



Does geopolitical risk influence GCC trade flows? Evidence from a country-pair model

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Abstract

Objectives: The study aimed to investigate the impact of geopolitical risk on bilateral trade flows between countries of the Gulf Cooperation Council (GCC) and their 36 main trading partners that have free trade agreements (FTAs). **Method:** The study used data from the period of 1975 to 2018. The model is estimated using different panel specifications. These include pooled OLS, fixed and random effects techniques, and cross-sectional unit interdependency tests. **Results:** Using the Kao test, the determinant factors of bilateral trade are shown to be cointegrated. Furthermore, the model is estimated with cross-sectional unit interdependency using Pesaran's test, the Frees test, and Friedman's test of cross-sectional interdependence. Importantly, according to the appropriate fixed effect findings, geopolitical risk has a negative impact on GCC countries' bilateral trade with their main FTA trading partners. **Conclusion:** Higher geopolitical risk between the GCC and the FTA partners brings about higher transportation costs, which influences trade flow patterns and firms' decisions about exporting and importing, thereby leading to a decline in investments.

Keywords: geopolitical risk, FTA, GCC

JEL Classification: F13, F15, L25, C23

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أثر المخاطر الجيوسياسية على التدفقات التجارية لدول مجلس التعاون الخليجي

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ملخص

الأهداف: بحثت الدراسة في تأثير المخاطر الجيوسياسية على التدفقات التجارية الثنائية بين دول مجلس التعاون الخليجي وأهم شركائها التجاريين من 36 دولة والذين لديهم اتفاقات تجارة حرة مع دول المجلس. **المنهج:** استخدمت الدراسة بيانات من الفترة من 1975 إلى 2018. هذا وتم اختبار العلاقة من خلال استخدام عدة نماذج للبيانات المدمجة (Pooled)، كذلك تم استخدام نموذج الآثار الزمنية الثابتة (Fixed Effect) والعشوائية (Random Effect)، كما تم استخدام اختبارات استقلال البيانات (Cross-sectional Unit Independency). **النتائج:** هذا وعند استخدام اختبار كاو (Kao) للاندماج المشترك، تبين وجود علاقة ترابط مع العوامل المحددة للتجارة الثنائية. علاوة على ذلك، تم تقدير ما يسمى في cross-sectional unit independency باستخدام اختبار بيساران واختبار فريز واختبار فريدمان. ووفقا لنتائج الآثار الزمنية الثابتة (Fixed Effect)، فإن المخاطر الجيوسياسية لها تأثير سلبي على التجارة الثنائية لدول مجلس التعاون الخليجي مع شركائها التجاريين. **الخاتمة:** أن ارتفاع المخاطر الجيوسياسية بين دول مجلس التعاون الخليجي وشركائها التجاريين تؤدي إلى ارتفاع تكاليف النقل، مما يؤثر على أنماط تدفق التجارة وقرارات الشركات بشأن التصدير والاستيراد والذي من شأنه تراجع الاستثمارات.

الكلمات المفتاحية: المخاطر الجيوسياسية، اتفاقية التجارة الحرة ، دول مجلس التعاون الخليجي

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Introduction

The Middle East has been witnessing economic and political fluctuations, instability, and changes since the late first half of the last century. In particular, the region has been experiencing wars and a high level of political uncertainty because of its economic and geographical importance due to its natural resources, such as oil and gas, and its shipping lines. The group of countries comprising the Gulf Cooperation Council (GCC) are the largest oil producers in the Middle East and have been politically and economically stable since the 1950s. This has enabled the GCC to offset any shortages in global oil supply when other OPEC members have been under embargo, such as in the case of Iran, or disruption, as has happened in Iraq.

According to Balcilar et al. (2018), geopolitical risk is among the main determinants of decisionmakers, and investment decisions based on geopolitical risk have a direct effect on financial market business cycles and global trade. However, geopolitical risk may have an indirect influence on the flow of trade through the channel of investment. In other words, geopolitical risk raises transportation costs, which affects firms' decisions with regard to exporting and importing, thereby leading to a decline in investments. Moreover, Engel (2014) concluded that geopolitical risk has an indirect impact on monetary and fiscal policy via exchange rates, as the real value of exchange rates is calculated by expectations.

