# Economics of Sanctions

## Part 1 — Introduction and Frontier

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PSE Summer School — June 2026

Bloomberg

Politics

# Treasury Targets Central Bank Leader in New Myanmar Sanctions

By Saleha Mohsin

17 May 2021, 16:30 CEST

The New York Times

# *Changing Tack, U.S. Sanctions Ethiopia Over Abuses in Tigray War*

The measures signal a tougher American approach to a war in which Ethiopian forces are accused of atrocities. Ethiopia accused the U.S. of "meddling."

REUTERS®

June 1, 2021
4:51 PM CEST

Europe

# EXCLUSIVE EU to blacklist Belarus airline ahead of economic sanctions, diplomats say

3 minute read

Robin Emmott

# Plan for the next 4.5 hours

1. **Introduction & Frontier**
2. Firm-level adjustment under sanctions
3. Macro counterfactuals in quantitative trade models

- Running case throughout: 2014 + 2022 sanctions against Russia.
- Two practicals in R: Colombia–Venezuela firm-level estimation, public `KITE` simulation.
- Companion site: `julianhinz.com/teaching/economics-of-sanctions`.

# Outline of Part 1

Stylized facts

What is a sanction?

Conceptual frameworks

Effects on target, sender, third country

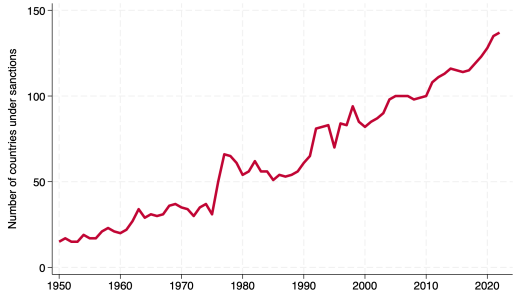
Case: Russia 2014 and 2022

Frontier: enforcement and circumvention

Take-aways

# Stylized facts

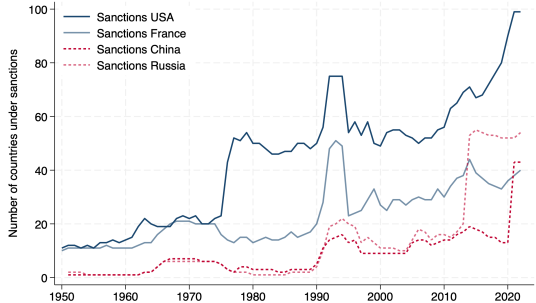
# Sanctions are everywhere




- Active sanctions programmes: ∼200 a decade ago → **∼600 in 2023** (Felbermayr et al., 2025; Yalcin et al., 2025).
- Roughly **12% of country pairs** and **27% of world trade** sit under at least one sanction regime.

*Source:* GSDB Release 4 (Yalcin et al., 2025), Table 2: bilateral pairs with at least one country targeted or initiating.

# Who sanctions whom? Initiators are concentrated



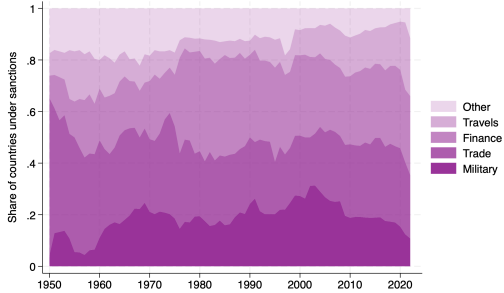

- In 2023: **US** runs ∼half of all programmes, with 113 active target countries.
- EU ∼10%; UK 50 targets; **Russia 53**; China 47; UN only 26 cases but universal membership (Felbermayr et al., 2025; Drezner, 2024).

*Source:* GSDB R4 (Yalcin et al., 2025); Felbermayr et al. (2025).

# Targets are dispersed — and Russia has risen

- Network structure is asymmetric: few initiators, many targets.
- Three macro trends of the last two decades (Felbermayr et al., 2025):
  - → Shift from **comprehensive** to **targeted** sanctions
  - → US over-representation in initiation
  - → Emergence of **Russia** as one of the most frequent targets
- Today ∼130 countries face at least one international sanction — two-thirds of all nations.

# The instrument mix has shifted




- Pure trade sanctions **rarely stand alone**; financial, asset, travel measures dominate the mix (Felbermayr et al., 2025).
- Russia 2022 = trade + financial + dual-use + travel + price cap in one package.

*Source:* GSDB R4 (Yalcin et al., 2025).

## Objectives have broadened

- Pre-1990 mix dominated by **security** (territorial integrity, war termination, prevention of WMD).
- Since 1990 a sharp rise in **human rights**, **democracy**, and **environmental** motives (Felbermayr et al., 2025).
- Drezner's conceptual hierarchy (Drezner, 2024):
  - $\rightarrow$ Economic **coercion** (quid pro quo) $\subset$
  - $\rightarrow$ Economic **sanctions** (also denial, containment, symbolism) $\subset$
  - $\rightarrow$ Economic **statecraft** (also adds inducements: BRI, IPEF, Marshall Plan).

# Durations are bimodal

- Many episodes are very short.
- But a non-trivial **tail is extremely long**: **5.4% of sanctions initiated in the 1950s are still in place** (Felbermayr et al., 2025).
- Stickiness raises a familiar puzzle: lifting requires **credible commitment**.
  - → Without it, even maximum pressure yields no concessions (Drezner, 2024).
  - → The Trump withdrawal from the JCPOA is the canonical illustration.

