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Beyond Borders: Assessing the Influence of Geopolitical Tensions on Sovereign Risk Dynamics

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Beyond Borders: Assessing the Influence of Geopolitical Tensions on Sovereign Risk Dynamics

Abstract

We assess the impact of geopolitical risk and world uncertainty on the sovereign debt risk of 26 European Economies during the period 1984-2022, through the implementation of OLS-Fixed Effects regressions and the Generalized Method of Moments (GMM). We find that geopolitical tensions and global uncertainty in border countries contribute to the rise of European country's sovereign risk as measured by 5- and 10-year Credit Default Swaps (CDS) and bond returns. Moreover, this interconnection is more pronounced during turbulent times such as the subprime crisis. Lastly, we found that geopolitical tensions in other country' groups such as South America and Asia have a significant impact on the government risks of European countries.

JEL-Codes: C230, E440, G320, H630.

Keywords: geopolitical risk, world uncertainty, political tensions, sovereign risk, European economy, GMM, subprime crisis.

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1. Introduction

Over the years, economies have become increasingly interconnected. One notable example of this phenomenon is observed in the geopolitical interactions between nations, which bear significant consequences for countries on a global scale. Geopolitical tensions, stemming from territorial disputes, ideological differences, or regional power struggles, possess the capacity to transcend borders, thereby imposing a strong impact on the economic and political stability of neighbouring nations. In this context, the dynamics of geopolitics emerge as a crucial determinant influencing the stability and development trajectory of nations.

Since economies are susceptible to external shocks, these have an impact on countries' sovereign debt risk. In fact, the economic consequences of geopolitical tensions on sovereign risk are particularly pronounced in border and neighbour countries. Escalating tensions can disrupt trade routes, hinder cross-border investments and capital-flows, financial stability, and lead to heightened economic uncertainty. These disruptions often translate into adverse effects on key economic indicators, such as GDP growth, foreign direct investment (FDI), and employment rates. Moreover, the all-encompassing impact extends beyond individual economic metrics to permeate the overall economy of neighbour countries. For instance, the conflict between Russia and Ukraine in 2022, threatened the overall European Union economic stability.

The uniqueness and contribution to the literature of our work lies in its focus on the effects that geopolitical tensions and uncertainty in border and neighbour countries have on the sovereign debt risk of European economies. To the best of our knowledge, this is the first study to directly analyse this relationship. Using a panel of 26 European economies for the period between 1984 and 2022, we evaluate how sovereign debt risks, proxied by 5- and 10-year CDS and Sovereign Bond returns, are impacted by geopolitical tensions and global uncertainty, measured by the Geopolitical Risk Index (GPR) by Caldara et al. (2018) and the World Uncertainty Index (WUI) by Ahir et al. (2022), respectively. In order to assess the relationship between sovereign debt and geopolitical risks, we resort to OLS-Fixed Effects regressions and the Generalized Method of Moments (GMM) econometric models. Further, we partition the data into two separate samples, before and after the 2009 subprime crisis to perceive its dynamics on different time-spans. Lastly, we assess how geopolitical risk and uncertainty in different country' groups as South America, Asia, the Middle East, and three major global economies like China, Japan, and the US impact the sovereign debt risk of European countries.

Therefore, we show that geopolitical tensions in neighbouring countries increase the sovereign risk for the home country due to spillover effects. Furthermore, the geopolitical tensions in South America, Asia, China, the Middle East, and Japan significantly impact the sovereign risk exposure of European countries. These findings suggest that European economies face increased sovereign risk from geopolitical issues in these regions, affecting, for instance, trade relationships and supply chains. This may be justified by the fact that global economic interconnectedness increases vulnerability to uncertainty from other regions. In fact, the increasingly integration of economies may lead to poor risk diversification and growing dependence among partners. Additionally, we report a stronger impact of geopolitical risk during stressed periods, such as the subprime crisis in 2009, with tensions in border countries significantly influencing their neighbours.

Our findings not only offer valuable insights for academics but also provide practical considerations for policymakers and stakeholders interested in understanding the connection between international relations and economic risk, allowing for a better management of public debt.

The paper is organised as follows.. Section 2 presents a literature review on the topic. Section 3 presents the data and methodology used. Section 4 reports the empirical analysis, a sensitivity analysis, and our findings. Section 5 presents the main conclusions of our study.

2. Literature Review

An extensive body of literature has been dedicated to analysing the factors that influence sovereign risk. While early research primarily focused on economic-related variables, such as credit risk (Gibson et al., 2017), liquidity risk (Favero et al., 2010) and financial risk (Andersson et al, 2009; Falagiarda et al., 2015; Gödl et al., 2016; Silvapulle et al., 2016; Afonso et al., 2020), recent studies have delved into the intricate connections between geopolitical risk and sovereign risk.

Geopolitical tensions have emerged as a significant factor influencing a nation's creditworthiness. As highlighted by Ramady (2014), geopolitical conflicts can increase sovereign risk by hindering a country's ability to access international financial markets or discouraging foreign investment. Catalán (2023) suggested that a country's exposure

to external shocks, such as geopolitical events, can rise sovereign risk. Furthermore, Bussy et al. (2023) argued that geopolitical instability can deter foreign direct investment and reduce a country's capacity to service its debt, thereby increasing sovereign risk. Caldara et al. (2022) also reached the same conclusion and showed that high geopolitical risk significantly decreased investment and had a greater negative impact on enterprises in highly vulnerable industries i.e., high firm-level geopolitical risk is related to reduced firm-level investment.

Geopolitics seeks to analyze international relations through the lens of geography, examining how the physical and spatial characteristics of nations influence their political decisions, strategies, and global standing. The term "geopolitics" was first coined by the Swedish political scientist Rudolf Kjellén in the early 20th century. Kjellén recognized that geography was not merely a backdrop for international politics but a fundamental determinant of state behaviour. Brill (1998) defined geopolitics as the doctrine of the impact of geographic space on a state's politics. Flint (2016) describes it as the practice of countries to control and compete for new lands. Throughout its history, geopolitics has been a subject of both fascination and controversy. During the two World Wars and the Cold War, it played a crucial role in shaping the strategies of the nations.

However, geopolitics remains a relevant topic of discussion and analysis today. Debates abound regarding the impact of globalization, the rise of non-state actors, and the role of technology in reshaping the geopolitical landscape. Additionally, market players, policymakers, and central banks' officials regard geopolitical risks as crucial factors influencing sovereign policy choices and fluctuations in stock markets (Agoraki, 2022; Bergman et al., 2019; Caldara et al., 2022; Subramaniam, 2022; Gupta et al., 2018). For instance, in 2016 the former governor of the Bank of England identified geopolitics as one of three uncertainties that influence the most global economic performance (Bank of England, 2023). In 2023, Christine Lagarde, president of the European Central Bank (ECB), said that the global economy has reached a crucial turning point as we observe the creation of a new map of economic relationships, one in which geopolitics is increasingly influencing the global economy (ECB, 2023).

These concerns are justified by the growing tensions between China and the United States since 2018, the outbreak of the Covid-19 pandemic in 2020 (Bouri et al., 2023), the emergence of new international conflicts such as the war in Ukraine in 2022

(Shen et al., 2023; Khan et al., 2023; Mokdadi et al., 2023) and, consequently, the growing tension between NATO members and Russia, which have led to today's growing geopolitical risk.

In the current global context, economies exhibit a heightened degree of interconnectedness. This heightened interdependence stems from the growing integration of nations, resulting in the anticipation that events occurring in one country will exert influences on others. For instance, Sandler et al. (2008) showed that terrorist attacks have economic repercussions that spread to neighbours. Similar to civil conflicts, terrorism can have an adverse impact on adjacent nations. For example, a terrorist attack in one country may discourage foreign investment, or a regional multiplier could enable the loss of economic activity in the nation targeted by terrorism to spread throughout the region (see, for instance, Murdoch and Sandler, 2004; or De Groot, 2010). Bobasu (2023) demonstrated that a rise in uncertainty of the eurozone's partners has the potential to affect the euro area economy to a significant degree. Furthermore, the rapid dissemination of information and the pervasive influence of globalization mechanisms ensure that events within one geographical region swiftly gain notoriety in other parts of the world (Balli et al., 2022; Monteiro et al., 2023). The evolution of information technologies, coupled with the pervasive reach of social networks and news outlets, facilitates the rapid flow of information, in stark contrast to the slower rates of dissemination a few decades ago. Consequently, when a significant event unfolds in a distant corner of the world, its impact is rapidly known across the globe. A noteworthy example illustrating this phenomenon is the tragic 9/11 terrorist attack in 2001.

Following an adverse geopolitical event, there can be many significant losses, including the loss of human lives, the destruction of capital stock, a surge in military and defence expenditures, decrease in bilateral trade and trade openness (Martin et al., 2008; Pham et al., 2017, Caldara et al. 2022), agricultural and essential commodity losses, an upsurge in poverty and hunger, reductions in output, productivity, and employment (Bloom, 2009), a rise in bond spreads, among others (Balli et al., 2022). The fact that uncertainty in financial markets has an impact on asset prices is well documented in the literature (see, for instance, Gruppe et al. ,2014; Muir, 2017; Ludvigson et al., 2019; and Beckmann et al., 2019). During more turbulent periods, it is noticeable that risk premia or expected returns are substantially higher than during periods of low financial volatility.

For instance, Balcilar et al. (2018) and Grikillas et al. (2018) documented significant effects of geopolitical risk on market volatility in financial markets. Baur et al. (2020) showed that stocks and bonds respond negatively to geopolitical risk and geopolitical threats while precious metals have some ability to hedge against these risks. This connection between stocks and geopolitics is further exploited by Salisu et al. (2022) who presented evidence of stock return predictability by geopolitical risk. Bouri et al. (2023) demonstrated that changes in geopolitics caused by Russia's invasion of Ukraine in 2022 impacted the spread of inflation rate spikes all around the world.

Recently, with the intensification of conflicts and trade wars, there has been a surge in commodity market prices (Cunado et al., 2022; Yang et al., 2022; Tian et al., 2022). For instance, in 2022, the exacerbation of the conflict in Ukraine had a profound and enduring effect on the global food market landscape. Ukraine, a primary supplier of grains to international markets, witnessed a substantial decrease in its export capabilities. This decline, in turn, gave rise to substantial apprehensions about global food security, affecting millions of individuals worldwide, and consequently, triggering an escalation in the prices of these essential commodities (European Union, 2023). The economic costs of Ukraine war are also noted in energy and oil prices faced by international economies. These increases potentiated rises in sovereign bond spreads as a consequence of Inflation rate upsurges (see, for instance, in Pavlova et al., 2018; Liadze et al., 2022; or Chen et al., 2022 the discussion of how oil-specific shocks may affect sovereign bond spreads).

