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# WORKING PAPER

**Sanctions and services trade: the neglected  
dimension**

Anirudh Shingal

European University Institute  
**Robert Schuman Centre for Advanced Studies**  
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## **Abstract**

Existing literature focuses on the effect of sanctions on merchandise trade and investment, neglecting the services trade dimension. We contribute by using the recent Global Sanctions Database (Felbermayr et al. 2020a,b) to examine the impact of sanctions on bilateral services trade in a structural gravity framework. Our results reveal considerable heterogeneity in sanctions-impact across sectors and depending upon sanctions-type. Trade sanctions are found to reduce sender-target services trade while military, financial and travel sanctions are found to enhance it. This positive effect contrasts with the largely insignificant effect of non-trade sanctions on merchandise trade in the literature and is driven by insurance, financial, ICT, business and maintenance and repair services. Our findings allude to the use of specific services to counter adverse effects of sanctions-imposition or for sanctions-busting, suggesting a review of the instrument's design, coverage and implementation to meet intended objectives.

## **Keywords**

Sanctions; services trade; heterogeneity; GSDB; structural gravity

## **Note from the Author**

The data that support the findings of this study are available from the corresponding author upon reasonable request.

# 1 Introduction

Extant work largely estimates an adverse impact of economic sanctions on merchandise trade (Caruso, 2003; Hufbauer and Oegg, 2003; Yang et al. 2004; Afesorgbor, 2019; Crozet and Hinz, 2020; Felbermayr et al. 2020a,b; Dai et al. 2021) providing more mixed evidence for investment (Biglaiser and Lektzian, 2011; Lektzian and Biglaiser, 2013; Barry and Kleinberg, 2015; Mirkina, 2018; Le and Bach, 2022). However, the effect of sanctions on services trade is largely neglected<sup>1</sup>. This omission is non-trivial given that services account for a quarter of international trade on a BOP basis and their contribution nearly doubles on a value-added basis (WTO, 2019).

We bridge this research gap by looking explicitly at the impact of sanctions on bilateral services trade using the Global Sanctions Database (GSDB; Felbermayr et al. 2020a,b). There are different ways in which sanctions can affect services trade depending both on the type of sanction imposed<sup>2</sup> and the services sector impacted. For instance, financial sanctions are likely to affect financial intermediation services directly by making it difficult, if not impossible, for commercial banks in target countries to conduct international money transfers, commercial lending, opening and operating nostril accounts<sup>3</sup>, issuing letters of credit, etc. (Nzaro et al. 2011) and by raising costs Dizaji (2021); in extreme cases, financial sanctions may extend to non-banking payment platforms thereby directly impeding trade in Mode<sup>4</sup> 1-intensive sectors such as transport, ICT, finance, insurance and business services<sup>5</sup>.

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<sup>1</sup>To the best of our knowledge, only Besedes et al. (2022) examine the impact of (financial) sanctions imposed by Germany on its merchandise and services trade as well as financial flows but this analysis is not cross-country and hence, not strictly undertaken in a structural gravity framework. Hufbauer and Oegg (2003) use the share of gravity-estimated loss in merchandise exports in total US exports to “predict” the loss in services exports. Korhonen et al. (2018) provide stylized facts to illustrate the impact of sanctions and counter-sanctions on the Russian economy, including its services trade, without any causal inference. Specific to financial services, Nzaro et al. (2011) qualitatively assess the impact of economic sanctions on financial services offered by Zimbabwean commercial banks while Dizaji (2021) uses stochastic frontier analysis to study the impact of sanctions-intensity on bank costs in Iran. In other work, Besedes et al. (2017, 2021) and Efung et al. (2018) examine the impact of financial sanctions on financial flows and performance of both financial and non-financial firms. Meanwhile, there is a much larger literature on the impact of sanctions on tourism (a component of travel services trade) but this is mostly descriptive and/or qualitative, based on case studies (see Hall and Seyfi, 2021 for an excellent review).

<sup>2</sup>Annex A provides illustrations of sanctions directly or indirectly affecting services trade.

<sup>3</sup>Nostril accounts are foreign currency deposits of a local bank held with the corresponding bank in another country usually in the currency of that country.

<sup>4</sup>According to the WTO General Agreement on Trade in Services or GATS, services are traded via four “modes of supply”. Mode 1 (“cross-border trade”) covers the whole range remotely-delivered services e.g. BPO services. Mode 2 (“consumption abroad”) refers to services transacted by the consumer in the economy of the supplier e.g. tourism. Mode 3 (“commercial presence”) refers to foreign affiliate activities in the host economy e.g. foreign bank operations. Mode 4 (“movement of natural persons”) categorizes services delivered by suppliers in the economy of the consumer e.g. onsite software programmers.

