Trading around Geopolitics

Giancarlo Corsetti [1] Banu Demir [2] Beata Javorcik [3]

[1]EUI and CEPR

[2]Oxford, Bilkent, and CEPR

[3]Oxford, EBRD, and CEPR

Erwit, Oxford
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Introduction

- Complex implications of economic sanctions for int'l trade flows
  - (Virtually) discontinued trade flows from sanctioning countries
  - Exporters from non-sanctioning economies step in to fill the gap
- Exporters trade off higher profits from a sanctioned markets with
  - heightened risk of reputational damage
  - higher transaction costs
  - greater risk of non-payment

This paper

- A **theoretical and empirical framework** to study the **trade-off** between **increased business opportunities** and **heightened costs and risks** when trading with countries under sanctions
- Empirical setting exploits the response of **Turkish exporters** to the implementation of comprehensive Western **sanctions on Russia** following its full-scale invasion of Ukraine **in 2022**

Russian Sanctions

- Western sanctions on Russia targeted a wide range of exports: e.g. arms, advanced and dual-use technology, and luxury products
- Russian financial institutions were disconnected from the SWIFT system, making trade with Russia more costly for firms dealing in Western currencies
- Most sanctions were in place by the end of March 2022
- This sanctions episode stands out in terms of its comprehensiveness and the size of the sanctioned economy (11th largest in 2021)

▸ Russia's trade profile

- Turkiye **does not** impose sanctions

Threat of secondary sanctions

- Secondary sanctions aim to prevent third parties from trading with countries subject to sanctions imposed by another country, even if these third parties are not citizens of the sanctioning country or based in the sanctioning country
- E.g., when the US reinstated sanctions against Iran, it reinstated secondary sanctions for non-US persons trading with Iran
- The most severe punishment is the loss of access to the financial system in the U.S. and to U.S. financial institutions, located elsewhere
- This measure effectively bars the sanctioned party from doing business with customers and suppliers in the U.S., since it prevents access to the currency

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Austria's Raiffeisen faces US wrath over Russian business

May 16, 2024 - 07:59 5 minutes

LONDON/FRANKFURT (Reuters) -The U.S. Treasury has warned Austria's Raiffeisen Bank International (RBI) that its access to the U.S. financial system could be restricted because of its Russian dealings, according to a person who has seen a letter detailing the threat.

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French company Auchan supporting Russia's war effort in Ukraine, report says

Investigation says some Auchan employees in Russia collected donated goods that were then sent for free to the frontlines.

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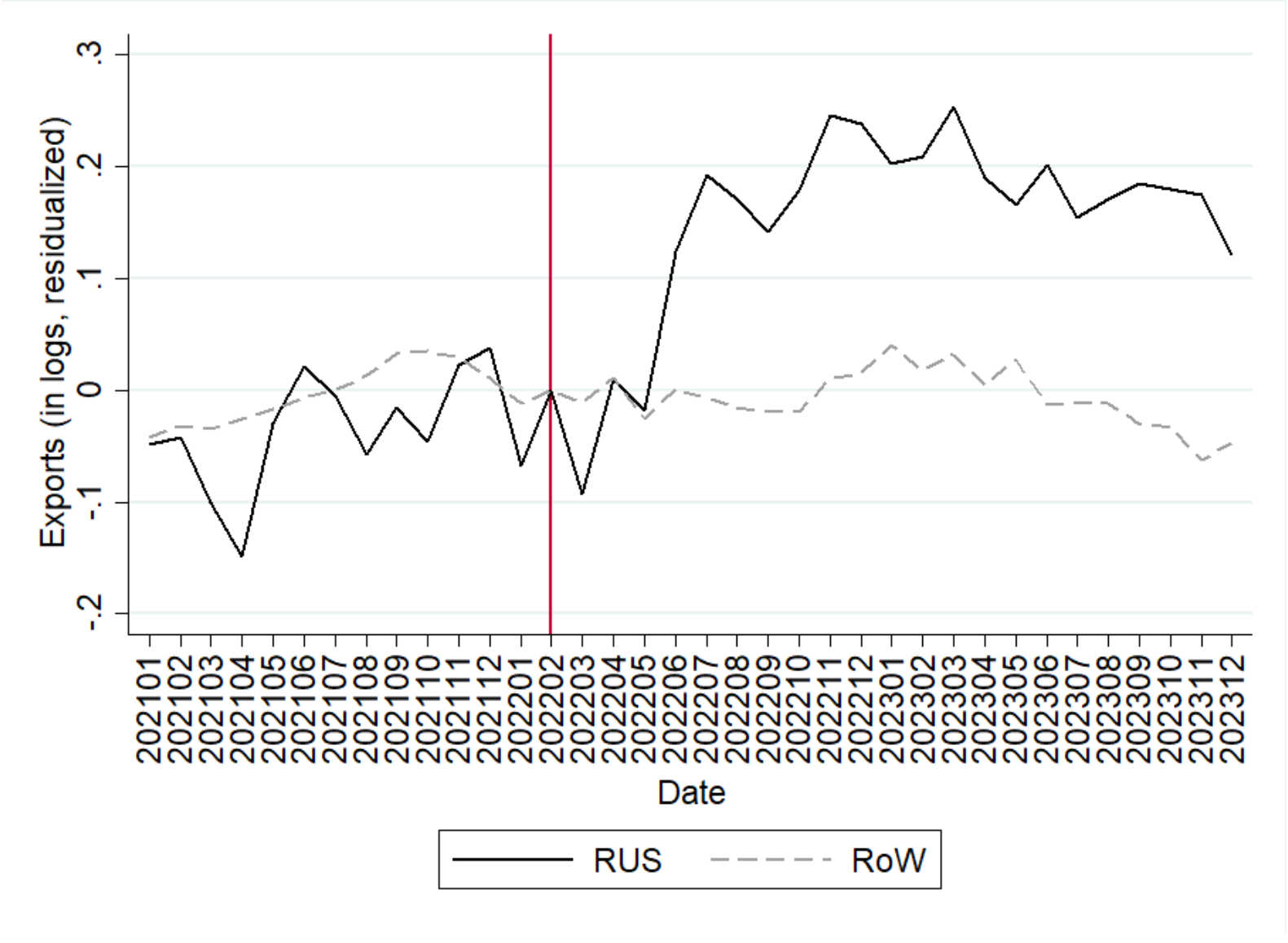
The report immediately triggered reactions from the Ukrainian government | Attila Kisbenedek/AFP via Getty Images

