27th Annual DNB Research Conference

The Macroeconomic Effects of Geopolitical Uncertainty

DeNederlandscheBank

EUROSYSTEEM

Trading around Geopolitics

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Motivation

- Complex implications of geopolitical tensions and economic sanctions for international trade flows
  - (Virtually) discontinued trade flows from sanctioning countries
  - Trade diversion: exporters from non-sanctioning economies step in to fill the gap
- Exporters trade-off higher profits from sanctioned country markets with
  - heightened risk of reputational damage
  - higher transaction costs
  - heightened risk of non-payment

Our contribution

- Present a **unified theoretical and empirical framework** to study the trade-offs between increased business opportunities and heightened 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

Takeaway

- Results highlight that Turkish firms exporting to Russia **adjust along several margins** :
  - prices and markups—raise both
  - invoicing currency choice—less dollar, more Turkish liras
  - payment method choice—more cash in advance (CIA)
- **Significant reputational effects** arising from exporting to Russia:
  - Western MNCs and Turkish exporters with high exposure to Western markets increased their exports less to Russia
  - Annualized foregone revenues amount to $2.99 million for an average Turkish affiliate of Western MNCs, with the reputational risk effect equivalent to tariffs of 12.2%

Context

- Western sanctions on Russia targeted a wide range of goods: 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)