<sup>5</sup>Sectoral mode-intensiveness is based on the distribution of global services trade by mode of supply in

Travel sanctions directly restrict trade in Mode 2-intensive sectors such as travel (tourism and business), health and education services; as well as the movement of independent professionals, contractual service suppliers, and intra-corporate transferees in Mode 3- and Mode 4-intensive sectors such as construction, distribution and business services. Sanctions can also impact travel services trade indirectly by affecting the tourism sector’s access to equipment and technology, leading to depleted infrastructure in the long-term as well as a negative destination image (Hall and Seyfi, 2021).

Meanwhile, trade sanctions normally target (specific) goods only but given the increasing global trend towards “servicification” (Lodefalk, 2016), services used as inputs in manufacturing activity (such as transport, logistics, distribution, manufacturing services on physical inputs, and maintenance & repair) are expected to be indirectly impacted by the adverse effects of trade sanctions on merchandise trade. Transport and logistics services are also complementary to military assistance activities and hence likely to be adversely affected by military sanctions. At the same time, sanctions can also generate positive effects on services trade due to the need for enhanced insurance, financial, business (accountancy, legal), maintenance and ICT services to negotiate adverse fallouts from sanctions imposition or even as a coping response (Hall and Seyfi, 2021). Thus, the net impact of sanctions on total services trade is ambiguous and at best, an empirical question.

We examine this question in the framework of a structural gravity model following recent literature (Anderson et al. 2018; Felbermayr et al. 2020a,b). Our analysis reveals considerable heterogeneity in sanctions-impact across sectors and depending upon sanctions-type. Trade sanctions are found to reduce sender-target services trade while military, financial and travel sanctions are found to enhance it. This positive effect, driven by insurance, financial, ICT, business and maintenance and repair services, contrasts with the largely insignificant effect of non-trade sanctions on merchandise trade (Felbermayr et al. 2020a,b). While this is an unexpected finding likely alluding to use of specific services to counter adverse fallouts of sanctions-imposition, it also suggests that services may provide targeted countries avenues for sanctions-busting. Thus senders may need to revisit the design, coverage and implementation of the instrument to improve its effectiveness.

The paper is structured as follows. Section 2 discusses the empirical model. Section 3 describes the results from estimation. Section 4 concludes.

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the WTO TISMOS (Trade in Services by Mode of Supply) database.

## 2 Empirical model

We estimate a structural gravity model to examine the effect of sanctions on services trade. This approach is consistent with a wide class of models, including Armington (Armington, 1969), monopolistic competition (Krugman, 1979), heterogeneous firms under monopolistic competition (Melitz, 2003), and heterogeneous firms under perfect competition (Bernard et al. 2003). The baseline estimating equations take the following form:

$$X_{ijt}^k = \exp[\beta_1 EIA_{ijt} + \beta_2 S_{ijt} + \mu_{it} + \gamma_{jt} + \chi_{ij} + \psi_{ji}] + \epsilon_{ijt} \quad (1)$$

$$M_{ijt}^k = \exp[\beta_1 EIA_{ijt} + \beta_2 S_{ijt} + \mu_{it} + \gamma_{jt} + \chi_{ij} + \psi_{ji}] + \epsilon_{ijt} \quad (2)$$

where  $X_{ijt}^k$  denotes the nominal value of services exports from country  $i$  to  $j$  in sector  $k$  at time  $t$ ;  $M_{ijt}^k$  denotes the nominal value of services imports into country  $i$  from  $j$ ;  $EIA_{ijt}$  is a binary dummy denoting membership of a bilateral preferential trade agreement in goods (notified under Article XXIV of the GATT) or services (notified under Article V of the GATS) constructed using information from WTO's RTA-IS database;  $S_{ijt}$  is the sanctions vector comprising binary dummy variables for the imposition of arms, financial, military, trade, travel and other sanctions; and  $\epsilon_{ijt}$  is the error term.

The use of three-way fixed effects ( $\mu_{it}, \gamma_{jt}, \chi_{ij}$ ) mitigates endogeneity-related concerns in estimation (Baier et al. 2014). The time-varying exporter and importer fixed effects also account for multilateral resistance terms in estimation (Anderson and van Wincoop, 2003) and for time-varying exporter- and importer-specific observables and unobservables likely to influence bilateral services trade. Similarly, pairwise fixed effects absorb both observable and unobservable time-invariant bilateral determinants of services trade costs. The use of asymmetric bilateral fixed effects ( $\chi_{ij}, \psi_{ji}$ ) is consistent both with recent literature to account for asymmetric trade costs (Baier et al. 2019) and the bi-directional imposition of sanctions in the GSDB (Dai et al. 2021). All equations are estimated using the Pseudo-Poisson Maximum Likelihood estimator (PPML; Silva and Tenreyro, 2006) which accounts for both zero trade flows in sectoral services data and for heteroskedasticity-related concerns.

