	.169918	0.00	2.016937	1,962	.5458557	.1536738	.037327	2.901267
$LTA_{i,t}$	1,549	.4633119	.311263	0.00	1.105257	1,962	.6527874	.1413227	0.00	1.127548
$DTA_{i,t}$	1,549	.6768399	.163048	0.00	.9875591	1,962	.7784505	.0876673	0.00	1.745949
$DIV_{i,t}$	1,549	.3434443	.134707	−.150606	.7744879	1,962	.2220765	.1224632	−.989310	.7868398
$RISK_{i,t}$	1,549	.0076857	.023395	−.013183	.6193898	1,962	.0049047	.0094046	−.007791	.1581937
$INFL_{i,t}$	1,549	.0204011	.021763	−.000616	.088337	1,962	.0235589	.0196978	−.003555	.080028
$HHID_{i,t}$	1,549	419.861	31.994	383.0633	493.4225	1,962	1,150.027	272.335	785.9392	1,637.471
$HHIL_{i,t}$	1,549	525.374	80.563	413.3352	712.512	1,962	931.9559	284.403	512.0234	1,444.076
$lagROE_{i,t}$	1,441	.0468008	.500757	−17.3674	2.094116	1,826	.0800583	.1352544	−2.64731	2.03696

The SK test for the univariate distribution of skewness (Prob>chi2), where H_0: Normal distribution. The test results shows that some of the variables are not normally distributed. Shapiro-Wilk W tests the hypothesis that the data originate from a normal distribution, where H_0: The data do not deviate significantly from the normal distribution. The results indicate that the data deviate from a normal distribution. Residuals of individual variables, regressed against ROE, according to the Shapiro-Wilk test, where H_0: The data do not deviate significantly from a normal distribution. The results confirm that the data deviate from a normal distribution. For example, ROE had a W test of $0.1231_{EU}(0.39786_{US})$, a V value of $824.056_{EU}(701.776_{US})$, a Z value of $16.917_{EU}(16.659_{US})$, and a *p-value* of 0.000 at a significance level of 5% (p<0.05), the test was statistically significant, so we rejected H_0 that all ROE values are normally distributed and accepted H_1 that all ROE values are not normally distributed at a significance level of 5%.

Source: Compiled by the author

Table 3: Diagnostic tests for EU banks

EU	ROE	OPEF	LTA	DTA	DIV	RISK	INFL	lagROE	Year	VIF
$ROE_{i,t}$	1.0000									
$OPEF_{i,t}$	**−0.1439***	1.0000								1.33
$LTA_{i,t}$	−0.0435	**−0.1481***	1.0000							1.07
$DTA_{i,t}$	**−0.0725***	**0.0932***	**0.1077***	1.0000						1.07
$DIV_{i,t}$	**0.1187***	**0.4305***	**−0.1104***	**−0.0678***	1.0000					1.36
$RISK_{i,t}$	**−0.1928***	**0.1148***	**0.1102***	**0.1292***	**−0.1524***	1.0000				1.13
$INFL_{i,t}$	−0.0041	−0.0345	**−0.0776***	0.0161	**−0.0584***	−0.0298	1.0000			1.20
$lagROE_{i,t}$	**0.0913***	0.0054	**−0.596***	**−0.0592***	0.0050	**−0.0841***	0.0087	1.0000		1.01
$YEAR_{i,t}$	0.0282	**0.3379***	−0.0151	**0.1140***	**0.3852***	**−0.1230***	**0.2205***	0.0257	1.0000	1.42
Breusch-Pagan/Cook-Weisberg White test Durbin-Watson Breusch-Godfrey LM test Friedman test		Ho: Constant variance Ho: Homoscedasticity H_0: No serial correlation H_0: No serial correlation			chi2(1)=4929.85; Prob>chi2=0.0000 chi2(44)=230.64; Prob>chi2=0.0000 d-statistic(9, 1441)=2.222298 chi2(1)=274.679; df(1); Prob>chi2=0.00 31.444; Pr=1.0000			Ha: Heteroscedasticity Ha: Heteroscedasticity Ha: Negative autocorrelation Ha: Autocorrelation Cross-sectional independence		Mean 1.20

