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Geopolitical Risks and Trade*

Alen Mulabdic Yoto V. Yotov[†]

Abstract

We study the impact of geopolitical risks on international trade. To this end, we use the Geopolitical Risk (GPR) index of [Caldara and Iacoviello \(2022\)](#) and an empirical gravity model. The impact of spikes in GPR on trade is negative, strong, and heterogeneous across sectors. Specifically, we find that increases in geopolitical risk reduce trade by about 30-40%. These effects are equivalent to a global tariff increase of up to 14%. Services trade is most vulnerable to geopolitical risks, followed by agriculture, while the impact on manufacturing trade is moderate. These negative effects are partially mitigated by cultural and geographic proximity, as well as by the presence of trade agreements.

Keywords: Geopolitical Risks, International Trade, Structural Gravity.

JEL codes: F13, F14, F16, F51, F52, H56.

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1 Introduction

Recent years have witnessed a marked increase in geopolitical tensions, most notably following Russia’s invasion of Ukraine and the resurgence of conflict in the Middle East. In March 2022, the Geopolitical Risk (GPR) index has increased to its highest level in over two decades (Caldara and Iacoviello, 2022), comparable to the spike observed after the September 11, 2001, attacks, and has remained elevated since. These tensions are not limited to a few isolated events. According to the Uppsala Conflict Data Program (UCDP), the number of state-based armed conflicts reached 59 in 2023, the highest level ever recorded.¹ These developments have unfolded during a period of an already slowing pace of globalization. Since the early 2010s, global trade has entered a period of “slowbalization,” marked by a plateau in the trade-to-GDP ratio and a deceleration in the expansion of global value chains.

Against this backdrop, we empirically investigate the effects of spikes in geopolitical risks on international trade. Specifically, we assess whether countries become more inward-looking during periods of elevated geopolitical risks and we explore the heterogeneity of these effects across various dimensions. Specifically, we use the Geopolitical Risk (GPR) index of Caldara and Iacoviello (2022) to identify episodes of elevated geopolitical tensions, and estimate their impact on trade within a modern empirical gravity model (Larch et al., 2025). Crucially for our identification purposes, the dependent trade variable in our model includes consistently constructed data on international and intra-national trade from the *International Trade and Production Database for Estimation* (ITPD-E) (Borchert et al., 2022) of the United States International Trade Commission (USITC).

Our main results can be summarized as follows. First, we find that geopolitical risks significantly depress international trade. During periods of elevated geopolitical risks countries become more inward-looking. Specifically, we estimate large, negative, and statistically significant effects for the majority of the 170 industries in our sample. On

¹See Uppsala University press release (June 3, 2024).

average, spikes in the global GPR index are associated with a decline in trade of about 30-40%. These risks act as a hidden tax on international trade, with a tariff-equivalent effect estimated between 8% and 14%.²

Second, the negative GPR effects on trade are very heterogeneous across disaggregated industries and broad sectors. The strongest GPR effects are for ‘Services’, suggesting that services trade is most vulnerable to geopolitical risks. A plausible explanation for this result is that services trade often relies on face-to-face interactions. ‘Beverage and Tobacco’, ‘Mining and Energy’, and ‘Agriculture’ are the three sectors with the largest negative impact of GPR on trade after Services. The estimates of the GPR effects on ‘Mining and Energy’ trade are mixed. However, we obtain a negative and statistically significant GPR estimate for ‘Extraction of crude petroleum and natural gas’. Finally, the GPR estimates for ‘Manufacturing’ are mostly negative and statistically significant, but they are relatively small, on average, with the exception of ‘Beverages and Tobacco’, for which the GPR estimates are relatively large.

Third, we explore the heterogeneity of the GPR effects across several bilateral dimensions by introducing a series of interactions in our econometric model. The results from this analysis is intuitive for the most part. Specifically, we find that the negative impact of GPR on trade is stronger for larger distances, i.e., geographically distant trade links are more vulnerable to geopolitical risks. We also find that common language, which often is interpreted as a proxy for cultural proximity, mitigates the negative impact of geopolitical risk, while trade between culturally distant partners suffers more due to GPR. The negative impact of GPR is stronger for countries that are subject to international sanctions. Finally, our estimates reveal that the negative GPR impact on bilateral trade is mitigated by RTA membership, possibly because these trade relationships are perceived to be relatively less risky during periods of heightened uncertainty.

²We perform a series of robustness experiments (e.g., using more conservative or more liberal GPR indexes, alternative econometric specifications, etc.), which confirm our main conclusions but also reveal some additional insights and intuitive variation in the GPR effects.

Finally, we construct alternative measures using specific components of the GPR index. The results suggest that the war-related components are the main drivers of the large negative effects on trade. The components related to threats and onsets of war confirm the baseline findings, with particularly large negative impacts on trade in services, as well as in ‘Beverages and Tobacco’ and ‘Apparel and Footwear’ products. In contrast, the escalation of war has a relatively smaller effect, likely because disruptions and uncertainty are highest during the initial phases of conflicts. Other components, such as terror threats and attacks, are associated with significant positive effects on electronics trade. This may reflect increased demand for home-related durable goods as consumers reduce air travel during events such as the 9/11 attacks.

Our paper contributes to several strands of the literature on the economic consequences of geopolitical risk and on the broader relationship between trade and uncertainty. Recent studies show that adverse geopolitical events increase the probability of economic disasters, reduce investment and employment, and generate spillover effects by increasing the risks of sovereign debt in countries neighboring those directly affected ([Caldara and Iacoviello, 2022](#); [Afonso et al., 2023](#)). Our contribution to this literature is to explore and quantify the impact of geopolitical risk on trade. From a broader perspective, our analysis relates to the literature on uncertainty, which dampens international trade. It may arise, for instance, from weak institutions, concerns about payment reliability during financial crises, volatility in business conditions, or uncertainty surrounding trade policy ([Anderson and Marcouiller, 2002](#); [Crozet et al., 2022](#); [Novy and Taylor, 2020](#); [Handley and Limao, 2015](#); [Handley and Limão, 2017](#)).

The rest of the paper is organized as follows. The next section describes our econometric specification. Section 3 discusses the data and the data sources. Section 4 presents our empirical results. Section 5 concludes.

2 Econometric Specification

To obtain our results, we rely on the recommendations of [Larch et al. \(2025\)](#) to specify the following econometric gravity model:

$$(1) \quad X_{ij,t}^k = \exp[\pi_{i,t}^k + \chi_{j,t}^k + \vec{\mu}_{ij}^k + POLICY_{ij,t} \times \alpha^k + GPR_{ij,t} \times \beta^k] \times \epsilon_{ij,t}^k.$$

Here, $X_{ij,t}^k$ denotes nominal trade flows (in U.S. dollars) from exporter i to importer j in industry k at time t . $X_{ij,t}^k$ is in levels because we will estimate the model with the Poisson Pseudo Maximum Likelihood (PPML) estimator.³ In addition to international trade flows, $X_{ij,t}^k$ includes domestic trade.⁴ As demonstrated below, the use of domestic trade is crucial for our identification purposes because it is exactly what will enable us to identify the GPR effects in the presence of a rich set of theory-motivated exporter-time and importer-time fixed effects. Finally, we will use data for consecutive years.⁵ This is important to obtain estimates of the impact of the GPR at the disaggregated industry level.

Turning to the covariates in our model, the first three terms on the right-hand side of equation (1) denote three sets of fixed effects. Specifically, $\pi_{i,t}^k$ and $\chi_{j,t}^k$ denote exporter-industry-time and importer-industry-time fixed effects, respectively, which will control for any country-time specific determinants of trade flows on the source and/or destination side.⁶ $\vec{\mu}_{ij}^k$ denotes a vector of directional/asymmetric country-pair fixed effects, which will absorb and control for all observable, unobservable, symmetric and asymmetric time-invariant bilateral trade costs.⁷

³PPML is the preferred estimator due to its ability to account for heteroskedasticity in trade data and because, due its multiplicative form, we can include zero trade flows ([Santos Silva and Tenreyro, 2006](#)).

⁴The use of domestic trade flows is consistent with theory and has many benefits for estimating the effects of various policies and globalization effects ([Yotov, 2022](#)).

⁵Following the recommendations of [Cheng and Wall \(2005\)](#), many authors have used interval data. More recently, [Egger et al. \(2022\)](#) argue that, in settings similar to ours, it is preferable to use data for all years.

⁶The theoretical motivation for these fixed effects is that they will control for the structural structural multilateral resistances of [Anderson and van Wincoop \(2003\)](#).

⁷The country-pair fixed effects in gravity models mitigate potential endogeneity concerns for bilateral policy variables ([Baier and Bergstrand, 2007](#)) and they perform significantly better than the set of standard gravity proxies when modeling bilateral trade costs ([Egger and Nigai, 2015](#); [Agnosteva et al., 2019](#)). [Baier](#)

The vector $POLICY_{ij,t}^k$ in Equation (1) includes time-varying bilateral policy variables that are used routinely in gravity estimations. Specifically, we control for membership in Regional Trade Agreements (RTA), membership in the European Union (EU), membership in the World Trade Organization (WTO), complete trade sanctions ($COMPL_SANCT$), and partial trade sanctions ($PARTL_SANCT$). Even though these policies are implemented at the country/aggregate level, their impact may be quite heterogeneous across industries and sectors. Therefore, we also allow for the estimates of the policy coefficients (α^k) to vary by industry/sector and type of policy.

The most important term in our model is $GPR_{ij,t}$, defined as $GPR_{ij,t} = High_GPR_t \times INTL_BRDR_{ij}$, where $High_GPR_t$ is an indicator variable equal to one in periods of high geopolitical risks, identified using the global GPR index of [Caldara and Iacoviello \(2022\)](#). If equation (1) was estimated with international trade flows only, we would not be able to identify the estimate of the impact of GPR_t , because it would be perfectly collinear with the exporter-time and importer-time fixed effects in our specification. However, due to the inclusion of domestic trade flows, we will be able to identify the impact of GPR on international relative to domestic trade flows, i.e., we will be able to assess whether countries become more inward-looking during periods of elevated geopolitical risks. To make this clear and explicit, we interact GPR_t with a dummy variable – $INTL_BRDR_{ij}$ – which takes a value of one for international trade and is equal to zero for domestic trade. As a result, the dimension of the interaction term, $GPR_{ij,t} \equiv High_GPR_t \times INTL_BRDR_{ij}$, becomes (ij, t) , i.e., this term is bilateral and time-varying and, therefore, we can identify the GPR effects even in the presence of all the fixed effects in our model. We use vector notation for $GPR_{ij,t}$, because we will experiment with several GPR variables and interactions.⁸ Finally, following the standard approach in the gravity literature, we will cluster the standard errors

et al. (2019) demonstrate the importance of using directional (as opposed to symmetric) country-pair fixed effects in gravity regressions.

