

The Eurasian roundabout: Trade flows into Russia via the Caucasus & Central Asia

Maxim Chupilkin, Beata Javorcik and Alexander Plekhanov



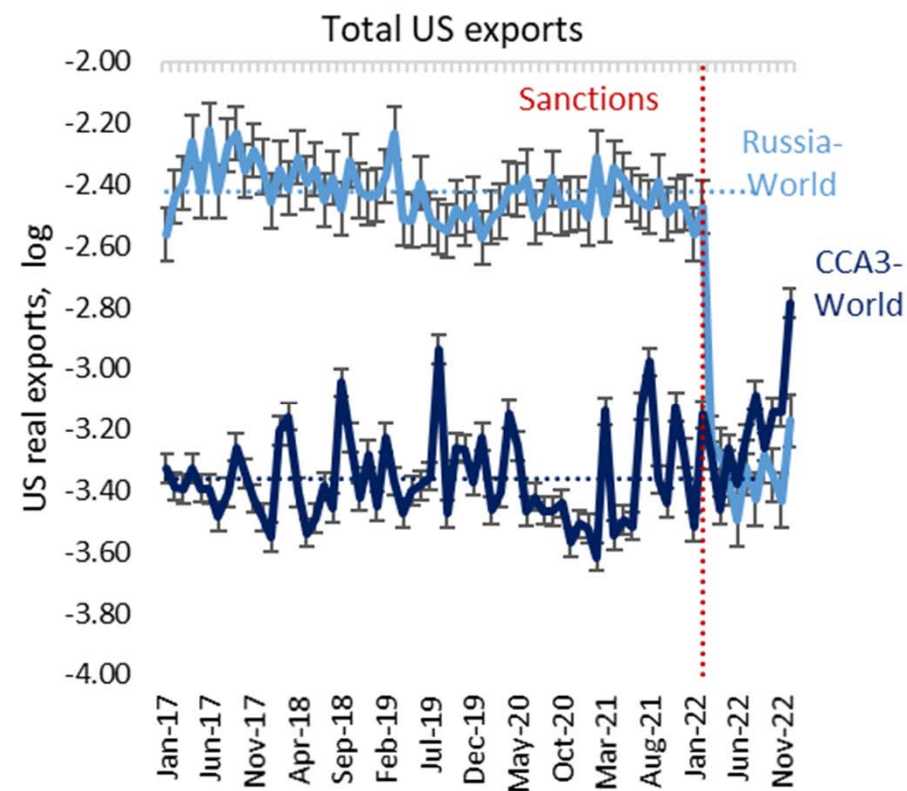
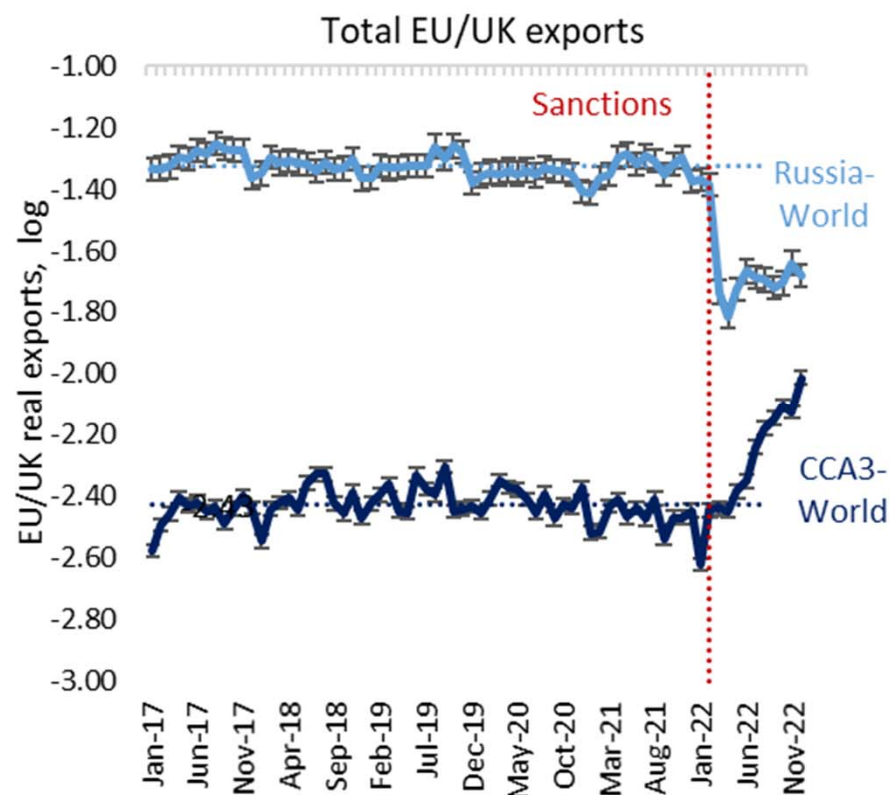
European Bank
for Reconstruction and Development



How well are exports sanctions on Russia working?

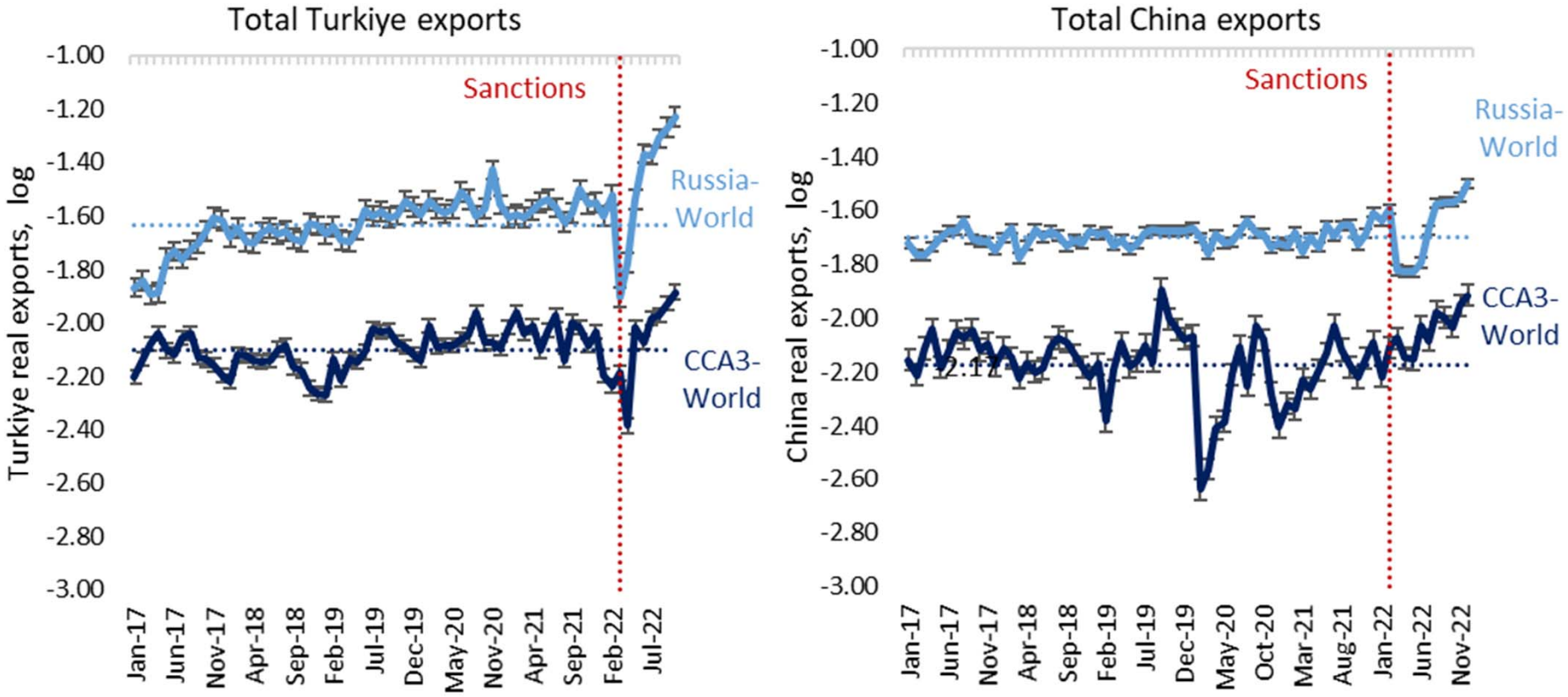
- Russia's war on Ukraine has led to substantial changes in international trade patterns
- Mostly driven by sanctions introduced by the West
- This paper
 - focuses on export sanctions
 - examines monthly bilateral trade data as reported by exporting countries
 - 5,369 product lines (HS classification)
 - Jan 2017 – Dec 2022
 - finds evidence consistent with sanction evasion

