

Shooting down trade: Firm-level effects of embargoes

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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)

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

- Fixed effects
 - $\Gamma_{\{i,o\}kt}$: Origin \times product \times time
 - Γ_{dkt} : Destination \times product \times time
 - $\Gamma_{\{i,o\}dk}$: 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)

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

- Only one origin country: Γ_{dkt} and $\delta_k S_{odkt}$ are collinear
→ needed: more origin countries
- Solution: Firm-level data from Turkey + global country-level data without Turkey
→ 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

- “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*** (0.6618)	-13.62*** (1.042)	-12.93*** (0.7108)	-14.36*** (0.6491)
Embargo x period lifting	-0.2994** (0.1024)	-0.1518 (0.0981)	-0.1752** (0.0672)	-0.7000*** (0.0837)
Diversion x period imposition	0.6815*** (0.0807)	0.0607 (0.0683)	0.1729*** (0.0478)	0.0831 (0.0529)
Diversion x period lifting	0.2474*** (0.0717)	-0.0977 (0.0653)	-0.0488 (0.0450)	-0.2351*** (0.0567)
Circumvention x period imposition	-0.0090 (0.0982)	0.0813 (0.0832)	-0.4077*** (0.0471)	-0.4435*** (0.0520)
Circumvention x period lifting	0.1572 (0.1030)	0.5076*** (0.0887)	-0.1058* (0.0476)	-0.2090*** (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

- Do embargoes really matter economically?
 - 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
→ 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
→ employment, wages, and workdays data

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 \times period imposition	-0.1448*** (0.0521)	-0.1288** (0.0553)	-0.1550*** (0.0534)
Embargo \times period lifting	-0.0653 (0.0682)	-0.0704 (0.0698)	-0.0715 (0.0698)
Non-Russia \times period imposition		0.0518 (0.0312)	
Non-Russia \times period lifting		-0.0256 (0.0514)	
Non-embargo \times period imposition			-0.0529 (0.0455)
Non-embargo \times 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 \times period imposition	-0.0496 (0.0308)	-0.0526 (0.0319)	-0.0554* (0.0314)
Embargo \times period lifting	-0.0740* (0.0416)	-0.0786* (0.0423)	-0.0824* (0.0425)
Non-Russia \times period imposition		0.0029 (0.0161)	
Non-Russia \times period lifting		-0.0235 (0.0355)	
Non-embargo \times period imposition			-0.0293 (0.0327)
Non-embargo \times period lifting			-0.0455 (0.0395)
Observations	88,294	88,294	88,294
R ²	0.91997	0.92004	0.91999

Employment

Dependent Variable: Model:	log(total workers)		
	(1)	(2)	(3)
Embargo × period imposition	-0.1085** (0.0419)	-0.0989** (0.0425)	-0.1108** (0.0426)
Embargo × period lifting	-0.1161** (0.0498)	-0.1159** (0.0498)	-0.1132** (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
- Firms permanently affected
- Novel estimation of trade effects

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

Extensive margin - ATT

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