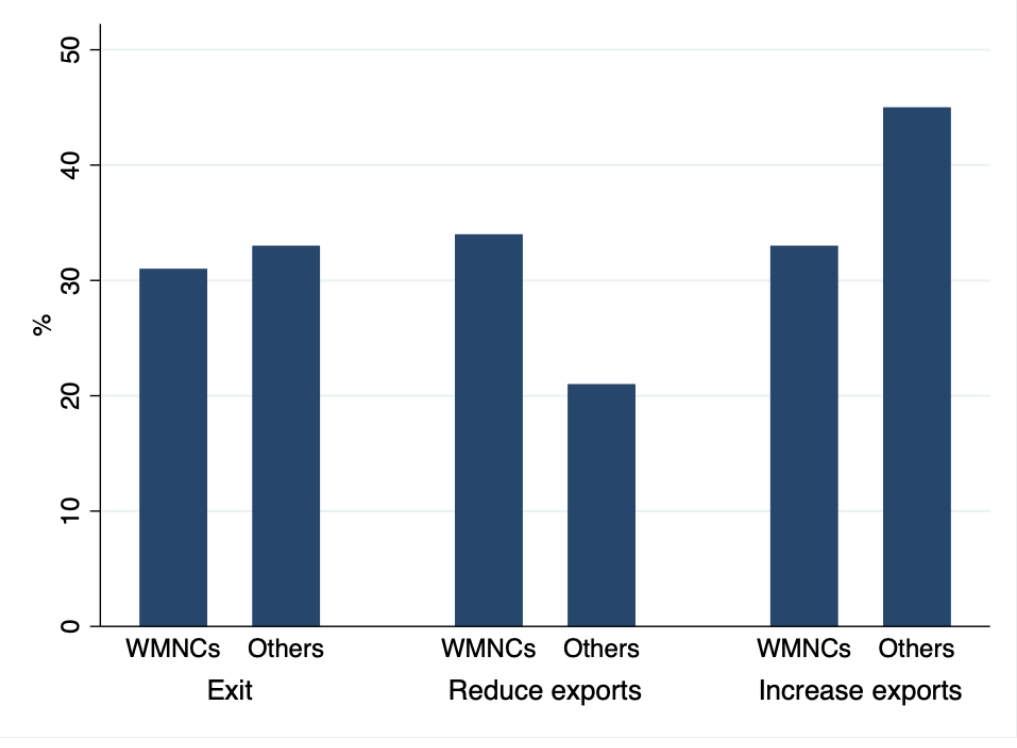
FEBRUARY 17, 2023 4:26 PM CET
BY GIORGIO LEALI

Monthly (residualized) Turkish exports by destination



Preview of the results

- **Heterogeneous firm response to sanctions** at the extensive and intensive margins
- Out of 9,759 Turkish firms and 283 Western MNCs exporting to Russia pre-invasion:



Preview of the results

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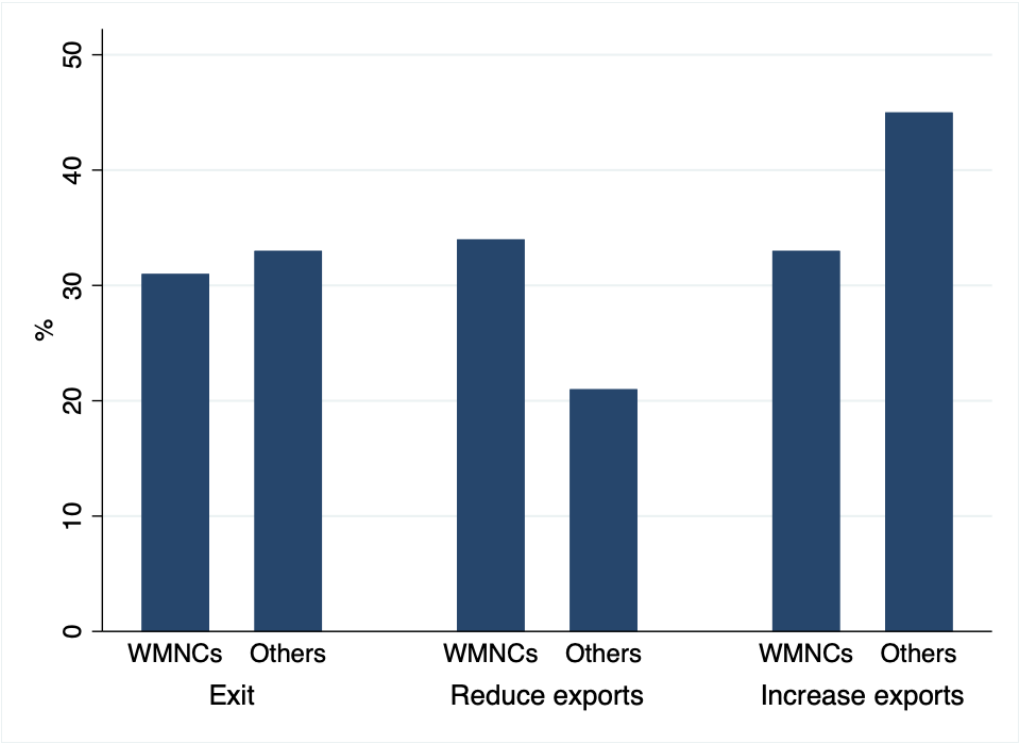