This paper aimed to assess the impact of geopolitical risk on the GCC's trade flows with its largest trading partners. The period used covers the main political tensions across the Middle East region from 1975 to 2018. Among these political tensions are the period of Iraq and Iran war from 1980 to 1988, Iraq's invasion of Kuwait in 1990-1991, the Yemen civil war in 1994, the second Gulf war in

2003, and the Arab spring uprising during 2010–2012. To the best of our knowledge, this is the first study that investigates the effect of geopolitical risk on GCC trade flows. The study also provides empirical evidence that is in line with previous studies on the indirect impact of geopolitical risk on trade flows.

The study applies a panel approach using fixed and random effect methods as well as the Hausman test to choose the appropriate method. The model is estimated with cross-sectional unit independency using Pesaran's test, the Frees test, and Friedman's test of cross-sectional independence. The results show a rejection of the null of cross-sectional independence, supporting the dependency of cross-sectional units. The estimated model is also tested using a panel cointegration test, which shows that the GCC trade determinant factors are cointegrated with their bilateral trade flows. Importantly, according to the appropriate fixed-effect panel model, higher geopolitical risk tends to decrease trade flows between GCC countries and their main free trade agreement (FTA) trading partners.

The paper is presented as follows. Section 1 reviews the literature on the impact of geopolitical risk on trade flows. Section 2 provides the model and methodology. The data description is shown at Section 3. The baseline empirical results and discussions are provided in Section 4, and the conclusion and policy implications are presented in Section 5.

Literature Review

A significant portion of the research on trade and conflict focuses on exploring the correlation between trade and peace among nations. One line of investigation examines how trade influences geopolitical conflict, suggesting that increased trade promotes cooperation and reduces hostility (Polachek, 1980). Other studies

delve into how geopolitical dynamics impact trade flows. For instance, Pollins (1989) demonstrates that diplomatic cooperation stimulates bilateral trade, while Morrow et al. (1998) found that countries with shared interests and similar democratic systems engage in greater trade. Additionally, Grossman (2001) and Skaperdas and Syropoulos (2001) have explored the relationship between property rights, security, and trade, providing valuable theoretical insights into these important factors. For those interested in delving further into this subject, comprehensive surveys of the empirical literature are available from Barbieri and Schneider (1999) and Reuveny (2000), which serve as valuable starting points for understanding the relationship between trade and various political and economic factors. Despite the common assumption that geopolitical issues cripple trade, the relationship is more nuanced. Barbieri and Levy (1999) found that while geopolitical issues can cause temporary dips in trade, the effect is usually fleeting and doesn't necessarily sever ties permanently. However, Anderton and Carter's 2001 study offered evidence that wars do, in fact, reduce trade compared to pre-conflict periods. Further research by Nitsch and Schumacher (2004) used the gravity model to analyze the impact of both terrorism and warfare on a broader scale. Their analysis of 200 countries from 1960 to 1993 revealed that terrorism, in particular, has a significant and negative impact on international trade flows. Another study by Singh et al. (2023) investigated the impact of geopolitical tensions across the largest seven economies in Latin America throughout the period from 2000 to 2020. Their findings show the excessive effects of geopolitical tensions on imports.

Global conflicts act as major trade barriers, with terrorism and international/external conflicts having the same impact as a 30% tariff (Blomberg & Hess, 2006). This cost surpasses even language

and border barriers. Further studies (Martin et al., 2008) explore military conflicts' influence to reduce trade openness. Interestingly, bilateral trade can act as a deterrent to further escalation, while multilateral openness might increase the risk of bilateral war by reducing dependence between countries.

Across centuries, warfare's ripples extend far beyond the battlefield. Glick and Taylor (2010) reveal, through data dating back to 1870, that wars do not just disrupt trade, but also cripple national income and harm global prosperity. Even in the modern era, Qureshi (2013) confirms this impact, finding that regional conflicts, both internal and international, cast a long shadow over trade flows across 145 countries for nearly six decades. Even neutral nations feel the economic tremors, with effects lingering for about three years after neighboring interstate conflicts and five years after global ones. Another study by Thakkar and Ayub (2022) tackles the interrelation between geopolitical risk and globalization. They found that a higher risk of geopolitical tends to decrease FDI and trade. The cost of trade was also found to be affected by geopolitical risk across 43 countries by the study of Hou and Zhang (2024).