Bilateral services trade data are sourced from ITPD-E or the International Trade and Production Database for Estimation (Borchert et al. 2021) for total services and its broad constituent sectors (according to the EBOPS 2010 classification) over 2000-2019 for a sample of 42 reporting and 63 partner countries. These are merged with the GSDB (Felbermayr et al. 2020a,b), which provides detailed data on sanctions between 210 sender and 186 tar-



get countries over 1950-2019. Given the scant availability of sector-specific bilateral services trade data and relatively limited overlap with the GSDB, the effective sample<sup>6</sup> is small and varies considerably by sector.

### 3 Results

Table 1 reports results from estimating equations (1) and (2) with data organized in a panel in continuous years over 2000-2019 given recent concerns about randomly excluding observations (Egger et al. 2022)<sup>7</sup>. Trade sanctions are found to reduce senders' bilateral services exports and imports with treatment effects of -17.3% and -42.6%<sup>8</sup>, respectively. Military and travel sanctions have statistically strong positive effects on senders' bilateral services exports and imports, respectively, while financial sanctions are found to enhance sender-target services trade in either direction (albeit weakly).

The results provide evidence for heterogeneity in sanctions-impact along multiple dimensions. For instance, military sanctions have more positive effects on senders' bilateral exports across sectors (maintenance & repair, travel, ICT, education and trade-related services) while the same holds for travel and other sanctions vis-a-vis senders' bilateral imports (in maintenance & repair, ICT, business and government services). Financial and trade sanctions tend to reduce senders' bilateral exports and imports in different sectors (financial, business, government versus transport, travel for financial sanctions; transport, insurance, IP versus maintenance & repair, construction, financial, ICT for trade sanctions). Meanwhile, arms sanctions are associated with countervailing effects on services trade across sectors in either direction. In other results, membership of preferential trade agreements has a more positive effect on bilateral services exports across sectors than for imports.

<Insert Tables 1-2 here>

Some of these results can be explained as follows. Military assistance is accompanied by transport and logistics; both sectors report a decline in trade emanating from military sanctions. At the same time, a ban on military assistance may activate trade in other sectors such as maintenance & repair, insurance, financial, ICT and business services to negotiate the adverse fallouts; military sanctions are found to enhance trade in all these sectors. A

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<sup>6</sup>The countries are reported in Annex A.

<sup>7</sup>In sensitivity analysis, we also organized the data at five-year intervals from 2000 onwards to allow for adjustment of trade flows to sanctions imposition (cf. Cheng and Wall, 2005; Piermartini and Yotov, 2016); the positive effect of non-trade sanctions on services trade prevailed in those results.

<sup>8</sup>Calculated as  $[exp(\widehat{coefficient}) - 1] * 100$ .

similar explanation may account for the other-sanctions-induced rise in senders' bilateral services imports in maintenance & repair, financial, ICT and trade-related services. Travel sanctions directly impede travel services exports but they also enhance imports of ICT and business services, likely as a response/work-around strategy; notably, both sectors are Mode 1-intensive and hence, these services are deliverable remotely. Interestingly, financial sanctions reduce exports of financial services but enhance their imports, suggesting that the coverage and/or implementation of the instrument may be weak.

Further exploiting the granularity of the GSDB with respect to trade sanctions, we find their adverse effects to be driven by partially-imposed import and bilateral sanctions (see Table 2)<sup>9</sup>. This contrasts with the findings on merchandise trade (Felbermayr et al. 2020a,b) where the effects are driven by complete bilateral sanctions.

## 4 Conclusion

Extant work largely focuses on the impact of economic sanctions on merchandise trade and investment. We are the first to provide a cross-country, cross-sector analysis of the sanctions-services trade relationship in a structural gravity framework following recent advancements in estimation. In a significant departure from existing findings, we find non-trade sanctions to increase sender-target bilateral services trade. This alludes to the use of specific services to counter adverse fallouts or for sanctions-busting. Future work could explore the channels through which non-trade sanctions have a positive impact on services trade. It would also be useful to re-visit the sanctions-services trade relationship using a more comprehensive database that also covers Mode 3 trade<sup>10</sup>.