- The share of Western MNCs in exports to Russia **shrinks from 16 to 5%**.

⏩ Entry

Preview of the results

- The 6,692 firms continuing to export to Russia **adjust along several margins**:
  - invoicing currency choice—less in dollars, more in Turkish liras
  - payment method choice—more cash in advance (CIA)
  - prices and markups— both go up

- **Risk of secondary sanctions and reputation loss matters**
  - Virtually no increase in exports to Russia by Western MNCs
  - Annualized **foregone revenues amount to around 50 million USD** for an average Turkish affiliate of a Western MNC

  Reputational risk effect **equivalent to tariffs of 25%** under Fontagne et al. (2022) estimates of trade elasticities, but can rise **above 300%** in the estimates of short-run elasticities by Boehm et al. (2023)

Literature

- **Impact of wars and sanctions:**
  Glick and Taylor (2010); Fisman, Hamao, and Wang (2014); Haidar (2017); Crozet and Hinz (2020); Ahn and Ludema (2020); Crozet, Hinz, Stammann, and Wanner (2021); Draca, Garred, Stickland, and Warrinnier (2022); Chupilkin, Javorcik, and Plekhanov (2023); Chupilkin, Javorcik, Peeva, and Plekhanov (2024)

- **Currency of invoicing:**
  Bacchetta and van Wincoop (2005); Corsetti and Pesenti (2002); Goldberg and Tille (2008); Amiti, Itskhoki, and Konings (2020); Gopinath, Itskhoki, and Rigobon (2010)

Data

- Monthly firm-level exports data from Turkiye for the 2021-2023 period, including information on HS8 products, destination countries, payment methods, and invoicing currencies
- Firm registry reports industry of operation and ownership structure
- Exclude re-exports from the sample—a related but different question: possible sanction violations
- Baseline sample consists of $\approx$ 18,000 firms

Setup

- Builds on Crowley, Han, and Son (2023) and Schmidt-Eisenlohr (2013)
- Assume oligopolistic competition, Cobb-Douglas production technology combining labor and intermediate inputs
- f, o, d, t, c denote firm, origin country, destination country, time and currency of denomination
- ρ_i, η denote elasticities within and across industries
- Revenue of a firm:

$$R^c_{f,o,d,t} = \left[q_{f,o,d,t} \left[\underbrace{\Omega_{f,o,d,t} \left[p^c_{f,o,d,t} e^c_{o,d,t} \right]}_{\substack{\text{revenue conditional on} \\ \text{a given payment method}}} \right] \right]$$

Predictions

- With sticky prices, expected profits from choosing RUB or a vehicle currency relative to own currency *TRY* is proportional to:

$$\lambda_{fd}\Bigg[\underbrace{\frac{\Gamma_{fd}}{1+\Gamma_{fd}}(\zeta^{\mathsf{CI}}_{(-f)d}-\zeta^{TRY}_{(-f)d})}_{\textbf{Strategic complementarity}}+\underbrace{\frac{1}{1+\Gamma_{fd}}(\psi^{\mathsf{CI}}_{f}-\psi^{TRY}_{f})}_{\textbf{Operational hedging}}\Bigg]$$

$$-\underbrace{(F^{\mathsf{C0}}_{fd}-F^{TRY}_{fd})}_{\textbf{Financial cost}}-\underbrace{\Delta\Phi^{CI,TRY}_{f}}_{\textbf{Reputational risk}}$$

  - $\mathbb{E}[\Pi^{c}_{fd}]$ is expected profit from invoicing in currency c;
  - λ_{fd} is a positive, non-stochastic term, related to the second derivative of the operational profit function;
  - Γ_{fd} is the markup elasticity,
  - $\zeta^{c}_{(-f)d}$ denotes a firm f's competitors' invoicing share of currency c;
  - ψ^{c}_{f} is the firm's share of imports invoiced in currency c;
  - F^{c}_{fd} is the cost of invoicing in a foreign currency c;
  - Φ^{C0}_{f} expected losses by firm from trading with Russia in a particular currency, conditional on this trade prompting retaliatory measures.

