Finance Research Letters 46 (2022) 102453

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Geopolitical risk and bank stability

Dinh Hoang Bach Phan [a,*], Vuong Thao Tran [b], Bernard Njindan Iyke [c]

[a] *Department of Economics, Finance and Marketing, La Trobe Business School, La Trobe University, Australia*
[b] *School of Economics, Finance and Marketing, RMIT University, Australia*
[c] *Monash Business School, Monash University, Australia*

ARTICLE INFO

Keywords:
Geopolitical risk
Perceived geopolitical risk
Realized geopolitical risk
Bank stability
Bank characteristics

ABSTRACT

In this paper, we present evidence supporting our hypothesis that geopolitical risk hurts bank stability. Using annual bank stability, bank-specific, macroeconomic, and geopolitical risk datasets, we show that an increase in geopolitical risk is associated with a decline in bank stability. This finding is robust to different geopolitical risk and bank stability measures, removing the period of extreme financial events, excluding banks with less than ten years of data, potential endogeneity issues, and controlling for other risk factors. Our results also emphasize the role of holding capital and bank size in attenuating the destabilizing effect of geopolitical risk.

1. Introduction

The outcomes of the 2020 US presidential election, the US-China relationship, the prolonged uncertainties associated with Brexit, continued instability in the Middle East, the impact of the ongoing refugee crisis throughout Europe, the social unrest in Hong Kong, among other important world events, have turned geopolitical risk into a 'top five' risk since 2016. This is according to the annual Systemic Risk Barometer Surveys conducted by the Depository Trust and Clearing Corporation (DTCC, 2021). Geopolitical risk surpassed cyber risk as the number one threat to global financial stability in 2020. The COVID-19 pandemic has heightened geopolitical risk stakes and made it even more unpredictable.

Given the increasing importance of geopolitical risk across the globe, several studies have focused on what geopolitical risk does to the macroeconomy (Clance et al., 2019), corporate decisions (Lee and Wang, 2021), stock markets dynamics (Caldara and Iacoviello, 2018), and to the prices of gold and oil (Bouoiyour et al., 2019; Gkillas et al., 2020). Nevertheless, not much scholarly attention has been paid to the impact of geopolitical risk on the fragility of the banking sector. Extant literature focuses on the effect of different macro-uncertainty indicators (e.g., political risk and economic policy uncertainty), but not geopolitical risk, on bank risk and performance (see Bordo et al., 2016; Biswas and Zhai, 2020). Geopolitical risk differs from other macroeconomic uncertainty indicators in the following significant ways and can, subsequently, create a different outcome for banking stability. First, it captures infrequent but cataclysmic events that may remain hidden for decades (Guttentag and Herring, 1997). Second, it covers all domestic and international affairs, distinct from other political instability indicators, which merely focus on domestic political issues (Alsagr and Almazor, 2020). Third, when compared with other macroeconomic events, geopolitical events (e.g., terrorist acts) are more difficult to predict (Dissanayake et al., 2020).

Taking these three distinct types of geopolitical risk into account, this study differentiates itself from prior studies by being the first to scrutinize the role of geopolitical risk in bank stability. Our study does not only enrich extant literature on bank stability determinants, but it also expands the growing research on the real and financial consequences of geopolitical risk (see Alsagr and

* Corresponding author.

https://doi.org/10.1016/j.frl.2021.102453
Received 15 February 2021; Received in revised form 19 August 2021; Accepted 13 September 2021
Available online 16 September 2021
1544-6123/

Almazor, 2020; Zhou et al., 2020; Demir and Danisman, 2021; Nguyen, 2021; Phan et al., 2021). Specifically, our study closely relates to but differs from Nguyen (2021) and Phan et al. (2021) because, unlike them, we consider the impact of geopolitical risk rather than economic policy uncertainty on bank stability. This empirical exploit is necessary, given that geopolitical risk is different from other forms of uncertainty, including economic policy uncertainty, and is shown to impact banks differently. For instance, Demir and Danisman (2021) show that, whereas economic uncertainty reduces overall bank credit growth in emerging economies, geopolitical risk does not. Our study is also closely related to Alsagr and Almazor (2020), Demir and Danisman (2021), and Zhou et al. (2020). However, it differs from them because it examines the direct impact of geopolitical risk on bank stability by using direct measures of bank stability. In contrast, these studies examine the implied impact of geopolitical risk on bank stability using measures of financial development, bank profitability, and credit growth. Unlike these studies (except Demir and Danisman, 2021), our analysis exploits micro-level data and thus explains how geopolitical risk affects the stability of individual banks.

We hypothesize that geopolitical risk reduces bank stability. Our hypothesis is inspired by studies showing that rising uncertainty causes panic in the financial market by reducing liquidity provision (Brunnermeier and Pedersen, 2009; Nagel, 2012). These studies argue that a rise in uncertainty creates additional risk premium requirements and thus forces financial institutions to remove substantial liquidity from the market. As argued by Phan et al. (2021), an increase in uncertainty leads to rising information asymmetry, making it difficult for lenders to differentiate good from bad borrowers, and thus causes reductions in lending, investment, and economic activity. Geopolitical risk is a form of uncertainty since it measures the likelihood of terrorist acts, wars, and tensions between states (see Caldara and Iacoviello, 2018). Hence, it will, like any other form of uncertainty, undermine financial markets and institutions.