Structural breaks in EU exports clearly emerge when log-differencing trade with exports to the ROW to account for Covid-related trends, etc



Source: Authors' calculations based on UN Comtrade. 95% confidence intervals are based on standard deviations calculated for the entire period shown. EU total is inclusive of the UK. $\text{Log}(\text{Export EU to Rus}) - \text{log}(\text{Export EU to Rest of the World})$ and $\text{Log}(\text{Export EU-CCA3}) - \text{log}(\text{Export EU to Rest of the World})$

Similar breaks are visible in exports from Turkiye and China

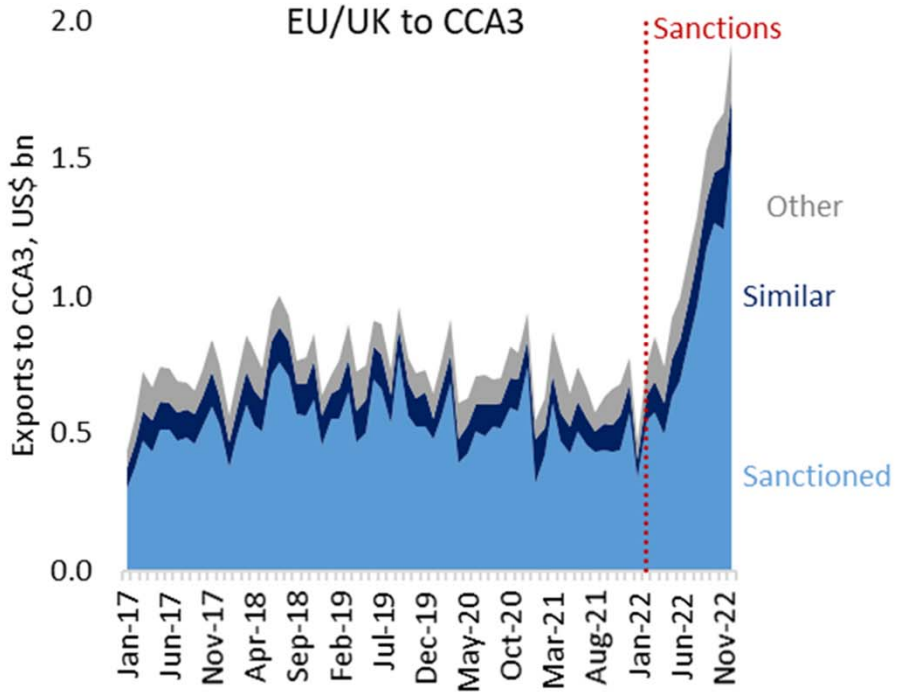
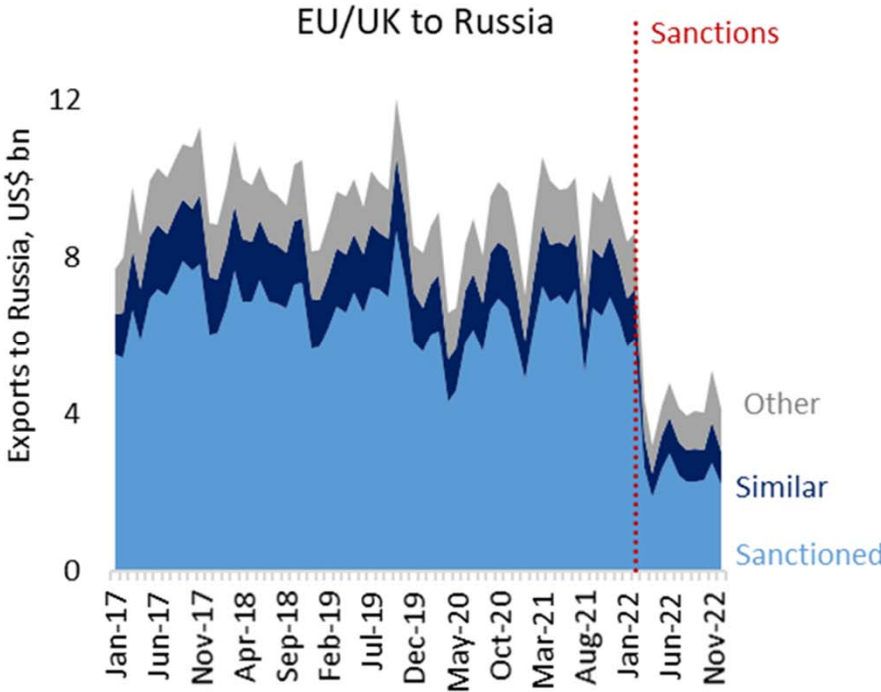


Source: Authors' calculations based on UN Comtrade and China Customs Administration. 95% confidence intervals are based on standard deviations calculated for the entire period shown. $\text{Log}(\text{Export China to Rus}) - \text{log}(\text{Export China to Rest of the World})$ and $\text{Log}(\text{Export China-CCA3}) - \text{log}(\text{Export China to Rest of the World})$

What about sanctions?

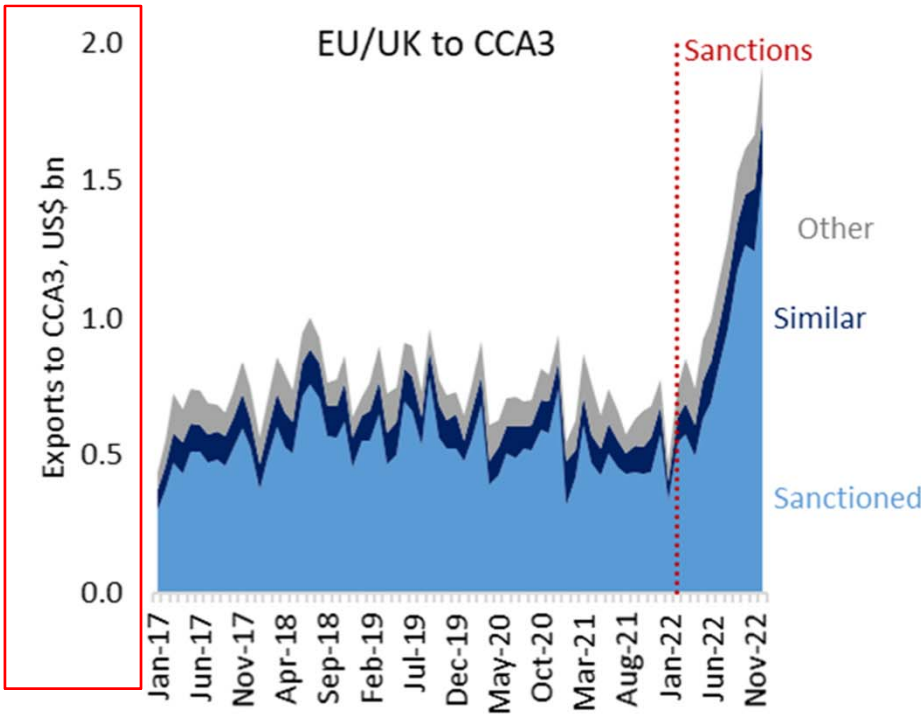
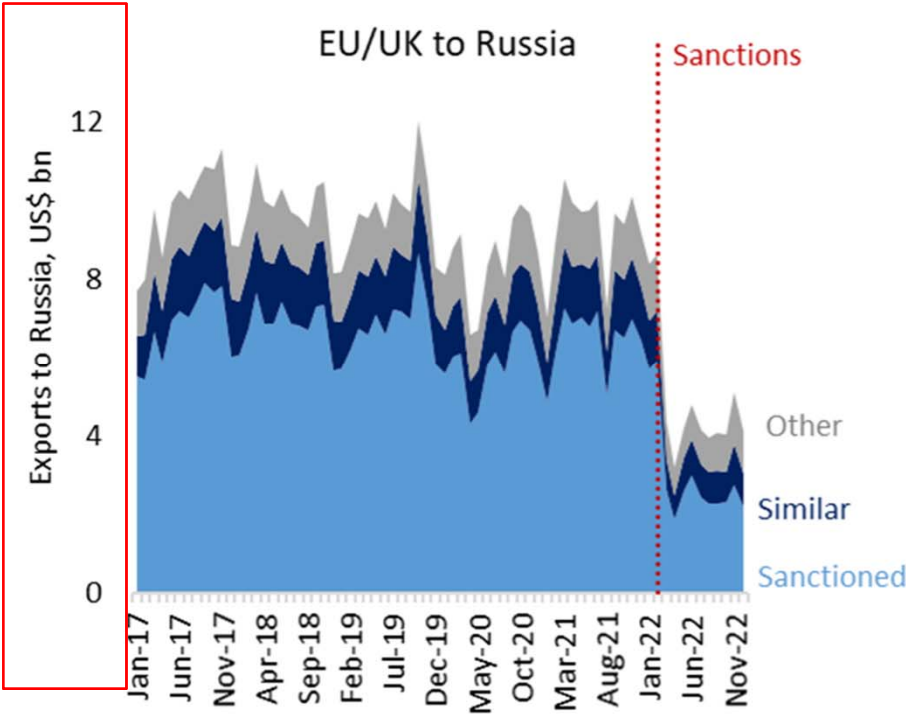
- From 23 February 2022, the EU introduced export sanctions in 10 waves
- Most were in place by 15 March 2022 (when luxury goods added)
 - **Arms**, advanced and **dual-use technology** (eg weapons HS 9301)
 - **Quantum computing**, advanced **semiconductors** (eg semi-conductor media 852352)
 - **Sensitive machinery**, goods seen to enhance Russia's industrial production capacity (eg engines, pumps, 8412, 8413)
 - **Transportation** (eg containers 860900; aircraft and parts 88)
 - Various **chemicals** (eg ammonia 281420)
 - Goods for use in the **oil industry** (eg steel pipes for oil pipelines, 730411)
 - **Maritime navigation** (eg navigation instruments 9014)
 - **Luxury goods** (eg ski suits 611220)

