The Russia-Ukraine War and Global Trade Reallocations*

Sandro Steinbach

Abstract

This paper uses a product-level empirical model of bilateral trade to examine the global trade implications of the Russian invasion of Ukraine. The results show that imports from Ukraine were 47.3% below the counterfactual between February and August 2022. The Russia-Ukraine war led to significant trade diversion for Russia, primarily benefiting Russian mineral oil and gas exports to Europe and Asia. The analysis also reveals that the trade adjustments operate mainly through import price hikes, with notable heterogeneity across product groups and regions. The findings indicate that the Ukraine-Russia war had significant trade implications for Ukraine and Russia but only limited ones for other countries.

Keywords: Russian invasion of Ukraine, international trade, trade destruction and diversion, treatment heterogeneity, dynamic trade effects

JEL codes: F14

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1. Introduction

The Russian invasion of Ukraine has caused considerable human suffering and harmed global trade (Ruta 2022). According to the World Trade Organization (WTO), the global economic outlook has worsened since the start of the Russia-Ukraine war on February 24, 2022, with trade growth projected to fall from 4.7% to less than 3.4% (WTO 2022). Ukraine and Russia are major commodity exporters. Ukraine, in particular, ships most of its products by sea, and the conflict has greatly limited this mode of transport. Russia, in contrast, faces substantial economic sanctions that impact the domestic economy and limits its ability to participate in global markets. Both mechanisms led to a worldwide reallocation of trade flows for commodities, such as base metals, mineral oils, and agricultural products (Borin et al. 2022; Bentley et al. 2022). This paper provides the first ex-post empirical analysis of the global trade reallocation effects caused by the Russia-Ukraine war, using detailed trade data and theory-consistent empirical models to quantify the degree of trade destruction and diversion resulting from the Russian invasion of Ukraine.

A growing literature investigates the economic consequences of the Russia-Ukraine war. Studies have examined a range of topics, including economic growth (Mahlstein et al. 2022), stock market performance (Boungou and Yatié 2022), commodity markets (Fang and Shao 2022), and food security (Behnassi and El Haiba 2022; Carriquiry et al. 2022). Borin et al. (2022) developed a theoretical model to show that the extent of the economic effects depends on the ability of a country to diversify its supply chains. Ruta (2022) conducted an ex-ante simulation that predicts global trade to decrease by 1% in 2022, reducing the global gross domestic product by 0.7%. Other ex-ante studies have simulated the implications of economic sanctions on trade (Allen 2022; Estrada and Koutronas 2022), analyzed pre-war grain market trade dependencies (Glauben et al. 2022), and explored measures to ensure food security (Bentley et al. 2022). In an ex-post analysis for grain and oilseed trade, Ahn et al. (2023) find that imports from Ukraine were 78.2% lower between February and July 2022. They show that the Ukraine-Russia war had substantial trade implications for the directly involved countries but only limited ones for global grain and oilseed markets.

The paper utilizes a product-level empirical model of bilateral trade to assess the ex-post trade effects of the Russian invasion of Ukraine. Drawing on recent contributions to the international

trade and policy literature (Arita et al. 2022; Steinbach 2022; Ahn et al. 2023), a counterfactual identification strategy is used that measures the trade destruction and diversion effects at the product and region levels. The estimates reveal that imports from Ukraine were 47.3% or $19.4 billion below the counterfactual level between February and August 2022. Reduced exports of agricultural commodities and base metals drive those trade losses. In contrast, Russia recorded trade grains that pushed imports 15.7% above the counterfactual. Higher mineral exports, which increased by more than $61.2 billion between February and August 2022, drove the trade gains. Russia realized those trade gains mainly with Asia, which imported more than $41.1 billion of additional products. There is further evidence of trade diversion with countries other than Russia and Ukraine, particularly in South America, North America, Europe, and Africa, being most pronounced for agricultural commodities and mineral products. The findings suggest that the Ukraine-Russia war had significant trade implications for the directly involved countries but only limited ones for the global markets. Lastly, the empirical results prove that global market adjustments operated mainly through increased commodity prices.

The paper makes two distinct contributions to the growing literature on the economic consequences of the Russian invasion of Ukraine. Firstly, it is the first study to utilize counterfactual statistical methods to quantify the direct and indirect impacts of the Russia-Ukraine war on international trade. These findings extend previous ex-ante studies on the trade effects of economic sanctions and trade blockages and ex-post studies on the product-specific trade effects (Allen 2022; Estrada and Koutronas 2022; Ahn et al. 2023). Secondly, the paper documents the global reallocation dynamics for different product groups and regions. It shows how the trade effects of the Russia-Ukraine war operate primarily through import price adjustments. These insights are essential, as earlier ex-ante simulation studies have warned of supply constraints and their implications for global markets (Bentley et al. 2022; Glauben et al. 2022; Ruta 2022).

2. Empirical Strategy and Data

This paper uses event study methods to examine the short-run global trade effects of the Russian invasion of Ukraine. The empirical strategy is based on the isomorphic gravity equation and recent developments in the field of international trade, which allow for the identification of ex-post

treatment dynamics and the evaluation of the global trade reallocation effects (Arita et al. 2022; Carter et al. 2022). A dynamic treatment model that includes leads and lags relative to the event of interest is utilized, enabling the capture of pre-trends and the assessment of post-treatment dynamics (Freyaldenhoven et al. 2021). The trade effects of the Russia-Ukraine war are quantified using a non-linear panel regression model for count data, as proposed by Steinbach (2022), with the following regression equation:

$$y_{ijpt} = \exp\left(\alpha_{ijp,mo} + \alpha_{ijp,yr} + \sum_{m=-6}^{6} \beta_m r_{ijp,t-m}\right) \eta_{ijpt}\,, \tag{1}$$

where i, j, p, and t represent the importer, exporter, product, and month, respectively. The outcome of interest is represented by y_{ijpt}, which maps into import value and unit value, while the multiplicative error term is represented by η_{ijpt}. It is assumed that all latent confounders are captured by the high-dimensional fixed effects defined at the importer-exporter-product-event-month ($\alpha_{ijp,mo}$) and importer-exporter-product-event-year ($\alpha_{ijp,yr}$) levels. The model addresses differences in import volumes through the importer-exporter-product-event-year fixed effects and accounts for seasonal patterns in trade with importer-exporter-product-event-month fixed effects. In addition, the fixed effects account for unobserved trade costs, such as cultural, border, and proximity effects, and trade integration agreements (Carter et al. 2022). For instance, mineral oil and gas imports could face pre-existing trends and seasonality patterns in import values.

