



Master Thesis U.S.E.

“Geopolitical Risk and Bank Profitability: Evidence from European Countries (2013-2023)”¹

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Abstract

This thesis delves into how geopolitical risk (GPR) affects the profits of banks in the Eurozone, an area known for its unity and political variety. The main question looks at how threats and actions on a geopolitical level impact bank profitability focusing on metrics like return on assets, return on equity and net interest margin. By utilizing a comprehensive dataset and robust methodological framework, the study differentiates the effects of geopolitical threats (GPR_T) from geopolitical actions (GPR_A) on bank profitability. The results show that threats have a significant influence on profitability metrics than actions leading to higher ROA, ROE and positively impacting NIM. This indicates that banks adjust their strategies in response to perceived threats to minimize risks. These findings are valuable for policymakers, investors, and bank executives as they navigate the complexities of the financial environment, offering deeper insights into how geopolitical risk influences bank profitability.

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1 Introduction

The banking system, serving as a financial intermediary, is a cornerstone for the operation of every economy. The performance of the banking sector is essential for economic growth and stability (Bucevska & Hadzi Misheva, 2017; Menicucci & Paolucci, 2016). This thesis aims to explore the impact of geopolitical risk (GPR) on the profitability of banks operating within the Eurozone, an area characterized by its economic integration and sociopolitical diversity. Understanding how GPR affects bank profitability is essential for policymakers, banking professionals, regulators and analysts to effectively manage the challenges posed by geopolitical developments. This study contributes to the literature by examining both the effects of aggregate GPR and the differentiated impacts of geopolitical threats i.e. perceived GPR (GPR_T) and GPR actions i.e. realized or actual GPR (GPR_A) on bank profitability.

Over the years, numerous studies have extensively examined the profitability determinants of banks for developed and developing countries (Almaqtari et al., 2019; Love & Rachinsky, 2015; Naceur & Omran, 2011; Tan, 2016). Bank-specific variables (e.g., size, capital adequacy, liquidity, credit risk, and asset quality) and external factors (e.g., market structure, financial structure, inflation, and GDP growth) have been shown to significantly impact bank profitability (e.g., Rjoub et al., 2017; Singh & Sharma, 2016; Athanasoglou et al., 2008; Mirzaei et al., 2013). Recently, studies have highlighted the significant role of domestic political and global risk factors in explaining the profitability of banks (Ali et al., 2019; Kamarudin et al., 2016; Yahya et al., 2017). For instance, increasing GPR has been linked with stock market volatility, higher cash holdings, and negative impacts on stock liquidity, firm value, and corporate investments. In the broader economy, GPR has been found to hinder foreign direct investment (FDI) inflows (Yu et al., 2023), promote inflation and inflation spillovers (Asadollah et al., 2023; Bouri et al., 2023; Yang et al., 2023; Lee et al., 2023), and increase the sovereign risk of the home country (Demiralay et al., 2024).

Research findings indicate that GPR impacts aspects of the banking sector including stability, loan pricing and susceptibility to crises. For instance, Banna et al. (2023) conducted an analysis of bank data post the 2008 financial crisis and revealed that GPR is linked to reduced bank stability. Similarly, Trinh et al. (2023) proposed that GPR contributes to decreased bank stability. Factors like economic growth, inflation, trade openness, financial development and governance effectiveness can help mitigate these effects. Phan et al. (2022) established a connection between GPR and increased vulnerability among banks across various stability metrics. Nguyen et al. (2023) highlighted that banks

perceive risk as a significant threat to their borrowers and respond by raising interest rates on loans to offset the added risk. While there is literature, on factors influencing bank profitability limited empirical studies have examined these determinants specifically for Eurozone banks in the context of GPR. This study aims to address this gap.

The central research question of this thesis revolves around examining the impact of geopolitical risk, specifically in terms of geopolitical threats and actions, on the profitability of banks within the Eurozone. In order to explore this research question, the study is divided into several sub-questions: (1) What is the effect of GPR on bank profitability? (2) Are there variations in the impact of geopolitical threats compared to actions on ROA, ROE, and NIM? (3) What is the effect of GPR variations on these?

The findings of this study suggest that GPR has a non-linear effect in the profitability measurements. Specifically, GPR threats lead to a significant increase in ROA and ROE and have a notably positive effect on NIM. This indicates that banks may be more responsive to perceived threats, leading them to make strategic adjustments in advance to minimize potential risks. In contrast, the impact of direct geopolitical actions on profitability is less substantial, suggesting that banks may have mechanisms in place to manage or alleviate the immediate effects of such actions.

The remainder of this thesis is organized as follows; In Section 2 provides a review of the literature and theoretical framework. Section 3 outlines the data and methods used in the analysis. Moving on to Section 4 the results and related discussion are presented. Finally, in Section 5 offers a conclusion that includes implications, constraints and recommendations, for future studies.

2 Literature Review

The impact of GPR on different economic aspects has been thoroughly explored in recent academic research. Caldara and colleagues (2022) presented a used method for measuring GPR, which involved analyzing the frequency of negative geopolitical news in a selection of newspapers, including The Wall Street Journal and The New York Times starting from 1985. Many studies have employed this approach to investigate how GPR impacts both the economy and businesses.

