Ahsen Emir Bulut
Research Assistant, PhD Candidate
Dokuz Eylül University, Izmir, Türkiye
Department of Economics
E-mail: ahsenemir.bulut@deu.edu.tr
Orcid: https://orcid.org/0000-0003-3475-9456

GEOPOLITICAL RISK AND BANK PERFORMANCE IN TURKIYE: EVIDENCE FROM TWO-STEP SYSTEM GMM AND PANEL THRESHOLD MODELS

UDC / UDK: 336.7+005.334+519.86]:327](560)
JEL classification / JEL klasifikacija: G21, F51, C23, G32
https://doi.org/10.17818/EMIP/2026/20
Original scientific paper / Izvorni znanstveni rad
Received / Primljeno: January 21, 2026 / 21. siječnja 2026.
Accepted / Prihvaćeno: April 10, 2026 / 10. travnja 2026.

Abstract

This paper analyses how geopolitical risk (GPR) influences bank profitability (ROA) and credit risk (NPL) across 25 deposit banks in Türkiye, focusing on the role of bank size (SIZE) during 2006–2024. Using Two-Step System GMM and panel threshold methods, the findings indicate that a 1% increase in GPR reduces ROA by 0.32% and increases NPL by 0.12%. Larger banks are better able to absorb these effects. The negative impact of GPR is more pronounced for smaller banks (SIZE ≤ 7.63) regarding profitability and results in a sharper rise in NPL (SIZE ≤ 8.24). As bank size exceeds these thresholds, the adverse effects become less significant, reflecting scale advantages and stronger risk management. Ownership is also important: private and foreign banks generally perform better, while state-owned banks demonstrate greater resilience to geopolitical shocks.

Keywords*: *Geopolitical risk, Bank performance, Two-Step System GMM, Panel Threshold

1. INTRODUCTION

In recent years, geopolitical risks (GPR), widely regarded as one of the most significant threats to the global economy, have become increasingly salient. GPR is considered a high-risk factor that triggers other risks due to its inclusion of sovereignty- and security-based shocks, as well as its expression of the occurrence, escalation, and potential of events such as wars, interstate tensions, terrorist acts, and political conflicts (Caldara & Iacoviello, 2022).

This work is licensed under a Creative Commons Attribution 4.0 International License.

Increasing GPR triggers uncertainty and risk aversion in financial markets, leading to changes in investment portfolio allocations and significant shifts in capital flows (Demir & Danisman, 2021). During GPR shocks, investors tend to shift funds from wholesale funding and risky assets to safer assets, such as deposits. While GPR affects asset price returns and stock market volatility, it also increases stock market volatility, particularly in emerging markets. Therefore, a geopolitical shock can simultaneously trigger a currency shock (market risk), capital outflows (liquidity risk), contraction in the real sector (credit risk), and regulatory uncertainty (political risk) (Podvorica et al, 2025; Gabbiadini et al., 2025).

GPR affects the banking sector's risk profile and operational costs through multifaceted and complex mechanisms. GPR significantly increases banks' funding costs and debt rollover costs. In periods of heightened uncertainty and heightened risk perception, wholesale financiers demand higher returns to assume additional risk. This situation reduces the bank's profitability by increasing its funding costs (Alsadan et al., 2025). Particularly when GPR rises, investors reduce liquidity provision by shifting their investments away from risky assets, motivated by a flight to safety. Furthermore, fund providers may withdraw their funds based on ‘noisy public signals’ about the quality of bank assets, which can increase the risk of bank failure and earnings volatility (Nguyen & Thuy, 2024). Moreover, GPR-induced uncertainty exacerbates asymmetric information between lenders and borrowers, leading banks to increase their credit prices. Banks' perception of risk can create panic and fear among consumers, prompting them to reduce their investments and spending, thereby contracting consumer and mortgage lending, reducing banks' profitability, and increasing their financial fragility (Fianto & Ibrahim, 2025).

Türkiye occupies a critical geopolitical position due to its location at the strategic crossroads of Europe, Asia and the Middle East, which are at the centre of regional and global policies. It is exposed to multifaceted geopolitical shocks, including the Russia-Ukraine war to the north, conflicts in Syria and Iraq to the south, energy tensions in the Eastern Mediterranean, and uncontrolled migration (Çelik, 2020). These shocks exert direct pressure on the banking system through channels such as increases in country risk premiums, exchange rate volatility, and tightening external financing conditions. Operating in a geopolitical uncertainty environment, the Turkish banking sector accounts for 73% of the national financial sector. It is the economy's primary source of financing, accounting for approximately 110% of GDP (Banks Association of Türkiye, 2023). Although the sector is heterogeneous in ownership structure, publicly owned deposit banks dominate, accounting for approximately 40% of total banking assets (Bulut et al., 2024). Therefore, the Turkish banking sector presents a heterogeneous picture with respect to ownership structure, balance sheet size, business model, and risk management capabilities (Mazgit & Balaylar, 2013). This structure enables GPR shocks to affect bank profitability and stability with varying intensity and through different channels, particularly depending on bank size and ownership structure.

These characteristics make it interesting to examine the impact of GPR on bank performance in the specific case of Türkiye.

Studies examining the impact of GPR on bank performance have increased in recent years (Nguyen & Thuy, 2024; Banna et al., 2023; Olalere & Mukuddem-Petersen, 2024; Andriani et al., 2024). The number of studies examining the moderating role of bank size is quite limited (Phan et al., 2022; Kunjal & Suvvari, 2024). These studies have found that the disruptive effect of GPR on bank stability is less pronounced for large and well-capitalised banking groups. However, the existing empirical literature lacks studies examining how bank size moderates the impact of GPR in Turkish banking. This study seeks to answer the following questions:

- What is the influence of GPR on the performance of banks?
- Does the size of a bank positively or negatively influence the effect of GPR on its performance?
- If the size of a bank does influence GPR's effect on its performance, at what point does this influence become apparent?

The first section of the paper reviews the empirical literature; the second section covers the dataset and methodology; the third section presents the empirical results; the fourth section discusses the findings; and the final section presents the conclusions and policy recommendations.

2. LITERATURE

2.1. GPR and Bank Performance

Research on bank performance has traditionally concentrated on macroeconomic indicators and bank-specific elements. However, the recent escalation of GPR impacting the financial system has prompted an expansion of literature in this area. GPR can influence the banking sector through various channels within the real economy. For instance, heightened GPR may lead firms in the real sector to delay or cancel investments, altering their investment and financing decisions (Caldara & Iacoviello, 2022). This behaviour can result in a decrease in credit volume. Similarly, during periods of increased GPR, consumers may lose confidence in both the economy and the government, which can trigger precautionary behaviours; this may lead businesses to postpone irreversible investment decisions and encourage households to boost their savings. Consequently, consumers might defer purchases of significant items, such as cars, durable goods, and housing, which are often financed through consumer loans and mortgages (Phan et al., 2022). Additionally, GPR affects the supply of credit. In times of elevated geopolitical risk, negative perceptions of personal security, private property, and freedom of expression can undermine a country's investment appeal. Such conditions may precipitate capital outflows or reduce capital inflows, thereby constraining the domestic credit supply (Gozgor et al., 2019). As economic conditions worsen, the likelihood of defaults by firms and households tends to rise sharply, increasing asset risk for banks and potentially leading to an increase in non-performing loans. Furthermore, economic sanctions imposed on Russia, a key player in global energy supply, along with escalating energy prices, are driving up production costs for energy-importing nations. These cost shocks can adversely affect the banking sector, contributing to economic slowdowns or stagnation (Martins et al., 2023).

GPR can also affect the banking sector through various channels operating via financial markets. Events such as geopolitical tensions, terrorist incidents or wars bring unforeseen uncertainty shocks to financial markets. Unlike other uncertainty indicators, GPR reflects events that are more difficult to predict and more destructive. This increased uncertainty can cause panic in financial markets, reducing the supply of credit. Liquidity problems and rising risk premiums can reduce expected future cash flows and increase discount rates, thereby reducing the market value-to-equity of banks. Another channel of impact is that when the GPR rises, investors traditionally turn to assets considered safe havens, such as government bonds and gold. This flight to safe havens reduces liquidity in the banking sector (Hodula et al., 2024).