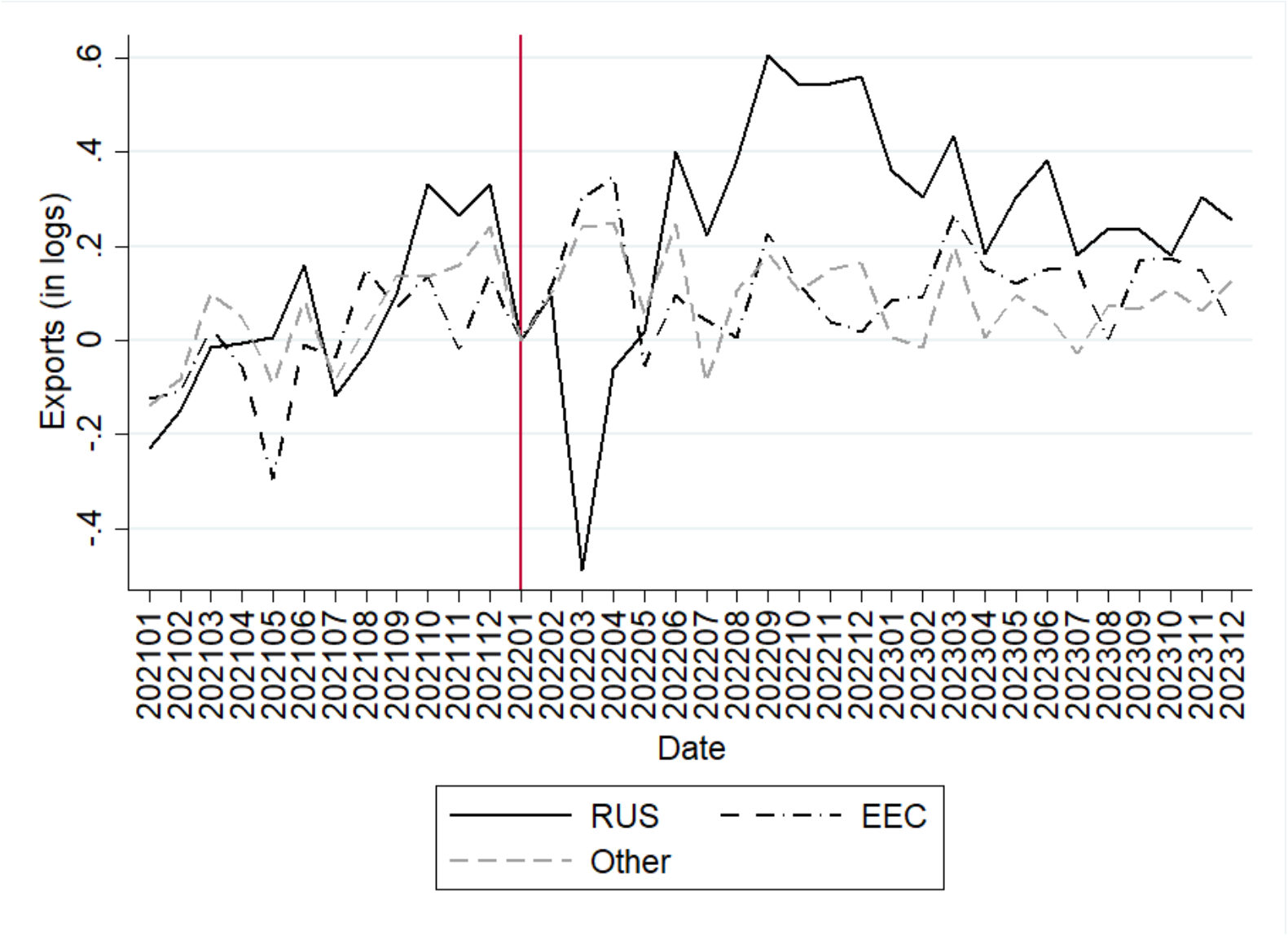
▸ Russia's trade profile

- Turkiye *does not* impose sanctions

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)
- **Elusive pro-competitive gains of reducing tariffs and trade costs:**
  Arkolakis, Costinot, Donaldson, and Rodriguez-Clare (2018) and Crowley, Han, and Prayer (2024)
- **Local vs. Producer vs. Dollar pricing:**
  Bacchetta and van Wincoop (2005); Corsetti and Pesenti (2002); Goldberg and Tille (2008); Amiti, Itskhoki, and Konings (2020); Gopinath, Itskhoki, and Rigobon (2010)

Monthly Turkish exports by destination



Data

- Detailed monthly exports data from Turkiye for the 2021-2023 period, including information on HS8 products, firms, payment methods, and invoicing currencies
- Firm registry reports industry of operation and ownership structure
- **Exclude re-exports** from the sample (to abstract from possible sanction violations)
- Baseline sample covers **continuing Turkish exporters** to Russia ($\approx$ 6,750 firms)
- Use EEC as a control group (and ROW in robustness checks)

Setup

- Builds on Crowley, Han, and Son (2023)
- 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
- Operating profits of a firm:

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

Profit maximization

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

s.t.

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

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

Choice of currency matters for reasons beyond nominal rigidities.

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:

$$\lambda_{fd}\Bigg[\underbrace{\frac{\Gamma_{fd}}{1+\Gamma_{fd}}\left(\zeta^{CI}_{(-f)d}-\zeta^{TRY}_{(-f)d}\right)}_{\text{Strategic complementarity}}+\underbrace{\frac{1}{1+\Gamma_{fd}}\left(\psi^{CI}_{f}-\psi^{TRY}_{f}\right)}_{\text{Operational hedging}}\Bigg]-\underbrace{\left(F^{C0}_{fd}-F^{TRY}_{fd}\right)}_{\text{Financial cost}}-\underbrace{\Delta\Phi^{CI,TRY}_{f}}_{\text{Reputational risk}}$$

where

- $\mathbb{E}[\Pi^{c}_{fd}]$ 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.

Empirical specification

- A standard DID and ES specification, comparing Turkish exports to Russia with Turkish exports to EEC:

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

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

- Event study:

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

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)

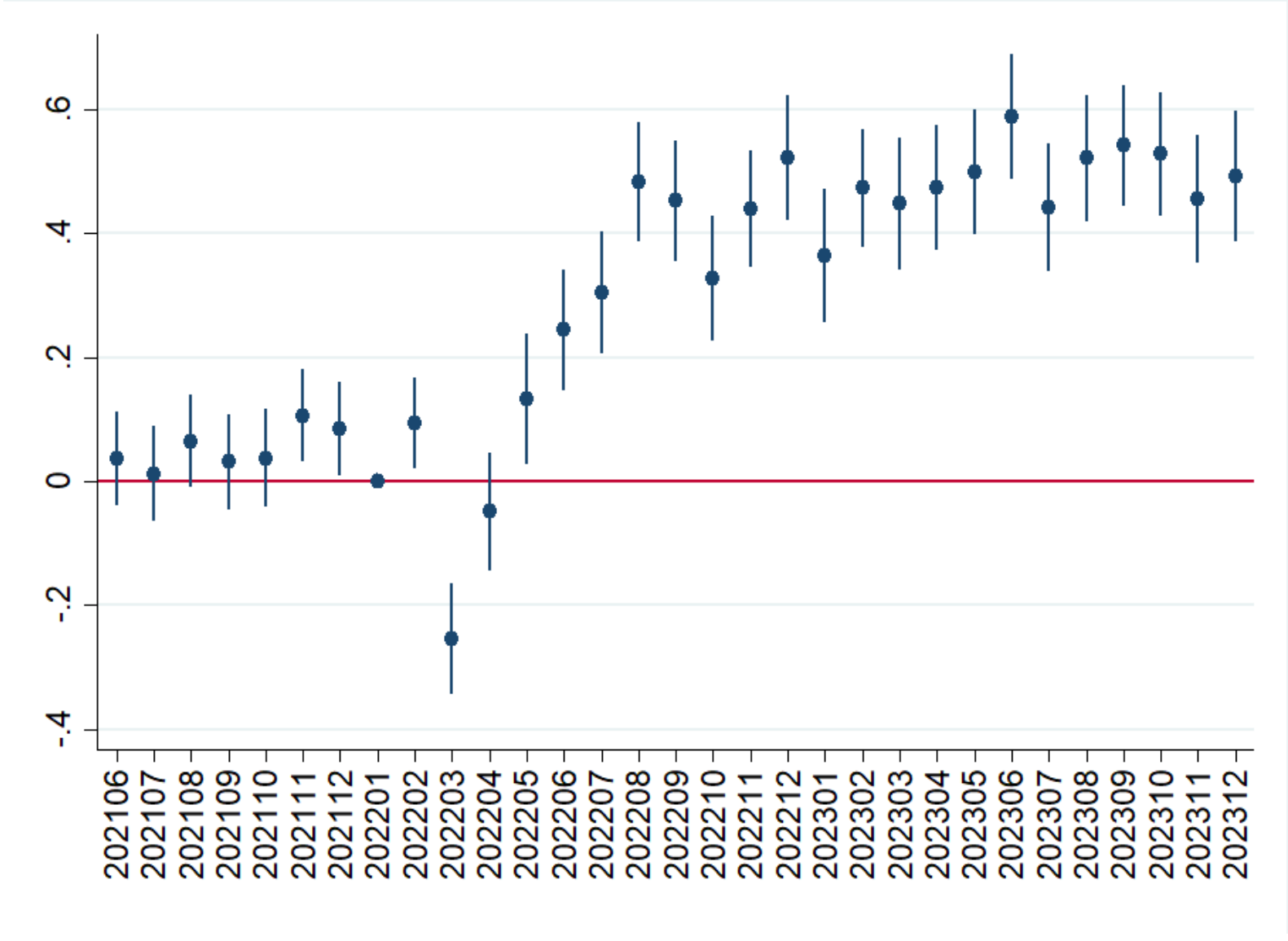
Large increase in exports to Russia, particularly in goods under Western sanctions

