Geopolitical Instability and Its Ripple Effects On Service Trade

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Amal Nair* and Sabyasachi Tripathi**

Abstract

Geopolitical risks affect global economies, particularly the services trade, which makes up 20% of total trade. Understanding these risks is key because they can impact inflation, GDP growth, the financial sector, and supply chains. The aim of the research is to examine the worldwide pattern of geopolitical risk and its significance on the trade of services, to measure how much global disputes and risk, as explained in the GPR Index, impact service trade, and to know how strong regulatory system helps to mitigate the impacts of such threats. The Pseudo-Poisson Maximum Likelihood is used in the study to assess the adverse impact of geopolitical risks on international service trade using a panel dataset comprising 44 countries from the year 2011 to the year 2021. The study finds a negative effect of geopolitical on service trade and further finds that an effective regulatory system can reduce the negative impact of such geopolitical disruptions. The results may assist policymakers in gauging the economic cost of geopolitical risk and in designing policies to neutralise its disruptive potential.

Keywords: Geopolitical Risk, Service trade, PPML, Regulatory Quality

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1. Introduction

Geopolitical dynamics are increasingly influencing the interconnectedness of global economies, with rising tensions often having significant economic consequences. While the existing literature has extensively examined the impact of geopolitical risks on merchandise goods trade, more research is needed, with a particular focus on services trade. The World Trade Organization (WTO) has emphasised that services currently represent the largest share of global trade, making up 20% of total trade globally. The services sector, which makes up more than two-thirds of global GDP and employs the most people and is where most new jobs are created (particularly for women and young people (World Bank & World Trade Organization (WTO), 2023a)), is susceptible to disruptions from geopolitical tension. Services are now the most dynamic part of the global trade system, in particular those activities that generate more value-added and bring changes to the economy at all stages of growth (World Bank & World Trade Organization (WTO), 2023b). Since the production and financial sectors have become more global, travel expenses have decreased, digital connectivity has improved, and knowledge and information have become increasingly valuable, service exports have increased significantly as a percentage of world trade in recent decades (Visagie & Turok, 2021). According to a report by S&P Global, the resurgence of protectionism and nationalism has sparked a debate over the entire set of pro-globalization arguments. COVID-19 and geopolitics exposed flaws in the global supply chain (S&P Global, 2024).

Geopolitical risks, defined as "the risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations" (Caldara & Lacoviello, 2022), can have a detrimental effect on global economic development, inflation, capital markets, and the global supply chains. High-level political conflicts like the wars between Israel and the Palestinians and the Russian-Ukraine war pose a threat to regional stability, food and energy security, and the possibility of increased inflation as a result of price increases. Also, these geopolitical issues can potentially change the magnitude and direction of international trade (S&P Global, 2024). At the moment, geopolitical risk is classified as one of the top five business threats in the world (PricewaterhouseCoopers, 2018). Services were previously considered to be “non-tradable” because their production and distribution are frequently interconnected, implying that services can only be traded locally (Visagie & Turok, 2021). However, this perspective is evolving

due to developments in telecommunications and airline services. For example, information digitization enables virtually free electronic cross-border delivery of services. Video game sales, e-books, music, and movies are some examples. Moreover, services can be traded overseas via various modes of transfer across borders. (Visagie & Turok, 2021). For instance, a lot of services are provided by people travelling physically, by a service provider temporarily visiting a foreign market, or by establishing a long-term business base in a foreign market (Visagie & Turok, 2021).

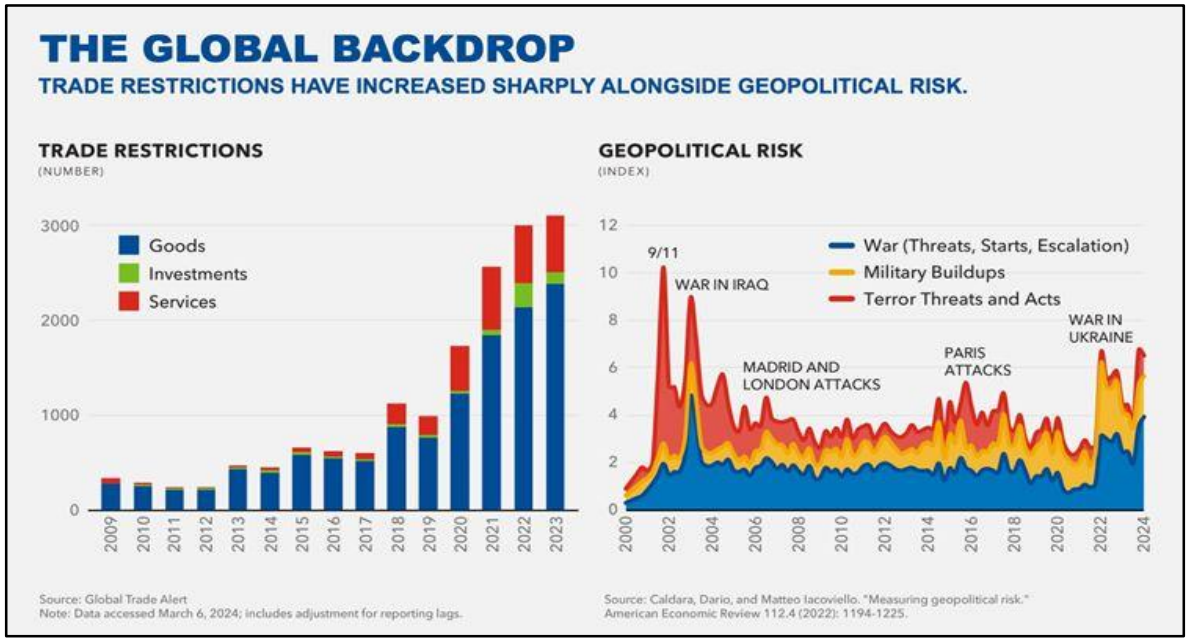

Fig. 1 Trade Restrictions and Geopolitical Risk
Source: Gopinath (2024)