Baseline empirical results

Empirical specification

- Standard Diff-In-Diff (DID) and Event Study (ES) specification, comparing Turkish exports to Russia with Turkish exports to RoW.
- DID:

$$Y_{fpdt} = \beta \text{Post}_t \times \text{RUS}_d + \alpha_{fpd} + \alpha_{pt} + \alpha_{ft} + e_{fpdt}$$

  - $\text{Post}_t = 1$ for the post-invasion period, i.e. after February 2022
  - $\text{RUS}_d = 1$ for Russia, and $= 0$ for other countries
  - Rich set of fixed effects:
    - firm-product-destination (fpd)
    - product-time (pt)
    - firm-time (ft)

- Event study:

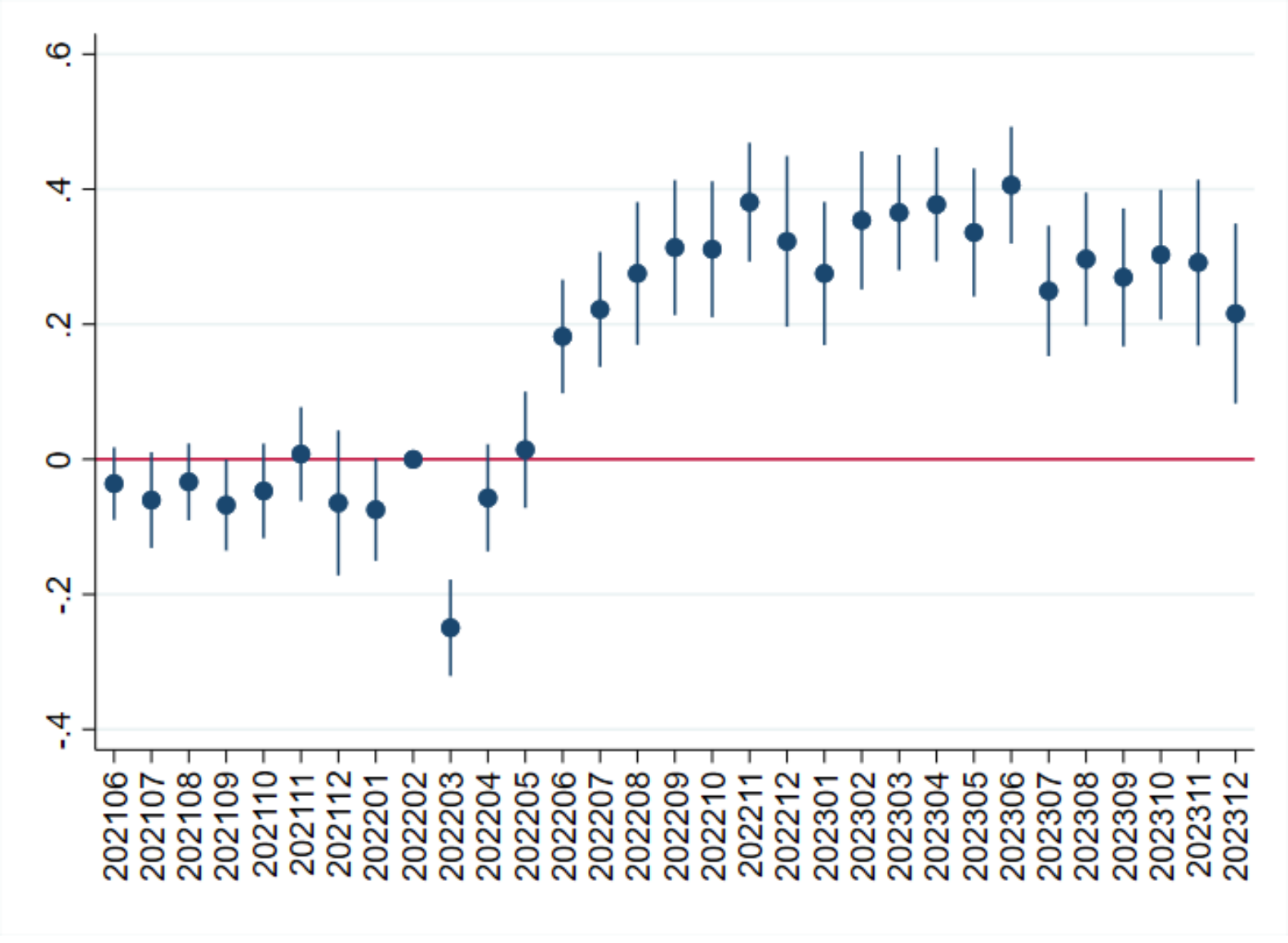
$$Y_{fpdt} = \sum_{l=-7}^{11} \beta^l \times 1_{t=l} \times \text{RUS}_d + \alpha_{fpd} + \alpha_{pt} + \alpha_{ft} + \epsilon_{fpdt}$$

Large increase in exports to Russia

Dep. Variable:	Log Value (1)	Log Quantity (2)
$\text{Post}_t \times \text{RUS}_d$	**0.284a**	**0.249a**
	(0.0273)	(0.0282)
Fixed Effects :		
Firm×Product×Country	✓	✓
Product×Time	✓	✓
Firm×Time	✓	✓
R^2	0.867	0.897
# observations	14436818	14436818

⏩ Product type

Event study estimates for export value



Affiliates of Western MNCs behave differently ⇒ threat of **secondary sanctions** and **reputational** risk

Dep. Variable:	Log Value (1)	Log Quantity (2)
$\text{Post}_t \times \text{RUS}_d$	0.300a	0.266a
	(0.0271)	(0.0276)
$\text{Post}_t \times \text{RUS}_d \times \text{Western MNC}_f$	**-0.215b**	**-0.214b**
	(0.103)	(0.106)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.867	0.897
# observations	14436818	14436818

Is it the **threat of secondary sanctions** or **reputational risk**?

