

Jan Zając

University of Bristol, United Kingdom,

 <https://orcid.org/0009-0003-8607-5889>,  janzajac900@gmail.com

Wojciech Paczos

The Institute of Economics of the Polish Academy of Sciences, Poland,

Cardiff University, United Kingdom,

 <https://orcid.org/0000-0002-8129-0235>,  PaczosW@cardiff.ac.uk

Euro Adoption and Bank Profitability in Central and Eastern Europe

Wpływ wejścia do strefy euro na rentowność banków w Europie Środkowo-Wschodniej

Abstract

We provide new evidence on the effects of adopting a common European currency on bank profitability in Central and Eastern Europe (CEE). We construct a panel of 1033 bank-year observations across 11 countries between 2006 and 2020. Our results suggest that the effect of joining the euro area on bank profitability is not statistically significant over a longer period, but that the euro exerts downward pressure on banks' profits in a stable economic climate. Additionally, we contribute to the existing literature on determinants of bank profitability in the CEE region and confirm that capitalisation and bank size have a positive influence, while liquidity and the loans-to-assets ratio have a negative influence on profitability.

Keywords: Euro Adoption, Central and Eastern Europe, Bank Profitability.

JEL: F36, G21

Streszczenie

Badanie przedstawia nowe dowody empiryczne na temat wpływu przyjęcia euro na rentowność banków w regionie Europy Środkowo-Wschodniej (EŚW). Budujemy panel obejmujący 1033 obserwacje banków w 11 krajach w latach 2006–2020 w krajach EŚW. Nasze wyniki sugerują, że wpływ strefy euro na rentowność banków nie jest statystycznie istotny w dłuższym okresie, ale euro wywiera presję na obniżenie zysków banków, gdy warunki gospodarcze są stabilne. Dodatkowo poszerzamy istniejącą literaturę dotyczącą determinant rentowności banków w regionie EŚW i potwierdzamy, że kapitalizacja oraz wielkość banku mają pozytywny wpływ, podczas gdy płynność oraz stosunek kredytów do aktywów mają negatywny wpływ na rentowność.

Słowa kluczowe: euro, Europa Środkowo-Wschodnia, rentowność banków.

JEL: F36, G21



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1. Introduction

The effects of joining the Economic and Monetary Union on Central and Eastern Europe (CEE) economies are broadly debated in the region. The advantages and disadvantages of adopting a common currency are discussed in academic, policy, and public discussions, especially in countries yet to join the eurozone. Since the first eastern European Union (EU) enlargement, 11 states of the former Eastern Bloc have joined the EU, each with an obligation to adopt the euro as a common currency, albeit within an unspecified timeframe.¹ There is rich academic literature (reviewed later) estimating the economic effects of joining a monetary union; however, less is known about the effects of monetary integration on the performance of the banking sector. This work aims to answer whether a common currency affects the banking sector's profitability in the CEE region.

Understanding how adopting the euro affects bank profitability is important for several reasons. Banks are central to financial intermediation and economic development, especially in the CEE region, where capital markets remain relatively underdeveloped. On the one hand, profitability is a key indicator of banks' ability to withstand economic shocks, maintain credit supply, and support investment and growth. On the other hand, profitability may reflect not just economic performance but also underlying structural issues. For example, in a tightly regulated and concentrated market like banking, high profitability may indicate a lack of competitive pressure or monopolistic practices, while low profitability may point to enhanced competition or margin compression due to increased transparency and supervision. In the context of joining the euro area, it may serve as an indication of how integration into the eurozone's institutional and regulatory framework reshapes the financial sector.

To fill the research gap, we construct an unbalanced panel of 92 banks from 11 economies between 2006 and 2020, using the data from the S&P Global market intelligence company and the World Bank Open Data. We use Return on Average Assets and Return on Average Equity as bank performance indicators and examine the influence of EMU and ERM II membership on those ratios. We use several lagged bank-specific controls, including bank size, capitalisation, liquidity, and loan-to-total-assets ratio. We also adjust for GDP growth, inflation and interest rate fluctuations and estimate several regression specifications. We conduct an alternative analysis between 2013 and 2019 to exclude the financial crisis, the European debt crisis, and the COVID-19 pandemic.

Our results suggest that the effect of adopting the euro on bank profitability is ambiguous over a longer period in a turbulent economic climate, and negative during a period of stable economic conditions. The first part of our results, using a sample from 2006 to 2020, yields ambiguous results across specifications, including bank-specific and macroeconomic controls and time, country and bank fixed effects (FE). The second part of the analysis covers the period from 2013 to 2019.

¹ Poland, Hungary, Czech Republic, Slovakia, Estonia, Latvia, Lithuania, Slovenia, Bulgaria, Romania, and Croatia.

The results suggest a negative impact of adopting the euro on bank profitability in this sample period. We argue that increased bank supervision in the eurozone results in greater transparency, increased competition, and lower profit margins. Increased supervision can also make the financial sector more stable and decrease losses during economic crises.

The euro was introduced in 1999, following a multi-stage convergence process designed to align member states' monetary and fiscal frameworks. Adopting the euro requires compliance with the Maastricht criteria, covering inflation, government debt and deficit, exchange rate stability, and interest rates. These requirements, and the broader institutional shift toward ECB-led supervision, have significant implications for banking systems, particularly in CEE countries that underwent simultaneous post-socialist transition and EU integration.