Changing composition of EU/UK exports



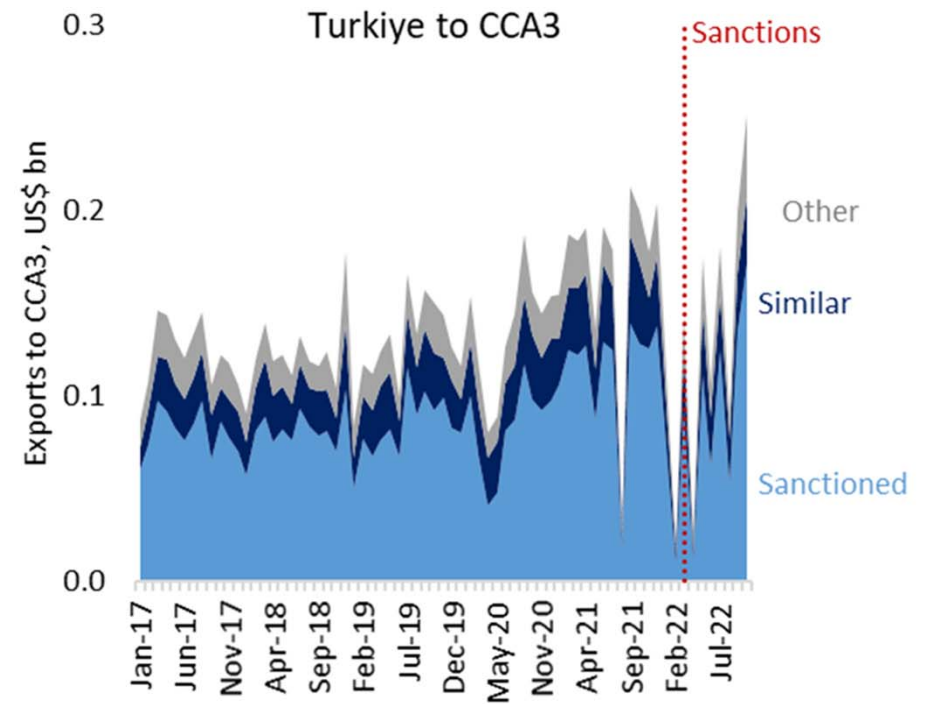
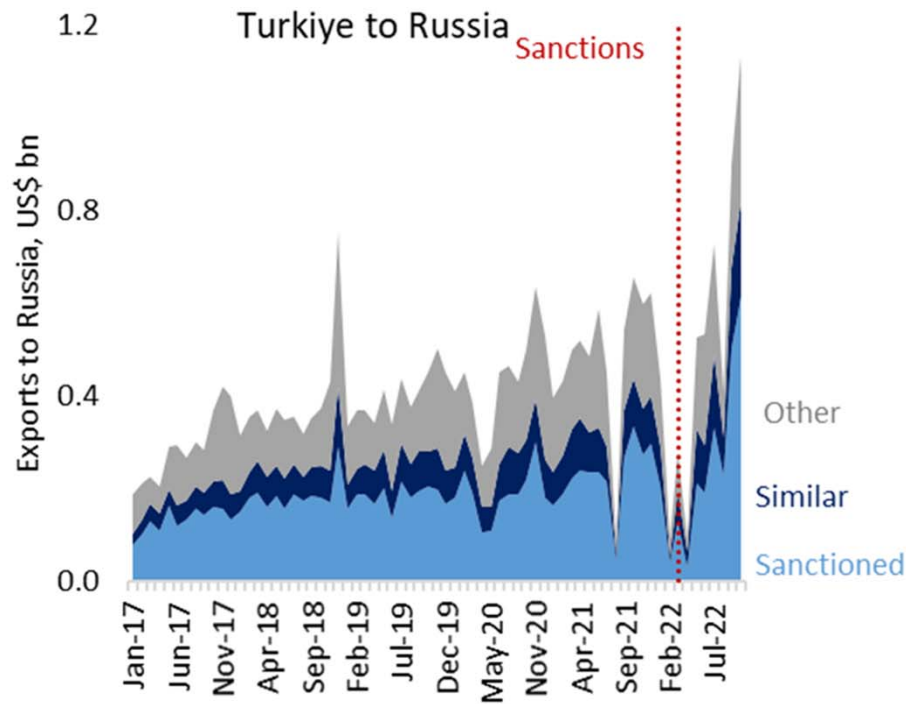
Source: Authors' calculations based on UN Comtrade. Sanctioned goods are where EU sanctions apply at least partially as of December 2022. Similar goods are not sanctioned but within the same HS4 as a sanctioned HS6.

Increased exports to CCA3 account for a small fraction of the drop in direct trade