⁸We describe each of the alternative definitions of $GPR_{ij,t}$ when we introduce them Section 4.

by country pair.⁹

3 Data and Sources

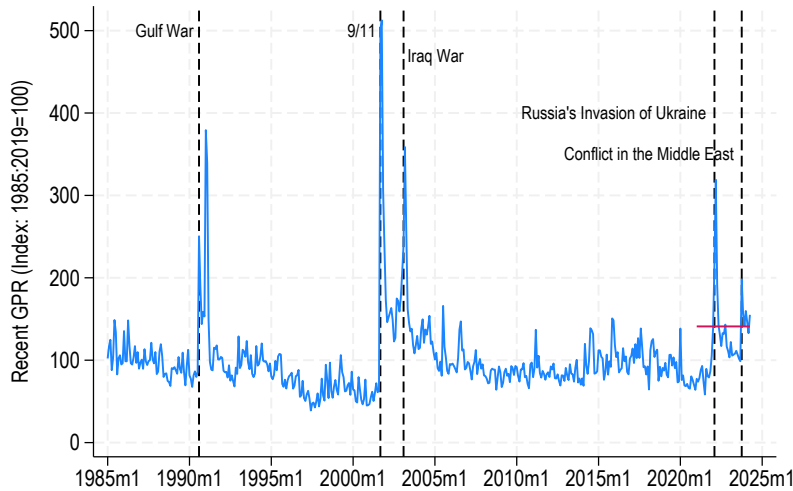
To perform the estimation analysis, we combine and rely on the following datasets.

Geopolitical Risk (GPR) data. To identify periods of high geopolitical risk, we use the GPR index developed by [Caldara and Iacoviello \(2022\)](#). The index is a monthly measure constructed using automated text searches of keywords related to geopolitical tensions in the electronic archives of 10 newspapers: *Chicago Tribune*, the *Daily Telegraph*, *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*. We define years of high geopolitical risk as those in which at least one month records a GPR index value within the top 5% of its historical distribution. Based on this threshold, we construct an indicator variable that takes the value of one in years with adverse geopolitical events and zero otherwise. As a robustness check, we also use alternative thresholds of 10% and 25%, as well as the maximum monthly value reached within a given year. In addition, we construct alternative indicators based on the components of the GPR index.

Based on this transformation, we identify six years of high geopolitical risk during the 1986–2019 period covered by our empirical analysis: 1990, 1991, 2001, 2002, 2003, and 2005. [Figure 1](#) shows that these years coincide with major adverse geopolitical events, including the Gulf War (1990-91), the 9/11 terrorist attacks (2001), the Iraq War (2003), and the London bombings (2005). During Russia’s invasion of Ukraine, the monthly values of the GPR index recorded its sixth-highest level on record—comparable to the spikes observed during the events included in our analysis. Since then, the average level of geopolitical risk has remained above the 90th percentile of its historical distribution since 1985.

⁹Motivated by [Egger and Tarlea \(2015\)](#), [Pfaffermayr \(2019\)](#), and [Pfaffermayr \(2022\)](#), we also experiment with three-way clustering by source, destination, and year in the robustness analysis.

Figure 1: Geopolitical Risk Index.



Note: GPR index reflects automated text-search results of the electronic archives of 10 newspapers: *Chicago Tribune*, the *Daily Telegraph*, *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*. Vertical lines indicate major geopolitical events. The horizontal red line represents the average value for the period following February 2022. Last observation is April 2024.

Trade data. The trade data for our analysis is from the *International Trade and Production Database for Estimation* (ITPD-E) (Borchert et al., 2020, 2022).¹⁰ The ITPD-E has several advantages for our purposes. First, the ITPD-E is constructed from raw data without reliance on any statistical modeling. Thus, it is appropriate for estimations. Second, the ITPD-E covers a large number of countries (more than 200), a large number of industries (170) that cover the whole economy (e.g., including Agriculture, Mining and Energy, Manufacturing, and Services), and a long period of time (1986-2019), which varies by industry depending on the raw data used. Third, the ITPD-E includes domestic trade flows. As highlighted earlier, the use of domestic trade is crucial for our identification purposes.¹¹

Gravity Variables. The data on membership in the European Union (EU), membership in the World Trade Organization (WTO), bilateral distance, contiguity, colonial ties, and common language comes from the *Dynamic Gravity Dataset* (DGD) of the USITC (Gurevich

¹⁰<https://www.usitc.gov/data/gravity/itpde.htm>

¹¹Due to raw data limitations, the ITPD-E does not include domestic trade flows for a few industries in agriculture and in services. Accordingly, we are not able to obtain GPR estimates for these industries.

and Herman, 2018).¹² The data on membership in Regional Trade Agreements (RTAs) are from Egger and Larch (2008).¹³ Finally, the data on economic sanctions are from the latest edition of the *Global Sanctions Database* (Felbermayr et al., 2020; Syropoulos et al., 2024).¹⁴

4 Estimation Results and Analysis

Subsection 4.1 includes our main findings on the links between GPR and trade. Then, in Subsection 4.2, we explore the mechanisms through which GPRs impact trade.

4.1 GPR and Trade: Main Findings

Since we obtain estimates for each industry in our sample (i.e., a total of 170 industries), we rely on a mixture of tables and figures. The estimates of the GPR effects at the industry-level that we obtain from specification (1) are reported in Table 1.

Table 1: GPR Effects on Trade: Industry-level Estimates.

ID	Industry Description	Broad Sector	GPR 5%		No pair FEs		Lagged GPR 5%	
			Estim.	Std.Err.	Estim.	Std.Err.	Estim.	Std.Err.
1	Wheat	Agriculture	-0.114	(.064)	-0.0670	(.095)	-0.175	(.072)*
2	Rice (raw)	Agriculture	-0.0980	(.085)	-0.363	(.128)**	-0.241	(.091)**
3	Corn	Agriculture	-0.156	(.076)*	-0.113	(.135)	-0.265	(.09)**
4	Other cereals	Agriculture	-0.118	(.073)	-0.0970	(.086)	-0.278	(.074)**
6	Soybeans	Agriculture	-0.209	(.287)	0.0550	(.285)	-0.436	(.228)
7	Other oilseeds (excluding peanuts)	Agriculture	-0.337	(.046)****	-0.323	(.075)****	-0.359	(.05)****
9	Raw and refined sugar and sugar crops	Agriculture	-0.496	(.115)****			-0.694	(.193)****
10	Other sweeteners	Agriculture	-0.250	(.089)**	-0.0650	(.123)	-0.336	(.083)****
11	Pulses and legumes, dried, preserved	Agriculture	-0.317	(.089)**	-0.172	(.076)*	-0.457	(.077)****
12	Fresh fruit	Agriculture	-0.265	(.04)****	-0.198	(.05)****	-0.325	(.044)****
13	Fresh vegetables	Agriculture	-0.181	(.028)****	-0.0510	(.042)	-0.217	(.024)****
16	Nuts	Agriculture	-0.129	(.071)	-0.113	(.139)	-0.0870	(.056)
19	Eggs	Agriculture	-0.262	(.061)****	-0.0290	(.06)	-0.320	(.051)****
20	Other meats, livestock products, and live animals	Agriculture	-0.234	(.084)**	0.283	(.103)**	-0.398	(.068)****
21	Cocoa and cocoa products	Agriculture	1.495	(.44)**	0.630	(.492)	1.145	(.421)**
22	Beverages, nec	Agriculture	-0.570	(.151)**	-0.126	(.241)	-0.490	(.177)**
24	Tobacco leaves and cigarettes	Agriculture	-0.135	(.125)	-0.170	(.112)	-0.291	(.1)**
25	Spices	Agriculture	-0.460	(.082)****	-0.448	(.124)***	-0.543	(.09)****
26	Other agricultural products, nec	Agriculture	-0.325	(.066)****	0.0380	(.11)	-0.337	(.058)****
29	Mining of hard coal	Mining and Energy	0.121	(.218)	0.304	(.224)	0.210	(.169)
30	Mining of lignite	Mining and Energy	-1.170	(.51)*	-1.337	(.714)	-1.337	(.425)**
31	Extraction crude petroleum and natural gas	Mining and Energy	-0.504	(.108)****	0.0700	(.149)	-0.266	(.124)*
32	Mining of iron ores	Mining and Energy	0.726	(.434)	1.124	(.235)****	-0.139	(.213)
33	Other mining and quarrying	Mining and Energy	0.0750	(.077)	0.153	(.089)	0.0730	(.068)
34	Electricity production, collection, and distribution	Mining and Energy	0.429	(.105)****	0.274	(.197)	0.439	(.136)**
35	Gas production and distribution	Mining and Energy	1.058	(.574)	0.511	(.686)	0.123	(.688)
36	Processing/preserving of meat	Manufacturing	-0.199	(.037)****	-0.107	(.038)**	-0.252	(.034)****
37	Processing/preserving of fish	Manufacturing	-0.0310	(.045)	0.125	(.07)	-0.0440	(.044)
38	Processing/preserving of fruit & vegetables	Manufacturing	-0.200	(.022)****	-0.166	(.029)****	-0.157	(.021)****
39	Vegetable and animal oils and fats	Manufacturing	-0.302	(.054)****	-0.252	(.073)***	-0.271	(.047)****
40	Dairy products	Manufacturing	-0.0910	(.021)****	0.00100	(.031)	-0.0800	(.018)****
41	Grain mill products	Manufacturing	-0.321	(.051)****	-0.277	(.052)****	-0.257	(.041)****