Studies examining the impact of geopolitical risk on bank performance generally find that GPR negatively affects bank profitability and stability. Alsagr & Hemmen (2020) examined the impact of GPR on bank profitability in oil-dependent and non-oil-dependent economies for the period 1998-2017 and found that the negative impact of GPR was relatively less in non-oil-dependent countries. Phan et al. (2022) examined 540 banks operating in the United States and used four separate risk indicators: Z-score, non-performing loans, and the volatility of return on assets and return on equity. The results show that both perceived and realised GPR were associated with a decline in bank stability of approximately 0.71% to 5.10%. Yıldırım & Berkman (2022), in their panel-data study of G-7 countries, found that an increase in GPR negatively affects the profitability of the banking sector. The authors interpret this situation as banks tightening their credit policies in line with their increased risk perception. Nguyen & Thuy (2024), in their study examining the relationship between geopolitical risk and the cost of bank loans in the United States between 1991 and 2019, found that they concluded that GPR has a negative impact on the cost of bank loans and non-price loans, and that geopolitical actions have a greater impact on credit prices by leading to higher credit spreads relative to perceived geopolitical risks. Similarly, Andriani et al. (2024) examined 69 banks operating in ASEAN countries using multiple regression methods for the period 2013-2022 and found that GPR negatively affected active profitability. In contrast, Olalere & Mukuddem-Petersen (2024), in their study covering 105 commercial banks in BRICS countries from 2009 to 2021, found that increased geopolitical risk and economic policy uncertainty reduced bank stability. The interaction between economic policy uncertainty and GPR emphasised that GPR's negative impact on the banking sector was amplified. Paltalidis & Zhang (2025) investigated the impact of GPR on syndicated loans in the US by measuring bank-based geopolitical risk. The findings show that when banks perceive high exposure to geopolitical risk, a 15% increase in credit margins applied to borrowers is observed. This indicates that banks use credit pricing to compensate for additional risks. Stamopoulos (2024), using data covering 2013-2023 for the Eurozone, found in a fixed-effects model that geopolitical threats have a more pronounced effect on profitability indicators than geopolitical actions. The authors emphasise that banks tend to minimise risks by making strategic adjustments in advance in response to perceived threats.

2.2. GPR and Bank Size

According to the view that GPR mitigates the negative effects on banks' profitability and stability and plays a protective role, large-scale banks have certain market-based and structural advantages. Accordingly, large banks are less prone to insolvency than small and medium-sized banks, owing to their greater credit and product diversity and their ability to benefit from economies of scale. However, another view underlying the greater resilience of large banks to GPR suggests that they tend to avoid excessively risky activities during periods of uncertainty induced by GPR to preserve their high franchise value. This balances out the destabilising effect of GPR (Vuong et al., 2024; Brignone et al., 2025). Furthermore, when GPR rises, market participants exhibit risk aversion, shifting their savings from high-risk assets to deposits at large banks, which are perceived as safer. The implicit government support stemming from the perception that large banks are "too big to fail" provides assurance to depositors. Thus, large banks do not suffer wholesale funding losses when GPR rises (Almualla & Al-Gasaymeh, 2023).

Studies examining the impact of GPR on bank performance are relatively limited in their investigation of the effect of bank size. Phan et al. (2022), in a study of 540 U.S. banks using annual data from 1999-2019, found that the impact of GPR on bank stability is less pronounced for large banks. They concluded that large, well-capitalised banks with low deposit-to-asset ratios are less affected by the profit volatility created by GPR. Kunjal & Suvvari (2024) used panel data analysis for 10 banks operating in South Africa, covering annual data from 2013 to 2022. The results indicate that the negative impact of GPR on the Z-score is more severe for small- and medium-sized banks than for large banks. Furthermore, the study found that GPR's impact on credit risk is greater for small- and medium-sized banks. In contrast, Banna et al. (2023), in a study of 21,618 banks worldwide, found that the destabilising effect of GPR is greater among large and medium-sized banks. The authors emphasise that this is due to large banks' cross-border investments, subsidiaries, and foreign branches. The fact that large banks maintain numerous overseas operations means that, when geopolitical risk increases, the risk of non-repayment of loans and declines in asset values in these international operations is greater. Small-scale banks are generally less exposed to the direct effects of geopolitical shocks as they operate in local markets. Chiaramonte et al. (2025) investigated the impact of GPR on credit growth for 18 European countries. The results indicate the importance of ownership structure, showing that state-owned banks exhibit more resilient credit behaviour in response to GPR shocks than private banks.

3. DATA AND FRAMEWORK

3.1. Data

This study investigates the impact of geopolitical risk and bank size on profitability and risk in the Turkish banking sector using dynamic panel data analysis and the system-GMM estimator. Annual data covering the period from 2006 to 2024 were used for this purpose. Abbreviations and definitions of variables are provided in Table 1. The dependent variables, namely return on assets and the share of non-performing loans in total loans, along with bank-specific control variables, were obtained from the Turkish Banks Association (TBA). The ROA variable is calculated by dividing the bank's net profit by its total assets and is a key performance indicator that measures how effectively the bank uses its assets to generate profit. The NPL ratio is the ratio of total non-performing loans to total gross loans and is used to measure the bank's asset quality and credit risk.

The main independent variable, the GPR index, was developed by Caldara & Iacoviello (2022) and reflects the automatic text search results of the electronic archives of 11 national and international newspapers: The Boston Globe, Chicago Tribune, The Daily Telegraph, Financial Times, The Globe and Mail, The Guardian, Los Angeles Times, The New York Times, The Times, The Wall Street Journal, and The Washington Post. The Caldara and Iacoviello index is calculated by counting the number of articles related to geopolitical risk in each newspaper (as a proportion of the total number of news articles). The index is then normalised to a mean of 100 over the ten-year period 2000-2009. The search identifies articles that reference six-word groups. Group 1 includes terms that explicitly mention geopolitical risk, as well as terms referring to military tensions involving large regions of the world and the involvement of the United States. Group 2 includes words directly related to nuclear tensions. 3. and 4. Groups contain words related to threats of war and terrorist threats, respectively. Finally, 5. and 6. Groups aim to capture press coverage of actual negative geopolitical events (as opposed to mere risks) that could reasonably lead to increased geopolitical uncertainty, such as terrorist acts or the outbreak of war.

The first bank-specific variable used in the models is the share of loans in total assets (CREDIT). CREDIT is one of the key determinants of bank performance. An increase in this ratio raises ROA thanks to high-yield loans; however, it can weaken stability by reducing liquidity and increasing the risk of non-performing loans (Terraza, 2015; Phan et al., 2022). The DEPOSITS variable is the ratio of total deposits to total assets. It indicates the bank's dependence on traditional funding sources and the stability of its funding. (Nguyen & Thuy, 2024). The EQUITY variable is a fundamental indicator calculated by dividing a bank's total equity by its total assets, reflecting the institution's level of capitalisation or degree of risk aversion. This ratio acts as a critical financial cushion, enabling the bank to absorb unexpected losses, thereby enhancing financial stability and reducing the bank's need for external funding (Bulut et al., 2024). The SECURITY variable represents the ratio of the bank's securities portfolio (treasury bills, bonds and other commercial assets) to total assets. This variable negatively affects profitability, as an increase in this ratio yields lower returns than loans. However, because these assets are risk-free and highly liquid, an increase in the ratio strengthens the balance sheet and enhances stability (Balaylar & Özdemir, 2018; Banna et al., 2023). The SIZE variable is defined as the natural logarithm of the bank's total assets. This variable represents economies of scale and the bank's market power. The NNII variable measures the share of fees, commissions, trading income and other non-interest items in the bank's total net operating income, excluding lending activities (Maté & Brizar, 2024). Operations focused on increasing non-interest income (NNII) help banks balance income and profitability and reduce risk (Acar Balaylar et al., 2025). The inflation rate (INF) and economic growth (GROWTH) variables were also included in the study. These variables have a decisive impact on banks' asset quality, operational costs, and credit demand. GROWTH reflects borrowers' repayment capacity and business cycles, while INF directly affects funding costs and interest rates, shaping bank stability (Adusei, 2015; Lamothe et al., 2024).