The term $\sum_{m=-6}^{6} \beta_m r_{ijp,t-m}$ measures the dynamic treatment effects of the Russian invasion of Ukraine, which occurred in February 2022 and serves as the center point of the event study. Trade data from 2017 to 2021 are used as the control group, following the counterfactual evaluation approach developed by Arita et al. (2022) and Steinbach (2022), who analyzed the trade effects of the coronavirus pandemic and the 2012/2022 U.S. container shipping disruptions, respectively. The Poisson pseudo-maximum likelihood (PML) estimator is employed to identify the parameters of interest, with the iteratively re-weighted least-squares algorithm being utilized to account for the high-dimensional fixed effects (Silva and Tenreyro 2006; Correia et al. 2020). Mullahy and Norton (2022) demonstrated that the Poisson estimator is more suitable than transforming the outcome when examining marginal effects. As the standard errors are suspected to be correlated at

the importer-exporter-product level, they are clustered in this manner (Cameron and Miller 2015; Steinbach 2022).

Detailed trade data at the Harmonized System (HS) chapter level (HS-2) were obtained from the Trade Data Monitor (2022).[1] The final balanced panel dataset consists of monthly import values and unit values for 107 reporting countries and 190 partner countries at the HS-chapter level from August 2017 to July 2022.[2] The trade data are mirrored due to Russia ceasing the reporting of monthly trade statistics in February 2022. The event study panel is constructed using this dataset and allows for measuring the degree of trade destruction and diversion resulting from the Russian invasion of Ukraine. The final panel includes 410,142 unique importer-exporter-product pairs imported under 99 HS chapters.[3]

3. Results

Figure 1 presents event study estimates for the global trade effects of the Russian invasion of Ukraine, comparing the import value and unit value effects for Ukraine, Russia, and the Rest of the World. Each subfigure displays the dynamic treatment parameters, 95% confidence intervals, and uniform sup-t bands for the event-time of the outcome, as described in Montiel Olea and Plagborg-Møller (2019) and Freyaldenhoven et al. (2021). The estimates for a static regression model are also shown, with test statistics for pre-trends and leveling-off treatment effects reported in the figure notes. The analysis found no statistically significant pre-trends, indicating that the Russian invasion of Ukraine is exogenous to the outcomes of interest (Freyaldenhoven et al. 2019; Sun and Abraham 2021; Roth 2022). Given the use of importer-exporter-product-event-year and importer-exporter-product-event-month fixed effects, the treatment group exhibits similar trends in the pre-treatment period to the control groups, validating the research design. At the same time, there is limited evidence for leveling-off treatment effects for Ukraine and Russia, but some

[1] Appendix Table A.1 maps the HS chapters to sections and provides product descriptions.

[2] Note that internal trade data at the chapter level are unavailable for a large set of countries. Therefore, the empirical analysis focused on foreign trade.

[3] Appendix Table A.2 provides the descriptive statistics for import value and log unit value. The statistics compare the six months before with the six months after the Russian invasion of Ukraine.

evidence for the Rest of the World.

The estimation results indicate that imports from Ukraine experienced a significant decline of 47.3% from February to August 2022.[4] This decrease in trade can be attributed to adverse effects that accumulated until March 2022, leading to a persistent depression of imports from Ukraine at -55.5% of the counterfactual level from April to August 2022. In contrast, the analysis reveals positive post-event treatment effects for Russia and other countries. The average trade effect for Russia was 15.7%, while it was 11.2% for all other countries.[5] Imports from Russia experienced a notable increase of 20.8% above the counterfactual level from March to June 2022, although economic sanctions subsequently reduced these trade gains to statistically insignificant levels. The analysis also found significant unit value effects, with unit values for imports from Ukraine, Russia, and other countries being 12.8%, 18.8%, and 3.2% higher, respectively. Because the average post-event trade effect is larger for the unit value specification (18.8%) than for the value specification (15.7%), there is some evidence for trade destruction in volume terms for Russia. In contrast, the increase in unit values for Ukraine suggests that Ukrainian exporters continued exporting higher-priced varieties while reducing exports of lower-valued products.

Figure 2 shows differences in the average post-event trade effects and Figure 3 the corresponding trade gains and losses by HS section. Starting with Ukraine, there is significant heterogeneity in the treatment effects across HS sections, with the largest average post-event trade effects observed for arms and ammunition (Section 19, -91.0%), animal and vegetable fats (Section 3, -71.0%), and base metals (Section 15, -67.0%). In terms of trade value, imports from Ukraine were $19.4 billion below the counterfactual between February and August 2022, with the largest trade losses occurring in vegetable products (Section 2, -$5.3 billion), base metals (Section 15, -$5.5 billion), and animal and vegetable fats (Section 3, -$4.3 billion). In contrast, Russia experienced significantly smaller

[4] The average post-event trade effects were calculated using the formula $\left(\exp\left(\bar{\beta}_m\right) - 1\right) * 100$.

[5] Appendix Figure A.1 presents robustness checks for potential pre-trends. Under the assumption that pre-trends would have continued linearly in the post-treatment period, we estimate Equation 1 following the approach outlined in Dobkin et al. (2018). The results show no evidence of significant linear pre-trend effects for Ukraine and Russia. When accounting for these pre-trends, the average post-event trade effects for Ukraine, Russia, and the Rest of the World are -48.4%, -3.3%, and -2.8%, respectively. These results suggest that the main estimates likely represent the upper bound of the treatment effect range.

adverse trade effects, with arms imports (Section 19) from Russia decreasing the most with -68.2%. However, this estimate is statistically insignificant at conventional levels. At the same time, imports of Russian mineral products (Section 5) saw a 31.7% increase above the counterfactual level between February and August 2022, resulting in $68.3 billion in additional imports from Russia. Without the higher energy imports, trade with Russia would have been $7.1 billion lower during this period. Lastly, the Rest of Section World experienced no significant adverse trade disruptions, with imports of arms and ammunition (Section 19) growing by 51.4%, followed by mineral products (Section 5, 47.2%) and footwear (Section 12, 35.6%). The substantial increase in imports of mineral products can be attributed to the post-Covid trade recovery and positive commodity price effects due to the Russian invasion of Ukraine.[6]

The average post-event treatment effects and estimated trade gains and losses by region are presented in Figure 4. South America, Africa, and Asia experienced the largest reduction in imports from Ukraine, with declines of 79.6%, 78.8%, and 72.9%, respectively, between February and August 2022. In terms of import value for Ukraine, Asia saw the most considerable reduction at $12.3 billion, followed by Europe ($4.0 billion) and Africa ($1.5 billion). Lower imports of agricultural products and base metal drove the decrease in imports. In contrast, Asia (26.7%) and Europe (11.3%) increased their imports from Russia beyond the counterfactual level. The most substantial trade gains were seen for Russian exports to Asia ($41.1 billion) and Europe ($18.1 billion), while Russia experienced trade losses of $2.3 billion in North America. Higher imports of mineral products drove the increase in Russian exports.[7] There is evidence of trade diversion with countries other than Russia and Ukraine beyond the counterfactual level, particularly in North America (18.5%), Asia (7.6%), and Europe (7.5%).