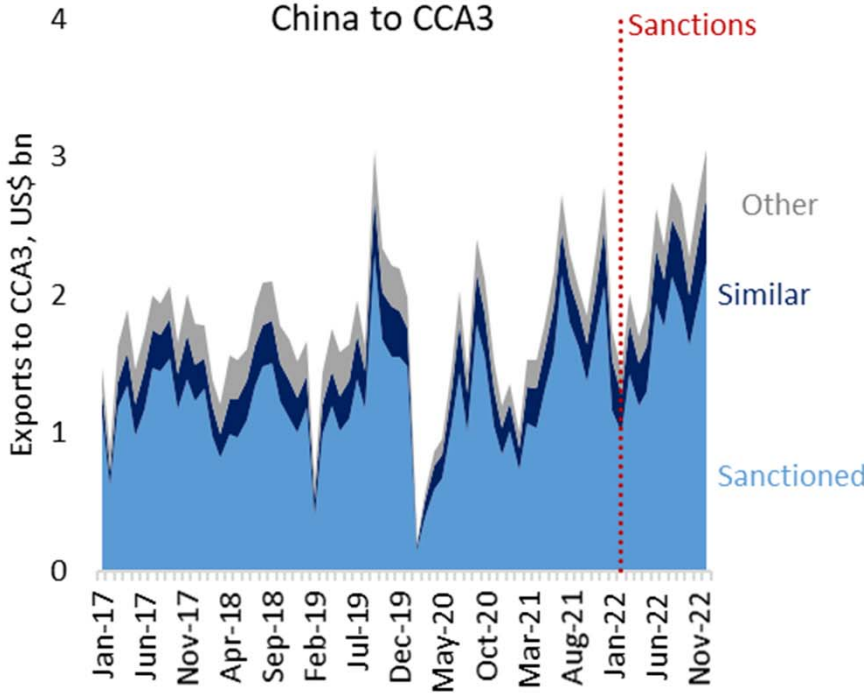
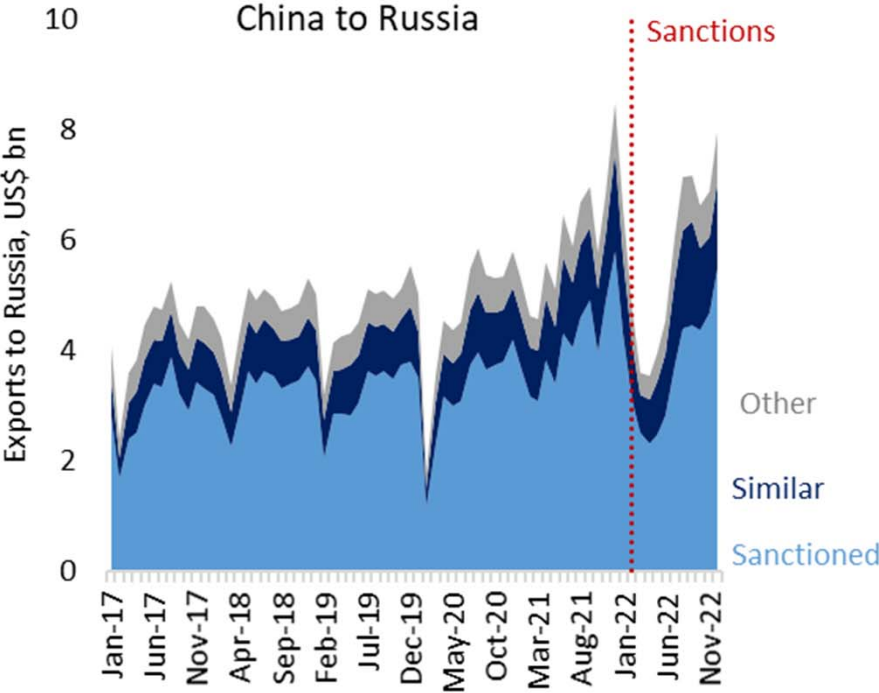
Source: Authors' calculations based on UN Comtrade. Sanctioned goods are where EU sanctions apply at least partially as of December 2022. Similar goods are not sanctioned but within the same HS4 as a sanctioned HS6.

A sharp increase in direct exports from Turkiye to Russia and CCA3 from Jul'22



Source: Authors' calculations based on UN Comtrade. As reported by exporters (eg Turkiye). Sanctions classifications is based on EU sanctions and HS6 product lines where sanctions apply to at least partially. Similar goods are those not sanctioned but within the same HS4 as sanctioned. Trade in nominal US dollars is adjusted for US inflation.

Less clear patterns for Chinese exports



Source: Authors' calculations based on China Customs Administration. Sanctioned goods are where EU sanctions apply at least partially as of December 2022. Similar goods are not sanctioned but within the same HS4 as a sanctioned HS6.

How well are export sanctions working?

Examine monthly HS6 bilateral trade data as reported by exporting countries

- EU/UK (aggregate), US, Turkiye (UN Comtrade)
- China (China Customs Administration)

Importers:

- Russia
 - CCA3: Armenia, Kazakhstan, Kyrgyz Republic
 - Georgia
 - Rest of the world (combined)
 - In some specifications looking separately at Azerbaijan, Mongolia, Turkiye (land / sea borders not directly affected by the conflict)
-
- 5,369 product codes
 - Jan 2017 – Dec 2022

Meet the neighbours: Membership of the Eurasian Economic (Customs) Union and Georgia's position as land corridor Armenia - Russia

	<i>EEU customs union member</i>	<i>Land border EEU</i>	<i>Land border Russia</i>	<i>Not subject to sanctions</i>
Belarus	X	X	X	
Kazakhstan	X	X	X	X
Kyrgyz R	X	X		X
Armenia	X			X
Georgia		X	X	X
Azerbaijan		X	X	X
Mongolia		X	X	X
Tajikistan		X		X
Uzbekistan		X		X

Source: Authors. EEU = Eurasian Economic Union.

Identifying goods sanctioned by the EU (EU Council Regulation 833/2014,

Translated sanctions into (**fully or partially**) covered HS6 product codes

- Specific HS8 only covered (eg champagne is sparkling wines)
- “Luxury” goods above certain unit value (eg €300 for clothing)
- Various exemptions on humanitarian / environmental grounds or goods that Russia needs to export oil and gas to Europe
- Wind-down clauses: trade based on pre-existing contracts
- Variable coded as constant from March 2022 onwards, time-varying in robustness checks

Example

HS2

22 Beverages, spirits and vinegar

HS4

2204 Wine of fresh grapes including fortified wines

HS6

220410 Sparkling wines

220421 Still wines, <2l

220430 Grape must

HS8

22041011 Champagne

22041015 Prosecco

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Also look at “**similar**” goods, not sanctioned but within same HS4

- Inaccurate declaration used to evade tariffs (Javorcik and Narciso, 2008, 2017)
- Example: x-ray for dentistry/ medical (902213) vs non-medical (902219)

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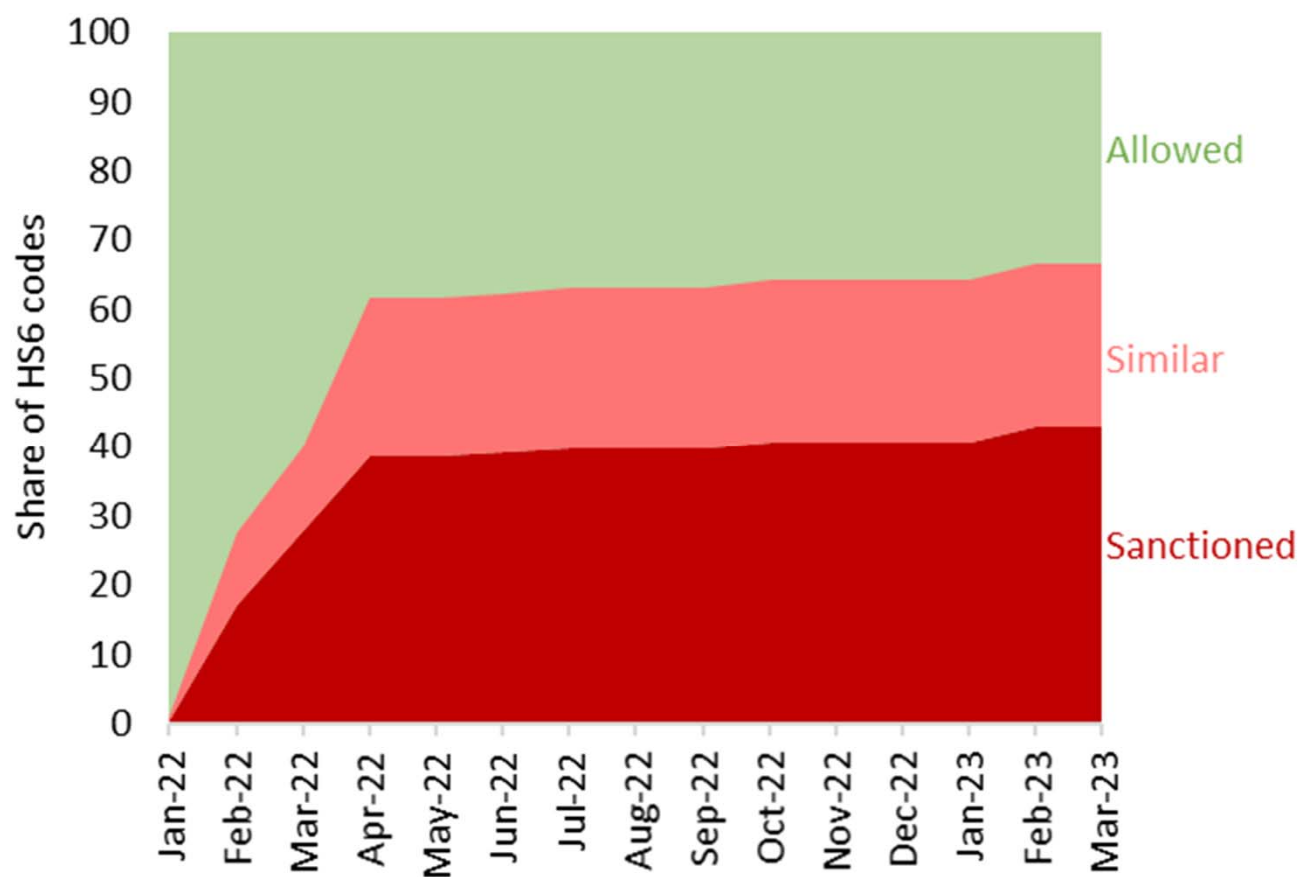
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<i>Category</i>	<i>N HS6 lines</i>	<i>% HS6 lines</i>
Sanctioned goods	1843	34.3
Similar, not sanctioned	2182	40.6
Other goods	1344	25.0