Dep. Variable:	Log Value	Log Quantity	Log Value	Log Quantity
	Non-sanctioned		Sanctioned	
	(1)	(2)	(3)	(4)
$Post_t \times RUS_d$	0.216a	0.196a	0.369a	0.322a
	(0.0220)	(0.0216)	(0.0385)	(0.0396)
$Post_t \times RUS_d \times$Western MNC_f	**-0.398b**	**-0.371b**	**-0.209c**	**-0.202c**
	(0.170)	(0.183)	(0.111)	(0.115)
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
R^2	0.884	0.914	0.856	0.882
# observations	6624252	6624252	7503862	7503862

Which MNCs are more exposed to reputational risk?

Dep. Variable:	Log Value (1)	Log Quantity (2)
$\text{Post}_t \times \text{RUS}_d$	0.299a	0.265a
	(0.0275)	(0.0281)
$\text{Post}_t \times \text{RUS}_d \times \text{Western MNC}_f$	**-0.214c**	**-0.213c**
	(0.115)	(0.116)
$\text{Post}_t \times \text{RUS}_d \times \text{Other MNC}_f$	0.0717	0.0464
	(0.0904)	(0.0949)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.867	0.897
# observations	14436818	14436818

Is it firm size rather than ownership?

- Control for firm size in terms of employment (or total sales)
- $Large_f = 1$ for domestic exporters above the mean size threshold

Dep. Variable:	Log Value		Log Quantity	
Size measure	Employment	Sales	Employment	Sales
	(1)	(2)	(3)	(4)
$Post_t \times RUS_d$	0.295a	0.281a	0.266a	0.249a
	(0.0512)	(0.0576)	(0.0501)	(0.0534)
$Post_t \times RUS_d \times$Western MNC_f	**-0.210c**	**-0.196c**	**-0.214c**	**-0.197c**
	(0.112)	(0.115)	(0.112)	(0.113)
$Post_t \times RUS_d \times$Other MNC_f	0.0760	0.0902	0.0454	0.0621
	(0.100)	(0.104)	(0.104)	(0.105)
$Post_t \times RUS_d \times Large_f$	0.00694	0.0276	-0.00170	0.0234
	(0.0599)	(0.0649)	(0.0600)	(0.0627)
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
R^2	0.867	0.867	0.897	0.897
# observations	14436818	14436818	14436818	14436818

US ownership matters the most

- US Share$_f$ denotes share of US ownership in %

Dep. Variable:	Log Value	Log Quantity
	(1)	(2)
Post$_t$ × RUS$_d$	0.295a	0.266a
	(0.0512)	(0.0501)
Post$_t$ × RUS$_d$ × Western MNC$_f$	-0.107	-0.0926
	(0.0939)	(0.0982)
Post$_t$ × RUS$_d$ × US Share$_f$	**-0.032a**	**-0.037a**
	(0.0084)	(0.0102)
Post$_t$ × RUS$_d$ × Other MNC$_f$	0.0761	0.0454
	(0.100)	(0.104)
Post$_t$ × RUS$_d$ × Large$_f$	0.00695	-0.00170
	(0.0599)	(0.0600)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.867	0.897
# observations	14436818	14436818

Margins of adjustment

Exit: More likely among Western MNCs

$$\text{Exit}_{fd} = \beta_1 \text{RUS}_d + \beta_2 \text{RUS}_d \times \text{Western MNC}_f + \alpha_f + e_{fd}$$

Dep. Vrb.: Dummy for exiting a country after Feb 2022				
	(1)	(2)	(3)	(4)
RUS_d	-0.0372a	-0.0429a		-0.0495a
	(0.00469)	(0.00475)		(0.00791)
$\text{RUS}_d \times$ Western MNC_f		**0.168a**	**0.176a**	**0.177a**
		(0.0284)	(0.0284)	(0.0296)
$\text{RUS}_d \times$ US Share_f				-0.0746
				(0.230)
$\text{RUS}_d \times$ Other MNC_f				0.130a
				(0.0487)
$\text{RUS}_d \times$ Large_f				0.00845
				(0.00991)
Fixed Effects :				
Firm	✓	✓	✓	✓
Country			✓	
R^2	0.334	0.334	0.360	0.334
# observations	447789	447789	447789	447789

Continuing exporters to Russia: Western MNCs reduced their exports

Dependent Variable:	Log Value (1)	Log Quantity (2)
$\text{Post}_t \times \text{RUS}_d$	0.299a	0.264a
	(0.0273)	(0.0279)
$\text{Post}_t \times \text{RUS}_d \times \text{Western MNC}_f$	**-0.213c**	**-0.211c**
	(0.116)	(0.117)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.874	0.900
# observations	5707558	5707558

▸ Interactions with US ownership

Continuing exporters: Adjustment of payment methods and invoicing currency

Dependent Variable:	Share of CIA-based exports (1)	Share of TRY-den. exports (2)	Share of USD-den. exports (3)	Share of EUR-den. exports (4)
$Post_t \times RUS_d$	**0.0643a**	**0.0462a**	**-0.0526c**	**-0.0315a**
	(0.0185)	(0.00771)	(0.0274)	(0.0100)
$Post_t \times RUS_d \times$ Western MNC_f	-0.00475	**-0.0420a**	0.0361	0.0412
	(0.0590)	(0.00806)	(0.0428)	(0.0263)
Fixed Effects :				
Firm × Product × Country	✓	✓	✓	✓
Product × Time	✓	✓	✓	✓
Firm × Time	✓	✓	✓	✓
R^2	0.889	0.826	0.891	0.893
# observations	5707558	5707558	5707558	5707558

