Shooting down trade: Firm-level effects of embargoes

Sanctions Workshop at Drexel U — February 9, 2024

Uğur Aytun,[1] **Julian Hinz**[2] and Cem Özgüzel[3]

[1] Dumlupınar Üniversitesi
[2] Bielefeld University and Kiel Institute for the World Economy
[3] Paris School of Economics, Sorbonne Economics Center and IZA



Aftermath

- Putin: “The loss today is a stab in the back, carried out by the accomplices of terrorists. I can’t describe it in any other way.”
- Lavrov cancels planned visit to Turkey
- Russia imposes range of measures, including very specific product-level import embargo as of Jan 1, 2016

Embargo of 17 products

- Fresh and dried oranges (080510), fresh and dried mandarins (080520), fresh apricots (080910), fresh peaches including nectarines (080930), fresh plums and blackthorn (080940)

  → lifted in October 2016
- Clove (060312), onion and shallots (070310), broccoli (070410), salt (250100)

  → lifted in March 2017
- Chicken (020714), turkey (020727), cucumber and gherkin (070700), apples (080810), pears (080830), grapes (080610), strawberries (081010)

  → lifted in June 2017
- Tomato (070200)

  → lifted on November 1, 2017

Related works

Macro-level effects

- Global trade effects (e.g., Hufbauer et al., 2006; Felbermayr et al., 2020)
- Coalitions (Chowdhry et al., 2023), productivity (Etkes et al., 2015), inequality (Afesorgbor & Mahadevan, 2016; Lee, 2018), growth (Kwon, 2024),

Micro-level effects

- Firms: intensive margin (e.g., Crozet & Hinz, 2020; Fransen et al., 2023; Görg et al. 2023), extensive margin (Crozet et al., 2022)
- Prices (Monastyrenko & Hinz, 2022), Health outcomes (Kirilakha, 2024; Gutmann et al., 2021), …

What we do

- Do sanctions actually matter for the affected firms?
- Estimate firm-level trade effects of the embargo
  - → old story, novel estimation: combination of firm- and country-level data
- Estimate other firm-level economic outcomes
  - → total sales, employment, …

Trade impact

Gravity setup

Gravity combined for firm-level (i) and country-level (o)

$$X_{\{i,o\}dkt} = \exp\left(\Gamma_{\{i,o\}kt} + \Gamma_{dkt} + \Gamma_{\{i,o\}dk} + \delta_k S_{odkt}\right)$$

- Fixed effects
  - $\rightarrow$ $\Gamma_{\{i,o\}kt}$: Origin $\times$ product $\times$ time
  - $\rightarrow$ Γ_{dkt}: Destination $\times$ product $\times$ time
  - $\rightarrow$ $\Gamma_{\{i,o\}dk}$: Origin $\times$ destination $\times$ product $\times$ month
- Estimate with PPML

Combining firm-level and country-level data

Gravity combined for firm-level (i) and country-level (o)

$$X_{\{i,o\}dkt} = \exp\left(\Gamma_{\{i,o\}kt} + \Gamma_{dkt} + \Gamma_{\{i,o\}dk} + \delta_k S_{odkt}\right)$$

- Only one origin country: Γ_{dkt} and $\delta_k S_{odkt}$ are collinear

  $\rightarrow$ needed: more origin countries

- Solution: Firm-level data from Turkey + global country-level data without Turkey

  $\rightarrow$ many origin countries, $\delta_k S_{odkt}$ can be estimated

Empirical setup

- Imposition period, lifting period (varying by embargoed product)

  → 17 products, different times of lifting

- Embargo, diversion, circumvention effects
- Intensive and extensive margin estimations

Trade data

- “Dış Ticaret İstatistikleri” from TurkStat for firm-level customs data
- Data since 2002, detailing on firm, product, and destination at 6-digit HS level.
- Subset: 2012 – 2020, embargoed products’ chapters 2, 6, 7, 8, and 25
- UN COMTRADE for global trade data at product level

	Three-way FE with global data	Three-way FE	Two-way FE with est. FE	Two-way FE
Embargo x period imposition	-13.05***	-13.62***	-12.93***	-14.36***
	(0.6618)	(1.042)	(0.7108)	(0.6491)
Embargo x period lifting	-0.2994**	-0.1518	-0.1752**	-0.7000***
	(0.1024)	(0.0981)	(0.0672)	(0.0837)
Diversion x period imposition	0.6815***	0.0607	0.1729***	0.0831
	(0.0807)	(0.0683)	(0.0478)	(0.0529)
Diversion x period lifting	0.2474***	-0.0977	-0.0488	-0.2351***
	(0.0717)	(0.0653)	(0.0450)	(0.0567)
Circumvention x period imposition	-0.0090	0.0813	-0.4077***	-0.4435***
	(0.0982)	(0.0832)	(0.0471)	(0.0520)
Circumvention x period lifting	0.1572	0.5076***	-0.1058*	-0.2090***
	(0.1030)	(0.0887)	(0.0476)	(0.0537)
Est. destination × product × time FE			0.8567***	
			(0.0161)	
Observations	13,085,742	1,179,861	1,114,179	1,185,212
Origin × product × time FE	yes	yes	yes	yes
Origin × destination × product × month FE	yes	yes	yes	yes
Destination × time FE	no	yes	yes	no
Destination × product × time FE	yes	no	no	no

Impact beyond trade

Impact beyond trade

- Do embargoes really matter economically?