[6] Appendix Figure A.2 depicts estimates of the average post-event trade effects for the unit value. Mineral products (Section 5) were 22.4% more expensive than under the counterfactual scenario. Similar patterns are observed for animal and vegetable fats (Section 3, 10.2%) and stone products (Section 13, 8.5%).

[7] Appendix Figure A.3 shows that higher commodity prices contributed to Russian trade gains in Europe. In contrast, Asian countries also significantly expanded their import volume, particularly Russian oil and gas. All other regions considerably reduced imports of Russian products.

4. Conclusion

This paper investigates the reallocation of global trade in response to the Russia-Ukraine war using detailed trade data and theory-consistent empirical models. The analysis utilizes counterfactual evaluation methods and finds that Ukraine experienced significant export disruptions. Compared with the counterfactual, imports from Ukraine were 47.3% lower between February and August 2022. In contrast, Russia experienced a more negligible impact from the war, realizing significant trade gains in Europe and Asia reinforced by higher prices for mineral products. The Russia-Ukraine war resulted in considerable trade diversion, benefiting countries in North America and Europe. Notably, the adjustment of global trade is primarily driven by commodity price hikes, with substantial heterogeneity observable across product groups and regions.

The ex-ante analysis suggests that the Ukraine-Russia war had significant but heterogeneous implications for the directly involved countries but only limited effects on global markets for most commodities. The results also indicate that economic sanctions imposed by Western countries against Russia were slow to limit Russian exports of mineral oils and other products. The considerable trade diversion is due to non-compliance with financial sanctions by Russian trading partners in Asia, Europe, and South America. In addition, the empirical findings point toward persistent trade disruptions for Ukraine in agricultural products and base metals, highlighting the economic and political importance of regaining foreign market access for Ukrainian exporters.

Further work might study how affected firms adjusted their supplier and customer networks in response to the trade disruptions caused by the Russian invasion of Ukraine. Trade costs are instrumental in forming such networks, implying that the trade shock caused by the Russia-Ukraine war may induce long-term and heterogeneous disruptions to those networks that vary with proximity and firm characteristics (Bernard and Moxnes 2018). Lastly, while this research speaks to the foreign trade response to the Russia-Ukraine war, an additional adjustment mechanism worth exploring is the domestic price response to the armed conflict (Korovkin and Makarin 2023).

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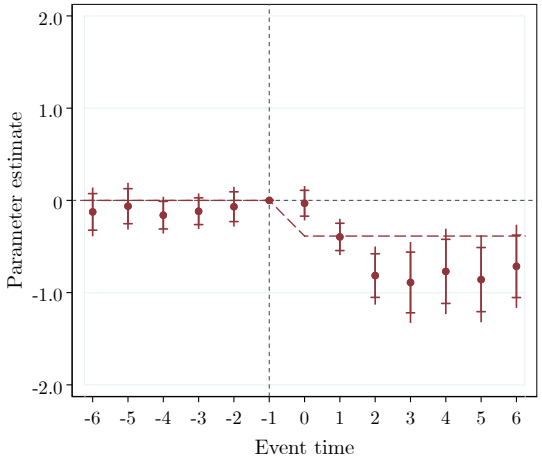
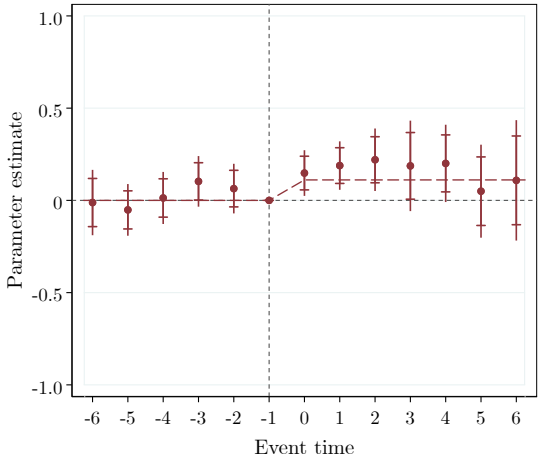
Tables and Figures



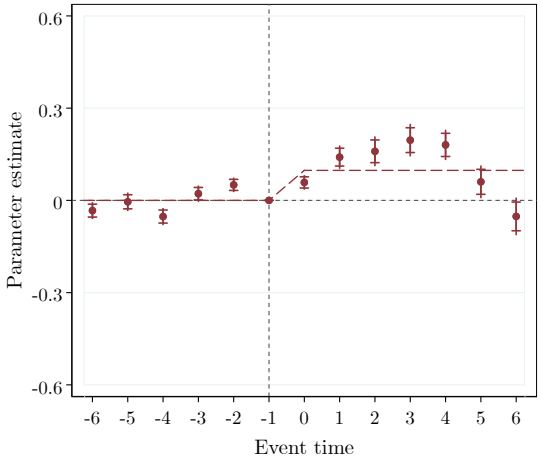
Pre-trends p-value: 0.143 - Leveling off p-value: 0.016 - Static effect p-value: 0.000
Pseudo R-squared: 0.957 - Observations: 222,006

Panel (A): Ukraine Import Value.



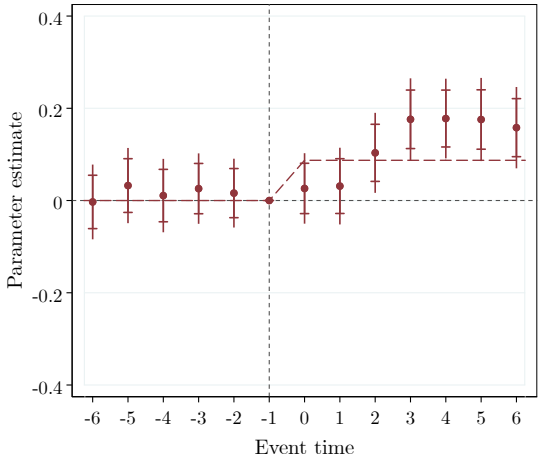
Pre-trends p-value: 0.636 - Leveling off p-value: 0.244 - Static effect p-value: 0.070
Pseudo R-squared: 0.983 - Observations: 278,208

Panel (B): Russia Import Value.



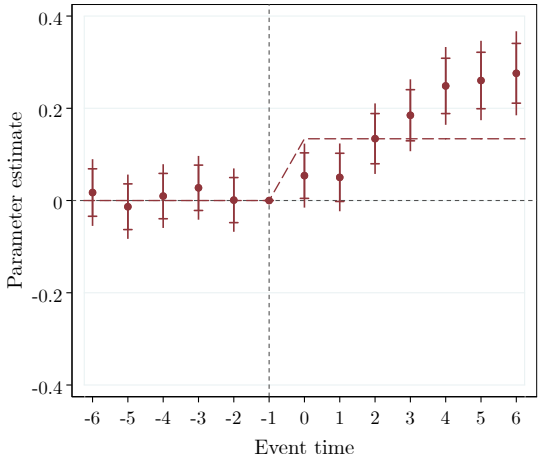
Pre-trends p-value: 0.695 - Leveling off p-value: 0.000 - Static effect p-value: 0.000
Pseudo R-squared: 0.996 - Observations: 654,543

Panel (C): Rest of World Import Value.