Figure 1 shows that the trade restrictions on services have been increasing alongside the geopolitical risk. This shows that countries are adopting more protectionist policies amidst the rising geopolitical risk. The motivation for this study stems from the recognition that, unlike merchandise trade, the service sector operates within a complex web of regulatory frameworks, cross-border collaboration, and data transfer. The increasing levels of geopolitical tension necessitate a deeper understanding of how these issues impact international trade. While many studies have examined the impact of geopolitical risk on merchandise trade, none have specifically addressed the trade in services. As services become a significant part of global trade, understanding how rising geopolitical tensions may affect service trade is crucial. Figure 2 shows how service trade has outgrown merchandise trade over the past few years.

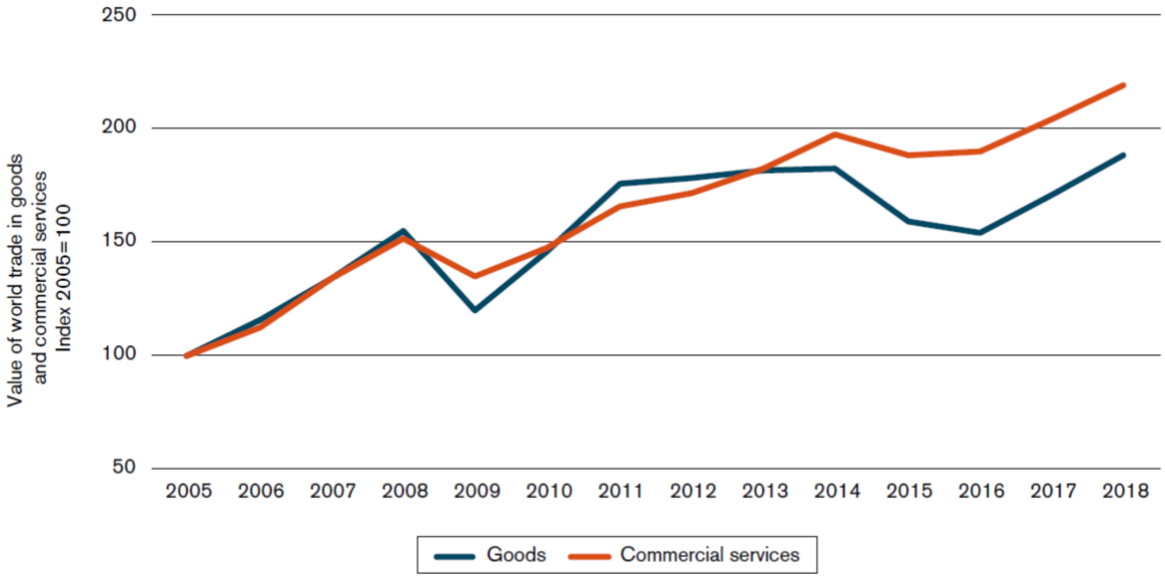

Fig. 2 Growth in Service trade and Merchandise trade over the years

Source: Organización Mundial del Comercio (2019)

This research aims to investigate how geopolitical risks, measured by the Geopolitical Risk (GPR) Index, affect trade flows in services between countries. It also aims to understand the role of a better regulatory system in reducing the negative externalities caused by global uncertainties. This understanding is crucial, especially given the growing global tensions. Given that services account for a growing percentage of all trade, it is critical to comprehend how rising international tensions impact the service trade. The purpose of this research is to look into how the service trade is affected by such geopolitical risk, as determined by the GPR Index. The research answers the following questions.

a) What is the trend in geopolitical risk and service trade globally, and how do they correlate with each other?

b) To what extent do geopolitical tensions and risk, as measured by the GPR Index, affect the service trade?

c) Does better regulatory quality help mitigate the negative effects of geopolitical risk on trade in services?

The rest of the paper is organised as follows. Section 2 presents the theoretical framework of the study, whereas Section 3 presents the relevant literature. The fourth section outlines the study's

data and methodology. Section 5 presents the empirical analysis and discussion, while the concluding implications, policy recommendations and limitations are covered in Section 6.

2. Theoretical Framework

Geopolitical risks significantly impact international trade, especially in the context of merchandise goods and services. According to the *theory of comparative advantage*, lowering trade restrictions may foster global progress through specialization (Ricardo, 1817), but as trade liberalization accelerates, capital tends to shift from developed economies to emerging markets, potentially affecting developed economies' interests (David et al., 2017). This shift has led some developed nations to impose greater trade barriers to curb capital outflows and promote domestic employment, contributing to the rise of protectionist policies that ultimately increase geopolitical risks (Soybilgen et al., 2019). Geopolitical risk, which can sometime be referred as a "Knightian uncertainty", is difficult to measure, and these risks undermine domestic progress by restricting the flow of foreign trade and investments, putting pressure on international relations, and encouraging a shift from a rules-based to a power-based global order (Yu & Wang, 2023). The *realism approach* to international relations emphasizes how international politics is an endless dispute between self-interested nations contending for dominance and establishment within an anarchic global system devoid of centralized authority. Geopolitical tensions tend to cause global disruptions, and this causes states to focus on their own domestic interest, adopt protectionist policies, and restrict the flow of goods and services. This shows that geopolitical risks are deeply connected to the state's strategic calculations.

