# Brothers in Arms: The Value of Coalitions in Sanctions Regimes

Vienna Institute for International Economic Studies — January 31, 2023

Sonali Chowdhry,[1,2,3] Julian Hinz,[2,4] Katrin Kamin,[2] and Joschka Wanner[2,5]

[1]European University Institute
[2]Kiel Institute for the World Economy
[3]DIW Berlin
[4]Bielefeld University
[5]University of Potsdam

CHINA ECONOMY

# China watches warily as Ukraine makes U.S., EU and Japan strengthen their alliance

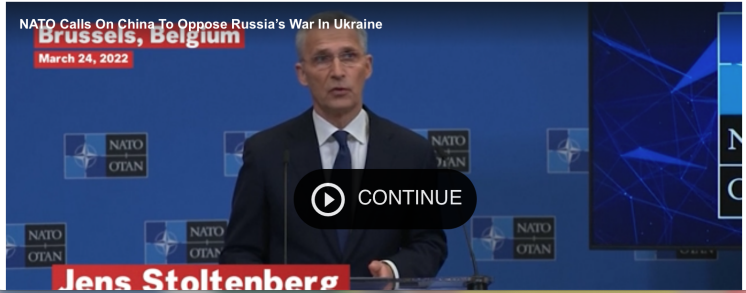
PUBLISHED TUE, MAR 8 2022•11:15 PM EST | UPDATED TUE, SEP 13 2022•AT 12:50 EDT

Evelyn Cheng
@CHENGEVELYN

WORLD

# NATO Coalition Calls on China to Oppose Russia's War in Ukraine

BY JOHN FENG ON 3/24/22 AT 11:00 AM EDT



cbsnews.com

CBS NEWS

WORLD ›

# India faces mounting pressure to condemn Russia, a key ally, over Ukraine invasion

BY ARSHAD R. ZARGAR
MARCH 4, 2022 / 11:13 AM / CBS NEWS

theguardian.com

The Guardian

News | Opinion | Sport | Culture | Lifestyle

Switzerland

# Switzerland adopts wholesale EU sanctions against Russia

**Measures do not undermine neutrality principle as Switzerland says it is acting in defence of international law**

# Research questions

- What is the economic cost of using sanctions to pursue geopolitical objectives?

→ non-trivial: global value chains

- How large are *incurred* costs and how are they distributed?
- How large are *imposed* costs?

# Research questions

- What is the economic cost of using sanctions to pursue geopolitical objectives?

→ non-trivial: global value chains

- How large are *incurred* costs and how are they distributed?
- How large are *imposed* costs?

## Research questions

- What is the economic cost of using sanctions to pursue geopolitical objectives?

$\rightarrow$ non-trivial: global value chains

- How large are *incurred* costs and how are they distributed?
- How large are *imposed* costs?

## What we do

- Setting: 2012 Iran and 2014 Russia sanctions
- Evaluate cost under actual and hypothetical setups of sanctions coalitions

→ Economic cost as changes in aggregate welfare from imposed sanctions

- “Dual use” of gravity: trade costs estimation & GE simulations
- Bayesian bootstrap: Confidence intervals for outcomes
- Model extension: Welfare loss-balancing transfers

# General equilibrium trade model with transfers

# Model of the world economy à la Caliendo and Parro (2015)

- Ricardian multi-country multi-sector with input-output linkages
- Production: Labour and composite of intermediates
- Preferences: Cobb-Douglas utility across and CES utility within sectors
- Trade in final and intermediate goods, costly due to bilateral frictions

→ Sectoral trade flows follow a structural gravity equation

# Model of the world economy à la Caliendo and Parro (2015)

- Ricardian multi-country multi-sector with input-output linkages
- Production: Labour and composite of intermediates
- Preferences: Cobb-Douglas utility across and CES utility within sectors
- Trade in final and intermediate goods, costly due to bilateral frictions

$\rightarrow$ Sectoral trade flows follow a structural gravity equation

## Model of the world economy à la Caliendo and Parro (2015)

- Model can be used to compute GE adjustment of trade cost shocks

→ "Dual use" of structural gravity model: Estimated trade cost shock used in simulations

- New equilibrium is solved in changes following Dekle et al. (2008)
- Model extension: Transfer mechanism

→ Idea: What (net) transfer is necessary to balance impact for all coalition members?

→ We determine the endogenous amount any coalition country pays into or receives out of a common transfer pool.