Furthermore, the impact of geopolitical risk on per capita growth is minor. However, when considering additional factors such as education, inflation, and trade openness, the significance of these findings diminishes. Seabra et al. (2020) suggest that geopolitical risk in one country can have varying effects on economic activities in other countries. For example, terrorist attacks occurring in Greece may negatively impact the tourism sector in Spain but positively affect the tourism sector in Dubai. Gupta et al. (2019) conducted a working paper using four different approaches to analyze the impact of geopolitical risk on international trade flows. They discovered that

geopolitical risk has a significantly negative influence on global trade flows. In 2020, Saint Akadiri et al. (2019) used Granger causality to investigate the effects of geopolitical risk on both GDP and the tourism sector in Turkey. Their findings indicated that geopolitical risk indirectly affects both economic growth and the occurrence of terrorist activities in the tourism sector.

Wang et al. (2023) examined the association between geopolitical issues and institutional investments by analyzing data from 9,088 firms spanning the period from 1987 to 2016. Their findings indicated a significant negative relationship between corporate investments at the firm level and geopolitical risk. However, they observed that the impact of geopolitical risk was less pronounced for labor-intensive firms. Furthermore, the study revealed that the influence of geopolitical risk varied across different sectors, with firms in the tourism and related sectors experiencing a higher impact compared to firms in the defense sector.

A study conducted by Rajput et al. (2019) examined the impacts of geopolitical risk on foreign currency transfers. Additionally, Demir et al. (2019) investigated the relationship between geopolitical risks and corporate cash holdings.

Le and Tran (2021) conducted an independent study that specifically examined the influence of geopolitical risk on emerging Asian countries. Their study uncovered a negative relationship between geopolitical risk and corporate physical investment. Furthermore, the study indicated that the impact was more pronounced for firms with a greater degree of investment irreversibility. However, firms with higher levels of cash holdings were able to alleviate the adverse effects of geopolitical risk.

In a separate investigation, Fania et al. (2020) explored the effects of geopolitical risk on foreign direct investment (FDI) across West African countries. Their analysis demonstrated that geopolitical risk indeed has an impact on FDI flows. However, the specific nature and extent of this impact were not explicitly specified in the given information. The other study by Shao et al. (2014) found that geopolitical risk has an impact on the strategic emerging minerals prices.

On the other hand, the literature on the potential effects of an FTA between the EU and the GCC on their bilateral trade, as the second category of relevant research, has been of interest to many researchers. Among them, Al-Shammari (2015) analyzed, using the gravity model, the economic agreement (EA) between the EU and the GCC, which commenced in 1988, during the period between 1980 and 2008. Their empirical results implied that the EA delivered enhanced bilateral trade between the two blocs. In addition, since launching the GCC–EU EA, there has been a pronounced opportunity for bilateral trade to increase. Some other noteworthy studies, among them Eissa (2014) and DeRosa and Kernohan (2004), have examined potential economic welfare gains as a result of the proposed FTA between the EU and the GCC countries. The empirical findings of these studies concluded that there have been some economic welfare gains for the GCC countries.

Another study by Alawadhi et al. (2021) investigated the effects of the EU–GCC EA on extensive and intensive margins of trade between the two blocs. The study exploited the gravity model to observe bilateral trade flows among 57 countries representing the EU, the GCC, and their main trading partners over the period between 1980 and 2015. The findings indicated a significant small increase in trade mainly along the extensive margins, suggesting that an FTA could have a positive impact on trade for both regions.

To conclude the literature review, the existing literature extensively examines the impact of terrorism, war, and violence on global trade. However, our paper focuses on a novel index called the Geopolitical Risk (GPR) index, which encompasses various dimensions of geopolitical risk, including tensions, terrorist acts, and wars. Notably, the GPR index goes beyond global geopolitical events. By utilizing this new GPR index, our paper presents initial findings in the literature regarding the impact of geopolitical risks on trade flows within the GCC. Notably, our study distinguishes itself by employing a range of panel data econometric techniques, encompassing a longer time period, and incorporating a larger number of countries compared to previous research papers addressing this subject.