For instance, a study conducted by Yu et al. (2023), utilized this index and delved into the effects of risk on foreign direct investment (FDI) inflows using data from 41 countries spanning the years 2003 to 2020. Their results indicated that GPR in host nations significantly impedes FDI inflows highlighting the role of investment motivations, in the context of risk.

Another recent research conducted by Bouri et al. 2023 delved into how GPR affects the transmission of inflation between American and European economies. Their findings highlighted a connection between GPR and inflation spillovers especially during key events like the Russo Ukrainian conflict. Moreover, Asadollah et al. (2023) revealed that global inflation is greatly shaped by GPR and global supply chain pressures with long term repercussions stemming from fluctuations, in oil prices.

Investigating how GPR influences stock market volatility a recent study by Zhang et al. (2023) looked at 32 countries. Found that GPR tends to increase volatility especially in emerging markets, oil exporting nations and peaceful regions. Additionally various research works have delved into the connection between GPR and specific company parameters. For example, Pan (2019) observed a link between GPR and corporate research and development (R&D) spending indicating fluctuations in research investment during high GPR periods. Similarly, Wang et al. (2023) noted an effect of GPR on firm level investments leading to significant drops in investment levels after spikes, in GPR levels even when considering economic policy uncertainty.

2.1 Bank Profitability

The role of the banking system as a financial intermediary is crucial to the functioning of every economy and performance of the banking sector is of significant importance for the economy (Moratis et al., 2021; Klein et al., 2022; Alihodžić et al., 2022; Mashamba et al., 2023; Raftis et al., 2024) Therefore, a large and growing body of literature has investigated the factors affecting bank profitability.

Several research studies have highlighted two categories of factors that influence the profitability of banks; internal factors specific to the bank itself and external factors related to the industry and country. Internal aspects such as bank size, capital structure, liquidity risk, credit risk, cost to income ratio, asset quality, liquidity management and operational efficiency play roles in determining a banks profitability (Lamothe et al. 2024; Duan et al., 2020; Huang, 2020; Doku et al., 2019; Le et al., 2020; Al Matari et

al., 2023). Factors like bank size and capital structure significantly impact profitability by enabling risk diversification, fostering economies of scale, and facilitating compliance with modifications (Bolivar et al., 2023; Screiber, 2024; Amare et al., 2020; Gržeta et al., 2023; Quoc et al., 2023; Ho et al., 2023). Research by Tran et al. (2016), suggests that banks with levels of regulatory capital experience a negative effect on profitability compared to those with lower levels. However, bank profitability is adversely affected by liquidity risk and credit risk, as they raise funding costs and diminish the quality of loans while the cost-to-income ratio and operational efficiency influence the ability of banks to generate revenue and manage expenses.

External factors that impact bank profitability include market structure, financial structure, competition, ownership, GDP growth, inflation rate, exchange rate, and interest rate (Lamothe et al., 2024; O'Connell, 2023; Hasanov et al., 2018;). Market structure and financial structure significantly impact bank profitability, as they affect the level of competition and the availability of funding sources. Foreign banks being present can lead to a rise in competition and improve bank efficiency. Macroeconomic factors such as GDP growth, inflation rate, exchange rate, and interest rate also affect bank profitability, as they influence the demand for credit and the cost of funding (Bolivar et al., 2023; Screiber, 2024; Amare et al., 2020).

Focusing European countries, Raftis et al. (2024), in their recent paper, utilize a sample of 36 European banks from 2005 to 2021 to capture the effect of monetary policy and bank profitability, finding that short-term interest rates negatively impact bank profitability, with disparities observed between developed and central, eastern, and southeastern European countries. Similarly, López-Penabad et al. (2022) examine the effects of negative interest rate policy (NIRP) on bank profitability, focusing on the European area. The study revealed that NIRP implementation reduced a representative bank's net interest margin, hurting the bank's overall profitability, concluding that a decrease in short-term interest rates did not affect the ROA. Still, it did lower the NIM when interest rates were already negative.

2.2 Banking and geopolitical risk

The adverse effects of GPR on the banking sector are well-documented. When faced with increasing GPR and political uncertainty, the banking sector tends to take on more risk (Athari et al., 2022). Since banks perceive as a significant threat to their borrowers and respond by imposing higher interest rates

on loans to compensate for the additional risk and considerable decline in bank performance (Nguyen et al., 2023; Kouzez, 2023).

Furthermore, GPR has been found to hinder the stability of banks. Thrinh et al. (2023) investigate the relationship between GPR and financial stability in commercial banking systems across worldwide. The findings demonstrate a robust negative correlation between GPR and financial stability by utilizing the bank Z-score as a primary proxy for measuring financial stability. Similarly, Phan et al. (2022) found compelling evidence that heightened GPR undermines the stability of US banks. Olalere & Mukuddem-Petersen (2023) focusing on BRICS² to reveal that GPR significantly reduces bank stability, with economic policy uncertainty (EPU) exacerbating this effect. However, Demir & Danisman (2021) found that while economic uncertainty significantly reduces bank credit growth, GPR do not exhibit a substantial influence.