Geopolitical risk is associated with negative investor sentiments; investors become increasingly worried about losing money, causing them to reorganize their portfolios by moving their investment from riskier investments to safer assets, thereby reducing liquidity, particularly among banks. Shleifer and Vishny (2010) proposed a theory of unstable banking, which shows that banks are influenced by investor sentiments. Banks make, securitize, distribute, and trade loans, hold cash, and borrow money, using their security holdings as collateral. Their theory predicts that bank credit and real investment will be volatile when market prices of loans are volatile and that any source of investor sentiment fluctuations can significantly undermine bank stability. Since geopolitical risk is linked to investor sentiment fluctuations, lower credit growth, profit variability, and higher probability of default (Brandt and Gao, 2019; Zhou et al., 2020), it is expected to make banks more unstable or fragile.

We test our hypothesis by assembling data on bank stability, geopolitical risk, bank-specific, and macroeconomic indicators. Our sample consists of 540 US banks covering the period from 1999 to 2019 (6848 bank–year observations).[1] Our empirical model regresses bank stability measures on geopolitical risk, bank-specific, and macroeconomic indicators. We find strong evidence supporting our hypothesis that geopolitical risk is a contributor to bank fragility (or overall risk). Specifically, we show that a percentage increase in geopolitical risk is associated with an approximately 0.71% to 5.10% decrease in the mean value of bank stability. This evidence is unaffected whether considering perceived or actual geopolitical risk. In addition, we observe that the effect of actual geopolitical risk on bank stability is stronger than perceived geopolitical risk. Our findings are also robust when excluding the global financial crisis (GFC) period (2007–2009), post-GFC period, excluding banks with less than ten years of data, and controlling for endogeneity issues. Further, we document that large, well-capitalized, and low deposits-to-asset ratio banks appear to suffer less from the destabilizing effect of geopolitical risk. This evidence supports the contention that capital is an effective instrument for enhancing bank stability. Moreover, we demonstrate that geopolitical risk increases bank instability by reducing bank profitability, which is consistent with theoretical predictions. Theoretically, geopolitical risk induces investor sentiment fluctuations, which elevates the probability of default, and lowers credit growth and profitability (Brandt and Gao, 2019; Zhou et al., 2020). Investors and banks alike become very concerned about losing their investments in times of heightened geopolitical risk and hence reorganize their portfolios, shifting their investment from riskier to safer assets, which reduces liquidity and increases the likelihood of bank failures (Shleifer and Vishny, 2010).

We proceed as follows. Section 2 outlines the data sources and variables. Section 3 presents the model and the empirical analysis, including the baseline results, additional tests, and robustness checks. Section 4 concludes the paper.

2. Data

Our empirical estimations draw on three main sets of data from the US. The first is bank stability dataset. We follow the literature (see, e.g., Laeven and Levine, 2009) and use Z-score as our main measure of bank stability. We compute Z-score as ($ROA + Equity/Assets$)/σ_{ROA}, where *ROA* is the return-on-assets ratio and σ_{ROA} is its standard deviation. In line with this literature, we also use σ(*ROA*), σ*(ROE)*, and non-performing loans to total loans ratio (*NPL*) as the alternative measures of bank stability. A higher Z-score means higher bank stability, while a higher σ(*ROA*), σ(*ROE*) and *NPL* indicates lower bank stability. We collect this data from the Osiris database.

Second, we collect bank-specific and macroeconomic control variables that can affect bank stability, according to the literature (see Phan et al., 2021). We use five bank-specific variables, namely total assets *(TA)*, equity ratio *(ER)*, loan ratio *(LR)*, deposit ratio *(DR)*,

[1] We believe the US is best placed for examining issues like the impact of geopolitical risk on bank stability because the geopolitical risk index used in this paper is based on US-centric data (i.e. US-based newspapers) and thus is more reflective of US-related information (see Caldara and Iacoviello, 2018). Furthermore, the US is the benchmark for most economic analyses, boasting the world's largest banking system and a benchmark currency.

loan loss provision ratio (*LLP*) and two macroeconomic variables, namely the growth rate of gross domestic product per capita (*GDP*) and inflation rate (*INF*). We collect data on the bank-specific variables from the Osiris database and the macroeconomic variables from the World Bank database. Table 1 reports the details about the variables' construction. Considering data availability, we use annual data ranging from 1999 to 2019. We only keep banks that have data on all the variables used in our empirical analysis. Our sample consists of 540 banks and 6848 bank–year observations. Our data are winsorized at the 1st and 99th percentiles to remove outliers.

Finally, we use the GPR index developed by Caldara and Iacoviello (2018) to measure geopolitical risk. The index is constructed based on the number of geopolitical-tension-related words that appeared in 11 of the foremost international newspapers. The GPR index is computed as the number of articles linked to geopolitical risk in each newspaper for each month relative to the total number of news articles. Fig. 1 plots the daily GPR index from January 1999 to December 2019. We observe that the GPR index shows spikes after the 9/11 terrorist attacks, through the 2003 Iraq invasion, Iran nuclear tension, and after the Paris terrorist attack. We compute the growth rate of GPR_t as $ln(GPR_t/GPR_{t-1})$, where GPR_t is the geopolitical risk index at time *t*.