For CEE countries, joining the euro area represents not only a shift in monetary policy but also a structural transformation of their banking systems. Integration into the eurozone entails joining the single supervisory mechanism (SSM), which imposes more stringent capital and reporting standards, enhances supervisory coordination, and reduces national discretion in financial oversight. These changes can lead to improved transparency and risk management, but also lower interest margins and increased competitive pressure. Understanding these implications is critical, as CEE banking sectors are relatively concentrated and play a central role in financial intermediation.

While our empirical strategy focuses on estimating the overall effect of adopting the euro on bank profitability, it is useful to consider the main theoretical and institutional channels through which such effects may operate. Table 1 in the literature review section summarises these mechanisms as identified in the existing literature. These include changes in regulatory and supervisory frameworks, reduced currency risk, and broader macroeconomic impacts such as lower inflation or altered volatility. The expected direction of the effects is mixed, with some mechanisms potentially improving profitability (e.g., lower cost of capital, enhanced efficiency), and others potentially reducing it (e.g., increased competition). Although our data do not allow us to disentangle these effects individually, understanding them provides context for interpreting the overall results.

2. Literature review

Our study is related to the two strands of literature. The first studies the determinants of bank profitability in the European Union member states. Djalilov and Piesse (2016) use generalised methods of moments in a sample of 16 former communist states in the 2000–2013 period. They find that the banking sector in the early transition states (CEE countries, currently part of the EU) is more competitive and that higher capitalisation in this region leads to higher profitability. Also, they find that credit risk positively affects profitability in early transition economies and negatively in late transition economies (e.g., Ukraine, Moldova, Armenia). Authors indicate that this is due to better capital allocation, which could be improved by

increased transparency and improved screening and monitoring of banks. Pasiouras and Kosmidou (2007) use a sample of 584 commercial banks from 15 EU states from 1995–2001. They split the sample into domestic and foreign ownership and provide analysis for each subgroup. On the market level, they show that the ratio of stock market capitalisation to total assets and the ratio of stock market capitalisation to GDP have positive effects, showing that the overall development of the banking industry increases profits of individual banks. Agoraki et al. (2021) show that equity ratio, loan ratio, default risk, liquidity risk, size, and GDP growth positively affect a bank's performance, while inflation has a negative effect. They also find positive effects of the Basel II accords on bank profitability. This strand of literature examines determinants of bank profitability in euro and non-euro area countries but does not explicitly study the effects of the euro currency itself.

The second strand studies the effects of adopting the euro on the macroeconomy and financial markets. The literature identifies two salient mechanisms through which the common currency can affect banks' profits due to the macroeconomic and financial market effects. Firstly, adopting the euro influences the institutional design of the financial market with additional regulation, supervision and possibly superior institutional quality imposed by the EMU. Askari and Chatterjee (2005) are among the first to show empirically that the financial market of the euro area countries became more unified with a lowered cost of capital. De Freitas, Nunes and Rodrigues (2017) show that during the recent financial crisis, adjusting for a number of factors, euro area membership reduced the probability of a member state experiencing a sudden economic stop, constituting a strength rather than a weakness. Psillaki and Mamatzakis (2017) study the impacts of financial regulation on the cost-efficiency of the banking sector in ten Eastern EU countries between 2004 and 2009 and find that regulation measured by the European Bank for Reconstruction and Development transitional reform indicator increases banks' cost-efficiency. Also, Chortareas, Girardone and Ventouri (2012) provide evidence of the positive effects of the capital requirement and supervisory power on net interest margin and cost-to-income ratio in 22 European states between 2000 and 2008. Based on a sample of 336 banks in the eurozone, Fiordelisi, Ricci and Lopes (2017) show that institutions directly supervised by the ECB through the SSM showed a decrease in lending and increase in capitalisation in comparison to nationally supervised institutions.

Secondly, adopting the euro eliminates currency fluctuations against other eurozone members. A study by He, Fayman and Casey (2014) covering 22 large US banks between 1978 and 2008 provides evidence that domestic currency appreciation positively impacts banks' earnings. However, Denderski and Paczos (2021) look into the effects of local currency fluctuations against the euro and Swiss franc on the supply of net loans in the ten CEE states between 1998 and 2021 and conclude that the currency fluctuations in the region do not affect the volume of extended loans.

Finally, we review the studies that directly study the effects of the euro adoption on the macroeconomy. Dreyer and Schmid (2017) show that EU membership has clear positive effects on GDP growth, but the eurozone membership has no visible effect except at crisis times when the effect is negative. Heller and Warzala (2019) compare Eastern European states which joined the euro area with Poland (which

remains outside of the eurozone) and establish that the benefits of the eurozone only include lower fluctuations in GDP and inflation, but that membership does not protect against adverse economic shocks or provide a remedy to economic difficulties. In contrast, Saia (2017) finds that aggregate trade flows between the UK and eurozone members would have been 16% higher and with third countries 15% higher had the UK joined the EMU.

Table 1.

Summary of potential channels for adopting the euro on banks

Mechanism	Channel	Potential effect on bank profitability
Regulation, supervision, institutions	Lower cost of capital	+
	Increased macro stability	+/-
	Higher capitalisation/efficiency	+
	Increased competition	-
Decreased currency fluctuations	Decreased balance sheet risk	+/-0
Effect on the macro indicators	Lower inflation	+
	Higher/lower GDP volatility	-/+

Source: own elaboration based on the literature.

