

Trade Sanctions

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October 18, 2024 @ 3rd Kiel-CEPR Conference on Geoeconomics

Motivation

- Fragmentation of global trade (Gopinath, 2024)
 - Brexit, US-China trade/chip war, ...
 - sanctions on/decoupling from Russia
 - future conflict with China over Taiwan?

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 - One reason to impose them is to punish a country and induce a change in political behavior
 - Another is to disrupt production and military supply chains
 - **No direct evidence on the latter**; unclear given possibility of evasion

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- So far, mixed evidence on the effectiveness of these sanctions
- This paper: comprehensive analysis combining granular data on trade transactions, firm balance sheets, domestic railway shipments, and government procurement

Do sanctions on the imports of Russia have an economic effect?

This paper: Results preview

(1) Did sanctions restrict imports to the target country?

(2) Did sanctions disrupt production in the target country?

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(2) Did sanctions disrupt production in the target country?

- Russian firms exposed to import sanctions **see a 15% decline in output**
- The decline is present also for manufacturing, high-tech, and military-related firms

- The effect of sanctions:

- model-based counterfactuals: Bachmann et al. (2022), Borin et al. (2023), Chowdhry et al. (2024), Corsetti et al. (2024), Crozet and Hinz (2020), Du and Wang (2022), Flach et al. (2024), Ghironi et al. (2024), Hausmann et al. (2024), Souza et al. (2024), ...
 - empirical evidence: Ahn and Ludema (2020), Babina et al. (2023), Chupilkin et al. (2023), Draca et al. (2019), Felbermayr et al. (2020), Görg et al. (2024), Haidar (2017), Huynh et al. (2023), Kohl et al. (2024), Kim et al. (2023), Nigmatulina (2021), Teti et al. (2024), ...
- ⇒ largest sanctions ever + comprehensive data + full causal chain, incl. impact on firm output

- Geopolitical threats and international trade:

- Eaton and Engers (1992), Thoenig (2023), Becko (2024), Clayton et al. (2024), Liu and Yang (2024), Martin et al. (2008a,b), Korovkin and Makarin (2023), Korovkin et al. (2024), ...
- ⇒ even partially enforced sanctions can disrupt production within the target country and potentially weaken its military capabilities

Outline

Data

Sanctions: Descriptive Facts

The Impact of Trade Sanctions on Trade Flows

The Impact of Trade Sanctions on Russian Firms

Conclusion

Data

We obtain, clean, and merge **five** datasets

- **Sanctions:** product codes, countries, timing
- *All* Russian **international trade transactions**, 2012–2023
- *Almost all* **financial statements** of Russian firms, 2012–2022
- *All* Russian **railroad shipments**, 2012–2023
- *All* Russian **government procurement contracts** (30% of GDP)

We obtain, clean, and merge **five** datasets → **comprehensive analysis**

- **Sanctions:** product codes, countries, timing
 - **variation for identification**
- *All* Russian **international trade transactions**, 2012–2023
 - **first stage + every mechanism of adjustment: re-routing, substitution, etc.**
- *Almost all* **financial statements** of Russian firms, 2012–2022
 - **overall firm-level performance**
- *All* Russian **railroad shipments**, 2012–2023
 - **propagation through domestic economy**
- *All* Russian **government procurement contracts** (30% of GDP)
 - **the impact on military supply chains**

Trade Data

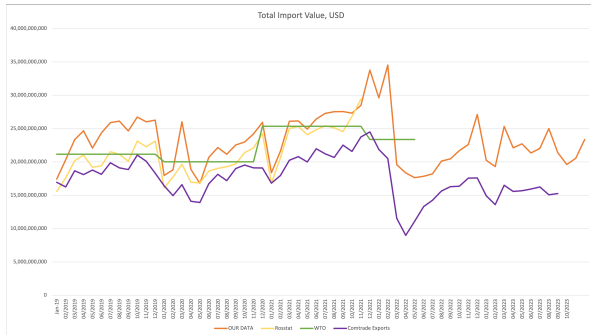
- *All* Russian **international trade transactions**, 2012–2023
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Sanctions: Descriptive Facts