Continued on next page

¹²<https://www.usitc.gov/data/gravity/dgd.htm>

¹³<https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html>

¹⁴<https://www.globalsanctionsdatabase.com/>

42	Starches and starch products	Manufacturing	-0.291	(.054)****	-0.277	(.074)***	-0.271	(.049)****
43	Prepared animal feeds	Manufacturing	-0.148	(.033)****	-0.145	(.045)**	-0.158	(.032)****
44	Bakery products	Manufacturing	-0.197	(.02)****	-0.108	(.034)**	-0.163	(.019)****
45	Sugar	Manufacturing	-0.203	(.094)*	-0.181	(.101)	-0.147	(.068)*
46	Cocoa chocolate and sugar confectionery	Manufacturing	-0.307	(.024)****	-0.213	(.041)****	-0.333	(.022)****
47	Macaroni noodles & similar products	Manufacturing	-0.355	(.079)****	-0.0500	(.228)	-0.407	(.064)****
48	Other food products n.e.c.	Manufacturing	-0.312	(.025)****	-0.192	(.038)****	-0.291	(.028)****
49	Distilling rectifying & blending of spirits	Manufacturing	-0.601	(.08)****	-0.597	(.147)****	-0.447	(.085)****
50	Wines	Manufacturing	0.193	(.089)*	0.0750	(.148)	0.284	(.102)**
51	Malt liquors and malt	Manufacturing	-0.272	(.067)****	-0.198	(.077)*	-0.284	(.045)****
52	Soft drinks; mineral waters	Manufacturing	-0.263	(.048)****	-0.105	(.058)	-0.210	(.038)****
53	Tobacco products	Manufacturing	-0.315	(.092)***	-0.146	(.123)	-0.313	(.086)**
54	Textile fibre preparation; textile weaving	Manufacturing	0.107	(.041)**	0.228	(.052)****	0.0830	(.048)
55	Made-up textile articles except apparel	Manufacturing	-0.358	(.034)****	-0.325	(.053)****	-0.289	(.036)****
56	Carpets and rugs	Manufacturing	-0.118	(.027)****	-0.0810	(.043)	-0.118	(.027)****
57	Cordage rope twine and netting	Manufacturing	0.0440	(.035)	-0.00800	(.068)	0.102	(.039)**
58	Other textiles n.e.c.	Manufacturing	-0.112	(.026)****	0.0380	(.038)	-0.0630	(.028)*
59	Knitted and crocheted fabrics and articles	Manufacturing	-0.00200	(.08)	0.245	(.146)	-0.0100	(.078)
60	Wearing apparel except fur apparel	Manufacturing	-0.357	(.055)****	-0.113	(.086)	-0.384	(.053)****
61	Dressing & dyeing of fur; processing of fur	Manufacturing	0.153	(.07)*	-0.0790	(.116)	0.159	(.09)
62	Tanning and dressing of leather	Manufacturing	0.147	(.069)*	0.190	(.077)*	0.164	(.088)
63	Luggage handbags etc.; saddlery & harness	Manufacturing	-0.292	(.066)****	-0.448	(.109)****	-0.255	(.085)**
64	Footwear	Manufacturing	-0.171	(.047)***	-0.138	(.084)	-0.113	(.051)*
65	Sawmilling and planing of wood	Manufacturing	-0.0640	(.042)	-0.0930	(.046)*	-0.0260	(.046)
66	Veneer sheets plywood particle board etc.	Manufacturing	0.101	(.049)*	0.125	(.046)**	0.109	(.043)*
67	Builders' carpentry and joinery	Manufacturing	-0.00900	(.03)	-0.0760	(.038)*	-0.0430	(.026)
68	Wooden containers	Manufacturing	0.0250	(.053)	-0.0520	(.068)	-0.0600	(.041)
69	Other wood products; articles of cork/straw	Manufacturing	0.0240	(.076)	0.0440	(.08)	0.00800	(.054)
70	Pulp paper and paperboard	Manufacturing	-0.168	(.024)****	-0.111	(.035)**	-0.120	(.024)****
71	Corrugated paper and paperboard	Manufacturing	-0.0890	(.022)****	-0.0950	(.023)****	-0.0980	(.022)****
72	Other articles of paper and paperboard	Manufacturing	0.0550	(.019)**	0.102	(.035)**	0.00200	(.022)
73	Publishing of books and other publications	Manufacturing	0.0180	(.026)	0.00400	(.034)	-0.0180	(.026)
74	Publishing of newspapers journals etc.	Manufacturing	-0.0110	(.034)	0.0250	(.04)	-0.0220	(.033)
75	Publishing of recorded media	Manufacturing	0.194	(.083)*	0.185	(.094)	0.182	(.078)*
76	Other publishing	Manufacturing	-0.0310	(.058)	0.103	(.07)	-0.106	(.066)
77	Printing	Manufacturing	-0.217	(.046)****	-0.125	(.046)**	-0.244	(.045)****
78	Service activities related to printing	Manufacturing	-0.518	(.081)****	-0.532	(.083)****	-0.502	(.086)****
79	Coke oven products	Manufacturing	0.00400	(.165)	0.642	(.198)**	-0.0380	(.201)
80	Refined petroleum products	Manufacturing	-0.243	(.055)****	-0.0210	(.079)	-0.143	(.043)***
81	Processing of nuclear fuel	Manufacturing	0.891	(.325)**	0.668	(.285)*	1.202	(.179)****
82	Basic chemicals except fertilizers	Manufacturing	0.0970	(.032)**	0.0800	(.054)	0.0370	(.026)
83	Fertilizers and nitrogen compounds	Manufacturing	-0.0430	(.067)	0.0250	(.082)	-0.0250	(.063)
84	Plastics in primary forms; synthetic rubber	Manufacturing	-0.254	(.037)****	-0.160	(.066)*	-0.239	(.043)****
85	Pesticides and other agro-chemical products	Manufacturing	-0.248	(.07)**	0.0450	(.08)	-0.250	(.069)***
86	Paints varnishes printing ink and mastics	Manufacturing	-0.275	(.022)****	-0.137	(.038)***	-0.233	(.021)****
87	Pharmaceuticals medicinal chemicals etc.	Manufacturing	-0.429	(.073)****	-0.123	(.092)	-0.434	(.073)****
88	Soap cleaning & cosmetic preparations	Manufacturing	-0.402	(.026)****	-0.346	(.044)****	-0.385	(.028)****
89	Other chemical products n.e.c.	Manufacturing	-0.164	(.061)**	0.246	(.111)*	-0.0250	(.064)
90	Man-made fibres	Manufacturing	-0.0950	(.053)	0.0950	(.067)	-0.125	(.055)*
91	Rubber tyres and tubes	Manufacturing	-0.359	(.05)****	-0.260	(.071)***	-0.357	(.045)****
92	Other rubber products	Manufacturing	-0.154	(.021)****	-0.122	(.038)**	-0.142	(.022)****
93	Plastic products	Manufacturing	-0.149	(.019)****	-0.125	(.025)****	-0.135	(.017)****
94	Glass and glass products	Manufacturing	-0.0540	(.023)*	0.0100	(.038)	-0.0340	(.023)
95	Pottery china and earthenware	Manufacturing	-0.224	(.036)****	-0.0150	(.066)	-0.194	(.036)****
96	Refractory ceramic products	Manufacturing	-0.0510	(.03)	0.181	(.054)***	0.0260	(.029)
97	Struct.non-refractory clay; ceramic products	Manufacturing	-0.118	(.033)***	-0.0650	(.057)	-0.116	(.039)**
98	Cement lime and plaster	Manufacturing	-0.181	(.061)**	0.125	(.09)	-0.123	(.062)*
99	Articles of concrete cement and plaster	Manufacturing	-0.116	(.037)**	-0.140	(.06)*	-0.142	(.035)***
100	Cutting shaping & finishing of stone	Manufacturing	0.111	(.038)**	-0.0210	(.077)	0.107	(.043)*
101	Other non-metallic mineral products n.e.c.	Manufacturing	-0.0140	(.017)	0.175	(.036)****	-0.00600	(.018)
102	Basic iron and steel	Manufacturing	-0.204	(.029)****	-0.0560	(.036)	-0.171	(.032)****
103	Basic precious and non-ferrous metals	Manufacturing	-0.274	(.052)****	0.0470	(.095)	-0.216	(.056)***
104	Structural metal products	Manufacturing	-0.176	(.023)****	-0.184	(.032)****	-0.136	(.023)****
105	Tanks reservoirs and containers of metal	Manufacturing	-0.463	(.045)****	-0.505	(.059)****	-0.526	(.05)****
106	Steam generators	Manufacturing	-0.0330	(.068)	-0.249	(.114)*	-0.236	(.056)****
107	Cutlery hand tools and general hardware	Manufacturing	-0.434	(.051)****	-0.558	(.074)****	-0.415	(.052)****
108	Other fabricated metal products n.e.c.	Manufacturing	0.0330	(.071)	-0.0840	(.068)	0.0530	(.061)
109	Engines & turbines (not for transport equipment)	Manufacturing	0.239	(.088)**	0.495	(.092)****	0.197	(.081)*
110	Pumps compressors taps and valves	Manufacturing	-0.381	(.059)****	-0.297	(.087)**	-0.341	(.06)****
111	Bearings gears gearing & driving elements	Manufacturing	-0.0880	(.054)	-0.00600	(.095)	-0.0690	(.058)
112	Ovens furnaces and furnace burners	Manufacturing	0.0870	(.065)	0.237	(.087)**	0.214	(.078)**
113	Lifting and handling equipment	Manufacturing	-0.225	(.027)****	-0.179	(.042)****	-0.186	(.029)****
114	Other general purpose machinery	Manufacturing	-0.217	(.025)****	-0.280	(.038)****	-0.175	(.027)****
115	Agricultural and forestry machinery	Manufacturing	-0.296	(.028)****	-0.228	(.042)****	-0.234	(.025)****
116	Machine tools	Manufacturing	-0.0810	(.029)**	0.00500	(.078)	0.0630	(.042)
117	Machinery for metallurgy	Manufacturing	0.436	(.123)***	0.638	(.14)****	0.512	(.123)****
118	Machinery for mining & construction	Manufacturing	0.0580	(.03)	0.253	(.066)**	0.0310	(.035)
119	Food/beverage/tobacco processing machinery	Manufacturing	-0.0580	(.029)*	-0.156	(.041)***	-0.0940	(.03)**
120	Machinery for textile apparel and leather	Manufacturing	0.0260	(.042)	0.0510	(.086)	0.0500	(.048)
121	Weapons and ammunition	Manufacturing	-0.311	(.07)****	-0.274	(.078)***	-0.374	(.064)****
122	Other special purpose machinery	Manufacturing	-0.436	(.053)****	-0.374	(.08)****	-0.463	(.056)****
123	Domestic appliances n.e.c.	Manufacturing	-0.0520	(.034)	0.0200	(.049)	-0.0180	(.026)
124	Office accounting and computing machinery	Manufacturing	-0.0850	(.072)	-0.247	(.169)	-0.0300	(.071)
125	Electric motors generators and transformers	Manufacturing	0.791	(.056)****	0.877	(.088)****	0.854	(.065)****
126	Electricity distribution & control apparatus	Manufacturing	0.0230	(.02)	0.0940	(.051)	0.0970	(.023)****
127	Insulated wire and cable	Manufacturing	-0.0420	(.037)	0.0110	(.051)	-0.0780	(.039)**
128	Accumulators primary cells and batteries	Manufacturing	0.196	(.084)*	0.321	(.091)***	0.246	(.091)**
129	Lighting equipment and electric lamps	Manufacturing	0.114	(.047)*	-0.00800	(.074)	0.156	(.055)**
130	Other electrical equipment n.e.c.	Manufacturing	-0.367	(.074)****	-0.155	(.103)	-0.343	(.076)****