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<sup>9</sup>Interestingly, complete and partial bilateral sanctions enhance bilateral services exports in these results.

<sup>10</sup>Mode 3 accounts for nearly 60% of global services trade but is excluded from BOP data that forms the basis of most services trade databases including the ITPD-E.

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## Data citation

*Bilateral services trade data: ITPD-E*

⇒Borchert, I., M. Larch, S. Shikher and Y. Yotov (2021). The International Trade and Production Database for Estimation (ITPD-E). *International Economics*, 166: 140–166.

*Sanctions data: GSDB*

⇒Felbermayr, G., A. Kirilakha, C. Syropoulos, E. Yalcin and Y. Yotov (2020a). The global sanctions data base. *European Economic Review*, Vol. 129(C).

⇒Felbermayr, G., C. Syropoulos, E. Yalcin and Y. Yotov (2020b). On the Heterogeneous Effects of Sanctions on Trade and Welfare: Evidence from the Sanctions on Iran and a New Database. School of Economics Working Paper Series 2020-4, LeBow College of Business, Drexel University.

*Modal shares in total services exports/imports: WTO TISMOS*

⇒Available at [https://www.wto.org/english/res\\_e/statis\\_e/trade\\_datasets\\_e.htm](https://www.wto.org/english/res_e/statis_e/trade_datasets_e.htm)

## **Annex A: Examples of sanctions directly or indirectly affecting services trade**

*Trade sanction:* US proclamation 3447 against Cuba in 1962 prohibiting “the importation into the United States of all goods of Cuban origin and all goods imported from or through Cuba”.

*Travel sanction:* Armenia-Azerbaijan border closure in 1989 due to the Nagorno-Karabakh War.

*Financial sanction:* UN Resolution 1737 against Iran in 2006 preventing “the provision to Iran of any technical assistance or training, financial assistance, investment, brokering or other services, and the transfer of financial resources or services, related to the supply, sale, transfer, manufacture or use of prohibited items, materials, equipment, goods and technology”.

*Military sanction:* Swiss sanction against Somalia from May, 2009 prohibiting the “supply, sale and transit of armaments of all kinds, including weapons and ammunition, military vehicles and equipment, paramilitary equipment and accessories and spare parts” as well as the “provision of services of all kinds, including financing, Mediation services and technical training relating to the supply, sale, transit, production, maintenance and use of goods...and to military activities in Somalia”.

*Other sanction:* Turkish sanction against Cyprus from April, 1987 prohibiting Cyprus flagged vessels to call at Turkish ports, which was extended in May, 1997 to cover “vessels under a foreign flag (of any nationality) sailing to Turkish ports directly from any Cypriot port under the effective control of the Republic of Cyprus (Limassol, Larnaca), or against vessels of any nationality related to the Republic of Cyprus in terms of ownership or ship management.”

## **Annex B: Country sample (ITPDE-GSDB merged data)**

*Reporters (senders):* Albania, Austria, Azerbaijan, Belgium, Bulgaria, Belarus, Canada, Switzerland, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Croatia, Hungary, Ireland, Iceland, Italy, Japan, Kyrgyz Republic, Lithuania, Luxembourg, Latvia, Malta, The Netherlands, Norway, New Zealand, Pakistan, Poland, Portugal, Romania, Russia, Serbia, Slovak Republic, Slovenia, Sweden, Turkiye, United States.

*Partners (targets):* Afghanistan, Albania, Austria, Azerbaijan, Belgium, Bulgaria, Bosnia & Herzegovina, Belarus, Canada, China, Cote d’Ivoire, Colombia, Cyprus, Czech Republic, Germany, Denmark, Egypt, Spain, Estonia, Finland, France, United Kingdom, Greece, Honduras, Croatia, Hungary, India, Ireland, Iran, Iraq, Israel, Italy, Kenya, Lebanon, Liberia, Libya, Lithuania, Luxembourg, Latvia, Moldova, Macedonia, Malta, Montenegro, Nigeria, The Netherlands, The Philippines, Poland, North Korea, Portugal, Romania, Russia, Sudan, Sierra Leone, Serbia, Slovak Republic, Slovenia, Sweden, Syria, Thailand, Ukraine, United States, Venezuela, Yemen.