*Significant at a 5% level. Source: Compiled by the author

Table 4: Diagnostic tests for US banks

US	ROE	OPEF	LTA	DTA	DIV	RISK	INFL	lagROE	Year	VIF
$ROE_{i,t}$	1.0000									
$OPEF_{i,t}$	**−0.3509***	1.0000								1.25
$LTA_{i,t}$	−0.0402	**−0.1801***	1.0000							1.21
$DTA_{i,t}$	0.0306	**0.1125***	−0.0223	1.0000						1.10
$DIV_{i,t}$	**0.1116***	**0.2603***	**−0.3938***	−0.0310	1.0000					1.34
$RISK_{i,t}$	**−0.4202***	0.0268	**−0.0470***	**−0.1210***	**0.0515***	1.0000				1.27
$INFL_{i,t}$	**0.1007***	**−0.1124***	**0.0094***	**0.0924***	**−0.0931***	**−0.1775***	1.0000			1.56
$lagROE_{i,t}$	**0.2773***	**−0.1617***	0.0032	0.0021	0.0195	**−0.2513***	**0.0686***	1.0000		1.12
$YEAR_{i,t}$	**0.2004***	0.0053	0.0434	**0.2510***	−0.0054	**−0.4358***	**0.4414***	**0.1905***	1.0000	1.84
Breusch-Pagan/Cook-Weisberg White test Durbin-Watson Breusch-Godfrey LM test Friedman test		Ho: Constant variance Ho: Homoscedasticity H0: No serial correlation H0: No serial correlation			chi2(1)=10296.13; Prob>chi2=0.0000 chi2(44)=1177.08; Prob>chi2=0.0000 d-statistic(9, 1826)=1.879363 chi2(1)=0.047; df(1); Prob>chi2=0.8285 84.618; Pr=0.9998			Ha: Heteroscedasticity Ha: Heteroscedasticity Ha: Positive autocorrelation Ha: Autocorrelation Cross-sectional independence		Mean 1.34

*Significant at a 5% level. Source: Compiled by the author

Table 5: Static panel model for EU banks

Indep. variab.	OLS	RE	FE	FE AR(1)	OLS#	RE#	FE#	WLS#
OPEF	−0.64978***(0.0887)	−0.64977***(0.08873)	−0.67940***(0.11274)	−0.41254**(0.1218)	−0.64978***(0.1299)	−0.64978***(0.1230)	−0.67940***(0.1825)	−0.29131***(0.0157)
LTA	−0.06335(0.04222)	−0.06335(0.04222)	−0.07006(0.06149)	−0.15718**(0.07493)	−0.06335(0.04262)	−0.06335(0.04262)	−0.07006*(0.04215)	−0.01459*(0.00795)
DTA	−0.06641(0.08200)	−0.06641(0.08200)	−0.37556*(0.20199)	−0.69353**(0.2820)	−0.06641(0.09689)	−0.06641(0.09690)	−0.37556(0.42850)	0.05479***(0.0142)
DIV	0.65040***(0.11209)	0.65040***(0.11209)	0.91764***(0.19034)	1.24798***(0.21994)	0.65040**(0.22359)	0.65040**(0.22360)	0.91764**(0.43394)	0.34039***(0.0190)
RISK	−2.75276***(0.5695)	−2.75276***(0.56954)	−0.26374(0.66214)	6.89702***(0.72696)	−2.75276*(1.07535)	−2.75276**(1.0753)	−0.26374(1.83694)	−3.96382***(0.1231)
INFL	−0.80826(0.63450)	−0.80826(0.63450)	−0.62374(0.65156)	0.28207(0.66849)	−0.80826*(0.43439)	−0.80826*(0.43439)	−0.62374(0.37767)	−1.99836*(1.04978)
lagROE	0.07638**(0.02542)	0.07638**(0.02542)	0.0045(0.02709)	−0.33736***(0.0263)	0.07638***(0.0179)	0.07638***(0.0179)	0.0045(0.01678)	0.099249***(0.0137)
YEAR	0.00627*(0.00377)	0.00627*(0.00377)	0.00602(0.00451)		0.00627*(0.00266)	0.00627**(0.00266)	0.00602*(0.00323)	−0.00195(0.00250)
Cons	−12.39485(7.56823)	−12.39485(7.56823)	−11.77801(9.03227)	0.12325(0.12570)	−12.39485*(5.3266)	−12.39485(5.32669)	−11.77801*(6.4104)	4.02585(5.03623)
Observations	1,441	1,441	1,441	1,333	1,441	1,441	1,441	1,333
Wald(χ^2)		145.37***				184.79***		
F(N(0,1))	18.17***		8.60***	46.38***	23.10***		8.10***	298.12***
LM(χ^2)		0.000***				0.000***		
Hausman(χ^2)		102.12***						
R^2	0.0922	0.0922	0.0661	0.0003	0.0922	0.0922	0.0661	0.6227