The equations relating to the models used in the study are as follows:

$$ROA_{it}=\alpha_0+\alpha_1 ROA_{it-1}+\alpha_2 GRR_{it}+\alpha_3 Size_{it} + \alpha_4(GPR_{it}\times Size_{it})+\alpha_5 Control\ Variables_{it} + u_{it} \quad (1)$$

$$NPL_{it}=\alpha_0+\alpha_1 NPL_{it-1}+\alpha_2 GPR_{it}+\alpha_3 Size_{it} + \alpha_4(GPR_{it}\times Size_{it})+\alpha_5 Control\ Variables_{it} + u_{it} \quad (2)$$

Table 1 Definitions

Variables	**Definition**	**Source**
Dependent Variables		
ROA	Bank profitability, measured by return on assets	TBA
NPL	Non-performing loans to total loans	TBA
Independent Variable		
GPR	Geopolitical Risk Index	Caldara and Iacoviello (2022)
Moderating Variable		
SIZE	Natural logarithm of total assets	Calculated by the author based on TBA data.
Bank Characteristic Variables		
CREDIT	Ratio of loans to total assets	TBA
DEPOSITS	Ratio of deposits to total assets	TBA
EQUITY	Ratio of equity to total assets	TBA
SECURITY	Ratio of security portfolio to total assets	TBA
NNII	The ratio of non-interest income to net operating income	TBA
Macroeconomic Variables		
GROWTH	GDP per capita growth rate	World Bank
INF	Annual growth rate of consumer price index	World Bank

Source: TBA and World Bank Database

3.2. Methodology

Economic and financial relationships are dynamic, current events that often result from past experiences and behaviours. Therefore, including lagged variables among the explanatory variables is important. Both lagged independent and dependent variables may affect the dependent variable. Panel data models help analyze these dynamics. When lagged values of the dependent variable are used as independent variables, the models are called dynamic panel data models (Bond, 2002).

The dynamic panel model is generally expressed as follows:

$y_{it}=\alpha y_{i,t-1}+\beta X_{it}+\eta_i+\varepsilon_{it}$

$y_{i,t-1}$: Lagged value of the dependent variable

X_{it} : Other independent variables

η_i: Individual/group specific effects (unobserved individual effects)

ε_{it}: Error term

In static panel data models, using lagged dependent variables leads to correlation with the error term, causing estimation problems. This distinguishes dynamic panel models from static ones (fixed-effects or random-effects). To address this, lagged variables are used as instruments in dynamic panel data estimation since they correlate with explanatory variables but not the error term. As a result, dynamic panel estimates using instrumental variables are consistent but inefficient (Blundell et al., 2001).

Forecasters are ineffective if they ignore possible instrumental variables. When lagged observations are uncorrelated with the error term, they are valid instruments. Arellano & Bond developed the GMM (Generalised Method of Moments) method, which uses all valid lagged variables as instruments in dynamic panel data models. GMM estimators control for unobservable individual effects by using all available lags, making GMM a leading method for dynamic panel estimation. GMM estimator is widely used in panel data modelling for its flexibility and ability to accommodate various models without strict distributional assumptions. GMM allows for over-specification, meaning the number of instruments can exceed the minimum needed for estimation.

The estimators developed by Arellano & Bond (1991) and Arellano & Bover (1995), referred to as Difference GMM and System GMM, can serve as more accurate estimators due to several characteristics (Roodman, 2009): i) They are particularly effective in panels with a short time dimension and a large number of cross-sections (small T, large N). ii) The inclusion of a time dummy enhances the likelihood of maintaining the assumption that there is no correlation between error terms. iii) These estimators utilise orthogonal deviations in unbalanced panels, thereby maximising the sample size. iv) The process demonstrates dynamic characteristics when the current value of the dependent variable is influenced by its past values. In this study, the System GMM estimation technique, a dynamic panel data method, was employed due to the model's dynamic structure and the larger unit dimension relative to the time dimension.

The panel dataset comprises N = 25 cross-sectional units observed over T = 19 time periods, resulting in a relatively large time dimension compared to the number of groups. This configuration increases the risk of instrument proliferation in System GMM estimation. Roodman (2009) highlights that an excessive number of instruments relative to cross-sectional units can overfit endogenous variables, weaken the Hansen overidentification test, and yield misleadingly high p-values that incorrectly indicate instrument validity. To mitigate this risk, two measures were implemented in the estimation procedure. First, the instrument matrix was collapsed following Roodman (2009), generating a single instrument per lag by summing across time periods instead of creating separate instruments for each lag-period combination. This approach substantially reduces the total number of instruments without losing information. Second, the lag depth was restricted to include only lags two through four as instruments for the endogenous variables in the difference equation. Consequently, the total number of instruments is limited to 12 and 14 for the Profitability and Risk models, respectively, both remaining below the number of cross-sectional units (N = 25), in line with Roodman's (2009) recommendations. Additionally, two-step estimation was preferred over one-step estimation due to its asymptotic efficiency, and Windmeijer's (2005) finite-sample corrected standard errors were applied to correct the downward bias commonly observed in two-step standard errors in small samples.

To enrich the findings of the two-step GMM, the main estimator of the study, and to analyse the moderating effect of bank size on the relationships between geopolitical risk and ROA and NPL, Hansen's (1999) panel threshold regression model was applied as a supplementary analysis. In this context, the SIZE variable was defined as a threshold variable to determine at which critical scale banks exhibit resistance to GPR. The model divides the sample into two regimes: banks of low scale (SIZE $\leq \gamma$) and large scale (SIZE $> \gamma$), and endogenously estimates the structural break in the GPR coefficient.

However, it has been observed that when dependent variables exhibit high persistence, such as profitability and credit risk, static threshold models may yield inconsistent parameter estimates. To overcome this methodological constraint, Hansen's (1999) results are analysed comparatively using the dynamic panel threshold model developed by Kremer et al. (2013). The dynamic model preserves the dynamic structure by incorporating the lagged dependent variables (ROA_{t-1}, NPL_{t-1}) into the model and eliminates fixed effects via the 'forward orthogonal deviations' transformation proposed by Arellano and Bover (1995). This method controls for the endogeneity problem arising from both the lagged dependent variable and the threshold indicator function by using GMM-based instrumental variables.

3.2.1. Breusch and Pagan (1980) LM Test

In the econometric literature, a wide array of tests has been proposed to investigate inter-unit correlation in panel data. When the number of cross-sectional units (N) is fixed and the time dimension (T) tends to infinity ($T \rightarrow \infty$), the

Breusch-Pagan (1980) Lagrange Multiplier (LM) test is frequently employed to detect cross-sectional dependence among the units in a panel dataset. Furthermore, it is well documented that this test is inappropriate for settings in which the number of cross-sectional units grows large ($N \rightarrow \infty$). The null hypothesis of the Breusch-Pagan (1980) LM test for cross-sectional dependence is formally expressed as $H_0: \rho_{ij} = 0$ and $i \neq j$ which posits that the residuals obtained from any pair of distinct cross-sectional units (or entities) are uncorrelated; that is, there exists no correlation among the disturbances across units. The corresponding test statistic for the Breusch-Pagan LM test is derived as:

$$LM_{BP} = T \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \hat{\rho}_{ij}^2 \tag{3}$$

Where ρ_{ij} denotes the estimated correlation coefficient between the residuals of units i and j. Specifically, $\hat{\rho}_{ij}$ is computed according to the formula presented in Equation 3 (Baltagi et al., 2012).

$$\hat{\rho}_{ij} = \frac{\sum_{t=1}^{T} e_{it} e_{jt}}{(\sum_{t=1}^{T} e_{it}^2)^{1/2} \, (\sum_{t=1}^{T} e_{jt}^2)^{1/2}} \tag{4}$$

3.2.2. Pesaran CIPS (2007) Panel Unit Root Test

Panel unit root tests are classified as first- or second-generation. First-generation tests assume panel units are independent, with no correlation between them. Second-generation tests, in contrast, allow for correlation among units.

The Cross-sectionally Augmented IPS (CIPS) test by Pesaran (2007) accounts for inter-unit correlation by modelling it with factors. Pesaran extends the ADF regression using cross-sectional means and lags, then applies first-differencing to remove inter-unit correlation. The CIPS statistic is the mean of the CADF statistics from these extended regressions.

$$CIPS(N,T) = N^{-1} \sum_{t=1}^{N} t_i(N,T) \tag{5}$$

is given by this formula. The discrete version of this statistic is calculated as follows:

$$CIPS^*(N,T) = N^{-1} \sum_{i=1}^{N} t_i^*(N,T) \tag{6}$$

4. RESULTS

Table 2 presents the results of the Breusch-Pagan LM test for the variables examined in the study. The null hypothesis of the test is that there is no unit root in the relevant variable. The chi-square test statistic indicates that the null hypothesis is rejected for all variables. Therefore, all variables exhibit unit roots, and second-generation panel unit root tests must be used to analyse them.