The *gravity model of international trade* explains that trade flows between two countries are positively influenced by their economic size but negatively influenced by the distance between them. It also discusses the detrimental effect of trade barriers (such as tariffs and non-tariff barriers) on the trade flows. Geopolitical risk acts as a nontariff barrier because it may cause countries to implement protectionist policies, impose sanctions on other countries, and so on. Thus, the gravity model predicts that geopolitical tensions will reduce or have a negative impact on bilateral service trade flows between countries. The gravity model applies equally well to flows of service trade as it does to those of goods. In particular, in connection with the gravity model of trade, the bilateral flows of trade between countries have been positively correlated with a country's

GDP and inversely related to distance (Walsh, 2004; Kimura & Lee, 2006). However, distance may have little bearing on service trade, where most services are intangible and do not require physical transfer (Walsh, 2004). Other than these, trade in services considers regulatory quality, political stability, and the like.

Trade protectionism increases the risks associated with global economic activities, jeopardizing global economic growth and straining international relationships. As geopolitical tensions rise, international capital flows and trade volumes fall, contributing to a negative feedback loop between Global Political Risk (GPR) and economic activity (Blonigen, 2005; Daude & Stein, 2007). This pattern has been observed in the merchandise and services sectors, as geopolitical risks increase uncertainty, making firms less likely to engage in cross-border trade and investment. Service trade, which depends on global mobility, capital flows, and stable diplomatic relations, is especially vulnerable to geopolitical tensions. These services require persistent rules and mutual trust among countries, and geopolitical risk may deter service flows due to countries enforcing protectionist policies during global unrest. Increased geopolitical risks may lead to investor confidence loss and restrictions on services like tourism or finance. Geopolitical risk can negatively affect service trade by increasing transaction costs through insurance or regulatory fees or limiting cross-border mobility due to visa restrictions or regulatory uncertainties.

H1: There is a significant negative correlation between geopolitical instability and cross-border service trade, implying that higher geopolitical risks result in lower service trade flows.

The *liberal institutionalism theory* explains that domestic and international institutions are central to facilitating cooperation and peace between countries (Johnson & Heiss, 2023). Countries with strong regulatory and political institutions have better control over geopolitical risks, and their regulatory systems may help reduce the adverse effects of these risks by developing proper policies. Beverelli et al. (2017) showed that the positive impact of lower services trade barriers is strongly contingent on governance quality across countries. Fiorini & Hoekman (2018) argue that to gain more from opening up of the services trade, in many instances regulatory quality will need to be augmented. Regulatory frameworks that ensure transparency, contract enforcement, and stable economic policies (Kaufmann et al., 2010) can mitigate the uncertainty associated with

GPR, thus encouraging businesses to continue operating in volatile environments. While geopolitical risk hinders service trade, good governance may reduce the impact of such disruptions.

H2: A strong regulatory system may help to reduce the negative impact of geopolitical risk on trade in services.

Figure 3 shows how geopolitical risk leads to a hike in the trade costs, which in turn tends to reduce service trade. A robust regulatory framework plays a mediating role in reducing the negative impact of the geopolitical risk on service trade.

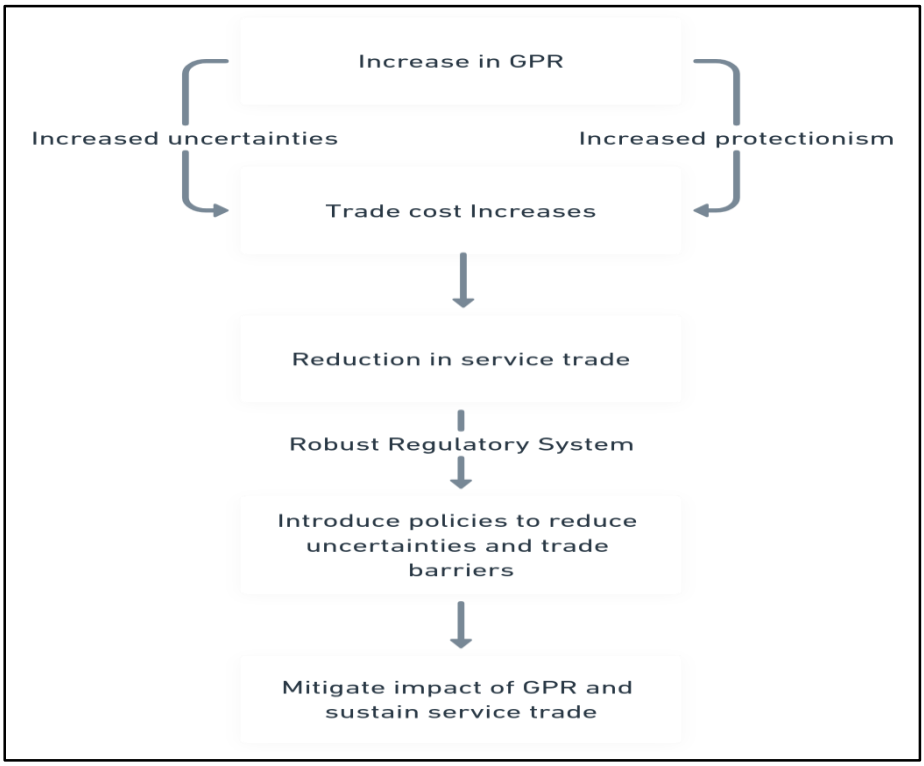

Fig. 3 Theoretical framework of the study
Source: Author's compilation

3. Literature Review and Research Gap

3.1 Literature Review

Different studies have utilized various methods to quantify global tensions and disruptions and measure their impact on trade. In recent years, the Geopolitical Risk Index, developed by Caldara & Lacoviello (2022), has emerged as a prominent method for quantifying global tensions and

disruptions, providing a comprehensive measure for assessing their impact on trade. The index was created on the basis of reports about geopolitical tensions, such as wars and terrorist threats, published in newspapers. The primary goal of the research was to track geopolitical uncertainty and its macroeconomic outcomes. The researchers found that the increase in geopolitical risk causes stock prices, investment, and trade between countries to decline. The new platform helps policymakers and researchers evaluate the risks around economic outcomes from geopolitical tensions with an integrated risk assessment system.