The review of the literature suggests three channels of the effect of adopting the euro on bank profitability. Additional regulation has been shown to improve banks' efficiency and overall performance. Decreased currency fluctuations have an ambiguous effect on bank profitability in the examined literature. Adopting the euro could affect the overall macroeconomic factors, which in turn would affect banks. The literature suggests, however, that the eurozone has an ambiguous effect on the economy; hence, we do not expect this channel to influence the profitability of financial institutions. Considering the three channels, it is uncertain whether the effect is positive or ambiguous, especially since it is not clear which aspects of the eurozone carries the greater weight. Table 1 summarises our hypothesised channels and directions of influence of adopting the euro on bank profitability.

Although there is an abundance of literature that studies the effects of adopting the euro on the macroeconomy and literature that studies determinants of bank profitability in the EU member states, there is a noticeable shortage of empirical studies on the direct link between adopting the euro and bank profitability. This paper is an attempt to fill this gap.

3. Data

We collect the data of 92 financial institutions in 11 Eastern EU countries that joined the EU in 2004 or later. The sample consists of a panel from 2006 to 2020, chosen due to data availability, comprising 1033 bank-year observations.²

Table 2 summarises euro adoption and ERM II participation years for the 11 CEE countries in our sample. Adoption was clearly staggered, with five countries joining the eurozone between 2007 and 2015, while others remain outside or only recently joined ERM II. This staggered entry provides useful temporal variation for identification. Our panel specification leverages this variation by using year-country-level dummies for euro and ERM II participation. While staggered adoption introduces potential heterogeneity in treatment timing, we mitigate bias by including year and country FE, as well as conducting separate estimations for pre- and post-crisis periods. We also treat ERM II as a distinct treatment phase to capture anticipatory adjustments.

Table 2.
Adoption of the euro and ERM II participation in CEE countries

Country	Euro Adoption Year	ERM II Entry Year
Slovenia	2007	2004
Slovakia	2009	2005
Estonia	2011	2004
Latvia	2014	2005
Lithuania	2015	2004
Croatia	2023 (out of sample)	2020
Bulgaria	Not adopted	2020
Czech Republic	Not adopted	Not in ERM II
Hungary	Not adopted	Not in ERM II
Poland	Not adopted	Not in ERM II
Romania	Not adopted	Not in ERM II

Source: European Commission. *The Euro*. Retrieved June 2025, from https://economy-finance.ec.europa.eu/euro_en

The primary source of bank-specific data is S&P Global, a market intelligence company that provides templated financial data on multiple institutions, including commercial banks in the CEE region. The data preparation included determining the top banks by total assets in each country using information from the Corporate Financial Institute (2022) and TheBanks.eu (2022) websites, sourcing the templated data on its financial performance and combining the relevant information into

² Including banks from older eurozone countries could improve precision of control estimates but would introduce structural heterogeneity. We decided to focus on CEE countries for internal consistency across transition economies. This allows us to better isolate the euro’s effect in this specific regional context.

a single dataset. Data collection was limited by the availability of the S&P Global database. Nevertheless, the majority of the most significant banks in each of the 11 states were included in the sample, capturing a large proportion of the banking sector in the CEE region.

The dataset is amended by information on eurozone membership, ERM II mechanism participation, inflation and GDP growth rates. The latter two were accessed on World Bank Open Data. The dummy variables for eurozone membership and the ERM II mechanism take the value of 1 if the state participated for at least one calendar quarter in the given year.

Table 3.

Descriptive statistics – whole sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Euro	1033	0.32	0.47	0	1
ERM	1033	0.05	0.22	0	1
ROAA	1033	0.75	1.53	-13.25	5.87
ROAE	1033	6.03	18.21	-227.19	54.43
Total Assets	1033	1.06e+07	1.25e+07	1.71e+05	8.18e+07
Capitalisation	1033	10.86	3.66	1.54	30.36
Liquidity	1033	31.38	13.85	0.611	87.30
Loan ratio	1033	59.77	15.06	10.006	96.32
Inflation	165	2.15	2.17	-1.545	15.40
GDP growth	165	2.04	3.35	-14.839	11.97
Interest rate	165	1.98	2.64	-0.43	13.08

Notes: summary statistics for the whole sample, including number of observations, mean, standard deviation, minimum and maximum.

Sources: bank-specific variables: S&P Global, inflation and GDP: World Bank, eurozone and ERM II membership: European Commission, interest rate: OECD.

The overall summary statistics for the whole sample are presented in table 3. 32% of observations come from banks operating in the eurozone and 5.1% from banks in ERM II. The mean of the ROAA in the sample is 0.749% with a standard deviation of 1.53 p.p., and the mean of the ROAE is 6.04% with a standard deviation of 18.16 p.p.

In tables 9 and 10 we report summary statistics separately for euro and non-euro subsamples. The average ROAA for the euro sample is 0.593 versus 0.822 for the non-euro sample. Also, ROAE is greater for non-euro observations, with an average of 7.257 versus 3.440. There is no significant difference in terms of mean capitalisation and liquidity ratios. Banks in the non-euro group are visibly larger on average. This is because the euro was adopted more commonly in smaller countries, where market size naturally limits the expansion of financial institutions. Average GDP growth for both samples is almost identical; however, mean inflation in the eurozone sample stands at 1.509 versus 2.455 in the non-euro sample. Similarly,

the mean interest rate in the non-euro sample is significantly higher at 2.865 versus only 0.89 for the euro sample. Appendix A lists all the banks included in the data sample.