Model Specifications

In a 1966 study by Leibenstein & Tinbergen who were the first economists to use the gravity model in international trade to assess the behavior of bilateral trade among European countries, they applied the value of exports as the dependent variable, with the independent variables being GDP and distance between the countries. Such concept has been widely accepted in international trade and improved by scholars over last four decades. Endoh (1999) introduced a population variable with a negative impact on total trade. In addition, a per capita income variable was applied to the right hand of the gravity equation as a proxy for economic size; this has a positive impact on the total trade volume (Frankel et al., 1995). Moreover, over the last three decades, several control variables, including border, language, currency union, and cultural and institutional factors, have been added to gravity model equations to capture different important specifications.

During recent decades, the gravity model equation has been developed and extended to be used as a multivariate means to examine the effect of trade agreements between countries on bilateral trade flow. Intraregional trade, a dummy variable, was added by Aitken (1973) to assess the level of trade creation between signatories of a trade agreement. In addition, many studies have attempted to improve the gravity equation by introducing another dummy variable to assess the impact of regional trade agreements with nonmembers. Endoh (1999) introduced new variables that would assist in differentiating between the terms of trade creation and trade diversion.

On the other hand, the focus determinants of bilateral trade in previous international trade literature consider income, distance, language, exchange rate, and others. However, recent studies see the importance of the geopolitical risk on bilateral trade volume. A recently developed indicator to represent the geopolitical disturbances is called Geopolitical Risk Index, which measures different geopolitics events through time. The indicator has been used by numerous studies (i.e., Balli et al., 2019; Bilgin et al., 2020; Lai et al., 2023; Tiwari et al., 2019). In the case of countries with open trade such as the case of GCC countries, their economies may be highly vulnerable to any geopolitical disturbances. Such risks on trade flows would harm their economies.

The focus of this study is to investigate the impact of geopolitical risk on trade flows between GCC countries and their main FTA trading partners by utilizing a panel approach for estimation. These estimations include the fixed and random effect methods as well as the Hausman test to choose the appropriate estimated model. They also include panel cointegration and testing for cross-sectional unit independency using Pesaran's test, the Frees test, and Friedman's test of cross-sectional independence. The panel estimation of fixed and random effects has

been extensively used in international trade because it is effective in controlling the unobserved pair specific effect.

Empirical work on gravity models has proven that the left side of the gravity equation can represent the value of exports, imports, or total trade to assess the determinant of trade flows. The total trade value is applied as the dependent variable for assessing the factors of total trade flows from economic or trade agreements between two or more countries. In particular, this study estimates the following gravity equation:

$$\log(Trade)_{ijt} = \beta_0 + \beta_1 \log(GDP_i \cdot GDP_j)_t + \beta_2 \log(\text{Geopolitical Risk})_{ijt} + \beta_3 \log(\text{Distance})_{ij} + \beta_4 (FTA)_{ijt} + \beta_5 (CU)_{ijt} + \beta_6 (\text{Border})_{ij} + \beta_7 (\text{Language})_{ij} + \varepsilon_{ijt}$$

where i denotes the GCC, j denotes the FTA trading partner, and t denotes time. The dependent variable “Trade” denotes the average nominal value of bilateral trade flows (exports plus imports) between the GCC and its trading partners. For the independent variables, the factor of GDP between country i and country j denotes the economic size of the GCC member i and trading partner j at a given time t , the “Geopolitical Risk” factor denotes the index of geopolitical risk of the GCC, and the variable “Distance” denotes distance between the capitals of each of the GCC countries and the capitals of their trade partners. For the other independent variables, FTA is a dummy variable that is unity if both countries i and j belong to a free trade area at time t and 0 otherwise, “CU” is a dummy variable that is unity if both countries i and j belong to a customs union at time t and 0 otherwise, “Border” is a dummy variable that is unity if the two countries share borders and 0 otherwise, and “Language” is a dummy variable that is unity if the two countries speak the same official language and 0 otherwise.

The assumed impact of predictor variables on regressed variables is as follows. GDP is expected to have a positive impact because the correlation between GDP and volume of trade is positive. The Distance variable is expected to be negative, since longer distance raises the cost of transportation, whereas the Border variable is expected to have a positive impact on trade flow, since two countries that share borders have fewer transaction costs. The Geopolitical Risk variable is expected to be negatively related to trade flow. In addition, the cultural factor measured by the dummy Language is expected to have a positive relation with trade flows, since two countries that speak the same official language would have the opportunity to complete transactions smoothly and quickly. Furthermore, FTA and CU are expected to have a positive impact on the trade flow of both countries by joining such agreements.