Continued on next page

131	Electronic valves tubes etc.	Manufacturing	0.234	(.041)****	0.384	(.073)****	0.258	(.05)****
132	TV/radio transmitters; line comm. apparatus	Manufacturing	0.189	(.091)*	0.153	(.112)	0.0360	(.096)
133	TV and radio receivers and associated goods	Manufacturing	0.127	(.07)	0.676	(.158)****	0.0530	(.08)
134	Medical surgical and orthopaedic equipment	Manufacturing	-0.0310	(.034)	0.0380	(.07)	0.0160	(.036)
135	Measuring/testing/navigating appliances etc.	Manufacturing	-0.212	(.028)****	-0.354	(.073)****	-0.114	(.028)****
136	Optical instruments & photographic equipment	Manufacturing	-0.0180	(.047)	-0.725	(.206)****	-0.125	(.066)
137	Watches and clocks	Manufacturing	0.258	(.119)*	0.653	(.28)*	0.319	(.117)**
138	Motor vehicles	Manufacturing	-0.161	(.041)****	-0.0390	(.088)	-0.123	(.04)**
139	Automobile bodies trailers & semi-trailers	Manufacturing	-0.124	(.033)***	-0.220	(.06)***	-0.0360	(.03)
140	Parts/accessories for automobiles	Manufacturing	0.130	(.076)	0.334	(.078)****	0.121	(.06)*
141	Building and repairing of ships	Manufacturing	0.0240	(.081)	-0.0890	(.12)	0.0650	(.07)
142	Building/repairing of pleasure/sport. boats	Manufacturing	-0.0880	(.065)	-0.00400	(.087)	-0.0560	(.056)
143	Railway/tramway locomotives & rolling stock	Manufacturing	-0.138	(.05)**	-0.120	(.071)	-0.0990	(.049)*
144	Aircraft and spacecraft	Manufacturing	-0.215	(.048)****	-0.137	(.094)	-0.132	(.053)*
145	Motorcycles	Manufacturing	-0.176	(.058)**	0.390	(.11)***	-0.267	(.062)****
146	Bicycles and invalid carriages	Manufacturing	-0.132	(.096)	-0.00900	(.129)	-0.0680	(.091)
147	Other transport equipment n.e.c.	Manufacturing	-0.0800	(.044)	-0.0900	(.092)	-0.186	(.038)****
148	Furniture	Manufacturing	-0.230	(.024)****	-0.236	(.042)****	-0.244	(.023)****
149	Jewellery and related articles	Manufacturing	0.0510	(.083)	1.419	(.254)****	0.135	(.083)
150	Musical instruments	Manufacturing	-0.225	(.059)***	-0.387	(.126)**	-0.209	(.068)**
151	Sports goods	Manufacturing	0.0490	(.034)	0.0330	(.06)	0.0170	(.03)
152	Games and toys	Manufacturing	0.131	(.111)	0.673	(.229)**	-0.0990	(.102)
153	Other manufacturing n.e.c.	Manufacturing	-0.173	(.044)****	-0.333	(.053)****	-0.193	(.043)****
156	Transport	Services	-0.0420	(.024)	0.112	(.037)**	0.00600	(.02)
157	Travel	Services	-1.072	(.067)****	-1.061	(.073)****	-0.535	(.068)****
158	Construction	Services	0.00600	(.086)	0.0270	(.088)	0.0570	(.073)
159	Insurance and pension services	Services	-0.504	(.1)****	-0.324	(.123)**	-0.167	(.074)*
160	Financial services	Services	-1.145	(.076)****	-0.965	(.115)****	-0.863	(.051)****
162	Telecom, computer, information services	Services	-0.974	(.084)****	-0.969	(.086)****	-0.700	(.053)****
163	Other business services	Services	-0.694	(.071)****	-0.655	(.07)****	-0.501	(.048)****
164	Heritage and recreational services	Services	-13.13	(2.899)****	-15.22	(1.562)****	-10.39	(.642)****
165	Health services	Services	-0.835	(.135)****	-0.976	(.16)****	-0.222	(.146)
166	Education services	Services	-0.559	(.071)****	-0.304	(.079)***	-0.370	(.056)****
169	Trade-related services	Services	-0.282	(.141)*	-0.262	(.151)	-0.0150	(.085)
170	Other personal services	Services	-15.95	(2.599)****	-18.03	(4.306)****	-15.10	(1.668)****

Notes: This table reports estimates of the impact of geopolitical risk on international trade, which are obtained from specification (1). Columns (1)-(3) list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E. Columns (4) and (5) report the GPR estimates together with their corresponding standard errors, respectively, based on the 5% GPR index. Columns (6) and (7) report the GPR estimates together with their corresponding standard errors, respectively, from a specification without pair fixed effects. Columns (8) and (9) report the GPR estimates together with their corresponding standard errors, respectively, based on the lagged 5% GPR index. All estimates are obtained with the PPML estimator, and the full set of control variables from specification (1). The results in columns (4) and (8) are obtained with country-pair fixed effects, while the results in column (6) are obtained with standard gravity variables. **** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05. The standard errors in all specifications are clustered by country pair. See text for further details.

The first three columns of the table list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E, respectively. Columns (4) and (5) report the GPR estimates together with their corresponding standard errors, respectively, based on the 5% GPR index, which, as discussed in the data section, is our preferred measure of geopolitical risk. Figure 2 visualizes the estimates from columns (4) and (5) of Table 1. The top panel of the figure shows all industry-level estimates and their corresponding confidence intervals, while, for clarity, the bottom panel drops the top and bottom 5% outliers.

Several findings stand out from Table 1. First, most of the GPR estimates (74%) that we obtain in column (4) are negative. Second, most of the negative GPR estimates (i.e., more than 80%) are also statistically significant. In combination, these two observations imply that geopolitical risk affects international trade negatively. The average GPR estimate across all industries is -0.31, and it implies that, *ceteris paribus*, geopolitical risk (as measured by

the GPR index) has lead to about 27% decrease in global trade.¹⁵ Using a standard value for the trade elasticity of 5,¹⁶ our estimates suggest that the average GPR impact is equivalent to a global tariff increase of about 8%.¹⁷ The average GPR estimate based only on the negative estimates is -0.51, implying a 40% decrease in the volume of global trade, and a corresponding global tariff equivalent increase of 14%. Third, we also obtain some positive GPR estimates, however, relatively few of them are statistically significant (i.e., about 16% of all estimates are positive and statistically significant). Finally, we note that the GPR estimates from Table 1 and Figure 2 are quite heterogeneous. We explore the heterogeneity of the GPR effects across the four broad sectors in our data next.

Figure 3 visualizes the estimates from columns (4) and (5) of Table 1 across the four broad sectors in the ITPD-E data, i.e., Agriculture, Mining and Energy, Manufacturing, and Services. The strongest GPR effects that we obtain are in the Services sector, suggesting that services trade is most vulnerable to geopolitical risks. The GPR estimates are mixed for the ‘Mining and Energy’ industries. Importantly, one of the two negative and statistically significant estimates is for ‘Extraction crude petroleum and natural gas’ (the other is for ‘Mining of lignite’). All GPR estimates for ‘Agriculture’ are negative, and most of them are also statistically significant. Thus, we conclude that, along with ‘Services’, ‘Agriculture’ is strongly affected by geopolitical risks. Finally, we see that the estimates for ‘Manufacturing’ are mostly negative and significant, but there are some positive estimates as well. Due to the large number of industries within the broad ‘Manufacturing’ sector, Figure 3 is not very informative. We address this challenge next.

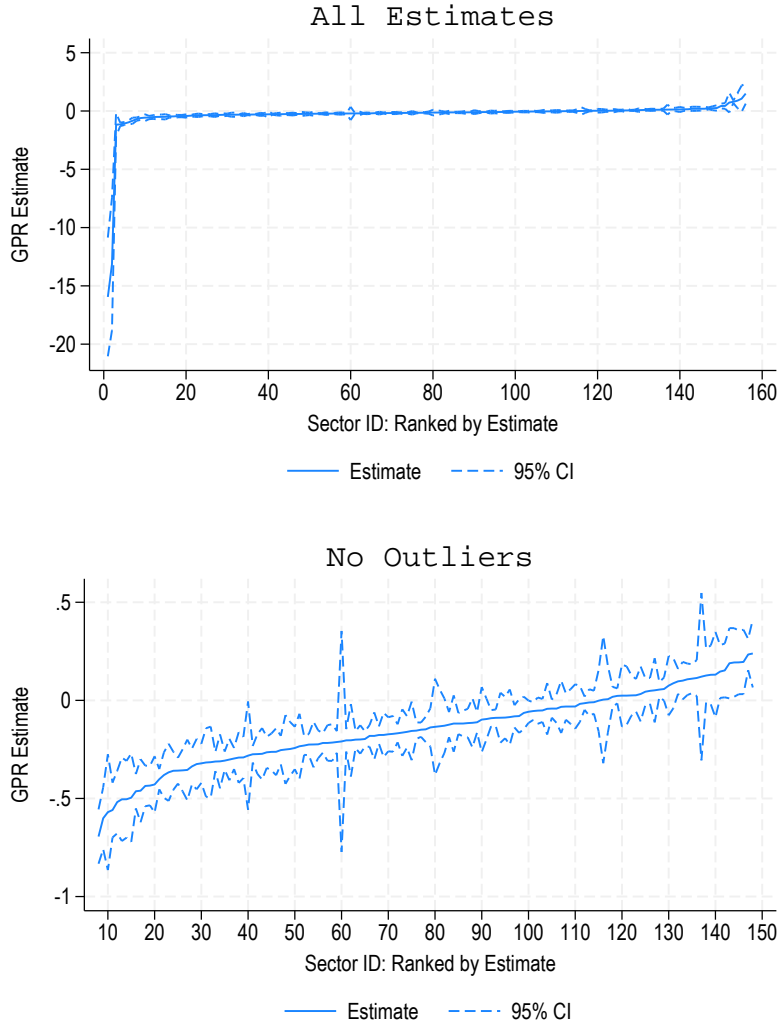
Table 2 reports sectoral estimates of the impact of geopolitical risk on international trade. These results are obtained from specification (1) after pooling all industries within each of the sectors. Accordingly, each of the three sets of fixed effects now also vary across industries.

¹⁵Calculated as $(\exp(-0.31) - 1) * 100$.

¹⁶The trade elasticity value that we employ corresponds to a value of 6 for the elasticity of substitution, in line with the average elasticity estimates computed at the product level. See Fontagné et al. (2022).

¹⁷Calculated as $(\exp(-0.31/(1 - \sigma)) - 1) * 100$, where $\sigma = 5$.

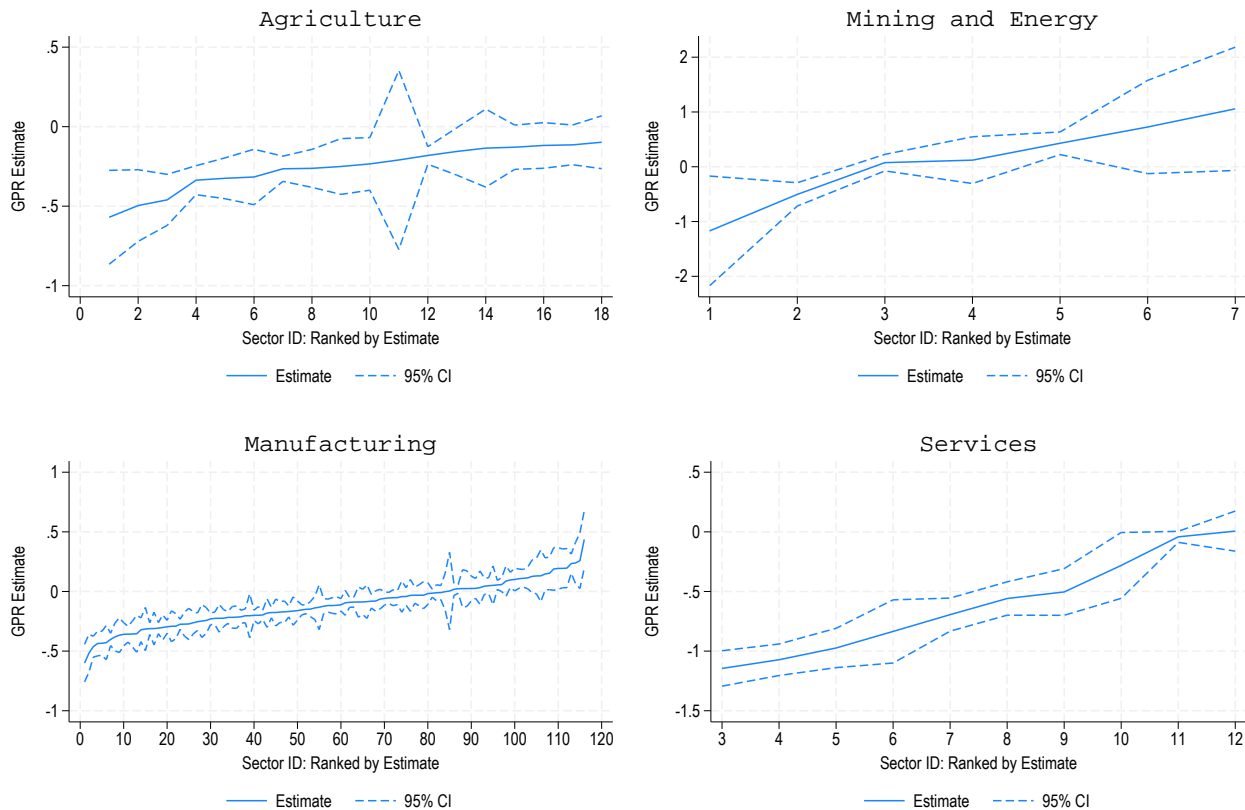
Figure 2: GPR Effects on Trade: All Industries.