Table 2 Breusch-Pagan LM Test Results for Cross-Sectional Dependence

Variables	χ^2 Test	p-value	df
ROA	58.25	0.000***	10
NPL	102.87	0.000***	10
SIZE	48.92	0.000***	10
LOANS	31.90	0.000***	10
DEPOSITS	72.77	0.000***	10
EQUITY	93.58	0.000***	10
SECURITY	57.06	0.000***	10
NNII	103.64	0.000***	10
GROWTH	117.06	0.000***	10
INF	88.34	0.000***	10

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

Source: Author's Calculation

Table 3 shows the results of the Pesaran (2007) CIPS panel unit root test for the variables in the study (excluding GPR, GROWTH, and INF). The null hypothesis of the test states that the relevant variable contains a unit root.

Table 3 Unit Root Test Results

Panel Variables	Type	Intercept		Int+Trend		Decision
		Level	1st Diff.	Level	1st Diff.	
ROA	CIPS	-2.147	-5.892***	-2.453	-7.124***	I(1)
NPL	CIPS	-1.986	-6.207***	-1.391	-5.458***	I(1)
SIZE	CIPS	-2.094	-5.873***	-2.516	-5.791***	I(1)
LOANS	CIPS	-1.824	-4.911***	-2.287	-5.234***	I(1)
DEPOSIT	CIPS	-2.213	-6.541***	-1.625	-6.873***	I(1)
SECURITY	CIPS	-1.759	-5.326***	-2.198	-5.677***	I(1)
EQUITY	CIPS	-2.031	-4.782***	-2.412	-5.095***	I(1)
NNII	CIPS	-1.915	-5.128***	-1.944	-5.516***	I(1)
TS Variable						
GPR	ADF	-0.897	-4.622***	-1.350	-4.734***	I(1)
GROWTH	ADF	-0.931	-8.068***	-1.774	-8.905***	I(1)
INF	ADF	-1.296	-4.081***	-1.411	-5.240***	I(1)

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

Source: Author's Calculation

Since the GPR, GROWTH, and INF variables are common time series variables for all banks, the Augmented Dickey-Fuller (ADF) time series unit root test was used for these variables. Upon examining the results, the null hypothesis cannot be rejected for all variables, and the variables are found to contain unit roots. Therefore, a logarithmic transformation was applied to all variables because their first differences were stationary.

Table 4 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	475	1.31395	1.75681	-11.9	13.07
NPL	475	4.3231	1.03104	1.22	7.84
GPR	475	0.27375	0.1135481	0.09	0.5
SIZE	475	5.323	0.74311	0.7	17.3
LOANS	475	55.11065	17.26074	3.72	84.72
DEPOSIT	475	59.0406	16.21665	2.09	87.89
SECURITY	475	23.1381	15.24398	4.79	98.17
EQUITY	475	14.03338	9.976215	2.88	65.98
NNII	475	1.598425	0.48004	0.77	7.57
GROWTH	475	4,63	3,6422	-5.73	11,61
INF	475	13.32	7.3712	3.93	84.21

Source: Author's Calculation

Table 4 presents descriptive statistics for the variables. Although the average ROA is 1.31%, the wide spread of maximum and minimum values, ranging from 13.07% to -11.9%, indicates that the sample includes both highly profitable and loss-making banks. The average NPL ratio is 4.32%, and its low standard deviation implies that banks have similar risk profiles.

Table 5 Correlation Matrix

Variable	ROA	NPL	GPR	SIZE	LOANS	DEPOSITS	EQUITY	SECURITY	NNII	GROWTH	INF
ROA	1.00										
NPL	-0.16	1.0									
GPR	-0.17	0.32	1.0								
SIZE	0.19	-0.14	-0.27	1.0							
LOANS	-0.08	-0.36	-0.22	0.38	1.0						
DEPOSITS	0.34	0.23	-0.18	-0.52	0.17	1.0					
EQUITY	0.09	0.32	0.21	-0.56	-0.50	0.49	1.0				
SECURITY	0.24	0.21	-0.35	-0.38	-0.12	0.27	0.41	1.0			
NNII	0.11	-0.29	0.24	-0.30	-0.34	0.15	0.33	-0.10	1.0		
GROWTH	0.34	-0.14	-0.13	0.09	0.35	0.29	0.18	0.22	-0.12	1.0	
INF	-0.31	0.44	0.36	0.19	0.34	-0.26	-0.07	-0.21	0.16	-0.47	1.0

Source: Author's Calculation

Table 5 presents the correlation matrix of the variables, illustrating relationships among indicators pertinent to the banking sector, geopolitical risk, and bank size. The ROA variable, a crucial indicator of bank profitability, is influenced by multiple factors. There exists a positive correlation of 0.197 between SIZE and ROA. In contrast, the positive correlation of 0.322 between GPR and NPL suggests that higher geopolitical risk is associated with higher bank credit risk. This initial finding indicates that political instability can adversely impact international capital flows and financial market conditions, subsequently raising banks' funding costs. Additionally, the negative correlation of 0.175 between GPR and ROA suggests that geopolitical risk could hinder credit performance and, in turn, reduce ROA.

Table 6 Two-step system GMM panel estimation regression results

Variable	Profitability Model		Risk Model	
	ROA	P>|z|	NPL	P>|z|
ROA(-1)	0.340*** (0.026)	0.000	-	-
NPL(-1)	-	-	0.418*** (0.036)	0.001
GPR	-0.317*** (0.329)	0.000	0.124*** (0.214)	0.001
SIZE	0.207*** (0.023)	0.000	-0.087** (0.181)	0.018
GPR*SIZE	0.139** (0.035)	0.021	-0.144** (0.032)	0.037
PRIVATE	0.128* (0.034)	0.063	-0.063** (0.299)	0.023
FOREIGN	0.195*** (0.051)	0.002	-0.141*** (0.052)	0.008
GPR*PRIVATE	-0.097** (0.188)	0.019	0.038** (0.047)	0.046
GPR*FOREIGN	-0.052** (0.921)	0.036	0.027* (0.558)	0.078
LOANS	0.306*** (0.033)	0.000	0.166*** (0.057)	0.000
DEPOSIT	0.283 (0.294)	0.69	-0.351*** (0.061)	0.000
SECURITY	0.124*** (0.350)	0.000	-0.073*** (0.028)	0.009
EQUITY	-0.017*** (0.154)	0.000	-0.345 ** (0.188)	0.029
NNII	0.052*** (0.141)	0.000	-0.037*** (0.013)	0.000
GROWTH	0.137*** (0.082)	0.000	-0.163*** (0.139)	0.000
INF	-0.164**	0.026	0.086***	0.005
	(0.107)		(0.023)	
N	450		450	
Number of Groups	25		25	
Number of Instr.	12		14	
AR(1) p-value	0.038		0.047	
AR(2) p-value	0.8753		0.229	
Hansen p-value	0.172		0.268	
Diff-in-Hansen p-Value	0.153		0.357	
Sargan p-value	0.1463		0.388	

Note:The instrument matrix is collapsed following Roodman (2009) with lag depth restricted to lags two through four, yielding 12 and 14 instruments for the Profitability and Risk models, respectively, both strictly below the number of cross-sectional units (N = 25). indicate significance at the 10%, 5% and 1% levels in the first-stage regression, respectively.

* p<0.1; ** p<0.05; *** p<0.01

Source: Author's Calculation

When examining the diagnostic tests for the models in Table 6, the AR(1) p-value is significant at the 5% level, while the AR(2) p-value is not statistically significant. The absence of second-order autocorrelation (AR(2)) in dynamic panel data analysis models is an important condition for the validity of instrumental variables. Furthermore, the Sargan test does not reject the null hypothesis that the model's instrumental variables are exogenous and correctly specified. This result indicates that the instrumental variables used in the model are valid.