Banna et al. (2023) conducted an extensive empirical investigation on the effects of GPR on banking risk in the years following the latest financial crisis (2010-2021). Drawing on a comprehensive dataset of 21,618 international banks, their findings suggest that increased GPR leads to decreased banking stability, thereby elevating banking risk. The study reveals that the magnitude of this effect depends on the bank size and specialty, with medium-sized and large-sized commercial and savings banks exhibiting higher levels of risk when GPR rises. The increasing risk is primarily attributed to a decline in the bank capital ratio and fluctuations in ROA.

Country-specific and inter-bank characteristics have also been associated with different results of how GPR affects banks. Shboul et al. (2020) found that Islamic banks operating in the Gulf Cooperative Council (GCC) subregion are less vulnerable to political risk compared to those in non-GCC countries, focusing on the Middle East and North Africa (MENA) region. Similarly, Banna et al. (2023) highlight certain bank-level factors that may mediate the effect of GPR, including the bank's goodwill, capital adequacy, and managerial quality. These factors play a significant role in influencing the level of risk a bank faces, providing valuable insights for policymakers and professionals in the banking and finance industry.

In Europe, GPR and bank profitability have been relatively neglected in recent literature. Notably, Athari (2019) investigates how the profitability of Ukrainian banks during the period of 2005-2015

² BRICS is an abbreviation for the countries of Brazil, Russia, India, China, and South Africa.

was affected by domestic political risk and global economic policy uncertainty, finding that domestic political stability had a significant positive effect on Ukrainian banks' profitability, while global economic policy uncertainty had a significant negative effect.

3 Methodology and Empirical Analysis

3.1 Data and Variables

The study selected 175 active, listed banks in the eurozone from 2013 to 2023. This 10-year timeframe allows for a comprehensive assessment while minimizing the impact of the European debt crisis in 2008. However, given the varying durations of the crisis in different countries (e.g., Greece imposed capital controls until September 1, 2019, gradually reducing them), some skewness is anticipated. The few outliers in the data are removed. All bank-related data is sourced from the Eikon database annually, with additional data for specific variables or banks manually collected from the banks' websites due to unavailability or missing values in Eikon. Data on inflation and GDP for the eurozone are collected from the European Central Bank Data Portal. Banks with random or entirely missing values are excluded to account for significant missing values, resulting in a final sample size of 84 operational banks over the same 10-year period. Consistent with prior research, this study incorporates bank-specific variables in the estimation models to account for their influence on the profitability factors of eurozone banks. (Lamothe et al. 2024; Duan et al., 2020; Huang., 2020; Bolivar et al., 2023; Screiber, 2024; Amare et al., 2020) Finally, even though Denmark does not use the euro as its official currency, it is included in the sample due to its fixed exchange rate with the euro under the European Exchange Rate Mechanism (ERM II³).

Table 1.

Banks per country

<i>Country</i>	<i>Banks</i>
Austria	6
Belgium	1
Croatia	6
Cyprus	2
Denmark	11

³ The European Exchange Rate Mechanism (ERM II) was established by the European Economic Community as part of the European Monetary System (EMS), built on the idea of fixed currency exchange rate margins to lessen exchange rate fluctuations and establish monetary stability in Europe.

<i>Country</i>	<i>Banks</i>
Austria	6
Finland	3
France	14
Germany	4
Greece	5
Ireland; Republic of	3
Italy	11
Liechtenstein	1
Lithuania	1
Malta	4
Netherlands	2
Portugal	1
Slovak Republic	2
Slovenia	1
Spain	6
Total	84

Note: This table provides a summary of how many times each country appears in the dataset.

The aggregate GPR index developed by Caldara et al. (2022) measures GPR. Notably, Caldara et al. (2022) distinguish potential geopolitical events from their actual occurrence and escalation, separating GPR into two categories: geopolitical threats (GPR_T) and geopolitical acts (GPR_A). They suggest that both indexes often experience sudden increases due to geopolitical actions, but GPR_T movements can also occur without any related actions taking place. The GPR_T index searches for articles containing language related to potential threats and the increase of military capabilities (such as war threats, peace threats, military buildup, nuclear threats, and Terrorist threats). The GPR_A index detects language indicating the onset or escalation of adverse events (such as the beginning of the war, escalation of the war, or terrorist acts). This separation is considered and discussed after the baseline model analysis. Furthermore, the GPR index is calculated daily, while bank data is reported on an annual basis to minimize the number of missing values. As a result, the annual standard deviation, which represents the index's volatility (SD_{GPR} , SD_{GPR_A} , SD_{GPR_T}), is utilized in the regression model.

3.1.1 Control variables

To isolate the effect of GPR, the baseline model uses some variables that are linked widely in literature with profitability. Firstly, the importance of a bank's size in determining its profitability is generally linked to positively influencing profitability, though some studies indicate that this may only be true up to a certain threshold, beyond which size could have a negative impact on bank profitability (Goddard et al., 2004; Athanasoglou et al., 2008).