This GPR Index has been widely used in recent studies. For example, Gupta et al. (2018) used an augmented gravity model to investigate the detrimental effects of geopolitical uncertainties on cross-border trade. The study used the augmented gravity model, which included variables such as GDP, distance between countries, and common borders, to assess the effect of escalating global political risk (shown by the GPR Index) on international trade. The authors found that the increased risks significantly affect trade flows, particularly in geopolitically sensitive regions. The research concluded that political instability could indeed harm not only trade but also international relations between the countries, using which they wanted to underline the necessity of a deeper understanding of how such geopolitical risks affect trade. Özçelik (2023) used a Non-linear Autoregressive Distributed Lag model (NARDL) to examine the impact of geopolitical risk on international trade flows. The study used the Geopolitical Risk Index to identify how geopolitical stability impacted trade patterns, particularly focusing on the asymmetric effects of rising and falling risks. The research indicates that a rise in geopolitical risk can have a notable impact on trade flows; however, the impact is not linear. This means that negative shocks from increased geopolitical risk have a more significant impact than positive ones from reduced risk. The study emphasized the importance of taking into account the intensity and direction of geopolitical changes when studying trade dynamics.

The gravity model has been extensively utilized to investigate the impact of geopolitical risks on trade flows (Gupta et al., 2018; Thakkar & Ayub, 2022; Kim & Jin, 2023; Hou et al., 2024). Thakkar & Ayub (2022) examined how geopolitical risks affected globalization using the gravity trade model and the Pseudo-Poisson Maximum Likelihood (PPML) methodology. A 10% increase in geopolitical riskiness was found to result in a significant decline in FDI and trade, whereas the multivariate model showed a significant increase in trade (0.04%). Kim and Jin (2023) used an

augmented gravity model to investigate how geopolitical risks affect South Korea's bilateral trade relationships. The results showed that geopolitical risks had a statistically significant negative effect on trade volumes, indicating that higher tensions are associated with lower trade activity. This is consistent with previous studies on the correlation between global instability and trade dynamics (Gupta et al., 2019; Özçelik, 2023). Hou et al. (2024) examined how geopolitical risk affects the trade costs between countries using an econometric model using the Geopolitical Risk (GPR) Index. The findings showed that increased geopolitical risk leads to higher trade costs, primarily due to heightened tariffs, shipping insurance, and logistical expenses. This study underscores the significant implications of geopolitical instability for international trade and emphasizes the need for businesses and policymakers to understand the cost dynamics associated with geopolitical tensions.

From a globalization perspective, Cevik (2023) studied how geopolitical tension and conflict shocks affected the dynamics of international trade. The study used panel data models to compare pre-and post-event trade data volumes and patterns. The research found that geopolitical shocks can initially slow down trade, but countries adapt and diversify their trading partners and routes, increasing globalization despite concerns. This demonstrates the dynamism of international trade relations in the face of geopolitical uncertainty. Several studies have explored the impact of geopolitical tensions, including the Geopolitical Risk Index. Krpec & Hodulak (2019) found that wars disrupt international trade patterns, causing significant economic damage to both countries and their trading partners. Barbieri & Levy (1999) found that war can have varying impacts on trade flows, influenced by historical ties and conflict context. Pham & Doucoulingos (2017) found that terrorism significantly reduces bilateral trade volumes, affecting not only the country directly affected but also its trade allies. Atacan & Açık's (2023) study found that positive geopolitical risk shocks lead to negative container traffic shocks, highlighting the importance of regional security and stability in a country's economy. Nitsch & Schumacher (2004) found strong evidence that terrorist acts lower trade volumes, with a doubling in the number of terrorist incidents linked to a roughly 4% decline in bilateral trade.

Few studies have investigated the sector-specific effects of geopolitical uncertainty on global trade. For instance, Li et al. (2021) discovered that geopolitical risk negatively impacted the energy trade in 17 emerging economies. The study discovered that geopolitics had a lagging and mediating

effect on imports and exports, with exports being more constrained than imports. The mechanism of this impact was diverse, influenced by national characteristics and geo-event types. Liu & Fu (2024) examined the agricultural exports of China from 1995 to 2020 to study how they were affected by global instabilities. According to the study, when China's trading partners face geopolitical risk, it suffers a decline in agricultural exports. Furthermore, in the case of China's agricultural trade, the study discovered that countries not part of the Belt and Road initiative were more significantly impacted by geopolitical risk than Belt and Road members. Mignon & Saadaoui (2024) assessed the impact of the US-China political relationship and geopolitical risk on oil prices. The study discovered that better US-China relations and increased geopolitical uncertainties push up oil prices. The authors concluded that political tensions and geopolitical risks were mutually reinforcing causes of oil prices. Such increases in oil prices can lead to increases in trade costs, which has a negative impact on international trade for oil-importing countries, resulting in more localized trade rather than international trade (Akman & Bozkurt, 2016; Nanovsky, 2019; Huntington, 2005). Michail & Melas (2022) investigated the effect of geopolitical risks on the LPG and LNG trade while adjusting for the macroeconomic environment. According to the study, a change in geopolitical risk has a considerable impact on spot charter rates for both LNG and LPG carriers, with an increase of roughly 25% for the former and 18% for the latter. Balakrishnan (2024) employed a method of moment quantile regression to analyse how capital flows are influenced by volatility in economic policies, threat from geopolitics and green performance in emerging countries. The research showed that the effects of geopolitical risk on FDI inflows are especially high during war such as the one between Ukraine and Russia. Khan (2025) studies the effect of the recent geopolitical crisis on global equity, commodity and cryptocurrency markets for Jan 2021 - Dec 2023. Using a TVP-VAR model, the study concluded that the crises increased the time-varying and generalized connectedness between the markets, with risk transmissions being significantly greater in sub-periods of wars compared to pre-war ones.