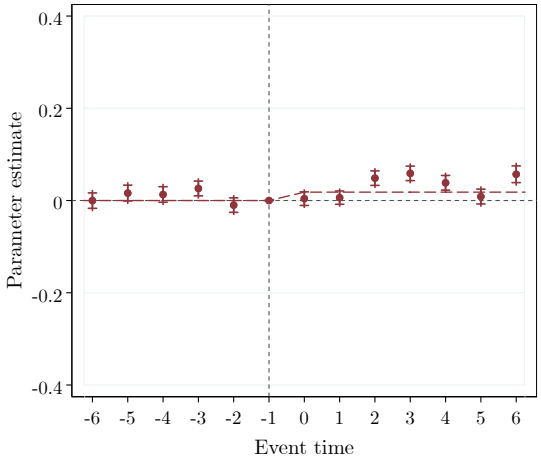
Pre-trends p-value: 0.476 - Leveling off p-value: 0.569 - Static effect p-value: 0.000
Adjusted R-squared: 0.849 - Observations: 161,665

Panel (D): Ukraine Unit Value.



Pre-trends p-value: 0.679 - Leveling off p-value: 0.624 - Static effect p-value: 0.000
Adjusted R-squared: 0.848 - Observations: 215,837

Panel (E): Russia Unit Value.

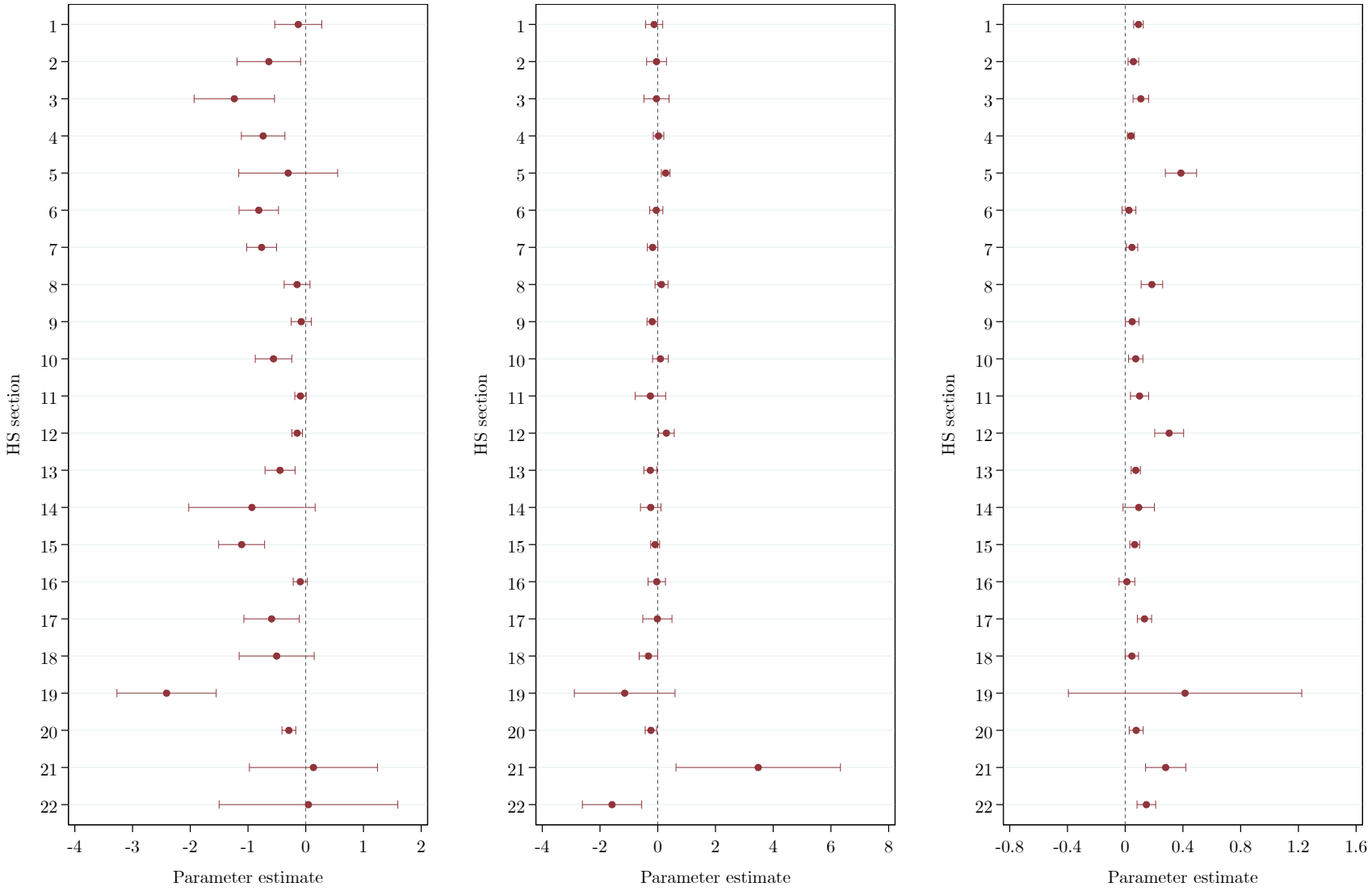


Pre-trends p-value: 0.200 - Leveling off p-value: 0.000 - Static effect p-value: 0.000
Adjusted R-squared: 0.929 - Observations: 620,844

Panel (F): Rest of World Unit Value.

Figure 1: Event Studies.