Table 4 presents the correlation matrix of the variables of interest. Both ROAA and ROAE have a statistically significant negative correlation to the euro, and positive significant correlations with the size, capitalisation, inflation and GDP growth. Neither profitability variable appears to be correlated with the interest rate.

Table 4.
Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ROAA	1.00										
(2) ROAE	0.92***	1.00									
(3) Euro	-0.07**	-0.10***	1.00								
(4) ERM	-0.05	-0.04	-0.16***	1.00							
(5) Total assets	0.16***	0.17***	-0.30***	-0.08***	1.00						
(6) Capitalisation	0.33***	0.16***	0.00	-0.02	-0.09***	1.00					
(7) Liquidity	0.01	0.04	-0.12***	0.04	-0.09***	-0.07**	1.00				
(8) Loan ratio	0.03	-0.01	-0.01	-0.01	0.04	0.20***	-0.84***	1.00			
(9) Inflation	0.11***	0.10***	-0.20***	0.04	0.10***	-0.10***	-0.12***	0.13***	1.00		
(10) GDP growth	0.19***	0.18***	0.00	-0.14***	-0.04	-0.03	0.08***	-0.06*	0.06**	1.00	
(11) Interest rate	0.02	0.03	-0.49***	-0.04	0.13***	-0.09***	-0.09***	0.18***	0.63***	-0.07**	1.00

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: correlation matrix of all non-transformed variables.

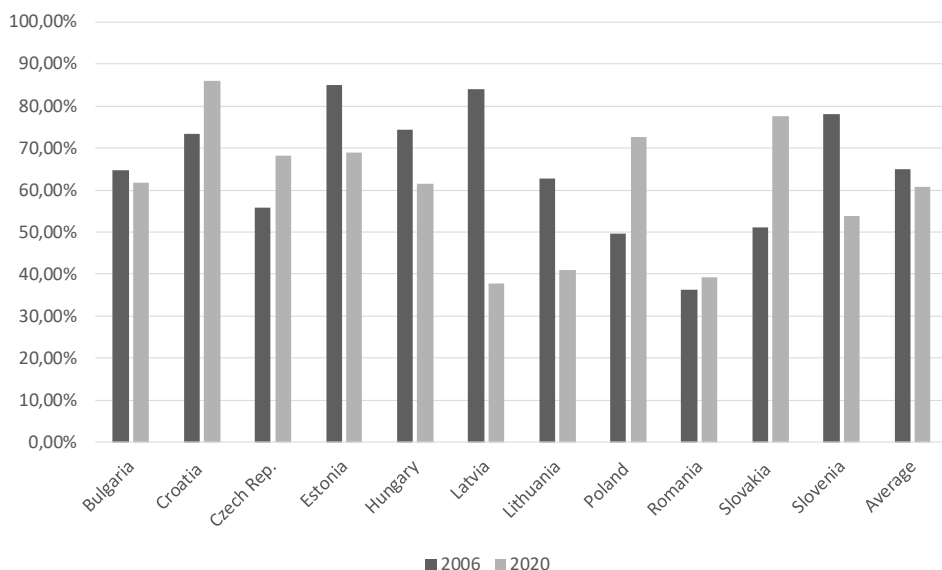
Sources: bank-specific variables: S&P Global, inflation and GDP: World Bank, eurozone and ERM II memberships: European Commission, interest rate: OECD.

We can observe a statistically significant negative correlation between the euro and total assets, liquidity, inflation and interest rate. The first is likely the result of the size of CEE states that joined the eurozone. The negative correlation with inflation suggests that countries that joined the EMU have lower inflation levels. Lower inflation levels can explain significantly lower interest rates in the eurozone.

Figure 1 shows how the size of changes in the banking sector relative to the GDP. In 2020, the total assets of banks in eastern EU states ranged from 38% of GDP in Latvia to 88% of GDP in Croatia. The average for the 11 states in the sample increased from 59% in 2006 to 61% in 2020.

Figure 1.

Bank assets-to-GDP ratio in CEE countries



Source: TheGlobalEconomy.

4. Methodology and results

4.1. Methodology

To answer the research question, we estimate different versions of the following regression model:

$$prof_{itj} = \beta * eurozone_{itj} + \gamma * bankspecific_{t-1itj} + \delta * macro_{itj} + \eta_{itj} + e_{itj} \quad (1)$$

where $prof_{itj}$ is the profitability of bank i in country j in year t . We use ROAA and ROAE as substitutes for bank profitability. Using average ratios instead of the classic ROA and ROE prevents misrepresentation of profitability by institutions by manipulating the value of total assets and equity at the end of the year. ROAA is defined as a ratio of net income to average total assets. Average total assets are calculated by a simple average of the total assets at the year's beginning and end. ROAE is defined as a ratio of net income to average total equity. ROAE represents the company's profitability with respect to the total capital invested by shareholders. Overall, ROAE tends to be more variable due to different levels of capitalisation of banks.

Our key independent variable, $eurozone_{itj}$ is a vector of two dummy variables: $euro_{itj}$ takes the value of 1 if the country of observation was in the eurozone for at

least one calendar quarter in a given year and zero otherwise. One challenge in estimating the effect of adopting the euro is that banks may begin adjusting their operations before formal accession. To address this, our specification includes a separate dummy variable for ERM II: erm_{ij} takes the value of 1 if the country of observation was participating in the ERM II mechanism for at least one calendar quarter and 0 otherwise. With the dummies, we aim to capture the average effect of joining monetary union on bank profitability, resulting from lower or no currency fluctuations and additional regulatory requirements.