# Humanitarian externalities are real and persistent

- Even **targeted** sanctions raise the probability of a currency crisis by $\sim$**40%**; comprehensive ones by $\sim$**135%** (Peksen and Son, 2015).
- UN sanctions: $\geq$25% decline in GDP per capita over a decade, persisting after lifting (Neuenkirch and Neumeier, 2015).
- Dodd–Frank conflict-minerals provision: **+140% infant mortality** in affected DRC villages (Parker et al., 2016).
- UN sanctions cut life expectancy by $\geq$1 year, US sanctions by up to $\frac{1}{2}$ year, women bearing the larger burden (Gutmann et al., 2021).

## Behavioural success rate is low to moderate

- Targeted Sanctions Consortium baseline: in UN cases since the end of the Cold War (Drezner, 2024):
  - → Overall success rate: **1 in 4**
  - → When the primary goal is *coercion*: **1 in 10**
- Threats of sanctions are **systematically more effective than imposed sanctions** (Morgan et al., 2009; Drezner, 2003).
- Implication: HSE-style success rates are biased by **selection on imposition** (Eaton and Engers, 1992).

## Drezner: threat-stage success > imposition stage

- Once threats become imposed sanctions, the target has already refused to concede.
- TIES data (Morgan et al., 2009): coercion ending at the threat stage has far higher success rates.
- Bargaining intuition (Eaton and Engers, 1992; Drezner, 1999):
  - → Sanctions are an *inside option* that reshapes future negotiating leverage.
  - → Most-bite cases never make it into the dataset because targets fold first.

## Geoeconomic fragmentation

- Modal post-Cold-War sanction hit a **peripheral** target with negligible global spillover.
- Post-2014 sanctions hit **core economies** and have **systemic** consequences (Aiyar et al., 2023; Goldberg and Reed, 2023).
- Parallels to interwar period (Mulder, 2022) and Cold-War-bloc trade structure.
- "Weaponized interdependence" (Farrell and Newman, 2019; Farrell and Newman, 2023) is **self-limiting**:
  - → Rivals refuse to enter networks where the central node can weaponize them.
  - → Less, not more, globalisation in strategic sectors.

# “Friendly fire”: sender firms self-sanction

- Russia 2014: most of the **lost trade was in non-embargoed goods** (Crozet and Hinz, 2020).
- Channels: trade finance withdrawn, country risk re-priced, compliance overhead, reputational concerns.
- Effects are **larger than expected** given the formal scope of the measures (Felbermayr et al., 2025).
- Returns in Session 2 with the firm-level evidence.

## Effectiveness is convex in coalition share

- Coalition design matters more than individual sanction stringency (Hausmann et al., 2024):

  $\rightarrow$ Sanctions effectiveness is **highly convex** in the coalition's share of the target's market at the HS6 level.

  $\rightarrow$ Partial bans waste enforcement effort; near-full bans bite disproportionately.

- Pre-war decoupling lowers exposure but also **lowers the opportunity cost of conflict** — deterrence is ambiguous (Mayer et al., 2026).

- Hooks Session 3's coalition counterfactuals.

# What is a sanction?

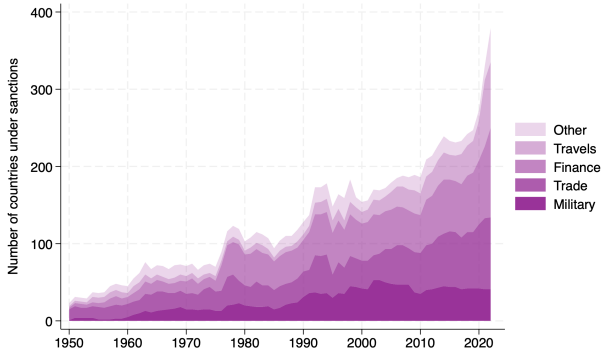
# A working definition

- A **sanction** is a coercive economic measure imposed by one or more states on another state, entity, or individual to alter behaviour.
- Three families used together in modern packages:
  - → **Trade** — export / import bans, dual-use controls, tariff hikes, embargoes
  - → **Financial** — asset freezes, SWIFT exclusion, reserve freezes, oil price cap
  - → **Personal** — travel bans, SDN listings on individuals
- Course focus: **trade sanctions**, with financial channels covered when they shape trade.

## Three purposes: coercion, denial, signalling

- Drezner (2024): any sanction pursues one (or several) of three logics.
- **Coercion** — change target behaviour through promised concessions for lifting.
  - → Example: *JCPOA 2015* — nuclear constraints traded for sanctions relief.
  - → Requires credible *both-ways* commitment.
- **Denial** — deny the target access to militarily or economically critical inputs.
  - → Example: *US chip export controls 2022/23/24* on advanced semiconductors.
  - → Doesn't need cooperation from the target.
- **Signalling** — to domestic publics, allies, or rivals.
  - → Example: *Magnitsky listings* on individual human-rights abusers.
  - → Effectiveness measured in audience reactions, not target compliance.

# A taxonomy of measures




*Source:* Syropoulos et al. (2024) and Yalcin et al. (2025).

# A long arc: the “economic weapon”

- Antiquity — Megarian Decree (432 BCE), the original trade embargo.
- Continental System (1806–1814); Boer War.
- **League of Nations sanctions against Italy** (1935–36) — the modern blueprint (Mulder, 2022).
- 1945–1990 — selective, mostly US-led: Cuba (1960–), Apartheid South Africa, Rhodesia, North Korea.
- Post-1990 — multilateralisation; UN Security Council activism; Iraq (1990–2003).
- Post-2014 — the **Russia decade**.