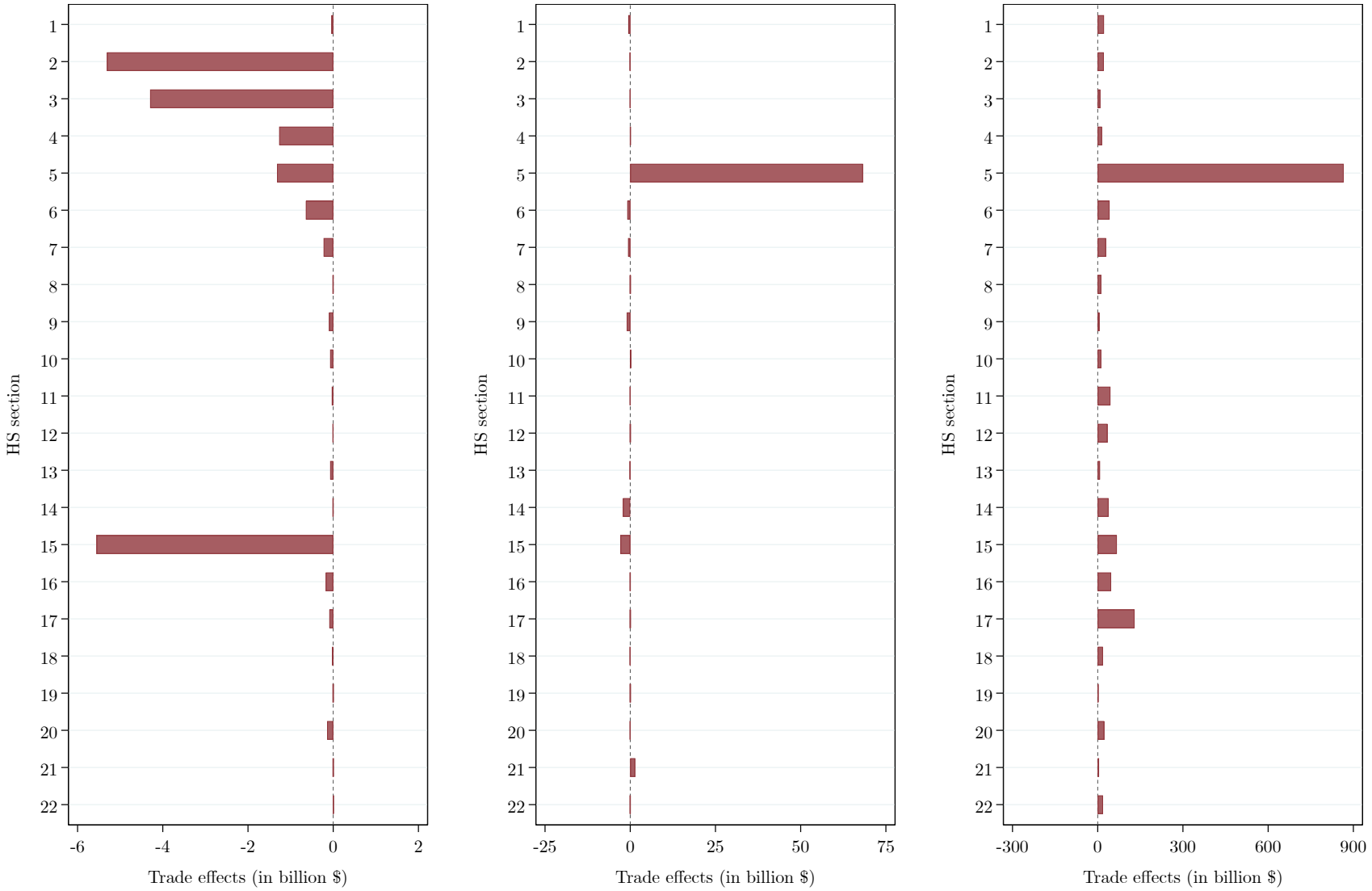
Notes. The figure shows the dynamic treatment parameters, 95% confidence intervals, and uniform sup-t bands for the event-time coefficients. We also report several Wald tests and regression statistics in each figure note. We used a log-linear regression for the unit value outcome.



Panel (A): Ukraine. Panel (B): Russia. Panel (C): Rest of World.

Figure 2: Average Post-Event Treatment Effects at the HS Section Level.

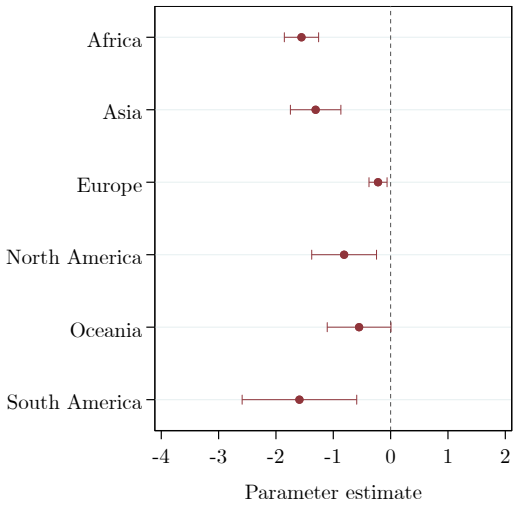
Note. The figure shows the average post-event treatment effects by HS section. The post-event trade effects in percent were calculated as the average of the post-event parameter estimates.



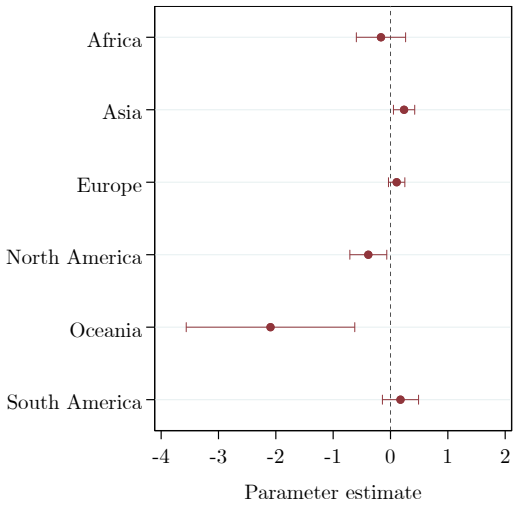
Panel (A): Ukraine. Panel (B): Russia. Panel (C): Rest of World.

Figure 3: Trade Gains and Losses for Different Product Groups.

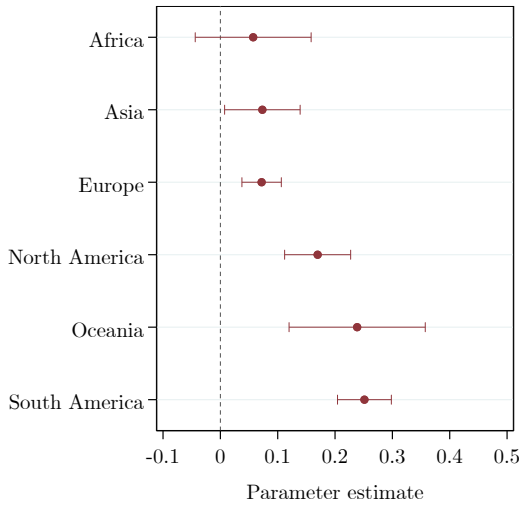
Note. The figure shows the estimated trade gains and losses by the HS section. The trade effects in billion $ were calculated based on the dynamic post-event treatment estimates and the pre-event import values.