Table 2 reports selected summary statistics of our variables. On average, GPR grew by 2.2% per annum. When considering bank stability measures, the average Z-score is 52.08, which strongly suggests that *ROA* has to drop by 52 times its standard deviation to deplete bank equity. The means of σ(*ROA*) and σ(*ROE*) are 0.003 and 0.03, respectively. The proportion of non-performing loans over total loans is 1.4%. These figures are in line with previous studies (i.e., Fang et al., 2014). The average bank size is $12.5 billion, while the equity, net loans, deposits, and loan loss provision, respectively, equal 10.2%, 65.9%, 78.1%, and 0.3% of bank total assets.

3. Empirical analysis

3.1. Baseline results

To examine the impact of geopolitical risk on bank stability, we estimate the following regression model:

$$Bank\_Stability_{i,t} = \alpha + \beta_1 GPR_t + \beta_2 Ln\_TA_{i,t} + \beta_3 Ln\_ER_{i,t} + \beta_4 Ln\_LR_{i,t} + \beta_5 Ln\_LLP_{i,t} + \beta_6 Ln\_DR_{i,t} + \beta_7 GDP_t + \beta_8 INF_t + \varepsilon_{i,t} \tag{1}$$

where *Bank_Stability* is bank stability measured by Ln(Z-score), σ(*ROA*), σ(*ROE*), and *NPL; GPR_t* is the geopolitical risk index growth rate at *t*; Ln_*TA* is the logarithm of total assets; Ln_*ER* is the logarithm of equity ratio; Ln_*LR* is logarithm of loan ratio; Ln_*LLP* is the logarithm of loan loss provision ratio; Ln_*DR* is the logarithm of deposit ratio; *GDP* is GDP per capita growth rate; *INF* is the inflation rate. Based on our hypothesis that geopolitical risk negatively affects bank stability, we expect a negative β_1 when using the Ln*(Z-score)* measure and a positive β_1 when using the σ*(ROA)*, σ*(ROE)*, and *NPL* measures of bank stability. The regression model controls for both bank and year fixed effects (based on the Hausman test) and clusters the standard errors at the bank[2] and year levels.

Table 3 reports our results. We observe that *GPR* is negatively and significantly associated with the Ln*(Z-score)*, supporting our hypothesis that an increase in geopolitical risk will weaken bank stability. The coefficient of *GPR*, β_1, is −3.351 and statistically significant at the 1% level. Hence, a percentage increase in geopolitical risk is associated with an approximately 0.034 decrease in bank stability (measured as Ln*(Z-score)*), which is equivalent to 0.85% of its mean value. This finding is consistent with the other three bank stability measures, namely σ*(ROA)*, σ*(ROE)*, and *NPL*. The *GPR* coefficient, β_1, is positive and statistically significant when using each of these measures of bank stability as expected. We find that a percentage increase in the geopolitical risk associates with an increase in the three bank stability measures by between 0.71% and 5.10% of their mean values. We also find that the control variables are statistically significant in at least three out of four regressions, confirming that they are important drivers of bank stability.

Next, we examine the profitability mechanism through which *GPR* might affect bank stability (see Brandt and Gao, 2019; Zhou et al., 2020). To examine this channel, we conduct subsample analyses for banks with high versus low profitability; accordingly, we divided the sample into low and high profitability (measured by *ROA* and *ROE*) using the sample median as a cut-off. The results, which are reported in Table 4, reveal that the effect of *GPR* on bank stability is stronger in banks with low profitability. We find that the magnitudes of the *GPR* coefficients of such banks are higher than those of the highly profitable banks for all four measures of bank stability and two measures of bank profitability. In terms of the statistical significance of the differences, we report the χ^2-statistic and associated *p*-values for the test of equality of the *GPR* coefficients across the two sub-samples in the last rows of the two panels in Table 4. These results suggest that the differences are statistically significant in three out of four cases (75%) in both Panels A and B.

3.2. Additional tests

3.2.1. Realized and perceived geopolitical risks

The baseline estimates in Table 3 consider the effect of aggregate geopolitical risk on bank stability. However, geopolitical risk can be perceived or realized, and these dimensions may influence bank stability differently. Hence, we take the analysis further by isolating the effect of perceived (threats) from realized geopolitical risk (acts) on bank stability. We achieve this using the *GPR_Threat* and *GPR_Act* indices, which measure potential and actual geopolitical events (Caldara and Iacoviello, 2018). Table 5 reports the estimates based on these two measures. Consistent with the baseline, these estimates suggest that an increase in geopolitical risk, whether perceived or realized, is associated with a decline in bank stability. The effect of realized geopolitical risk on bank stability is stronger than (almost double) perceived geopolitical risk.

[2] As a robustness test, we control the standard errors at the regional level and the results do not change. The results are available upon request.

Table 1
Definitions of variables.