First, in the profitability model, the coefficient on GPR is -0.317 and significant at the 1% level, indicating that GPR has a negative effect on ROA on average across all units in the panel. The SIZE variable, by contrast, has a positive coefficient of 0.207 and is significant at the 1% level. This indicates that size has a direct positive effect: profitability increases with scale. The coefficient of the GPR×SIZE interaction variable is 0.139 and is significant at the 5% level, which is critical. The fact that the conditional marginal effect of GPR on ROA ($\frac{\partial ROA}{\partial GPR} = \beta_{GPR} + \beta_{GPR \times SIZE} \cdot SIZE$) being positive indicates that the absolute value of GPR's negative effect decreases as size increases; in other words, geopolitical risk reduces the profitability of small banks more than that of large banks. The findings are consistent with those of Phan et al. (2022) and Kunjal & Suvvari (2024), but inconsistent with those of Banna et al. (2023).

In the profitability model, the impact of GPR is more pronounced for domestic private banks compared to state-owned banks (GPR×PRIVATE: -0.097). Conversely, the adverse effects are less severe for foreign banks (GPR×FOREIGN: -0.052). In the risk model, GPR increases NPL ratios more significantly in private and foreign banks than in state-owned banks (GPR×PRIVATE: 0.038, GPR×FOREIGN: 0.027). This indicates that geopolitical risks exert a more detrimental effect on the credit quality of private and foreign banks than on that of state-owned banks. According to Chiaramonte et al. (2025), the underlying reason for this disparity in performance lies in the differing strategic responses and funding capabilities across ownership structures in the face of geopolitical shocks. Profit-oriented private banks adopt a risk-averse approach during periods of uncertainty, especially when GPR rises, leading to tighter credit policies and reduced credit supply due to increased information asymmetry. This contraction exerts greater pressure on interest income, thus impacting profitability more severely than in the case of state-owned banks. In contrast, the resilience of foreign banks relative to domestic private banks derives from their global diversification, corporate and financial support from parent companies, and more advanced risk management techniques.

Most of the model's control variables are consistent with expectations. The SECURITY and LOANS variables are positive and significant at the 1% level. Increases in securities investments and credit supply enhance profitability. The coefficient of the EQUITY variable is negative and significant. Banks with more conservative balance sheets and lower leverage sacrifice profitability. The NNII variable is positive and significant, indicating that income diversification increases profitability. The DEPOSITS variable is positive but not statistically significant. Economic growth increases ROA; however, higher inflation reduces it.

The results of the risk model presented in Table 6 indicate that GPR has a destabilising effect by increasing credit risk (NPL), while bank size partially mitigates this effect. Firstly, the coefficient for the lagged value of the dependent variable (NPL(-1)) is 0.418 and is significant at the 1% level. This result indicates strong continuity in NPL. The coefficient for the GPR variable is 0.124 and is significant at the 1% level. Consistent with the studies by Alsagr & Hemmen, 2020; Yıldırım & Berkman, 2022; and Nguyen & Thuy, 2024, the findings show that an increase in GPR increases banks' NPL ratios, thereby undermining stability and credit quality. This finding indicates that the uncertainties created by geopolitical risks significantly impair the quality of banks' credit portfolios. Increases in GPR weaken borrowers' repayment capacity by disrupting the investment environment, creating volatility in exchange rates, and ultimately slowing economic activity. The coefficient of the SIZE variable is -0.087 and is significant at the 5% level. This result shows that, on average, larger banks have lower NPL ratios and that size has a protective effect on credit risk. Importantly, the coefficient of the GPRxSIZE interaction term is -0.144 and is significant at the 5% level. The fact that the conditional marginal effect of GPR on NPL ($\frac{\partial NPL}{\partial GPR} = \beta_{GPR} + \beta_{GPR \times SIZE} \cdot SIZE$) has a negative coefficient implies that as bank size increases, the positive effect of GPR on NPL weakens. In other words, size acts as a buffer/protective mechanism against GPR shocks. The findings are consistent with those of Phan et al. (2022) and Kunjal & Suvvari (2024).

Control variables yield results consistent with the expected direction, in line with other studies examining bank performance using GPR. The positive and statistically significant result at the 1% level for the CREDIT variable indicates that the NPL ratio increases with rising credit volume. The negative and statistically significant result for the DEPOSIT variable shows that banks with a high deposit base have relatively lower credit risks. The EQUITY and SECURITY variables are negative and significant. A stronger capital structure and higher securities investment reduce NPL ratios. The negative and significant coefficient on the NNII variable indicates that income diversification reduces credit risk. The GROWTH variable reduces credit risk. During periods of economic expansion, corporate profitability and household income levels increase. This situation reduces NPL ratios by increasing borrowers' capacity to meet their obligations. The INF variable, on the other hand, increases credit risk.

The results in Table 6 show that increases in GPR negatively affect bank performance, but that the GPR × SIZE interaction term mitigates this negative effect. However, because these results are based on a linear moderating effect, they do not fully reveal whether the GPR-performance relationship exhibits a threshold-like, nonlinear structure with respect to bank size. In other words, whether increases in GPR affect small banks and banks above a certain size to the same extent, and at what point sensitivity increases/decreases significantly, cannot be directly determined from two-stage GMM estimates. To answer this question and conduct an in-depth analysis of the two-stage GMM estimation results, Hansen's (1999) panel threshold model was applied. Threshold analysis enables the identification of internally determined threshold values for the SIZE variable, thereby allowing the separation of GPR effects across different size regimes.

Table 7 Hansen (1999) Panel Threshold Model Results

Model	Bank Size Regime	GPR Effect	GPR × SIZE Effect	Threshold Value
ROA				
	Small Banks (SIZE ≤ 7.63)	-0.188***	0.074	γ =7.63
		(-3.89)	(0.92)	
	Large Banks (SIZE >7.63)			
		-0.114*	0.041***	γ =7.63
		(-1.91)	(3.67)	
NPL				
	Small Banks (SIZE ≤ 8.24)	0.156***	-0.091	γ =8.24
		(4.67)	(-1.24)	
	Large Banks (SIZE >8.24)	0.087**	-0.052***	γ =8.24
		(2.43)	(-3.28)	

Note: The table reports the differential effects of GPR on bank performance across bank-size thresholds. Small (Large) banks are defined as those below (above) the endogenously determined threshold. Control variables included but not reported for brevity. t-statistics in parentheses.

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

Source: Author's Calculation

Table 7 presents the findings from the panel threshold model, revealing that bank size has a heterogeneous impact on bank profitability and stability regarding GPR. Firstly, in the profitability (ROA) model for small banks (SIZE ≤ 7.63), the GPR coefficient is -0.188, which is significant at the 1% level. This suggests that increases in GPR lead to a significant decline in the profitability of small banks. In this same regime, the coefficient for the GPRxSIZE variable is 0.074%, but it is not statistically significant. Thus, an increase in size does not alleviate the adverse effect of GPR on small banks. Conversely, in the regime of larger banks (SIZE > 7.63), the GPR coefficient is -0.114, significant only at the 10% level and of a lesser magnitude compared to small banks. Here, the GPRxSIZE coefficient is 0.041, which is significant at the 1% level. The results from the ROA model indicate that in banks with a market share exceeding a certain threshold, the negative impact of GPR on profitability diminishes as market share increases. In this larger bank regime, bank size serves as a buffer against GPR.

Upon examining the NPL model results, it is evident that, as with the ROA model, GPR has a greater adverse effect on smaller banks. Within the small banks category (SIZE ≤ 8.24), the GPR coefficient is 0.156, which is significant at all levels. In this context, the coefficient for the GPRxSIZE variable is -0.091 and is not statistically significant across all levels. This finding indicates that an increase in size below the 8.24% threshold among small banks does not meaningfully change the impact of GPR on NPL. Conversely, in the regime of larger banks (SIZE

> 8.24), the GPR coefficient is 0.087, significant at the 5% level. This suggests that while GPR elevates NPL in larger banks, the effect is weaker in comparison to that observed among small banks. Additionally, the GPR × SIZE moderator effect in this context is -0.052 and is significant. Thus, as bank size surpasses the 8.24 threshold, the negative influence of GPR on NPL diminishes considerably. This implies that, for banks within this larger category, increasing size serves to absorb some of the risks associated with the credit risk channel.

4.1. Dynamic Robustness of Threshold Analysis

Table 8 displays the results of the dynamic panel threshold model estimated according to Kremer et al. (2013), incorporating ownership structure as both direct control variables and interaction terms with GPR. This analysis serves as a robustness check of the static Hansen (1999) threshold estimates, addressing potential inconsistencies arising from applying a static framework to a dynamic relationship.