## Three waves of empirical work

- **Case studies** — Galtung (1967) on Rhodesia; Doxey 1972; Schreiber 1973 on Cuba.
- **Large-$N$ cross-section** — HSE (Hufbauer et al., 2009); Pape (1997a): roughly $\frac{1}{3}$ "success," contested.
- **Selection-corrected designs** — threats as treatment (Morgan et al., 2009; Drezner, 2003; Eaton and Engers, 1992).
- Then the modern **GSDB / micro** wave: Felbermayr et al. (2020), Crozet–Hinz (2020), Crozet et al. (2021), Hinz–Monastyrenko (2022), …

## Three databases, three angles

- **HSE** (Hufbauer–Schott–Elliott, 1985 / 1990 / 2007) — case-coded successes / failures; foundational.
- **TIES** (Morgan–Bapat–Krustev 2009) — threats and impositions, 1971–2000; selection-aware.
- **GSDB** (Felbermayr et al. 2020; Releases 3 / 4) — comprehensive dyadic-by-type panel, 1950–; the workhorse (Felbermayr et al., 2020; Syropoulos et al., 2024; Yalcin et al., 2025).
- Caveat: GSDB **excludes threats** — selection bias *built in* (Eaton and Engers, 1992; Drezner, 2003; Morgan et al., 2009).

# Conceptual frameworks

## Hirschman: asymmetric interdependence

- Hirschman (1945): trade ties confer power on the **less-dependent** side.
- Two channels:
  - → **Supply** effect — import dependence on the target
  - → **Influence** effect — export dependence of the target
- Operationalised today as **weaponized interdependence** (Farrell and Newman, 2019; Farrell and Newman, 2023).
- Underlies most theoretical models of sanctions and KITE-style counterfactuals.

## The Pape–HSE debate

- Hufbauer et al. (1990) (HSE, 1985 / 1990 / 2007): large-*N* case coding.
  - → Headline success rate ∼**34%** — foundational benchmark.
- Pape (1997b): *recodes* the same cases on tighter behavioural criteria.
  - → Success rate collapses to ∼**5%** — "sanctions do not work".
- Drezner (2003): it's **selection bias**.
  - → Threats settle before imposition; observed cases are the systematically tougher ones.
- Today's consensus (Felbermayr et al., 2025; Drezner, 2024): modest effectiveness, large damage, **threat-stage success** $>>$ **imposition stage**.

## The sanctions paradox

- Drezner (1999): sanctions bite **harder against allies** than against enemies.
  - → Allies fear future disputes and concede.
  - → Enemies expect repeated games and refuse, building resilience.
- Implication: **the cases we see imposed are precisely those expected to fail**.
- Reconciles HSE-style pessimism with the strategic-bargaining view.

## Hausmann–Schetter–Yildirim: convexity in coalition share

- Hausmann et al. (2024): with HS6-level partial bans, sanctions effectiveness is **convex** in the coalition's market share.
- Mechanism: the target faces a **residual supply curve** from non-coalition exporters that is concave in coverage — below 80–90% coverage the residual market is elastic and prices barely move; above it, marginal coverage forces ever-larger price compensation.
- Direct prescription: design for **breadth** of coalition over **intensity** of any one sender.
- Returns in Session 3 (the *S3_global* counterfactual: $-7.23\%$ vs $-2.62\%$).

## Sanctions as bargaining inside an outside option

- Eaton and Engers (1992): target chooses whether to comply, given sender's outside option.
- Imposition is **off-path** in equilibrium when threats are credible.
- Modern rationalisation (Felbermayr et al., 2025): sanctions as an *inside option* that shifts the bargaining frontier in dynamic coercive games à la Fearon (1995) / Powell (2004).
- Provides a theoretical answer to the puzzle: *why impose sanctions at all?*

# Effects on target, sender, third country

## Three incidence channels

- **Target** — direct trade loss, terms-of-trade movement, welfare drop.
  - → Russia 2022: $-2.6\%$ welfare in our review-paper benchmark.
- **Sender** — friendly fire, mercantilist illusion.
  - → Lost exports are *both cost and goal*.
  - → But benefits of trade come from *imports* as well.
- **Third country** — GE spillovers, diversion, circumvention.
  - → Extraterritoriality (Kwon et al., 2024; Janeba, 2024).
  - → Third-country GE (Ghironi et al., 2024).

## Target: large, negative, long-lasting

- Strong negative effects on target trade and welfare (Felbermayr et al., 2025).
- Heterogeneity even within coalitions: Baltics + Cyprus carry the heaviest sender burden.
- Russian counter-sanctions episode: $-25\%$ Russian exports, $-26\%$ imports from senders (Nguyen and Do, 2021).
- Russian counter-measures hit Western exporters $\sim 8\times$ harder than the original Western sanctions hit Russia (Bělín and Hanousek, 2021).

## Sender: small but visible

- Sender welfare effects **small and short-lived** in aggregate (Felbermayr et al., 2025).
- But concentrated in particular bilateral relationships.
- Russia 2014: French welfare $-0.02\%$, German $-0.06\%$; 2022: $-0.05\%$ / $-0.15\%$.
- Mechanism shows up at the **firm level** as the friendly-fire pattern — Session 2.