Also distinguish between types of sanctions
(luxury goods, dual-use technology, limiting industrial capacity)



Source: EU and authors' calculations. HS6 product lines where EU sanctioned apply at least partially, from the month following the adoption of the relevant package. Similar goods are those not sanctioned but within the same HS4 as sanctioned

Empirical specification

$$\text{Log}(\text{Export})_{tpi} = \beta_1 \text{Sanct}_{pt} \times \text{Rus}_i + \beta_2 \text{Sanct}_{pt} \times \text{CCA3}_i + \beta_3 \text{Sanct}_{pt} \times \text{Geo}_i + \alpha_{it} + \alpha_{pt} + \alpha_{pi} + \varepsilon_{tpi}$$

Exports of product p to country i in month t

Focus on one exporter at a time

Sanction indicator is a product-specific and time varying (set to 1 from the month following the date of the sanctions package, 0 otherwise)

Comparison between

- Sanctioned vs non-sanctioned goods (time-varying treatment)
- Exports to Russia (CCA3, Georgia) vs to the rest of the world

Fixed effects:

- Importer X Month = accounts for fluctuations in the aggregate demand in the importing country
- HS6 X Month = accounts for seasonality, any production issues on the exporter side
- Importer X HS6 = accounts for structure of production and demand in importing economy

Dependent variable accommodates intensive and extensive margins

Intensive margin: trade in already traded products

$$\text{Log}(\text{Export})_{tpi} = \beta_1 \text{Sanct}_{pt} x \text{ Rus}_i + \beta_2 \text{Sanct}_{pt} x \text{ CCA3}_i + \beta_3 \text{Sanct}_{pt} x \text{ Geo}_i + \alpha_{it} + \alpha_{pt} + \alpha_{pi} + \varepsilon_{tpi}$$

Extensive margin: LPM for probability of trade taking place in a given month,

$$P(\text{Export}_{tpi} > 0) = \beta_1 \text{Sanct}_{pt} x \text{ Rus}_i + \beta_2 \text{Sanct}_{pt} x \text{ CCA3}_i + \beta_3 \text{Sanct}_{pt} x \text{ Geo}_i + \alpha_{pt} + \alpha_{pt} + \alpha_{pi} + \varepsilon_{tpi}$$

Combining intensive + extensive margins: Inverse hyperbolic sine transformation of trade

$$\text{Log}(\text{Export} + \sqrt{\text{Export}^2 + 1})_{tpi} = \beta_1 \text{Sanct}_{pt} x \text{ Rus}_i + \beta_2 \text{Sanct}_{pt} x \text{ CCA3}_i + \beta_3 \text{Sanct}_{pt} x \text{ Geo}_i + \alpha_{pt} + \alpha_{pt} + \alpha_{pi} + \varepsilon_{tpi}$$

Approximates $\log(x)$ for high values and assigns zero (rather than missing) to zero

EU/UK exports: 81% greater drop in exports of sanctioned goods to Russia

VARIABLES	(1) EU/UK log	(2) EU/UK non-zero	(3) EU/UK hyperbolic	(4) US log	(5) US non-zero	(6) US hyperbolic
Sanctioned x Russia	-0.806*** (0.0404)	-0.139*** (0.00720)	-2.282*** (0.0832)	-0.614*** (0.0892)	-0.0804*** (0.00922)	-1.164*** (0.114)
Sanctioned x CCA3	0.265*** (0.0326)	0.0222*** (0.00411)	0.470*** (0.0439)	0.109* (0.0601)	0.00975* (0.00589)	0.143** (0.0661)
Sanctioned x Georgia	-0.00958 (0.0288)	0.00342 (0.00463)	0.0620 (0.0445)	-0.0166 (0.0951)	-0.00882 (0.00649)	-0.0705 (0.0733)
Observations	1,640,415	2,798,784	2,798,784	346,039	1,355,256	1,355,256
R-squared	0.908	0.730	0.864	0.955	0.774	0.872
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

EU/UK exports: 27% increase in exports of sanctioned goods to CCA3

VARIABLES	(1) EU/UK log	(2) EU/UK non-zero	(3) EU/UK hyperbolic	(4) US log	(5) US non-zero	(6) US hyperbolic
Sanctioned x Russia	-0.806*** (0.0404)	-0.139*** (0.00720)	-2.282*** (0.0832)	-0.614*** (0.0892)	-0.0804*** (0.00922)	-1.164*** (0.114)
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Similar patterns for US exports

VARIABLES	(1) EU/UK log	(2) EU/UK non-zero	(3) EU/UK hyperbolic	(4) US log	(5) US non-zero	(6) US hyperbolic
Sanctioned x Russia	-0.806*** (0.0404)	-0.139*** (0.00720)	-2.282*** (0.0832)	-0.614*** (0.0892)	-0.0804*** (0.00922)	-1.164*** (0.114)
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EU/UK exports: 9% increase in exports of similar goods to CCA3