Note: This figure visualizes the results from columns (4) and (5) of Table 1. The top panel of the figure shows all industry-level estimates and their corresponding confidence intervals, while the bottom panel report the same estimates but without the top and bottom 5% outliers. See text for further details.

Column (1) lists the sector IDs. Column (2) offers sector descriptions. Columns (3) and (4) report the GPR estimates together with their corresponding standard errors, respectively, based on the 5% GPR index. All estimates are obtained with the PPML estimator, three-way fixed effects that vary at the industry level too, and the full set of control variables from specification (1). The standard errors are clustered by country-pair-industry. We visualize the results from Table 2 in Figure 4.

Figure 3: GPR Effects on Trade: Broad Sectors.



Note: This figure visualizes the results from columns (4) and (5) of Table 1 for each of the four broad sectors in our estimating sample, i.e., Agriculture, Mining and Energy, Manufacturing, and Services. See text for further details.

The results from Table 2 and Figure 4 reinforce our previous conclusions and offer some new insights. All but two of the sectoral estimates are negative, and all but one of the negative estimates are statistically significant. The only positive and statistically significant (but small in magnitude) estimate is for ‘Electronics’, possibly reflecting increased demand for home-related durable goods during periods of elevated geopolitical risk, such as following the 9/11 attacks, when consumers reduced air travel. Turning to the specific estimates and their heterogeneity, we see that the GPR estimate for ‘Services’ is the largest in absolute value, and it is more than twice as large as the second largest estimate, which is for ‘Beverages and Tobacco’. Agricultural products and ‘Mining and Energy’ are also among the most affected sectors. We also note that the GPR estimates are relatively homogeneous (i.e., around -0.2)

Table 2: GPR Effects on Trade: Sector-level Estimates.

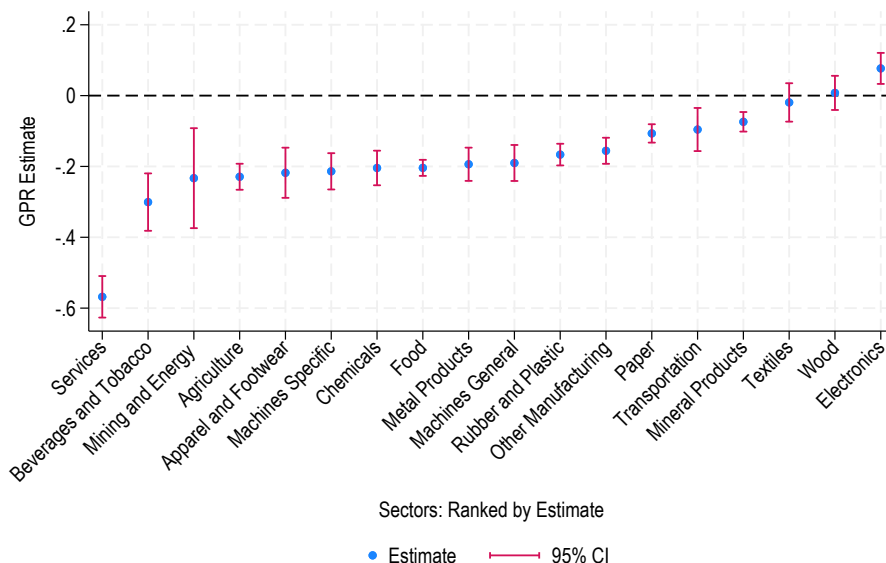
ID	Sector Description	Estim.	Std.Err.
1	Agriculture	-0.229	(.019)****
2	Mining and Energy	-0.233	(.072)**
3	Food	-0.204	(.012)****
4	Beverages and Tobacco	-0.301	(.041)****
5	Textiles	-0.0190	(.028)
6	Apparel and Footwear	-0.218	(.036)****
7	Wood	0.00800	(.025)
8	Paper	-0.107	(.013)****
9	Chemicals	-0.204	(.025)****
10	Rubber and Plastic	-0.167	(.016)****
11	Mineral Products	-0.0740	(.014)****
12	Metal Products	-0.194	(.024)****
13	Machines General	-0.190	(.026)****
14	Machines Specific	-0.214	(.026)****
15	Electronics	0.0770	(.022)***
16	Transportation	-0.0960	(.031)**
17	Other Manufacturing	-0.156	(.019)****
18	Services	-0.568	(.03)****

Notes: This table reports sectoral estimates of the impact of geopolitical risk on international trade, which are obtained from specification (1) after pooling all industries within each of the sectors. Columns (1) lists the sector IDs. Column (2) offers sector descriptions. Columns (3) and (4) report the GPR estimates together with their corresponding standard errors, respectively, based on the 5% GPR index. All estimates are obtained with the PPML estimator, three-way fixed effects, and the full set of control variables from specification (1). The standard errors are clustered by country pair. **** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05. See text for further details.

across most of the manufacturing sectors, with ‘Paper’, ‘Transportation’, ‘Mineral Products’, and ‘Textiles’ being exceptions with smaller negative impact. ‘Textiles’ and ‘Wood’ products are the only two categories with estimates that are not statistically significant.

We conclude the analysis with several robustness experiments. First, the results in columns (6) and (7) Table 1 report the GPR estimates together with their corresponding standard errors, respectively, from a specification without pair fixed effects. Instead of using country-pair fixed effects we use a set of standard time-invariant gravity variables including bilateral distance, contiguity, colonial relationships, and common official language. Many (i.e., about 62%) of the estimates from this specification are still negative, and most of them are statistically significant. However, our main specification delivers a larger number of

Figure 4: GPR Effects on Trade: Sector-level Estimates.



Note: This figure visualizes the results from columns (3) and (4) of Table 2. See text for further details.

negative GPR estimates. We attribute the differences to the better (perfect) modeling of the time-invariant bilateral trade frictions in our main specification. Second, columns (8) and (9) report the GPR estimates together with their corresponding standard errors, respectively, based on the lagged 5% GPR index. With a correlation coefficient of 0.99, the GPR results from this specification are very similar to our main findings.

The estimates in columns (4) and (5) of Table 3, from the Appendix, are obtained with the 25% GPR index, and we see that most of them are positive and most are also not statistically significant. This changes when we construct and use more conservative GPR measures, e.g., the 10% GPR and the maximum GPR indexes, in columns (6) and (8) of Table 3, respectively. We find these changes intuitive, as the more conservative GPR measures should have a stronger negative impact on trade. Overall, based on the analysis in this section, we conclude that geopolitical risk has been an important impediment to global trade with a strong impact for all sectors, which has been particularly pronounced for trade in ‘Services’ and ‘Agriculture’.

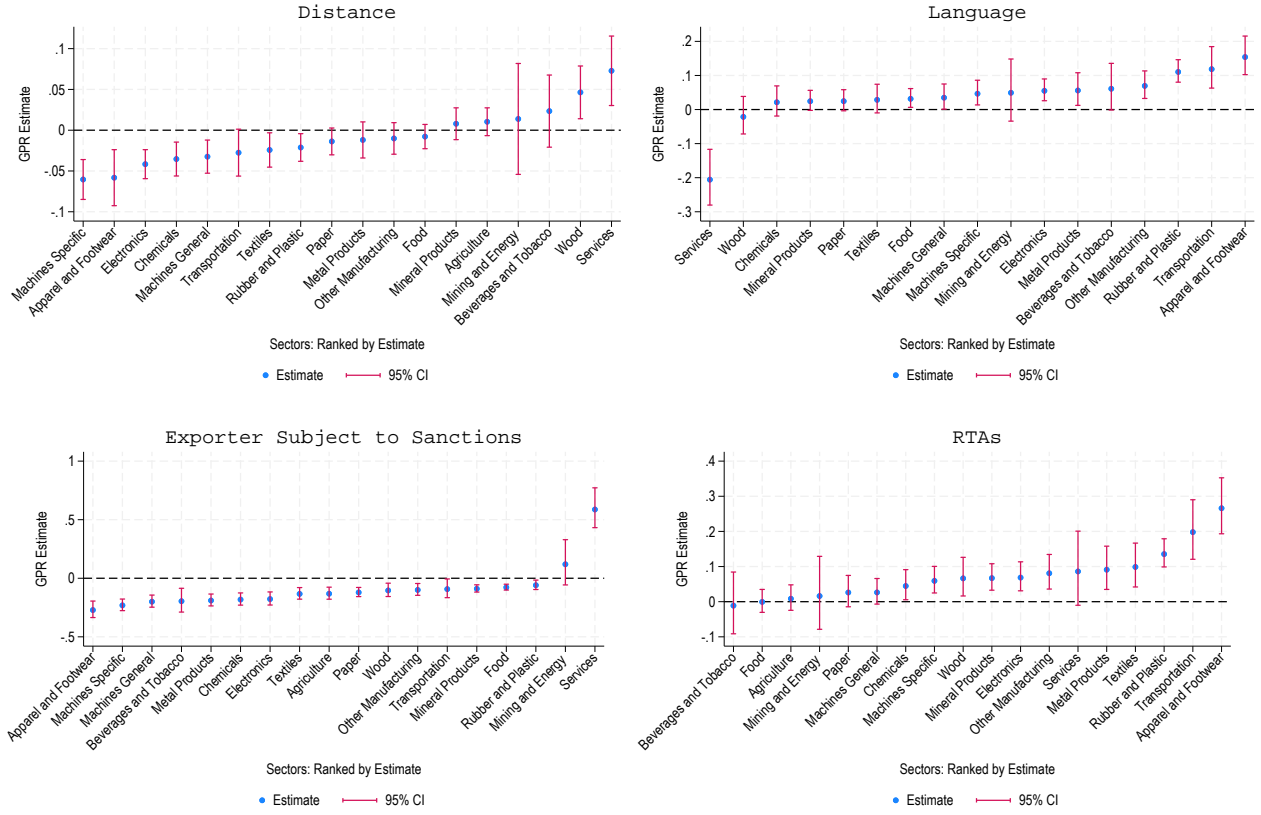
4.2 GPR and Trade: Mechanisms and Discussion

The objective of this section is to try to better understand the channels and mechanisms through which geopolitical risk affects international trade. To this end, we proceed in two steps. First, we introduce to our main specification a series of interactions between GPR and some standard determinants of trade flows. Then, we study the impact of some of the specific components of the GPR index of [Caldara and Iacoviello \(2022\)](#).