Significant at *10%, **5%, and ***1% levels; # - robust analysis corrected for autocorrelation and heterscedasticity. SD in brackets.
Source: Compiled by the author

Table 6: Static panel model for US banks

Indep. variab.	OLS	RE	FE	FE AR(1)	OLS#	RE#	FE#	WLS#
OPEF	−0.3853***(0.0219)	−0.38530***(0.02198)	−0.44740***(0.02784)	−0.37955***(0.03224)	−0.3853***(0.0383)	−0.38530***(0.042)	−0.4474***(0.0493)	−0.33175(0.01157)
LTA	−0.02965(0.01972)	−0.02965(0.01972)	−0.09340**(0.03108)	−0.07918**(0.03443)	−0.02965(0.02543)	−0.02965(0.03879)	−0.09340(0.07055)	−0.01695(0.00929)
DTA	0.09219**(0.03234)	0.09219**(0.03234)	−0.06298(0.05118)	−0.03191(0.05757)	0.09219**(0.03217)	0.09219*(0.05069)	−0.06298(0.06769)	0.048756(0.01224)
DIV	0.23979***(0.0240)	0.23979***(0.02406)	0.24786***(0.04122)	0.21891***(0.05451)	0.23979***(0.0482)	0.23979***(0.048)	0.24786**(0.0939)	0.220271(0.01123)
RISK	−5.30542***(0.3051)	−5.30541***(0.30514)	−5.86510***(0.31749)	−5.01592***(0.42327)	−5.30542**(1.5742)	−5.30541***(1.399)	−5.8651***(1.4131)	−6.72488(0.20297)
INFL	0.08129(0.15545)	0.08129(0.15545)	0.01032(0.15476)	0.04492(0.14170)	0.08129(0.13489)	0.08129(0.17692)	0.01032(0.20391)	0.441613(.346189)
lagROE	0.11453***(0.0194)	0.11453***(0.01945)	0.05134**(0.02016)	0.03146(0.02075)	0.11453(0.24489)	0.11453**(0.0405)	0.05134(0.03863)	0.081517(0.02191)
YEAR	−0.00062(0.00085)	−0.00062(0.00085)	−4.92e-06(0.00087)		−0.00062(0.00143)	−0.00062(0.00147)	−4.92e-06(0.0017)	−0.00383(0.00092)
Cons	1.45050(1.69674)	1.45050(1.69674)	0.41773(1.75068)	0.34158***(0.05341)	1.45050(2.85639)	1.45050(2.93700)	0.41773(3.51759)	7.942232(1.86176)
Observations	1,826	1,826	1,826	1,690	1,826	1,826	1,826	1,690
Wald(χ^2)		884.79***				362.44***		
F(N(0,1))	110.60***		98.05***	41.97***	36.01***		34.05***	396.17***
LM(χ^2)		0.000***				0.000***		
Hausman(χ^2)		334.17***						
R^2	0.3114	0.3275	0.3114	0.1742	0.3275	0.3275	0.3114	0.6340

Significant at *10%, **5%, and ***1% levels; # - robust analysis corrected for heterscedasticity only. SD in brackets.
Source: Compiled by the author