Dep. Variable: Log Export Value	(1)	(2)	(3)	(4)	(5)
$\text{Post}_t \times \text{RUS}_d$	**0.315a**	**0.236a**	**0.181a**	**0.181a**	**0.297a**
	(0.0234)	(0.0294)	(0.0422)	(0.0421)	(0.0238)
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$		**0.134a**	**0.0953b**		
		(0.0372)	(0.0441)		
$\text{Post}_t \times \text{RUS}_c \times \text{Similar}_p$			**0.0937c**	**0.0992c**	
			(0.0533)	(0.0530)	
$\text{Post}_t \times \text{RUS}_d \times \text{Industrial}_p$				**0.178b**	
				(0.0757)	
$\text{Post}_t \times \text{RUS}_d \times \text{Dual}_p$				0.0232	
				(0.0547)	
$\text{Post}_t \times \text{RUS}_d \times \text{Luxury}_p$				0.0708	
				(0.0511)	
$\text{Post}_t \times \text{RUS}_d \times$ High EU Share_p					0.187a
					(0.0567)
Fixed Effects :					
Firm×Product×Country	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓
R^2	0.896	0.896	0.896	0.896	0.896
# observations	485185	485185	485185	485185	485185

Strong trade diversion

Dep. Variable: Log Export Value	(1)	(2)	(3)	(4)	(5)
$\text{Post}_t \times \text{RUS}_d$	**0.315a**	**0.236a**	**0.181a**	**0.181a**	**0.297a**
	(0.0234)	(0.0294)	(0.0422)	(0.0421)	(0.0238)
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$		**0.134a**	**0.0953b**		
		(0.0372)	(0.0441)		
$\text{Post}_t \times \text{RUS}_c \times \text{Similar}_p$			**0.0937c**	**0.0992c**	
			(0.0533)	(0.0530)	
$\text{Post}_t \times \text{RUS}_d \times \text{Industrial}_p$				**0.178b**	
				(0.0757)	
$\text{Post}_t \times \text{RUS}_d \times \text{Dual}_p$				0.0232	
				(0.0547)	
$\text{Post}_t \times \text{RUS}_d \times \text{Luxury}_p$				0.0708	
				(0.0511)	
$\text{Post}_t \times \text{RUS}_d \times \text{High EU Share}_p$					**0.187a**
					(0.0567)
Fixed Effects :					
Firm×Product×Country	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓
R^2	0.896	0.896	0.896	0.896	0.896
# observations	485185	485185	485185	485185	485185