Figure 5 reports estimates of the interactions between the 5% GPR and four standard gravity variables, including bilateral distance, common language, economic sanctions, and regional trade agreements. Estimates are obtained from equation (1), augmented with additional interaction terms. For each sector, all industries within each sector are pooled and an industry dimension is added to each of the three sets of fixed effects. The estimates are obtained with the PPML estimator and the full set of control variables from specification (1). Standard errors are clustered by country-pair-industry.

Several patterns emerge from the estimates in Figure 5. First, we observe that for most sectors, the negative impact of GPR is stronger and statistically significant for larger distances. The two exceptions are ‘Services’ and ‘Wood’. We remind the reader that ‘Wood’ was one of only two sectors with positive GPR estimates, while ‘Services’ had the largest negative effect. ‘Machines’, ‘Apparel and Footwear’, and ‘Electronics’ are among the sectors with the largest estimates on the GPR interaction with distance. Second, with two exception (‘Services’ and ‘Wood’), the estimates on the interaction between GPR and language are all positive and most are statistically significant. The implication is that common language, which often is interpreted as a proxy for cultural proximity, mitigates the negative impact of geopolitical risk. We find these results intuitive. Importantly, we note that the ‘language’ estimate for ‘Services’ is negative and quite large. Third, our estimates suggest that the negative impact of GPR is stronger for countries that are subject to sanctions. Once again, ‘Services’ is a notable exception. Finally, our estimates reveal that the negative

Figure 5: GPR Effects on Trade: Interactions and Mechanisms.



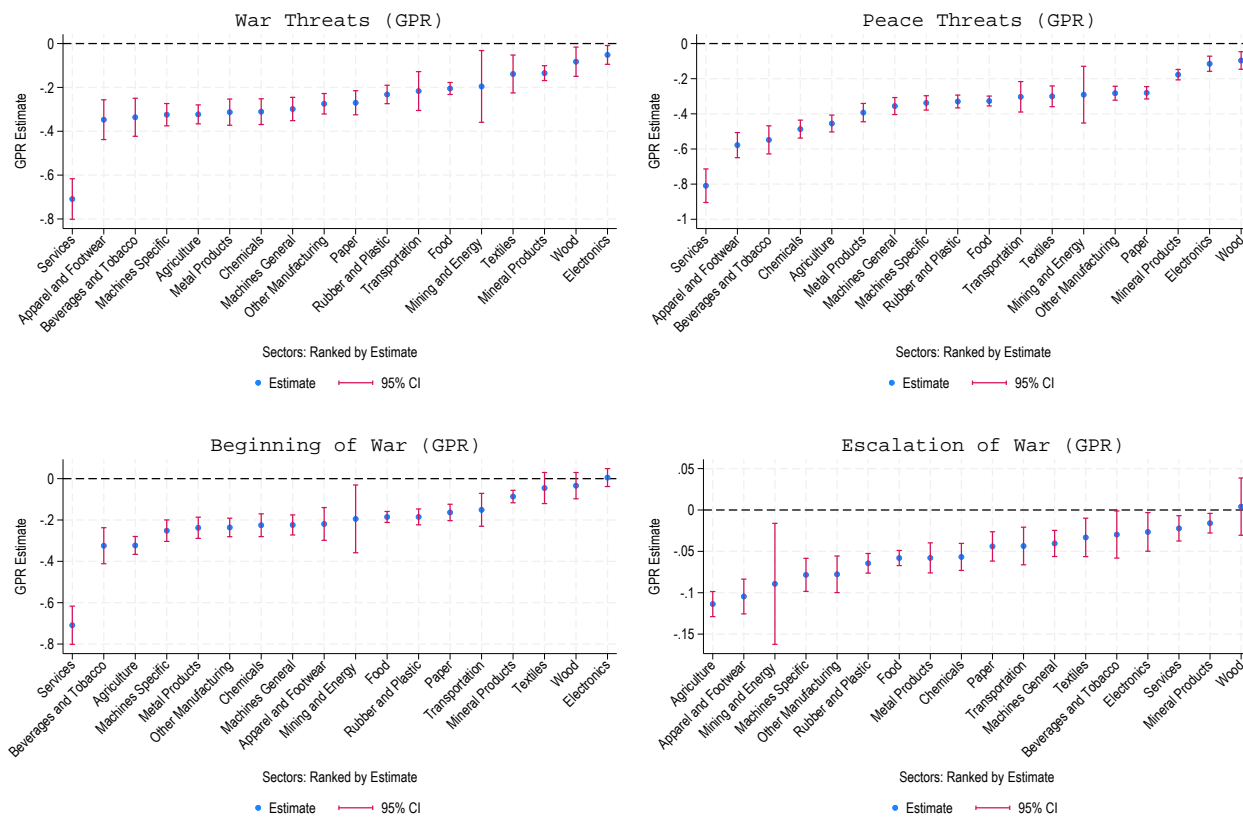
Note: This figure reports sectoral estimates of the interactions between the top 5% geopolitical risk index and several variables that are strong predictors of bilateral trade flows. All estimates are obtained from the same specification, which is based on (1) but with the additional interactions. The estimates for each sector are obtained after pooling all industries within the corresponding sector. All estimates are obtained with the PPML estimator, three-way fixed effects, and the full set of control variables from specification (1). The standard errors are clustered by country pair. See text for further details.

GPR impact on bilateral trade is mitigated by RTA membership, possibly because these trade relationships are perceived to be relatively less risky during periods of increased uncertainty.

Figure 6 presents the estimates for the war-related components of the GPR index. The top panels show the results for components associated with threats of war and peace, while the bottom panels present the results for components capturing the onset and escalation of armed conflict. Similarly to our baseline specification, we transform each component into a dummy variable that identifies years with elevated risk. Specifically, the variable takes a value of one if at least one month within a year records a value in the top 5% of the

component's historical distribution and zero otherwise.

Figure 6: GPR Effects on Trade: War GPR Categories.



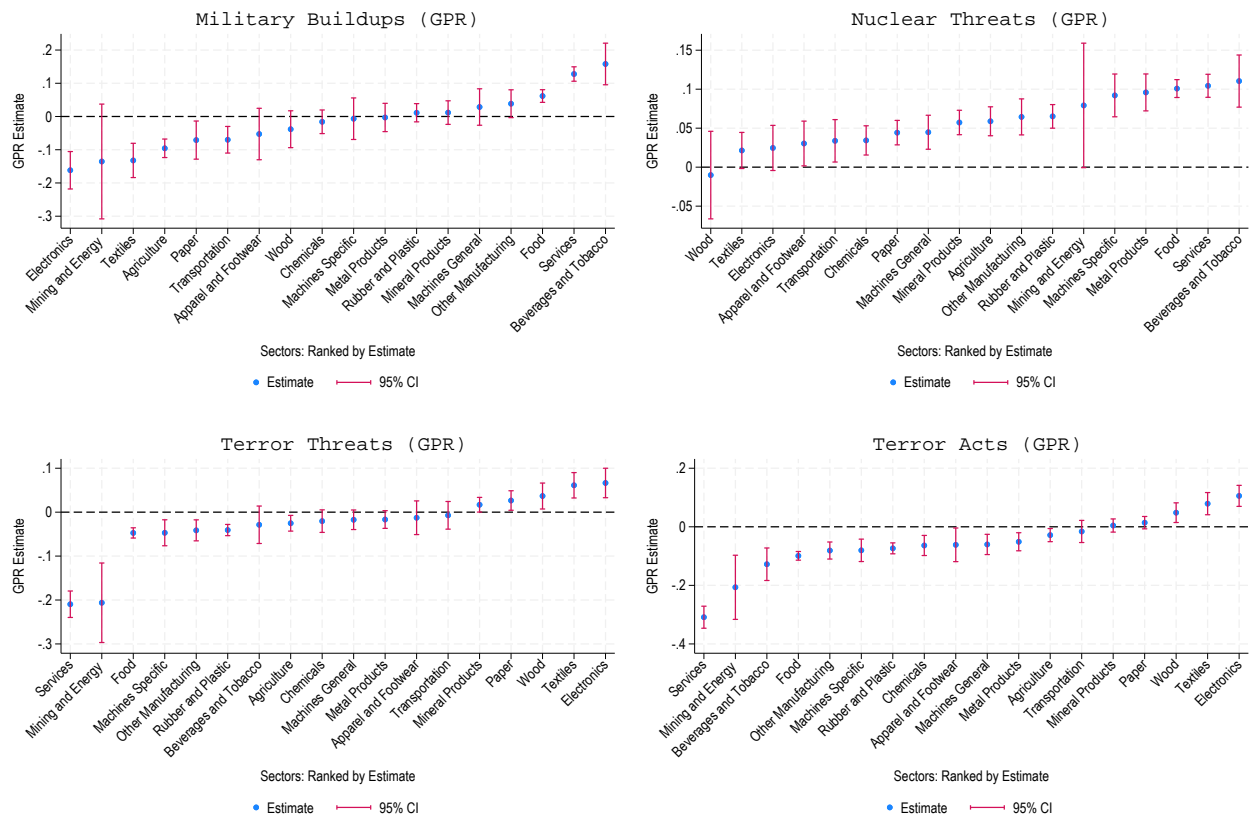
Note: This figure reports sectoral estimates of the top 5% geopolitical risk categories. All estimates are obtained from the same specification, which is based on (1). The estimates for each sector are obtained after pooling all industries within the corresponding sector. All estimates are obtained with the PPML estimator, three-way fixed effects, and the full set of control variables from specification (1). The standard errors are clustered by country pair. See text for further details.

The results suggest that the war-related components of the GPR index are the main drivers of the negative effects on trade. Interestingly, the positive effects observed for electronics in the baseline results largely disappear, with the exception of the ‘Beginning of War’ component, which has a small positive coefficient that is not statistically different from zero. Services trade is the sector most negatively affected when geopolitical risks are related to threats and onset of war, while the escalation of war appears to impact the agriculture sector most strongly. Finally, escalation of war has a relatively smaller effect compared to threats and the onset of war. This may reflect the fact that much of the trade disruption occurs in the earlier phases of conflict, with subsequent escalations contributing

only marginal additional negative effects.

Figure 7 presents the results for the remaining components of the GPR index. These estimates are less consistent, with some sectors, particularly electronics, experiencing increased trade during periods of elevated terrorism-related threats and attacks. The positive baseline effects observed for electronics appear to be driven by these components. One possible interpretation is that adverse geopolitical events, such as the 9/11 terrorist attacks, lead to changes in consumer behavior. These events may reduce demand for services like air travel while increasing demand for home-related durable goods, including television sets and other electronics.

Figure 7: GPR Effects on Trade: Other GPR Categories.