Variable	Definition	Data source
Geopolitical risk measures		
GPR	Growth rate of Geopolitical Risk Index	Caldara and Iacoviello (2018)
GPR_Threat	Growth rate of Geopolitical Threat Index	Caldara and Iacoviello (2018)
GPR_Act	Growth rate of Geopolitical Acts Index	Caldara and Iacoviello (2018)
Bank stability measures		
Z-score	Computed as the sum of ROA and equity-to-asset ratio divided by the standard deviation of ROA over the past three years.	Osiris Database
σ(ROA)	Standard deviation of ROA over the past three years	Osiris Database
σ(ROE)	Standard deviation of ROE over the past three years	Osiris Database
NPL	Ratio of non-performing loans over total loans	Osiris Database
Bank characteristic variables		
TA	Total assets	Osiris Database
ER	Ratio of total equity over total assets	Osiris Database
LR	Ratio of net loans over total assets	Osiris Database
DR	Ratio of total deposits over total assets	Osiris Database
LLP	Ratio of total loan loss provision over total assets	Osiris Database
Macroeconomic variables		
GDP	GDP per capita growth rate	World Bank Database
INF	Annual growth rate of consumer price index	World Bank Database

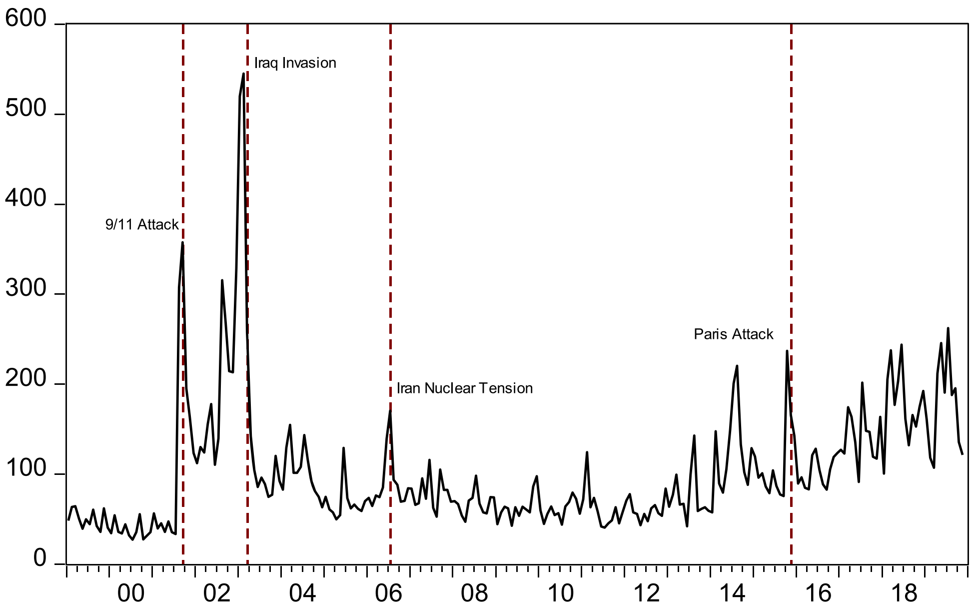

Fig. 1. Geopolitical risk index. This figure plots the daily geopolitical risk index from January 1999 to December 2019.

3.2.2. Roles of bank characteristics

There is clear evidence in the literature that bank size, equity capital, and funding structure are important determinants of how much risk they may have to bear (Zheng and Cronje, 2019; Davydov et al., 2021). Banks of different sizes, capital, and funding structures are expected to differ in their response to GPR variations. To further understand the relationship between GPR and bank stability in the presence of these bank-specific characteristics, we re-estimate the regressions in a number of sub-samples as follows.

First, we divide the whole sample into large and small banks using the sample median as a cut-off. In Panel A of Table 6, we report the results for size panels using four different measures of bank stability. There is strong evidence across the board that the destabilizing effect of GPR appears to be economically stronger for small banks than their counterparts. Taking the results using the Ln*(Z-score)* measure as an illustration, the magnitude of the *GPR* coefficient for small banks is almost one and a half that for large banks (−4.717 versus −3.344). In the last row of Panel A in Table 6, we report the χ^2-statistic and associated *p*-values for the test of equality of the *GPR* coefficients. The results suggest that the differences in the *GPR* coefficients for both large and small banks are statistically significant in all cases. This finding can be explained by the well-known "franchise value effect" theory. Large banks are likely to enjoy

Table 2
Descriptive statistics. This table reports selected descriptive statistics of variables. Note that SD, 25th, and 75th denote standard deviation, 25th' and 75th percentiles, respectively.

	Observation	Mean	SD	Median	25th	75th
Geopolitical risk measures						
GPR	6848	0.022	0.450	−0.014	−0.331	0.173
GPR_Threat	6848	0.026	0.447	0.020	−0.354	0.282
GPR_Act	6848	−0.020	0.682	−0.079	−0.453	0.459
Bank stability measures						
Z-score	6848	52.083	66.434	30.942	14.837	61.121
σ(ROA)	6848	0.003	0.004	0.001	0.001	0.002
σ(ROE)	6848	0.030	0.063	0.012	0.006	0.025
NPL	6848	0.014	0.019	0.008	0.004	0.016
Bank characteristic variable						
TA ($billion)	6848	12.500	37.800	1.448	0.606	4.962
ER	6848	0.102	0.029	0.099	0.084	0.116
LR	6848	0.659	0.133	0.679	0.597	0.750
DR	6848	0.781	0.095	0.799	0.738	0.847
LLP	6848	0.003	0.006	0.002	0.001	0.003
Macroeconomic variables						
GDP (%)	6848	1.318	1.437	1.709	0.842	2.132
INF (%)	6848	2.091	1.051	2.130	1.586	2.853