In this way, the ERM II dummy allows us to identify the early-stage or anticipatory effects of the euro accession process, while the euro dummy captures the marginal effect of full eurozone membership, conditional on prior ERM II participation and other controls.

We include two sets of control variables: bank-specific and macro-level variables. The $bankspecific_{ij}$ vector includes a logarithm of the total value of the bank's assets in thousands USD (Total Assets), a ratio of the equity to the total assets (Capitalisation), a ratio of liquid assets to the total assets (Liquidity), and a ratio of net loans given to customers to total assets (Loan Ratio). We follow a widely used set of bank-level controls in the relevant literature. Returns in a given year might affect the size of assets, equity, and liquid assets contemporaneously. To address this, we use lagged independent variables. Bank controls can affect the following year's profits, but profits cannot affect the previous year's bank controls. vector includes the annual inflation measured by the CPI index (Inflation) and the annual GDP growth in a given country (GDP growth). Both variables adjust for economic fluctuations in given economies and are expected to affect bank profitability positively, as shown in the literature (e.g. Albertazzi and Gambacorta, 2009). Finally, a yearly average of three-month money market rates is used as a proxy for the bank rates (Interest Rate). It is used to adjust for central banks' monetary policy, which significantly influences financial institutions.

η_{ij} is a fixed effects constant term. We estimate versions of the model with different sets of fixed effects. In the country FE, $\eta_{ij} = \eta_j$ accounts for unobserved, country-specific characteristics. This isolates the variation resulting from differences between the financial sectors to better isolate the variation induced by joining ERM II and the eurozone. In the time FE model, accounts for the changes in the global economic environment. In the bank FE model, accounts for bank-specific dummies to adjust for unobserved banks' characteristics.

Our specification is designed to estimate the average effects of adopting the euro and ERM II participation on bank profitability, adjusting for a set of bank-specific and macroeconomic variables. The ERM II dummy captures the anticipatory phase of adopting the euro, during which banks may begin adjusting in response to exchange rate stabilisation and policy convergence. The euro dummy, in turn, captures the marginal effect of full eurozone accession, reflecting institutional changes such as the shift to ECB monetary policy and integration into the SSM. However, the specification does not capture informal expectations connected with adopting the euro that may influence bank behaviour prior to joining ERM II. Additionally, it assumes that effects occur linearly and contemporaneously within

each calendar year, without modelling dynamic or lagged adjustments explicitly. As such, our estimates should be interpreted as reduced-form average treatment effects during and after formal entry stages, rather than a complete account of the entire transition process.

4.2. Benchmark results

Table 5 contains the results of six specifications with ROAA as a dependent variable.

Table 5.

Benchmark results – ROAA

	(1)	(2)	(3)	(4)	(5)	(6)
Euro	0.593*** (0.096)	0.070 (0.455)	0.636 (0.544)	-0.212** (0.107)	0.309 (0.439)	0.345 (0.430)
ERM	0.438** (0.223)	0.063 (0.185)	0.225 (0.342)	-0.269 (0.215)	0.041 (0.190)	0.005 (0.215)
Total Assets				0.072*** (0.024)	0.128*** (0.035)	0.083* (0.044)
Capitalisation				0.121*** (0.015)	0.121*** (0.015)	0.059** (0.024)
Liquidity				-0.015*** (0.004)	-0.011** (0.005)	-0.002 (0.007)
Loan ratio				-2.372*** (0.420)	-1.646*** (0.505)	-1.202* (0.679)
GDP growth				0.075*** (0.013)	0.059* (0.032)	0.069** (0.031)
Inflation				0.108*** (0.025)	0.029 (0.034)	0.014 (0.031)
Interest rate				-0.039* (0.023)	-0.052 (0.042)	-0.053 (0.042)
Observations	1033	1033	1033	1032	1032	1032
R-Squared	0.042	0.295	0.531	0.315	0.413	0.561
F-Statistic	21.07	39.86	46.29	76.94	52.82	42.94
Time FE	No	Yes	Yes	No	Yes	Yes
Country FE	No	Yes	No	No	Yes	No
Bank FE	No	No	Yes	No	No	Yes

Notes: benchmark model for ROAA. Column 1 shows OLS regression without controls, column 2 additionally shows time and country FE, whereas column 3 shows time and bank FE. Column 4 shows OLS regression with bank and macro controls. Column 5 additionally shows time and country FE, whereas column 6 shows time and bank FE.

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own calculations.

The euro's effect in four out of six specifications is not statistically significant. It is only statistically significant (and positive) in the simple OLS regression (column 1) and (negative) in the OLS regression with banks and macro controls (column 4). In other specifications, the coefficient of the euro dummy remains positive, albeit insignificant. A comparison of specifications (4) and (5) suggests that systematic factors, country-specific characteristics and changes in the global environment are more likely to explain the lower average profitability of eurozone banks than euro membership itself.

Including bank FE does not change the euro coefficient and the standard error, suggesting that the time effects play a crucial role in the model dynamics. Eastern EU states have similar economies on comparable development levels and have strong economic ties to each other and the rest of the EU. Hence, they experience very similar economic shocks in origin and magnitude. Kolasa (2013) proves that although CEE and eurozone fluctuations differ, significant convergence is observed after EU accession. Benczúr and Rátfai (2010) show that most of the CEE states, excluding Romania and Bulgaria, experience similar economic fluctuations. Hence, year-specific changes in the economic environment could explain the variation in bank profitability and the reason why the convergence of Eastern EU states with Western EU economies has a more profound effect than the adoption of the common currency. Benchmark results for the ERM variable represent a similar relationship.