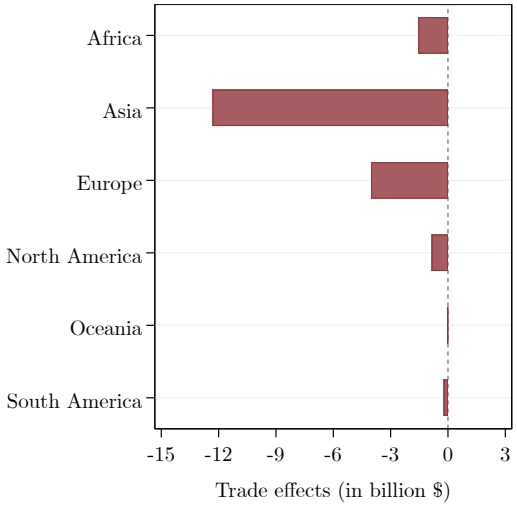
Panel (A): Ukraine Value Estimate.



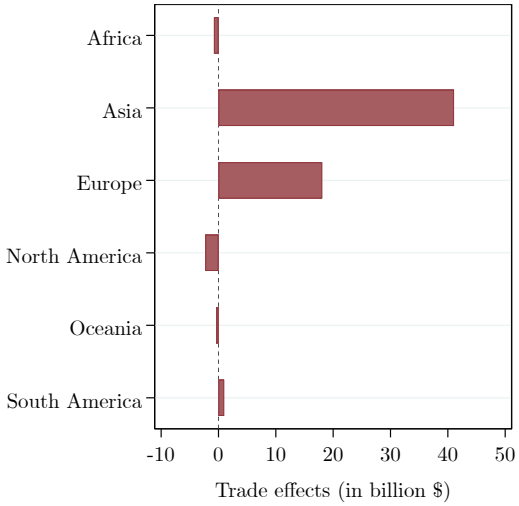
Panel (C): Russia Value Estimate.



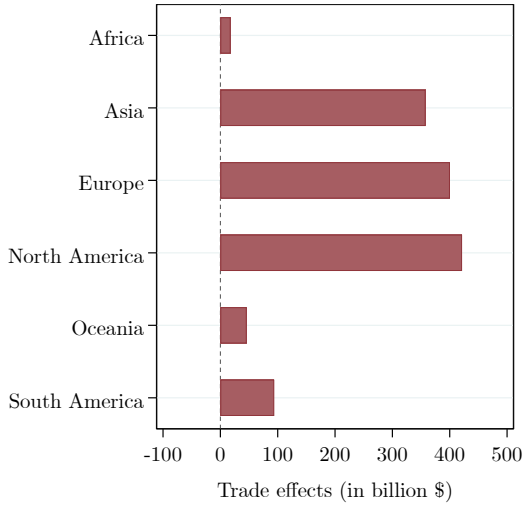
Panel (E): Rest of World Value Estimate.



Panel (B): Ukraine Trade Effects.



Panel (D): Russia Trade Effects.



Panel (F): Rest of World Trade Effects.

Figure 4: Regional Treatment Heterogeneity.

Note. The figure shows the average post-event treatment effects and estimated trade gains and losses by region. The post-event trade effects in percent were calculated as the average of the post-event parameter estimates. The trade effects in billion $ were calculated based on the dynamic post-event treatment estimates and the pre-event import values.

Appendix Tables and Figures

Table A.1: HS Classification.

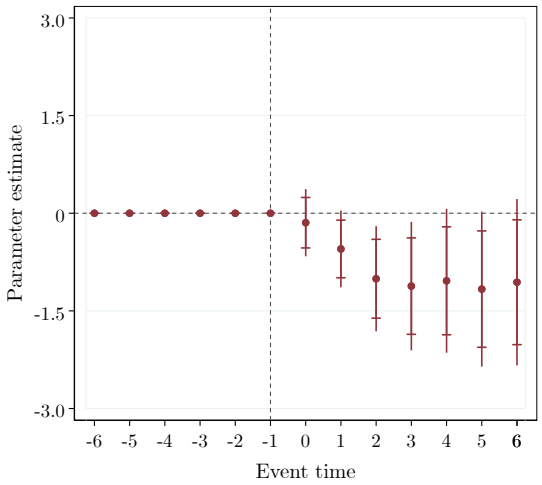
Section	Description
1	Live Animals; Animal Products (Chapters 1 to 5)
2	Vegetable Products (Chapters 6 to 14)
3	Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Chapter 15)
4	Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes (Chapters 16 to 24)
5	Mineral Products (Chapters 25 to 27)
6	Products of the Chemical or Allied Industries (Chapters 28 to 38)
7	Plastics and Articles Thereof Rubber and Articles Thereof (Chapters 39 to 40)
8	Raw Hides and Skins, Leather, Furskins and Articles Thereof; Saddlery and Harness; Travel Goods, Handbags and Similar Containers; Articles of Animal Gut (Other Than Silkworm Gut) (Chapters 41 to 43)
9	Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufacturers of Straw,of Esparto or of Other Plaiting Materials; Basketware and Wickerwork (Chapters 44 to 46)
10	Pulp of Wood or of Other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard; Paper and Paperboard and Articles Thereof (Chapters 47 to 49)
11	Textile and Textile Articles (Chapters 50 to 63)
12	Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking Sticks, Seatsticks, Whips, Riding-Crops and Parts Thereof; Prepared Feathers and Articles Made Therewith; Artificial Flowers; Articles of Human Hair (Chapters 64 to 67)
13	Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware (Chapters 68 to 70)
14	Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad With Precious Metal, and Articles Thereof; Imitation Jewelry; Coin (Chapter 71)
15	Base Metals and Articles of Base Metal (Chapters 72 to 83)
16	Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles (Chapters 84 to 85)
17	Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86 to 89)
18	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Clocks and Watches; Musical Instruments; Parts and Accessories Thereof (Chapters 90 to 92)
19	Arms and Ammunition; Parts and Accessories Thereof (Chapter 93)
20	Miscellaneous Manufactured Articles (Chapters 94 to 96)
21	Works of Art, Collectors' Pieces and Antiques (Chapter 97)
22	Special Classification Provisions; Temporary Legislation; Temporary Modifications Proclaimed pursuant to Trade Agreements Legislation; Additional Import Restrictions Proclaimed Pursuant to Section 22 of the Agricultural Adjustment Act, As Amended (Chapters 98 to 99)

Note. The table provides the mapping between HS sections and chapters and the product descriptions.

Table A.2: Descriptive Statistics.