Research has shown that as the loans to deposit ratio (LDR) increases, bank profitability typically decreases. This trend is attributed to banks with LDR ratios relying more on expensive and uncertain wholesale funding sources, as highlighted by Petria et al. (2015). Similarly, Korytowski (2018) revealed that liquidity, measured as the inverse of the deposits to loans ratio, significantly influences ROA in a manner. Moreover, studies highlight that when the amount of interest income compared to total income (NIR) increases, also known as diversification, it is associated with improved profitability (Goddard et al., 2013; Petria et al., 2015).

The efficiency ratio (EFF) plays a vital role in elucidating the relationship between average ROE and average ROA, as noted by Lamothe et al. (2024). Banks that operate efficiently and exhibit a positive correlation between efficiency and profitability are able to operate at lower costs and may even pass on a part of these savings to their customers (Pasiouras et al., 2009).

The effects of capitalization as an equity-to-assets ratio (CAP) on bank profitability have been extensively investigated as an internal factor. A study by Athanasoglou et al. (2008) suggests that when using ROA as a profitability measure, the capital adequacy ratio should be employed to represent capital variability in the data. Supporting that, later research indicates that well-capitalized banks have more flexibility in conducting business and taking advantage of new opportunities, leading to expectations of higher profitability (Al-Harbi, 2019; Menicucci et al., 2016). However, some studies have identified a negative connection between profitability and a high capital index due to the assumption of reduced risks, which can lead to lower returns (Saona, 2016; Bouzgarrou et al., 2018).

The existing studies indicate that the overall economic conditions in which banks operate can impact their performance (Boungou, 2019; López-Penabad et al., 2022). Therefore, the GDP and inflation rate are considered as part of the control variables. Inflation (INF) exerts a substantial impact on bank performance, as accurate predictions enable banks to adjust interest rates and manage operational

costs in order to optimize their profitability (Lajaunie, 2023). This paper uses the Harmonised Index of Consumer Prices (HICP) overall inflation index in changing composition. The gross domestic product (GDP) reflects the conditions of the economy, and higher economic growth may lead to a greater demand for both interest and non-interest activities, thereby improving the profitability of banks. (Bouzgarrou et al., 2018). This paper uses annual GDP at market prices and in fixed composition.

Table 2.

Definition of variables

<i>Variables</i>	<i>Definition</i>	<i>Calculation</i>	<i>Data source</i>
<i>Dependent Variables</i>			
ROA	The income generated by the bank's assets	EBIT/Total Assets	Refinitiv Eikon
ROE	The income generated by the bank's capital	EBIT/Equity	Refinitiv Eikon
NIM	The income generated by interest bearing activities relative to the bank's assets	Net interest income/Total assets	Refinitiv Eikon
<i>Independent Variables</i>			
GPR			
GPR_T	A metric derived from news sources that quantifies adverse geopolitical events and their associated risks.		Caldara and Iacoviello (2022)
GPR_A	A metric derived from news sources that quantifies adverse geopolitical perceived events.		Caldara and Iacoviello (2022)
	A metric derived from news sources that quantifies adverse geopolitical realized events.		Caldara and Iacoviello (2022)
<i>Control Variables</i>			
<i>Bank-level</i>			
SIZE			

<i>Variables</i>	<i>Definition</i>	<i>Calculation</i>	<i>Data source</i>
LDR	Larger banks might have different profitability dynamics compared to smaller banks due to economies of scale, diversification, and market power.	Natural logarithm of banks assets	Refinitiv Eikon
NIR	The ratio of total loans to the sum of non-interest bearing deposits, interest bearing deposits and other deposits, to account for liquidity.	Total loans / Total deposits	Refinitiv Eikon
EFR	Ratio of non-interest income to total revenues to account for diversification.	Non-interest income / Total revenues	Refinitiv Eikon
CAP	Management efficiency ratio	Operating expenses / Operating Revenues	Refinitiv Eikon
Macro-level	Higher capitalization ratios indicate greater financial stability and may affect profitability.	Equity/Total assets	Refinitiv Eikon
GDP	The output of the eurozone economy.		ECB Data Portal
INF	Inflation rate in the eurozone area		ECB Data Portal

Finally, to measure geopolitical risk, the aggregate GPR index developed by Caldara et al. (2022) is utilized. Notably, Caldara et al. (2022) distinguish potential geopolitical events from their actual occurrence and escalation, separating GPR into two categories: geopolitical threats (GPR_T) and geopolitical acts (GPR_A). They suggest that both indexes often experience sudden increases due to geopolitical actions, but GPR_T movements can also occur without any related actions taking place. The GPR_T index searches for articles containing language related to potential threats and the increase of military capabilities (such as war threats, peace threats, military buildup, nuclear threats, and Terrorist threats). The GPR_A index detects language indicating the onset or escalation of adverse events (such as the beginning of the war, escalation of the war, or terrorist acts). This separation is considered and discussed after the baseline model analysis. Furthermore, the GPR index is calculated on a daily basis, while bank data is reported on an annual basis to minimize the number of missing values. As a result, the annual standard deviation, which represents the index's volatility (SD_GPR, SD_GPR_A, SD_GPR_T), is utilized in the regression model.