Further, we investigate relationships between bank and macro controls and the dependent variable. We find a uniformly positive and statistically significant relationship between the size and ROAA in each specification, ranging from 0.072-0.128 p.p. This differs from Djalilov and Piesse (2016), who do not find a relationship in early transitioning countries, and Pasiouras and Kosmidou (2007), who find a negative relationship in 15 EU countries. We also find a positive effect of capitalisation ranging between 0.059 to 0.121 p.p. on average. This is a standard result in the literature (e.g. Agoraki et al., 2021; Djalilov and Piesse, 2016). We find that liquidity and loan ratio negatively affect ROAA and liquidity by -0.002 to -0.015 and loan ratio by -1.202 to -2.372 p.p. on average.

GDP has a strong positive and statistically significant effect on profitability in line with expectations: a 1 p.p. increase in the GDP growth increases ROAA on average by 0.059-0.075 p.p. The inflation coefficient is only significant in a specification without Time FE. A possible explanation is that inflation is strongly affected by global conditions included in the year dummies. Nevertheless, the coefficient remains positive in all three specifications. The results relating to the effects of inflation on bank profitability are generally mixed in the literature. The interest rate coefficient remains negative, albeit significant, only in one specification (4). Raised interest rates are a response to inflation increasing over the central bank's target; hence, a reversed, negative relationship is expected.

Table 6 contains corresponding regressions with ROAE as a dependent variable.

Table 6.
Benchmark results – ROAE

	(1)	(2)	(3)	(4)	(5)	(6)
Euro	3.440*** (1.183)	0.606 (6.491)	6.968 (6.155)	-3.635*** (1.333)	2.095 (6.461)	2.380 (6.767)
ERM	2.691 (3.065)	0.522 (1.792)	2.173 (3.820)	-3.367 (3.103)	-0.417 (2.007)	-1.235 (2.431)
Total assets				0.909*** (0.294)	1.505*** (0.475)	1.277** (0.552)
Capitalisation				0.699*** (0.181)	0.722*** (0.194)	0.483 (0.371)
Liquidity				-0.096* (0.054)	-0.063 (0.073)	-0.014 (0.115)
Loan ratio				-23.446*** (4.836)	-15.966** (6.361)	-15.889 (9.672)
GDP growth				0.784*** (0.170)	0.647 (0.403)	0.690* (0.391)
Inflation				1.040*** (0.280)	0.163 (0.424)	0.046 (0.396)
Interest rate				-0.467 (0.289)	-0.324 (0.546)	-0.481 (0.550)
Observations	1033	1033	1033	1032	1032	1032
R-Squared	0.011	0.225	0.411	0.179	0.292	0.434
F-Statistic	4.61	37.18	34.93	60.56	40.38	31.66
Time FE	No	Yes	Yes	No	Yes	Yes
Country FE	No	Yes	No	No	Yes	No
Bank FE	No	No	Yes	No	No	Yes

Notes: benchmark model for ROAE. Column 1 shows OLS regression without controls, column 2 additionally shows Time and Country FE, whereas column 3 shows Time and Bank FE. Column 4 contains OLS regression with bank and macro controls. Column 5 additionally shows Time and Country FE, whereas column 6 shows Time and Bank FE.

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Source: own calculations.

The ROAE results are consistent with those for the ROAA in terms of both the sign of the coefficients and their statistical significance. Further, controls are less statistically significant, most probably due to higher ROAE variability, but show the same relationship with the dependent variable.

4.3. Robustness results

The sample period includes years of significant economic shocks, the 2007-2009 financial crisis, the following European debt crisis of 2010-2012, and the 2020 Co-

vid pandemic. In tables 7 and 8 we present the results for additional specifications for tranquil times of 2013–2019, when economic conditions were primarily stable. Table 7 shows the results.

Table 7.

Robustness results – ROAA in tranquil times

	(1)	(2)	(3)	(4)	(5)	(6)
Euro	0.695*** (0.120)	-0.961** (0.424)	0.425 (0.386)	-0.476*** (0.143)	-1.154*** (0.318)	2.959 (2.959)
ERM	0.527 (0.459)	-0.242 (0.583)	0.824 (0.553)	-0.435 (0.467)	-1.157* (0.655)	2.803 (2.961)
Total assets				0.064* (0.038)	0.080 (0.056)	-0.063 (0.165)
Capitalisation				0.129*** (0.022)	0.129*** (0.022)	0.111 (0.069)
Liquidity				-0.014*** (0.005)	-0.010 (0.007)	-0.002 (0.014)
Loan ratio				-2.314*** (0.579)	-2.275*** (0.705)	-5.014*** (1.585)
GDP growth				0.167** (0.068)	0.088 (0.082)	0.076 (0.072)
Inflation				0.045 (0.044)	-0.116 (0.079)	-0.123 (0.076)
Interest rate				-0.301*** (0.082)	-0.280** (0.129)	-0.194 (0.126)
Observations	600	600	600	600	600	600
R-Squared	0.060	0.295	0.533	0.302	0.378	0.576
F-Statistic	17.56	36.91	41.51	60.64	57.13	50.10
Time FE	No	Yes	Yes	No	Yes	Yes
Country FE	No	Yes	No	No	Yes	No
Bank FE	No	No	Yes	No	No	Yes

Notes: robustness results for ROAA, years 2013–2019. Column 1 shows OLS regression without controls, column 2 additionally shows Time and Country FE, whereas column 3 shows Time and Bank FE. Column 4 contains OLS regression with bank and macro controls. Column 5 additionally shows Time and Country FE, whereas column 6 shows Time and Bank FE.