Table 3
Baseline results. This table reports the results for the effect of geopolitical risk on bank stability based on the following regression model: $Bank\_Stability_{i,t} = \alpha + \beta_1 GPR_t + \beta_2 Ln\_TA_{i,t} + \beta_3 Ln\_ER_{i,t} + \beta_4 Ln\_LR_{i,t} + \beta_5 Ln\_LLP_{i,t} + \beta_6 Ln\_DR_{i,t} + \beta_7 GDP_t + \beta_8 INF_t + \varepsilon_{i,t}$ where *Bank_Stability* is bank stability measured by Ln*(Z-score),* σ*(ROA),* σ*(ROE*), and *NPL;* GPR_t is the geopolitical risk index growth rate; Ln_*TA* is the logarithm of total asset; Ln_*ER* is the logarithm of equity ratio; Ln_*LR* is logarithm of loan ratio; Ln_*LLP* is the logarithm of loan loss provision ratio; Ln_*DR* is the logarithm of deposit ratio; *GDP* is GDP per capita growth rate; *INF* is the inflation rate. The coefficients and their *p*-values are reported outside and inside the parentheses, respectively. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*
GPR	−3.351***	0.009***	0.153***	0.010***
	(0.000)	(0.000)	(0.000)	(0.006)
Ln_TA	0.401***	−0.002***	−0.024***	0.000
	(0.000)	(0.000)	(0.000)	(0.695)
Ln_ER	0.626***	0.000	−0.057***	−0.009***
	(0.000)	(0.285)	(0.000)	(0.000)
Ln_LR	0.369***	−0.002***	−0.031***	−0.010***
	(0.001)	(0.000)	(0.000)	(0.000)
Ln_LLP	−0.334*	0.002***	0.033***	0.004*
	(0.077)	(0.005)	(0.005)	(0.061)
Ln_DR	−27.427***	0.104***	0.950***	1.588***
	(0.000)	(0.000)	(0.001)	(0.000)
GDP	−0.416***	0.000*	0.005*	−0.001
	(0.000)	(0.067)	(0.099)	(0.242)
INF	5.208***	−0.012***	−0.198***	−0.012**
	(0.000)	(0.000)	(0.000)	(0.016)
Constant	−11.180***	0.053***	0.665***	0.006
	(0.000)	(0.000)	(0.000)	(0.715)
Year fixed effect	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes
Observations	6848	6848	6848	6848
Adjusted *R*-squared	0.472	0.428	0.413	0.682

higher franchise or charter values. To ward off the loss of these values and significant opportunity costs that these banks encounter when bank runs occur, they tend to be conservative and avoid excessive risk-taking actions (Keeley, 1990; Hellmann et al., 2000; Repullo, 2004; Allen and Gale, 2004). Reducing risk-taking behaviours as a result of bank size will offset the marginal destabilizing effect of GPR.

Next, to examine the potential differential impacts of bank capitalization and funding structure level on the GPR–bank stability nexus, we re-estimate the regressions separately for high and low subsamples. This is based on the ratio of equity capital to total assets and the ratio of deposits to total assets, using the sample median as a cut-off. Results are reported in Panel B and C of Table 6, respectively. Despite varying degrees of economic and statistical significance, GPR is found to have a destabilizing impact on banks irrespective of their capitalization and deposit level. From Panel B, we document strong evidence for the risk absorption role of capital previously reported in the literature (Zheng and Cronje, 2019). Capital is found to counter the negative impact of geopolitical risk on bank stability, evidenced by *GPR* coefficients' smaller magnitude across the board for banks with a stronger capital position. In general, our findings lend support to the risk-absorption framework that higher capital expands banks capacity to absorb liquidity shocks,

Table 4

Channel test—profitability. This table reports the effect of geopolitical risk on bank stability for different panels based on bank profitability (ROA and ROE). The sample is divided into low and high profitability based on the sample median. The coefficients of *GPR* and their *p*-value are reported outside and inside the parentheses, respectively. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The last rows of the table provide the χ2-statistic and associated p-values for the test of equality of the GPR coefficients across the sub-samples.

Panel A: ROA								
	Ln(Z-score)		*σ(ROA)*		*σ(ROE)*		*NPL*	
	Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
GPR	−3.334***	−2.781***	0.011***	0.004***	0.173***	0.063***	0.017***	−0.009**
	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.018)	(0.023)
Bank variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3424	3424	3424	3424	3424	3424	3424	3424
Adjusted *R*-squared	0.530	0.356	0.475	0.382	0.470	0.352	0.694	0.532
χ2 (*p*-value)	0.49 (0.484)		5.08 (0.024)		8.06 (0.005)		11.77 (0.001)	
Panel B: ROE								
	Ln(Z-score)		*σ(ROA)*		*σ(ROE)*		*NPL*	
	Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
GPR	−3.757***	−3.569***	0.014***	0.006***	0.211***	0.105***	0.021**	−0.002
	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.015)	(0.721)
Bank variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3424	3424	3424	3424	3424	3424	3424	3424
Adjusted *R*-squared	0.550	0.381	0.473	0.375	0.459	0.426	0.724	0.580
χ2 (*p*-value)	0.05 (0.829)		7.97 (0.005)		6.10 (0.014)		5.80 (0.016)	

Table 5

Geopolitical acts versus geopolitical threats. This table reports the results of comparing the effect of realized and perceived GPR on bank stability using the following regression model: $Bank_Stability_{i,t} = \alpha + \beta_1 GPR_Threat_t + \beta_2 GPR_Act_t + \beta_3 Ln_TA_{i,t} + \beta_4 Ln_ER_{i,t} + \beta_5 Ln_LR_{i,t} + \beta_6 Ln_LLP_{i,t} + \beta_7 Ln_DR_{i,t} + \beta_8 GDP_t + \beta_9 INF_t + \varepsilon_{i,t}$The coefficients of GPR measures and their *p*-values are reported outside and inside the parentheses, respectively. *** denotes significance at the 1% level.