▸ Channels

Continuing exporters: all increase prices and markups

- Markup estimation follows Corsetti, Crowley, Han, and Song (2023) Details

	(1)	(2)	(3)	(4)
	Log of unit value		Log of markups	
$\text{Post}_t \times \text{RUS}_d$	**0.0367a**	**0.0347b**	**0.0406a**	**0.0409a**
	(0.0129)	(0.0135)	(0.0104)	(0.0106)
$\text{Post}_t \times \text{RUS}_d \times$ Western MNC_f		0.0274		-0.00433
		(0.0453)		(0.0464)
R^2	0.926	0.926	0.0001	0.0001
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
# observations	6059902	6059902	6059902	6059902

Continuing exporters:US affiliates less likely to export new products to Russia

$$\text{New Product}_{fpd} = \delta_1 \text{RUS}_d + \delta_2 \text{RUS}_d \times \text{Western MNC}_f + \alpha_{fp} + e_{fpd}$$

Dep. Vrb.:	Dummy for exporting a new product to a country			
	(1)	(2)	(3)	(4)
RUS_d	0.00248a	0.0373a		0.0958a
	(0.000113)	(0.00167)		(0.0118)
$\text{RUS}_d \times$ Western MNC_f		**-0.0363a**	**-0.0342a**	0.466b
		(0.00177)	(0.00166)	(0.205)
$\text{RUS}_d \times \text{US Share}_f$				**-0.023a**
				(0.0059)
$\text{RUS}_d \times \text{Other MNC}_f$				0.666b
				(0.282)
$\text{RUS}_d \times \text{Large}_f$				0.536a
				(0.0426)
Fixed Effects :				
Firm×Product	✓	✓	✓	✓
Country			✓	
R^2	0.373	0.373	0.375	0.373
# observations	52401090	52401090	52401090	52401090

▸▸ Entry ▸▸ Overlap with imports

Tariff equivalence of the threat of secondary sanctions and reputation effect

- Tariff equivalence: $\tau^r = 100 \times (\exp(\hat{\gamma}/\sigma) - 1)$

	τ^r
$\sigma = 5.3$ (Fontagne et al., 2022)	25.1%
$\sigma = 0.76$ (SR estimate in Boehm et al., 2023)	376.1%
$\sigma = 2$ (LR estimate in Boehm et al., 2023)	80.9%

The range of tariff equivalence reflects different estimates of trade elasticities, which tend to be lower in studies explicitly distinguishing short- and long-run elasticities.

Conclusions

- We examine the effects of Western sanctions on Russia on exports by Turkiye, motivated by comprehensive model of firms export decisions.
- Key testable predictions:
  - Reputational risk and the threat of secondary sanctions weighs on export decisions at both the intensive and the extensive margins, as well as on the choice of the currency in invoice and settlement
  - Risk of non-payment raises the importance of cash-in-advance gains
  - Prices and markups of continuing exporters in Russia rise

Quantification

Quantification of the reputation effect

- How much export revenue did Western MNCs forego to protect their reputation?
  - Reduced exports by continuing exporters
  - Exit from the Russian market
- Compare growth in their exports to Russia with that of other Turkish firms
- Use the above estimate to calculate the foregone export revenue based on the pre-invasion average monthly exports
- Convert into the tariff-equivalent of the reputational effect

DiD estimates for export growth to Russia by firm type

$$\frac{Val_{fpd,t} - Val_{fpd,t-12}}{0.5(Val_{fpd,t} + Val_{fpd,t-12})} = \gamma \text{Post}_t \times \text{RUS}_d + \alpha_{fpc} + \alpha_{pt} + \alpha_{ft} + \varepsilon_{fpdt}$$

Dependent Variable:	Annual (12-month) mid-point growth of export values	
	(1)	(2)
$\text{Post}_t \times \text{RUS}_d$	-0.0427	**0.0760a**
	(0.0473)	(0.0287)
$\text{Post}_t \times \text{RUS}_d \times$ Western MNC_f		**-1.186a**
		(0.278)
R^2	0.439	0.439
Fixed Effects :		
Firm×Product×Country	✓	✓
Product×Time	✓	✓
Firm×Time	✓	✓
# observations	26750694	26750694

Conclusions

- Empirical evidence based on detailed monthly data on Turkish exports for the January 2021-December 2023 period confirm theoretical predictions:
  - The sharp increase in Turkish exports to Russia is accompanied by significant heterogeneity of firms decisions at the extensive and intensive margins
    - One third of Turkish exporters discontinue trade with Russia (33% relative to pre-invasion) or reduce their trade (up to 33% for the affiliates of Western MNCs)
    - Sanctions and reputational risk specifically weigh on MNCs with U.S. ties: more likely to exit; continuing exporters significantly reduce their trade
    - Significant rise of CIA transactions and invoicing in TRY
    - Increase in prices and markups

Goods subject to EU sanctions

- 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)

Back

Russia's trade profile in 2021

- Total exports were valued at $492.3 bn, and imports at $293.5 bn
- Exports were dominated by commodities, while imports consisted primarily of machinery, equipment, vehicles, and pharmaceuticals
- Broad set of imported products in 4,384 distinct 6-digit HS product categories
- The main sources of imports were China, Germany, and the US

Back

Entry in the Russian market post-sanction

- 79 Western MNCs
  - Fewer than exiters
  - Average export size of entrants is half of that of exiters
- 8,044 Turkish firms
  - More than twice the exiters
  - Average export size of entrants is twice as large as that of exiters

Back

Large increase in exports of both non-sanctioned and sanctioned products to Russia