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own calculations.

The results suggest that adopting the common currency exerts negative pressure on banks' profit margins: the euro coefficient is negative and statistically significant in three specifications, most importantly in the two that adjust for bank-specific and macroeconomics conditions with and without country- and time FE (columns 4 and 5). Further, inflation does not influence profitability; the effect of GDP growth is positive but more limited than in the full sample, and we can observe a strong, negative impact of interest rates. Capitalisation and loan ratio still play significant roles in explaining performance variation in the sample. However, the size of the bank

plays a less important role, weakening in significance and magnitude compared to the whole period. We observe similar changes in the ROAE specification in table 8.

Table 8:

Robustness results – ROAE in tranquil times

	(1)	(2)	(3)	(4)	(5)	(6)
Euro	4.198*** (1.499)	-13.367** (6.061)	-0.974 (4.717)	-6.593*** (1.665)	-13.120*** (3.899)	-17.833 (40.878)
ERM	3.824 (4.600)	-5.560 (6.934)	5.380 (6.250)	-4.848 (4.772)	-11.461 (7.515)	-16.509 (41.273)
Total assets				0.659 (0.507)	0.681 (0.782)	1.684 (2.260)
Capitalisation				0.683** (0.273)	0.720*** (0.273)	1.539 (1.049)
Liquidity				-0.051 (0.068)	0.006 (0.083)	0.137 (0.179)
Loan ratio				-19.820*** (6.575)	-21.315** (8.446)	-58.407*** (20.729)
GDP growth				1.906** (0.952)	1.178 (1.063)	1.043 (0.921)
Inflation				0.353 (0.517)	-1.192 (0.880)	-1.224 (0.871)
Interest rate				-3.256*** (0.977)	-1.924 (1.636)	-0.852 (1.590)
Observations	600	600	600	600	600	600
R-Squared	0.018	0.226	0.417	0.175	0.262	0.473
F-Static	4.26	33.51	29.68	45.86	33.31	24.76
Time FE	No	Yes	Yes	No	Yes	Yes
Country FE	No	Yes	No	No	Yes	No
Bank FE	No	No	Yes	No	No	Yes

Notes: robustness model for ROAE, years 2013–2019. Column 1 shows OLS regression without controls, column 2 additionally shows Time and Country FE, whereas column 3 shows Time and Bank FE. Column 4 contains OLS regression with bank and macro controls. Column 5 additionally shows Time and Country FE, whereas column 6 shows Time and Bank FE.

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own calculations.

4.4. Discussion

Specifications presented in the benchmark results section, estimated for the longer period, including the financial crisis and the COVID-19 pandemic, suggest that adopting the euro did not affect bank profitability. Initial exploratory regression without controls suggests that joining the eurozone had a positive effect. However, this appears misleading when considering bank-specific characteristics, the

macroeconomic situation, and fixed effect, which control for unobserved factors over time, and across countries and institutions. All euro and ERM coefficients from the full specifications in columns (5) and (6) in tables 5 and 6 are statistically insignificant. The consistent estimates of bank and macro controls across specifications confirm the robustness of our approach.

Specifications presented in the robustness results section are estimated on the shorter, tranquil period. Table 7 indicates the negative effect of adoption of the euro on bank profitability in both specifications without fixed effects and with time and country FE (columns 4 and 5). The significance is not present in regression with bank and time FE; restricted sample size and a significant number of variables cause the variability resulting from the euro to be much harder to isolate. Again, the coefficients of control variables appear to be consistent across specifications. Table 8, containing the ROAE specification, presents similar results and reinforces this message.

The results from both periods suggest that joining the eurozone does not positively affect bank profitability in the CEE region, partially contradicting the hypothesis based on the literature review. Our results suggest that the effect could be negative during stable economic times and absent over a longer period. We hypothesise that this is an effect of increased competition from improved transparency and supervision, resulting in lower profit margins. This is different from the examined literature (Psillaki and Mamatzakis, 2017; Chortareas et al., 2012; Fiordelisi et al., 2017). However, the mentioned studies cover different periods and countries. The absence of the effect of the eurozone results in the benchmark specifications (including turbulent economic times), which may indicate that eurozone banks perform better during crises. This also could result from an improved supervisory system, which makes the financial system more stable.

A decline in profitability associated with adoption of the euro, particularly under stable economic conditions, may suggest heightened competitive pressure, reduced pricing power, or narrowing interest margins due to tighter supervision and transparency. However, it could also reveal broader structural changes in market power. Given that the banking sector in many CEE countries is already concentrated, declining profitability might signal a move away from oligopolistic structures towards more competitive markets.

5. Conclusions

This research contributes to the existing literature on the benefits of adopting the euro by examining its effect on banks' performance in 11 CEE states. We gathered a sample of 92 banks from 2006 to 2020 with 1033 bank-year observations. We estimated the benchmark model with country FE, including dummy variables for eurozone and ERM II membership and several control variables. Further, we analysed the period excluding the financial crisis and the Covid pandemic.