According to the results, the lagged dependent variables (L.ROA and L.NPL) are statistically significant, indicating that bank performance follows a dynamic process and that past performance is decisive for future performance. Furthermore, ownership structure (PRIVATE and FOREIGN) was included in the model both as a direct control variable and as interaction terms with GPR (GPR x PRIVATE, GPR x FOREIGN), thereby empirically testing the resilience or sensitivity of ownership type to geopolitical shocks.

The findings indicate that, particularly in the small bank regime ($SIZE \leq \gamma$), privately and foreign-owned banks exhibit higher profitability compared to state-owned banks in the reference group. However, due to the negative significance of the interaction terms with GPR, they are more adversely affected by increases in geopolitical risk. In the large bank regime, the reduction in the pressure of these interactions on profitability or their transformation into a protective effect in the risk model confirms that bank size acts as a financial shield that dominates the vulnerabilities arising from the ownership structure. Finally, the ownership effect test results confirm the model's explanatory power regarding ownership effects, revealing that the profitability and risk dynamics of private and foreign banks differ from those of state-owned banks at a statistically significant level.

Table 8 Dynamic Panel Threshold Model Results with Ownership Effects

	Profitability Model		**Risk Model**	
Variable	Small Banks (SIZE≤7.63)	Large Banks (SIZE>7.63)	Small Banks (SIZE≤8.24)	Large Banks (SIZE>8.24)
L.ROA/L.NPL	0.274** (0.031)	0.368** (0.034)	0.563** (0.047)	0.614* (0.051)
GPR	-0.218** (0.045)	-0.092* (0.054)	0.175** (0.041)	0.081** (0.037)
GPR x SIZE	0.091 (0.061)	0.057*** (0.020)	-0.108 (0.068)	-0.065*** (0.023)
SIZE	0.227** (0.032)	0.258** (0.035)	-0.102** (0.044)	-0.074** (0.039)
PRIVATE	0.185** (0.048)	0.142* (0.082)	-0.096* (0.071)	-0.058** (0.046)
FOREIGN	0.243** (0.084)	0.198* (0.089)	-0.124** (0.057)	-0.082** (0.048)
GPR x PRIVATE	-0.067** (0.052)	-0.038** (0.047)	0.045** (0.039)	0.031** (0.035)
GPR x FOREIGN	-0.039** (0.048)	0.052* (0.051)	0.061** (0.042)	-0.042** (0.038)
Observations	450		450	
Number of banks	25		25	
Number of instr.	19		21	
AR(1) p-value	0.038		0.021	
AR(2) p-value	0.891		0.247	
Hansen p-value	0.176		0.284	
Diff-in-Hansen	0.162		0.356	
Linearity Test (H_0: $\beta_1 = \beta_2$)	$\chi^2 = 24.73$*** (p- value=0.002)		$\chi^2 = 28.91$*** (p- value=0.000)	
Ownership Effect Test				
Private vs State	$\chi^2 = 8.26$** (p- value=0.014)		$\chi^2 = 6.32$** (p- value=0.042)	
Foreign vs State	$\chi^2 = 11.27$*** (p- value=0.002)		$\chi^2 = 9.75$** (p- value=0.017)	

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

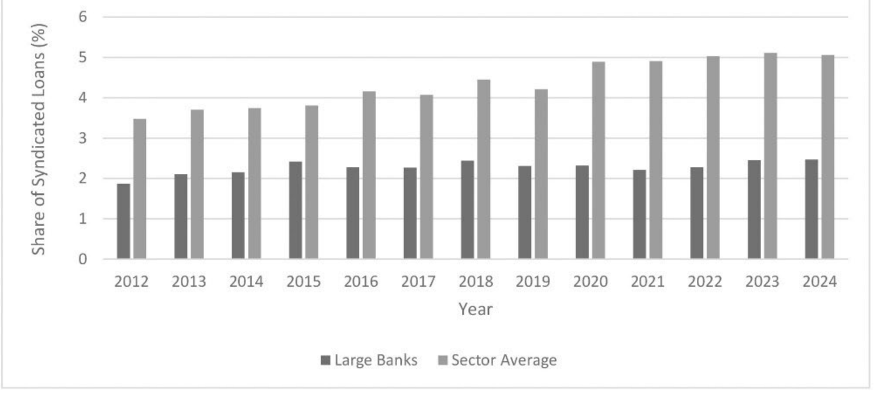
Source: Author's Calculation

5. DISCUSSION

In analyzing the varying effects of the GPR on sector performance, it is crucial to consider the differences in banks' funding structures. These varied impacts operate through a complex mechanism involving capital flows and the exchange-rate channel, as outlined in the existing literature. A shock to the GPR index can lead to capital outflows from emerging markets by diminishing global investors' risk appetite or by tightening international borrowing conditions. This tightening manifests through two primary mechanisms in the syndicated loan market. The first is the price effect. Syndicated loans are priced as the sum of the reference interest rate and an additional spread. An increase in the GPR naturally raises these syndication spreads, making the renewal of maturing syndicated loans more expensive. The second mechanism involves the maturity and amount effect.

In an uncertain environment brought about by the rise in GPR and the subsequent tightening of global liquidity, creditors may require shorter maturities and additional collateral. This scenario can hinder the ability to roll over maturing syndicated loans on the same terms and conditions, thereby increasing refinancing risk. Overall, these conditions adversely affect profitability by increasing funding costs and compressing net interest margins for banks that hold a significant share of syndicated loans in their total liabilities.

Figure 1 Share of Syndicated Loans in Total Funding



Source: Calculated by the author using BRSA data. (https://www.bddk.org.tr/BultenAylik/en)

Figure 1 shows the share of syndicated loans belonging to large banks (SIZE >7.63) in total liabilities and the sector average. The fact that this ratio is significantly lower in large banks than the sector average clearly limits the negative impact of a GPR shock on their balance sheets through these channels. Lower syndication dependence weakens the impact of increases in global risk premiums on the bank's funding costs and alleviates the pressure that uncertainty about the renewal of maturing syndications would create on liquidity management. This enables large banks to make more balanced balance-sheet adjustments during GPR periods, rather than experiencing a sharper contraction in credit supply. This structural advantage is complemented by the franchise value effect, which incentivises large banks to maintain more conservative risk profiles to protect their high charter values and avoid the systemic opportunity costs of potential distress. Moreover, while small banks often suffer from the withdrawal of funds by creditors reacting to noisy public signals such as earnings volatility and bad debts during geopolitical turmoil, large banks benefit from more stable relationships with informed wholesale financiers who recognise their superior asset quality. Furthermore, large banks' stable and strong deposit base increases their capacity to rely on internal resources amid deteriorating global conditions. This stability is reinforced by a flight-to-safety phenomenon, where depositors and investors reallocate capital to institutions perceived as "too big to fail" during geopolitical shocks to seek wealth protection. Large banks also utilise economies of scale and scope to diversify their operations geographically and across various products, allowing them to absorb regional GPR shocks more effectively than their smaller, more concentrated counterparts. Consequently, external financing shocks stemming from GPRs have a limited impact on large banks, both in terms of quantity constraints and pricing. Ultimately, the deterioration in profitability and risk indicators is less pronounced than that of smaller banks, reflecting their superior capacity to absorb shocks through diversified revenue streams, sophisticated risk management, and robust capital buffers.

The study's findings indicate that the negative impact of geopolitical risks on banking stability is limited for large banks. This indicates that the decline in profitability and the increase in the ratio of non-performing loans caused by an increase in GPR are more severe in small banks. Table 9 shows the market share of the ten largest banks in the Turkish banking sector by asset size and their sector shares. It is noteworthy that three of the four largest banks are state-owned banks. The most important reason for state-owned banks being less sensitive to GPR is the institutional advantages stemming from their ownership structures. The stability of state-owned banks compared to privately owned banks during periods of shock and uncertainty caused by GPR is explained in the theoretical literature by the framework defined as the “Insurance Function of State Ownership”. The key factor determining this situation is that the treasury support provided to state-owned banks during periods of increased GPR reinforces the perception that there is no risk of failure in the markets. This implicit guarantee makes state-owned banks a safe haven for depositors and investors. While state-owned banks gain a liquidity advantage through access to low-cost funds thanks to the ‘flight to quality,’ private banks struggle with increased funding costs.