Table 3.

Descriptive statistics

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
ROA	920	0.011	0.009	-0.044	0.057
ROE	923	0.136	0.146	-1.057	0.810
NIM	924	-4.128	0.452	-5.372	-2.662
SD_GPR	924	13.697	5.222	7.147	23.194
SD_GPR_A	924	17.315	10.031	8.619	37.843
SD_GPR_T	924	20.669	6.885	10.873	38.615
SIZE	924	10.397	0.973	8.088	12.425
CAP	924	0.090	0.035	-0.018	0.185
LRD	924	0.870	0.407	0.051	4.556
EFF	924	0.679	0.177	0.000	2.139
NIR	923	0.479	0.141	0.032	0.886
INF	924	2.124	2.449	0.183	8.358
GDP	924	33.783.460	3.482.544	29.241.650	41.004.010

4 Empirical analysis

4.1 Model specification

To examine the effects of GPR on bank profitability, the following regression model is estimated initially:

Equation 1. Baseline model

$$P_{i,t} = a + \beta_1 GPR_t + \beta_2 SIZE_{i,t} + \beta_3 CAP_{i,t} + \beta_4 LDR_{i,t} + \beta_5 EFR_{i,t} + \beta_7 NIR_{i,t} + \beta_8 GDP_t + \beta_9 INF_t + \varepsilon_{i,t}$$

The regression baseline model (Equation 1.) is used for each of the three dependent variables: ROA, ROE, and NIM. Conducting the Hausman test (Hausman, 1978) to identify the appropriate panel estimation method, i.e., fixed effects (FE) or random effects (RE), the results indicate the use of a fixed effects panel data estimator for all three baseline regression variations.

Table 4.

Correlation coefficients matrix

<i>Variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
(1) ROA	1.00					
(2) ROE	0.81	1.00				
(3) NIM	0.15	-0.06	1.00			
(4) SD_GPR	0.17	0.13	0.05	1.00		
(5) SIZE	0.03	0.15	0.49	0.03	1.00	
(6) CAP	0.19	0.25	0.34	0.01	0.50	1.00
(7) LDR	0.01	-0.05	0.13	-0.03	0.22	-0.02
(8) EFF	0.41	-0.04	0.21	0.11	0.05	0.18
(9) NIR	0.00	0.03	0.43	0.00	0.20	0.12
(10) INF	0.17	0.16	-0.06	0.63	0.05	-0.02
(11) GDP	0.24	0.15	0.09	0.58	0.07	0.04
<i>Variable</i>	<i>(7)</i>	<i>(8)</i>	<i>(9)</i>	<i>(10)</i>	<i>(11)</i>	
(7) LDR	1.00					
(8) EFF	-0.06	1.00				

<i>Variable</i>	(1)	(2)	(3)	(4)	(5)	(6)
(9) NIR	0.01	-0.01	1.00			
(10) INF	-0.06	0.08	0.06	1.00		
(11) GDP	0.08	0.08	0.03	0.82	1.00	

In the baseline model, the quadratic term of the GPR index is included to account for the potential non-linear impacts of GPR on bank profitability. This allows for the consideration that the effects of GPR may vary across different levels. Additionally, it is widely observed that an increase in size positively affects profitability up to a certain point. However, when banks reach an extremely large size, their profitability may be negatively impacted by bureaucracy and other reasons (Athanasoglou et al., 2008). Hence, the relationship between size and profitability is anticipated to be non-linear, and to address this, the natural logarithm of the banks' real assets and their square is utilized (SIZE_SQ). Finally, to address skewness, the natural logarithm is applied appropriately (LN_[Variable]), and to account for heteroscedasticity and within-group correlation, bank-clustered standard errors are applied.

The extended model is specified as follows:

Equation 2. Baseline model using quadratic form

$$P_{i,t} = \alpha + \beta_1 SD_GPR_t + \beta_2 SD_GPR_SQ_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 SIZE_SQ_{i,t} + \beta_5 LN_CAP_{i,t} + \beta_6 LN_LDR_{i,t} + \beta_7 EFR_{i,t} + \beta_8 NIR_{i,t} + \beta_9 GDP_t + \beta_{10} INF_t + \varepsilon_{i,t}$$

4.2 Baseline data analysis

The results from the regression analysis (Table 4) show how GPR volatility affects bank profitability. The negative and significant coefficient of SD_GPR (b = -0.002, p < 0.001) indicates that higher GPR volatility leads to a decrease in bank profitability as measured by ROA. Similarly, the findings reveal that SD_GPR impacts ROE negatively (b = -0.024, p < 0.002), indicating that higher GPR volatility is associated with decreased shareholder returns. ROE's greater sensitivity to GPR than ROA underscores the susceptibility of equity returns to external shocks within the Eurozone banking sector. The negative and significant effect on NIM (b = -0.053, p < 0.001) implies that increased GPR volatility diminishes banks' net interest income relative to their earning assets. This leads to decreased net interest income for banks in relation to their earning assets. This highlights the significant influence of geopolitical instability on key banking activities, particularly in lending and interest income generation as supported by Nguyen et al., 2023. Although statistically significant, the small coefficient value in all

profitability measures indicates that while GPR has a consistent effect, its actual influence is relatively minor compared to other factors influencing bank profitability in the Eurozone.