Such consequences may compel governments to reassess their governance strategies across financial, social, administrative, and security domains, thereby precipitating far-reaching implications for the well-being and livelihoods of their citizens. In fact, Balcilar et al. (2018) have shown that geopolitical risks are often considered by policy-makers and investors as determinants of economic decisions. Further, geopolitical shocks have triggered macroeconomic stability which have repercussion on sovereign bonds and Credit Default Swaps (CDS). Bratis et al. (2021) identified volatility spillovers between the geopolitical risk index and sovereign risk markets, which were strongest during the crisis period (2009-2012) and weakest during the eurozone debt crisis easing phase (2012-2014). During the crisis, sovereign risk was more related to the uncertainty of geopolitical risk than after the crisis. Huang et al. (2015) showed that international political risks are positively related to government bond yields, demonstrating that

political uncertainty had a large impact on governments. Caldara et al. (2022) treated geopolitical risk as a driver of business fluctuations, highlighting a new force and a new set of shocks that economists have not traditionally emphasized. Additionally, Mokdadi et al. (2023) observed that the cost of debt in Germany was positively impacted by geopolitical uncertainty, with long-term debt being the one with the highest impact. Further, information asymmetry is found to play a crucial role in moderating the impact of geopolitical unrest on financial conditions. Balduzzi et al. (2020) also showed an interconnection between political risk and CDS in Italy. However, the relationship between geopolitical tensions in one country and economic risk in nearby countries, however, has not often been researched.

Typically, geopolitical risk is measured through the Geopolitical Risk Index (GPR) by Candara et al. (2018). This index is well suitable for empirical analysis as, in opposition to other indices, it defines geopolitical risk as a wide-ranging definition that includes different events, ranging from wars to major economic crises to climate change. Second, existing indices are exceedingly difficult to reproduce. These indices, primarily formulated by private entities, are often inaccessible to the public, created subjectively, and shrouded in opacity regarding their construction. Thirdly, numerous indexes exhibit limited variability and have a relatively short historical dataset. Moreover, a substantial portion of these indexes serve as qualitative indicators of political stability, conveyed through color-coded maps or numerical values spanning a range from one to five (see, for instance, the discussion of Gupta et al., 2019). Lastly, a complementary variable to assess risk measured by the uncertainty in the global economy is the World Uncertainty Index developed by Ahir et al. (2022). Diverging from existing metrics for assessing economic uncertainty, this index draws its foundation from a singular source with a well-defined thematic scope, primarily focusing on economic and political developments. It follows a meticulously standardized framework, thereby enhancing the comparability of these metrics across temporal and geographical contexts.

3. Data and Methodology

This study employs data from 26 European economies, spanning the period from 1984 to 2022. The countries included in the analysis are Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland,

Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. These 26 nations share land borders with a total of 74 neighbouring countries, and the list of these countries is provided in Appendix A. The selection of these nations is dictated by the data availability. We also include a group of regions, South America (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela), Asia (Hong Kong, Indonesia, India, Korea, Malaysia, Philippines, Russia, Thailand, Taiwan, and Vietnam), and ME-Middle East (Saudi Arabia, Turkey, and Egypt).

The primary focus of this study revolves around the dependent variable, the sovereign risk, which is proxied by the logarithm of the sovereign credit default swaps (CDS) with maturities of 5 and 10 years and bond returns⁴. Data for these variables are sourced from Bloomberg, AMECO, and Thomson Reuters Datastream, respectively.

The key independent variable in this study is geopolitical risk. To gauge this variable, we employ the Geopolitical Risk Index (GPR), as developed by Caldara and Iacoviello (2022) and the World Uncertainty Index (WUI) by Ahir et al. (2022). The GPR index is constructed using news-based data by tallying the occurrences of words associated with geopolitical risk monthly. The data is compiled from a selection of 11 prominent international newspapers, namely The Boston Globe, the Chicago Tribune, The Daily Telegraph, the Financial Times, The Globe and Mail, The Guardian, the Los Angeles Times, The New York Times, The Times, The Wall Street Journal, and The Washington Post (Caldara and Iacoviello, 2022). This index is known for its ability to encompass a wide spectrum of exogenous global uncertainties, capturing elements such as military threats, wars, terror attacks, and trade disputes, as observed by Balcilar et al. (2018). The GPR was collected in monthly data and transformed into annual data by averaging the twelve months. The WUI index is a measure that tracks uncertainty across the globe by text-mining the country reports of the Economist Intelligence Unit. It is computed by counting the percent of the word “uncertain” (or its variants) in the Economist Intelligence Unit country reports on a quarterly basis and then it is rescaled by multiplying by 1,000,000. A higher value indicates higher uncertainty and vice versa.

In this study, we incorporate several controlled variables. To capture international market-related volatility, we use the logarithm of the stock price volatility indicator

⁴ Bond returns are calculated from the Total Return Index obtained from Datastream.

(VOL) of the Global Financial Development database of World Bank. This indicator is an average of the 360-day volatility of the national stock market index. An upswing in the VOL is expected to correspond to higher risk values. Trends in global risk exhibit low values prior to the financial crisis, followed by substantial increases between 2007 and 2012, and a gradual regression toward pre-crisis levels thereafter. This variable was transformed into a growth rate and multiplied by one hundred.

Furthermore, we also include inflation rate (Inflation), calculated as the change in the annual average of the headline consumer price inflation; and the logarithm of the real effective exchange rate (REER). This variable generally captures credit risk arising from general macroeconomic disequilibrium. A rise (decrease) in REER indicates real exchange rate appreciation (depreciation), which is projected to increase (decrease) sovereign risk, as theoretically supported by Arghyrou and Tsoukalas (2011) and Afonso et al. (2015). This variable was transformed in a growth rate to capture its dynamics. We also include the three-month short-term interest rate (Int. rate); the output gap (Output Gap) computed as actual GDP less potential GDP as a percent of potential GDP; the logarithm of the sovereign credit ratings (Ratings) following the approach of Afonso et al. (2014). This approach categorizes qualitative ratings from Moody's, Standard & Poor's, and Fitch credit agencies on a scale from 1 (low quality, $\leq B^-$) to 17 (high quality, AAA). The overall measure is the simple average of the sovereign credit ratings of these three main credit agencies for each country.

Additionally, we consider the general government debt-to-GDP ratio (debt) to account for fiscal dynamics. We expect that higher (lower) debt should cause an increase (reduction) in sovereign risk. Data for these control variables are obtained from the World Bank database, AMECO, IMF, and Thomson Reuters Datastream. All variables are measured at an annual frequency.

Table 1 presents the descriptive statistics of the data used in this study. The CDS, Bond returns and Ratings are in logarithms and the Volatility index and REER are in growth rates. CDS only report positive values but Bond returns present negative observations. The GPR and WUI indexes also have exclusively positive values and small standard deviations. The market volatility index has an average of around 100 points and exclusively positive values. The inflation rate has an expected low mean, high variability, and a wide range since its values vary from -102.6 to 112.9. The short-term interest rate

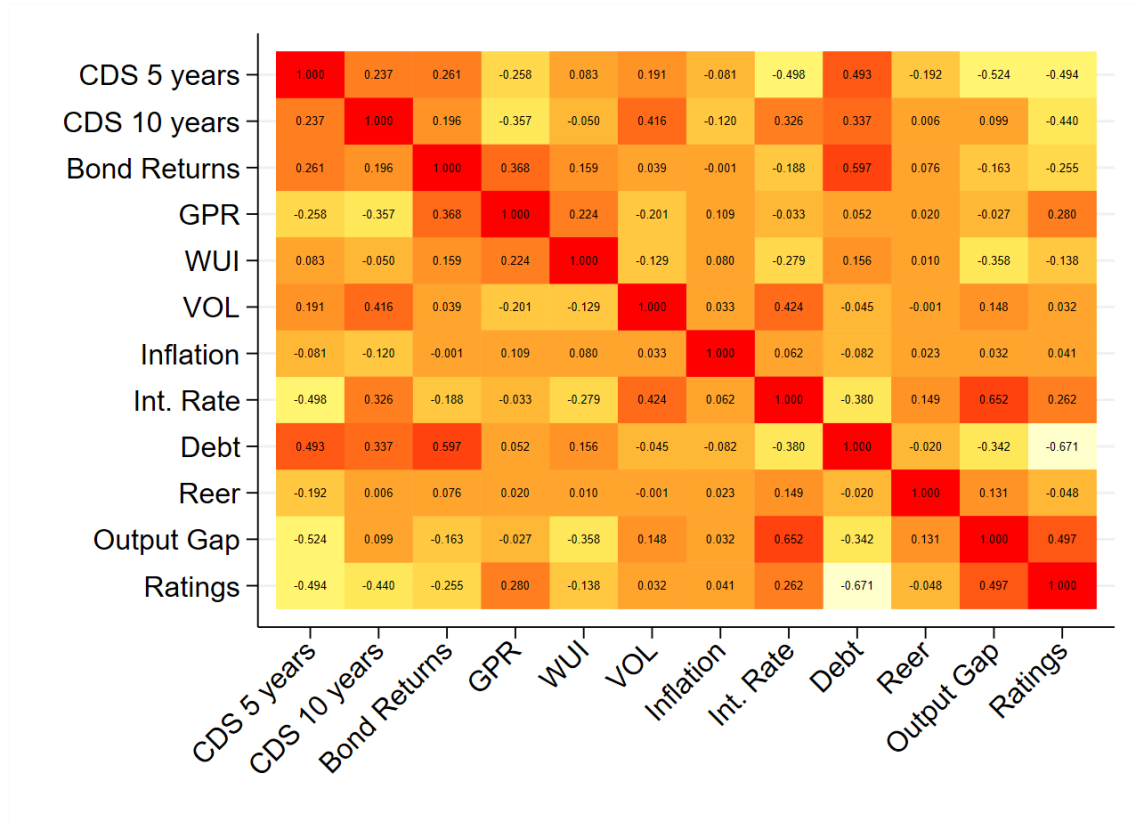
and the debt ratio also present wide-ranging observations, but average values that are common in the literature. REER presents typical values, with exclusively positive observations, while the Output Gap reports negative average and median. Finally, the mean of the logarithm of credit Ratings is high (2.719) which corresponds to an average rating of 15 on a scale from 1-17. This is expected as we only report European economies.