VARIABLES	(1) EU/UK Log trade	(2) EU/UK Non-zero trade	(3) EU/UK Hyperbolic trade	(4) US Log trade	(5) US Non-zero trade	(6) US Hyperbolic trade
Sanctioned x Russia	-0.844*** (0.0438)	-0.146*** (0.00769)	-2.402*** (0.0887)	-0.536*** (0.103)	-0.0950*** (0.0101)	-1.309*** (0.125)
Similar x Russia	-0.0879** (0.0436)	-0.0174** (0.00755)	-0.282*** (0.0829)	0.187* (0.108)	-0.0309*** (0.0113)	-0.310** (0.137)
Sanctioned x CCA3	0.303*** (0.0356)	0.0301*** (0.00460)	0.556*** (0.0482)	0.0520 (0.0842)	0.0123* (0.00679)	0.156** (0.0767)
Similar x CCA3	0.0864** (0.0420)	0.0183*** (0.00527)	0.198*** (0.0541)	-0.113 (0.0882)	0.00536 (0.00771)	0.0261 (0.0849)
Sanctioned x Georgia	-0.0416 (0.0323)	-0.000261 (0.00518)	0.0167 (0.0489)	-0.124 (0.107)	-0.0143* (0.00747)	-0.144* (0.0845)
Similar x Georgia	-0.0801** (0.0400)	-0.00924 (0.00602)	-0.113** (0.0575)	-0.278* (0.142)	-0.0120 (0.00842)	-0.161* (0.0931)
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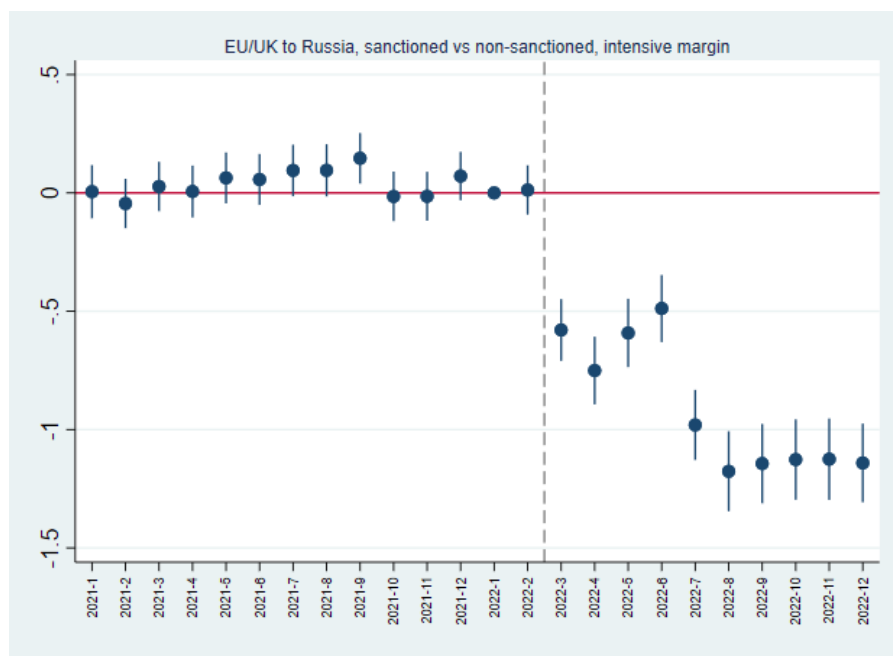
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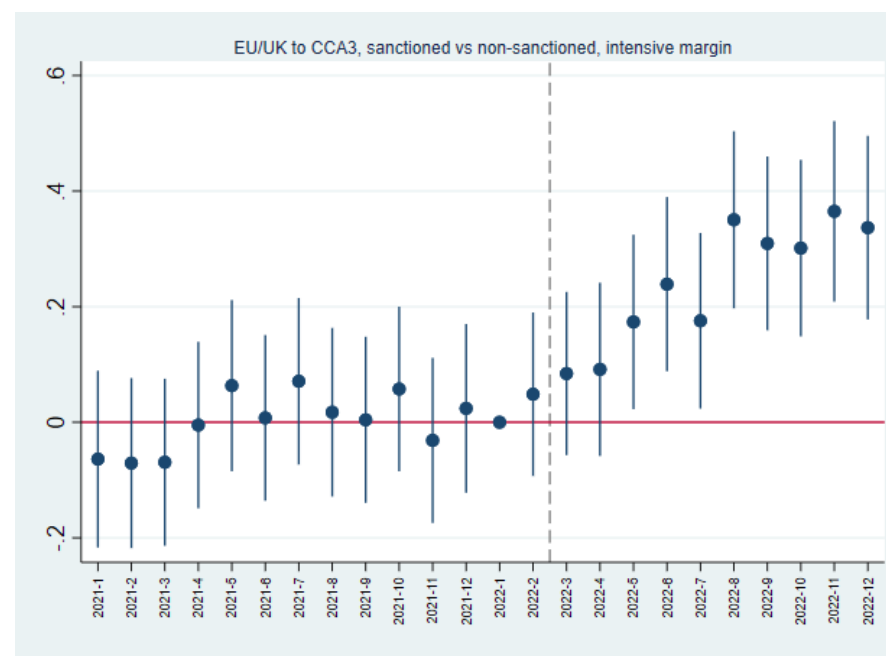
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Event study: EU/UK exports of sanctioned vs non-sanctioned goods (base = Jan'22; data since Jan 2020)

EU/UK exports to Russia: sanctioned vs non-sanctioned



EU/UK exports to CCA3: sanctioned vs non-sanctioned



Source: Authors' calculations, UN Comtrade. Coefficients on interaction terms with each month, 95% confidence intervals based on standard errors clustered at HS6 level. Goods classified into sanctioned (where EU sanctions apply at least partially as of Dec 2022), similar (not sanctioned but within the same HS4 as sanctioned) and other. Dependent variable = log trade; non-zero trade.

CCA3 exports to Russia increase by 55-75% in sanctioned goods and 50% in similar goods

VARIABLES	(1) Log trade	(2) Non-zero trade	(3) Hyperbolic trade	(4) Log trade	(5) Non-zero trade	(6) Hyperbolic trade
Sanctioned x Russia	0.546*** (0.0801)	0.0426*** (0.00642)	0.573*** (0.0667)	0.741*** (0.0862)	0.0673*** (0.00706)	0.826*** (0.0733)
Similar x Russia				0.503*** (0.108)	0.0625*** (0.00837)	0.642*** (0.0842)
Observations	165,172	1,161,174	1,161,174	165,172	1,161,174	1,161,174
R-squared	0.864	0.766	0.813	0.864	0.766	0.814
Month x Partner x Reporter FE	YES	YES	YES	YES	YES	YES
Month x HS6 x Reporter FE	YES	YES	YES	YES	YES	YES
HS6 x Partner x Reporter FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Distinguishing between types of sanctioned goods: Drop in direct exports in all categories

VARIABLES	EU log	EU non-zero	EU hyperbolic	US log	US non-zero	US hyperbolic
Luxury goods x Russia	-0.626*** (0.0608)	-0.00138 (0.0102)	-0.632*** (0.112)	-0.257 (0.203)	-0.0349** (0.0152)	-0.490** (0.194)
Industrial/transport capacity x Russia	-1.532*** (0.0963)	-0.402*** (0.0111)	-5.515*** (0.126)	-0.455* (0.252)	-0.0749*** (0.0181)	-0.961*** (0.223)
Oil and gas x Russia	-0.139 (0.260)	-0.0753 (0.0599)	-1.080 (0.747)	-1.355*** (0.461)	-0.0667 (0.0765)	-1.448 (0.905)
Dual-use and military technology x Russia	-0.745*** (0.0518)	-0.0983*** (0.00926)	-1.777*** (0.107)	-0.693*** (0.0959)	-0.103*** (0.0113)	-1.551*** (0.139)
Luxury goods x CCA3	0.0930** (0.0449)	0.00480 (0.00630)	0.293*** (0.0698)	0.257** (0.124)	-0.00296 (0.00927)	0.0122 (0.107)
Industrial/transport capacity x CCA3	0.406*** (0.0648)	0.0272*** (0.00739)	0.468*** (0.0793)	-0.0441 (0.0936)	0.00811 (0.0103)	0.0868 (0.115)
Oil and gas x CCA3	-0.119 (0.293)	-0.0370 (0.0228)	-0.112 (0.297)	0.259* (0.149)	-0.108*** (0.0328)	-0.929** (0.438)
Dual-use and military technology x CCA3	0.364*** (0.0391)	0.0307*** (0.00495)	0.569*** (0.0529)	0.0908 (0.0636)	0.0188*** (0.00706)	0.235*** (0.0792)
Observations	1,640,415	2,798,784	2,798,784	346,039	1,355,256	1,355,256
R-squared	0.908	0.731	0.864	0.955	0.774	0.872

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Distinguishing between types of sanctioned goods: Increase in intermediated trade in some categories

VARIABLES	EU log	EU non-zero	EU hyperbolic	US log	US non-zero	US hyperbolic
Luxury goods x Russia	-0.626*** (0.0608)	-0.00138 (0.0102)	-0.632*** (0.112)	-0.257 (0.203)	-0.0349** (0.0152)	-0.490** (0.194)
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Dual-use and military technology x CCA3	0.364*** (0.0391)	0.0307*** (0.00495)	0.569*** (0.0529)	0.0908 (0.0636)	0.0188*** (0.00706)	0.235*** (0.0792)
Observations	1,640,415	2,798,784	2,798,784	346,039	1,355,256	1,355,256
R-squared	0.908	0.731	0.864	0.955	0.774	0.872

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Arm, Aze, Geo, Kaz, Kyr., Mongolia, Rus, Turkiye and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

CCA3 exports to Russia of industrial capacity goods and dual-use technology up by extra 90% relative to exports of non-sanctioned goods