	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*
GPR_Threat	−2.732***	0.007***	0.125***	0.008***
	(0.000)	(0.000)	(0.000)	(0.006)
GPR_Act	−4.904***	0.013***	0.224***	0.015***
	(0.000)	(0.000)	(0.000)	(0.006)
Bank specific variables	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes
Observations	6848	6848	6848	6848
Adjusted *R*-squared	0.472	0.428	0.413	0.682

thereby reducing the destabilizing effect of GPR.

Turning to Panel C, we find that the fragility effect of GPR appears to be weaker in the group of banks that rely less on non-traditional funding sources for their lending activities (i.e. a group of banks with lower deposits-to-assets ratios). Since equity capital crowds out deposits needed to provide funds, according to Diamond and Rajan (2001) and Gorton and Winton, (2000), this outcome is perhaps not surprising. It follows that banks with a smaller deposit-to-asset ratio are likely to be well capitalized. For these banks, their high capital levels enable them to absorb risk and thus make them less fragile entities, which lessens the negative impact of GPR on bank stability.

3.3. Robustness tests

We conduct five robustness checks to validate our findings. First, banks are generally less stable during financial crises and several studies find that the GFC (2007–2009) greatly affected financial stability (i.e., Caballero and Krishnamurthy, 2009). Therefore, we purge the GFC period from our data as our first robustness test. We also rerun our regressions using the post-GFC (i.e., 2010–2019) sub-sample. Next, banks with several years of missing observations could be biasing our estimates, and for this reason, we purge banks with less than ten years of data. We next apply a two-stage least squares (instrumental variables) approach to control for any potential

Table 6
Roles of bank characteristics. This table reports the effect of geopolitical risk on bank stability based on different bank characteristics. Banks are sorted based on their sizes (small and large), capital structure (low and high equity capital to total asset ratios), and funding structure (low and high deposit to total asset ratios). The coefficients of *GPR* and their *p*-values are reported outside and inside the parentheses, respectively. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The last rows of the table provide the χ2-statistic and associated p-values for the test of equality of the GPR coefficients across the sub-samples.

Panel A: Role of bank size								
	Ln(Z-score)		*σ(ROA)*		*σ(ROE)*		*NPL*	
	Small	*Large*	*Small*	*Large*	*Small*	*Large*	*Small*	*Large*
GPR	−4.717***	−3.344**	0.017***	0.009***	0.264***	0.127***	0.022***	0.005
	(0.000)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.296)
Bank variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3424	3424	3424	3424	3424	3424	3424	3424
Adjusted *R*-squared	0.539	0.451	0.499	0.394	0.483	0.367	0.694	0.682
χ2 (*p*-value)	3.20 (0.074)		9.68 (0.002)		11.05 (0.001)		4.03 (0.045)	
Panel B: Role of bank capital structure								
	Ln(Z-score)		*σ(ROA)*		*σ(ROE)*		*NPL*	
	Capital_Low	*Capital_High*	*Capital_Low*	*Capital_High*	*Capital_Low*	*Capital_High*	*Capital_Low*	*Capital_High*
GPR	−5.375***	−2.124***	0.015***	0.005***	0.272***	0.042*	0.031***	−0.011**
	(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.053)	(0.000)	(0.044)
Bank variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3424	3424	3424	3424	3424	3424	3424	3424
Adjusted *R*-squared	0.521	0.483	0.484	0.477	0.520	0.381	0.736	0.640
χ2 (*p*-value)	15.74 (0.000)		16.71 (0.000)		32.28 (0.000)		21.86 (0.000)	
Panel C: Role of bank funding structure								
	Ln(Z-score)		*σ(ROA)*		*σ(ROE)*		*NPL*	
	Deposit_Low	*Deposit_High*	*Deposit_Low*	*Deposit_High*	*Deposit_Low*	*Deposit_High*	*Deposit_Low*	*Deposit_High*
GPR	−2.184***	−4.778***	0.006***	0.014***	0.083***	0.235***	−0.008	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.112)	(0.000)
Bank variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3424	3424	3424	3424	3424	3424	3424	3424
Adjusted *R*-squared	0.422	0.543	0.46	0.472	0.357	0.497	0.662	0.719
χ2 (*p*-value)	11.95 (0.001)		8.51 (0.004)		15.74 (0.000)		26.87 (0.000)	

endogeneity issue. As suggested by other research (Baker and Bloom, 2013; Bilgin et al., 2021), we use terrorist attacks as an instrumental variable. Specifically, we use the growth rate of the number of terrorist attacks in the US (downloaded from Global Terrorism Database[3]) and its one-year lag as instrumental variables for GPR. The results from the first stage regression model reported in Panel D Table 7 show that terrorist attacks significantly explain GPR, suggesting our instrumental variables are relevant. To test for the exogeneity of the instrumental variables, we perform the overidentification test and report the χ2 of the Sargan score and its p-value. The results indicate that our instrumental variables are exogenous. In the final robustness test, we control for the effect of other risks on bank stability. Specifically, we add the growth of the economic policy uncertainty index (constructed by Baker et al., 2016), the growth of the US equity market volatility index (constructed by Baker et al., 2019), and the growth of religious tension index (downloaded from World Bank Database) to our regression models. The results of these robustness tests are reported in Table 7. Our finding that an increase in geopolitical risk is associated with a decline in bank stability is neither influenced by the GFC, missing observations, endogeneity, or other risks.