  $\rightarrow$ short-term and long-run

- Firm-level indicators for activity: Domestic sales and purchases, employment

Non-trade firm-level data

- “Beyan Alış-Beyan Satış verileri” for domestic input-output linkages from TurkStat
  $\rightarrow$ firm-level transactions over 5,000 TL ($\approx$ 160 USD)
- firm registry for industry and location, using NACE classification to identify embargo-related activities and domestic sales by suppliers.
- Employer-employee dataset from the Social Security Institute
  $\rightarrow$ employment, wages, and workdays data

Empirical setup

Classic difference-in-differences setup

$$\log X_{it} = \Gamma_{im} + \Gamma_t + \delta S_{it} + \epsilon_{it}$$

- Firm $\times$ month and time fixed effect
- Treatment: Firm exported embargoed products to Russia before imposition
- Control group:
  - Firms exported embargoed products to other markets and
  - Firms exporting non-embargoed products to Russia

Domestic sales

Dependent Variables:	log(value)		
Model:	(1)	(2)	(3)
Embargo × period imposition	-0.1448***	-0.1288**	-0.1550***
	(0.0521)	(0.0553)	(0.0534)
Embargo × period lifting	-0.0653	-0.0704	-0.0715
	(0.0682)	(0.0698)	(0.0698)
Non-Russia × period imposition		0.0518	
		(0.0312)	
Non-Russia × period lifting		-0.0256	
		(0.0514)	
Non-embargo × period imposition			-0.0529
			(0.0455)
Non-embargo × period lifting			-0.0239
			(0.0597)
Observations	88,294	88,294	88,294
R^2	0.83888	0.83906	0.83889

Number of customers

Dependent Variables:	log(number of connections)		
Model:	(4)	(5)	(6)
Embargo × period imposition	-0.0496	-0.0526	-0.0554*
	(0.0308)	(0.0319)	(0.0314)
Embargo × period lifting	-0.0740*	-0.0786*	-0.0824*
	(0.0416)	(0.0423)	(0.0425)
Non-Russia × period imposition		0.0029	
		(0.0161)	
Non-Russia × period lifting		-0.0235	
		(0.0355)	
Non-embargo × period imposition			-0.0293
			(0.0327)
Non-embargo × period lifting			-0.0455
			(0.0395)
Observations	88,294	88,294	88,294
R^2	0.91997	0.92004	0.91999

Employment

Dependent Variable:	log(total workers)		
Model:	(1)	(2)	(3)
Embargo × period imposition	-0.1085**	-0.0989**	-0.1108**
	(0.0419)	(0.0425)	(0.0426)
Embargo × period lifting	-0.1161**	-0.1159**	-0.1132**
	(0.0498)	(0.0498)	(0.0510)
Non-Russia × period imposition		0.0522	
		(0.0460)	
Non-Russia × period lifting		0.0298	
		(0.0500)	
Non-embargo × period imposition			-0.0114
			(0.0486)
Non-embargo × period lifting			0.0230
			(0.0602)
Observations	88,553	88,553	88,553
R^2	0.92214	0.92216	0.92215

Conclusion

Conclusion

- Do embargoes really matter economically?
  - Trade effects persistent
  - Domestic sales don’t fully recover
  - Employment stays reduced

  $\rightarrow$ Firms permanently affected
- Novel estimation of trade effects

Shooting down trade: Firm-level effects of embargoes

Julian Hinz

Bielefeld University and Kiel Institute for the World Economy

E-Mail: mail@julianhinz.com
Twitter/X: @julianhinz
Bluesky: @julianhi.nz

Additional measures

- various measures such as prohibiting Turkish companies to carry out activities in Russia
- employment of new Turkish workers
- suspension of visa-free travel between two countries
- banning of charter flights to Turkey

Extensive margin

	Two-way with est. FE	Three-way
Embargo x period imposition	-7.599***	-6.890***
	(0.5200)	(0.5097)
Embargo x period lifting	-0.2294***	-0.0179
	(0.0530)	(0.0670)
Diversion x period imposition	0.2263***	0.0977*
	(0.0397)	(0.0476)
Diversion x period lifting	-0.3471***	-0.2785***
	(0.0353)	(0.0429)
Circumvention x period imposition	-0.6454***	0.1210.
	(0.0563)	(0.0713)
Circumvention x period lifting	0.3457***	0.7063***
	(0.0594)	(0.0764)
Est. destination × product × time FE	0.3662***	

Extensive margin - ATT

	Two-way with est. FE	Three-way
Embargo x period imposition	-0.0364***	-0.0328***
	(0.0000)	(0.0000)
Embargo x period lifting	-0.0058***	-0.0004
	(0.0012)	(0.0013)
Diversion x period imposition	0.0060***	0.0023*
	(0.0009)	(0.0010)
Diversion x period lifting	-0.0086***	-0.0061***
	(0.0007)	(0.0008)
Circumvention x period imposition	-0.0152***	0.0030.
	(0.0010)	(0.0014)
Circumvention x period lifting	0.0092***	0.0169***
	(0.0014)	(0.0016)
Est. destination × product × time FE	0.0095***	
	(0.0000)	
Observations	704,036	761,518
Origin × product × time FE		yes