Table 1: Summary Statistics

	Mean	Median	Std. Dev.	Min	Max
<i>5-year CDS</i>	3.553	3.734	1.285	0.571	6.774
<i>10-year CDS</i>	4.145	4.190	0.862	2.344	6.780
<i>Bond returns</i>	5.357	5.638	1.596	-0.844	7.447
<i>GPR</i>	0.217	0.106	0.244	0.006	2.285
<i>WUI</i>	0.158	0.113	0.168	0.000	1.284
<i>Volatility Index</i>	100.533	100.247	9.570	75.661	132.321
<i>Inflation</i>	0.218	-0.089	6.211	-102.755	112.895
<i>Int. rate</i>	4.256	3.079	5.353	-0.819	45.475
<i>Debt</i>	60.748	57.794	29.834	3.765	154.89
<i>REER</i>	100.105	100.119	0.950	95.967	110.160
<i>Output Gap</i>	-0.263	-0.397	2.374	-10.994	11.829
<i>Ratings</i>	2.719	2.833	0.190	1.792	2.833

Notes: This table presents the summary statistics of the variables under study for the period of 1984-2022. Specifically, we report the mean, median, Standard deviation (Std. Dev.), the maximum and, the minimum of the series. All the variables are in annual terms.

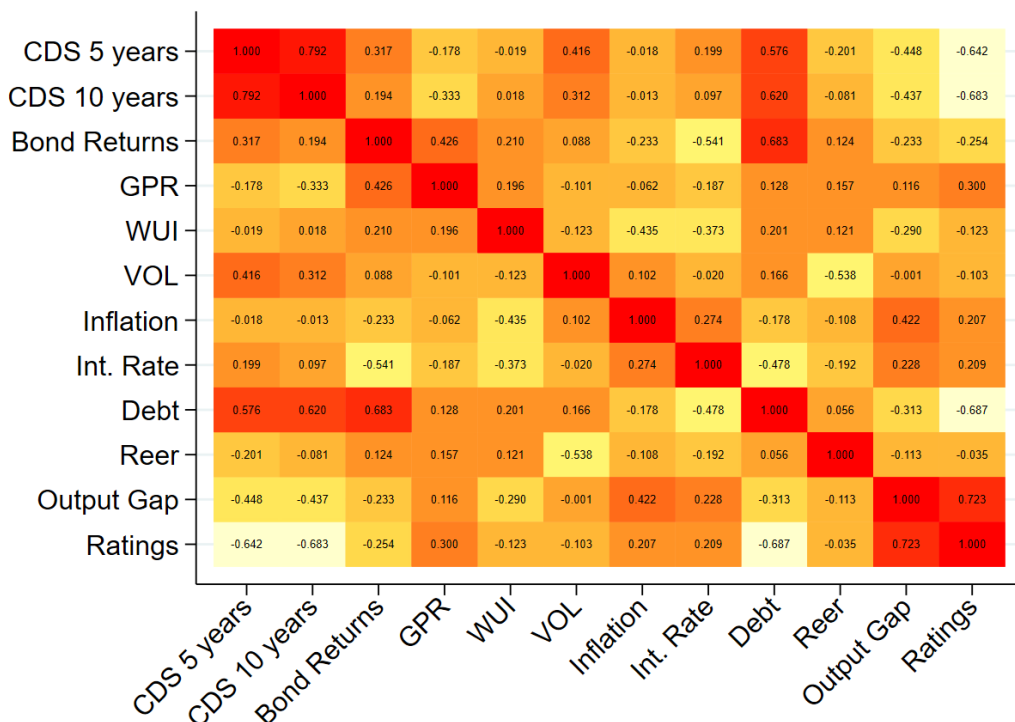
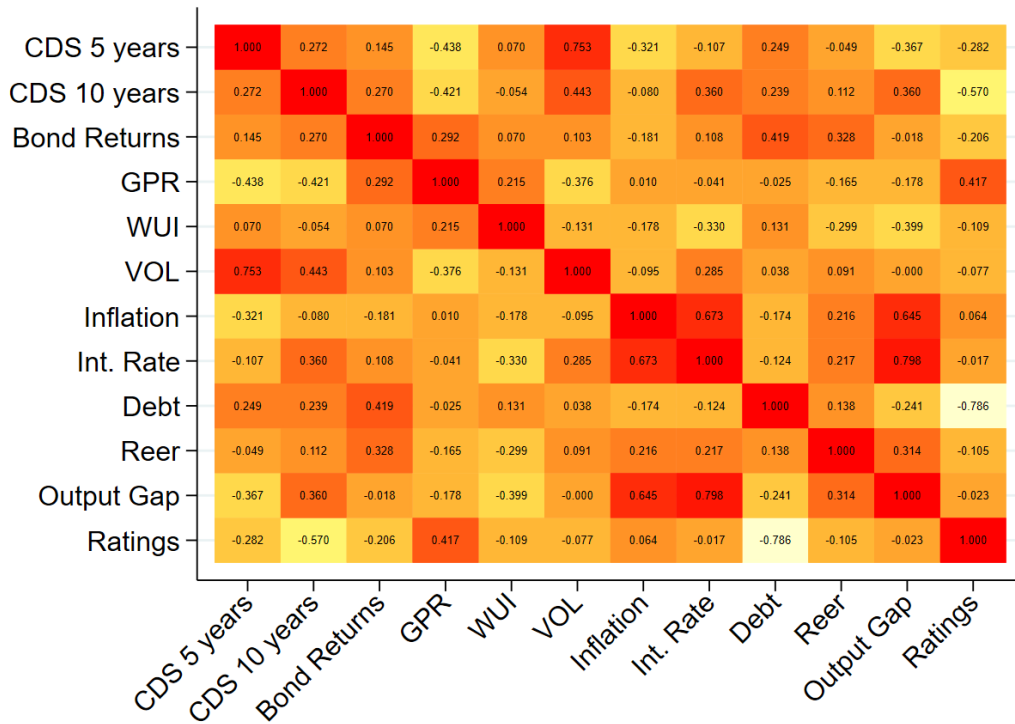
Figure 1: Heatmap of Correlations (all sample)



Notes: This figure reports the correlation coefficients between the variables used in this study. Since economies are susceptible to external shocks, this has an impact on countries' sovereign debt risk. A warmer colour means a correlation closer to 1 (red) and a lighter one closer to -1 (light yellow).

Figure 1 presents the map of correlations between the variables under study. In this graph, we can see that a warmer colour means a greater positive correlation, while a lighter one means a more negative correlation. The measures of sovereign risk are highly correlated with the debt ratio and Ratings. For instance, when the debt ratio increases, the risk of the government increases, while when the credit rating increases, the sovereign risk decreases. However, for the 5-year CDS, the highest correlation is with the Output Gap, -0.524, indicating that a rise in the GDP gap reduces the sovereign risk of the government. We also can observe that the GPR index is only positively correlated with Bond returns, the WUI index, Inflation, and the Ratings variable. It is also positively correlated with the debt and REER, but only marginally.

Figure 2: Heatmap of Correlations Before (left) and After (right) the 2009 crisis.

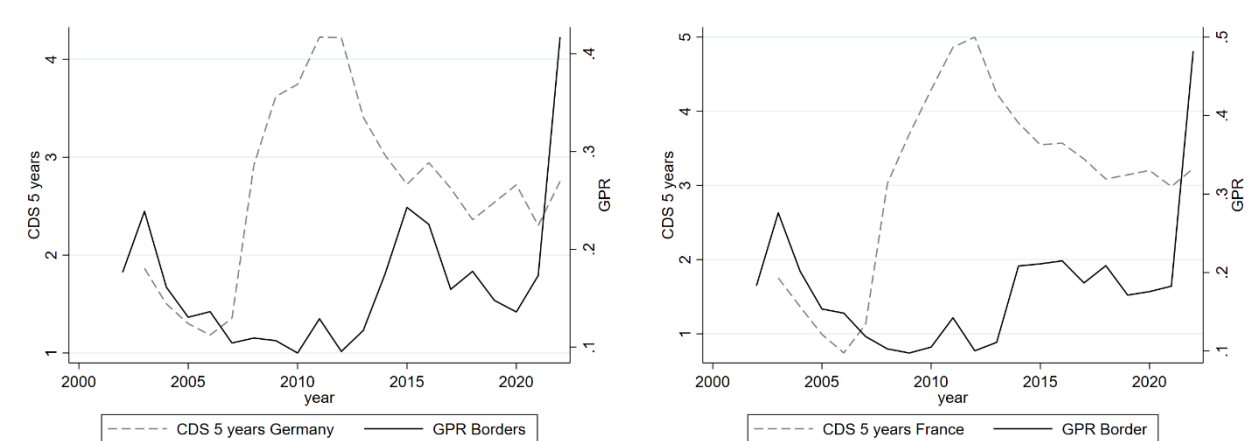


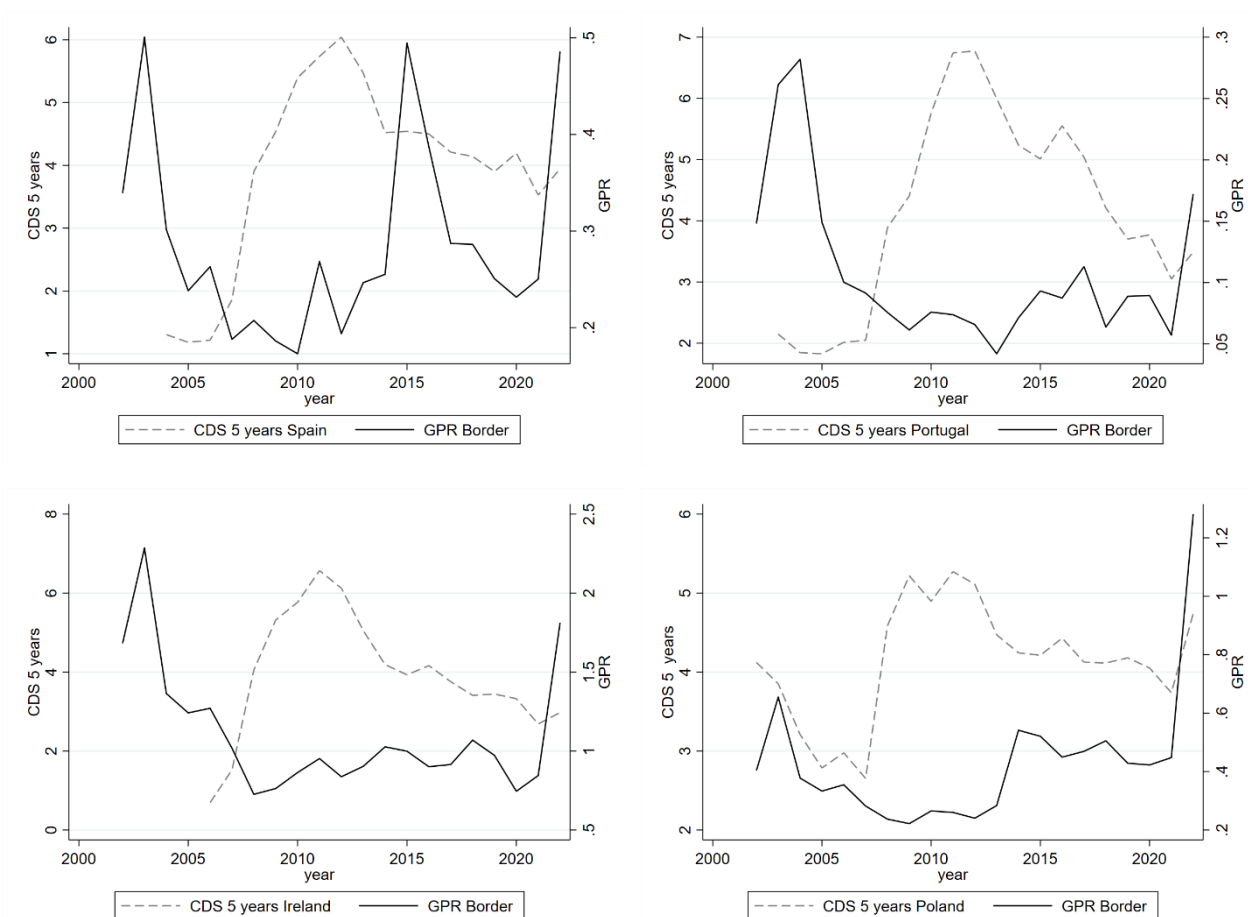
Notes: This figure reports the correlation coefficients between the variables used in this study. Since economies are susceptible to external shocks, this has an impact on countries' sovereign debt risk. A warmer colour means a correlation closer to 1 (red) and a lighter one closer to -1 (light yellow).