Note: This figure reports sectoral estimates of the top 5% geopolitical risk categories. All estimates are obtained from the same specification, which is based on (1). The estimates for each sector are obtained after pooling all industries within the corresponding sector. All estimates are obtained with the PPML estimator, three-way fixed effects, and the full set of control variables from specification (1). The standard errors are clustered by country pair. **** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. See text for further details.

5 Conclusion

We combined data on geopolitical risk from [Caldara and Iacoviello \(2022\)](#) with international and domestic trade data from the ITPD-E of the USITC to study the impact of GPR on trade within a modern empirical gravity model. The main conclusions from our analysis are that GPR has a large, negative, and statistically significant impact on international trade (i.e., a decline of about 30-40%), and that countries become significantly more inward-looking during periods of elevated geopolitical risks. The negative GPR effects on trade are very heterogeneous across industries and sectors, with ‘Services’ and ‘Agriculture’ being the most vulnerable. The GPR impact also varies intuitively across several bilateral dimensions, with stronger negative effects for geographically and culturally distant countries and for countries subject to international sanctions, while RTA membership mitigates the negative effects. An analysis of the GPR subcomponents reveals that war-related elements are the main drivers of the negative effects on trade. We believe that further analysis on the short- vs. long-run impact of GPR on trade, as well as explorations of the general equilibrium effects of GPR on trade and welfare, would be a valuable direction for future research.

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Appendix

This appendix includes additional results and robustness analysis.

Table 3: GPR Effects on Trade: Industry-level Estimates. Robustness.

ID	Industry Description	Broad Sector	GPR 25%		GPR 10%		GPR Max	
			Estim.	Std.Err.	Estim.	Std.Err.		
1	Wheat	Agriculture	-0.00100	(.039)	-0.0570	(.054)	0.0140	(.044)
2	Rice (raw)	Agriculture	0.00800	(.051)	-0.0530	(.062)	0.0300	(.05)
3	Corn	Agriculture	0.179	(.043)****	-0.0180	(.048)	0.0660	(.038)
4	Other cereals	Agriculture	0.274	(.057)****	0.00600	(.048)	0.0830	(.037)*
6	Soybeans	Agriculture	-0.0830	(.108)	-0.225	(.2)	-0.329	(.228)
7	Other oilseeds (excluding peanuts)	Agriculture	-0.0150	(.02)	-0.222	(.03)****	-0.143	(.028)****
9	Raw and refined sugar and sugar crops	Agriculture	-0.0140	(.09)	-0.370	(.169)*	-0.191	(.078)*
10	Other sweeteners	Agriculture	0.113	(.048)*	-0.161	(.056)**	-0.0920	(.052)
11	Pulses and legumes, dried, preserved	Agriculture	0.118	(.033)***	-0.142	(.065)*	-0.0740	(.052)
12	Fresh fruit	Agriculture	0.0670	(.016)****	-0.128	(.025)****	-0.0700	(.019)***
13	Fresh vegetables	Agriculture	0.0540	(.018)**	-0.108	(.02)****	-0.0410	(.018)*
16	Nuts	Agriculture	0.0830	(.036)*	0.00600	(.039)	0.0290	(.035)
19	Eggs	Agriculture	0.0920	(.025)***	-0.0600	(.038)	-0.0620	(.037)
20	Other meats, livestock products, and live animals	Agriculture	0.0970	(.046)*	-0.133	(.068)	-0.171	(.066)**
21	Cocoa and cocoa products	Agriculture	-0.193	(.202)	0.615	(.361)	0.621	(.346)
22	Beverages, nec	Agriculture	0.0580	(.095)	-0.145	(.093)	-0.218	(.117)
24	Tobacco leaves and cigarettes	Agriculture	0.0110	(.044)	-0.0170	(.109)	-0.0320	(.085)
25	Spices	Agriculture	0.132	(.039)***	-0.137	(.059)*	-0.130	(.049)**
26	Other agricultural products, nec	Agriculture	0.0250	(.025)	-0.126	(.037)**	-0.119	(.035)***
29	Mining of hard coal	Mining and Energy	-0.00500	(.118)	-0.0650	(.201)	-0.101	(.216)
30	Mining of lignite	Mining and Energy	0.0770	(.328)	-0.563	(.33)	-0.563	(.293)
31	Extraction crude petroleum and natural gas	Mining and Energy	0.153	(.06)*	-0.357	(.097)***	-0.0980	(.075)
32	Mining of iron ores	Mining and Energy	0.297	(.134)*	0.0130	(.196)	0.579	(.186)**
33	Other mining and quarrying	Mining and Energy	-0.145	(.029)****	0.0330	(.047)	-0.0720	(.044)
34	Electricity production, collection, and distribution	Mining and Energy	0.282	(.091)**	0.483	(.161)**	0.364	(.074)****
35	Gas production and distribution	Mining and Energy	1.447	(.345)****	2.126	(.438)****	1.083	(.382)**
36	Processing/preserving of meat	Manufacturing	0.0360	(.012)**	-0.144	(.025)****	-0.0530	(.02)**
37	Processing/preserving of fish	Manufacturing	0.0780	(.02)****	-0.0190	(.033)	0.00400	(.026)
38	Processing/preserving of fruit & vegetables	Manufacturing	0.0670	(.014)****	-0.0710	(.017)****	-0.0520	(.014)***
39	Vegetable and animal oils and fats	Manufacturing	-0.0210	(.031)	-0.186	(.033)****	-0.134	(.034)****
40	Dairy products	Manufacturing	0.0390	(.01)***	-0.0510	(.014)***	-0.0130	(.013)
41	Grain mill products	Manufacturing	0.147	(.027)****	-0.0990	(.026)**	-0.0220	(.021)
42	Starches and starch products	Manufacturing	0.102	(.024)****	-0.142	(.037)**	-0.0390	(.022)
43	Prepared animal feeds	Manufacturing	0.0900	(.012)****	-0.0830	(.022)**	0.0210	(.017)
44	Bakery products	Manufacturing	0.104	(.015)****	-0.0980	(.014)****	-0.0120	(.015)
45	Sugar	Manufacturing	0.0790	(.03)**	-0.105	(.06)	-0.0320	(.056)
46	Cocoa chocolate and sugar confectionery	Manufacturing	0.131	(.02)****	-0.219	(.017)****	-0.0470	(.017)**
47	Macaroni noodles & similar products	Manufacturing	0.0950	(.032)**	-0.282	(.051)****	-0.0520	(.045)
48	Other food products n.e.c.	Manufacturing	0.0850	(.011)****	-0.149	(.018)****	-0.0440	(.014)**
49	Distilling rectifying & blending of spirits	Manufacturing	0.116	(.029)****	-0.255	(.067)**	-0.131	(.04)**
50	Wines	Manufacturing	0.188	(.039)****	0.274	(.067)****	0.268	(.06)****
51	Malt liquors and malt	Manufacturing	0.0590	(.037)	-0.165	(.031)****	-0.103	(.021)****
52	Soft drinks; mineral waters	Manufacturing	0.119	(.021)****	-0.143	(.028)****	-0.0480	(.024)*
53	Tobacco products	Manufacturing	0.108	(.059)	-0.185	(.078)*	-0.0710	(.068)
54	Textile fibre preparation; textile weaving	Manufacturing	0.111	(.023)****	0.138	(.033)****	0.111	(.028)****
55	Made-up textile articles except apparel	Manufacturing	0.101	(.02)****	-0.197	(.031)****	-0.107	(.021)****
56	Carpets and rugs	Manufacturing	-0.0350	(.023)	-0.0740	(.022)**	-0.108	(.023)****
57	Cordage rope twine and netting	Manufacturing	0.119	(.02)****	0.112	(.028)****	0.0630	(.022)**
58	Other textiles n.e.c.	Manufacturing	0.0770	(.014)****	-0.0230	(.021)	-0.0160	(.02)
59	Knitted and crocheted fabrics and articles	Manufacturing	0.188	(.033)****	0.109	(.069)	0.0940	(.048)*
60	Wearing apparel except fur apparel	Manufacturing	-0.0380	(.025)	-0.259	(.042)****	-0.153	(.029)****
61	Dressing & dyeing of fur; processing of fur	Manufacturing	0.191	(.054)**	0.144	(.068)*	0.0780	(.053)
62	Tanning and dressing of leather	Manufacturing	0.232	(.048)****	0.197	(.067)**	0.198	(.048)****
63	Luggage handbags etc.; saddlery & harness	Manufacturing	0.0110	(.05)	-0.212	(.072)**	-0.121	(.049)*
64	Footwear	Manufacturing	0.127	(.029)****	-0.0490	(.037)	-0.0120	(.027)
65	Sawmilling and planing of wood	Manufacturing	0.00400	(.044)	0.0250	(.038)	-0.0620	(.03)**
66	Veneer sheets plywood particle board etc.	Manufacturing	0.0870	(.016)****	0.0940	(.033)**	0.0930	(.027)***
67	Builders' carpentry and joinery	Manufacturing	0.0260	(.016)	-0.00600	(.024)	0.00500	(.022)
68	Wooden containers	Manufacturing	0.00100	(.018)	-0.00800	(.034)	0.0390	(.03)
69	Other wood products; articles of cork/straw	Manufacturing	0.0600	(.02)**	0.0180	(.05)	0.0430	(.05)
70	Pulp paper and paperboard	Manufacturing	0.0930	(.016)****	-0.0520	(.02)**	-0.0380	(.02)
71	Corrugated paper and paperboard	Manufacturing	0.0450	(.011)****	-0.0490	(.016)**	-0.0100	(.015)
72	Other articles of paper and paperboard	Manufacturing	0.0330	(.016)*	0.0510	(.02)*	0.0590	(.018)***
73	Publishing of books and other publications	Manufacturing	0.0190	(.031)	0.0230	(.029)	0.00700	(.022)
74	Publishing of newspapers journals etc.	Manufacturing	-0.0710	(.041)	-0.0100	(.039)	-0.0270	(.03)
75	Publishing of recorded media	Manufacturing	0.0950	(.072)	0.463	(.097)****	0.137	(.071)
76	Other publishing	Manufacturing	-0.113	(.062)	-0.0810	(.069)	-0.0640	(.06)
77	Printing	Manufacturing	0.0410	(.014)**	-0.154	(.038)****	-0.0810	(.03)**
78	Service activities related to printing	Manufacturing	-0.173	(.049)**	-0.411	(.066)****	-0.333	(.062)****
79	Coke oven products	Manufacturing	-0.0930	(.161)	-0.0890	(.2)	-0.0890	(.192)
80	Refined petroleum products	Manufacturing	0.0630	(.025)*	-0.102	(.038)**	-0.00700	(.038)
81	Processing of nuclear fuel	Manufacturing	0.861	(.187)****	0.966	(.182)****	0.685	(.177)***
82	Basic chemicals except fertilizers	Manufacturing	0.00200	(.014)	0.0600	(.021)**	0.0130	(.022)
83	Fertilizers and nitrogen compounds	Manufacturing	0.0560	(.033)	0.0400	(.045)	0.0410	(.048)
84	Plastics in primary forms; synthetic rubber	Manufacturing	0.0890	(.023)***	-0.137	(.03)****	-0.0640	(.025)*
85	Pesticides and other agro-chemical products	Manufacturing	0.0670	(.04)	-0.141	(.063)*	-0.0850	(.058)