Dep. Variable:	Log Value (1)	Log Quantity (2)
$\text{Post}_t \times \text{RUS}_d$	**0.159a**	**0.147a**
	(0.0272)	(0.0259)
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$	**0.0886a**	**0.0579a**
	(0.0317)	(0.0320)
$\text{Post}_t \times \text{RUS}_d \times \text{Similar}_p$	0.0912b	0.0858b
	(0.0365)	(0.0374)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.867	0.897
# observations	14436818	14436818

Back

Exports of Western MNCs by product type

Dep. Variable:	Log Value	Log Quantity	Log Value	Log Quantity
	Non-sanctioned		Sanctioned	
	(1)	(2)	(3)	(4)
$\text{Post}_t \times \text{RUS}_d$	0.216a	0.196a	0.369a	0.322a
	(0.0220)	(0.0216)	(0.0385)	(0.0396)
$\text{Post}_t \times \text{RUS}_d \times \text{Western MNC}_f$	**-0.398b**	**-0.371b**	**-0.209c**	**-0.202c**
	(0.170)	(0.183)	(0.111)	(0.115)
Fixed Effects :				
Firm × Product × Country	✓	✓	✓	✓
Product × Time	✓	✓	✓	✓
Firm × Time	✓	✓	✓	✓
R^2	0.884	0.914	0.856	0.882
# observations	6624252	6624252	7503862	7503862

Back

Importance of US ownership for the intensive margin of exports

Dep. Variable:	Log Value	Log Quantity
	(1)	(2)
$\text{Post}_t \times \text{RUS}_d$	0.282a	0.249a
	(0.0384)	(0.0368)
$\text{Post}_t \times \text{RUS}_d \times \text{Western MNC}_f$	-0.0939	-0.0756
	(0.0889)	(0.0932)
$\text{Post}_t \times \text{RUS}_d \times \text{US Share}_f$	**-0.0314a**	**-0.03697a**
	(0.00856)	(0.01044)
$\text{Post}_t \times \text{RUS}_d \times \text{Other MNC}_f$	0.108	0.0804
	(0.0925)	(0.0967)
$\text{Post}_t \times \text{RUS}_d \times \text{Large}_f$	0.0386	0.0353
	(0.0560)	(0.0592)
Fixed Effects :		
Firm × Product × Country	✓	✓
Product × Time	✓	✓
Firm × Time	✓	✓
R^2	0.874	0.900
# observations	5707558	5707558

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Channels for the effect on currency invoicing

Dependent Variable:	Share of TRY-den. exports (1)	Share of USD-den. exports (2)	Share of EUR-den. exports (3)
$Post_t \times RUS_d$	0.0283a	-0.0365c	-0.0339a
	(0.00558)	(0.0216)	(0.000958)
$Post_t \times RUS_d \times$ Currency mismatch$_f$	0.0122	-0.00444	0.0123
	(0.00869)	(0.0215)	(0.0125)
$Post_t \times RUS_d \times$ Share of TRY den. exports$_d^{-f}$	0.102a		
	(0.0259)		
$Post_t \times RUS_d \times$ Share of USD den. exports$_d^{-f}$		0.135a	
		(0.0371)	
$Post_t \times RUS_d \times$ Share of EUR den. exports$_d^{-f}$			0.122a
			(0.0340)
Fixed Effects :			
Firm $\times$ Product $\times$ Country	✓	✓	✓
Product $\times$ Time	✓	✓	✓
Firm $\times$ Time	✓	✓	✓
R^2	0.962	0.928	0.931
# observations	14436818	14436818	14436818

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Estimation of markups

- Follow the approach developed by Corsetti, Crowley, Han, and Song (2023)
- A sequential fixed effects estimation that
  - removes time-varying factors such as unobservable marginal production costs
  - controls for the firm's time-varying set of export destinations
- Estimator requires observing a "trade pattern", i.e. set of destination markets for a given firm-product pair, in multiple periods.
- Estimation proceeds in two steps:
  - Mean value of unit values over all active destinations is subtracted from the firm-product-destination unit value in a period, $\dot{p}_{fpdt}$
  - Mean value of the demeaned unit values obtained in the first step for a given trade pattern is subtracted from $\dot{p}_{fpdt}$ to obtain double-demeaned unit values, $\ddot{p}_{fpdt}$

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Significant entry into the Russian market

$$\text{Entry}_{fd} = \beta_1 \text{RUS}_d + \beta_2 \text{RUS}_d \times \text{Western MNC}_f + \alpha_f + e_{fd}$$

Dep. Vrb.:	Dummy for entering an export market after Feb 2022			
	(1)	(2)	(3)	(4)
RUS_d	0.0531a	0.0530a		0.0475a
	(0.000677)	(0.000678)		(0.000884)
$\text{RUS}_d \times$ Western MNC_f		0.0209b	0.0202b	0.0258a
		(0.00951)	(0.00951)	(0.00974)
$\text{RUS}_d \times \text{US Share}_f$				0.0163
				(0.0661)
$\text{RUS}_d \times \text{Other MNC}_f$				0.0323c
				(0.0165)
$\text{RUS}_d \times \text{Large}_f$				0.0117a
				(0.00137)
Fixed Effects :				
Firm	✓	✓	✓	✓
Country			✓	
R^2	0.0452	0.0452	0.0723	0.0452
# observations	27424572	27424572	27424572	27424572

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Overlap between exports to Russia and imports from Western countries