The importance in using the geopolitical risk index comes from the fact that it captures the main political incidents that could have an impact on the economy. The data used in this paper ranges from 1975 to 2018. Such period covers the most important geopolitical fluctuations in the Middle East region including the GCC. These includes the Iran–Iraq war, the Iraqi invasion of Kuwait, the war to liberate the State of Kuwait, Yemen war, the Second Gulf War, and finally the period of the Arab Spring revolutions. Such period is considered to be one of the most important geopolitical times that have a direct or even indirect impact on maritime traffic and, thus, trade flows throughout history. All these periods were reflected in the volatility of the geopolitical risk index data. What is noteworthy is that there are no significant geopolitical fluctuations affecting the Middle East after 2018, which is the reason why authors use data up to 2018.

Data

The focus of this paper is on the GCC's trade flows with its 36 largest trade partners over the period from 1975 to 2018. The trade partners of the GCC's members are listed in Table 1.

Table 1

Country Sample

Bahrain	Kuwait	Oman	Qatar
UAE	China	India	France
Canada	UK	USA	Germany
Japan	Jordan	South Africa	South Korea
Egypt	Spain	Italy	Brazil
Malaysia	Hong Kong	Indonesia	Lebanon
Yemen	Turkey	Australia	New Zealand
Singapore	Philippine	Thailand	Algeria
Morocco	Tunisia	Pakistan	Sudan

The total trade volume consists of merchandise exports and imports and is applied as an outcome variable in the gravity model equation between the GCC member countries and their partners in current US dollars. The data on total trade volume are taken from the International Monetary Fund.

There are several predictor variables used in the specifications of gravity equations. Gross domestic product (GDP) and per capita GDP are available from the database of the World Bank in current US dollars. The distance between GCC members and their trade partners has been calculated in kilometers using Google Maps. In addition, the data for geopolitical risk have been taken from <https://www.matteoiacoviello.com/gpr.htm#data> and built on the

work of Caldara and Iacoviello (2022).⁽¹⁾ In order to examine the impact of the geopolitical risk index on the trade flows of GCC countries, standard gravity equations are considered from the international trade literature, and these seem to be a mainstay for empirical work on the factors of the bilateral trade.

Results and Discussion

Benchmark Results

The impact of geopolitical risk on the GCC members' trade flows was estimated using different techniques. The country sample is listed in Table 1, both summary descriptive statistics are listed in Table 2, and a correlation matrix of all variables is listed in Table 3.

Table 2

Descriptive Statistics

Variable	Observation	<i>M</i>	<i>SD</i>	Min	Max
Log Trade	7540	5.03902	2.489423	-8.37041	11.31485
Log Export	8453	4.492333	2.714501	-8.51589	11.05338
Log Import	8709	4.401756	2.448024	-8.37041	10.78406
Log GDPi . GDPj	7615	22.33189	2.683059	14.86559	30.41347
Log Geopolitical Risk	7344	4.503661	.2552492	4.07614	4.880342
Log Distance	9064	4993.678	3551.719	140	14951
FTA	9504	.1199495	.3249196	0	1
CU	9504	.0505051	.2189962	0	1
Border	9504	.092803	.2901715	0	1
Language	9504	.3611111	.480348	0	1

(1) Dario Caldara and Matteo Iacoviello constructed a monthly index of geopolitical risk (GPR Index) by counting the occurrence of words related to geopolitical tensions in leading international newspapers. The GPR Index spiked around the Gulf War, after 9/11, during the 2003 Iraq invasion, during the 2014 Russia–Ukraine crisis, and after the Paris terrorist attacks.