Sanctions: Countries

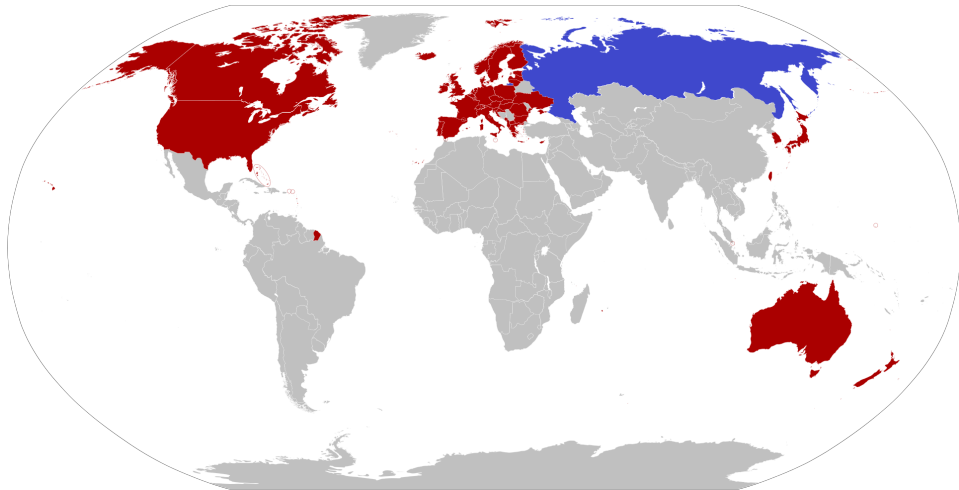
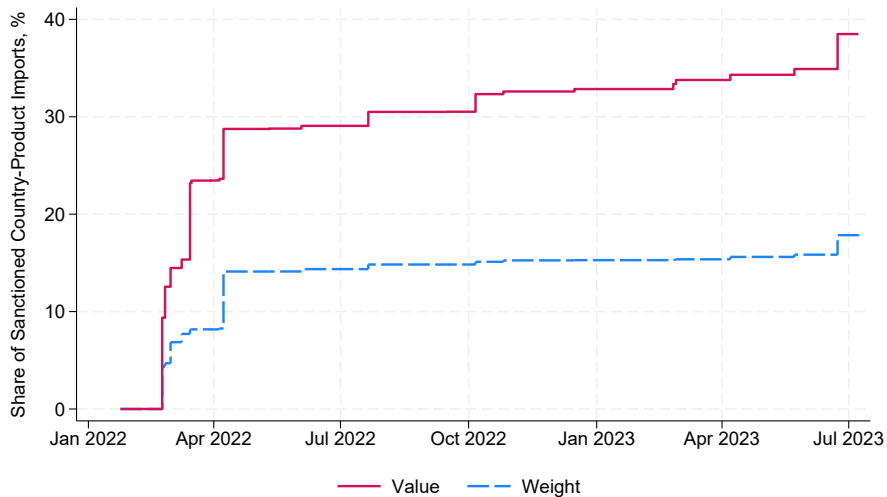


Figure 1: “Unfriendly countries” according to the Russian government

Sanctions: Volume and Timing

▸ Products

▸ Product Shares

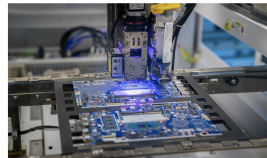


Anecdotes: How Were Sanctions Circumvented?

- **Re-routing:** “Azint Elektronik, an Istanbul-based electronics supplier, was hit by US sanctions this month for allegedly [making shipments to Russia containing high-priority goods](#) [subject to US, UK EU and Japan export controls] such as electronic integrated circuits.” (FT)
- **Substitution:** “A leader in low-end microchip manufacturing and the world’s top chip importer, [China is now the foremost supplier of semiconductors](#) to Russia.” (Carnegie)
- **Re-labelling:** “After testing, the French authorities concluded that the company (Ommic) was [downplaying the chips’ true capabilities](#). These items — intended to be sent to Russia via China — were of much higher specification than the company was claiming.” (FT)

Chinese chipmakers see rising inquiries from Russia

By GT staff reporters
Published Apr 15, 2022 10:35 PM



A chip manufacture machine Photo: YCD

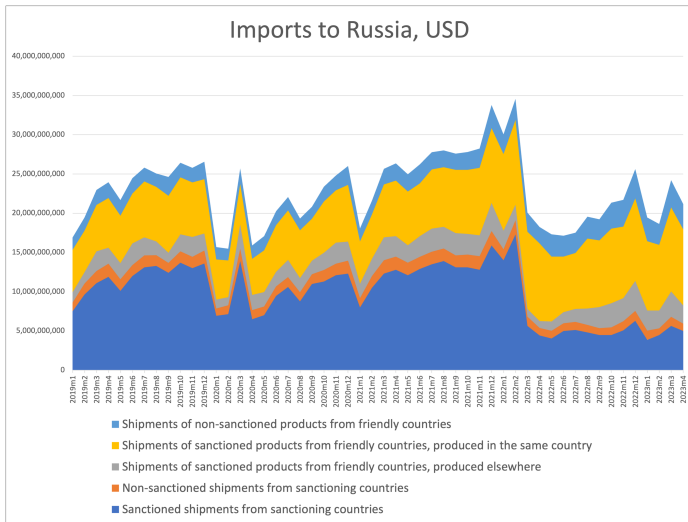
🚨 BREAKING - 🇫🇷 [#French](#) tech firm [#Ommic](#)'s, known for making electronic semiconductor chips, is now in trouble as its boss, Marc R, faces charges for sending microchips to [#China](#).

1/n



5:59 PM · Jul 28, 2023 · 3,017 Views

Raw data: Breakdown by Flow Type



► Example: Semiconductors

► By Country

The Impact of Trade Sanctions on Trade Flows

Questions

1. Did sanctions reduce the sanctioned country-product trade flows?
2. Did rerouting and substitution alleviate this decline? To what extent?

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2. Did rerouting and substitution alleviate this decline? To what extent?

Product-Country-Level Regression

- Difference-in-differences specification comparing sanctioned and nonsanctioned product-country imports to Russia before and after the war's onset:

$$y_{gct} = \tau_{gc} + \eta_{gt} + \omega_{ct} + \theta_t \times \text{Sanctioned}_{gc} + \zeta_{gct} \quad (1)$$

- y_{gct} : (log-)trade flows (total value or weight) from country c to Russia of a 10-digit product code g in quarter t ;
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- The standard errors are clustered at the product-country level.