**Table 1: Impact of economic sanctions by type on bilateral services trade across sectors (PPML estimates; ITPD-E, 2000-2019)**

<b>EXPORTS</b>															
VARIABLES	(1) $X^{SA}_{ijt}$	(2) $X^{SB}_{ijt}$	(3) $X^{SC}_{ijt}$	(4) $X^{SD}_{ijt}$	(5) $X^{SE}_{ijt}$	(6) $X^{SF}_{ijt}$	(7) $X^{SG}_{ijt}$	(8) $X^{SH}_{ijt}$	(9) $X^{SI}_{ijt}$	(10) $X^{SJ}_{ijt}$	(11) $X^{SK21}_{ijt}$	(12) $X^{SK22}_{ijt}$	(13) $X^{SL}_{ijt}$	(14) $X^{TRS}_{ijt}$	(15) $X^S_{ijt}$
ARMS <sub>ijt</sub>			0.637** (0.283)	0.211 (0.283)	2.342 (0.000)	0.497 (0.409)	-1.634*** (0.529)	0.459 (0.354)	-0.583* (0.341)	-1.076 (0.770)	1.182 (0.000)	0.282 (0.600)	0.961*** (0.332)	0.612 (0.810)	-0.087 (0.146)
MILITARY <sub>ijt</sub>	2.277 (0.000)	4.558*** (0.548)	-0.660*** (0.131)	1.083*** (0.134)	2.031 (0.000)	1.090 (0.724)	0.327 (0.308)	0.545 (0.353)	0.677*** (0.249)	-0.221 (0.176)	0.552 (0.000)	1.478*** (0.379)	-0.068 (0.309)	1.352*** (0.516)	0.654*** (0.109)
FINANCIAL <sub>ijt</sub>			0.314** (0.141)	0.478 (0.573)	3.033 (0.000)	3.976*** (0.924)	-1.829*** (0.384)	0.211 (0.315)	0.273 (0.454)	-1.559* (0.896)	21.698 (0.000)		-0.727** (0.336)		0.183* (0.101)
TRADE <sub>ijt</sub>	-370.035 (0.000)	-0.156 (0.154)	-0.227** (0.092)	-0.717 (0.569)	-1.151 (0.000)	-3.622*** (0.838)	1.551*** (0.360)	-0.492* (0.280)	-0.015 (0.441)	1.327 (0.898)	-21.575 (0.000)	0.698*** (0.153)	0.400 (0.248)	0.976** (0.399)	-0.190** (0.074)
TRAVEL <sub>ijt</sub>	-19.507 (0.000)	0.213 (0.165)	0.172 (0.105)	-0.174** (0.071)	0.613 (0.000)	0.250 (0.598)	-0.119 (0.114)	0.295 (0.315)	-0.469** (0.190)	-0.067 (0.152)	-0.248 (0.000)	0.023 (0.172)	-0.190 (0.188)	-0.398 (0.444)	-0.107 (0.115)
OTHER <sub>ijt</sub>			-0.347 (0.386)	0.135 (0.641)	26.624 (0.000)	2.462* (1.360)	-0.054 (0.314)	-1.348 (1.668)	0.158 (0.411)	-0.455 (0.354)		-0.285 (0.415)	-0.413 (0.587)	-0.416 (0.507)	0.156 (0.279)
EIA <sub>ijt</sub>			2.421*** (0.260)	0.850*** (0.316)	0.644 (0.000)	1.735*** (0.649)	-0.269 (0.383)	0.123 (0.297)	-0.288 (0.339)	0.228 (0.217)	2.635 (0.000)	1.458*** (0.541)	1.686*** (0.361)	0.360 (0.731)	1.015*** (0.158)
Observations	722	1,480	4,152	3,078	2,170	2,603	2,936	2,705	3,626	3,694	1,340	1,894	2,333	2,014	4,055