The positive and significant quadratic term suggests a non-linear relationship exists for all profitability measures. For ROA ($b = 0.0001$, $p < 0.001$), this could mean that banks in the Eurozone might adopt risk management strategies once geopolitical volatility crosses a certain threshold to offset its impact; similarly, for ROE ($b = 0.002$, $p < 0.001$) GPR volatility's adverse impact on ROE may decrease at very high levels of risk. Regarding NIM ($b = 0.002$, $p < 0.001$), the nonlinear effect indicates that initial increases in GPR adversely affect net interest margins, while further increases may prompt banks to adjust their interest rate spreads or risk premiums as a response to the volatility.

In contrast to existing literature that suggests that bank size plays a crucial role in determining resilience under political distress, with larger banks being less vulnerable than smaller ones (Kouzev, 2023), size did not significantly impact profitability measures. This may indicate that other factors overshadow the effects of size in the present dataset or that the range of bank sizes is not sufficiently wide enough to capture notable differences and differences in calculation and definition between political and GPR risk.

Interestingly, regarding ROA, NIR shows an impactful relationship ($b = 0.016$, $p < 0.001$), highlighting how diversifying income can enhance profitability. Similarly, NIR has a statistically significant effect on ROE ($b = 0.194$, $p < 0.001$). Conversely, NIR has a significant impact on NIM ($b = -1.483$, $p < 0.001$), indicating that a higher proportion of interest income relative to total revenues could reduce net interest margins potentially due to shifts in revenue sources. Finally, as per the existing literature, it is evident that the EFF has a negative and significant impact on all profitability measures. This suggests that higher operational expenses relative to revenues have a diminishing effect on profitability.

The R-squared values imply that the models account effectively for a significant portion of the variability in bank profitability over time, particularly for NIM (0.661). This results in accordance with the relevant literature where GPR predominantly hinders the growth of consumer and mortgage loans (Demir & Danisman., 2021). shows that the model effectively captures the time-variant influences on profitability, showing that both within-bank factors and GPR volatility have a substantial impact on profitability metrics over time. The study focuses on explanatory rather than predictive modeling, using FE to examine the impact of GPR volatility on financial performance variables; consequently,

the emphasis is placed on the R-squared. The low overall R-squared values for ROA (0.032) and ROE (0.001) suggest that the model might be missing some crucial variables that affect these profitability measures. This might be due to the unavailability of certain variables that significantly influence ROA and ROE but not NIM as much, such as regulatory capital.

Table 6.

Comparison of regression results across dependent variables

<i>Variables</i>	<i>Model 1: ROA</i>	<i>Model 2: ROE</i>	<i>Model 3: NIM</i>
<i>Coefficient</i>	<i>b</i>	<i>b</i>	<i>b</i>
SD_GPR	-0.002 (0.000)***	-0.024 (0.002)***	-0.053 (0.000)***
SD_GPR_SQ	0.000 (0.000)***	0.001 (0.001)***	0.002 (0.000)***
SIZE	0.032 (0.287)	-0.215 (0.606)	0.750 (0.498)
SIZE_SQ	-0.002 (0.194)	0.007 (0.758)	-0.083 (0.127)
LN_CAP	0.012 (0.003)***	0.080 (0.223)	0.195 (0.002)***
LN_LDR	-0.006 (0.032)*	-0.089 (0.025)*	0.091 (0.041)*
EFR	-0.022 (0.003)***	-0.321 (0.004)***	-0.356 (0.000)***
NIR	0.016 (0.001)***	0.194 (0.000)***	-1.483 (0.000)***
INF	-0.001 (0.000)***	-0.009 (0.000)***	-0.009 (0.011)*
GDP	0.000 (0.025)*	0.000 (0.147)	-0.000 (0.034)*
Within R ²	0.336	0.253	0.661
Between R ²	0.005	0.092	0.356
Overall R ²	0.032	0.001	0.336
F(10, 83)	18.72	12.22,	65.01
Prob > F	0.000	0.000	0.000

*Note: *p < 0.1, **p < 0.05, ***p < 0.01*

4.3 Robustness check

This study conducts robustness tests to ensure the consistency of the results by estimating the Panel-Corrected Standard Errors (PCSE) as it considers potential heteroskedasticity and contemporaneous

correlation across panels and is commonly used in research on bank profitability (Athari, 2021). The PCSE results (Table 5) align with those of the FE analysis, providing further evidence of the non-linear impact of GPR on bank profitability measures. Specifically, the PCSE results indicate that GPR volatility negatively affects the profitability variables of the baseline model. The positive coefficients for the squared term (SD_GPR_SQ) further suggest a non-linear relationship. This consistency between the PCSE and FE results reinforces the robustness of the findings.