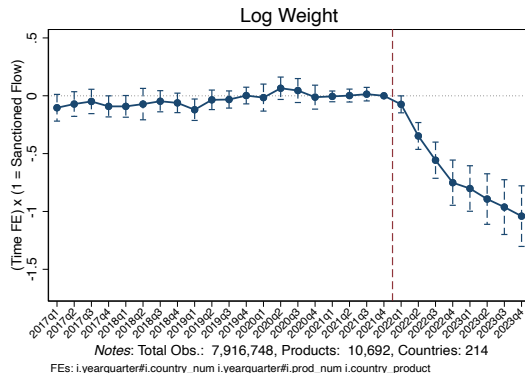
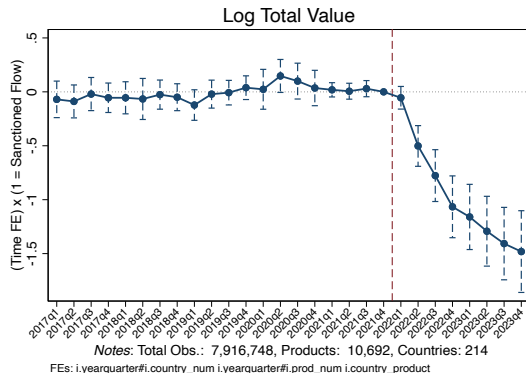
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- **Identifying assumptions: parallel trends (+ SUTVA)**

Product-Country-Level Estimates



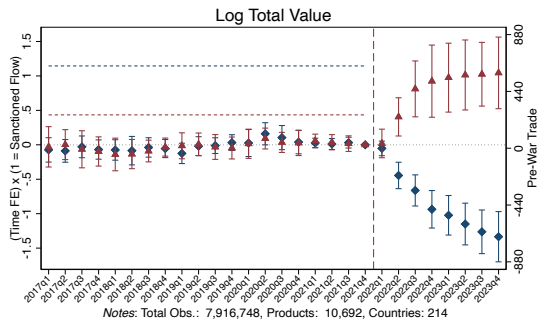
► Monthly Estimates

► Staggered DiD

Questions

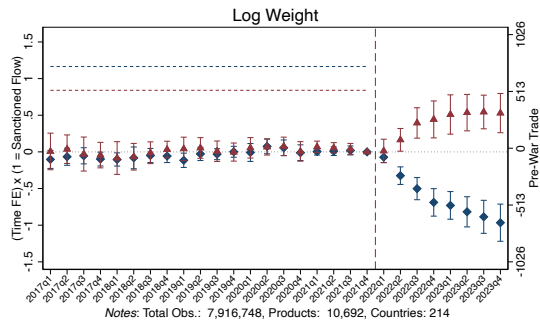
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2. **Did rerouting and substitution alleviate this decline? To what extent?**

Product-Country-Level: Rerouting and Substitution



◆ Sanct. products, enemies ▲ Sanct. products, friends
- - - Enemies total import, pre-2022 - - - Friends total import, pre-2022

FEs: i:yearquarter#i.country_num i:yearquarter#i.prod_num i.country_product



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► Only Sanctioning Countries

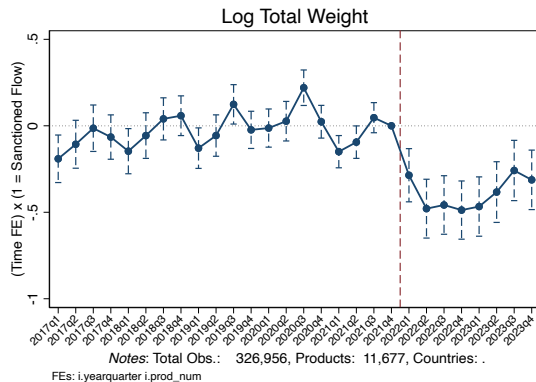
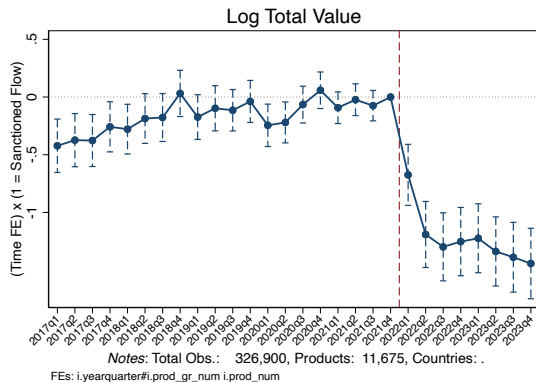
Did Rerouting & Substitution Fully Offset the Decline in Trade of Sanctioned Products? Product-Level Regression

- Difference-in-differences specification comparing imports of ever-sanctioned and never-sanctioned products before and after the war's onset:

$$y_{gt} = \tau_g + \eta_t + \theta_t \times \textit{Sanctioned}_g + \zeta_{gt}. \quad (2)$$

- y_{gt} : total (log-)trade imports of a 10-digit product code g at quarter t ;
- $\textit{Sanctioned}_g$: indicator for whether product g was ever sanctioned by any country;
- τ_g and η_t are the 10-digit-product-code and quarter fixed effects;
- Standard errors are clustered at the product level.

Product-Level Regression: Sanctioned vs Non-Sanctioned Products



► 3-Digit Product Code × Quarter FE

► Continuous Exposure

► Unit Values

The Impact of Trade Sanctions on Russian Firms

Questions

1. Impact on firms that imported sanctioned products prewar?
2. Impact on firms in military supply chains?

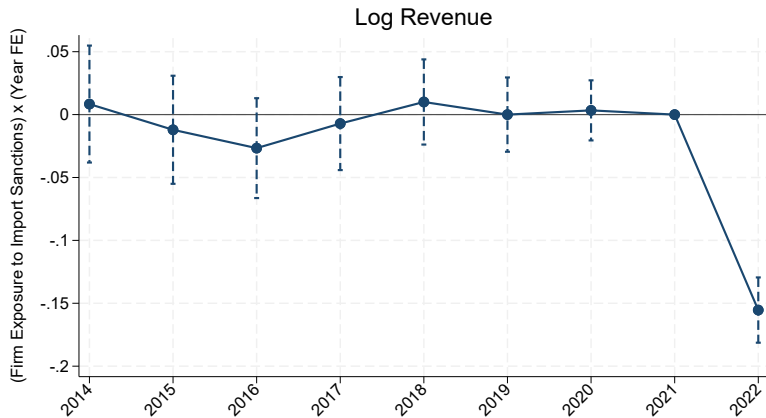
Impact on Firm-level Outcomes

- Difference-in-differences specification comparing firms with higher versus lower prewar exposure to sanctions of imports to Russia, before and after war's onset:

$$y_{ft} = \mu_f + \alpha_{it} + \beta_t \times Exposure_f + \delta_t \times \mathbb{1}\{ever\ imported\} + \epsilon_{ft}$$

- y_{ft} : firm f revenues or other firm-level outcomes at year t
- $Exposure_f$: share of firm f 's to-be-sanctioned prewar imports to its total prewar imports
- μ_f : firm fixed effects
- α_{it} : industry-by-year fixed effects
- $\delta_t \times \mathbb{1}\{ever\ imported\}$: importer-status-by-year fixed effects

Impact on Affected Firms' Sales



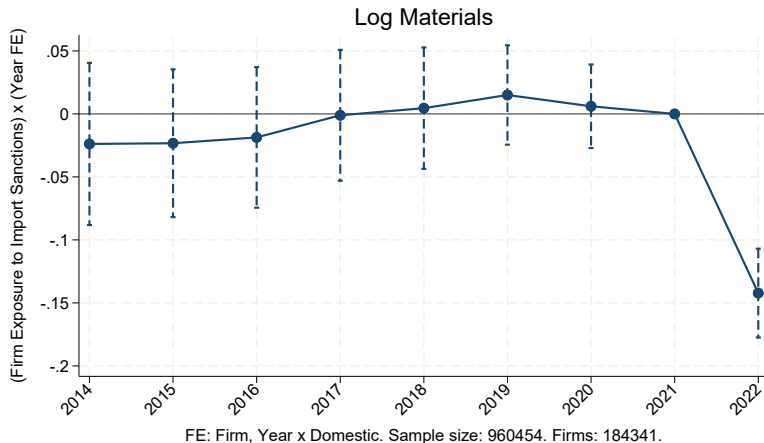
FE: Firm, Year x Domestic. Sample size: 3527336. Firms: 573446.

► Wholesale & Transportation

► By Industry

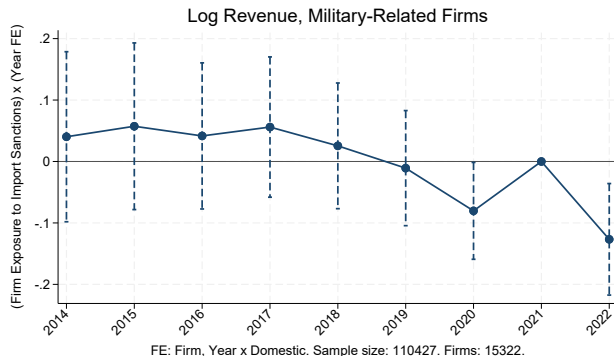
► Table

Impact on Affected Firms' Material Costs



Impact on Affected Firms' Sales: Military Supply Chain Only ► Table

- Using public government procurement data, we can identify buyers or sellers of military procurement contracts.
- Military contracts are defined as featuring any of the following key words “Гособоронзаказ”, “ГОЗ”, “Оборон”, “Вооружение”

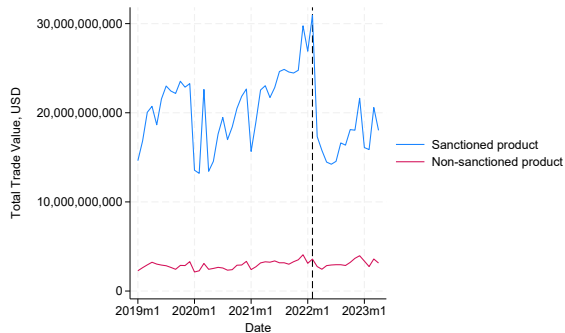
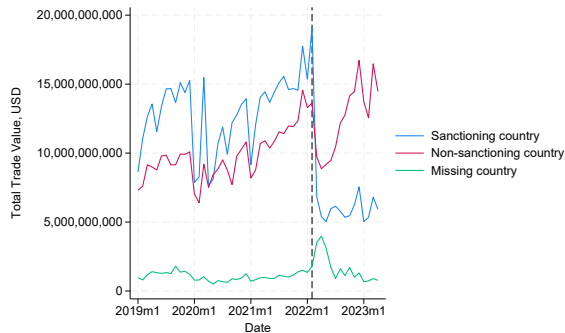


Conclusion

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- Study the largest sanction campaign in history—sanctions against Russia post-2022
- We combine several comprehensive datasets to provide the most detailed analysis of the impact of trade sanctions on the Russian economy. Our findings:
 - Large negative response to sanctioned trade flows
 - Substitution and rerouting are not enough to offset the decline in sanctioned flows
 - Firms exposed to sanctions on their imports experience a reduction in output
 - The impact is present also for manufacturing, high-tech, and military-adjacent firms