Our results suggest that adopting the euro and joining ERM II have no effect on bank profitability in the CEE region over a long period but are negative during

stable economic conditions. Regressions on the full sample from 2006 to 2020, including bank-specific and macroeconomic controls and country- and time FE, do not yield statistically significant results. Regressions on a sample from 2013 to 2019, a period of stable economic conditions, yield a negative effect of adoption of the euro on bank profitability. This may be due to the impact of increased banking supervision in the eurozone, which increases transparency, boosts competition, lowers the profit margin, and assures greater stability of the financial sector during crises. Importantly, there is no indication that adopting the euro and joining the ERM II mechanism have strictly positive effects on bank profitability.

An important limitation of this study is that GDP growth and inflation are treated as independent variables. However, the findings in the abundance of literature are that adopting the euro has a taming effect on inflation and could positively affect GDP growth. Thus, some of the impact of adopting the euro on banks' profits could also be ascribed to the macroeconomic channels. We leave this avenue for future research.

This paper additionally contributes to the discussion on determinants of bank profitability in the CEE region. We find that capitalisation and bank size have a positive effect, while liquidity negatively affects bank profitability.

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Appendix

A. List of banks included in the sample by country:

Bulgaria

Allianz Bank Bulgaria
Central Cooperative Bank
DSK Bank EAD
Eurobank Bulgaria
Expressbank
First Investment Bank
Piraeus Bank Bulgaria
Raiffeisenbank (Bulgaria) EAD
UniCredit Bulbank AD
United Bulgarian Bank

Croatia

Addiko Bank Croatia d.d.
Agram banka d.d.
Hrvatska postanska banka d.d.
Nova hrvatska banka d.d.
Podravska banka d.d.
Privredna banka Zagreb
Raiffeisenbank Austria d.d.
Splitska banka d.d.
Zagrebacka banka d.d.

Czech Republic

Ceska sporitelna
Ceskoslovenská obchodní banka
Fio banka
Komerční banka
MONETA Money Bank
PPF banka
Raiffeisenbank CZ
Sberbank CZ
UniCredit Bank Czech Republic and Slovakia

Estonia

AS LHV Pank
AS SEB Pank
AS TBB pank
Bigbank AS
Coop Pank AS

Luminor Bank AS Estonia

SwedBank Estonia

Hungary

Budapest Hitel- és Fejlesztési Bank Zrt.
CIB Bank Zrt.
Erste Bank Hungary Zrt.
MKB BANK Nyrt.
OTP Bank Nyrt.
Raiffeisen Bank Zrt.
UniCredit Bank Hungary Zrt.

Latvia

AS Citadele banka Latvia
AS Industra Bank
AS LPB Bank
AS PNB Banka
AS Rietumu Banka
AS SEB banka Latvia
BluOr Bank AS
JSC "Baltic International Bank"
Regionāla Investīciju Banka AS

Lithuania

AB SEB bankas
AB Siauliu Bankas
Citadele Bankas AB
Luminor Bank AB
Swedbank Lithuania
UAB Medicinos Bankas

Poland

Alior Bank
Bank Handlowy
Bank Millennium
BNP Paribas Polska
Getin Noble Bank
ING Bank Śląski
mBank
Santander Bank Polska

Romania

Alpha Bank Romania S.A.
Banca Comerciala Romana S.A.
Banca Romaneasca S.A.
Banca Transilvania S.A.
BRD – Groupe Société Générale S.A.
CEC Bank S.A.
OTP Bank Romania S.A.
Raiffeisen Bank Romania S.A.
UniCredit Bank Romania S.A.

Slovakia

365.bank, a. s.
OTP Banka Slovensko
Prima banka Slovensko
Privatbanka
Slovenská sporiteľňa
Tatra banka
UniCredit Bank Slovakia
Vseobecna uverova banka

Slovenia

Addiko Bank
Banka Intesa Sanpaolo
Banka Sparkasse
Deželna banka Slovenije
Gorenjska banka
Nova Kreditna Banka Maribor
Nova Ljubljanska Banka
SID - Slovenska izvozna in razvojna banka
SKB banka
UniCredit Banka Slovenij

B. Descriptive statistics

Table 9.

Observations by year

Year	Freq	Percent	Cum
2006	27	2.61	2.61
2007	30	2.90	5.52
2008	40	3.87	9.39
2009	43	4.16	13.55
2010	46	4.45	18.01
2011	82	7.94	25.94
2012	82	7.94	33.88
2013	82	7.94	41.82
2014	86	8.33	50.15
2015	88	8.52	58.66
2016	88	8.52	67.18
2017	89	8.62	75.80
2018	86	8.33	84.12
2019	81	7.84	91.97
2020	83	8.03	100.00
Total	1,033	100.00	

Notes: number of observations per year including proportion of the sample and cumulative distribution

Source: own calculations based on S&P Global data.

Table 10.

Observations by year – euro observations

Year	Freq	Percent	Cum
2006	-	-	-
2007	2	0.60	0.60
2008	2	0.60	1.21
2009	7	2.11	3.32
2010	8	2.42	5.74
2011	23	6.95	12.69
2012	23	6.95	19.64
2013	22	6.65	26.28
2014	31	9.37	35.65
2015	37	11.18	46.83
2016	37	11.18	58.01
2017	38	11.48	69.49
2018	35	10.57	80.06
2019	32	9.67	89.73
2020	34	10.27	100.00
Total	331	100.00	

Notes: number of euro observations per year including proportion of the sample and cumulative distribution

Source: own calculations based on S&P Global data.