## Model of the world economy à la Caliendo and Parro (2015)

- Model can be used to compute GE adjustment of trade cost shocks

→ "Dual use" of structural gravity model: Estimated trade cost shock used in simulations

- New equilibrium is solved in changes following Dekle et al. (2008)
- Model extension: Transfer mechanism

→ Idea: What (net) transfer is necessary to balance impact for all coalition members?

→ We determine the endogenous amount any coalition country pays into or receives out of a common transfer pool.

## Model of the world economy à la Caliendo and Parro (2015)

- Model can be used to compute GE adjustment of trade cost shocks

→ "Dual use" of structural gravity model: Estimated trade cost shock used in simulations

- New equilibrium is solved in changes following Dekle et al. (2008)
- Model extension: Transfer mechanism

→ Idea: What (net) transfer is necessary to balance impact for all coalition members?

→ We determine the endogenous amount any coalition country pays into or receives out of a common transfer pool.

## Model of the world economy à la Caliendo and Parro (2015)

- Model can be used to compute GE adjustment of trade cost shocks

→ "Dual use" of structural gravity model: Estimated trade cost shock used in simulations

- New equilibrium is solved in changes following Dekle et al. (2008)
- Model extension: Transfer mechanism

→ Idea: What (net) transfer is necessary to balance impact for all coalition members?

→ We determine the endogenous amount any coalition country pays into or receives out of a common transfer pool.

## Data for estimation and simulation

- GTAP 10 Database

→ Tariffs, consumption shares, input coefficients

→ 65 sectors and 141 countries/regions

- Trade flows from UN Comtrade

→ Flows from origin ($o$) to destination ($d$) in (GTAP) sector ($s$) and time ($t$)

→ Coverage: 20 years (2000 – 2019), 10 million observations

- CEPII Gravity database

## Data for estimation and simulation

- GTAP 10 Database

→ Tariffs, consumption shares, input coefficients

→ 65 sectors and 141 countries/regions

- Trade flows from UN Comtrade

→ Flows from origin ($o$) to destination ($d$) in (GTAP) sector ($s$) and time ($t$)

→ Coverage: 20 years (2000 – 2019), 10 million observations

- CEPII Gravity database

# Gravity estimation

## Sectoral Gravity

- Separability: Gravity model estimated for each of the 65 GTAP sectors

$$X_{odt} = \exp\left(\beta z_{odt} + \Gamma_{ot} + \Gamma_{dt} + \Gamma_{od}\right) \times \epsilon_{odt}$$

- $z_{odt}$ is a vector of time-varying bilateral trade frictions

$\rightarrow$ Iran and Russia sanctions dummies, other policy variables

- Fixed effects purge all origin $\times$ time, destination $\times$ time and bilateral characteristics
- Estimated with Poisson pseudo-maximum likelihood (PPML)
- Trade cost shock computed as $\hat{t}_{od} = \left(\exp(\hat{\beta}_{sanc})\right)^{-1/\theta}$

## Clustered Bayesian bootstrap

- Each observation's weight is the same in expectation as in the traditional bootstrap, i.e. $E[\omega_i] = E[w_i] = 1/n$
- Continuous reformulation implies no observations receive a zero weight in any bootstrap iteration

$\rightarrow$ collinearity structure of the original sample is retained in every iteration

$\rightarrow$ any parameter that is identified in the original sample is also identified in every bootstrap iteration

- Clustering: Weights drawn a priori, clustering across sectors

**Table 1:** Impact of the Iran and Russia sanctions on aggregate international trade

| Dependent Variable: | Trade value | |
|---|---|---|
| Sanctions on flows to Iran | -0.3401** | (0.1796) |
| Sanctions on flows from Iran | -0.6028*** | (0.1879) |
| Sanctions on flows to Russia | -0.3046*** | (0.0656) |
| Sanctions on flows from Russia | -0.2725*** | (0.0946) |
| WTO | 0.2028*** | (0.0548) |
| Common currency | 0.1166** | (0.0341) |
| FTA | 0.0626*** | (0.0205) |
| Observations | 347,407 | |
| Pseudo $R^2$ | 0.9916 | |

*Note:* Regression includes origin $\times$ year, destination $\times$ year, and origin $\times$ destination fixed effects. Clustered (origin & destination) bootstrapped standard-errors based on 1000 replications in parentheses. Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

# Simulations: Scenarios and outcomes

## Scenarios

- **Benchmarks: Impact for actual and hypothetical coalitions and measures**
- **Scenario 1: Individual contributions of coalition countries**
- Scenario 2: Impact of non-cooperating China
- Scenario 3: Ideal coalition partners
- **Scenario 4: Burden sharing**

# Benchmarks

**Table 2:** Benchmark impact for actual and hypothetical coalitions and measures

**(a)** Iran sanctions

| | Actual coalition | Global implementation |
|---|---|---|
| Actual measures | -1.50 %<br>(0.26) | -2.35 %<br>(0.64) |
| Complete embargo | -4.01 % | -13.34 % |

**(b)** Russia sanctions

| | Actual coalition | Global implementation |
|---|---|---|
| Actual measures | -1.68 %<br>(0.18) | -2.90 %<br>(0.31) |
| Complete embargo | -5.16 % | -14.57 % |

## Scenario 1: Incurred and imposed economic costs

- What is the *imposed* cost be for *sanctioned* country

→ if country X puts sanctions in place unilaterally?