# Third country: extraterritorial and GE

- **Extraterritorial** reach: US dollar plumbing makes secondary sanctions bite globally (Janeba, 2024; Kwon et al., 2024).
- Third-country **GE spillovers** matter quantitatively (Ghironi et al., 2024).
- Dyad-only estimates of sanction effects are **biased**.
- And the third country is sometimes the *entrepôt* — next-to-last block.

## Structural gravity in one slide

- Bilateral trade share (allocation of expenditure):

$$\pi_{ij} \;=\; \frac{X_{ij}}{X_j} \;=\; \frac{\phi_{ij}\, S_i/\Omega_i}{\Phi_j}$$

  with $\phi_{ij}$ trade frictions, $\Omega_i$ outward and $\Phi_j$ inward multilateral resistances; market clearing $Y_i = S_i\,\Omega_i$.

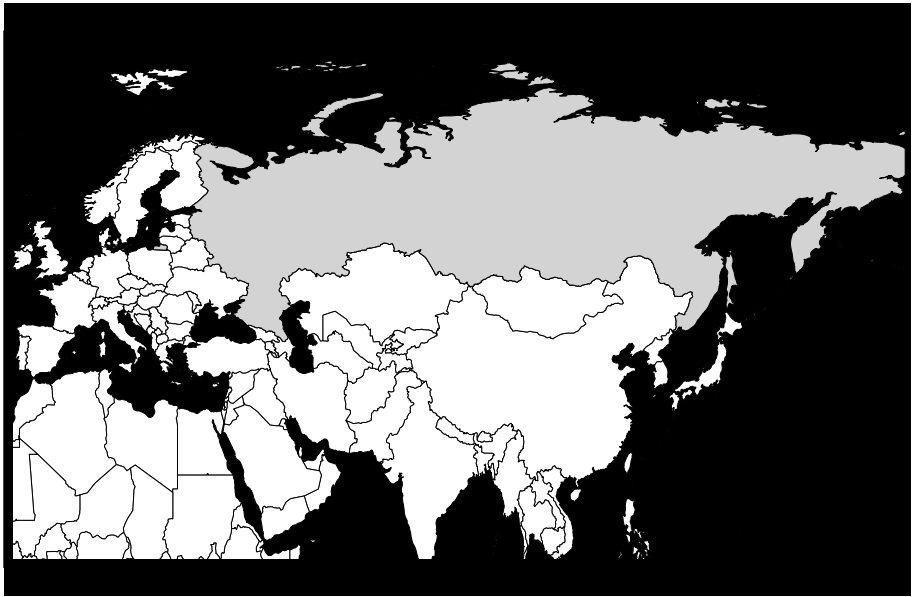
- Sanctions enter as $\hat{\tau}^s_{ij} > 1$ on targeted bilateral $\times$ sector cells.

- Hat algebra (Caliendo and Parro, 2015): write changes as $\hat{x} \equiv x'/x$, solve for $\hat{w}, \hat{P}, \hat{\pi}$ in the fixed point given $\hat{\tau}$.

- Counterfactual welfare: $\hat{W}_n = \hat{w}_n/\hat{P}_n$.

- **We will use this object in Sessions 2 and 3** — the firm-level estimator (Session 2) recovers $\hat{\tau}^s_{ij}$ partial effects; KITE (Session 3) takes them through GE. (Full derivation in the appendix.)

# Case: Russia 2014 and 2022



# Russia 2014: Crimea, Donbas, sectoral sanctions

- Annexation of Crimea (Feb–Mar 2014) $\rightarrow$ EU, US, CA, AU, JP packages by July.
- Targets: defence, energy tech, financial-sector **long-term funding**; SDN list of $\sim$3,000 firms.
- Russian counter-sanctions: Aug 2014 agri import ban on the EU, US, NO, AU, CA (Hinz and Monastyrenko, 2022).
- Russia welfare loss in the GE benchmark: $-1.06\%$ (Crozet–Hinz–Šváb 2025 replication of Chowdhry et al., 2024); Session 3 returns to the full 7-scenario grid.

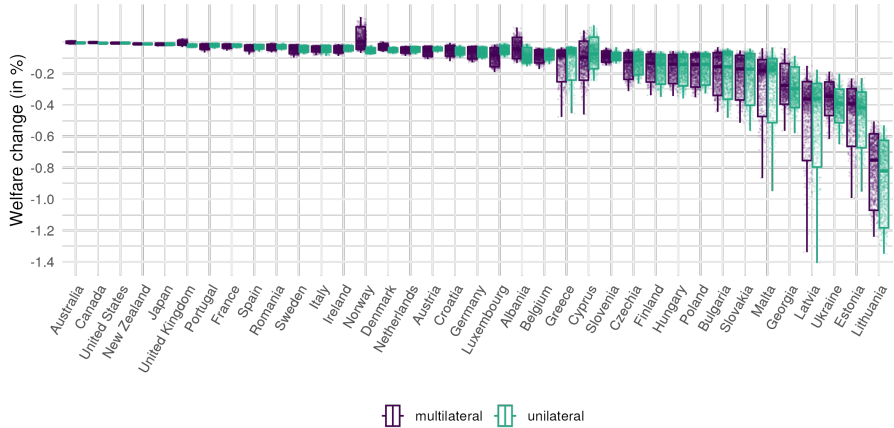
## Russia 2014: how big is the welfare bite?

| Crozet–Hinz–Šváb (2025) replication | Russia welfare |
|---|---|
| S1: 2014 coalition + 2014 measures (current) | $-1.06\%$ |
| Global coalition + 2014 measures | $\approx -2.5\%$ |
| 2014-group total embargo (hypothetical ceiling) | $\approx -3.8\%$ |

- Current 2014 measures impose a fraction of the welfare hit a hypothetical full embargo would — but **far less than "maximum pressure" rhetoric implies**.
- Coalition breadth matters **more than intensity within the existing coalition** (Chowdhry et al., 2024; Hausmann et al., 2024).
- *Caveat:* welfare loss is **economic cost**, not **policy success** — behaviour change is a separate question (Drezner, 2024).