Table 7: Dynamic panel model for EU/US banks

	EU banks		US banks	
Independent variables	GMM (1991)	GMM system (1998)	GMM (1991)	GMM system (1998)
OPEF	–0.22120 (0.33210)	–0.69778* (0.38389)	–0.36111*** (0.03003)	–0.37802*** (0.03176)
LTA	0.12373 (0.11888)	0.03367 (0.22768)	–0.36111 (0.03004)	–0.06775 (0.11104)
DTA	–1.12986 (1.24602)	–0.97643 (1.28556)	0.10805 (0.17721)	0.09515 (0.16533)
DIV	0.85976 (0.64627)	1.13175 (0.81551)	0.21958** (0.17721)	0.16173** (0.07168)
RISK	–7.49689* (4.01809)	–7.74796*** (1.85808)	–5.26145*** (1.44885)	–5.22093** (1.46635)
INFL	–0.05621 (0.47881)	–0.21076 (0.69108)	–0.05566 (0.22535)	–0.10008 (0.22808)
lagROE	0.10393 (0.10519)	0.04679** (0.01428)	0.03135 (0.04103)	0.03656 (0.05126)
Year	–0.00026 (0.00452)	0.00092 (0.00707)	0.00102 (0.00242)	0.00098 (0.00220)
Cons	1.14707 (9.02808)	–1.15134 (14.14973)	–1.84648 (4.78517)	–1.72816 (4.36633)
Instruments	120	106	120	120
Observations	1,441	1,441	1,826	1,826
Wald(χ2)	40.09***		2588.20***	
F(N(0,1))		11.88***		282.54***
Sargan(χ2)	132.24		114.85	
Hansen(N(0,1))		106.2		131.39
m1(0,1)	–0.97	–1.11	–1.05	–1.07
m2(0,1)	0.54	1.79	0.92	0.96

*Significant at 10%, **5%, and ***1% levels. Robust SE in brackets.
Source: Compiled by the author

4.3 Static panel models

To determine the significance of unobservable individual effects, Nunes et al. (2009) specify the use of the Lagrange multiplier test, whose null hypothesis rests on the irrelevance of unobservable individual effects. If the hypothesis is rejected, the conclusion is that OLS does not explain the relationship between ROE and the determinants of bank profitability and that further modeling taking into account individual effects using the FE/RE model is required. The authors (2009) perform the Hausman test to test the existence of correlation between individual effects and determinants of profitability. The null hypothesis states that there is no correlation between individual effects and ROE. By rejecting the above hypothesis, it is assumed that the FE model is a model applied to explain the relationship between profitability and its determinants. In addition to the above tests, the Wald test was performed to test the significance of a set of coefficients in the selected models and the F-test was applied for the overall significance of the variables explaining ROE variance (Nunes et al., 2009).

Due to the presence of autocorrelation and heteroscedasticity, the OLS/FE/RE models are corrected (#), while the FE AR(1) estimator has no possibility of correction. The OLS/RE models have very similar results, but they do not have identical values with regard to the confidence in-

terval. In addition, AR(1) does not allow regression with a time-varying component due to problems with endogeneity and assumptions for panel data. By analyzing the presence of individual effects using the LM test, the hypothesis of the irrelevance of unobservable individual effects was rejected, indicating that the OLS model does not sufficiently explain the variance of the variables mentioned on the return on ROE. The hypothesis of the existence of a correlation between individual effects and profitability determinants was tested using the Hausman test and rejected, indicating that the FE estimator is a suitable model for future analyses. Due to the presence of heteroscedasticity, the WLS model was additionally implemented with the aim of weighting depending on the variance in order to remove the effect of heterogeneity of variance. WLS addresses the problem of heteroscedasticity by assigning different weights to observations based on the variance of their residuals. Observations with higher residuals have greater variability and conversely receive lower weights. INFL is selected as the weighting variable.

Based on the results, the most robust static estimators (FE#/WLS# models), which were corrected for autocorrelation and heteroscedasticity, were selected and presented in Tables 5-6.

4.4 Dynamic estimators

As a solution to the correlation between individual effects and profitability in the previous period, Arellano & Bond (1991) recommend using the first difference, which can eliminate this issue. Furthermore, the authors assume that the correlation between errors and profitability is eliminated by using previous profitability at different levels as a GMM instrument. Therefore, the dynamic models are based on the GMM estimator, which includes the first difference of equation (2) and different levels of previous profitability, as shown in Table 7.

The Sargan test was performed to test the validity of over-restrictions in the GMM method (Arellano & Bond, 1991), and the presence of first- and second-order autocorrelation (Nunes et al., 2009). The dynamic models are robust, with the Sargan and Hansen tests confirming the validity of the instruments. Furthermore, the hypotheses of no first- and second-order autocorrelation cannot be rejected.