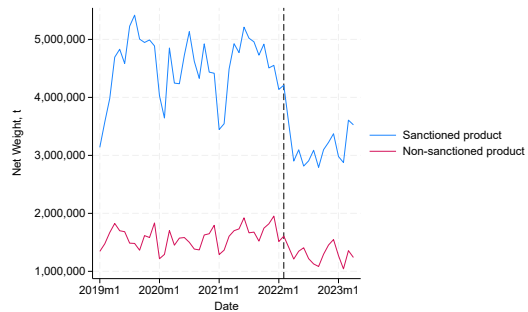
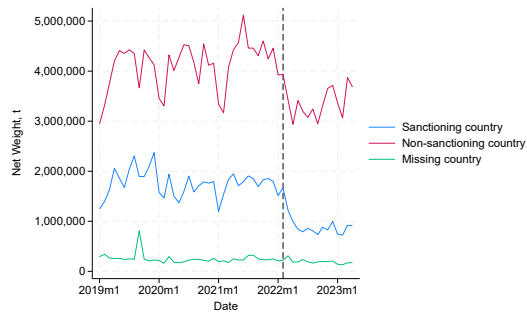
Raw Data: Country Substitution Is Stronger Than Product Substitution

[◀ Back](#)

Notes: Country = Country of shipment

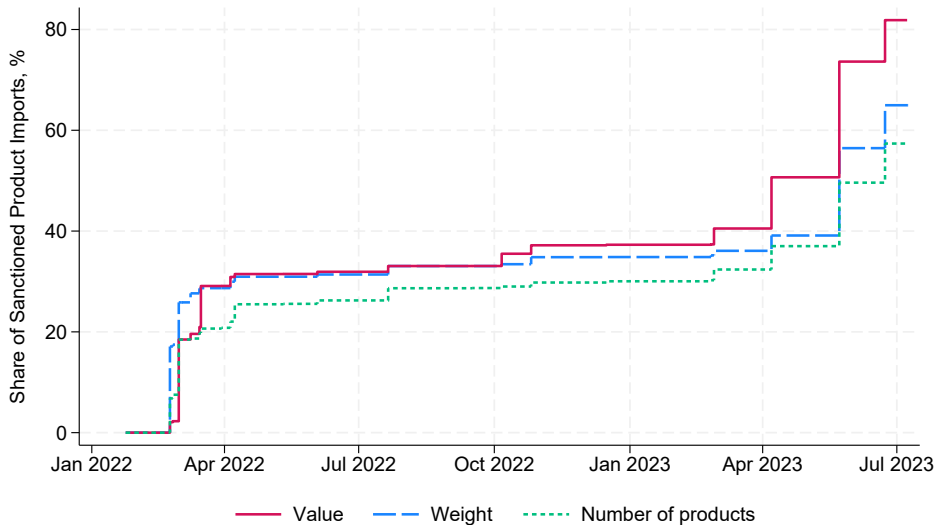
Raw Data: Total Weight

[◀ back](#)