4. Concluding remarks

We hypothesized that geopolitical risk reduces bank stability. To test our hypothesis, we assembled annual bank-specific and macroeconomic, and geopolitical risk datasets covering the period 1999 to 2019. We find strong and consistent evidence that GPR is associated with higher bank frailty across a broad range of bank stability measures. We show that this finding remains intact regardless of the types of geopolitical risk. However, the negative effect of realized geopolitical risk on bank stability is stronger than perceived geopolitical risk. We further show that our estimates are robust when excluding the GFC period, banks with less than ten years of data, and when controlling for endogeneity and other risks. Finally, we confirm that the detrimental impact of GPR on bank stability is less

[3] https://www.start.umd.edu/gtd/

Table 7
Robustness tests. This table reports the results of five robustness tests. In the first test, we remove the observations during the Global Financial Crisis (2007–2009). In the second test, we use the sub-sample 2010–2019 period. Next, we remove banks with less than ten years of data. Fourth, we use the 2SLS (instrumental variables) approach to control for a potential endogeneity issue. Finally, we control the effect of other risks. The coefficients of *GPR* and their *p*-values are reported outside and inside the parentheses, respectively. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Remove GFC period					
	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*	
GPR	−3.217***	0.008***	0.140***	0.010***	
	(0.000)	(0.000)	(0.000)	(0.007)	
Bank variables	Yes	Yes	Yes	Yes	
Macroeconomic variables	Yes	Yes	Yes	Yes	
Year fixed effect	Yes	Yes	Yes	Yes	
Bank fixed effect	Yes	Yes	Yes	Yes	
Observations	5829	5829	5829	5829	
Adjusted R-squared	0.472	0.443	0.450	0.641	
Panel B: Sub-sample 2010–2019					
	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*	
GPR	−0.933***	0.003***	0.042**	0.039***	
	(0.002)	(0.005)	(0.027)	(0.000)	
Bank variables	Yes	Yes	Yes	Yes	
Macroeconomic variables	Yes	Yes	Yes	Yes	
Year fixed effect	Yes	Yes	Yes	Yes	
Bank fixed effect	Yes	Yes	Yes	Yes	
Observations	3787	3787	3787	3787	
Adjusted R-squared	0.590	0.549	0.589	0.724	
Panel C: Remove banks with a low number of observations					
	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*	
GPR	−3.696***	0.009***	0.154***	0.010**	
	(0.000)	(0.000)	(0.000)	(0.020)	
Bank variables	Yes	Yes	Yes	Yes	
Macroeconomic variables	Yes	Yes	Yes	Yes	
Year fixed effect	Yes	Yes	Yes	Yes	
Bank fixed effect	Yes	Yes	Yes	Yes	
Observations	5852	5852	5852	5852	
Adjusted R-squared	0.445	0.414	0.397	0.644	
Panel D: Two-stage least squares					
	Stage 1	*Stage 2*			
		Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*
$TERR_{(t)}$	0.035***				
	(0.002)				
$TERR_{(t-1)}$	0.133***				
	(0.000)				
GPR		−2.269***	0.001**	0.017**	0.009***
		(0.001)	(0.012)	(0.037)	(0.003)
Sargan χ2 (*p*-value)		0.192 (0.661)	0.056 (0.812)	0.105 (0.746)	1.608 (0.205)
Bank variables	Yes	Yes	Yes	Yes	Yes
Macroeconomic variables	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	6282	6282	6282	6282	6282
Adjusted R-squared	0.087	0.148	0.102	0.127	0.404
Panel E: Control for other risks					
	Ln(Z-score)	*σ(ROA)*	*σ(ROE)*	*NPL*	
GPR	−3.190***	0.008***	0.149***	0.009***	
	(0.000)	(0.000)	(0.000)	(0.006)	
Bank variables	Yes	Yes	Yes	Yes	
Macroeconomic variables	Yes	Yes	Yes	Yes	
Year fixed effect	Yes	Yes	Yes	Yes	
Bank fixed effect	Yes	Yes	Yes	Yes	
Observations	6848	6848	6848	6848	
Adjusted R-squared	0.472	0.428	0.413	0.682	

pronounced for the groups of large banks, well-capitalized banks, and banks with lower deposit-to-asset ratios compared to their counterparts. Our findings lend support to the benefit of capital holding in controlling bank risk.

CRediT authorship contribution statement

Dinh Hoang Bach Phan: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Vuong Thao Tran:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Bernard Njindan Iyke: Conceptualization, Writing – original draft, Writing – review & editing, Visualization.

Acknowledgments

This research is funded by La Trobe University under the grant ASSC-2020-RSU20-PHAN.