→ if country X joins the coalition of sanctioning countries?

- What is the *incurred* cost for *sanctioning* country

→ if acting unilaterally?

→ if acting as part of a coalition?

## Scenario 1: Incurred and imposed economic costs

- What is the *imposed* cost be for *sanctioned* country

→ if country X puts sanctions in place unilaterally?

→ if country X joins the coalition of sanctioning countries?

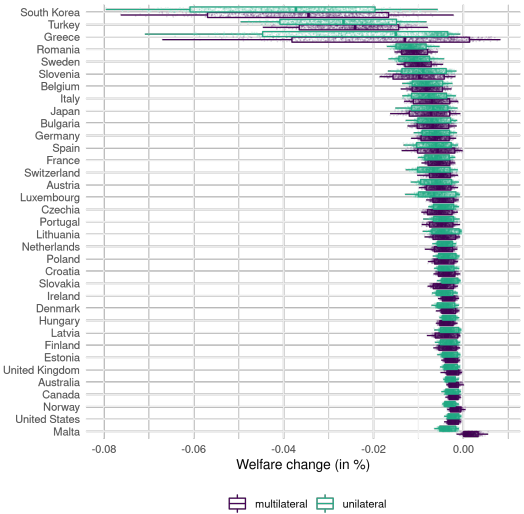
- What is the *incurred* cost for *sanctioning* country

→ if acting unilaterally?

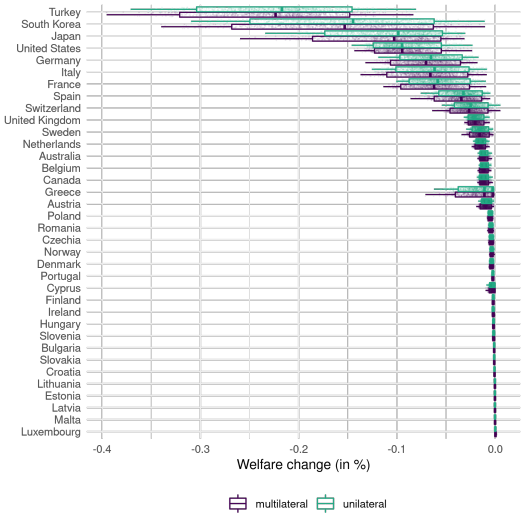
→ if acting as part of a coalition?