Table 7.
Comparison of PCSE results across dependent variables

<i>Variables</i>	<i>Model 1: ROA</i>	<i>Model 2: ROE</i>	<i>Model 3: NIM</i>
<i>Coefficient</i>	<i>b</i>	<i>b</i>	<i>b</i>
SD_GPR	-0.002 (0.000)***	-0.015 (0.009)**	-0.040 (0.043)*
SD_GPR_SQ	0.000 (0.000)***	0.001 (0.008)**	0.002 (0.031)*
SIZE	-0.035 (0.004)***	-0.705 (0.000)***	-1.470 (0.000)***
SIZE_SQ	0.002 (0.002)**	0.036 (0.000)***	0.065 (0.000)***
LN_CAP	0.009 (0.000)***	-0.012 (0.731)	0.241 (0.000)***
LN_LDR	0.001 (0.324)	0.001 (0.950)	-0.062 (0.000)***
EFR	-0.023 (0.000)***	-0.378 (0.000)***	-0.349 (0.000)***
NIR	0.014 (0.000)***	0.181 (0.000)***	-1.502 (0.000)***
INF	-0.001 (0.000)***	-0.008 (0.000)***	-0.007 (0.362)
GDP	0.000 (0.000)***	0.000 (0.000)***	-0.000 (0.200)
Prob > chi2	0.0000	0.0000	0.0000

*Note: *p < 0.1, **p < 0.05, ***p < 0.01*

4.4 Additional Analysis

4.4.1 Realized and perceived geopolitical risks

The calculations of the baseline model consider the influence of overall GPR on bank profitability. However, as mentioned above, Caldara et al. (2022) distinguish GPR as either threats or acts. These two factors can affect banks differently (Phan et al., 2022); hence, the analysis proceeds further by isolating the effect of each on bank profitability.

Comparing the results of FE regression models concerning GPR actions (Table 6.) and GPR threats (Table 7.) distinct impacts on bank profitability measures emerge. Specifically, GPR actions have no statistically insignificant effect, whereas GPR threats significantly impact the profitability variables (ROA, $b = 0.001$, $p < 0.01$; ROE, $b = 0.012$, $p < 0.026$; NIM, $b = 0.039$, $p < 0.001$). This suggests that banks may have strategies in place to handle actions but view threats as opportunities to proactively adjust their operations, indicating that perceived threats, by reallocating resources or adjusting strategies, could drive banks to optimize their equity returns up to a certain point due to the non-linearity as supported by a significant quadratic SD_GPR . Regarding NIM, this suggests that while banks' interest margins are somewhat resilient to direct geopolitical actions, anticipating threats drive more significant adjustments in interest-related operations, likely due to changes in risk assessment and lending practices.

The control variables consistently indicate that larger banks typically experience lower profitability, but this effect diminishes as the size increases. Size seems to have a more significant role in controlling ROA under GPR_A . Higher capitalization and improved efficiency are positively linked to profitability. NIR generally boosts ROA and ROE but reduces NIM, suggesting a trade-off between diversification and net interest margins. Inflation has varied effects, with a positive impact on NIM and little to no negative impact on ROA and ROE.

Table 8.

Comparison of FE results across three models using GPR actions

<i>Variables</i>	<i>Model 1: ROA (FE)</i>	<i>Model 2: ROE (FE)</i>	<i>Model 3: NIM (FE)</i>
Coefficient	b (Fixed Effects)	b (Fixed Effects)	b (Fixed Effects)
SD_GPR_A	-0.000	-0.003	0.001

<i>Variables</i>	<i>Model 1: ROA (FE)</i>	<i>Model 2: ROE (FE)</i>	<i>Model 3: NIM (FE)</i>
Coefficient	b (Fixed Effects)	b (Fixed Effects)	b (Fixed Effects)
	(0.428)	(0.285)	(0.673)
SD_GPR_A_SQ	0.000	0.000	0.000
	(0.192)	(0.140)	(0.344)
SIZE	0.034	-0.183	0.818
	(0.251)	(0.654)	(0.447)
SIZE_SQ	-0.002	0.005	-0.086
	(0.168)	(0.804)	(0.105)
LN_CAP	0.011	0.065	0.162
	(0.009)**	(0.316)	(0.008)**
LN_LDR	-0.005	-0.088	0.095
	(0.035)*	(0.026)*	(0.031)*
EFR	-0.023	-0.327	-0.370
	(0.003)***	(0.003)***	(0.000)***
NIR	0.014	0.172	-1.542
	(0.005)**	(0.001)***	(0.000)***
INF	-0.000	0.001	0.014
	(0.485)	(0.638)	(0.002)**
GDP	0.000	0.000	-0.000
	(0.010)*	(0.130)	(0.196)
Within R ²	0.324	0.248	0.653
Between R ²	0.005	0.081	0.358
Overall R ²	0.031	0.0001	0.338
F(10, 83)	18.11	10.48	65.45
Prob > F	0.000	0.000	0.000

*Note: *p < 0.1, **p < 0.05, ***p < 0.01*

Table 9.