References

Alsagr, N., Almazor, S.F.V.H., 2020. Oil rent, geopolitical risk and banking sector performance. Int. J. Energy Econ. Policy 10 (5), 305–314.
Baker, S., Bloom, N., 2013. Does Uncertainty Reduce growth? Using disasters As Natural experiments, Working paper. National Bureau of Economic Research.
Baker, S., Bloom, N., Davis, S., 2016. Measuring economic policy uncertainty. Q. J. Econ. 131 (4), 1593–1636.
Baker, S., Bloom, N., Davis, S., Kost, K., 2019. Policy News and Stock Market volatility, Working paper. Stanford University.
Bilgin, M., Danisman, G., Demir, E., Tarazi, A., 2021. Economic uncertainty and bank stability: conventional vs. Islamic banking. J. Financ. Stability 56, 100911.
Biswas, S., Zhai, W., 2020. Economic policy uncertainty and cross-border lending. J. Corpor. Finance, 101867.
Bordo, M.D., Duca, J.V., Koch, C., 2016. Economic policy uncertainty and the credit channel: aggregate and bank level US evidence over several decades. J. Financ. Stab. 26, 90–106.
Bouoiyour, J., Selmi, R., Hammoudeh, S., Wohar, M.E., 2019. What are the categories of geopolitical risks that could drive oil prices higher? Acts or threats? Energy Econ. 84, 104523.
Brandt, M.W., Gao, L., 2019. Macro fundamentals or geopolitical events? A textual analysis of news events for crude oil. J. Empir. Finance 51, 64–94.
Brunnermeier, M.K., Pedersen, L.H., 2009. Market liquidity and funding liquidity. Rev. Financ. Stud. 22 (6), 2201–2238.
Caballero, R.J., Krishnamurthy, A., 2009. Global imbalances and financial fragility. Am. Econ. Rev. 99, 584–588.
Caldara, D., Iacoviello, M., 2018. Measuring geopolitical risk. FRB Int. Finance Discussion Paper 1222.
Clance, M.W., Gupta, R., Wohar, M.E., 2019. Geopolitical risks and recessions in a panel of advanced economies: evidence from over a century of data. Appl. Econ. Lett. 26 (16), 1317–1321.
DTCC (2021) Systemic risk barometer survey, accessed 3 January 2021, <https://www.dtcc.com/systemic-risk/systemic-risk-barometer-surveys>.
Davydov, D., Vähämaa, S., Yasar, S., 2021. Bank liquidity creation and systemic risk. J. Bank Financ. 123, 106031.
Demir, E., Danisman, G.O., 2021. The impact of economic uncertainty and geopolitical risks on bank credit. North Am. J. Econ. Finance 57, 101444.
Diamond, D., Rajan, R., 2001. Liquidity risk, liquidity creation, and financial fragility: a theory of banking. J. Polit. Econ. 109, 287–327.
Dissanayake, R., Mehrotra, V., Wu, Y., 2020. Geopolitical risk and corporate investment, Working paper. SSRN Electron. J. https://www.ssrn.com/abstract=3222198.
Fang, Y., Hasan, I., Marton, K., 2014. Institutional development and bank stability: evidence from transition countries. J. Bank Financ. 39, 160–176.
Gkillas, K., Gupta, R., Pierdzioch, C., 2020. Forecasting realized gold volatility: is there a role of geopolitical risks? Finance Res. Lett. 35, 101280.
Gorton, G, Winton, A, 2000. Liquidity Provision, Bank Capital, and the Macroeconomy. Working paper. University of Minnesota.
Guttentag, J.M., Herring, R.J., 1997. Disaster myopia in international banking. J. Reprints Antitrust Law Econ. 27, 37–74.
Hellmann, T.F., Murdock, K., Stiglitz, J., 2000. Liberalization, moral hazard in banking and prudential regulation: are capital requirements enough? Am. Econ. Rev. 90, 147–165.
Keeley, M.C., 1990. Deposit insurance, risk and market power in banking. Am. Econ. Rev. 80, 1183–1200.
Laeven, L., Levine, R., 2009. Bank governance, regulation and risk taking. J. Financ. Econ. 93, 259–275.
Lee, C.C., Wang, C.W., 2021. Firms' cash reserve, financial constraint, and geopolitical risk. Pacific-Basin Finance J. 65, 101480.
Nagel, S., 2012. Evaporating liquidity. Rev. Financ. Stud. 25 (7), 2005–2039.
Nguyen, T.C., 2021. Economic policy uncertainty and bank stability: does bank regulation and supervision matter in major Europe economies? SSRN Electron. J. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3767196.
Phan, D.H.B., Iyke, B.N., Sharma, S.S., Affandi, Y., 2021. Economic policy uncertainty and the financial stability–Is there a relation? Econ. Model. 94, 1018–1029.
Repullo, R., 2004. Capital requirements, market power, and risk-taking in banking. J. Financ. Intermediation 13, 156–183.
Shleifer, A., Vishny, R.W., 2010. Unstable banking. J. Financ. Econ. 97 (3), 306–318.
Zheng, C., Cronje, T., 2019. The moderating role of capital on the relationship between bank liquidity creation and failure risk. J. Bank Financ. 108, 105651.
Zhou, L., Gozgor, G., Huang, M., Lau, M.C.K., 2020. The impact of geopolitical risks on financial development: evidence from emerging markets. J. Competitiveness 12 (1), 93–107.