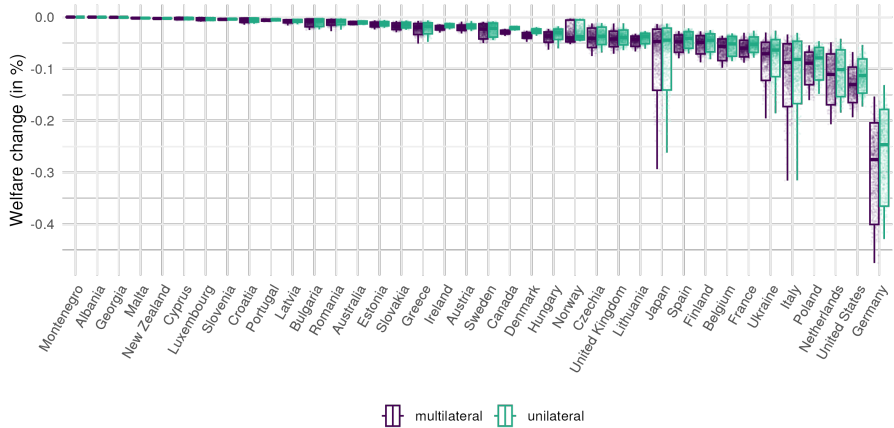
*Source:* Crozet et al. (2025) §3; replicates Chowdhry et al. (2024). Session 3 returns to the full S1–S7 grid.

# Russia 2014: who pays the welfare bill? (1/2 — costs *incurred*)




*Source:* Chowdhry et al. (2024): welfare costs *incurred* by sanctioning countries, 2014 episode.

# Russia 2014: who pays the welfare bill? (2/2 — costs *imposed*)




*Source:* Chowdhry et al. (2024): welfare costs *imposed* on Russia, by sanctioning country, 2014 episode.

# Russia 2022: the qualitative break

- Full-scale invasion of Ukraine, Feb 2022 $\rightarrow$ **12 EU packages**, US, UK, CA, AU, JP, KR.
- Trade: export controls + dual-use + luxury + later oil + steel + financial services.
- **Financial**: CBR reserves freeze ($\sim$\$300 B), SWIFT exclusion of major banks, oil **price cap**.
- Russia welfare loss in the GE benchmark: $-2.62\%$ — $\sim 2.5\times$ 2014.
- EU+UK sanctions cost $\approx$ **\$41 B** over two years; comparable to Ukraine direct aid.

## Comparison: Iran 2012 / 2018

- **2012**: comprehensive UN + EU + US oil and financial sanctions over the nuclear programme.
- **JCPOA 2015**: phased lifting; **2018**: US reinstatement under Trump ("maximum pressure").
- Haidar (2017a): $\sim$two-thirds of Iranian exporters **redirected sales** to non-sanctioning destinations (Iraq, UAE, Turkey).
- Moghaddasi Kelishomi and Nisticò (2022) and Moghaddasi Kelishomi and Nisticò (2024): formal-manufacturing employment losses + reallocation to the **informal sector**.
- Stylised fact: Iran sanctions $\sim 3\times$ more comprehensive than Russia 2022 in scope, yet $\sim \frac{1}{3}$ as effective at changing behaviour — coalition breadth $\neq$ behavioural success.

# Frontier: enforcement and circumvention

## Scheckenhofer–Teti–Wanner: military-goods evasion

- Triple-DiD on HS6 Comtrade 2021–23 (Scheckenhofer et al., 2025):
  - → CHP-listed (Common High-Priority) military goods to Russia.
  - → Russia-friendly entrepôt countries vs neutral controls.
- Headline: $+20$ **pp** higher probability that friends export military goods to Russia after Feb 2022.
- Western allies $+4$ pp more likely to ship military goods to friends.
- Re-exports through GE / MD / UZ: $+7.6$ pp.
- **Enforcement, not design**, is the binding constraint.

## Eurasian roundabout: the entrepôt trade

- Chupilkin et al. (2026): trade through Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan and others jumped sharply post-2022.
- Russian imports of sanctioned Western goods via **neutral hubs +100–200%**.
- Circumvention adds **20–40% to Russian import prices** (Itskhoki and Ribakova, 2024).
- Hence the GE bound is informative *even if* circumvention happens — price gap is the friction.

## Oil price cap and the dark fleet

- G7 + EU oil price cap (Dec 2022): hybrid **trade–finance–shipping** instrument (Johnson et al., 2023).
- Initially binding → Russian discounts; later eroded as a **shadow fleet** of tankers without G7 insurance scaled (Spiro et al., 2025; Fernández-Villaverde et al., 2025).
- Design trade-off: *starve revenue* vs *protect oil supply*.
- **Dark shipping** is now itself a measurable evasion technology.