Figure 2 presents the correlation coefficients and intensity colour maps of the correlations between the variables of this study before and after the subprime crisis of 2009. Before the crisis, we can see that CDS are strongly correlated with volatility, 0.753 for 5-year CDS and 0.443 for 10-year CDS. Bond returns maintain their high correlation with the debt ratio. Interestingly, inflation and interest rates are highly correlated for this period, 0.673 but the highest value is found between the output gap and the interest rate, 0.798, which does not come as a surprise, since during stressful periods, these variables tend to vary in the same direction and are intrinsically connected.

Moreover, after the financial crisis, we observed that our measures of sovereign risk increased their interconnection. The correlation between the debt ratio and these measures of government risk are also higher, with values larger than 0.576. This is in line with what happened in the European Union after the crisis. Economies such as Portugal, Greece and Ireland suffered a major public debt crisis, leading to higher long-term interest rates and a serious economic and social impact, which ended with the need for external aid and intervention and support by the IMF, the EC, and the ECB. The value with the highest correlation is observed between the output gap and credit ratings, with a value of 0.723.

Figure 3: GPR borders and 5-year CDS.





Notes: These graphs present the 5-year CDS of six countries against the GPR of their border countries.

Figure 3 presents six graphical representations of the 5-year CDS of Germany, France, Spain, Portugal, Ireland, and Poland and their respective country borders average GPR. From the graphs, we can observe that a rise in the GPR of the border countries is followed by a rise in the sovereign risk, proxied by the 5-year CDS. This indicates that international tensions in neighbouring countries have an impact on home countries' risk, i.e., influencing sovereign risk dynamics. This is not surprising as economies are intrinsically interconnected with their frontier countries due to their geographical proximity. Geopolitical events have wide-ranging implications for neighbouring nations, influencing their security, economy, diplomacy, and overall stability. The interconnected nature of geopolitics means that changes in one part of the world can reverberate across borders and impact the geopolitical landscape of entire regions.

For instance, for all graphs, we observe a spike in GPR during the 2009-2010 Global Financial Crisis (GFC) period and a rise in sovereign risk. The same phenomenon

occurred in 2019 due to the Covid-19 pandemic, indicating that economic events in one country impact their neighbours. We also highlight that economies may possess different economic systems that absorb differently the consequences of geopolitical shocks.

For testing the annual relationship between the sovereign risk and the geopolitical tensions, we estimate the following baseline equation (1):

$$SovereignRisk_{i,t,k} = \alpha_0 + \beta_1 \cdot Geopolitical_{i,t,n} + \beta_2 \cdot X_{i,t} + \psi_i + \eta_t + \varepsilon_{i,t} \quad (1)$$

where $SovereignRisk_k$ represents the sovereign risk faced by each countries, where k is, alternatively, 5-year and 10-year CDS and Bond returns, $Geopolitical_{i,t,n}$ is each type of risk n , where n is GPR or WUI index, for country i in year t , X is the set of the abovementioned control variables, ψ and η are the country i and time t specific effects and ε is the error term. Equation (1) is estimated employing a Panel Data OLS-FE approach. Moreover, standard errors are corrected for heteroskedasticity and serial correlation.

Further, we also employed a dynamic panel data model based on the Generalized Method of Moments (GMM) to deal with problems related to endogeneity and reverse causality. We employ an estimation, which relies on a homoscedastic error term due to its constant nature, and the unbalanced panel data does not adversely affect estimation for this model.

In addition, we also assess the relevance of regional, r , GPR indices, $Geopolitical_{i,t,r}$, notably: South America, Asia, Middle East, China, Japan, and USA on sovereign risk:

$$SovereignRisk_{i,t,k} = \alpha_0 + \beta_1 \cdot Geopolitical_{i,t,r} + \beta_2 \cdot X_{i,t} + \psi_i + \eta_t + \varepsilon_{i,t}. \quad (2)$$

4. Empirical Analysis

In this section, we report an empirical analysis of the effect of Geopolitical risk on the dynamics of sovereign risk. To do so, we present the OLS estimates with year fixed-effects, and the GMM method estimations for the GPR of bordering countries and specific countries and regions. In order to have a clear view of the dynamics of sovereign risk, we also report the estimation results of the OLS-FE before and after the subprime

crisis of 2009, and, as a robustness check and alternatively, we provide the results using World Uncertainty index as a proxy variable for risk.

4.1 Geopolitical Risk Impact

Table 2 presents the results for the OLS estimations for the three measures of sovereign risk (CDS 5- and 10-years maturity, and Bond returns) regressed on the GPR index measure and the seven control variables considered. We report the stand-alone estimations for each variable and the last column presents the estimation coefficients for all variables together in the regression.

We can observe from Table 2 that GPR has a positive coefficient in all of the regressions, indicating a positive relationship between geopolitical tensions occurring in border countries and our measures of country sovereign risk. Therefore, when a neighbouring country faces a geopolitical tension event, it raises the risk of the home country, for instance, the relative change in 10-year CDS owing to an absolute change in one unit of the GPR is given by $\partial \ln \text{CDS} / \partial \text{GPR} = \exp(0.448) - 1 = (1.565 - 1) = 0.565\%$, (significant at a 1% level) in the full regression. The same relation is observed for bond returns and 5-year CDS, with coefficients of $\exp(0.422) - 1 = (1.525 - 1) = 0.525\%$ and $\exp(0.210) - 1 = (1.234 - 1) = 0.234\%$ (significant at a 1% level), respectively.⁵ This is consistent with the literature as global bond investors demand higher returns at times of higher instability (see, for instance, Agoraki et al., 2022). This interconnection can be justified by the fact that conflicts and tensions may originate spillover effects, increase military presence, or change the strategic balance in the region. Events in one country can trigger joint responses or collaborations among neighbouring nations to address shared concerns.

Furthermore, we can see that volatility increases the risk of governments as measured by 10-year CDS. This does not come as a surprise, since during turbulent periods, governments naturally face higher risk. Additionally, inflation reports a negative and highly significant coefficient for the stand-alone estimation for all measures of risk and in the full regression of the 10-year CDS. Hence, an increase in inflation diminishes the risk faced by governments which can be justified by the fact that inflation erodes the

⁵ Indeed, for our semilog regressions, to compute the true poportional change in the dependent variable, for instance CDS, resulting from a non-infinitesimal change in GPR, and for a unit change in GPR, one would have to calculate $\partial \ln \text{CDS} / \partial \text{GPR} = \exp(\text{estimated coeff for GPR}) - 1$.

real value of a country's outstanding stock of government debt, or it can lead to higher nominal economic growth, including increased government tax revenues. Regarding the short-term interest rate, it can be seen in the stand-alone estimation of the CDS that an increase in the short-term rate leads to an increase in risk, meaning that states find it more difficult to finance themselves. However, the interest rate coefficient, when all other variables are included in the model, becomes negative and significant at a 1% level. If an increase in short-term interest rates is perceived as a move by the central bank to combat inflation or maintain financial stability, it can enhance the credibility of the governments. Increasing short-term interest rates can attract foreign capital seeking higher returns, leading to an appreciation of the national currency. This, in turn, may reduce the risk associated with a country's external debt and improve its overall sovereign risk profile. Higher short-term interest rates can make a country's financial assets more attractive to foreign investors seeking better returns. This capital inflow can contribute to overall economic stability and improve the country's external financial position.

Regarding the debt ratio, it can also be seen that an increase in the debt ratio leads to an increase in sovereign risk, as the country becomes more indebted and therefore faces more difficulties to finance itself in capital markets. The real effective exchange rate (REER) has a positive and significant relation with risk. Therefore, an appreciation of the REER leads to an increase in sovereign risk.

Ultimately, credit ratings have the opposite effect on sovereign risk. In other words, has expected an improvement in the rating by the credit rating agencies reduces the perceived market risk of the country's debt.

Table 3 reports the results of the estimations of the Generalized Method of Moments for the three measures of sovereign risk. The results of this model, which takes into account the heterogeneity of the sample in the regression, confirm the empirical evidence of the OLS model. In particular, it can be seen that geopolitical risk has an adverse effect on sovereign risk. In other words, political tensions and/or wars have a negative effect on risk. In addition, the debt ratio has a positive influence on sovereign risk, i.e. an increase in one of these variables leads to increases in risk, while increases in inflation lead to reductions in government risk.

The relationship between geopolitical tensions in different regions and the sovereign risk exposure of European countries is complex and context-dependent. It is

crucial to note that geopolitical dynamics are multifaceted, and the impact on sovereign risk can vary depending on the geographical area. Table 4 reports the resulting estimations of the GMM methodology for the GPR of different countries and regions. Specifically, we analyze the effect of South America, Asia, ME (Middle East), China, Japan, and USA GPR on the sovereign risk of 26 European countries. The GPR for each region is obtained as an average of the countries included in each group. For the first measure of sovereign risk, 10-year CDS, we observed that an increase in the geopolitical risk of South America, Asia, and China, increases the sovereign risk of European economies. These countries, being major players in the global economy, can be adversely affected by disruptions in key economic regions, leading to potential economic challenges and impacting sovereign risk. Furthermore, European nations have engaged in extensive trade with countries in South America, China, and Asia. Thus, geopolitical tensions that disrupt trade routes, supply chains, or diplomatic relations can harm the economic interests of European countries and can, in turn, affect the country's sovereign risk.