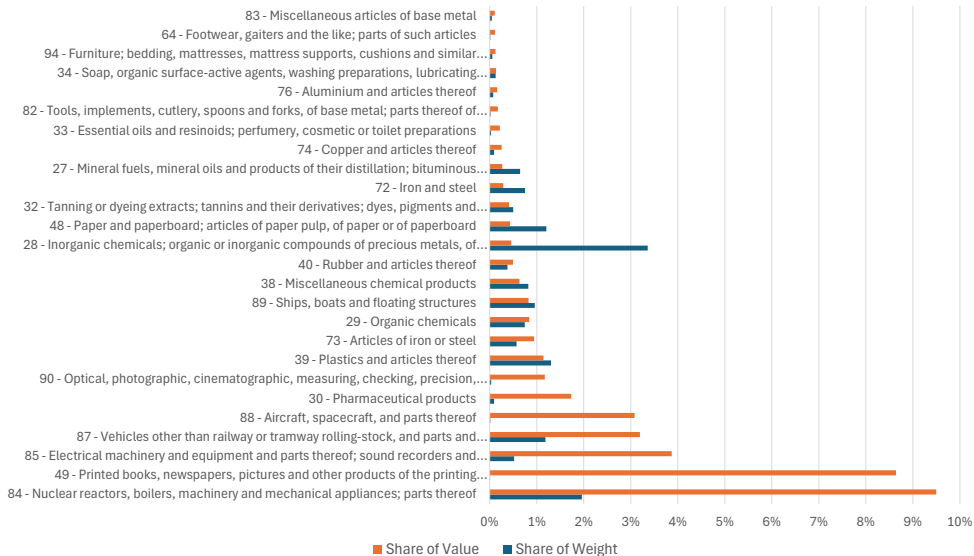


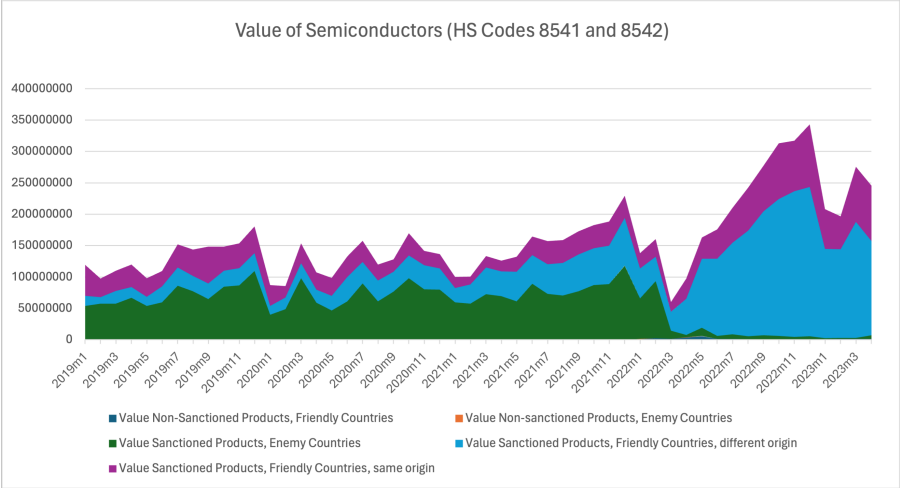
Share of Sanctioned Products

◀ back



Most Sanctioned Products (HS2), in Prewar Shares

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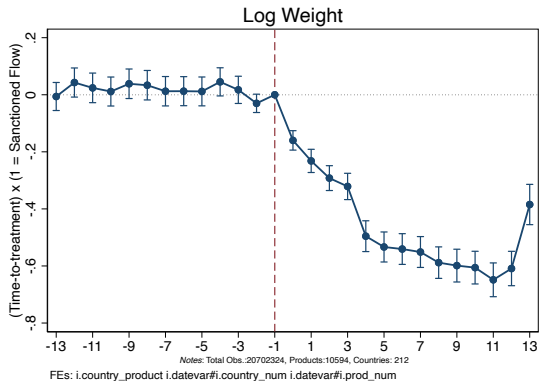
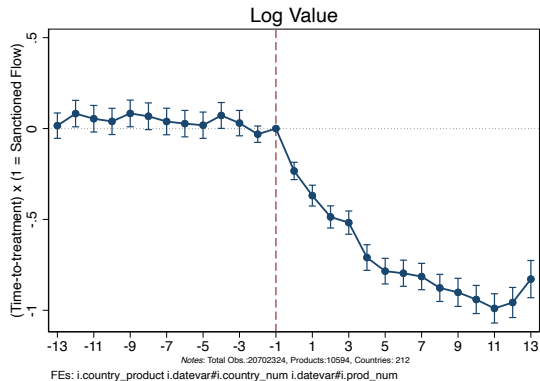


Following Fajgelbaum et al. (2019), we estimate:

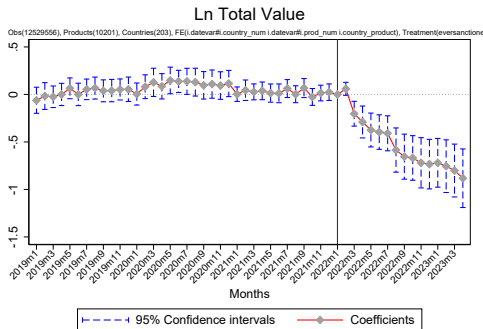
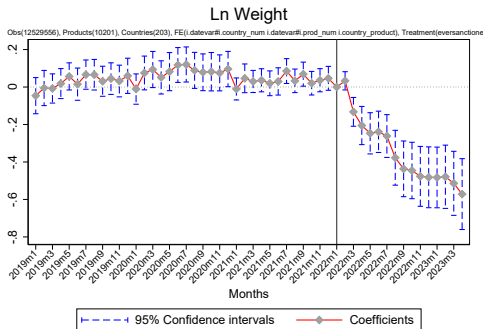
$$y_{gct} = \tau_{gc} + \eta_{gt} + \omega_{ct} + \sum_{\tau} \beta_{0\tau} \mathbb{1}(\text{event}_{gct} = \tau) \\ + \sum_{\tau} \beta_{1\tau} \mathbb{1}(\text{event}_{gct} = \tau) \times \text{Sanctioned}_{gc} + \zeta_{gct}$$

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Staggered DID [◀ back](#)

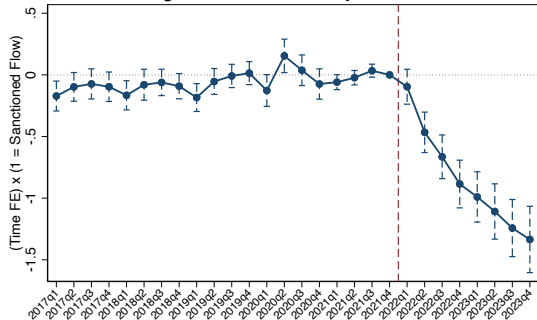


Product-Country-Level Regression: Month-by-Month Estimates

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Product-Country-Level: 'Enemy' Countries Only [◀ back](#)