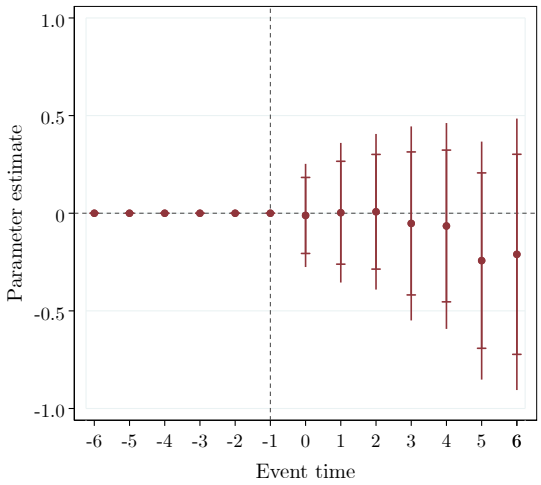
	Sum	Mean	SD	Min.	Max.	Obs.
Panel A: Ukraine						
Value (Pre)	3,304	0.14	1.18	0	55	22,854
Value (Post)	1,927	0.09	0.71	0	43	22,477
Log Unit Value (Pre)	35,282	2.03	2.12	−7	14	17,388
Log Unit Value (Post)	34,283	2.14	2.05	−8	15	16,010
Panel B: Russia						
Value (Pre)	25,594	0.92	11.00	0	598	27,942
Value (Post)	27,993	1.03	14.84	0	833	27,287
Log Unit Value (Pre)	43,654	1.91	2.21	−8	15	22,854
Log Unit Value (Post)	41,215	2.02	2.17	−10	15	20,405
Panel C: Rest of World						
Value (Pre)	1,003,340	16.41	117.78	0	5,485	61,134
Value (Post)	1,069,348	17.49	124.64	0	5,026	61,134
Log Unit Value (Pre)	88,093	1.51	1.71	−10	17	58,306
Log Unit Value (Post)	87,781	1.56	1.68	−10	18	56,326

Note. The table shows the descriptive statistics for the import value and unit value (in logs) for the six months before and after the event month for Ukraine, Russia, and the Rest of the World. The sum, mean, standard deviation (SD), minimum (Min.), maximum (Max.), and observation numbers (Obs.) were calculated.



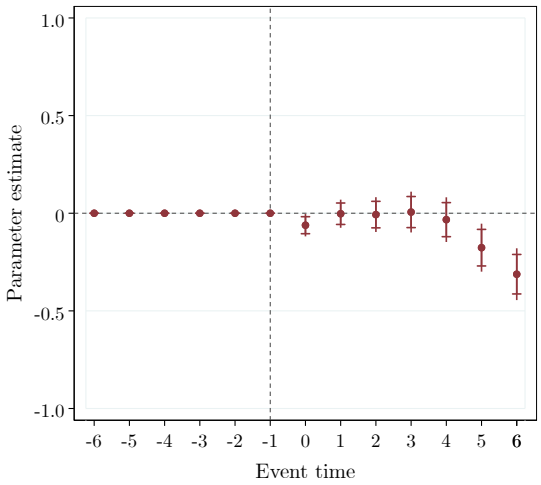
Pseudo R-squared: 0.957 -- Observations: 222,006 -- Linear trend: 0.019 (0.020)

Panel (A): Ukraine Import Value.



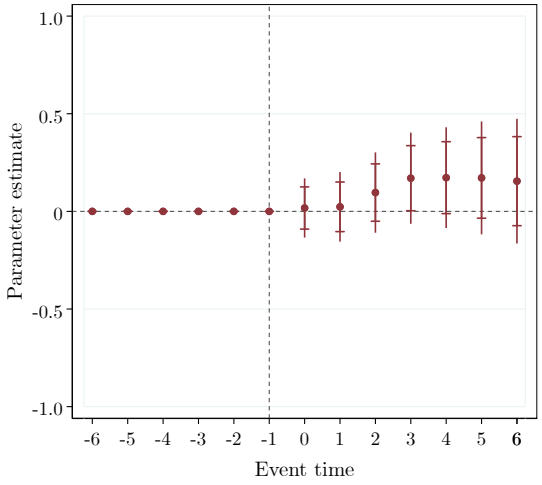
Pseudo R-squared: 0.983 -- Observations: 278,208 -- Linear trend: 0.013 (0.011)

Panel (B): Russia Import Value.



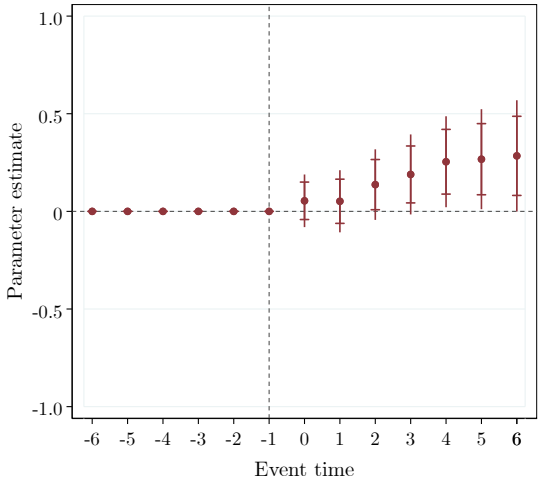
Pseudo R-squared: 0.996 -- Observations: 654,543 -- Linear trend: 0.012 (0.002)

Panel (C): Rest of World Import Value.



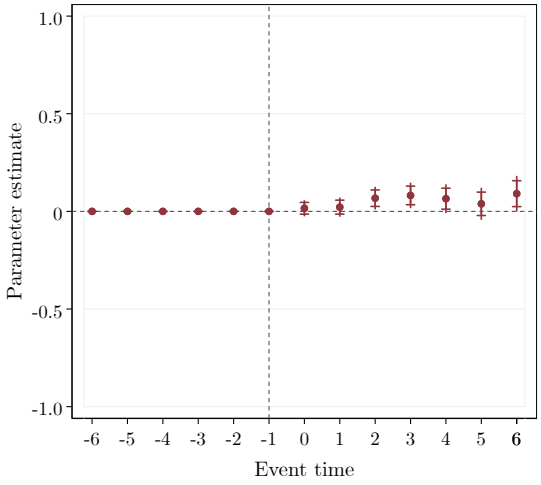
Adjusted R-squared: 0.849 -- Observations: 161,665 -- Linear trend: -0.000 (0.005)

Panel (D): Ukraine Unit Value.



Adjusted R-squared: 0.848 -- Observations: 215,837 -- Linear trend: -0.001 (0.004)

Panel (E): Russia Unit Value.