Pseudo-R2	0.950	0.971	0.987	0.989	0.926	0.974	0.991	0.994	0.980	0.989	0.917	0.996	0.960	0.968	0.997
<b>IMPORTS</b>															
VARIABLES	(1) $M^{SA}_{ijt}$	(2) $M^{SB}_{ijt}$	(3) $M^{SC}_{ijt}$	(4) $M^{SD}_{ijt}$	(5) $M^{SE}_{ijt}$	(6) $M^{SF}_{ijt}$	(7) $M^{SG}_{ijt}$	(8) $M^{SH}_{ijt}$	(9) $M^{SI}_{ijt}$	(10) $M^{SJ}_{ijt}$	(11) $M^{SK21}_{ijt}$	(12) $M^{SK22}_{ijt}$	(13) $M^{SL}_{ijt}$	(14) $M^{TRS}_{ijt}$	(15) $M^S_{ijt}$
ARMS <sub>ijt</sub>			0.164 (0.271)	-0.226 (0.366)	1.411 (0.898)	-2.415*** (0.672)	-1.235** (0.487)	-0.038 (0.000)	0.907** (0.438)	-0.370 (0.544)	1.207 (0.000)	-0.287 (0.000)	1.054** (0.424)	-7.317*** (1.402)	0.222 (0.197)
MILITARY <sub>ijt</sub>	3.670 (0.000)	3.433*** (0.596)	-0.348*** (0.124)	0.210 (0.199)	1.400 (0.992)	1.325*** (0.465)	2.584*** (0.494)	-0.780 (0.000)	0.149 (0.238)	0.497** (0.208)	1.662 (0.000)	1.325 (0.000)	-1.866*** (0.307)	-0.774* (0.423)	-0.110 (0.089)
FINANCIAL <sub>ijt</sub>			-0.471** (0.235)	-1.034** (0.471)	3.027*** (0.957)	1.162 (0.794)	2.075*** (0.377)	-1.142 (0.000)	0.121 (0.462)	0.166 (0.748)	11.363 (0.000)		0.401 (0.405)		0.189* (0.106)
TRADE <sub>ijt</sub>	-21.752 (0.000)	-0.837*** (0.256)	0.179 (0.163)	0.576 (0.465)	-5.991*** (0.920)	0.274 (0.710)	-1.215*** (0.331)	0.447 (0.000)	-1.351*** (0.444)	-0.186 (0.751)	-10.548 (0.000)	0.277 (0.000)	0.714*** (0.205)	-0.389 (0.241)	-0.556*** (0.082)
TRAVEL <sub>ijt</sub>	-1.021 (0.000)	1.805*** (0.456)	0.438 (0.270)	0.287 (0.213)	-0.494 (0.523)	-0.465 (0.379)	-1.137*** (0.292)	0.515 (0.000)	0.566*** (0.122)	0.387*** (0.102)	1.006 (0.000)	-0.737 (0.000)	0.710* (0.370)	-0.371 (0.317)	0.220*** (0.082)
OTHER <sub>ijt</sub>		2.791** (1.145)	1.179 (0.999)	-1.026* (0.554)		1.612** (0.689)	0.836 (0.936)	-33.030 (0.000)	3.570*** (0.815)	0.372 (0.278)	-18.018 (0.000)	-19.699 (0.000)	0.719 (0.710)	1.778** (0.859)	0.245 (0.209)
EIA <sub>ijt</sub>			3.246*** (0.328)	0.426 (0.354)	0.293 (1.234)	-0.128 (0.822)	-1.835*** (0.659)	-0.261 (0.000)	0.251 (0.261)	-0.199 (0.228)	2.266 (0.000)	-2.233 (0.000)	0.150 (0.710)	0.572 (0.883)	0.865*** (0.141)
Observations	1,078	1,453	4,432	3,179	2,338	2,827	2,933	2,441	3,647	3,582	1,185	1,701	2,530	2,295	3,978
Pseudo-R2	0.962	0.972	0.987	0.978	0.945	0.988	0.993	0.993	0.982	0.990	0.762	0.973	0.983	0.939	0.996