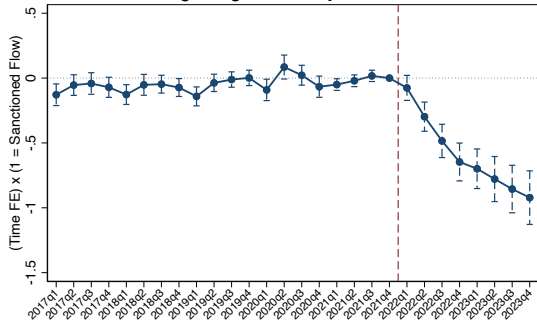
Log Total Value - Enemy Countries



Notes: Total Obs.: 4,340,672, Products: 10,783, Countries: 34

FEs: i.yearquarter#i.country_num i.prod_num#i.country_num

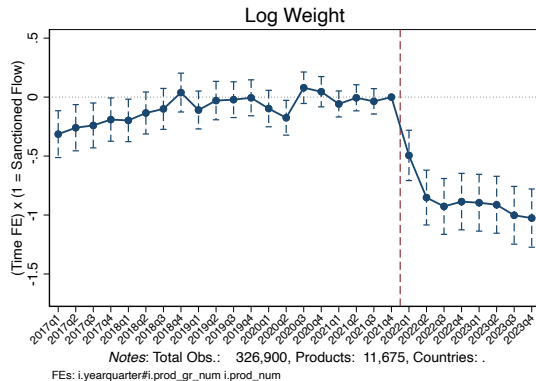
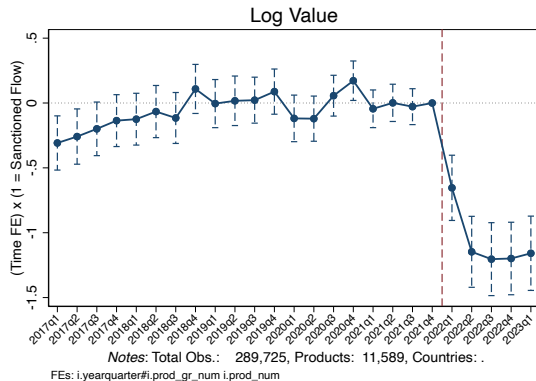
Log Weight - Enemy Countries



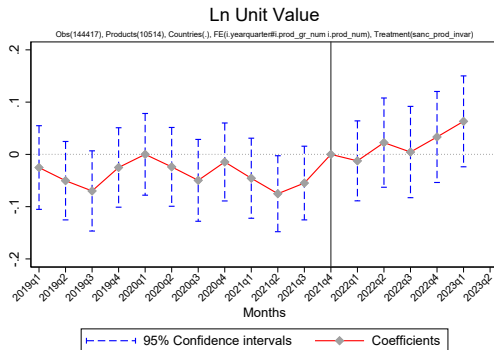
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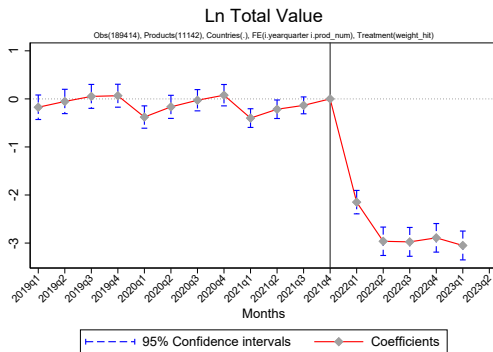
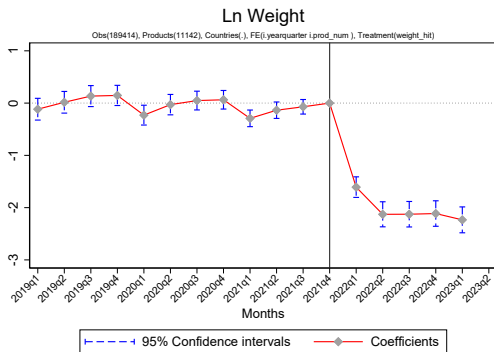
Product-Level Regression, 3-Digit Product Code $\times$ Quarter FE [◀ back](#)



Product-Level Regression: Unit Values

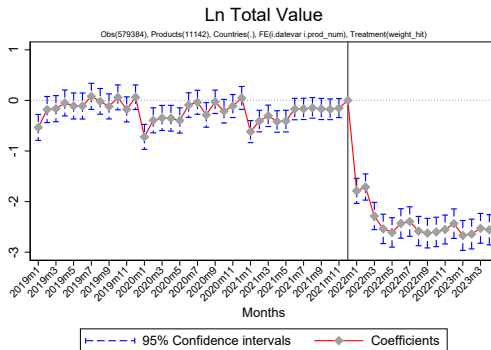
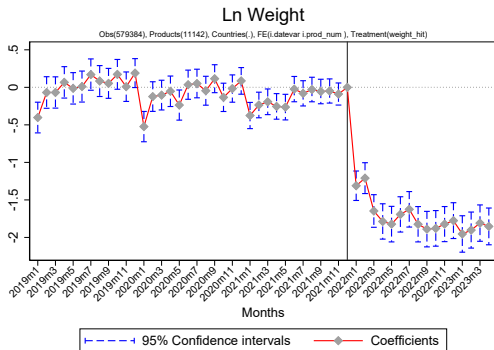


Product-Level Regression: More vs Less Exposed Sanctioned Products



$Exposure_g = \frac{\sum_c Sanctioned\ Weight_{cg}}{\sum_c Traded\ Weight_{cg}}$ defined for total weight of each product in 2019-2021

Monthly Imports of More vs Less Exposed Sanctioned Products



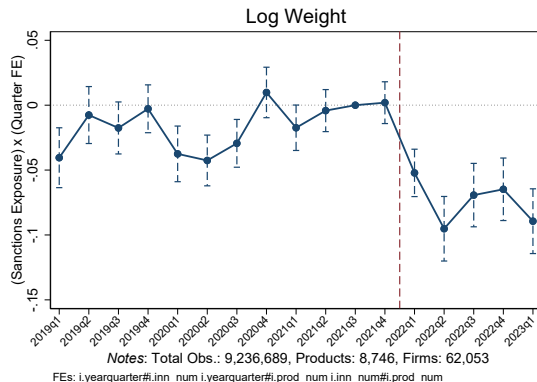
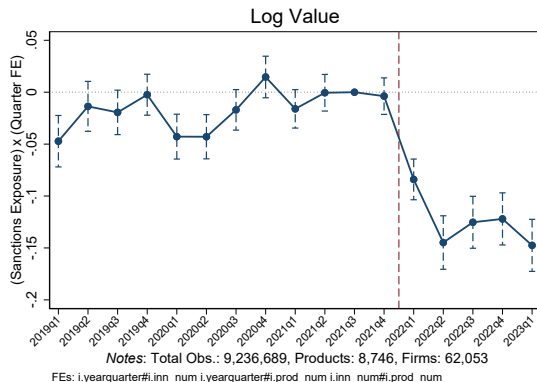
Firm-Product-Level Regression

Does the negative impact on imports hold even at the firm level, controlling for firm-specific shocks? Are firms able to substitute the sanctioned product flows?