According to Beverelli et al. (2017), the quality of governance significantly impacts the benefits of lower trade barriers. Countries with strong governance structures are better positioned to reap the benefits of trade liberalization. Fiorini & Hoekman (2018) emphasize the importance of improving economic regulation quality in order to maximize trade liberalization benefits. Kaufmann et al. (2010) highlight the importance of regulatory quality elements such as transparency, contract enforcement, and stable economic policies in creating a favourable trading

environment. Good governance and regulatory quality serve as a stabilizing force, allowing businesses to continue trading despite geopolitical disruptions. Strong governance can promote resilience in high-GPR environments by ensuring that regulatory systems can effectively respond to political challenges.

3.2 Research Gap

The effect of geopolitical risk on merchandise trade has been the subject of numerous studies; however, the current literature lacks a thorough understanding of how geopolitical risk affects services trade. Because services trade is heavily reliant on regulatory environments, cross-border mobility, and geopolitical stability, it is expected to be especially vulnerable to such risks. More importantly, services account for a significant portion of total economic growth, employment, and innovation, so understanding the dynamics of services in the context of geopolitical unrest is critical. This paper aims to bridge the gap by exploring further into the impact of geopolitical risk on service trade flows.

4. Methodology

The study uses a quantitative approach to determine the impact of geopolitical risks on international service trade. The analysis uses a panel dataset of countries with varying levels of geopolitical stability and service trade activity. The GPR Index is used to quantify geopolitical risk in various countries and investigate its impact on service trade. The analysis uses panel data from 44 countries spanning 2011 to 2021 to determine the impact of such geopolitical risk on service trade flows. The time period is chosen because service trade started gaining more importance after 2010 (World Trade Organization (WTO), 2019). According to the World Bank's World Trade Report (2019), service trade has grown faster than merchandise trade, and more countries have become service-based since 2011 (World Trade Organization (WTO), 2019). The data is taken till 2021 mainly because of data unavailability. The selected 44 countries were chosen because data for the GPR Index is only available for these 44 countries. As per the UNCTAD trade statistics data, the countries selected in the analysis account for most of the global service trade (UNCTAD, 2024). Descriptive statistics and a correlation matrix is used to understand the overall structure of the data. The PPML method is used to understand the impact of geopolitical risk on bilateral service trade. Apart from this, for the robustness test, a different independent variable to measure

geopolitical risk (GPRH) has been used. The study also incorporates a lagged variable regression to study the delayed impact of geopolitical risk on the service trade.

Table 1. List of countries included in the analysis

Region	**Countries**
North America	Canada, Mexico, USA
South America	Argentina, Brazil, Chile, Colombia, Peru, Venezuela
Europe	Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Norway, Portugal, Poland, Russia, Spain, Sweden, Switzerland, The Netherlands, Ukraine, United Kingdom
Middle East and Africa	Egypt, Israel, Saudi Arabia, South Africa, Tunisia, Turkey
Asia and Oceania	Australia, China, Hong Kong, Japan, South Korea, The Philippines, Taiwan, Indonesia, India, Malaysia, Thailand, Vietnam

Source: Author's compilation

4.1 Econometric Model

The proposed econometric model follows the Pseudo-Poisson Maximum Likelihood (PPML) method as suggested by (Silva & Tenreyro, 2006) to deal with the biases caused by the presence of zero observations and heteroscedasticity in OLS estimation of the gravity framework (Thakkar & Ayub, 2022). The model can be expressed as follows:

$$Tradeijt = a + \beta 1(GPR)ijt + \beta 2(RegQua)ijt + \beta 3Xijt + ui + eit$$

Where,

Tradeijt: Trade flows in services at time t

GPRit: Geopolitical Risk Index for country i and country j at time t

Xijt: A vector of control variables (including gravity model variables and other control variables)

RegQuaijt: Regulatory Quality of country i and j

ui: Country-specific effects

eit: Error term

4.2 Variables and Data Sources

Variables	**Abbreviation**	**Description**	**Data Source**
Trade Flows in Services (Dependent Variable)	Trade	*Trade flows in services* refer to the transfer of services between nations, which includes industries such as banking, tourism, and transportation. (*World Bank Metadata Glossary*, n.d.).	WTO-OECD Balanced Trade in Services dataset
Geopolitical Risk Index	GPRC	A composite index that measures geopolitical risk by tracking the frequency of newspaper articles about geopolitical tensions Caldara & Iacoviello (2022).	Caldara & Iacoviello (2022)
Gross Domestic Product	log_GDP_con	Gross domestic product (GDP) is the total of value added by all its producers (World Bank Metadata Glossary, n.d.).	World Bank (World Development Indicators)
Trade Openness	TO	*Trade Openness* shows how open the country is in terms of trade. It is calculated by adding the total exports and imports of the country and dividing it by the GDP of the country.	World Bank (World Development Indicators)

Common Language Dummy	CLD	The Common Language is a dummy variable that is equal to 1 if two countries share a common official or native language, and 0 otherwise (Rindler, 2021).	CEPII GeoDist Database.
Employment in services	ES	*Employment in services* measures the number of people working in service-oriented industries such as hospitality, healthcare, and education (*World Bank Metadata Glossary*, n.d.).	World Bank's World Development Indicator
Real Effective Exchange Rate (REER)	REER	*The real effective exchange rate (REER)* measures a currency's value against a weighted average of other currencies adjusted for inflation.	World Bank's World Development Indicator
Regulatory Quality	RQ	The *Regulatory Quality* measures the internal stability of a country, which can impact trade security and business confidence.	World Bank's Worldwide Governance Indicators.