4.5 Static panel models vs. dynamic estimators

Despite the observed differences in the results between the static and dynamic models, the recognized differences raise an additional question that requires further investigation and is beyond the scope of this paper. The analysis of static models with dynamic estimators revealed that the RISK variable has a negative effect on the profitability of European banks according to bothWLS# and dynamic estimators, while it is not statistically significant in the FE#model. The negative impact of RISK/OPEF on profitability is confirmed by static models and dynamic estimators, while the WLS# estimator for US banks confirms statistical insignificance for RISK/OPEF. Analyzing only static models, the profitability of European banks is influenced by OPEF/LTA/DIV, which is confirmed by FE#/WLS#models. In addition, the YEAR variable in the FE# model proved to be statistically significant, and the DTA/RISK/INFL/

lagROE variables showed significance through the WLS# model. In the case of the American banks, only the FE# model with the variables OPEF/DIV/RISK proved to be statistically significant.

5 Discussion

OPEF proved to be a significant variable influencing the profitability of banks in both regions. Similar results were obtained by Petria, Căpraru, and Ihnatov (2015), who found a negative impact of operational efficiency on ROAE using the FE model. The results of this study further confirmed that efficiency also impacts ROE, which confirms the original hypothesis. The research results indicate a greater negative impact of operational efficiency on EU banks compared to US banks within this sample. However, it is worth noting that, despite the differing impact, the US banks in this sample exhibit a higher average negative operating efficiency ratio. The LTA ratio has a negative and statistically significant effect on the profitability of EU banks, as evidenced by static modeling, which is not consistent with the original hypothesis. The positive effect is expected due to the assumption that a larger loan volume leads to higher profitability. Staikouras & Wood (2004) report similar findings, attributing the negative impact on profitability to the low quality of loans granted by the institutions. According to the statistical models, the DTA variable has a significant positive impact on the profitability of EU banks, which is not consistent with the hypothesis of this paper. However, the dynamic models confirm the hypothesis of the paper that the impact is positive in the US and negative in Europe. Nevertheless, the dynamic model result is not statistically significant, and as a result, the hypothesis is not confirmed.

DIV shows a positive and statistically significant impact on the profitability of EU/US banks. The assumption that diversification has a positive impact on profitability by reducing business risk and reliance on loans proved to be correct according to the results of Chiorazzo et al. (2008) and Elsas et al. (2010). Furthermore, the sample used in this research indicates that European banks have a higher degree of diversification than American banks,

which is not consistent with the assumptions of this paper. This result differs from previous studies, such as Di Vito et al. (2023), which found that US banks generate more non-interest income than European banks. Thus, although the results confirm the hypothesis that diversification has a positive impact on profitability, they do not confirm the assumption that American banks have a higher degree of diversification leading to higher profitability. This discrepancy may stem from the unique characteristics of the sample, which needs to be further investigated. The RISK hypothesis proved to be accurate and statistically significant, which is confirmed by the results of the static and dynamic models. The negative impact of bank risk on profitability was also found by Kosmidou (2008), Miller & Noulas (1997), Cooper et al. (2003), Duca & Mclaughin (1990). The findings confirm the assumption of this paper and partly explain the higher profitability of American banks, as according to this sample, American banks exhibit lower average credit risk compared to EU banks. lagROE was shown to be a statistically significant variable with a positive impact on the profitability of EU banks compared to the WLS model. Similar results were achieved in studies by O'Connell (2023) and Messai et al. (2015). The autoregressive coefficients ρ, interpreted based on Islam & Nishiyama (2016), suggest the persistence of profitability and a high speed of reaching equilibrium in a relatively competitive market. Analyzing the previous profitability of US banks yields conclusions similar to those for EU banks; however, these conclusions are not statistically significant.

Several variables showed statistical significance exclusively for European banks. The impact of INFL on ROE is not consistent with the hypothesis. The results of the static WLS model show a negative statistically significant impact on the profitability of EU banks. Negative results were also reported by Horobet et al. (2021) and Messai et al. (2015), while Căpraru & Ihnatov (2014), Karadžić & Đalović (2021) observed positive effects. INFL did not exhibit a statistically significant effect on the profitability of American banks, although Bikker & Vervliet (2018) argued the positive impact of inflation on the profitability of American banks.