Event study estimates for export value



No evidence of trade creation at the firm level

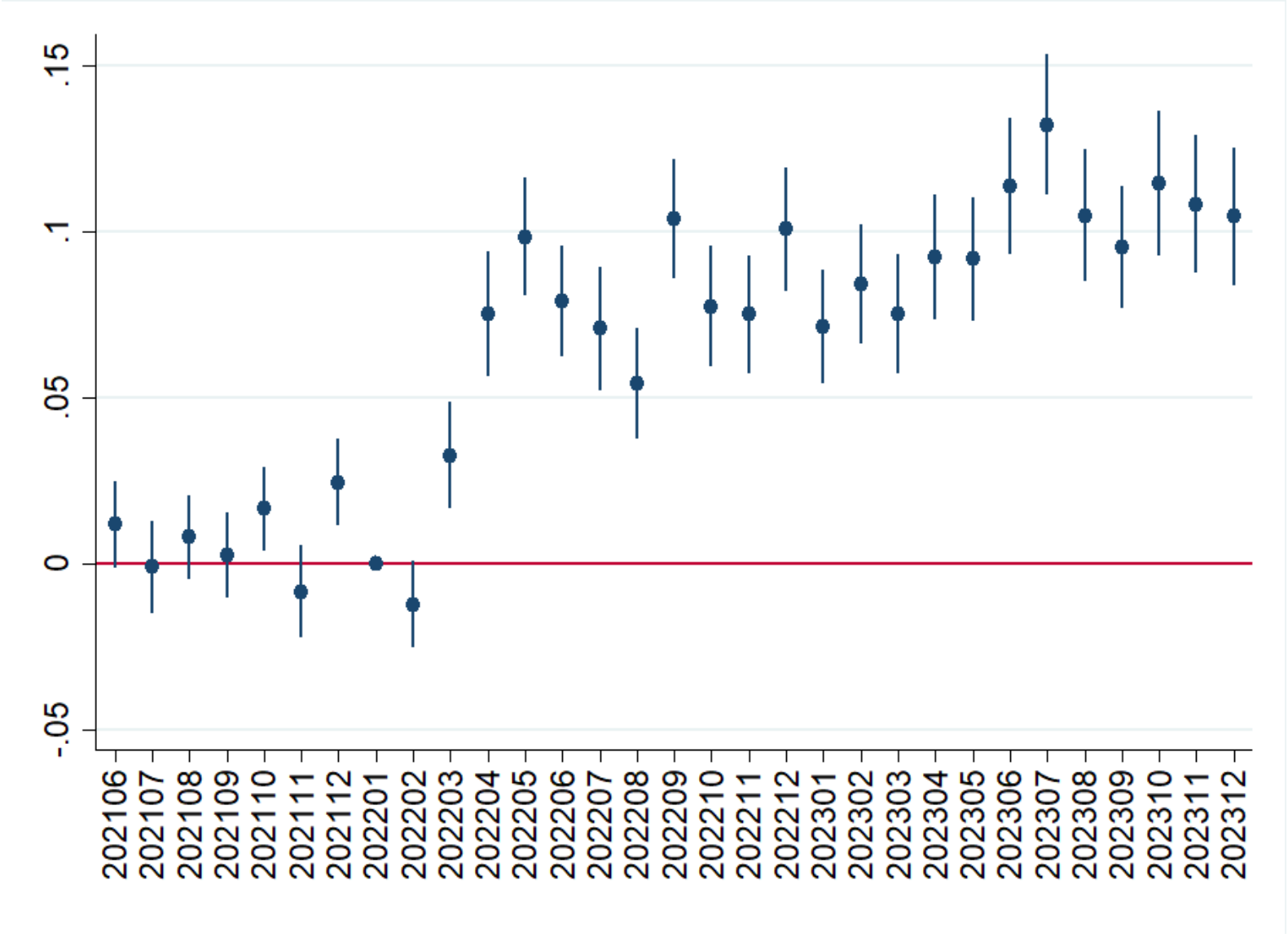
Dependent Variable: Log Total Firm-level Export Value		
	(1)	(2)
$\text{Post}_t \times$ Share of exports to $\text{RUS}_{f,t=0}$	0.0222	0.0222
	(0.0400)	(0.0400)
$\text{Post}_t \times$ Log of $\text{employment}_{f,t=0}$		0.0000
		(0.00002)
Fixed Effects :		
Firm	✓	✓
Size quintile×Time	✓	✓
R^2	0.820	0.820
# observations	163030	163030

Increased reliance on CIA due to higher payment risk

- Share of CIA-based exports up by 6.6 percentage points from the initial average level of 18.5%

Dep. Variable: CIA Share					
	(1)	(2)	(3)	(4)	(5)
$Post_t \times RUS_d$	**0.0662a**	**0.0583a**	**0.0521a**	**0.0521a**	**0.0637a**
	(0.00457)	(0.00542)	(0.00771)	(0.00773)	(0.00437)
$Post_t \times RUS_d \times Sanctioned_p$		**0.0140b**	0.00966		
		(0.00617)	(0.00695)		
$Post_t \times RUS_d \times Similar_p$			0.0106	0.0131	
			(0.00892)	(0.00889)	
$Post_t \times RUS_d \times Industrial_p$				**0.0262b**	
				(0.0117)	
$Post_t \times RUS_d \times Dual_p$				0.0136	
				(0.00832)	
$Post_t \times RUS_d \times Luxury_p$				-0.00859	
				(0.00874)	
$Post_t \times RUS_d \times$ High EU $Share_p$					**0.0295b**
					(0.0139)
Fixed Effects :					
Firm×Product×Country	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓
R^2	0.918	0.918	0.918	0.918	0.918
# observations	485185	485185	485185	485185	485185