Table 3*Correlation Matrix*

Variable	Log Trade	Log GDPi . GDPj	Log Geo-political Risk	Log Distance	FTA	Border	Language	CU
Log Trade	1.0000							
Log GDPi . GDPj	0.7785	1.0000						
Log Geopolitical Risk	0.3132	0.3132	1.0000					
Log Distance	0.0733	0.3246	-0.0026	1.0000				
FTA	0.0412	-0.2198	-0.0079	-0.4884	1.0000			
Border	0.0633	-0.1334	0.0002	-0.3802	0.4890	1.0000		
Language	-0.3202	-0.4785	0.0103	-0.6370	0.5471	0.4463	1.0000	
CU	0.1502	0.0320	0.1419	-0.3252	0.6660	0.3204	0.3644	1.0000

In Table 4, the model is estimated using the pooled panel ordinary least squares (OLS) approach. The estimated model is tested using different dependent variable specifications. The regression includes total trade, exports, and imports as dependent variables each time. The variables of GDP product, Geopolitical Risk, Distance, FTA, CU, Border, and Language are all significant for influencing the bilateral trade flows between the GCC and its main FTA trading partners. For the GDP product variable, its estimated coefficient is statistically significant at 1% significance level with a positive sign. This suggests that higher economic size between these two partners is associated with higher bilateral trade, be it total trade, exports, or imports. For the Distance variable, its estimated coefficient turns out to be statistically significant with a negative sign at 5% for affecting total trade, 10% for affecting exports, and 1% percent for affecting

imports. This suggests that greater distance between GCC countries and their trading partners is associated with lower bilateral trade. For the FTA variable, its estimated coefficient is statistically significant with a positive sign for total trade and exports, whereas it turns out to be negative when regressing on imports as a dependent variable. For the other binary variables, including CU, Border, and Language, their estimated coefficients turn out to be statistically significant at a 1% level of significance.

Table 4

Benchmark Regression; Pooled OLS Panel

Dependent variable	Log Trade	Log Export	Log Import
Log GDP _i . GDP _j	0.7396973*** (0.0087826)	0.7860782*** (0.0134879)	0.3918488*** (0.0130031)
Log Geopolitical Risk	-0.1820199** (0.074200)	-0.1986907* (0.1136117)	-1.121758*** (0.1122802)
Log Distance	-0.8117041*** (0.0347061)	-0.9024511*** (0.0530751)	-0.3704191*** (0.0529418)
FTA	0.6709167*** (0.0896702)	0.2791678** (0.1372355)	-0.5058743*** (0.1384811)
CU	-0.4038355*** (0.0943513)	-0.6484636*** (0.1433007)	-0.9890205*** (0.1519591)
Border	0.7022078*** (0.0694643)	0.7103517*** (0.1054326)	0.4944417*** (0.1091977)
Language	-1.146103*** (0.0595097)	-0.2524167*** (0.0911039)	0.8600645*** (0.0879542)
Observations	5634	5508	5153
Adj. R ²	0.6788	0.4650	0.1633

Note. The table reports the standard error in parentheses. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Regarding the interest variable, which refers to Geopolitical Risk, its estimated coefficient turns out to be statistically significant with the expected negative sign on all trading levels. This suggests that higher geographic risk is associated with lower bilateral trade. This contributes to the literature by showing that any geopolitical risk, including risk related to tensions, terrorist threats, or wars, can harm trade volumes between GCC countries and their main FTA trading partners.

The estimated model is again estimated with fixed effects and random effects techniques. The main findings for the fixed effects (Table 5) are more consistent with the benchmark results of the pooled OLS in Table 4 than the findings of the random effects (Table 6). Interestingly, the interest variable of Geopolitical Risk has a highly significant estimated coefficient at the 1% level of significance with an expected negative sign.

Table 5

Fixed-Effects Regression

Dependent variable	Log Trade	Log Export	Log Import
Log GDP _i . GDP _j	0.770385*** (0.0129204)	0.7879396*** (0.0194482)	0.4919006*** (0.0135784)
Log Geopolitical Risk	-0.4476769*** (0.166489)	-0.7531356*** (0.2618956)	-2.583116*** (0.1678688)
Log Distance	-0.7237626*** (0.0539152)	-0.8466041*** (0.0810516)	-1.078172*** (0.0591658)
FTA	0.603492*** (0.110463)	0.2250786 (0.1661047)	-1.337663*** (0.1237968)
CU	-0.2505017*** (0.0811168)	-0.4645561*** (0.121309)	-0.2896074*** (0.086683)