Continued on next page

86	Paints varnishes printing ink and mastics	Manufacturing	0.0880	(.014)****	-0.169	(.018)****	-0.0830	(.016)****
87	Pharmaceuticals medicinal chemicals etc.	Manufacturing	0.0820	(.025)***	-0.248	(.053)****	-0.109	(.047)*
88	Soap cleaning & cosmetic preparations	Manufacturing	0.205	(.022)****	-0.217	(.022)****	-0.0550	(.015)***
89	Other chemical products n.e.c.	Manufacturing	0.0960	(.026)***	-0.00500	(.047)	-0.0510	(.046)
90	Man-made fibres	Manufacturing	0.107	(.028)***	-0.0100	(.048)	-0.0180	(.037)
91	Rubber tyres and tubes	Manufacturing	0.0660	(.033)*	-0.238	(.036)****	-0.0870	(.038)*
92	Other rubber products	Manufacturing	0.115	(.013)****	-0.0720	(.017)****	0.00500	(.012)
93	Plastic products	Manufacturing	0.0450	(.007)****	-0.0900	(.012)****	-0.0400	(.011)***
94	Glass and glass products	Manufacturing	0.102	(.013)****	0.00900	(.02)	0.0330	(.016)*
95	Pottery china and earthenware	Manufacturing	0.0920	(.023)****	-0.124	(.027)****	-0.0640	(.018)***
96	Refractory ceramic products	Manufacturing	0.0840	(.022)***	0.0170	(.024)	0.0130	(.024)
97	Struct.non-refractory clay; ceramic products	Manufacturing	0.0330	(.024)	-0.0480	(.027)	-0.0520	(.024)*
98	Cement lime and plaster	Manufacturing	0.0450	(.03)	-0.0960	(.046)*	-0.0430	(.036)
99	Articles of concrete cement and plaster	Manufacturing	0.0640	(.015)****	-0.0700	(.028)*	-0.00800	(.021)
100	Cutting shaping & finishing of stone	Manufacturing	0.0340	(.019)	0.0980	(.031)**	0.0690	(.028)*
101	Other non-metallic mineral products n.e.c.	Manufacturing	0.0780	(.011)****	0.0140	(.014)	0.0340	(.013)**
102	Basic iron and steel	Manufacturing	0.0660	(.011)****	-0.0790	(.023)***	-0.0640	(.018)***
103	Basic precious and non-ferrous metals	Manufacturing	0.0460	(.023)*	-0.0870	(.047)	-0.0810	(.031)**
104	Structural metal products	Manufacturing	0.00100	(.012)	-0.101	(.018)****	-0.0790	(.014)****
105	Tanks reservoirs and containers of metal	Manufacturing	0.0860	(.017)****	-0.270	(.029)****	-0.0780	(.018)****
106	Steam generators	Manufacturing	-0.135	(.047)**	-0.165	(.054)**	-0.0850	(.06)
107	Cutlery hand tools and general hardware	Manufacturing	0.0880	(.015)****	-0.281	(.042)****	-0.116	(.022)****
108	Other fabricated metal products n.e.c.	Manufacturing	0.0970	(.018)****	0.0490	(.045)	0.0600	(.03)*
109	Engines & turbines (not for transport equipment)	Manufacturing	-0.0380	(.02)	0.183	(.057)**	0.105	(.04)**
110	Pumps compressors taps and valves	Manufacturing	0.0860	(.039)*	-0.234	(.051)****	-0.113	(.04)**
111	Bearings gears gearing & driving elements	Manufacturing	0.150	(.021)****	-0.00100	(.05)	0.0340	(.031)
112	Ovens furnaces and furnace burners	Manufacturing	-0.0160	(.052)	0.163	(.067)*	-0.00500	(.057)
113	Lifting and handling equipment	Manufacturing	0.0730	(.012)****	-0.0960	(.024)****	-0.0680	(.017)****
114	Other general purpose machinery	Manufacturing	0.0400	(.012)***	-0.123	(.02)****	-0.0720	(.019)***
115	Agricultural and forestry machinery	Manufacturing	0.0430	(.017)*	-0.161	(.018)****	-0.112	(.018)****
116	Machine tools	Manufacturing	0.0640	(.026)*	0.0500	(.032)	-0.0240	(.016)
117	Machinery for metallurgy	Manufacturing	-0.0850	(.028)**	0.241	(.072)**	-0.0690	(.06)
118	Machinery for mining & construction	Manufacturing	0.0480	(.02)*	0.0820	(.025)**	0.0280	(.024)
119	Food/beverage/tobacco processing machinery	Manufacturing	0.107	(.019)****	-0.00900	(.026)	0.0570	(.024)*
120	Machinery for textile apparel and leather	Manufacturing	0.100	(.029)***	0.110	(.038)**	0.0100	(.03)
121	Weapons and ammunition	Manufacturing	-0.0170	(.034)	-0.324	(.058)****	-0.0920	(.051)
122	Other special purpose machinery	Manufacturing	0.0310	(.018)	-0.293	(.041)****	-0.159	(.024)****
123	Domestic appliances n.e.c.	Manufacturing	0.169	(.022)****	0.0690	(.023)**	0.0620	(.023)**
124	Office accounting and computing machinery	Manufacturing	-0.0620	(.038)	-0.129	(.064)*	-0.0870	(.036)*
125	Electric motors generators and transformers	Manufacturing	0.140	(.024)****	0.484	(.03)****	0.375	(.036)****
126	Electricity distribution & control apparatus	Manufacturing	0.188	(.029)****	0.129	(.026)****	0.0420	(.02)*
127	Insulated wire and cable	Manufacturing	0.120	(.016)****	-0.00100	(.031)	0.0770	(.02)***
128	Accumulators primary cells and batteries	Manufacturing	0.171	(.043)****	0.0960	(.067)	0.175	(.056)**
129	Lighting equipment and electric lamps	Manufacturing	0.0460	(.018)*	0.133	(.033)****	0.0800	(.025)**
130	Other electrical equipment n.e.c.	Manufacturing	-0.126	(.069)	-0.415	(.069)****	-0.265	(.042)****
131	Electronic valves tubes etc.	Manufacturing	0.0580	(.045)	0.270	(.04)****	0.147	(.038)***
132	TV/radio transmitters; line comm. apparatus	Manufacturing	0.143	(.056)*	0.240	(.077)**	0.227	(.054)****
133	TV and radio receivers and associated goods	Manufacturing	-0.0570	(.099)	0.0870	(.083)	0.0410	(.062)
134	Medical surgical and orthopaedic equipment	Manufacturing	0.0730	(.02)***	0.0360	(.024)	0.0100	(.024)
135	Measuring/testing/navigating appliances etc.	Manufacturing	0.0450	(.027)	-0.0910	(.026)***	-0.0620	(.023)**
136	Optical instruments & photographic equipment	Manufacturing	0.0110	(.072)	-0.0310	(.06)	0.0880	(.055)
137	Watches and clocks	Manufacturing	0.133	(.073)	0.264	(.097)**	0.145	(.079)
138	Motor vehicles	Manufacturing	0.0830	(.028)**	-0.0530	(.031)	-0.0300	(.033)
139	Automobile bodies trailers & semi-trailers	Manufacturing	0.168	(.026)****	-0.00100	(.025)	0.0120	(.025)
140	Parts/accessories for automobiles	Manufacturing	0.0250	(.017)	0.100	(.038)**	0.0710	(.031)*
141	Building and repairing of ships	Manufacturing	-0.0710	(.064)	0.0170	(.07)	-0.0130	(.07)
142	Building/repairing of pleasure/sport. boats	Manufacturing	0.0580	(.037)	-0.0180	(.066)	-0.0740	(.049)
143	Railway/tramway locomotives & rolling stock	Manufacturing	-0.0310	(.037)	-0.111	(.039)**	-0.0240	(.035)
144	Aircraft and spacecraft	Manufacturing	0.0810	(.037)*	-0.120	(.045)**	-0.0280	(.026)
145	Motorcycles	Manufacturing	0.149	(.049)**	-0.0280	(.058)	-0.0200	(.039)
146	Bicycles and invalid carriages	Manufacturing	0.195	(.036)****	0.00800	(.06)	0.0250	(.044)
147	Other transport equipment n.e.c.	Manufacturing	0.181	(.052)***	0.0390	(.037)	0.0410	(.035)
148	Furniture	Manufacturing	0.0460	(.013)***	-0.155	(.019)****	-0.0570	(.013)****
149	Jewellery and related articles	Manufacturing	0.248	(.065)***	0.00500	(.068)	0.0900	(.052)
150	Musical instruments	Manufacturing	-0.0260	(.033)	-0.162	(.05)**	-0.185	(.043)****
151	Sports goods	Manufacturing	-0.0420	(.028)	-0.0100	(.027)	-0.0200	(.022)
152	Games and toys	Manufacturing	0.128	(.074)	0.134	(.11)	0.108	(.071)
153	Other manufacturing n.e.c.	Manufacturing	0.0780	(.032)*	-0.0810	(.041)*	-0.0500	(.036)
156	Transport	Services	0.0110	(.012)	-0.0140	(.016)	-0.0200	(.019)
157	Travel	Services	-0.00800	(.018)	-0.394	(.04)****	-0.710	(.051)****
158	Construction	Services	0.138	(.046)**	0.0810	(.059)	0.157	(.069)*
159	Insurance and pension services	Services	-0.0540	(.034)	-0.234	(.056)****	-0.327	(.068)****
160	Financial services	Services	-0.0520	(.029)	-0.637	(.037)****	-0.714	(.045)****
162	Telecom, computer, information services	Services	0.0190	(.018)	-0.465	(.037)****	-0.445	(.045)****
163	Other business services	Services	0.0370	(.018)*	-0.335	(.034)****	-0.396	(.041)****
164	Heritage and recreational services	Services	0.235	(.075)**	-1.382	(.084)****	-0.430	(.058)****
165	Health services	Services	0.0690	(.049)	-0.156	(.096)	-0.472	(.085)****
166	Education services	Services	0.0190	(.023)	-0.279	(.037)****	-0.282	(.052)****
169	Trade-related services	Services	0.0610	(.052)	-0.0260	(.077)	-0.206	(.105)*
170	Other personal services	Services	0.431	(.063)****	-1.062	(.069)****	-0.332	(.04)****

Notes: This table reports estimates of the impact of geopolitical risk on international trade, which are obtained from specification (1). Columns (1)-(3) list the industry IDs, the industry descriptions, and the broad sector descriptions from the ITPD-E. Columns (4) and (5) report the GPR estimates together with their corresponding standard errors, respectively, based on the 25% GPR index. Columns (6) and (7) report the GPR estimates together with their corresponding standard errors, respectively, based on the 10% GPR index. Finally, Columns (8) and (9) report the GPR estimates together with their corresponding standard errors, respectively, based on the maximum GPR index. All estimates are obtained with the PPML estimator, three-way fixed effects, and the full set of control variables from specification (1). The standard errors are clustered by country pair. See text for further details.