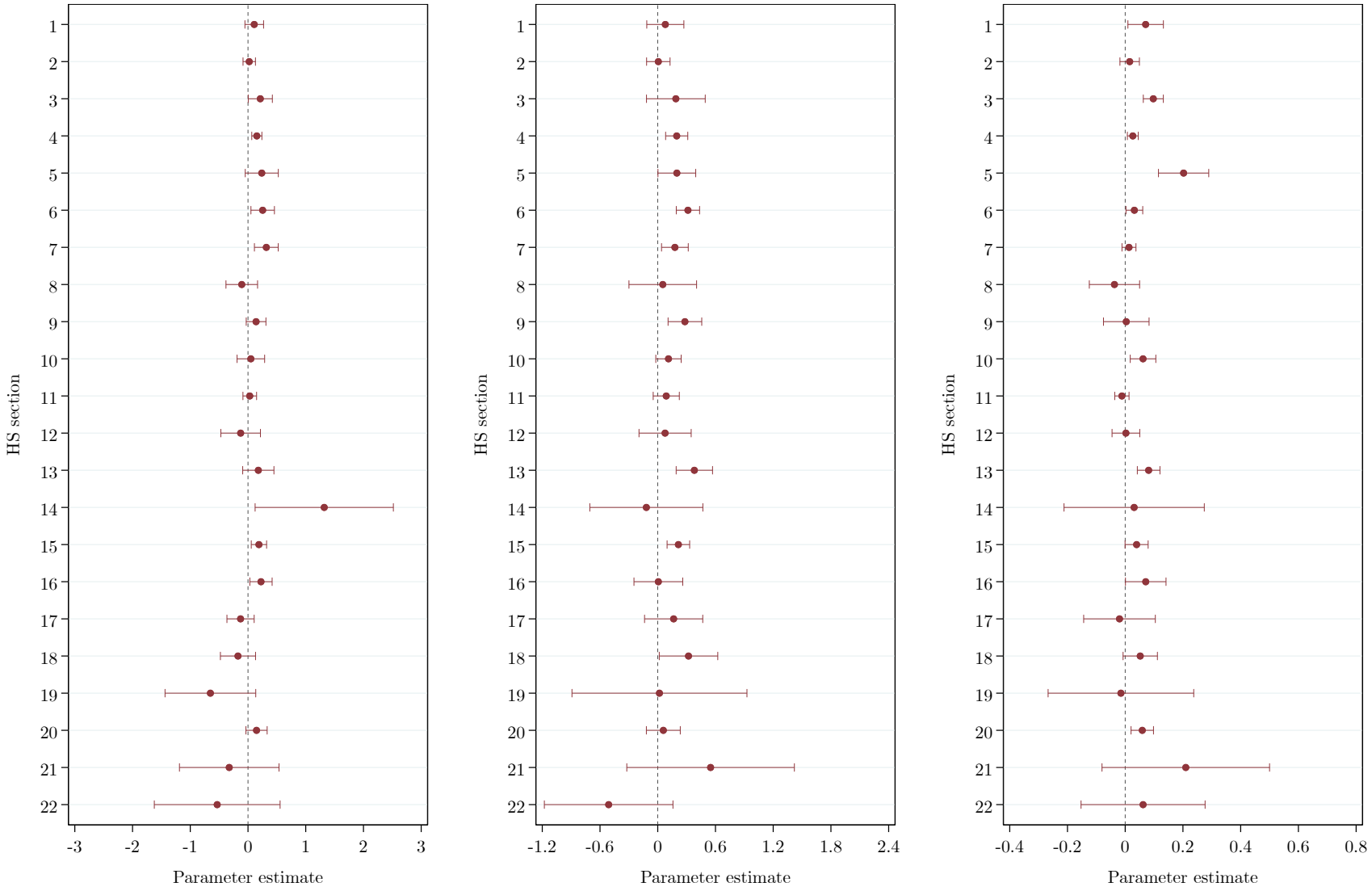


Adjusted R-squared: 0.929 -- Observations: 620,844 -- Linear trend: -0.002 (0.002)

Panel (F): Rest of World Unit Value.

Figure A.1: Event Studies with Adjusted Linear Pre-Trends.

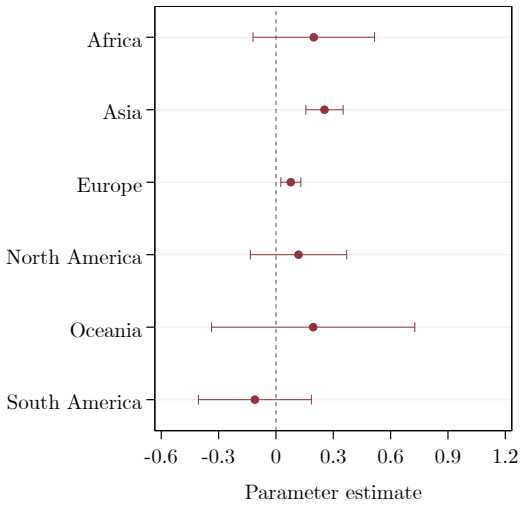
Note. The figure presents event studies with adjusted linear pre-trends following Dobkin et al. (2018). The dynamic treatment parameters, 95% confidence intervals, and uniform sup-t bands for the event-time coefficients are shown. Each figure note reports Wald tests for linear pre-trends and regression statistics. A log-linear regression was used for the unit value outcome.



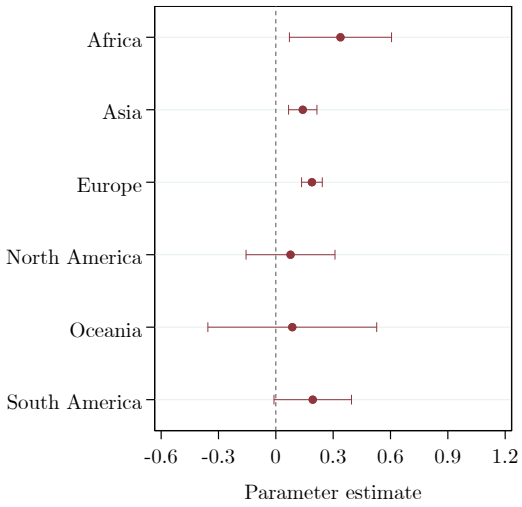
Panel (A): Ukraine. Panel (B): Russia. Panel (C): Rest of World.

Figure A.2: Average Post-Event Treatment Effects for Unit Value by HS Section.

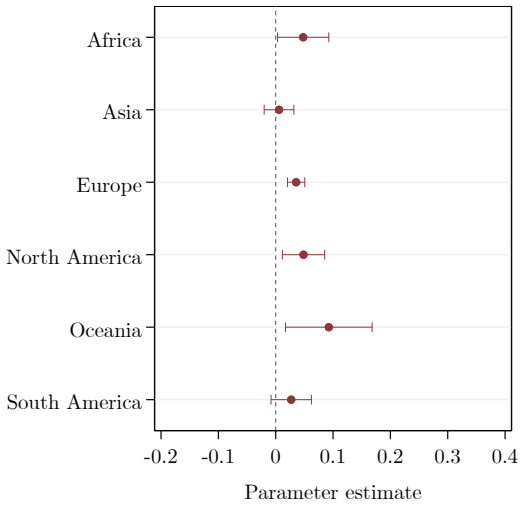
Note. The figure shows the average post-event treatment effects for the unit value specification by the HS section. A log-linear regression was used for the unit value outcome.



Panel (A): Ukraine.



Panel (B): Russia.



Panel (C): Rest of World.

Figure A.3: Regional Differences in Post-Event Treatment Effects for Unit Value.

Note. The figure shows the average post-event treatment effects for the unit value specification by the region. A log-linear regression was used for the unit value outcome.