Cont. Table 5*Fixed-Effects Regression*

Dependent variable	Log Trade	Log Export	Log Import
Border	0.4742992*** (0.1133714)	0.1835035 (0.1691968)	-2.041738*** (0.123035)
Language	-1.116668*** (0.1051134)	-0.4975853*** (0.158095)	-.7294011*** (0.1141134)
Observations	5634	5508	5153
Adj. R^2	0.7789	0.6432	0.7444

Note. The table reports the standard error in parentheses. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 6*Random Effects Regression:*

Dependent variable	Log Trade	Log Export	Log Import
Log GDPi . GDPj	0.6685315*** (0.0088578)	0.7244617*** (0.0137621)	0.0107931*** (0.0006129)
Log Geopolitical Risk	0.0271417 (0.052556)	0.0288556 (0.0814457)	0.008915** (0.0036464)
Log Distance	-0.8131223*** (0.1549517)	-0.9381507*** (0.2293356)	-0.314634 (0.2927181)
FTA	0.7049418** (0.3504968)	0.3321526 (0.5189165)	-.4954083 (0.6627894)
CU	-0.2253224*** (0.0641434)	-0.507275*** (0.0986412)	-0.0208121*** (0.0047109)
Border	0.4019617 (0.2764891)	0.2523142 (0.411516)	0.0138898 (0.0413017)
Language	-1.313426*** (0.2439383)	-0.4001276 (0.361185)	-0.114842 (0.4516468)
Observations	5634	5508	5153
Overall R^2	0.6762	0.4628	0.0181

Note. The table reports the standard error in parentheses. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

In order to choose the appropriate estimated model between the fixed effects and presented random effects, evidence in Table 7 shows Hausman's test to determine which findings can be relied on between these two effects. In Table 7, the results of the Hausman test suggest that the fixed effect estimated model is the appropriate model to use because the Prob > chi² is 0.01; that is, it is less than 0.05. Therefore, the findings of the estimated model can be interpreted based on the findings of the fixed effect technique.

Table 7

Results Using the Hausman Test Using Total Trade as a Dependent Variable

Dependent variable: Log Remittances	Fixed Effects	Random Effects	Difference
Log GDP _i . GDP _j	0.770385	0.6685315	0.1018535
Log Geopolitical Risk	-0.4476769	0.0271417	-0.4748186
Log Distance	-0.7237626	-0.8131223	0.0893597
FTA	0.603492	0.7049418	-0.1014498
CU	-0.2505017	-0.2253224	-0.0251793
Border	0.4742992	0.4019617	0.0723375
Language	-1.116668	-1.313426	0.1967579
Chi ² (7)		119.04	
Prob > Chi2		0.0000	

According to the appropriate fixed effects model in Table 5, the findings show that the coefficient of GDP product that presents the economic size of the GCC countries and their trade partners has a significantly positive impact, as expected, on the GCC's trade flows. The estimated coefficient suggests that an increase of 1% economic size raises the volume of trade flows by 0.77%. The result is consistent with the specification of exports and imports. As

expected, the coefficient on transportation cost, which is represented by Distance, is significantly and negatively affecting the volume of trade flows, with distance elasticity being -0.70 . This suggests that the greater the distance between the GCC countries and their main FTA trading partners, the lower the bilateral trade by 0.70%. The impact of distance on exports turns out to be 0.8%. For imports, a 1% increase in distance leads to lower imports by 1%.

The Geopolitical Risk coefficient shows that geopolitical risk has a significantly negative effect on the GCC's trade flows across all trade specifications. This suggests that when geopolitical risk goes up by 1%, the volume of bilateral trade flow goes down by 0.44%, whereas the GCC's flow of exports to these trading partners goes down by 0.75%. However, the size of the effect becomes greater when dealing with GCC imports from these main trading partners, whereas the GCC's flow of imports from these trading partners goes down by 2.6%. The justification for size differentiation on the effect of geopolitical risk depends on the fact that GCC exports mainly consist of oil. Thus, the inelastic demand for the GCC's oil by its trading partners is not extremely affected by any sort of tensions, terrorist threats, and wars in that region, compared with their exports to the GCC region.