Table 2. List of variables, description, and data sources
Source: Author's Compilation

Trade flow in services is the dependent variable in this study. The main independent variables are the GPR Index and the regulatory quality variable. The control variables include the gravity model variables (Market size, and common language dummy), trade openness, and employment in services. Service trade data for the previously mentioned countries will be taken from the BaTiS dataset, which is developed by the OECD. The Balanced Trade in Services (BaTiS) dataset contains a balanced matrix of international trade in services for over 200 reporting economies and their partners by sector for 2005-21. The dataset is the only source of comprehensive bilateral data on trade in services (World Trade Organization, n.d.).

Table 3 shows the summary statistics of the variables used in the study. The results indicate notable variability in the bilateral trade flows, with a mean value of 3431.96 and a high coefficient of

variation (CV = 3.008). This suggests that there is a significant disparity across observations. The Geopolitical Risk Index (GPRC) exhibits low average values but CV = 1.763 shows that there are significant differences in the geopolitical stability across countries. Control variables like GDP and trade openness (TO) show moderate variability, while exchange rate (REER) display higher dispersion, reflecting differences in currency competitiveness across countries. Overall, the data reveal diversity in economic and geopolitical conditions across the sample.

Variables	*N*	*Mean*	*SD*	*Min*	*Max*	*CV*
Trade	20800	3431.959	10324.049	.161	190157.7	3.008
GPRC	20812	.208	0.366	.006	2.628	1.763
log_GDP_con	19866	27.256	1.207	24.442	30.672	.044
TO	20038	82.718	61.402	22.486	442.62	.742
ES	20339	66.001	13.288	27.387	86.331	.201
REER	15867	99.552	37.835	53.792	741.7	.38
CLD	20812	.086	0.280	0	1	3.268
RQ	20339	.667	0.923	-2.387	2.221	1.384

Table 3. Summary statistics
Source: Author's Calculations

The correlation matrix in table 4 shows several noteworthy relationships among the variables. Trade (Bilateral trade flows) is positively correlated with the geopolitical risk (GPRC) and GDP variables (log_GDP_con), indicating that larger economies and higher geopolitical stability are associated with increased trade. Trade openness (TO) has a weak negative correlation with trade, suggesting limited direct influence. Comparatively high collinearity exists between variables such as ES and RQ, reflecting strong internal consistency within economic stability and regulatory quality measures for each country.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Trade	1.000							
(2) GPRC	0.332	1.000						
(3) log_GDP_con	0.324	0.664	1.000					
(4) TO	-0.055	-0.251	-0.371	1.000				
(5) ES	0.073	0.129	0.100	0.280	1.000			
(6) REER	0.115	0.245	0.166	0.246	0.059	1.000		
(7) CLD	0.176	0.045	-0.001	0.039	0.058	0.012	1.000	
(8) RQ	0.096	0.013	0.069	0.319	0.778	0.167	0.035	1.000

Table 4. Correlation Matrix
Source: Author's Calculations

The Variance Inflation Factor (VIF) values, shown in Table 5, indicate no significant multicollinearity among the independent variables, with all VIFs values below the threshold of 10 and a mean VIF of 1.989.

Variables	*VIF*	*1/VIF*
RQ	2.802	.357
ES	2.797	.358
log_GDP_con	2.042	.49
GPRC	1.982	.505
TO	1.523	.656
REER	1.265	.79
CLD	1.029	.972
Mean VIF	1.989	.503

Table 5. Variance inflation factor
Source: Author's Calculations

5. Empirical Analysis

5.1 Baseline Estimation

The PPML regression results (see table 6) indicate that geopolitical risk (GPRC1 and GPRC2) negatively impacts trade, with statistically significant coefficients in both models, where 1 is the exporting country and 2 is the importing country. This is similar to the expected outcome that similar to merchandise trade (Gupta et al., 2018; Thakkar & Ayub, 2022; Kim & Jin, 2023; Pham & Doucoulingos, 2017), geopolitical risk negatively affects service trade. When geopolitical tension rise due to factors such as wars, economic sanctions, diplomatic conflicts or political instability, service trade between countries tend to decrease. For example, the war between Russia and Ukraine sharply curtailed financial, transport and IT-related services between Russia and Western economies in the wake of sanctions and shuttered businesses. Visa and Mastercard, for example, suspended operations in Russia, drastically shrinking cross-border service transactions (BBC, 2022). Similary, the US-China trade war contributed to a contraction in bilateral services trade, especially in education and tourism, as Chinese students, who have contributed billions to the US education sector, began to search for alternatives, due to geopolitical tensions (Nikkei Asia, 2019). These instances offer a demonstration of how geopolitical risks can not only curb access onto the market, but also enhance the cost of delivering services across borders. Control variables such as GDP, trade openness, and exchange rates are positively associated with trade which goes

hand in hand with the previous literature (Gupta et al., 2018; Thakkar & Ayub, 2022; Hou et al., 2024; Cevik, 2023), while economic stability (ES1 and ES2) also plays a significant role, positively affecting the service trade.