# Financial plumbing: SWIFT, TARGET2

- Drott et al. (2024): bank-level TARGET2 payment flows show measurable disruptions around SWIFT exclusion.
- Private de-risking amplifies designated-bank effects (Drezner, 2024).
- Enforcement of export controls is increasingly a **financial-monitoring problem** (Hilgenstock et al., 2025).
- Cross-border credit and currency choice shift gradually with sanctions risk.

## Chips: export controls and second-order effects

- US Oct 2022 / Oct 2023 / Dec 2024 chip export controls.
- Bonnet et al. (2026): **unintended third-country adjustments** “throwing sand in the chips.”
- Pre-war decoupling lowers exposure but **ambiguous deterrence value** (Mayer et al., 2026).
- Hooks into industrial-policy turn (CHIPS Act, IRA, BIL, EU Anti-Coercion Instrument).

## Private sanctions and political backlash

- Hart et al. (2024): voluntary corporate exits from Russia operate in parallel with state sanctions.
- Stigma + consumer + investor pressure $\rightarrow$ "self-sanctions" beyond legal scope.
- Backlash side: regions of Russia with greater sanctions exposure show **higher regime support** (Gold et al., 2023).
- Implication: GE welfare losses do *not* translate one-to-one into political pressure.

# Take-aways

## What sanctions look like in the model

- For the rest of the course, a sanction is a **bilateral, sector-specific shifter** on $\tau_{ij}^{s}$.
- Four channels stacked into one $\hat{\tau}_{ij}^{s}$:
  - → **Formal embargo** — the de jure measure on the SDN / EU package list.
  - → **Private de-risking** — voluntary corporate exit + reputation (Hart et al., 2024).
  - → **Finance** — trade credit withdrawal, SWIFT / TARGET2 frictions, currency-choice risk.
  - → **Compliance** — screening overhead, secondary-sanctions exposure.
- **Session 2 measures** the joint effect at the firm level (PPML on Colombia–Venezuela / Russia).
- **Session 3 simulates** the GE response (KITE counterfactuals on the 2022 ICIO).

## Three take-aways

- Sanctions are **everywhere now** — but their mix, design, and enforcement have all shifted.
- **Coalition breadth and enforcement** matter more than headline measures or individual sender stringency.
- The interesting questions are at the **firm level** (Session 2) and in **macro counterfactuals** (Session 3) — which is where we go next.

## How an EU sanctions package gets adopted

- **Legal base**: TEU Art. 29 (CFSP Decision) + TFEU Art. 215 (Council Regulation, binding on firms).
- **Process**: HR/VP proposes; Foreign Affairs Council adopts CFSP Decision by *unanimity*; Commission + HR/VP propose the Regulation; Council adopts by qualified majority.
- **Speed**: emergency packages have been adopted in $<$48 h (Russia, Feb 2022); standard packages take 4–6 weeks.
- **Rolling packages**: 14 Russia sanctions packages since Feb 2022 — each ratchets coverage, closes loopholes, lists more entities.
- Hard-power vote: “EU sanctions” = unanimity. One member state can block (Hungary on Russia, Cyprus on Belarus). Anti-Coercion Instrument (2023) only partially eases this.

*Source:* Eur-Lex; EEAS sanctions policy page; Portela and Mora-Sanguinetti (2023).

## Primary sources for sanctions work

- Official trackers:
  - → EU Sanctions Map — live coverage of all EU regimes.
  - → OFAC Sanctions Programs — US Treasury.
  - → UN Security Council Sanctions Committees.
  - → Council “Russia sanctions explained”.
- Curated databases:
  - → Atlantic Council Russia Sanctions Database.
  - → KSE Sanctions Portal (entity- + sector-level).
  - → Global Sanctions Data Base, Release 4 (Yalcin et al., 2025).
- Bookmark these *tonight*; we will not have time to walk through them in class.

## Where to read more

- Surveys: Drezner (2024), Felbermayr et al. (2025), Morgan et al. (2023).
- Books: Mulder (2022), Baldwin (1985), Farrell and Newman (2023).
- Policy: Schott (2023), Simola (2023), Hilgenstock et al. (2025), Astrov et al. (2024).
- **Companion site** — `julianhinz.com/teaching/economics-of-sanctions` — full reading list with PDFs.

# References i



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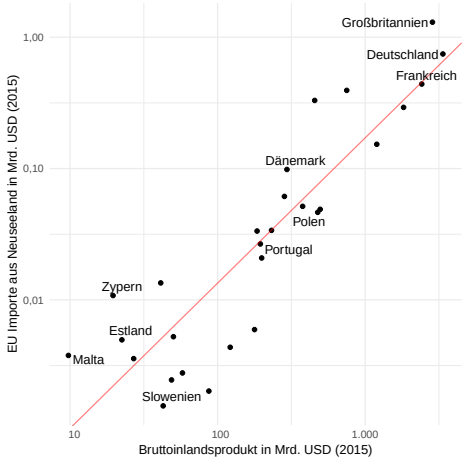
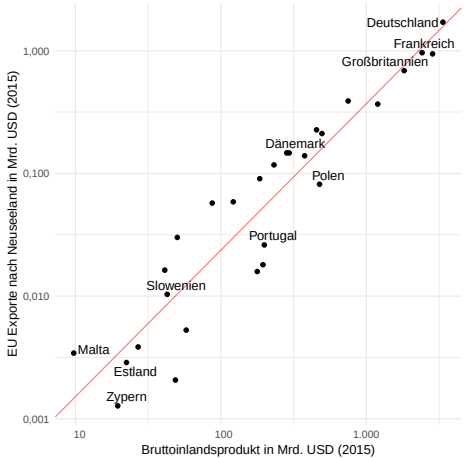
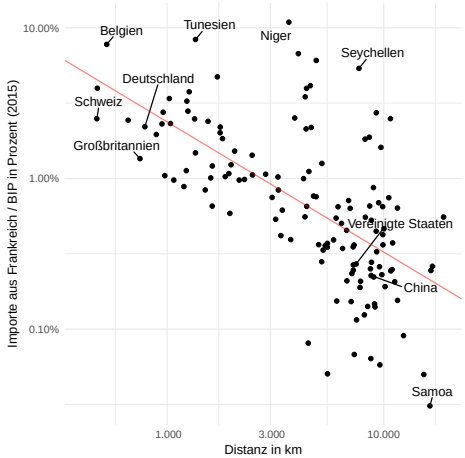
# Backup: economic mass matters