Table 9 Ranking of Banks in the Turkish Banking Sector by Total Assets (2023)

Bank Name	**Total Assets (Turkish Lira)**	**Sector Share (%)**	**Ownership Status**
T.C Ziraat Bankası	4.95 trillion	16.22	State-Owned
Türkiye Vakıflar Bankası	3.5 trillion	11.47	State-Owned
Türkiye İş Bankası	3.10 trillion	10.16	Domestic Private
Halk Bankası	2.8 trillion	9.18	State-Owned
Garanti BBVA	2.4 trillion	7.86	Domestic+Foreign
Yapı Kredi Bankası	2.3 trillion	7.54	Domestic Private
Akbank	2.2 trillion	7.21	Domestic Private
QNB Finansbank	1.36 trillion	4.46	Domestic+Foreign
DenizBank	1.32 trillion	4.32	Domestic+Foreign
Türkiye Ekonomi Bankası	0.83 trillion	2.71	Domestic+Foreign
Total	24.76 trillion	81.13	

Source: Banking Regulation and Supervision Agency, https://www.bddk.org.tr/

Secondly, Phan et al. (2022), Nguyen & Thuy (2024), and Hodula et al. (2024) observed that during times of heightened GPR, banks tended to exhibit pro-cyclical behaviour by tightening credit supply. In contrast, state-owned banks displayed counter-cyclical behaviour. As instruments employed by the state to stimulate the economy during crises, state-owned banks continued to lend, serving as a systemic buffer. As highlighted by Chiaramonte et al. (2025), state-owned banks that remain in the market during periods of increased GPR not only strengthen their customer relationships and market share but also create the potential for generating more stable income through this customer base during normalisation periods.

6. CONCLUSION

This study investigates the impact of geopolitical risks on the profitability and risk indicators of 25 deposit banks operating in Türkiye, using annual data from 2006 to 2024. The analysis employs a two-stage system GMM and panel threshold models. In the profitability model, ROA is the dependent variable, and the risk model utilises the NPL variable to represent credit risk. The main findings from the dynamic panel models indicate that geopolitical risks adversely affect bank profitability and destabilise banks by increasing non-performing loans. However, the interaction term between bank size and geopolitical risk is significant in both models. Specifically, the positive interaction term in the profitability model suggests that larger banks are less impacted by geopolitical risks, whereas the negative coefficient of the interaction term in the risk model indicates that larger banks can maintain their credit quality during periods of heightened geopolitical risks, in contrast to smaller banks. Overall, both models demonstrate that bank size offers a protective buffer against geopolitical risks.

In the second stage of the analysis, the non-linear structure of the relationship between GPR and bank performance was investigated using a panel threshold model with bank size as the threshold variable. The findings revealed that in small banks with assets below a certain size, GPR reduced profitability more significantly and led to a greater increase in NPL ratios. In larger banks with assets above the threshold, the impact of geopolitical risks was weak, and this impact decreased with increasing size.

These findings highlight the need to consider small, fragile banks and bank size in the design of macroprudential policies and regulations targeting the banking sector. Countercyclical capital buffers should be applied more flexibly by differentiating debt-to-income and loan-to-value ratio limits for small banks. In this context, bank-based stress tests should be deepened to cover the GPR, and scale-sensitive policy tools should be designed, such as additional capital injections for small banks during periods of rising GPR and relaxation of reserve requirements. Large banks are relatively resilient, but given their systemic importance to the financial system, even a limited impact of geopolitical shocks on this group can be critical at the macro level. Therefore, the strict enforcement of governance standards and systemic capital requirements for large banks is critical. Furthermore, given the profitability-enhancing and non-performing loan-reducing effects of income diversification, technical capacity support and regulations that encourage non-interest income activities can be developed for all banks. Finally, integrating GPR into the regulatory and supervisory framework as an early-warning system will strengthen the capacity to respond proactively to shocks.

Future research may delve more deeply into the lagged effects of geopolitical risk by utilising monthly or quarterly data. By developing GPR metrics at the individual bank level, analyses can be enhanced based on banks' foreign currency positions, foreign trade financing, and international affiliate structures. In bank-centred studies, regression analysis that accounts for correlations among error terms can be employed. Additionally, panel smooth transition or NARDL models may be utilised to explore asymmetric effects. Moreover, the influence of varying bank ownership structures (state-owned, domestic private, foreign) on resilience to geopolitical risk can also be investigated.

Author Contributions: The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Funding: The research presented in the manuscript did not receive any external funding.

Conflict of interest: None.

Acknowledgement of the Use of Artificial Intelligence (AI) or AI-Based Tools: During the preparation of this paper, the author used Grammarly to improve language and readability.

REFERENCES

Adusei, M. (2015). Bank profitability: Insights from the rural banking industry in Ghana. *Cogent Economics & Finance*, *3*(1), 1078270. https://doi.org/10.1080/23322039.2015.1078270

Almualla, F., & Al-Gasaymeh, A. (2023). The impact of risk on banking sector profitability: Evidence from Middle East and North Africa. *Journal of Banking and Finance*, *47*(1), 89-110.

Alsadan, A., Alalmaee, H., Zehri, C., & Youssef, W. A. B. (2025). Global financial fragmentation under raised geopolitical risk. *International Economics and Economic Policy*, *22*(3), 44. https://doi.org/10.1007/s10368-025-00671-x

Alsagr, N., & Hemmen, S. V. (2020). Oil rent, geopolitical risk and banking sector performance. *International Journal of Energy Economics and Policy*, *10*(5), 305-314. https://doi.org/10.32479/ijeep.9668

Andriani, E., Ashsifa, I., & Kuncoro, M. T. (2024). How Geopolıtıcal, Credıt and Fınancıal Rısks Defıne Asean Banks ' Performance?. *Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA)*, *8*(2), 2087-2105. https://doi.org/10.31955/mea.v8i2.4297

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297. https://doi.org/10.2307/2297968

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), 29-51. https://doi.org/10.1016/0304-4076(94)01642-D

Balaylar, N. A., & Özdemir, M. O. (2018). TÜRKİYE'DE YERLİ MEVDUAT BANKALARINDA SERMAYE YETERLİLİĞİ VE KARLILIK İLİŞKİSİ. *Muhasebe ve Denetime Bakış*, *18*(54), 57-76. https://izlik.org/JA64HJ69TE

Balaylar, N. A., Karımlı, T., & Bulut, A. E. (2025). The effect of non-interest income on bank profitability and risk: Evidence from Turkey. *Revista galega de economía: Publicación Interdisciplinar da Facultade de Ciencias Económicas e Empresariais*, *34*(1), 1. https://doi.org/10.15304/rge.34.1.9855

Baltagi, B. H., Feng, Q., & Kao, C. (2012). A Lagrange Multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of Econometrics*, *170*(1), 164-177. https://doi.org/10.1016/j.jeconom.2012.04.004

Banking Regulation and Supervision Agency. (n.d.). *Banking Regulation and Supervision Agency*. Retrieved December, 2025, from https://www.bddk.org.tr/

Banks Association of Türkiye. (2023, October). *Key economic and banking indicators: Turkey – EU countries*. Retrieved December, 2025, from https://www.tbb.org.tr/sites/default/files/son-eklenenler/tr_ab_kiyaslama_raporu.pdf

Banna, H., Alam, A., Alam, A. W., & Chen, X. H. (2023). Geopolitical uncertainty and banking risk: International evidence. *Available at SSRN 4325966*. http://dx.doi.org/10.2139/ssrn.4325966

Blundell, R., Bond, S., & Windmeijer, F. (2001). Estimation in dynamic panel data models: improving on the performance of the standard GMM estimator. *Nonstationary panels, panel cointegration, and dynamic panels*, 53-91. https://doi.org/10.1016/S0731-9053(00)15003-0

Bond, S. R. (2002). Dynamic panel data models: a guide to micro data methods and practice. *Portuguese economic journal*, *1*(2), 141-162. https://doi.org/10.1007/s10258-002-0009-9

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The review of economic studies*, *47*(1), 239-253. https://doi.org/10.2307/2297111

Brignone, D., Gambetti, L., & Ricci, M. (2025). Geopolitical risk shocks: when size matters. *Bank of England Staff Working Paper Series*, (1118). https://doi.org/10.2139/ssrn.5227417