An interesting result is reported for bond returns in the case of ME country's GPR. Where, as a consequence of a rise in geopolitical tension in this region, bond returns increase (with a coefficient of 0.552 and significant at a 1% level). The Middle East is a crucial source of energy for many European countries. Geopolitical tensions in the region, especially those that threaten the stability of oil-producing countries, can lead to fluctuations in energy prices. If tensions result in increased oil prices, European countries, as net importers of energy, might face economic challenges and higher country investor risk.

Japan's risk also seems to have an effect on European sovereign risk as measured by 5-year CDS. Geopolitical tensions in Japan alone typically would not directly increase the sovereign risk of European countries. However, there are indirect ways in which geopolitical tensions in Japan could have implications for European countries. Japan is a major economic player, and its economic health is interconnected with the global economy. If geopolitical tensions in Japan lead to economic disruptions, it could have broader global economic consequences. European countries, being key participants in the global economy, may experience indirect effects through trade, investment, and financial market linkages.

Finally, although economies are more interconnected, they are also more integrated and trade partners and investors tend to be from the same area, so this could potentially lead to poor risk diversification and increasing dependence between partners.

Table 2: Results on the relationship between sovereign debt risks and geopolitical risks (GPR index), OLS-FE, 1984-2022

Variables	10-year CDS									Bond returns								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	0.839*** (0.154)	0.802*** (0.148)	0.822*** (0.156)	0.833*** (0.154)	0.774*** (0.168)	0.928*** (0.147)	0.851*** (0.171)	0.546*** (0.203)	0.448** (0.188)	0.264** (0.103)	0.316*** (0.105)	0.274*** (0.103)	0.384*** (0.101)	0.115 (0.109)	0.297*** (0.102)	0.596*** (0.078)	0.369*** (0.096)	0.422*** (0.080)
<i>VOL</i>		0.030*** (0.009)							0.022* (0.014)		0.005 (0.007)							0.001 (0.006)
<i>Inflation</i>			-0.013*** (0.005)						-0.013*** (0.003)			-0.007** (0.003)						0.003 (0.003)
<i>Int. Rate</i>				0.113*** (0.038)					-0.035 (0.080)				-0.249*** (0.032)					-0.296*** (0.049)
<i>Debt</i>					0.003* (0.002)				0.004** (0.002)					0.020*** (0.001)				0.017*** (0.001)
<i>REER</i>						0.176*** (0.057)			0.096 (0.078)						-0.170** (0.075)			0.121* (0.073)
<i>Output Gap</i>							-0.058** (0.024)		0.114*** (0.027)							-0.081*** (0.017)		-0.057*** (0.019)
<i>Ratings</i>								-2.211*** (0.171)	-2.425*** (0.296)								-0.116 (0.224)	0.869*** (0.175)
<i>Constant</i>	2.980*** (0.154)	0.332 (0.839)	3.009*** (0.159)	2.718*** (0.171)	2.807*** (0.193)	-14.734** (5.710)	2.754*** (0.138)	9.127*** (0.498)	-2.080 (7.729)	4.407*** (0.125)	4.083*** (0.680)	4.411*** (0.125)	6.544*** (0.296)	3.393*** (0.201)	21.376*** (7.425)	4.417*** (0.129)	5.035*** (0.652)	-7.734 (7.613)
Obs.	417	417	415	417	417	406	373	386	351	1,273	1,176	1,271	1,197	1,241	1,273	1,068	1,167	959
<i>R</i> ²	0.346	0.373	0.351	0.354	0.354	0.390	0.392	0.567	0.612	0.219	0.206	0.220	0.266	0.408	0.227	0.441	0.215	0.580

Table 2: Results on the relationship between sovereign debt risks and geopolitical risks (GPR index), OLS-FE, 1984-2022 (continued)

Variables	CDS 5 years								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	0.396*** (0.129)	0.430*** (0.138)	0.396*** (0.128)	0.413*** (0.137)	0.309*** (0.114)	0.534*** (0.132)	0.400*** (0.112)	0.177*** (0.063)	0.210*** (0.071)
<i>VOL</i>		-0.002 (0.006)							-0.005 (0.004)
<i>Inflation</i>			-0.010* (0.005)						0.003 (0.003)
<i>Int. Rate</i>				0.134*** (0.047)					-0.246*** (0.052)
<i>Debt</i>					0.007*** (0.001)				0.006*** (0.001)
<i>REER</i>						0.121* (0.062)			-0.024 (0.045)
<i>Output Gap</i>							-0.201*** (0.019)		0.009 (0.013)
<i>Ratings</i>								-3.009*** (0.081)	-2.500*** (0.114)
<i>Constant</i>	4.721*** (0.018)	4.859*** (0.585)	4.719*** (0.018)	1.614 (1.086)	4.418*** (0.053)	-7.519 (6.257)	4.253*** (0.058)	12.653*** (0.211)	11.882*** (4.517)
Obs.	713	690	711	690	713	666	595	645	529
<i>R</i> ²	0.696	0.702	0.699	0.708	0.718	0.713	0.776	0.924	0.942

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the standard errors. Obs. are the observations for each regression.

Table 3: Results on the relationship between sovereign debt risks and geopolitical risks (GPR index), GMM, 1984-2022

Variables	10-year CDS									Bond returns								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	1.451*** (0.016)	1.339*** (0.024)	1.441*** (0.007)	0.091*** (0.001)	-0.248*** (0.002)	1.350*** (0.017)	0.057*** (0.001)	0.712*** (0.005)	0.015*** (0.001)	0.139*** (0.036)	0.188*** (0.036)	0.140*** (0.037)	0.164*** (0.037)	0.160*** (0.037)	0.093*** (0.035)	0.190*** (0.041)	0.169*** (0.038)	0.170*** (0.040)
<i>VOL</i>		0.007*** (0.000)							0.005*** (0.000)		0.002*** (0.000)							0.002*** (0.000)
<i>Inflation</i>			-0.020*** (0.000)						-0.014*** (0.000)			-0.001* (0.001)						0.000 (0.001)
<i>Int. Rate</i>				0.206*** (0.000)					0.214*** (0.000)				-0.009*** (0.003)					-0.004 (0.003)
<i>Debt</i>					-0.023 (0.000)				0.004*** (0.000)					0.001* (0.000)				0.001*** (0.001)
<i>REER</i>						0.058*** (0.001)			-0.078*** (0.000)						0.067*** (0.005)			0.075*** (0.005)
<i>Output Gap</i>							0.105*** (0.000)		0.002*** (0.000)							-0.005** (0.002)		-0.005* (0.002)
<i>Ratings</i>								1.555 (0.013)	0.666 (0.001)								-0.010 (0.034)	0.057 (0.052)
<i>Constant</i>	0.994*** (0.003)	0.679*** (0.004)	0.955*** (0.003)	2.140*** (0.000)	3.541*** (0.003)	-4.791*** (0.051)	1.824*** (0.000)	-2.755*** (0.039)	7.415*** (0.006)	0.446*** (0.031)	0.192*** (0.051)	0.445*** (0.032)	0.610*** (0.078)	0.434*** (0.033)	-6.279*** (0.459)	0.357*** (0.036)	0.493*** (0.114)	-7.327*** (0.596)
Obs.	339	339	335	339	339	330	303	314	283	1,195	1,109	1,191	1,126	1,176	1,195	1,001	1,124	920

Table 3: Results on the relationship between sovereign debt risks and geopolitical risks (GPR index), GMM, 1984-2022 (continued)

Variables	5-year CDS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	2.985*** (0.270)	1.963*** (0.298)	2.913*** (0.269)	2.818*** (0.267)	2.896*** (0.277)	3.062*** (0.257)	3.272*** (0.302)	3.016*** (0.299)	1.111*** (0.301)
<i>VOL</i>		0.021*** (0.002)							0.021*** (0.003)
<i>Inflation</i>			0.008 (0.004)						0.002 (0.004)
<i>Int. Rate</i>				0.099*** (0.013)					0.249*** (0.024)
<i>Debt</i>					-0.014 (0.003)				0.006 (0.004)
<i>REER</i>						-0.072** (0.031)			-0.062 (0.042)
<i>Output Gap</i>							0.075*** (0.016)		0.037** (0.015)
<i>Ratings</i>								1.297 (0.277)	0.922 (0.372)
<i>Constant</i>	-0.096 (0.101)	-2.023*** (0.236)	-0.101 (0.101)	-0.484*** (0.108)	0.547*** (0.167)	6.984** (3.102)	-0.462*** (0.120)	-3.836*** (0.789)	0.221 (4.583)
Obs.	581	558	577	558	581	540	484	517	422

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the standard errors. Obs. are the observations for each regression.