Both GDP1 and GDP2 coefficients are highly positive and significant, confirming the main premise of the gravity model of trade (Tinbergen, 1962). With larger production and consumption capacities, larger economies will trade more. There are many examples which validates this hypothesis and the results. For instance, countries like China, US and India have a bigger market size and are one of the largest importer and exporter of services. Trade openness is also an important factor that fosters service trade. TO1 and TO2 have positive and highly significant coefficients, indicating more trade in services for more open economies. Singapore is a very good example of the same. Singapore is one of the most open economies in the world and have a very liberalized trading environment. This has helped singapore to become a global financial hub (Vieira & Doellinger, 2024) improving its bilateral service trade. The positive and significant coefficients for REER1 indicate that a stronger domestic currency tends to increase the volume of trade in services. This fits with the notion that if the currency of an exporter appreciates, the relative price of services may raise, but if the services are high value added (for example, financial, IT, legal services), the demand may stay solid due to quality, reputation or technological edge. An illustrative case is the appreciation of the US dollar in the 2010s that did not cause significant harm to US service exports in in business, professional, and technical services, as global firms continued to depend on US expertise (U.S. International Trade Commission, 2011). On the other hand, REER2, the REER from the country importing the goods, is also positive and significant. This means that an appreciation of the importing country's currency increases its demand for foreign services since imports are relatively cheaper. This is inline with the expectation that appreciation of the domestic currency leads to an increase in the imports beacuse of the cheaper imports avalilabe to the consumers as a result of the currency appreciation.

In Model (2), the inclusion of regulatory quality variables (RQ1 and RQ2) reduces the negative impact of GPRC1 (from -0.206 to -0.134) and renders the effect of GPRC2 insignificant, suggesting that better regulatory quality helps to reduce the adverse effects of geopolitical risk on service trade.

Variables	Dependent Variable	
	Trade	
	(1)	(2)
GPRC1	-0.206***	-0.134***
	(0.0335)	(0.0340)
GPRC2	-0.131***	-0.0197
	(0.0302)	(0.0299)
log_GDP1_con_	0.830***	0.792***
	(0.0154)	(0.0154)
log_GDP2_con_	0.845***	0.791***
	(0.0153)	(0.0150)
TO1	0.00307***	0.00279***
	(0.000292)	(0.000292)
TO2	0.00374***	0.00347***
	(0.000332)	(0.000342)
ES1	0.0229***	0.00421*
	(0.00189)	(0.00252)
ES2	0.0334***	0.00684***
	(0.00171)	(0.00252)
REER1	0.00587***	0.00482***
	(0.000857)	(0.000870)
REER2	0.00495***	0.00338***
	(0.000928)	(0.000956)
CLD	0.543***	0.498***
	(0.0466)	(0.0469)
RQ1		0.332***
		(0.0302)
RQ2		0.460***
		(0.0337)
Constant	-43.91***	-38.72***
	(0.702)	(0.766)
Observations	11,616	11,616
R-squared	0.658	0.676

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Regression Output
Source: Author's Calculation

Countries with strong regulatory framwork tend to have a strong service sector which inturn increases trade. For instance, Switzerland has robust and effective regulatory environment, which along with other favourvale measures, makes Swiss financial centre an attractive destinantion for banks and other financial institution. When there is any disruption in the global trading

environment, countries with an effective regulatory environment and political stability can cusion the negative impact of such disruptions and help in maintaining the overall trade, which included the services as well. The R-squared improves from 0.658 in Model (1) to 0.676 in Model (2), indicating that the inclusion of regulatory quality enhances the explanatory power of the model.

5.2 Robustness Test

For the robustness test, the study used the historical GPR index instead of the country-wise GPR index. The recent GPR index (GPRC) is developed using the automated text searches on the electronic archives of 10 newspapers, namely the Chicago Tribune, the Daily Telegraph, the Financial Times, the Globe and Mail, the Guardian, the Los Angeles Times, the New York Times, USA Today, the Wall Street Journal, and the Washington Post (Caldara & Lacoviello, 2022). On the other hand, the historical GPR index, dating back to 1900, is based on searches of the historical archives of 3 major newspapers, namely the Chicago Tribune, the New York Times, and the Washington Post (Caldara & Lacoviello, 2022).

The robustness test confirms the validity of the study's main findings. The results are mostly in line with the previous results, with GPR showing a negative impact on the service trade. More specifically, GPRH1 and GPRH2 have a significant detrimental impact on the service trade, similar to the GPRC index. This indicates that an increase in global tension is associated with a reduction in the total service trade volume between countries. The control variables such as the log GDP (log_GDP1_con_ and log_GDP2_con_), Trade openness (TO1 and TO2), Employment in services (ES1 and ES2), Real effective exchange rates (REER1 and REER2), and common language dummy (CLD) remain stable and positively impacts the service trade. This shows that the observed relations between the variables do not change regardless of the measure for geopolitical risk. These results improve the robustness of the study and confirm the negative relation between geopolitical risk and service trade. Again, regulatory quality plays a meditating role by reducing the negative impact of the GPR on the service trade.