Bulut, A. E., Acar Balaylar, N., & Karimli, T. (2024). How does ownership structure affect the profitability of Turkish banks? A comparative analysis of determinants. *Public Sector Economics*, *48*(3), 337-361. https://doi.org/10.3326/pse.48.3.4

Caldara, D., & Iacoviello, M. (2022). Measuring geopolitical risk. *American economic review*, *112*(4), 1194-1225. https://doi.org/10.1257/aer.20191823

Chiaramonte, L., Mecchia, F., Paltrinieri, A., & Piserà, S. (2025). Does geopolitical risk affect bank lending behavior? Evidence from Europe. *The European Journal of Finance*, *31*(16), 2089-2113. https://doi.org/10.1080/1351847X.2025.2585959

Çelik, S. (2020). Günümüzde Türkiye'nin Jeopolitik Konumu. *Journal of International Social Research*, *13*(74). https://doi.org/10.17719/jisr.11169

Demir, E., & Danisman, G. O. (2021). The impact of economic uncertainty and geopolitical risks on bank credit. *The North American Journal of Economics and Finance*, *57*, 101444. https://doi.org/10.1016/j.najef.2021.101444

Fianto, B. A., & Ibrahim, M. H. (2025). Bank lending amid geopolitical risk: The GCC case. *Review of Financial Economics*, *43*(4), 608-628. https://doi.org/10.1002/rfe.70017

Gabbiadini, M., Meoli, M., & Vismara, S. (2025). Geopolitical risk and systemic risk in the European banking system. *Finance Research Letters*, 108796. https://doi.org/10.1016/j.frl.2025.108796

Gozgor, G., Tiwari, A. K., Demir, E., & Akron, S. (2019). The relationship between Bitcoin returns and trade policy uncertainty. *Finance Research Letters*, *29*, 75-82. https://doi.org/10.1016/j.frl.2019.03.016

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of econometrics*, *93*(2), 345-368. https://doi.org/10.1016/S0304-4076(99)00025-1

Hodula, M., Janků, J., Malovaná, S., & Ngo, N. A. (2024). *Geopolitical risks and their impact on global macro-financial stability: Literature and measurements* (No. 9/2024). BOFIT Discussion Papers. https://doi.org/10.2139/ssrn.4968346

Kremer, S., Bick, A., & Nautz, D. (2013). Inflation and growth: new evidence from a dynamic panel threshold analysis. *Empirical economics*, *44*(2), 861-878. https://doi.org/10.1007/s00181-012-0553-9

Kunjal, D., & Suvvari, A. R. (2024). Do Economic and Geopolitical Risks Matter for Banks' Lending Decisions, Credit Risk, Performance, and Stability in South Africa?. *Finance, Accounting and Business Analysis (FABA)*, *6*(1), 74-85.

Lamothe, P., Delgado, E., Solano, M. A., & Fernández, S. M. (2024). A global analysis of bank profitability factors. *Humanities and Social Sciences Communications*, *11*(1), 1-12. https://doi.org/10.1057/s41599-023-02545-6

Martins, A. M., Correia, P., & Gouveia, R. (2023). Russia-Ukraine conflict: The effect on European banks' stock market returns. *Journal of Multinational Financial Management*, *67*, 100786. https://doi.org/10.1016/j.mulfin.2023.100786

Maté, M., & Brizar, Z. (2024). Trends And Determinants of Cash Usage in Non-Eurozone Eu Member States. *Ekonomska misao i praksa*, *33*(1), 25-40. https://doi.org/10.17818/EMIP/2024/1.2

Mazgit, İ., & Balaylar, N. A. (2013). Türkiye'de Yabanci Sermayeli Bankalarin Etkinlik Analizi. *Yönetim ve Ekonomi Araştırmaları Dergisi*, *11*(21), 317-348. https://doi.org/10.11611/JMER218

Nguyen, T. C., & Thuy, T. H. (2024). Bank wholesale funding in an era of rising geopolitical risk. *The World Economy*, *47*(11), 4306-4330. https://doi.org/10.1111/twec.13620

Olalere, O. E., & Mukuddem-Petersen, J. (2024). Geopolitical risk, economic policy uncertainty, and bank stability in BRICS countries. *Cogent Economics & Finance*, *12*(1), 2290368. https://doi.org/10.1080/23322039.2023.2290368

Paltalidis, N., & Zhang, B. (2025). Geopolitical Risk and Bank Lending. *Available at SSRN 5284582*. https://doi.org/10.2139/ssrn.5284582

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics*, *22*(2), 265-312. https://doi.org/10.1002/jae.951

Phan, D. H. B., Tran, V. T., & Iyke, B. N. (2022). Geopolitical risk and bank stability. *Finance Research Letters*, *46*, 102453. https://doi.org/10.1016/j.frl.2021.102453

Podvorica, N., Hoti, A., & Gashi, P. (2025). FDI drivers in central Europe, the Baltics, and the Western Balkans: The role of macroeconomic and institutional factors. *Ekonomska misao i praksa*, 0-0. https://doi.org/10.17818/EMIP/2025/15

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, *9*(1), 86-136. https://doi.org/10.1177/1536867X0900900106

Srbinoski, B., Poposki, K., Born, P., & Kraft, M. (2025). Market Structure, Brokers, and Insurer Performance: Evidence from the Non-Life Insurance Market In North Macedonia. *Ekonomska misao i praksa*, *34*(2), 395-412. https://doi.org/10.17818/EMIP/2025/21

Stamopoulos, I. (2024). *Geopolitical Risk and Bank Profitability: Evidence from European Countries (2013-2023)* (Master's thesis).

Terraza, V. (2015). The effect of bank size on risk ratios: Implications of banks' performance. *Procedia Economics and Finance*, *30*, 903-909. https://doi.org/10.1016/S2212-5671(15)01340-4

Vuong, G. T. H., Nguyen, Y. D. H., Nguyen, M. H., & Wong, W. K. (2024). Assessing the impact of macroeconomic uncertainties on bank stability: Insights from ASEAN-8 countries. *Heliyon*, *10*(11). https://doi.org/10.1016/j.heliyon.2024.e31711

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of econometrics*, *126*(1), 25-51. https://doi.org/10.1016/j.jeconom.2004.02.005

Yıldırım, F., & Berkman, A. N. (2022). The impact of geopolitical risk index on the profitability performance of the banking sector. *Journal of Turkish Social Sciences Research/Türk Sosyal Bilimler Araştırmaları Dergisi*, *7*(2).

Ahsen Emir Bulut

Pomoćnik u istraživanju, Doktorski kandidat
Sveučilište Dokuz Eylül, Izmir, Turska
Odsjek za ekonomiju
E-mail: ahsenemir.bulut@deu.edu.tr
Orcid: https://orcid.org/0000-0003-3475-9456

GEOPOLITIČKI RIZIK I PERFORMANSE BANAKA U TURSKOJ: EMPIRIJSKI DOKAZI IZ DVOSTUPANJSKOG SUSTAVNOG GMM-A I PRAGOVNIH PANELNIH MODELA

Sažetak

Rad analizira utjecaj geopolitičkih rizika (GPR) na profitabilnost (ROA) i kreditni rizik (NPL) 25 depozitnih banaka u Turskoj u razdoblju 2006.–2024., s posebnim naglaskom na moderirajući učinak veličine banke (SIZE). Primjenom metoda Two-Step System GMM i panelnog praga utvrđeno je da povećanje GPR-a za 1 % smanjuje ROA za 0,32 %, a povećava NPL za 0,12 %. Rezultati pokazuju da veće banke učinkovitije ublažavaju negativne učinke. GPR ima izraženiji nepovoljan utjecaj na manje banke (SIZE ≤ 7,63) u pogledu profitabilnosti te snažnije povećava NPL (SIZE ≤ 8,24). Iznad tih pragova negativni učinci slabe, što se može pripisati ekonomiji obujma i naprednijem upravljanju rizicima. Također, struktura vlasništva ima važnu ulogu: privatne i strane banke uglavnom su profitabilnije i rizično stabilnije, dok državne banke pokazuju veću otpornost na geopolitičke šokove.

***Ključne riječi**: geopolitički rizik, performanse banke, dvostupanjski sustav GMM, prag panela.*

JEL klasifikacija: G21, F51, C23, G32.