- Do exporters in Turkiye export to Russia the products they have recently imported from Western countries?
- Define Western Imports$_{fpt}$ to indicate product p imported by firm f during the past two months from a Western country.
- Estimate:

$$\begin{aligned} Y_{fpdt} &= \eta_1 \text{Post}_t \times \text{RUS}_d \times \text{Western Imports}_{fpt} \\ &+ \eta_2 \text{Post}_t \times \text{RUS}_d + \eta_3 \text{RUS}_d \times \text{Western Imports}_{fpt} \\ &+ \alpha_{fpd} + \alpha_{fpt} + e_{fpdt} \end{aligned}$$

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Overlap between exports to Russia and imports from Western countries

	Affiliates of Western MNCs		Others	
Dep. Variable:	Log Value	Log Quantity	Log Value	Log Quantity
	(1)	(2)	(3)	(4)
Western Imports$_{fpt}$ × Post$_t$ × RUS$_d$	-0.0369	-0.0877	**0.0796c**	**0.108b**
	(0.190)	(0.216)	(0.0449)	(0.0523)
Post$_t$ × RUS$_d$	0.0927	0.0965	**0.291a**	**0.252a**
	(0.0957)	(0.104)	(0.0296)	(0.0281)
Fixed Effects :				
Firm × Product × Country	✓	✓	✓	
Firm × Product × Time	✓	✓	✓	
R^2	0.883	0.902	0.899	0.927
# observations	1473177	1473177	8000849	8000849

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Model

Setup

- Builds on Crowley, Han, and Son (2023) and Schmidt-Eisenlohr (2013)
- Assume oligopolistic competition, Cobb-Douglas production technology combining labor and intermediate inputs
- f, o, d, t, c denote firm, origin country, destination country, time and currency of denomination
- ρ_i, η denote elasticities within and across industries
- Revenue of a firm:

$$R^c_{f,o,d,t} = \left[q_{f,o,d,t} \left[\underbrace{\Omega_{f,o,d,t} \left[p^c_{f,o,d,t} e^c_{o,d,t} \right]}_{\substack{\text{revenue conditional on} \\ \text{a given payment method}}} \right] \right]$$

Profit maximization and predictions

$$\Pi^c_{f,o,d,t} \equiv \max_{p^c_{f,o,d,t} e^c_{d,t}} \{ R^c_{f,o,d,t} - mc_{f,o,t} - \underbrace{F^c_f}_{\substack{\text{currency} \\ \text{management} \\ \text{cost}}} - \underbrace{\Phi_{f,t}(c,d)}_{\text{reputational risk}} \}$$

$$\text{subject to: } q_{f,o,d,t} = \left(p^d_{f,o,d,t}\right)^{-\rho_i} \left(P^d_{d,t}\right)^{\eta-\rho} \underbrace{D_{d,t}}_{\substack{\text{exogenous} \\ \text{demand shifter}}}$$

$$c = argmax\left(\Pi^c_{f,o,d,t}\right)$$

$$\Pi^c_{f,o,d,t} \geq \underbrace{\chi_d}_{\text{sunk cost of exporting}}$$

- Choice of currency may matter for reasons beyond nominal rigidities.
- Reputational risk weighs on entry-exit decisions.

Predictions

- Markups increase with market share of exporters:

$$\Omega_{f,o,d,t} P^d_{f,d} = \underbrace{\frac{\epsilon(S_{f,d})}{\epsilon(S_{f,d}) - 1}}_{\text{markup}} \frac{mc_f}{e^d}$$

- Attactiveness of CIA contracts relative to post-delivery contracts increases after the war as payment probability, γ_p, falls:

$$\frac{1 + r_{EXP}}{1 + r_{IMP}} \geq \frac{[\gamma_p + (1 - \gamma_p)\mu_p]}{[\gamma_q + (1 - \gamma_q)\mu_q]},$$

  - r_{EXP} and r_{IMP}: rates faced by exporters and importers, respectively
  - μ_p: fraction of the contractual payment received by the exporters if the contract is not enforced (non-CIA contracts)
  - μ_q: fraction of the contractual quantity received by the importers (CIA contracts).

Predictions

- With sticky prices, expected profits from choosing RUB or a vehicle currency relative to own currency *TRY* is proportional to:

$$\lambda_{fd}\Bigg[\underbrace{\frac{\Gamma_{fd}}{1+\Gamma_{fd}}(\zeta^{\mathsf{CI}}_{(-f)d}-\zeta^{TRY}_{(-f)d})}_{\textbf{Strategic complementarity}}+\underbrace{\frac{1}{1+\Gamma_{fd}}(\psi^{\mathsf{CI}}_{f}-\psi^{TRY}_{f})}_{\textbf{Operational hedging}}\Bigg]$$

$$-\underbrace{(F^{\mathsf{C0}}_{fd}-F^{TRY}_{fd})}_{\textbf{Financial cost}}-\underbrace{\Delta\Phi^{CI,TRY}_{f}}_{\textbf{Reputational risk}}$$

  - $\mathbb{E}[\Pi^{c}_{fd}]$ is expected profit from invoicing in currency c;
  - λ_{fd} is a positive, non-stochastic term, related to the second derivative of the operational profit function;
  - Γ_{fd} is the markup elasticity,
  - $\zeta^{c}_{(-f)d}$ denotes a firm f's competitors' invoicing share of currency c;
  - ψ^{c}_{f} is the firm's share of imports invoiced in currency c;
  - F^{c}_{fd} is the cost of invoicing in a foreign currency c;
  - Φ^{C0}_{f} expected losses by firm from trading with Russia in a particular currency, conditional on this trade prompting retaliatory measures.