# Scenario 1: Individual contributions — Iran sanctions

**(a)** Welfare loss incurred

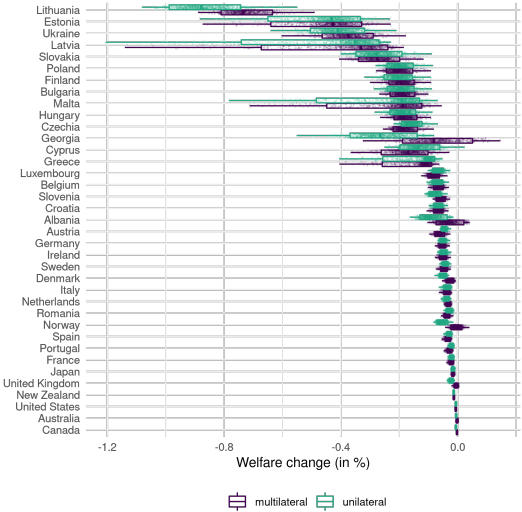



**(b)** Welfare loss imposed

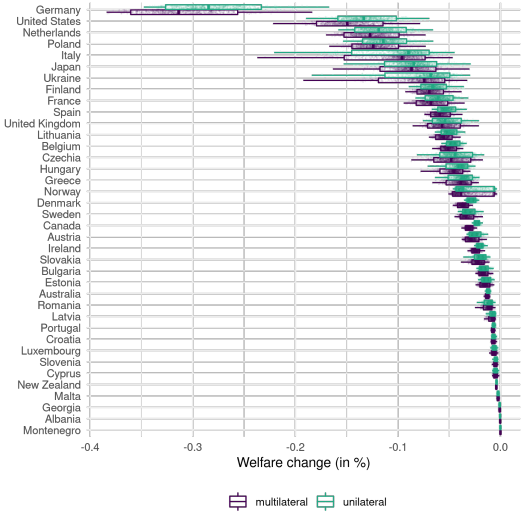


# Scenario 1: Individual contributions — Russia sanctions

**(a)** Welfare loss incurred




**(b)** Welfare loss imposed



## Scenario 1: Individual contributions — Average across coalition members

**(a)** Iran sanctions

| | Loss incurred | Loss imposed |
|---|---|---|
| unilateral | -0.0072 % | -0.0265 % |
| multilateral | -0.0066 % | -0.0277 % |

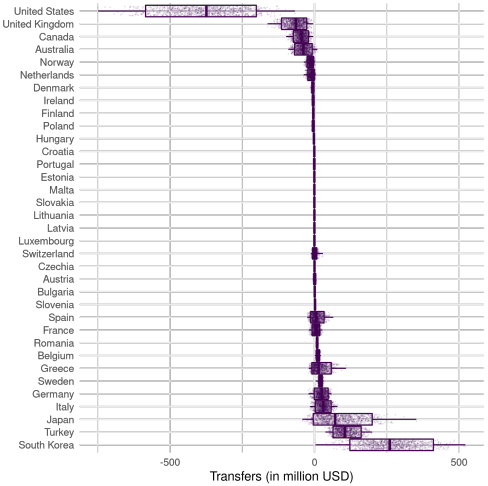
**(b)** Russia sanctions

| | Loss incurred | Loss imposed |
|---|---|---|
| unilateral | -0.1351 % | -0.0427 % |
| multilateral | -0.1220 % | -0.0467 % |

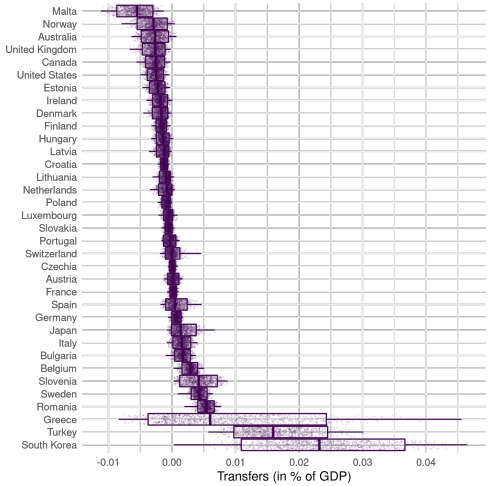
- Domestic welfare loss is on average nearly 8.3% lower for Iran sanctions and 9.6% for Russia sanctions if implemented in the coalition.
- Welfare losses in the target increase by 4.5% for Iran and 9.3% for Russia.

# Scenario 4: Burden sharing through transfers — Iran sanctions

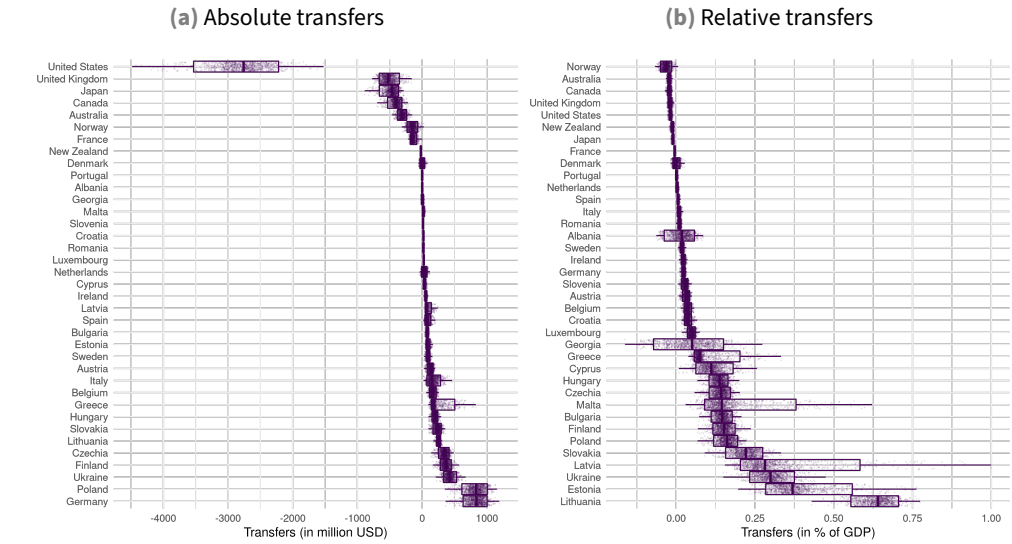
**(a)** Absolute transfers




**(b)** Relative transfers



# Scenario 4: Burden sharing through transfers — Russia sanctions



## Conclusion

- What is the imposed and incurred costs of individual members of sanctions coalitions?