Note: The dependent variables are sectoral bilateral services exports and imports in levels in the top and bottom panels, respectively. All specifications include sender-year, target-year, sender-target and target-sender fixed effects. Robust standard errors, clustered by dyad-year, reported in parentheses. Legend: SA - Manufacturing services on physical inputs; SB- Main tenance and repair services; SC - Transport services; SD - Travel services; SE - Construction services; SF - Insurance and pension services; SG - Financial services; SH - Charges for the use of intellectual property; SI - Telecommunications, computer and information services; SJ - Other business services; SK21 - Health services; SK22 - Education services; SL - Govt. services; TRS - Trade-related services; S - Total services. Significance levels: \*10%, \*\*5%, \*\*\*1%.

**Table 2: Disaggregating the impact of trade sanctions on bilateral services trade (PPML estimates; ITPD-E, 2000-2019)**

<b>EXPORTS</b>															
VARIABLES	(1) $X_{ijt}^{SA}$	(2) $X_{ijt}^{SB}$	(3) $X_{ijt}^{SC}$	(4) $X_{ijt}^{SD}$	(5) $X_{ijt}^{SE}$	(6) $X_{ijt}^{SF}$	(7) $X_{ijt}^{SG}$	(8) $X_{ijt}^{SH}$	(9) $X_{ijt}^{SI}$	(10) $X_{ijt}^{SJ}$	(11) $X_{ijt}^{SK21}$	(12) $X_{ijt}^{SK22}$	(13) $X_{ijt}^{SL}$	(14) $X_{ijt}^{TRS}$	(15) $X_{ijt}^S$
ARMS <sub>ijt</sub>			0.981 (0.793)	0.211 (0.283)	2.342 (0.000)	0.421 (0.000)	-1.844 (0.000)	0.325 (0.000)	-0.472 (0.000)	-1.077 (0.000)	1.182 (0.000)	0.282 (0.600)	0.936 (0.000)	0.612 (0.810)	-0.009 (0.142)
MILITARY <sub>ijt</sub>	2.288 (0.000)	4.558*** (0.548)	-0.613*** (0.132)	1.083*** (0.134)	2.031 (0.000)	1.090 (0.000)	0.320 (0.000)	0.540 (0.000)	0.686 (0.000)	-0.217 (0.000)	0.552 (0.000)	1.478*** (0.379)	-0.057 (0.000)	1.352*** (0.516)	0.671*** (0.111)
FINANCIAL <sub>ijt</sub>			-0.510 (0.570)		14.751 (0.000)	-7.820 (0.000)	7.436 (0.000)	-11.999 (0.000)	-14.862 (0.000)	7.813 (0.000)				-17.199 (0.000)	-1.997*** (0.392)
T_COMPLETE_BILATERAL <sub>ijt</sub>			3.376*** (0.867)			19.523 (0.000)	-5.563 (0.000)		17.453 (0.000)	-4.290 (0.000)		-1.860** (0.845)	15.593 (0.000)		1.878*** (0.509)
T_PARTIAL_BILATERAL <sub>ijt</sub>	-17.734 (0.000)	-0.156 (0.154)	0.592 (0.569)	-0.239*** (0.081)	-12.868 (0.000)	8.175 (0.000)	-7.714 (0.000)	11.718 (0.000)	15.120 (0.000)	-8.046 (0.000)	0.123 (0.153)	0.698*** (0.000)	16.882 (0.000)	0.976** (0.399)	1.994*** (0.391)
T_PARTIAL_EXPORT <sub>ijt</sub>			-0.857 (0.838)	-0.717 (0.569)	535.146 (0.000)	-1.857 (0.000)	16.022 (0.000)	-0.167 (0.000)	-0.193 (0.000)	1.323 (0.000)	-23.652 (0.000)		0.570 (0.000)		-0.378 (0.333)
T_PARTIAL_IMPORT <sub>ijt</sub>			-0.244*** (0.093)		-1.151 (0.000)	-3.646 (0.000)	1.475 (0.000)	-0.504 (0.000)	0.063 (0.000)				0.244 (0.000)		-0.214*** (0.074)
TRAVEL <sub>ijt</sub>	-18.756 (0.000)	0.213 (0.165)	0.124 (0.099)	-0.174** (0.071)	0.613 (0.000)	0.246 (0.000)	-0.119 (0.000)	0.293 (0.000)	-0.469 (0.000)	-0.067 (0.000)	-0.248 (0.000)	0.023 (0.172)	-0.140 (0.000)	-0.398 (0.444)	-0.109 (0.115)
OTHER <sub>ijt</sub>			-0.835*** (0.294)	0.135 (0.641)	20.543 (0.000)	2.458 (0.000)	-0.054 (0.000)	-1.349 (0.000)	0.158 (0.000)	-0.455 (0.000)		-0.285 (0.415)	0.094 (0.000)	-0.416 (0.507)	0.166 (0.292)
EIA <sub>ijt</sub>			2.439*** (0.271)	0.850*** (0.316)	0.644 (0.000)	1.690 (0.000)	-0.339 (0.000)	0.077 (0.000)	-0.271 (0.000)	0.226 (0.000)	2.635 (0.000)	1.458*** (0.541)	1.695 (0.000)	0.360 (0.731)	1.025*** (0.154)