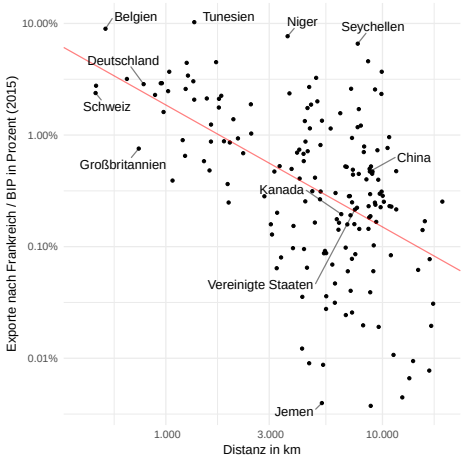



*Source:* Own computation; UN Comtrade + CEPII gravity dataset.

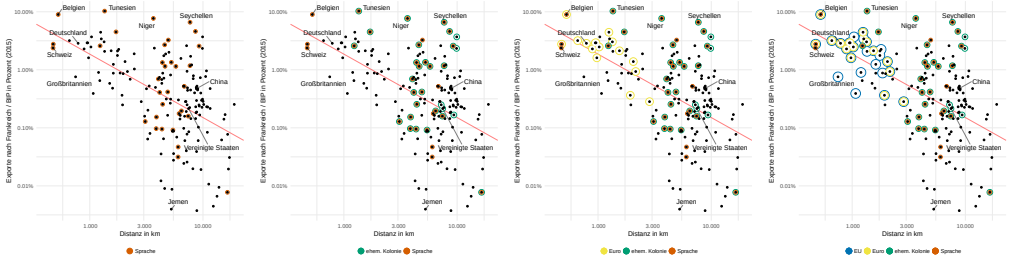
# Backup: distance still matters




*Source:* Own computation; CEPII gravity dataset.

# Backup: “other” distances — language, history, currency, EU




*Source:* Own computation; CEPII gravity dataset.

## Backup: “naive” gravity (Tinbergen 1962)

- Origin in Tinbergen (1962):

$$X_{ij} = G \frac{Y_i^{\alpha} E_j^{\gamma}}{\phi_{ij}^{\beta}}$$

- $Y_i$, $E_j$ economic mass; $\phi_{ij}$ trade frictions (distance, language, . . . ).
- Powerful empirically but **missing GE feedback** — prices, market shares, multilateral resistance.

## Backup: structural gravity — two conditions

- **Allocation of expenditure**: bilateral trade share

$$\pi_{ij} = \frac{X_{ij}}{X_j} = \frac{\phi_{ij}\, S_i/\Omega_i}{\Phi_j}$$

- **Market clearing**: producer revenue

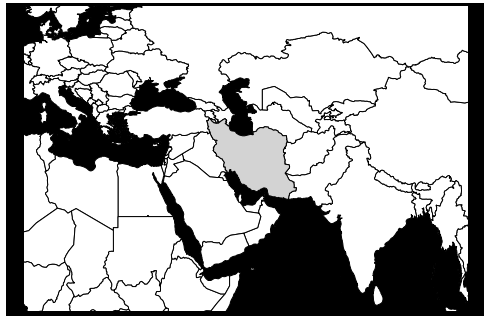
$$Y_i = \sum_j X_{ij} = S_i \sum_j \frac{\phi_{ij}\, E_j}{\Phi_j} = S_i\, \Omega_i$$

- $\Omega_i$ = outward multilateral resistance; $\Phi_j$ = inward.
- Microfoundations: Armington, Eaton–Kortum, Krugman, Melitz — all nest.

## Backup: hat algebra

- Following Caliendo and Parro (2015): write all variables in proportional changes $\hat{x} \equiv x'/x$.
- Sanctions enter as $\hat{\tau}_{ij,s} > 1$ on the targeted bilateral $\times$ sector cells.
- Solve fixed point in $\hat{w}$, $\hat{P}$, $\hat{\pi}$ given $\hat{\tau}$ and initial conditions.
- Counterfactual welfare: $\hat{W}_n = \hat{w}_n / \hat{P}_n$.
- This is **exactly what KITE does** — Session 3.

## Backup: Iran 2012 case



- 2010–12 oil + financial sanctions over the nuclear programme; JCPOA 2015; US reimposition 2018.
- Haidar (2017b): Iranian exporters deflected to non-sanctioned destinations.
- Welfare benchmark below.

# Backup: Iran 2012 — welfare benchmarks

| | Current Coalition | Global Coalition |
|---|---|---|
| Iran welfare effect | −1.90% | −4.88% |
| Complete embargo | −4.04% | −13.20% |

*Source:* Chowdhry et al. (2024), balanced welfare measure.