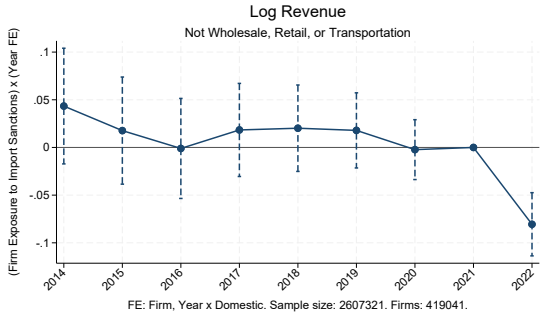
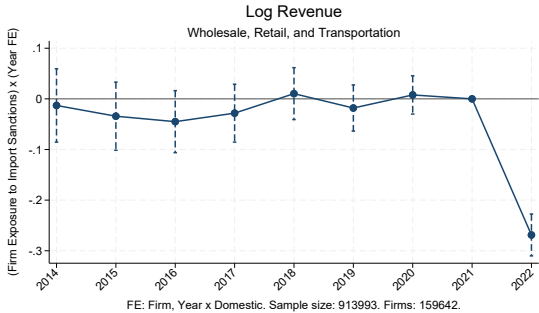
$$y_{fgt} = \tau_{fg} + \eta_{gt} + \omega_{ft} + \theta_t \times Exposure_{fg} + \zeta_{fgt}$$

- y_{fgt} are firm f imports of 10-digit product code g at quarter t
- $Exposure_{fg} = \frac{\sum_c Sanctioned\ Value_{fcg}}{\sum_c Traded\ Value_{fcg}}$
- τ_{fg} are firm-product fixed effects
- η_{gt} are product-time fixed effects
- ω_{ft} are firm-time fixed effects
- Standard errors clustered at the firm level

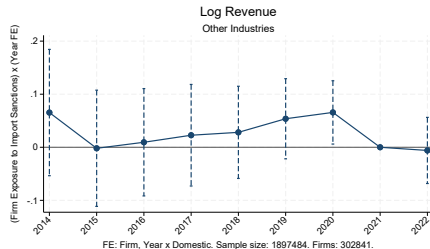
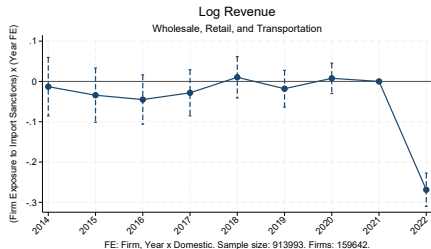
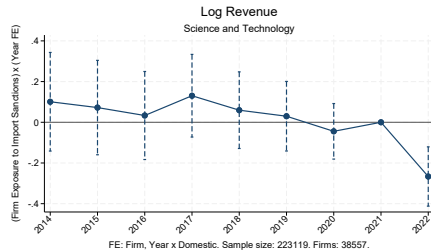
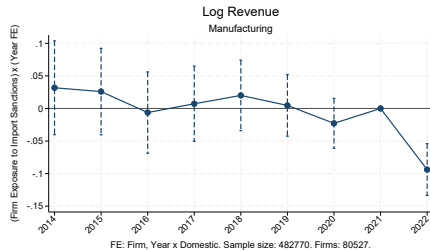
Firm-Product-Level Regression



Impact on Firm Sales: Wholesalers, Retail, and Transportation



Impact on Firm Sales: Heterogeneity by Industry



Impact on Firm Performance: Table

	(1) Log Revenue	(2) Log Profit	(3) Log Capital	(4) Log Materials	(5) Log Labor
<i>Panel A: Difference-in-Differences Estimation: Ever Sanctioned</i>					
Post-2022 × Firm Imported Sanctioned Flows	-0.155*** (0.015)	-0.119*** (0.023)	-0.077*** (0.019)	-0.153*** (0.021)	-0.059*** (0.016)
Firm FE	✓	✓	✓	✓	✓
Year-Industry FE	✓	✓	✓	✓	✓
Year-Importer Status FE	✓	✓	✓	✓	✓
Mean Dep. Var.	16.73	14.04	14.62	17.55	16.11
SD Dep. Var.	2.26	2.46	2.65	2.70	2.26
R ²	0.86	0.75	0.89	0.88	0.91
Observations	3,742,883	2,785,871	4,171,987	1,000,517	979,764
Number of Firms	606,255	527,155	670,024	192,372	187,237
<i>Panel B: Only Military-Related Firms</i>					
Post-2022 × Firm Imported Sanctioned Flows	-0.135** (0.059)	-0.112 (0.092)	-0.089 (0.083)	-0.102 (0.070)	-0.044 (0.056)
Firm FE	✓	✓	✓	✓	✓
Year-Industry FE	✓	✓	✓	✓	✓
Year-Importer Status FE	✓	✓	✓	✓	✓
Mean Dep. Var.	18.69	15.28	15.75	19.71	17.94
SD Dep. Var.	2.31	2.56	3.04	2.29	2.15
R ²	0.89	0.78	0.91	0.89	0.93
Observations	117,340	97,147	118,370	51,974	51,918
Number of Firms	16,224	15,295	16,358	8,506	8,491