Table 4: Results on the relationship between sovereign debt risks and geopolitical risks (GPR index) by regions, GMM, 1984-2022

Variables	10-year CDS						Bond Returns						5-year CDS					
	South America	Asia	ME	China	Japan	USA	South America	Asia	ME	China	Japan	USA	South America	Asia	ME	China	Japan	USA
<i>GPR</i>	8.331*** (1.810)	8.392** (3.692)	-2.084** (1.187)	1.081* (0.638)	0.252 (1.642)	-0.346 (0.437)	2.556 (0.000)	0.468 (0.000)	0.552*** (0.141)	0.142 (0.000)	0.430*** (0.141)	0.053 (0.000)	3.792** (1.836)	-2.418 (2.056)	-0.734 (0.511)	-0.281 (0.230)	-1.534 (2.523)	-0.247 (0.190)
<i>VOL</i>	0.014*** (0.005)	0.018*** (0.006)	0.012** (0.005)	0.014*** (0.005)	0.012** (0.005)	0.008 (0.005)	0.001 (0.000)	0.002 (0.000)	0.001* (0.001)	0.001 (0.000)	0.002*** (0.001)	0.002 (0.000)	0.021*** (0.002)	0.022*** (0.003)	0.020*** (0.003)	0.023*** (0.002)	0.015 (0.021)	0.019*** (0.004)
<i>Inflation</i>	-0.017*** (0.004)	-0.015*** (0.004)	-0.015*** (0.004)	-0.016*** (0.004)	-0.018*** (0.004)	-0.015*** (0.004)	0.001 (0.000)	0.001 (0.000)	0.000 (0.001)	0.001 (0.000)	0.001 (0.001)	0.001 (0.000)	0.001 (0.002)	0.004 (0.003)	0.002 (0.003)	0.002 (0.002)	0.003 (0.083)	0.005 (0.004)
<i>Int. Rate</i>	-0.015 (0.106)	-0.019 (0.080)	0.073 (0.106)	0.139** (0.063)	0.037 (0.104)	0.161 (0.121)	-0.007 (0.000)	-0.010 (0.000)	0.011 (0.016)	-0.011 (0.000)	-0.006 (0.035)	-0.009 (0.000)	0.339*** (0.079)	0.196** (0.076)	0.213** (0.089)	0.271*** (0.080)	0.234 (0.300)	0.218*** (0.067)
<i>Debt</i>	-0.005 (0.013)	-0.021 (0.013)	-0.051* (0.031)	0.004 (0.014)	-0.003 (0.013)	-0.006 (0.011)	-0.000 (0.000)	-0.000 (0.000)	-0.003 (0.004)	-0.000 (0.000)	0.002 (0.002)	0.001 (0.000)	-0.004 (0.005)	-0.003 (0.002)	0.007 (0.006)	-0.002 (0.005)	0.003 (0.090)	-0.004 (0.003)
<i>REER</i>	0.039 (0.061)	-0.191* (0.102)	-0.190 (0.145)	-0.012 (0.058)	0.036 (0.068)	0.009 (0.092)	0.049 (0.000)	0.060 (0.000)	0.055*** (0.006)	0.059 (0.000)	0.048*** (0.008)	0.050 (0.000)	-0.079* (0.044)	-0.123*** (0.031)	0.081 (0.131)	-0.097** (0.040)	0.047 (0.769)	-0.119*** (0.029)
<i>Output Gap</i>	0.103 (0.066)	0.081*** (0.028)	-0.005 (0.084)	0.011 (0.023)	0.077 (0.069)	0.026 (0.024)	-0.001 (0.000)	-0.004 (0.000)	-0.004 (0.005)	-0.005 (0.000)	-0.004 (0.012)	-0.002 (0.000)	-0.018 (0.024)	-0.004 (0.029)	-0.017 (0.027)	-0.019 (0.026)	-0.021 (0.210)	-0.020 (0.036)
<i>Ratings</i>	-0.628 (1.088)	-2.918* (1.547)	-5.236* (3.112)	0.827 (1.328)	-0.220 (1.073)	-0.061 (1.198)	-0.094 (0.000)	-0.050 (0.000)	-0.685 (0.568)	-0.043 (0.000)	0.164 (0.284)	-0.057 (0.000)	-0.266 (0.233)	-0.228 (0.206)	-0.328 (0.314)	-0.232 (0.267)	-0.256 (1.519)	-0.182 (0.186)
<i>Constant</i>	-0.843 (8.245)	28.025** (13.392)	38.648 (24.625)	-0.293 (6.747)	-1.416 (8.949)	2.482 (9.054)	-4.159 (0.000)	-5.296 (0.000)	-2.379 (2.473)	-5.061 (0.000)	-4.664*** (1.205)	-4.461 (0.000)	6.109 (4.331)	11.296*** (4.059)	-8.874 (12.421)	8.347** (3.834)	-4.925 (77.562)	11.399*** (4.064)
Obs.	118	118	118	118	118	118	400	400	400	400	400	400	191	191	191	191	191	191

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

Table 5: Results on the relationship between sovereign debt risk (10-year CDS) and geopolitical risks (GPR index) before and after 2009 Subprime crisis, OLS-FE

Variables	Before the crisis									After the crisis								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	1.162*** (0.213)	1.101*** (0.209)	1.165*** (0.214)	1.136*** (0.215)	1.163*** (0.208)	1.250*** (0.190)	1.131*** (0.197)	1.174*** (0.218)	0.587*** (0.191)	0.567*** (0.178)	0.510*** (0.189)	0.527*** (0.179)	0.569*** (0.178)	0.232 (0.187)	0.604*** (0.179)	0.347* (0.179)	0.074 (0.184)	-0.007 (0.145)
<i>VOL</i>		0.028** (0.013)							0.001 (0.013)		0.028* (0.015)							0.017 (0.012)
<i>Inflation</i>			0.013 (0.019)						-0.280*** (0.064)			-0.018*** (0.002)						0.127*** (0.034)
<i>Int. Rate</i>				0.158*** (0.045)					-0.127 (0.151)				0.047 (0.065)					0.626*** (0.131)
<i>Debt</i>					-0.004 (0.003)				-0.014*** (0.004)					0.009*** (0.002)				0.020*** (0.003)
<i>REER</i>						0.262*** (0.070)			0.429*** (0.120)						-0.086* (0.044)			0.216 (0.133)
<i>Output Gap</i>							0.119*** (0.037)		0.073* (0.038)							-0.160*** (0.023)		-0.099*** (0.037)
<i>Ratings</i>								-3.960*** (0.469)	-10.197*** (1.201)								-1.952*** (0.135)	-0.033 (0.357)
<i>Constant</i>	2.913*** (0.159)	0.393 (1.173)	2.887*** (0.171)	2.552*** (0.182)	3.118*** (0.253)	-23.503*** (6.992)	2.740*** (0.115)	13.848*** (1.313)	-10.443 (10.474)	3.951*** (0.097)	1.355 (1.376)	3.943*** (0.097)	3.903*** (0.118)	3.365*** (0.152)	12.551*** (4.438)	3.721*** (0.109)	9.366*** (0.382)	-21.742 (13.625)
Obs.	194	194	194	194	194	188	170	178	160	223	184	221	223	223	217	203	208	160
<i>R</i> ²	0.383	0.410	0.384	0.398	0.390	0.481	0.488	0.612	0.757	0.201	0.219	0.222	0.203	0.298	0.218	0.369	0.563	0.687

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

Table 6: Results on the relationship between sovereign debt risk (Bond Returns) and geopolitical risks (GPR index) before and after 2009 Subprime crisis, OLS-FE

Variables	Before the crisis									After the crisis								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	0.401*** (0.110)	0.348*** (0.115)	0.411*** (0.109)	0.470*** (0.112)	0.234* (0.132)	0.427*** (0.113)	0.566*** (0.095)	0.487*** (0.116)	0.476*** (0.096)	0.090 (0.185)	0.257 (0.210)	0.099 (0.185)	0.101 (0.175)	0.025 (0.153)	0.088 (0.184)	0.579*** (0.139)	0.253* (0.148)	0.171 (0.125)
<i>VOL</i>		-0.002 (0.008)							-0.001 (0.006)		0.036 (0.026)							-0.009 (0.011)
<i>Inflation</i>			-0.036** (0.018)						-0.135 (0.088)			-0.003 (0.003)						0.003 (0.005)
<i>Int. Rate</i>				-0.148*** (0.022)					-0.199*** (0.050)				-1.099*** (0.124)					-1.013*** (0.110)
<i>Debt</i>					0.015*** (0.002)				0.014*** (0.003)					0.026*** (0.002)				0.018*** (0.002)
<i>REER</i>						-0.137 (0.085)			0.103 (0.087)						0.044 (0.128)			0.203* (0.121)
<i>Output Gap</i>							-0.016 (0.025)		-0.014 (0.031)							-0.147*** (0.022)		-0.072*** (0.022)
<i>Ratings</i>								6.461*** (1.080)	2.766*** (0.887)								-0.864*** (0.147)	1.021*** (0.240)
<i>Constant</i>	4.384*** (0.125)	4.634*** (0.686)	4.407*** (0.128)	5.657*** (0.218)	3.758*** (0.168)	18.032** (8.505)	4.410*** (0.135)	-13.626*** (3.064)	-12.002 (9.689)	5.881*** (0.181)	2.626 (2.419)	5.842*** (0.190)	6.923*** (0.194)	4.041*** (0.188)	1.499 (12.980)	5.893*** (0.136)	8.297*** (0.481)	-16.040 (12.265)
<i>Obs.</i>	766	708	766	729	734	766	672	679	565	507	429	505	468	507	506	396	488	363
<i>R²</i>	0.153	0.138	0.163	0.179	0.245	0.161	0.320	0.273	0.404	0.013	0.019	0.014	0.325	0.441	0.013	0.144	0.064	0.699

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

Table 7: Results on the relationship between sovereign debt risk (5-year CDS) and geopolitical risks (GPR index) before and after 2009 Subprime crisis, OLS-FE

Variables	Before the crisis									After the crisis								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>GPR</i>	0.500*** (0.155)	0.527*** (0.172)	0.503*** (0.154)	0.573*** (0.169)	0.370*** (0.126)	0.649*** (0.158)	0.477*** (0.134)	0.189*** (0.073)	0.177** (0.081)	0.098 (0.200)	0.099 (0.200)	0.100 (0.201)	0.033 (0.182)	0.226 (0.231)	0.240 (0.214)	-0.017 (0.194)	0.152 (0.123)	0.081 (0.131)
<i>VOL</i>		-0.005 (0.011)							-0.008 (0.006)		-0.002 (0.008)							-0.009* (0.005)
<i>Inflation</i>			-0.012** (0.006)						0.007*** (0.002)			0.048 (0.010)						-0.089 (0.079)
<i>Int. Rate</i>				0.019 (0.069)					-0.243*** (0.057)				0.203*** (0.063)					-0.011 (0.175)
<i>Debt</i>					0.013*** (0.001)				0.008*** (0.001)					-0.008*** (0.002)				-0.006** (0.003)
<i>REER</i>						0.029 (0.052)			-0.067 (0.057)						0.193* (0.101)			0.091 (0.125)
<i>Output Gap</i>							-0.287*** (0.020)		-0.019 (0.015)							0.055** (0.025)		0.007 (0.031)
<i>Ratings</i>								-2.924*** (0.082)	-2.158*** (0.132)								-3.979*** (0.197)	-6.011*** (0.715)
<i>Constant</i>	4.215*** (0.101)	5.076*** (0.983)	4.240*** (0.100)	4.187*** (0.114)	3.387*** (0.130)	1.256 (5.161)	3.822*** (0.104)	12.314*** (0.241)	17.685*** (5.611)	4.763*** (0.028)	4.965*** (0.736)	4.774*** (0.028)	0.079 (1.458)	5.087*** (0.087)	-14.702 (10.159)	5.052*** (0.078)	15.167*** (0.510)	10.826 (12.392)
<i>Obs.</i>	248	248	248	248	248	232	210	217	182	465	398	463	442	465	433	385	428	316
<i>R²</i>	0.824	0.824	0.829	0.846	0.841	0.848	0.866	0.945	0.940	0.406	0.415	0.416	0.415	0.530	0.433	0.626	0.865	0.933

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

4.2 Sensitivity analysis

As we previously analysed, understanding the relationship between geopolitical tensions and sovereign risk is paramount. The dynamics of this relation can be multifaceted, and capturing its nuances requires an even more detailed analytical approach. Therefore, in this section we delve into the application of a sample partition before and after the subprime crisis of 2009, to comprehensively grasp the evolving impact of geopolitical tensions on sovereign risk. Additionally, the incorporation of an alternative measure of uncertainty and instability, the World Uncertainty Index (WUI), aims to enrich our comparative analysis, offering a more robust understanding of the complex interplay between global uncertainties and risks faced by governments.