Event study estimates for cash-in-advance share



Drop in competition:
Increase in prices charged in the Russian market

Dependent Variable: Log of unit value	(1)	(2)	(3)
$\text{Post}_t \times \text{RUS}_d$	**0.0259a**	**0.0191c**	**0.0146c**
	(0.00722)	(0.0102)	(0.0086)
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$		0.0113	0.00814
		(0.0132)	(0.0147)
$\text{Post}_t \times \text{RUS}_d \times \text{Similar}_p$			0.00764
			(0.0203)
Fixed Effects :			
Firm×Product×Country	✓	✓	✓
Product×Time	✓	✓	✓
Firm×Time	✓	✓	✓
R^2	0.938	0.938	0.938
# observations	485185	485185	485185

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, $\ddot{p}_{fpdt}$

Price adjustment driven by adjustment to markups

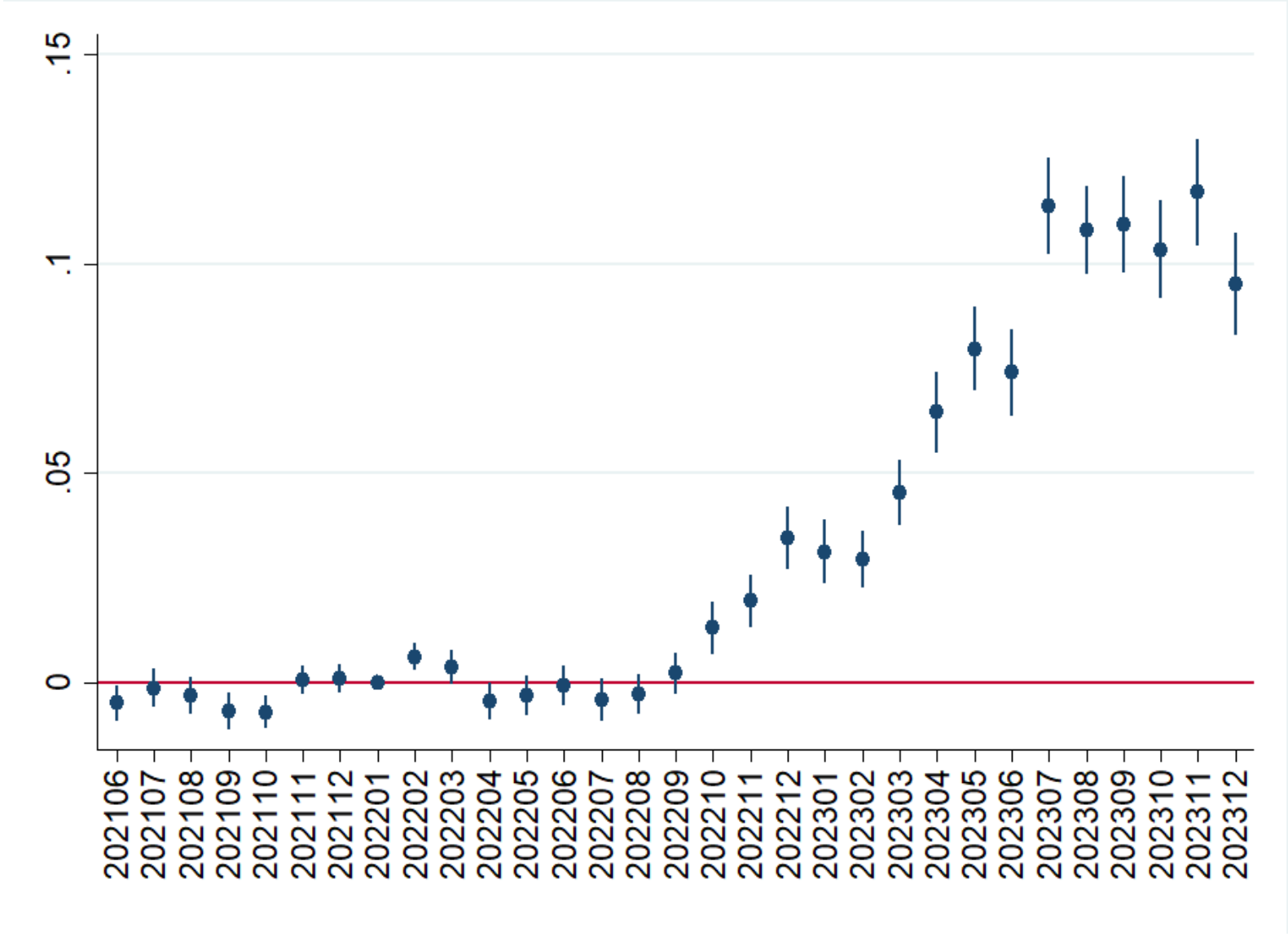
	(1)	(2)	(3)	(4)	(5)	(6)
	Log of unit value			Log of markups		
$\text{Post}_t \times \text{RUS}_d$	**0.0448a**	**0.0424a**	0.0128	**0.0292a**	**0.0289a**	-0.00271
	(0.0116)	(0.0117)	(0.0122)	(0.00888)	(0.00899)	(0.0152)
$\text{Post}_t \times \text{EEC}_d$		-0.0159c			-0.00180	
		(0.00823)			(0.00670)	
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$			**0.0434a**			**0.0319a**
			(0.0182)			(0.0113)
$\text{Post}_t \times \text{RUS}_d \times \text{Similar}_p$			0.0419c			0.0216
			(0.0225)			(0.0162)
R^2	0.937	0.937	0.937	0.0705	0.0705	0.0705
Fixed Effects :						
Firm×Product×Country	✓	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓	✓
# observations	672199	672199	672199	672199	672199	672199