## Backup: Drezner stylized fact pool

- 13.5 sanctions episodes / year in 1945–1990 $\rightarrow$ 53.5 / year in 1990–2005.
- Financial sanctions get **amplified by private de-risking**; trade sanctions easier to evade (Drezner, 2024).
- Personalist regimes are softer targets than institutionalised autocracies (Marinov, 2005).
- Iraq child-mortality figures known to be *upward-manipulated by the regime* — caveat to humanitarian numbers.
- Banking-crisis probability **roughly doubles** under sanctions (Peksen and Son, 2015).

## Backup: more on initiation predictors

- Larger, more democratic countries **impose** sanctions more often (Felbermayr et al., 2025).
- Dyad-level: common minority, language, distance, size asymmetry, regime type all predict imposition heterogeneity.
- Open frontier: measuring deterrence (Drezner, 2024) — the counterfactual is what didn't happen.

## Backup: “smart” sanctions are not always humane

- Targeted financial sanctions still produce most of the humanitarian effects (Drezner, 2024).
- Corruption / informal economies grow under sanctions; do not return after lifting.
- Economic-freedom scores collapse and stay low.
- Counter-evidence that *targeting* alone solves the ethical problem of sanctions.

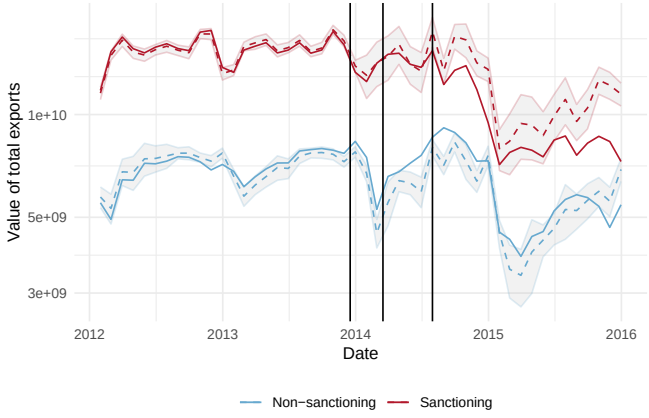
## Backup: informal coercion — China, THAAD

- China runs sanctions **without prior threats** via SOEs and informal boycotts (Lim and Ferguson, 2022).
- Officially: “nothing is happening.” Empirically: measurable trade and investment drops.
- Open question: a distinct *national style* of statecraft, or just an earlier state-building stage?

## Backup: counter-sanctions can dominate

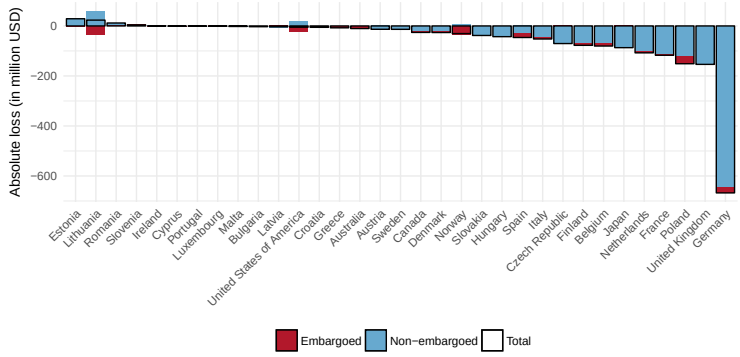
- Russian counter-sanctions episode (Aug 2014 agri ban):
  - $\rightarrow$ $\sim 8\times$ larger trade decline than the Western sanctions did (Bělín and Hanousek, 2021)
  - $\rightarrow$ Driven by **grandfathered contracts** on the Western side
- Consumer-price impact: embargoed-good prices $+7.7$ to $+14.9\%$ short-run (Hinz and Monastyrenko, 2022).
- CPI $+0.33\%$; household welfare $-1.84\%$ for Russia.

# Backup: friendly fire, aggregate




*Source:* Crozet and Hinz (2020); observed vs counterfactual sender exports to Russia, 2014 episode.

# Backup: lost trade by sender




*Source:* Crozet and Hinz (2020); monthly export loss in USD millions by sender.

## Backup: oil exports under sanctions

- Babina et al. (2023): Russian crude flows reroute to Asia; discounts compress over time.
- Spiro et al. (2025): shadow fleet adoption $\rightarrow$ price-cap evasion technology.
- Johnson et al. (2023): the hybrid trade–finance–shipping instrument is the design innovation.
- Open: a long-run, dynamic-deterrence analogue of the Hausmann–Schetter–Yildirim coalition convexity result.

## Backup: when sanctions work — threat stage

- Drezner (2024): most behavioural success accrues at the **threat** stage.
- Implication for empirics: **study selection into imposition**.
- TIES data (Morgan et al., 2009) include threats; GSDB does not.
- Identification + policy lesson: lift the threat credibly to extract concessions; impose only when extraction has failed.

## Backup: open frontier

- **Deterrence measurement**: counterfactual conflicts that didn't happen.
- **National styles of statecraft**: persistent or transient?
- **Systemic implications**: sanctions reshape the global trading system (Aiyar et al., 2023; Goldberg and Reed, 2023).
- **Enforcement** as the binding constraint: chips, oil cap, secondary sanctions.
- Today's course = the empirical workhorse for any of the above.