6 Conclusions

The differences in the profitability of banks in the EU and the US have been observed over the last 15 years, but the underlying reasons remain unexplained. This paper attempts to explain the factors influencing bank profitability in the two regions and how these differ. To find a possible answer to this problem, an analysis of a total of 250 banks was conducted. The main determinants of bank profitability used in other relevant studies were examined and the analysis yielded satisfactory results.

Robust static models and dynamic estimators are found to be effective in estimating the determinants of profitability of EU/US banks during the observed period. The above models suggest that the profitability of European banks is determined by operating efficiency, the share of deposits and loans in total assets, diversification, risk, previous profitability and inflation. In particular, operating efficiency and risk exposure stand out as the most important variables, as they are statistically significant across most models. In contrast, the analysis revealed that the profitability of US banks is related to the level of operational efficiency, risk and diversification, and is partially consistent with the EU determinants uncovered. It is important to note that the variables analyzed exhibit greater predictive power for the profitability of US banks compared to their European counterparts, further highlighting the differences in the determinants of profitability between the two markets. The main contribution of the paper is the direct comparison of EU and US bank profitability determinants using static and dynamic models in the post-2008 financial crisis period. In addition, the existing methodology of static models with dynamic estimators was enhanced by incorporating WLS models and robust estimators. Although the research results did not fully explain the higher profitability of American banks compared to European banks, they highlighted specific determinants influencing their profitability that should be extended and subsequently examined. The bank risk hypothesis was confirmed, partially explaining why American banks have higher profitability. However, other statistically significant results observed in both regions neither confirm the original hypothesis nor explain the higher profitability of American banks.

Future research could revisit these variables in other time periods or test other variables in the same time period to possibly uncover other profitability determinants that explain the differences between the EU and the US. The post-COVID-19 era, marked by sharp increases in benchmark interest rates, presents a particularly interesting context for such analyses. Additionally, the context of digital transformation and its role in redefining profitability factors, as emphasized by Grujić & Vojinović (2024), should also be taken into account.

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Ocena dejavnikov dobičkonosnosti bank: Primerjalna študija za banke EU in ZDA

Ozadje/Namen: Članek preučuje pomembne razlike v tržnih donosih med bančnima sektorjema ZDA in EU po finančni krizi leta 2008. Analiza razkriva, da je dobičkonosnost ameriških bank, merjena z donosom na kapital, višja kot pri evropskih bankah, kar delno pojasnjuje opažene razlike v donosih.
Metodologija: Študija uporablja dva neuravnotežena panela podatkov za banke EU in ZDA, ki zajemata obdobje 2008-2022. Statični in dinamični ocenjevalci so bili uporabljeni za identifikacijo pomembnih dejavnikov dobičkonosnosti bank, ki vključujejo vpliv trenda dobičkonosnosti v opazovanem obdobju na prihodnjo dobičkonosnost.
Rezultati: Na podlagi vzorca 250 bank so bile ugotovljene operativna učinkovitost, diverzifikacija in tveganje kot dejavniki, ki vplivajo na dobičkonosnost bank v obeh regijah. Za evropske banke so bili ugotovljeni tudi vplivi pretekle dobičkonosnosti, deleža vlog in posojil v sredstvih ter inflacije. Po drugi strani pa ameriške banke kažejo večjo napovedno moč za te spremenljivke, kar potrjuje razlike v dejavnikih med obema trgoma. Čeprav tveganje delno pojasnjuje višjo dobičkonosnost ameriških bank, drugi rezultati niso potrdili prvotne hipoteze.
Zaključek: Glavni prispevek članka je neposredna primerjava dejavnikov dobičkonosnosti za banke EU in ZDA z uporabo statičnih in dinamičnih modelov v obdobju po finančni krizi leta 2008. Poleg tega je bila obstoječa metodologija statičnih modelov z dinamičnimi ocenjevalci razširjena z WLS modeli in robustnimi ocenjevalci, kar je pokazalo, da obstajajo določeni dejavniki, ki vplivajo na njihovo dobičkonosnost in bi jih bilo treba razširiti in nadalje preučiti.

Ključne besede: *Dobičkonosnost, Banke EU/ZDA, Panelni podatki, Statični modeli, Dinamični ocenjevalci*