Shift towards producer currency pricing

- Share of TRY-denominated exports up by 4.2 percentage points from the initial average level of 2.6%

Dep. Var.: Share of TRY-den. exports	(1)	(2)	(3)	(4)	(5)
$Post_t \times RUS_d$	**0.0416a**	**0.0368a**	**0.0371a**	**0.0372a**	**0.0419a**
	(0.00196)	(0.00253)	(0.00391)	(0.00392)	(0.00206)
$Post_t \times RUS_d \times Sanctioned_p$		**0.00787a**	**0.00806b**		
		(0.00285)	(0.00315)		
$Post_t \times RUS_d \times Similar_p$			-0.000472	-0.000154	
			(0.00452)	(0.00449)	
$Post_t \times RUS_d \times Industrial_p$				0.000573	
				(0.00357)	
$Post_t \times RUS_d \times Dual_p$				**0.0142a**	
				(0.00478)	
$Post_t \times RUS_d \times Luxury_p$				**0.00858b**	
				(0.00376)	
$Post_t \times RUS_d \times$ High EU Share$_p$					-0.00308
					(0.00325)
Fixed Effects :					
Firm×Product×Country	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓
R^2	0.863	0.863	0.863	0.863	0.863
# observations	485185	485185	485185	485185	485185

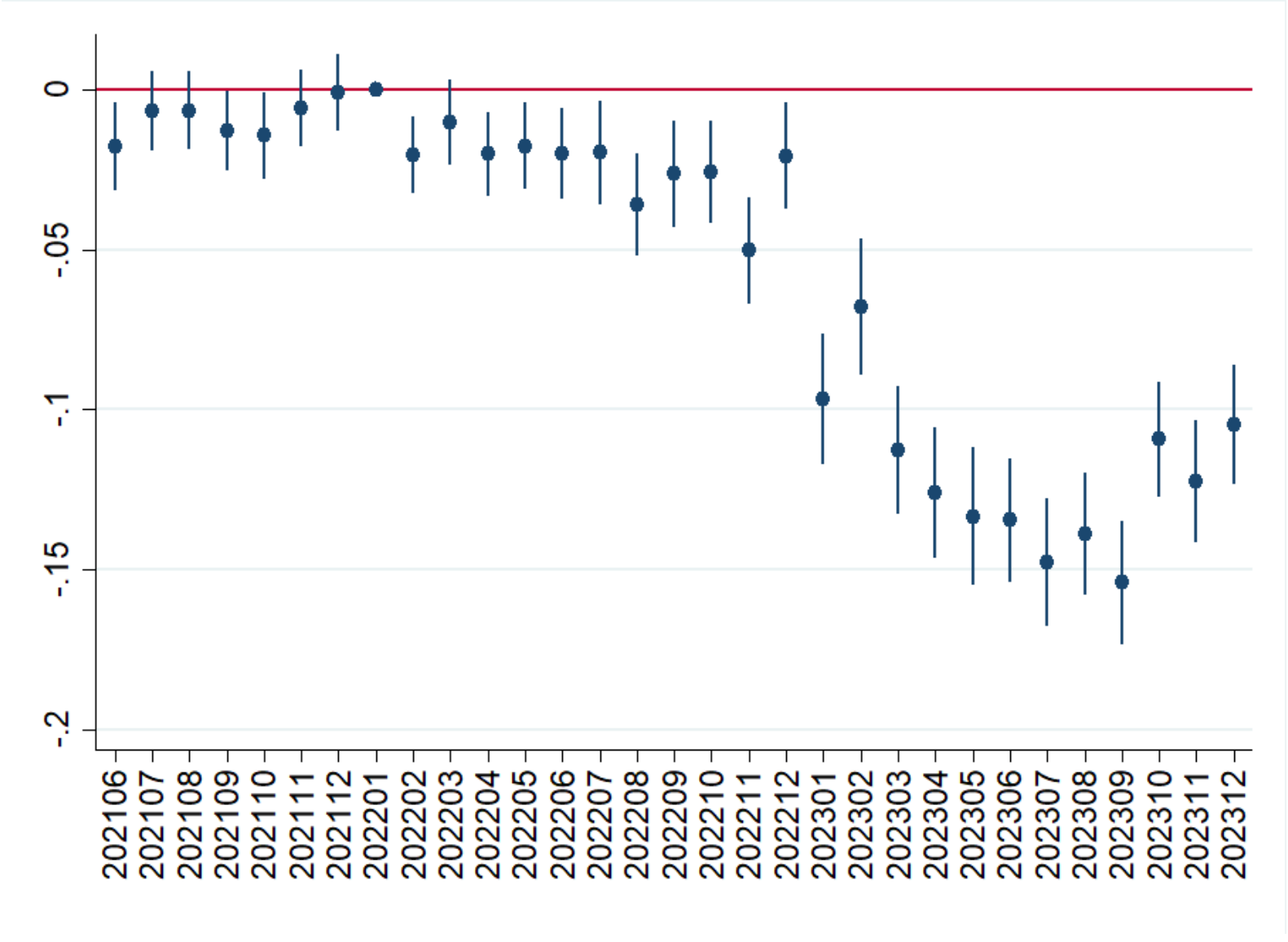
Event study estimates for local currency (TRY) share