VARIABLES	(1) Log	(2) Non-zero	(3) Hyperbolic
Luxury goods x Russia	-0.0180 (0.0979)	-0.00486 (0.00900)	0.0504 (0.0920)
Industrial/transport capacity x Russia	0.891*** (0.167)	0.0711*** (0.0122)	0.875*** (0.129)
Oil and gas x Russia	-1.228 (0.806)	0.0877 (0.0891)	0.540 (1.080)
Dual-use and military technology x Russia	0.873*** (0.103)	0.0649*** (0.00813)	0.827*** (0.0855)
Observations	165,172	1,161,174	1,161,174
R-squared	0.864	0.766	0.814
Month x Partner x Reporter FE	YES	YES	YES
Month x HS6 x Reporter FE	YES	YES	YES
HS6 x Partner x Reporter FE	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Exit of Western exporters created opportunities for China

VARIABLES	(7) China log	(8) China non-zero	(9) China hyperbolic	(10) Turkiye log	(11) Turkiye non-zero	(12) Turkiye hyperbolic
Sanctioned x Russia	0.161*** (0.0326)	0.0286*** (0.00585)	0.420*** (0.0689)	0.0895 (0.0572)	-0.00165 (0.00739)	0.0726 (0.0784)
Sanctioned x CCA3	0.137*** (0.0334)	0.0202*** (0.00432)	0.250*** (0.0518)	0.214*** (0.0474)	-0.0191*** (0.00519)	-0.130** (0.0528)
Sanctioned x Georgia	0.0723* (0.0422)	0.0183*** (0.00568)	0.207*** (0.0635)	-0.00660 (0.0405)	0.000107 (0.00583)	0.0468 (0.0580)
Observations	1,121,393	2,239,704	2,239,704	698,558	1,785,325	1,785,325
R-squared	0.894	0.704	0.834	0.881	0.690	0.795
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

China's exports of industrial capacity and dual-use sanctioned goods to Russia have increased by extra 25-50% relative to other goods

VARIABLES	China log	China non-zero	China hyperbolic	Turkey log	Turkey non-zero	Turkey hyperbolic
Luxury goods x Russia	-0.218*** (0.0462)	-0.0117 (0.00880)	-0.298*** (0.0967)	-0.475*** (0.0679)	-0.0563*** (0.0108)	-0.654*** (0.110)
Industrial/transport capacity x Russia	0.492*** (0.0683)	0.0893*** (0.0116)	1.195*** (0.134)	0.574*** (0.126)	0.0363*** (0.0136)	0.540*** (0.152)
Oil and gas x Russia	0.0456 (0.241)	-0.0578 (0.0486)	-0.801 (0.723)	-0.119 (0.271)	0.0944 (0.0970)	0.903 (0.914)
Dual-use and military technology x Russia	0.253*** (0.0381)	0.0197*** (0.00732)	0.429*** (0.0894)	0.368*** (0.0712)	0.0222** (0.00984)	0.408*** (0.105)
Luxury goods x CCA3	0.227*** (0.0494)	0.0187*** (0.00630)	0.384*** (0.0725)	0.274*** (0.0597)	-0.0376*** (0.00790)	-0.198** (0.0779)
Industrial/transport capacity x CCA3	-0.0339 (0.0669)	-0.00391 (0.00689)	-0.144* (0.0769)	0.151* (0.0894)	0.0191** (0.00896)	0.156* (0.0920)
Oil and gas x CCA3	-0.0589 (0.256)	-0.0372 (0.0274)	-0.493 (0.342)	0.0656 (0.343)	0.0668** (0.0269)	0.646** (0.300)
Dual-use and military technology x CCA3	0.0909** (0.0394)	0.0246*** (0.00529)	0.260*** (0.0643)	0.147** (0.0589)	-0.00803 (0.00668)	-0.0567 (0.0665)
Observations	1,121,393	2,239,704	2,239,704	698,425	1,733,869	1,733,869
R-squared	0.894	0.704	0.834	0.881	0.687	0.795

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Arm, Aze, Geo, Kaz, Kyr., Mongolia, Rus, Turkiye and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially. Sanction groupings are exhaustive and mutually exclusive. All regressions

include month x importer, month x HS6 and HS6 x importer fixed effects

Unit value analysis: Did sanctions differentially affect prices as reported by *exporters*?

Unit values are computed as *primaryvalue* divided by *quantity* (in HS6-specific units)

Log regression of a unit value, triple-difference interactions: Importer type (Rus / CCA3 / Georgia) * Product type (Sanctioned / Similar)

- Sanctioned / similar becomes 1 when sanctions are in effects
- Effects for sanctioned goods over and above broad-based decline / pickup in trade

Note exporter price is not the same as price paid by consumers at the end of a lengthened supply chain

Account separately for luxury goods where sanctions depend on unit values

$$\text{Log}(\text{Unitvalue})_{tpi} = \beta_1 \text{Sanct}_{p,t} \times \text{Rus}_i + \beta_2 \text{Sanct}_{p,t} \times \text{CCA3}_i + \beta_3 \text{Sanct}_{p,t} \times \text{Geo}_i + \alpha_{it} + \alpha_{pt} + \alpha_{pi} + \varepsilon_{tpi}$$

Exporters' unit value are 10% up in trade with Russia for part-sanctioned goods; but down 20% for luxury goods; up 6% for luxury sanctioned to CCA3

Dep. var: log of unit values	(1)	(2)	(3)
VARIABLES	Baseline	Luxury vs non-luxury	Sanction type
Sanctioned x Russia	-0.0392* (0.0214)	0.0978*** (0.0272)	
Luxury goods x Russia		-0.202*** (0.0283)	-0.208*** (0.0306)
Industrial/transport capacity x Russia			0.166*** (0.0443)
Oil and gas x Russia			-0.0933 (0.149)
Dual-use and military technology x Russia			0.0369 (0.0296)
Sanctioned x CCA3	0.0149 (0.0179)	-0.0335 (0.0221)	
Luxury goods x CCA3		0.0601** (0.0234)	0.0526** (0.0252)
Industrial/transport capacity x CCA3			-0.0318 (0.0331)
Oil and gas x CCA3			0.0536 (0.159)
Dual-use and military technology x CCA3			-0.00865 (0.0246)
Observations	1,186,114	1,186,114	1,186,114
R-squared	0.917	0.917	0.917
Month x Partner FE	YES	YES	YES
Month x HS6 FE	YES	YES	YES
HS6 x Partner FE	YES	YES	YES

Standard errors clustered on HS6 in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations based on UN Comtrade. Sanctioned refers to HS6 product lines where sanctions apply at least partially.

Conclusions

- Evidence suggestive of some **sanctioned goods finding their way to the Russian market**
- Overall, **the replacement rate is low**, though it may be high in particular products
- **Trade diversion:** increased exports from China
- In the case of exports sanctions, incentives are not aligned: free rider problem

The results are robust to using HS6-specific time-invariant sanctioned dummy (for instance, as of December 2022)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EU	EU	EU	US	US	US
	log	non-zero trade	hyperbolic	log	non-zero trade	hyperbolic
Post x Sanction x Russia	-0.856*** (0.0423)	-0.148*** (0.00744)	-2.432*** (0.0848)	-0.912*** (0.115)	-0.0927*** (0.00995)	-1.350*** (0.123)
Post x Sanction x CCA3	0.300*** (0.0342)	0.0227*** (0.00430)	0.501*** (0.0456)	0.0877 (0.0703)	0.0133** (0.00633)	0.179** (0.0708)
Post x Sanction x Georgia	-0.00935 (0.0303)	0.00111 (0.00479)	0.0373 (0.0458)	0.0311 (0.108)	-0.00805 (0.00695)	-0.0593 (0.0783)
Observations	1,640,415	2,798,784	2,798,784	346,039	1,355,256	1,355,256
R-squared	0.908	0.730	0.864	0.955	0.774	0.872
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

Some evidence of increases in EU/UK exports of sanctioned goods to UAE and Vietnam relative to other goods