Importantly, the findings of the benchmark model show that GCC trade flows are statistically significant and negatively affected by geopolitical risks and tensions. The findings are consistent with previous studies such as those of Anderton and Carter (2001), Barbieri and Levy (1999), and Demir et al. (2019). Notably, this study applies a new measure as well as additional factors to the gravity equation to capture the impact of geopolitical risk.

Robustness Checking Results

As far as testing for cross-section independency, Tables 8–10 present these tests. In Table 8, Pesaran’s test is applied, and the findings show that the null hypothesis of no cross-sectional dependence in the estimated model is rejected, since its p-value is less than 5%.

Table 8

Pesaran’s CD Test

Pesaran’s test of cross-sectional independence	20.965
Prob.	0.0000
Average absolute value of the off-diagonal elements	0.315

In addition, the Frees test is applied in Table 9, showing the statistics to be higher (0.2333, 0.3103, and 0.4649) than the critical values (0.10, 0.05, and 0.01), which is similar to the case when the Friedman’s test is applied (Table 10). Accordingly, the fixed-effects estimated mode shows support for the presence of cross-sectional dependence, or in other words, rejection of the null hypothesis of cross-sectional independence, based on Pesaran’s test, the Frees test, and Friedman’s test.

Table 9

The Frees Test

The Frees test of cross-sectional independence	26.842
Critical values from the Frees Q-distribution	
α (Critical values)	Frees statistic
0.10	0.2333
0.05	0.3103
0.01	0.4649

Table 10

Friedman's Test

Friedman's test of cross-sectional independence	166.383
Prob.	0.5425

The panel cointegration test is applied in Table 11 to investigate the existing long-term relationship between the estimated variables. Based on the Kao test for cointegration, it is suggested to reject the null hypothesis of no cointegration. Therefore, the findings suggest that all panels are cointegrated in the long term.

Table 11

Panel Cointegration Tests: Kao Test for Cointegration

	Statistic	P-value
Kao test for cointegration		
Unadjusted modified Dickey-Fuller t	-27.9979	0.0000
Unadjusted Dickey-Fuller t	-14.2397	0.0000

Conclusion and Policy Implications

In this study, the gravity approach was used to assess the impact of geopolitical risk on the GCC's trade flows with its main trade partners over the period from 1975 to 2018. The geopolitical risk index followed by Caldara and Iacoviello (2022) was used as a proxy of countries' geopolitical risk. As far as we know, this is the first study that assesses the relationship between geopolitical risk and the GCC's trade flows using the gravity model. The appropriate fixed-effects techniques were applied to reveal the main results.

The outcomes of the estimation show that geopolitical risk significantly and negatively influences the GCC's trade flows. Moreover, the findings show that higher economic size between

GCC countries and their main trading partners is important for higher bilateral trade, while distance is a factor that negatively affects bilateral trade. Other factors, such as FTA and other binary variables including custom union, common border, and language, significantly affect bilateral trade for GCC countries.

In terms of policy implications, these findings can be used to enlighten policymakers regarding certain policies. This study's discussion of geographic risks shows the importance of trade costs in terms of bilateral trade flows. Therefore, GCC countries are particularly vulnerable to any political disturbances and tensions affecting their trade policy, which may cause direct trade shocks. This conclusion needs to be taken into consideration when formulating future FTAs. Therefore, maintaining stable trade flows requires policymakers to promote certain incentives to both exporters and importers through FTAs (Gupta et al., 2019). GCC countries should also estimate the sensitivity of different sectors to trade costs, which may be affected by any political disturbances. This can be done through performing a necessarily analysis to the most reliance sector on imports in addition to the petroleum sector as an exporter sector.

The frequency of data used in the paper is considered the core limitation of the paper. Since the GPR index is available on a monthly basis, then when the estimation is applied, the impact of the geopolitical risk on trade can be better explained. However, according to data availability, all other variables such as income and trade have available data only on a yearly basis for the case of GCC. Therefore, this would limit the time series estimation to examine the effects of geopolitical at a highly frequency data.

In further investigations, this work can be extended by focusing on the sector-specific effects of geographic risks on trade patterns.

Studying the different sectors would help bring a better understating of the exact effect of geographic risk on bilateral trade since some products can be directly influenced by this type of risk, compared to other products. These concerns are relevant from a policy perspective, and investigating them can draw conclusions that may be different to aggregate trade investigations.

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