Shift away from pricing in USD

Dep. Vrb.: Share of USD-den. exports	(1)	(2)	(3)	(4)	(5)
$\text{Post}_t \times \text{RUS}_d$	**-0.0598a**	**-0.0614a**	**-0.0868a**	**-0.0868a**	**-0.0643a**
	(0.00486)	(0.00665)	(0.00864)	(0.00868)	(0.00506)
$\text{Post}_t \times \text{RUS}_d \times \text{Sanctioned}_p$		0.00261	**-0.0151b**		
		(0.00687)	(0.00763)		
$\text{Post}_t \times \text{RUS}_d \times \text{Similar}_p$			0.0435a	0.0442a	
			(0.0103)	(0.0102)	
$\text{Post}_t \times \text{RUS}_d \times \text{Industrial}_p$				0.0150	
				(0.00931)	
$\text{Post}_t \times \text{RUS}_d \times \text{Dual}_p$				-0.00277	
				(0.00870)	
$\text{Post}_t \times \text{RUS}_d \times \text{Luxury}_p$				**-0.0410a**	
				(0.0100)	
$\text{Post}_t \times \text{RUS}_d \times \text{High EU Share}_p$					**0.0434a**
					(0.00851)
Fixed Effects :					
Firm×Product×Country	✓	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓	✓
R^2	0.927	0.927	0.927	0.927	0.927
# observations	485185	485185	485185	485185	485185

Event study estimates for USD share



Reputational risks matter

Dependent Variable:	Log Value	Shr of CIA-based exports	Shr of TRY-den. exports	Shr of USD-den. exports
	(1)	(2)	(3)	(4)
$\text{Post}_t \times \text{RUS}_d$	**0.211a**	**0.0591a**	**0.0398a**	**-0.0855a**
	(0.0434)	(0.00791)	(0.00400)	(0.00883)
$\text{Post}_t \times \text{RUS}_d \times$ Western MNC_f	**-0.316a**	**-0.0777a**	**-0.0288a**	-0.0177
	(0.0839)	(0.0184)	(0.00376)	(0.0147)
R^2	0.896	0.918	0.863	0.927
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
# observations	485185	485185	485185	485185

Reputational risks also work through the exports channel

Dependent Variable:	Log Value	Shr of CIA-based exports	Shr of TRY-den. exports	Shr of USD-den. exports
	(1)	(2)	(3)	(4)
$Post_t \times RUS_d$	**0.381a**	**0.0758a**	**0.0470a**	**-0.0684a**
	(0.0258)	(0.00500)	(0.00247)	(0.00547)
$Post_t \times RUS_d \times$ Western MNC_f	**-0.221b**	**-0.0730a**	**-0.0217a**	**-0.0441a**
	(0.0867)	(0.0189)	(0.00386)	(0.0145)
$Post_t \times RUS_d \times$ High West. $Shr._f$	**-0.184a**	-0.00861	**-0.0143a**	**0.0554a**
	(0.0545)	(0.0100)	(0.00447)	(0.0101)
R^2	0.896	0.918	0.863	0.927
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
# observations	485185	485185	485185	485185

Note: High West. Shr.=1 if the share of exports to Western countries was above $\approx$ 30% in 2021.

Reputational risks also work through the exports channel

Dependent Variable:	Log Value	Shr of CIA-based exports	Shr of TRY-den. exports	Shr of USD-den. exports
	(1)	(2)	(3)	(4)
$Post_t \times RUS_d$	0.372a	0.0737a	0.0466a	-0.0659a
	(0.0256)	(0.00492)	(0.00244)	(0.00557)
$Post_t \times RUS_d \times$ Western MNC_f	-0.257a	-0.0760a	-0.0237a	-0.0334b
	(0.0867)	(0.0190)	(0.00383)	(0.0144)
$Post_t \times RUS_d \times$ High US $Share_f$	**-0.209c**	-0.0300	-0.0190b	0.0554b
	(0.110)	(0.0184)	(0.00812)	(0.0269)
$Post_t \times RUS_d \times$ High EU $Share_f$	**-0.128b**	0.00438	-0.0115a	0.0399a
	(0.0547)	(0.0114)	(0.00437)	(0.00986)
R^2	0.896	0.918	0.863	0.927
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	✓
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
# observations	485185	485185	485185	485185