Table 5 presents the results for 10-year CDS before and after 2009, Table 6 shows the results for bond returns and Table 7 displays the estimates for 5-year CDS, for the same sub-samples.

The effect of geopolitical risk on sovereign risk varies depending on the period under analysis. Starting with Table 5, we observe that before and during the subprime crisis, the GPR had a significantly positive impact on 10-year CDS for both the standalone and the regression with all variables. However, after the crisis, the coefficients are only significant for some stand-alone regressions, and when this occurs, the absolute magnitude of the coefficients is typically small, with values being half of the ones before the crisis. This could be a sign that the impact of this measure is more noteworthy during stressed periods, which is in line with the presence of high economic uncertainty during recessions for financial markets.

Interestingly, we report a change in the sign of inflation after the subprime. The value is negative in the all-sample estimations and before the crisis but becomes positive afterward. This could be a sign that governments might find it challenging to service their debts if economic activity is subdued. If economic growth is sluggish due to low inflation, it may affect the government's ability to generate sufficient revenue.

Another compelling result is the change in the sign of the debt ratio for the CDS measures of risk. We observe that for the all-sample and after the subprime crisis the coefficients were significant and positive, indicating that as government debt rises, sovereign risk should go up in recognition of the higher risk carried by investors holding government securities, but before the 2009 subprime crisis, the values reported are

significant and negative. The sovereign debt crisis in Europe alone was timed to have started at the end of 2009 and is typically spanned until 2016. Therefore, after this period more debt might be perceived differently. Before turbulent periods, there might be increased demand for government debt as investors seek safety, leading to lower perceived risk for these countries.

Table 6 shows a few changes in the periods before and after the 2009 crisis. The coefficient that measures the impact of GPR on bond returns is no longer significant after the crisis (when all variables are included in the model).

Finally, Table 7 (5-year CDS) shows very similar results to those presented in Table 5 (10-year CDS). Only the fact that the GPR variable was smaller values before and during the 2009 crisis stands out, but it is highly significant.

Table 8: Results on the relationship between sovereign debt risks and geopolitical risks (WUI index), OLS-FE, 1984-2022

Variables	CDS 10 years								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	0.076 (0.202)	0.099 (0.204)	0.072 (0.202)	0.315 (0.195)	0.073 (0.203)	-0.023 (0.201)	0.373* (0.215)	0.191 (0.173)	0.169 (0.190)
<i>VOL</i>		0.027*** (0.006)							0.024** (0.012)
<i>Inflation</i>			-0.015*** (0.004)						-0.013*** (0.003)
<i>Int. Rate</i>				0.184*** (0.021)					0.043 (0.070)
<i>Debt</i>					0.001 (0.001)				0.006*** (0.002)
<i>REER</i>						0.137*** (0.040)			0.122* (0.071)
<i>Output Gap</i>							-0.034 (0.025)		0.108*** (0.025)
<i>Ratings</i>								-2.404*** (0.141)	-2.458*** (0.298)
<i>Constant</i>	3.442*** (0.137)	0.967 (0.599)	3.483*** (0.143)	2.829*** (0.144)	3.388*** (0.161)	-10.392*** (4.018)	2.976*** (0.142)	9.816*** (0.401)	-4.951 (7.208)
<i>Obs.</i>	635	635	633	614	635	608	482	518	435
<i>R²</i>	0.272	0.298	0.277	0.344	0.273	0.305	0.313	0.567	0.625

Table 8: Results on the relationship between sovereign debt risks and geopolitical risks (WUI index), OLS-FE, 1984-2022 (continued)

Variables	Bond returns								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	1.101*** (0.228)	1.076*** (0.234)	1.105*** (0.228)	0.763*** (0.205)	0.920*** (0.212)	1.102*** (0.227)	0.444*** (0.114)	0.576*** (0.183)	0.365*** (0.102)
<i>VOL</i>		0.019* (0.010)							0.003 (0.005)
<i>Inflation</i>			-0.005 (0.004)						0.003 (0.003)
<i>Int. Rate</i>				-0.391*** (0.037)					-0.232*** (0.045)
<i>Debt</i>					0.023*** (0.001)				0.016*** (0.001)
<i>REER</i>						-0.278*** (0.063)			0.142** (0.065)
<i>Output Gap</i>							-0.081*** (0.015)		-0.071*** (0.017)
<i>Ratings</i>								0.428* (0.227)	0.927*** (0.166)
<i>Constant</i>	4.366*** (0.122)	2.829*** (0.924)	4.369*** (0.122)	7.873*** (0.362)	3.240*** (0.218)	32.048*** (6.272)	4.517*** (0.127)	3.495*** (0.657)	-10.776 (6.827)
<i>Obs.</i>	1,741	1,612	1,739	1,616	1,706	1,741	1,307	1,476	1,178
<i>R²</i>	0.076	0.076	0.077	0.256	0.203	0.091	0.462	0.180	0.571

Table 8: Results on the relationship between sovereign debt risks and geopolitical risks (WUI index), OLS-FE, 1984-2022 (continued)

Variables	CDS 5 years								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	0.035 (0.153)	0.053 (0.154)	0.045 (0.152)	0.175 (0.148)	-0.012 (0.150)	0.005 (0.159)	0.352** (0.154)	0.191** (0.081)	0.200** (0.086)
<i>VOL</i>		-0.003 (0.004)							-0.005 (0.004)
<i>Inflation</i>			-0.012** (0.006)						0.003 (0.004)
<i>Int. Rate</i>				0.193*** (0.018)					-0.197*** (0.049)
<i>Debt</i>					0.004*** (0.001)				0.007*** (0.001)
<i>REER</i>						0.049 (0.038)			-0.059 (0.041)
<i>Output Gap</i>							-0.187*** (0.017)		0.020* (0.011)
<i>Ratings</i>								-3.075*** (0.069)	-2.584*** (0.097)
<i>Constant</i>	4.773*** (0.015)	5.086*** (0.387)	4.769*** (0.015)	0.294 (0.406)	4.609*** (0.042)	-0.160 (3.860)	4.298*** (0.052)	12.805*** (0.181)	15.585*** (4.130)
<i>Obs.</i>	1,147	1,109	1,145	1,088	1,147	1,057	794	884	668
<i>R²</i>	0.627	0.635	0.631	0.684	0.634	0.624	0.747	0.922	0.943

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

As mentioned above, in this section we present the results of estimating regressions that use an alternative measure of instability and uncertainty, the WUI, as an explanatory variable. Table 8 shows the results for the three risk measures analyzed. This table shows that uncertainty in a bordering country has an adverse impact on sovereign risk. In other words, increases in global uncertainty mean that governments face more risk. The values for the coefficients of this uncertainty risk measure are highly significant for the case of Bond returns and for some 5-year CDS models, including the model with all regressors. These results confirm what we concluded earlier for the GPR risk measure. Greater uncertainty and instability lead to greater sovereign risk.

The coefficients for the variables presented exclusively with the uncertainty measure have the values that are expected.

In the appendix, we included an analysis of the GMM estimation and the regions GMM estimations for the WUI measure. We reach the same conclusions as reported in here.

5. Conclusion

In this study, we have assessed the impact of geopolitical risk and global uncertainty in country's borders on sovereign risk faced by governments in 26 European countries ranging from 1984 to 2022, by employing OLS-Fixed effects and GMM econometric approaches.

Our results show that when a neighbouring country faces a geopolitical tension event, it raises the sovereign risk of the home country. This interconnectivity can be supported by the fact that wars and tensions can cause spillover effects, increase military presence, or shift the regional strategic balance. Events in one country can prompt cooperative responses or collaborations among neighbouring countries to address common challenges.

Furthermore, we explore how geopolitical tensions in different regions impact the sovereign risk exposure of European countries. We conclude that the geopolitical risk of South America, Asia, and China, increases the governmental risk of European economies. This may be justified by the fact that European countries have these regions as a large trading partner and, therefore, tensions within these regions may affect the production chain of many European firms. Additionally, we observe that the Middle East tensions impact negatively European Bond returns, as this region is an important energy supplier of the European Union. Japanese's risk also presents some degree of influence upon Europe sovereign risks. We justify these finding as the increased interconnectedness of economies has made them more vulnerable to instability from other regions. In fact, economies are also more integrated, with trade partners and investors often coming from the same area. This could result in poor risk diversification and a growing dependence between partners.

Interestingly, we report a stronger the impact of Geopolitical risk during stressed periods. We observe that geopolitical tensions in border countries strongly affect their neighbours before and during the subprime crisis in 2009.

Lastly, the above-mentioned results are relevant for market participants, monetary authorities, governmental officials, and policymakers formulating their decisions. Government authorities may adapt and actively monitor policy actions during uncertain environments, and investors may adjust their diversification strategies. It is noteworthy that geopolitical shocks predominantly manifest as unanticipated events. Therefore, it is

crucial to underscore the necessity for maintaining stability in both government management and financial markets.