Observations	722	1,480	4,152	3,078	2,170	2,603	2,936	2,705	3,626	3,694	1,340	1,894	2,486	2,014	4,055
Pseudo-R2	0.950	0.971	0.987	0.989	0.926	0.974	0.991	0.994	0.980	0.989	0.917	0.996	0.961	0.968	0.997
<b>IMPORTS</b>															
VARIABLES	(1) $M_{ijt}^{SA}$	(2) $M_{ijt}^{SB}$	(3) $M_{ijt}^{SC}$	(4) $M_{ijt}^{SD}$	(5) $M_{ijt}^{SE}$	(6) $M_{ijt}^{SF}$	(7) $M_{ijt}^{SG}$	(8) $M_{ijt}^{SH}$	(9) $M_{ijt}^{SI}$	(10) $M_{ijt}^{SJ}$	(11) $M_{ijt}^{SK21}$	(12) $M_{ijt}^{SK22}$	(13) $M_{ijt}^{SL}$	(14) $M_{ijt}^{TRS}$	(15) $M_{ijt}^S$
ARMS <sub>ijt</sub>			0.272 (0.314)	-0.226 (0.366)	1.280 (0.000)	-3.257 (0.000)	-1.466 (0.000)	-1.477 (0.000)	0.243 (0.000)	-0.378 (0.547)	1.207 (0.000)	-0.287 (0.000)	1.515 (0.000)	-7.317*** (1.402)	-0.267** (0.136)
MILITARY <sub>ijt</sub>	3.670 (0.000)	3.433*** (0.596)	-0.329*** (0.122)	0.210 (0.199)	0.920 (0.000)	1.289 (0.000)	2.565 (0.000)	-0.806 (0.000)	0.104 (0.000)	0.494** (0.207)	1.662 (0.000)	1.325 (0.000)	-1.839 (0.000)	-0.774* (0.423)	-0.131 (0.091)
FINANCIAL <sub>ijt</sub>			-0.080 (0.836)		7.446 (0.000)	-11.983 (0.000)	7.541 (0.000)	-12.951 (0.000)	-12.998 (0.000)					-12.900 (0.000)	0.520 (0.366)
T_COMPLETE_BILATERAL <sub>ijt</sub>			6.204*** (1.849)			25.102 (0.000)	-6.740 (0.000)	14.850 (0.000)	16.405 (0.000)	1.387 (1.054)		0.554 (0.000)			0.315 (0.551)
T_PARTIAL_BILATERAL <sub>ijt</sub>	-21.752 (0.000)	-0.837*** (0.256)	-0.215 (0.834)	-0.458*** (0.148)	-10.670 (0.000)	13.420 (0.000)	-6.680 (0.000)	12.259 (0.000)	11.769 (0.000)	-0.019 (0.093)	0.815 (0.000)	0.277 (0.000)	14.017 (0.000)	-0.389 (0.241)	-0.886** (0.366)
T_PARTIAL_EXPORT <sub>ijt</sub>			-0.449 (0.592)	0.576 (0.465)	3.612 (0.000)	2.427 (0.000)	-0.832 (0.000)	3.361 (0.000)	-0.564 (0.000)	-0.172 (0.752)	-8.637 (0.000)		-0.221 (0.000)		0.226 (0.340)
T_PARTIAL_IMPORT <sub>ijt</sub>			0.236* (0.133)		-5.409 (0.000)	0.078 (0.000)	-1.306 (0.000)	0.430 (0.000)	-1.871 (0.000)				0.734 (0.000)		-0.592*** (0.084)
TRAVEL <sub>ijt</sub>	-1.021 (0.000)	1.805*** (0.456)	0.412 (0.274)	0.287 (0.213)	-0.502 (0.000)	-0.477 (0.000)	-1.137 (0.000)	0.516 (0.000)	0.568 (0.102)	0.386*** (0.000)	1.006 (0.000)	-0.737 (0.000)	0.701 (0.000)	-0.371 (0.317)	0.221*** (0.082)
OTHER <sub>ijt</sub>		2.791** (1.145)	0.141 (0.819)	-1.026* (0.554)		1.600 (0.000)	0.836 (0.000)	-32.446 (0.000)	3.571 (0.000)	0.372 (0.278)	-16.018 (0.000)	-19.699 (0.000)	0.711 (0.000)	1.778** (0.859)	0.204 (0.201)
EIA <sub>ijt</sub>			3.237*** (0.328)	0.426 (0.354)	0.531 (0.000)	-0.505 (0.000)	-1.887 (0.000)	-0.445 (0.000)	0.176 (0.000)	-0.204 (0.225)	2.266 (0.000)	-2.233 (0.000)	0.199 (0.000)	0.572 (0.883)	0.736*** (0.148)
Observations	1,078	1,453	4,432	3,179	2,338	2,827	2,933	2,441	3,647	3,626	1,185	1,701	2,413	2,295	3,978
Pseudo-R2	0.962	0.972	0.987	0.978	0.946	0.988	0.993	0.993	0.982	0.990	0.762	0.973	0.982	0.939	0.996

Note: The dependent variables are sectoral bilateral services exports and imports in levels in the top and bottom panels, respectively. All specifications include sender-year, target-year, sender-target & target-sender fixed effects. Robust standard errors, clustered by dyad-year, reported in parentheses. The most disaggregated breakdown of trade sanctions is used in these results; complete-export and complete-import sanctions are dropped due to collinearity. Sector descriptions as reported in Table 1. Significance levels: \*10%, \*\*5%, \*\*\*1%.



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