Quantification of the reputation effect

- How much export revenue did firms forego to protect their reputation?
  - Western MNCs
  - Turkish exports with high reliance on Western markets
- 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

$$\Delta Y_{fpdt} = \gamma \text{Post}_t \times \text{RUS}_d + \alpha_{pt} + \alpha_{ft} + \varepsilon_{fpdt}$$

Dependent Variable:	Annual (12-month) growth of export values			
Sample :	All firms	All firms	Excl. MNCs	Excl. domestic firms with high West. Shr
	(1)	(2)	(3)	(4)
$\text{Post}_t \times \text{RUS}_d$	0.00713	**0.305a**	**0.281a**	**0.284a**
	(0.0157)	(0.0194)	(0.0187)	(0.0188)
$\text{Post}_t \times \text{RUS}_d \times$ Western MNC_f		**-0.444a**		**-0.610a**
		(0.0635)		(0.108)
$\text{Post}_t \times \text{RUS}_d \times$ High West. Shr._f		-0.0566	**-0.108c**	
		(0.0515)	(0.0578)	
$\text{RUS}_d \times$ Western MNC_f		0.0108		0.769a
		(0.0655)		(0.116)
$\text{RUS}_d \times$ High West. Shr._f		-0.771a	-0.589a	
		(0.0457)	(0.0494)	
R^2	0.309	0.323	0.338	0.343
Fixed Effects :				
Product×Time	✓	✓	✓	✓
Firm×Time	✓	✓	✓	✓
# observations	393259	393259	341096	288907

Quantification of the reputation effect

	Domestic firms with high West. Shr.	MNCs
Estimated average annualized foregone export revenues (1000$)	172.6	2,991.1
Tariff equivalence Ass. $\sigma = 5.3$ (Fontagne et al, 2022)	2.1%	12.2%

Conclusions

- Our model, building on Crowley, Han, and Son (2023) with added features from Schmidt-Eisenlohr (2013) and Antras and Foley (2015), yields three testable predictions for Turkish exporters:
  - markups increase
  - Western currencies lose importance against TRY (producer currency) for invoicing
  - cash-in-advance gains importance

Conclusions

- Our model, building on Crowley, Han, and Son (2023) with added features from Schmidt-Eisenlohr (2013) and Antras and Foley (2015), yields three testable predictions for Turkish exporters:
  - markups increase
  - Western currencies lose importance against TRY (producer currency) for invoicing
  - cash-in-advance gains importance
- Empirical results based on detailed monthly data on Turkish exports for the January 2021-December 2023 period show:
  - sharp increase in Turkish exports to Russia
    - particularly for both products under Western sanctions
    - higher if the pre-war market share of the EU exporters was large
  - increase in the share of cash-in-advance transactions
  - shift from USD towards TRY invoicing
  - increase in markups, particularly for goods under Western sanctions

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

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Baseline DiD Estimates: Including New Exporters to Russia

Dependent Variable:	Log Value	Share of CIA-based exports	Share of TRY-den. exports	S
	(1)	(2)	(3)	
$\text{Post}_t \times \text{RUS}_d$	0.315a	0.0662a	0.0418a	
	(0.0234)	(0.00457)	(0.00198)	
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	
Product×Time	✓	✓	✓	
Firm×Time	✓	✓	✓	
R^2	0.896	0.930	0.890	
# observations	742115	742115	742115	

Notes: a, b and c denote statistical significance at the 1, 5 and 10% level, respectively.

Baseline DiD Estimates: RoW as the Control Group

Dependent Variable:	Log Value	Share of CIA-based exports	Share of TRY-den. exports	S
	(1)	(2)	(3)	
$Post_t \times RUS_d$	0.256a	0.0402a	0.0399a	
	(0.0148)	(0.00264)	(0.00156)	
Fixed Effects :				
Firm×Product×Country	✓	✓	✓	
Product×Time	✓	✓	✓	
Firm×Time	✓	✓	✓	
R^2	0.739	0.715	0.670	
# observations	4160387	4160387	4160387	

Notes: a, b and c denote statistical significance at the 1, 5 and 10% level, respectively.

Baseline DiD Estimates: Impact of Currency Mismatch

Dependent Variable:	Log Value	Share of CIA-based exports	Share of TRY-den. exports
	(1)	(2)	(3)
$\text{Post}_t \times \text{RUS}_d$	0.289a	0.0685a	0.0313a
	(0.0404)	(0.00893)	(0.00231)
$\text{Post}_t \times \text{RUS}_d \times \text{Mismatch}_f$	0.0456	-0.00277	0.0170a
	(0.0519)	(0.0117)	(0.00345)
Fixed Effects :			
Firm×Product×Country	✓	✓	✓
Product×Time	✓	✓	✓
Firm×Time	✓	✓	✓
R^2	0.895	0.917	0.863
# observations	485185	485185	485185

Notes: a, b and c denote statistical significance at the 1, 5 and 10% level, respectively. Currency mismatch is defined as the difference between the sum of USD and EUR denominated exports and imports, divided by the sum of total exports and imports at the firm level. This variable is constructed using pre-invasion data, i.e. 2019-2021.