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Appendix

Appendix A. Data Information

Neighboring countries

Countries	Neighbours								
	1	2	3	4	5	6	7	8	9
Austria	Czech Republic	Germany	Hungary	Italy	Slovakia	Slovenia	Switzerland		
Belgium	France	Germany	Luxembourg	Netherlands					
Czech Republic	Austria	Germany	Poland	Slovakia					
Denmark	Germany								
Estonia	Latvia								
Finland	Norway	Sweden							
France	Switzerland	Belgium	Germany	Italy	Luxembourg	Spain			
Germany	Austria	Belgium	Czech Republic	Denmark	France	Luxembourg	Netherlands	Poland	Switzerland
Greece									
Hungary	Austria	Slovakia	Slovenia						
Iceland									
Ireland	United Kingdom								
Italy	Austria	France	Slovenia	Switzerland					
Latvia	Lithuania	Estonia							
Lithuania	Poland	Latvia							
Luxembourg	Belgium	France	Germany						
Netherlands	Belgium	Germany							
Norway	Finland	Sweden							
Poland	Slovakia	Czech Republic	Germany	Lithuania					
Portugal	Spain								
Slovakia	Austria	Czech Republic	Hungary	Poland					
Slovenia	Austria	Italy	Hungary						
Spain	Portugal	France							
Sweden	Finland	Norway							
Switzerland	Austria	France	Italy	Germany					
United Kingdom	Ireland								

Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) 5-year CDS	1.000											
(2) 10-year CDS	0.237	0.237										
(3) Bond returns	0.261	0.261	0.261									
(4) GPR	-0.258	-0.258	-0.258	-0.258								
(5) WUI	0.083	0.083	0.083	0.083	0.083							
(6) VOL	0.191	0.191	0.191	0.191	0.191	0.191						
(7) Inflation	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081					
(8) Int. Rate	-0.498	-0.498	-0.498	-0.498	-0.498	-0.498	-0.498	-0.498				
(9) debt	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493	0.493			
(10) REER	-0.192	-0.192	-0.192	-0.192	-0.192	-0.192	-0.192	-0.192	-0.192	-0.192		
(11) Output Gap	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524	
(12) Ratings	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494	-0.494

Appendix B. World Uncertainty Index estimations

Table B1: Results on the relationship between sovereign debt risks and geopolitical risks (WUI), GMM, 1984-2022

Variables	10-year CDS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	0.327*** (0.003)	0.274*** (0.002)	0.368*** (0.002)	-0.005*** (0.000)	0.065*** (0.001)	0.284*** (0.004)	0.120*** (0.001)	0.217*** (0.003)	0.058*** (0.001)
<i>VOL</i>		0.006*** (0.000)							0.004*** (0.000)
<i>Inflation</i>			-0.016*** (0.000)						-0.013*** (0.000)
<i>Int. Rate</i>				0.172*** (0.000)					0.234*** (0.000)
<i>debt</i>					-0.023*** (0.000)				0.010*** (0.000)
<i>REER</i>						0.097*** (0.000)			-0.056*** (0.000)
<i>Output Gap</i>							0.098*** (0.000)		-0.004*** (0.000)
<i>Ratings</i>								1.623*** (0.003)	0.987*** (0.005)
<i>Constant</i>	1.234*** (0.002)	0.960*** (0.003)	1.207*** (0.002)	2.173*** (0.000)	3.386*** (0.001)	-8.342*** (0.028)	1.688*** (0.001)	-2.880*** (0.010)	3.928*** (0.043)
<i>Obs.</i>	513	513	509	489	513	494	388	418	351

Table B1: Results on the relationship between sovereign debt risks and geopolitical risks (WUI), GMM, 1984-2022 (continued)

Variables	Bond returns								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	0.113*** (0.000)	0.120*** (0.000)	0.113*** (0.000)	0.121*** (0.000)	0.110*** (0.000)	0.104*** (0.000)	0.112*** (0.000)	0.106*** (0.001)	0.078*** (0.002)
<i>VOL</i>		0.001*** (0.000)							0.001*** (0.000)
<i>Inflation</i>			-0.001*** (0.000)						0.001*** (0.000)
<i>Int. Rate</i>				-0.008*** (0.000)					-0.003*** (0.000)
<i>debt</i>					0.000*** (0.000)				0.001*** (0.000)
<i>REER</i>						0.057*** (0.000)			0.076*** (0.000)
<i>Output Gap</i>							-0.003*** (0.000)		-0.004*** (0.000)
<i>Ratings</i>								0.010*** (0.002)	0.031*** (0.012)
<i>Constant</i>	0.530*** (0.000)	0.348*** (0.002)	0.533*** (0.000)	0.668*** (0.001)	0.530*** (0.000)	-5.243*** (0.007)	0.430*** (0.001)	0.503*** (0.006)	-7.271*** (0.060)
<i>Obs.</i>	1,634	1,518	1,630	1,508	1,614	1,634	1,229	1,420	1,131

Table B1: Results on the relationship between sovereign debt risks and geopolitical risks (WUI), GMM, 1984-2022 (continued)

Variables	5-year CDS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>WUI</i>	-0.779*** (0.004)	-0.661*** (0.001)	-0.777*** (0.005)	-0.615*** (0.008)	-0.696*** (0.007)	-0.743*** (0.006)	-0.844*** (0.014)	-0.789*** (0.006)	0.148*** (0.006)
<i>VOL</i>		0.025*** (0.000)							0.026*** (0.000)
<i>Inflation</i>			0.011*** (0.000)						0.002*** (0.000)
<i>Int. Rate</i>				0.047*** (0.001)					0.275*** (0.000)
<i>debt</i>					-0.007*** (0.000)				0.006*** (0.000)
<i>REER</i>						-0.031*** (0.001)			-0.042*** (0.001)
<i>Output Gap</i>							0.066*** (0.001)		0.031*** (0.000)
<i>Ratings</i>								1.054*** (0.023)	0.834*** (0.012)
<i>Constant</i>	0.948*** (0.002)	-1.720*** (0.006)	0.928*** (0.003)	0.682*** (0.009)	1.212*** (0.006)	3.972*** (0.084)	0.633*** (0.008)	-2.075*** (0.060)	-1.751*** (0.125)
Obs.	959	921	955	891	959	882	654	714	539

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.

Table B2: Results on the relationship between sovereign debt risks and geopolitical risks (WUI) by regions, GMM, 1984-2022

	10-year CDS					
Variables	South America	Asia	ME	China	Japan	USA
WUI	-0.879** (0.426)	0.812* (0.461)	-0.306** (0.152)	-0.546 (0.774)	-2.321 *** (0.514)	0.207 (0.154)
VOL	0.008* (0.004)	0.009 (0.006)	0.013*** (0.004)	0.008 (0.005)	0.014*** (0.005)	0.012*** (0.004)
Inflation	-0.017*** (0.004)	-0.019*** (0.004)	-0.017*** (0.004)	-0.016*** (0.004)	-0.017*** (0.004)	-0.017*** (0.004)
Int. Rate	0.128 (0.081)	0.052 (0.141)	0.011 (0.079)	0.099 (0.066)	0.094** (0.045)	0.045 (0.067)
Debt	0.002 (0.015)	0.007 (0.014)	-0.011 (0.010)	-0.003 (0.012)	-0.002 (0.011)	-0.006 (0.011)
REER	0.048 (0.065)	0.039 (0.103)	0.077 (0.070)	-0.014 (0.125)	0.613*** (0.195)	0.041 (0.063)
Output Gap	0.032 (0.027)	0.092 (0.089)	0.069** (0.031)	0.041 (0.029)	-0.079*** (0.030)	0.067** (0.030)
Ratings	0.236 (1.481)	0.272 (1.344)	-0.892 (0.907)	-0.308 (1.187)	0.930 (1.042)	-0.274 (1.013)
Constant	-3.511 (9.744)	-4.106 (14.073)	-2.818 (7.262)	3.989 (13.898)	-61.937*** (20.824)	-1.354 (7.766)
Obs.	118	118	118	118	118	118

Table B2: Results on the relationship between sovereign debt risks and geopolitical risks (WUI) by regions, GMM, 1984-2022 (continued)

Variables	Bond Returns					
	South America	Asia	ME	China	Japan	USA
<i>WUI</i>	-0.342* (0.178)	0.081 (0.187)	-0.103 (0.113)	-0.104 (0.123)	-0.073 (0.143)	0.215*** (0.051)
<i>VOL</i>	0.001 (0.001)	0.002*** (0.001)	0.002** (0.001)	0.002*** (0.001)	0.001** (0.001)	0.001 (0.001)
<i>Inflation</i>	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)
<i>Int. Rate</i>	-0.014 (0.012)	-0.014 (0.019)	-0.010 (0.009)	-0.011 (0.019)	-0.009 (0.012)	0.010 (0.024)
<i>Debt</i>	0.003 (0.003)	0.000 (0.005)	-0.001 (0.004)	-0.002 (0.005)	0.000 (0.003)	-0.000 (0.004)
<i>REER</i>	0.059*** (0.007)	0.052*** (0.009)	0.054*** (0.007)	0.059*** (0.008)	0.057*** (0.008)	0.050*** (0.009)
<i>Output Gap</i>	0.004 (0.007)	0.000 (0.010)	-0.002 (0.007)	-0.005 (0.008)	-0.003 (0.007)	-0.007 (0.008)
<i>Ratings</i>	-0.129 (0.174)	-0.135 (0.432)	-0.354 (0.419)	-0.192 (0.430)	-0.131 (0.216)	-0.103 (0.748)
<i>Constant</i>	-4.129*** (1.345)	-3.842** (1.629)	-4.039** (1.681)	-4.674*** (1.516)	-4.576*** (1.370)	-4.279 (2.608)
Obs.	400	400	400	400	400	400

Table B2: Results on the relationship between sovereign debt risks and geopolitical risks (WUI) by regions, GMM, 1984-2022 (continued)

Variables	5-year CDS					
	South America	Asia	ME	China	Japan	USA
<i>WUI</i>	-2.933*** (0.468)	0.000 (0.350)	-1.846 (1.436)	-0.402 (0.342)	-0.706* (0.361)	0.586*** (0.166)
<i>VOL</i>	0.013*** (0.003)	0.022*** (0.002)	0.023*** (0.004)	0.021*** (0.002)	0.022*** (0.002)	0.024*** (0.003)
<i>Inflation</i>	-0.002 (0.002)	0.003 (0.002)	0.003 (0.003)	0.002 (0.001)	0.002 (0.002)	0.006*** (0.001)
<i>Int. Rate</i>	0.244*** (0.064)	0.286*** (0.076)	0.205 (0.144)	0.264*** (0.071)	0.320*** (0.078)	0.283*** (0.032)
<i>debt</i>	-0.017** (0.008)	-0.000 (0.005)	0.009 (0.013)	0.004 (0.005)	-0.001 (0.004)	-0.002 (0.004)
<i>REER</i>	0.186* (0.105)	-0.121*** (0.036)	0.113 (0.129)	0.021 (0.070)	-0.175*** (0.044)	-0.067 (0.070)
<i>Output Gap</i>	-0.009 (0.028)	-0.008 (0.024)	-0.014 (0.038)	-0.016 (0.022)	-0.021 (0.024)	0.002 (0.027)
<i>Ratings</i>	0.109 (0.397)	-0.174 (0.235)	-0.316 (0.457)	-0.209 (0.249)	0.269 (0.312)	-0.355 (0.477)
<i>Constant</i>	-20.294* (11.314)	10.268*** (3.715)	-12.822 (11.970)	-3.743 (6.986)	14.233*** (4.042)	5.081 (7.330)
<i>Obs.</i>	191	191	191	191	191	191

Notes: * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets we report the robust standard errors.