Comparison of FE results across three models using GPR threats

<i>Variables</i>	<i>Model 1: ROA</i>	<i>Model 2: ROE</i>	<i>Model 3: NIM</i>
Coefficient	b	b	b
SD_GPR Treats	0.001	0.012	0.039

<i>Variables</i>	<i>Model 1: ROA</i>	<i>Model 2: ROE</i>	<i>Model 3: NIM</i>
	(0.007)**	(0.026)*	(0.000)***
SD_GPR Treats Sq	-0.000	-0.000	-0.001
	(0.002)***	(0.011)**	(0.000)***
SIZE	0.028	-0.259	0.656
	(0.342)	(0.529)	(0.541)
SIZE SQ	-0.002	0.010	-0.076
	(0.258)	(0.640)	(0.152)
LN_CAP	0.011	0.072	0.165
	(0.005)**	(0.270)	(0.006)**
LN_LDR	-0.006	-0.096	0.080
	(0.020)*	(0.016)*	(0.071)
EFR	-0.022	-0.321	-0.366
	(0.004)***	(0.005)***	(0.000)***
NIR	0.014	0.176	-1.560
	(0.004)**	(0.001)***	(0.000)***
INF	0.001	0.020	0.064
	(0.003)**	(0.016)*	(0.000)***
GDP	0.000	-0.000	-0.000
	(0.765)	(0.786)	(0.000)***
Within R ²	0.332	0.253	0.647
Between R ²	0.007	0.050	0.365
Overall R ²	0.041	0.007	0.346
F(10, 83)	21.43	14.89	72.95
Prob > F	0.000	0.000	0.000

*Note: *p < 0.1, **p < 0.05, ***p < 0.01*

5 Conclusion and discussion

Several studies have explored the factors that influence the profitability of banks around the world. However, few studies have focused on how GPR affects the Eurozone banking industry. This study adds to the existing body of knowledge by establishing an empirical framework to assess the impact of GPR on banks' profitability in the post-debt-crisis Eurozone over ten years. The study also takes an

innovative approach by incorporating the standard deviation of the GPR index as a metric for assessing annual volatility in geopolitical risk, thereby introducing a new dimension to the discourse within the banking literature.

The empirical results highlight that GPR affects bank profitability measures, including ROA, ROE, and NIM. The study finds that an increase in the standard deviation of GPR generally reduces profitability, although this negative impact diminishes at higher levels of risk, indicating a non-linear relationship. Notably, while the coefficients for GPR and its quadratic term are statistically significant, they are relatively small. This suggests that although Eurozone banks' profitability is influenced by GPR volatility, the overall impact remains relatively modest.

The additional analysis distinguishes between the effects of GPR actions and threats on bank profitability. The analysis reveals that threats have a more pronounced impact on profitability measures than actions. Specifically, perceived GPR significantly increases ROA and ROE and has a strong positive effect on NIM. This suggests that banks may be more sensitive to perceived threats, prompting preemptive strategic adjustments to mitigate potential risks.

The findings have significant implications for policymakers, bankers, regulators, and analysts. Policymakers are advised to prioritize establishing a geopolitical climate to boost the profitability of Eurozone banks. Focusing on bank-specific factors, like efficiency and capitalization, is also crucial, which greatly influence profitability. Bank executives should devise plans to counter the effects of geopolitical risks by diversifying income streams and implementing sound credit risk management strategies. Furthermore, the research indicates that maintaining efficiency and sufficient capitalization levels can help offset the adverse effects of geopolitical uncertainties.

Overall, the findings suggest that a combination of geopolitical risk, bank-specific factors, and macroeconomic conditions shapes the profitability of Eurozone banks. Although the coefficients for GPR are relatively small, indicating that while GPR volatility affects profitability, the overall profitability of Eurozone banks remains relatively resilient. This finding is supported by literature as countries with better governance are better equipped to mitigate the effects of GPR on their banking system's financial stability (Thrane et al., 2023).

6 Future Research and Limitations

In light of these findings, further research into the mechanisms through which GPR volatility influences bank profitability, including the role of macroeconomic variables, bank-specific risk management practices, and market conditions, presents a promising avenue for future inquiry. Future research could also examine whether ownership structure and concentration levels mitigate the effects of geopolitical risk. Comparative studies encompassing other sectors within financial services could yield valuable insights into banks' unique challenges and opportunities concerning profit volatility. Additionally, qualitative studies might provide insights into why specific GPR threats have the observed effects and under what conditions these effects are most potent.

Finally, several limitations ought to be acknowledged. Due to data unavailability, this paper excludes the consideration of how regulations (such as Basel III and IFRS9) have affected the profitability of European banks over the last decade while allowing a risk reduction. Including these regulatory factors in future studies could provide a more comprehensive understanding of the determinants of bank profitability in the Eurozone. Furthermore, the study's findings are based on the available data, and different results might be obtained with more recent or comprehensive datasets. Subsequent research efforts should focus on overcoming these limitations to develop a more nuanced insight into how GPR influences bank profitability.

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