VARIABLES	(1) EU log	(2) EU non-zero trade	(3) EU hyperbolic	(4) US log	(5) US non-zero trade	(6) US hyperbolic	(7) China log	(8) China non-zero trade	(9) China hyperbolic	(10) Turkey log	(11) Turkey non-zero trade	(12) Turkey hyperbolic
Sanctioned x Russia	-0.804*** (0.0404)	-0.140*** (0.00721)	-2.287*** (0.0831)	-0.611*** (0.0878)	-0.0805*** (0.00916)	-1.159*** (0.113)	0.161*** (0.0326)	0.0286*** (0.00585)	0.420*** (0.0689)	0.0877 (0.0571)	0.00328 (0.00296)	0.191*** (0.0717)
Sanctioned x CCA3	0.265*** (0.0325)	0.0224*** (0.00411)	0.471*** (0.0439)	0.0962* (0.0578)	0.0119** (0.00573)	0.148** (0.0640)	0.137*** (0.0334)	0.0202*** (0.00432)	0.250*** (0.0518)	0.216*** (0.0471)	0.00230 (0.00283)	0.300*** (0.0644)
Sanctioned x Georgia	-0.00476 (0.0288)	0.00364 (0.00461)	0.0614 (0.0444)	-0.00629 (0.0948)	-0.00420 (0.00630)	-0.0322 (0.0706)	0.0723* (0.0422)	0.0183*** (0.00568)	0.207*** (0.0635)	0.00256 (0.0404)	0.00285 (0.00300)	0.109* (0.0599)
Sanctioned x UAE/Vietnam	0.0904*** (0.0209)	0.00644* (0.00330)	0.101*** (0.0362)	0.0648*** (0.0236)	0.00365 (0.00407)	0.0494 (0.0477)				0.193*** (0.0463)	0.00173 (0.00293)	0.261*** (0.0638)
Observations	2,112,542	3,514,824	3,514,824	620,927	1,982,736	1,982,736	1,121,393	2,239,704	2,239,704	829,457	849,211	849,211
R-squared	0.888	0.711	0.843	0.937	0.730	0.831	0.894	0.704	0.834	0.863	0.771	0.832
Month x Partner FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses

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

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye, UAE, Vietnam and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

EU/UK exports: 86% greater drop in exports of sanctioned goods to Russia

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EU	EU	EU	US	US	US
	log	non-zero trade	hyperbolic	log	non-zero trade	hyperbolic
Post x Sanctioned x Russia	-0.856*** (0.0423)	-0.149*** (0.00745)	-2.437*** (0.0847)	-0.907*** (0.113)	-0.0923*** (0.00986)	-1.340*** (0.121)
Post x Sanctioned x CCA3	0.296*** (0.0340)	0.0231*** (0.00431)	0.503*** (0.0456)	0.0848 (0.0666)	0.0146** (0.00613)	0.176** (0.0683)
Post x Sanctioned x Georgia	-0.00874 (0.0302)	0.00142 (0.00478)	0.0373 (0.0457)	0.0438 (0.107)	-0.00354 (0.00674)	-0.0240 (0.0754)
Post x Sanctioned x UAE/Vietnam	0.0752*** (0.0218)	0.00363 (0.00340)	0.0559 (0.0374)	0.0484** (0.0243)	0.00418 (0.00421)	0.0458 (0.0493)
Observations	2,112,542	3,514,824	3,514,824	620,927	1,982,736	1,982,736
R-squared	0.888	0.711	0.843	0.937	0.730	0.831
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye, UAE, Vietnam and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

EU/UK exports: 30% increase in exports of sanctioned goods to CCA3

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EU	EU	EU	US	US	US
	log	non-zero trade	hyperbolic	log	non-zero trade	hyperbolic
Post x Sanctioned x Russia	-0.856*** (0.0423)	-0.149*** (0.00745)	-2.437*** (0.0847)	-0.907*** (0.113)	-0.0923*** (0.00986)	-1.340*** (0.121)
Post x Sanctioned x CCA3	0.296*** (0.0340)	0.0231*** (0.00431)	0.503*** (0.0456)	0.0848 (0.0666)	0.0146** (0.00613)	0.176** (0.0683)
Post x Sanctioned x Georgia	-0.00874 (0.0302)	0.00142 (0.00478)	0.0373 (0.0457)	0.0438 (0.107)	-0.00354 (0.00674)	-0.0240 (0.0754)
Post x Sanctioned x UAE/Vietnam	0.0752*** (0.0218)	0.00363 (0.00340)	0.0559 (0.0374)	0.0484** (0.0243)	0.00418 (0.00421)	0.0458 (0.0493)
Observations	2,112,542	3,514,824	3,514,824	620,927	1,982,736	1,982,736
R-squared	0.888	0.711	0.843	0.937	0.730	0.831
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye, UAE, Vietnam and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

EU/UK exports: 10% increase in exports of similar goods to CCA3

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EU	EU	EU	US	US	US
	log	non-zero trade	hyperbolic	log	non-zero trade	hyperbolic
Post x Sanctioned x Russia	-0.908*** (0.0482)	-0.160*** (0.00813)	-2.596*** (0.0927)	-0.796*** (0.160)	-0.112*** (0.0113)	-1.542*** (0.140)
Post x Similar x Russia	-0.117** (0.0507)	-0.0258*** (0.00844)	-0.367*** (0.0907)	0.216 (0.172)	-0.0408*** (0.0136)	-0.417** (0.163)
Post x Sanctioned x CCA3	0.340*** (0.0384)	0.0336*** (0.00506)	0.623*** (0.0527)	0.0362 (0.0985)	0.0179** (0.00737)	0.198** (0.0827)
Post x Similar x CCA3	0.0970** (0.0473)	0.0241*** (0.00592)	0.273*** (0.0597)	-0.0928 (0.111)	0.00724 (0.00883)	0.0495 (0.0962)
Post x Sanctioned x Georgia	-0.0520 (0.0350)	-0.00117 (0.00550)	0.00283 (0.0515)	-0.114 (0.116)	-0.0115 (0.00800)	-0.122 (0.0900)
Post x Similar x Georgia	-0.106** (0.0453)	-0.00642 (0.00693)	-0.0849 (0.0661)	-0.383** (0.163)	-0.0170* (0.00989)	-0.211* (0.109)
Post x Sanctioned x UAE/Vietnam	0.0572** (0.0253)	0.00429 (0.00403)	0.0552 (0.0434)	0.0619** (0.0287)	0.00584 (0.00490)	0.0654 (0.0578)
Post x Similar x UAE/Vietnam	-0.0417 (0.0323)	0.00167 (0.00483)	-0.00109 (0.0518)	0.0294 (0.0351)	0.00392 (0.00591)	0.0466 (0.0687)
Observations	2,112,542	3,514,824	3,514,824	620,927	1,982,736	1,982,736
R-squared	0.888	0.711	0.843	0.937	0.730	0.831
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors clustered on HS6 in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye, UAE, Vietnam and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.

Exit of Western exporters created opportunities for China and Turkiye

	(7)	(8)	(9)	(10)	(11)	(12)
	China	China	China	Turkey	Turkey	Turkey
VARIABLES	log	non-zero trade	hyperbolic	log	non-zero trade	hyperbolic
Post x Sanctioned x Russia	0.174*** (0.0339)	0.0290*** (0.00607)	0.412*** (0.0712)	0.168*** (0.0574)	0.00408 (0.00292)	0.283*** (0.0715)
Post x Sanctioned x CCA3	0.123*** (0.0350)	0.0175*** (0.00449)	0.187*** (0.0533)	0.277*** (0.0478)	0.00312 (0.00277)	0.372*** (0.0643)
Post x Sanctioned x Georgia	0.0879** (0.0434)	0.0216*** (0.00591)	0.222*** (0.0653)	0.0608 (0.0403)	0.00510* (0.00290)	0.197*** (0.0585)
Post x Sanctioned x UAE/Vietnam				0.196*** (0.0469)	0.00412 (0.00285)	0.305*** (0.0629)
Observations	1,121,393	2,239,704	2,239,704	829,457	849,211	849,211
R-squared	0.894	0.704	0.834	0.863	0.771	0.832
Month x Partner FE	YES	YES	YES	YES	YES	YES
Month x HS6 FE	YES	YES	YES	YES	YES	YES
HS6 x Partner FE	YES	YES	YES	YES	YES	YES

Standard errors are clustered at the HS6 level. *, **, *** denote statistical significance at the 10%, 5% and 1% levels. Importer economies comprise Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz R., Mongolia, Russia, Turkiye, UAE, Vietnam and the rest of the world (aggregated). Sanctioned refers to HS6 product lines where EU sanctions apply at least partially.