Variables	Dependent Variable	
	Trade	
	(3)	(4)
GPRH1	-0.203***	-0.140***
	(0.0252)	(0.0254)
GPRH2	-0.171***	-0.0777***
	(0.0237)	(0.0231)
log_GDP1_con_	0.844***	0.805***
	(0.0143)	(0.0144)
log_GDP2_con_	0.878***	0.822***
	(0.0149)	(0.0146)
TO1	0.00307***	0.00280***
	(0.000286)	(0.000287)
TO2	0.00372***	0.00345***
	(0.000329)	(0.000340)
ES1	0.0238***	0.00584**
	(0.00188)	(0.00250)
ES2	0.0352***	0.00985***
	(0.00176)	(0.00257)
REER1	0.00596***	0.00499***
	(0.000848)	(0.000862)
REER2	0.00547***	0.00409***
	(0.000914)	(0.000936)
CLD	0.540***	0.501***
	(0.0458)	(0.0460)
RQ1		0.315***
		(0.0303)
RQ2		0.436***
		(0.0336)
Constant	-45.46***	-40.31***
	(0.684)	(0.752)
Observations	11,616	11,616
R-squared	0.664	0.678

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Robustness Test Output

Source: Author's Calculation

The study included a lagged variable regression as suggested by Liu & Fu (2024). By including lagged variables of GPR in the regression analysis, we investigate the dynamic response of trade to political uncertainty in time. Trade patterns do not change overnight in response to geopolitical shocks; rather, companies and economies need time to process uncertainty, reappraise risk, and adapt supply chains, contracts and market strategies. With four lags, the model is able to capture how trade volumes continue to decline even after the initial shock of geopolitical risks.

	Dependent variable			
	Trade			
Variables	(5)	(6)	(7)	(8)
lag_GPRC1	-0.244***			
	(0.0352)			
lag_GPRC2	-0.157***			
	(0.0325)			
lag2_GPRC1		-0.296***		
		(0.0370)		
lag2_GPRC2		-0.186***		
		(0.0345)		
lag3_GPRC1			-0.291***	
			(0.0387)	
lag3_GPRC2			-0.159***	
			(0.0364)	
lag4_GPRC1				-0.273***
				(0.0423)
lag4_GPRC2				-0.118***
				(0.0402)
Constant	-44.96***	-46.32***	-46.04***	-45.51***
	(0.744)	(0.767)	(0.781)	(0.834)
Control Variables	Yes	Yes	Yes	Yes
Observations	10,560	9,504	8,448	7,392
R-squared	0.661	0.666	0.667	0.667

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Lagged Variable Regression Output
Source: Author's Calculation

The consistently negative and statistically significant coefficients on lagged GPR variables suggest that the geopolitical risk causes the trade to decrease persistently. The effects seem to grow in the second and third lags, implying that firms and policymakers may take a while to respond to heightened uncertainty. This is in line with the idea that temporary shocks may be absorbed by ongoing contracts and inventory management strategies, but as uncertainty stays elevated, firms start to pull back on their trade involvements. By the fourth lag, the effect size weakens slightly, suggesting that eventually companies adjust their trade activities, perhaps by diversifying suppliers or renegotiating trade agreements or moving their production to more stable areas.

The findings align with the broader economic theory of trade under uncertainty. The significant negative impact of the GPRC shows how some disruption can lead to a prolonged effect on the service trade, which reinforces the idea of hysteresis in international trade. Those results further underscore the ever-present and accumulating character of geopolitical adversity, underlining how crucial it is to maintain reliable institutions, coherent trade plans, and risk-reduction techniques, so as to avoid prolonged harms to your trade flows.

6. Conclusion

Geopolitical risks are affecting global economies, particularly in services trade, which accounts for 20% of total global trade. These services, which account for over two-thirds of global GDP and create jobs, are vulnerable to disruptions caused by geopolitical tensions. The resurgence of protectionism and nationalism has sparked debates over pro-globalization arguments, while COVID-19 and geopolitics have exposed flaws in the global supply chain. Services were previously considered 'non-tradable' due to their interconnected production and distribution, but developments in telecommunications and airline services have made them more accessible. This research aims to investigate how geopolitical risks affect trade flows in services between countries, particularly given the growing global tensions. The study answers questions about the trend in geopolitical risk and service trade globally, and the extent to which these risks affect service trade. This study aimed to fill a critical gap in the literature by investigating how geopolitical risks affect international service trade. Understanding how these risk factors can affect the services sector is becoming increasingly important for researchers and policymakers as geopolitical tensions are

becoming more widely observed worldwide. This study contributes to international trade and economic policy and uses the GPR Index along with a robust econometric framework.

The study shows that the geopolitical tensions, as measured by the GPR Index, negatively affects the bilateral service trade between the countries. When the “regulatory quality” variable is added in the analysis, it reduces some amount of negative impact of the GPR. This provides policy makers with an understanding of how such global tensions affect the service trade. To reduce the negative impact of such disruptions, governments should focus on their regulatory system and take proper measures to stabilize their domestic economy to mitigate the negative impact of such risks. The robustness test confirmed the outcome of the baseline destination. The lagged variable regression demonstrates how global uncertainty may have a delayed impact on the service trade, as countries and companies may take some time to be affected by this risk due to existing orders and strategies. The effects are highest in the second period, then gradually decrease, implying that countries adapt to the situation after a few years, though the negative impact remains.

Based on the empirical analysis, the study presents few policy recommendations. The study highlights how global tensions can negatively impact service trade. Thus, countries should seek to diversify their trading partners so that they are not overly reliant on a single set of countries. Also, governments should focus on strengthening their trade agreements by indulging into more deep RTAs and digital trade agreements. Thirdly, governments should try and build better digital infrastructure and work on their trade facilitation measures to promote service trade. Lastly, countries should focus on building a strong and efficient regulatory system so that such geopolitical uncertainties can be dealt with more effectively.

The study's main limitation is that it did not focus on a sector-specific impact, such as the impact of global uncertainties on the trade of financial services, which is critical in developing better policies. This is not done, primarily due to data inaccessibility. In addition, the value of service trade is difficult to quantify because it is typically intangible. Also, major geopolitical events (e.g., wars, trade wars, financial crises) may cause structural breaks in trade patterns, leading to nonlinear effects that are not fully captured in this study. Future research should focus on modelling these limitation of the study to get a more detailed understanding on impact of geopolitical risk on service trade.

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