→ Very heterogeneous, some incurred costs statistically insignificant

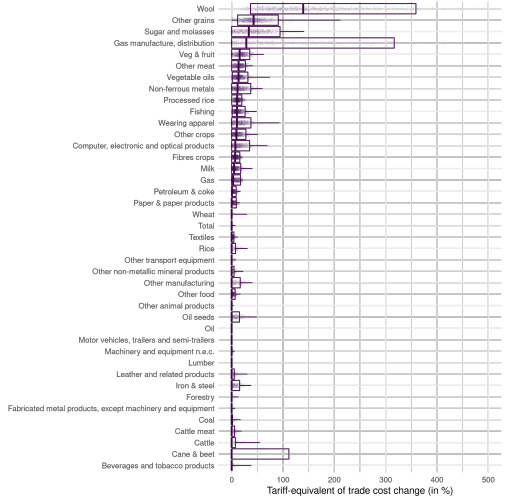
- Net transfers for welfare loss equalization alternative quantification, comparable to NATO spending goal
- Additional exercise: Which countries would further magnify economic cost for sanctioned countries? China, other BRICs.

# Brothers in Arms: The Value of Coalitions in Sanctions Regimes

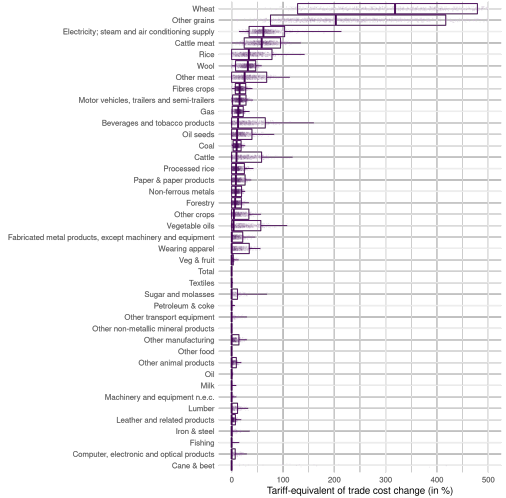
Julian Hinz — mail@julianhinz.com

# Sectoral trade cost shock — Iran

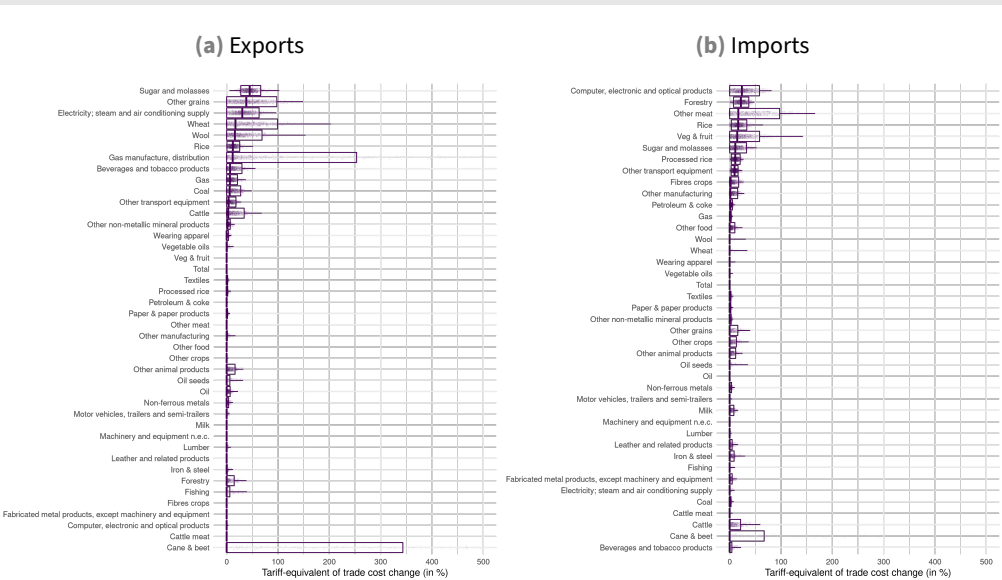
**(a)** Exports



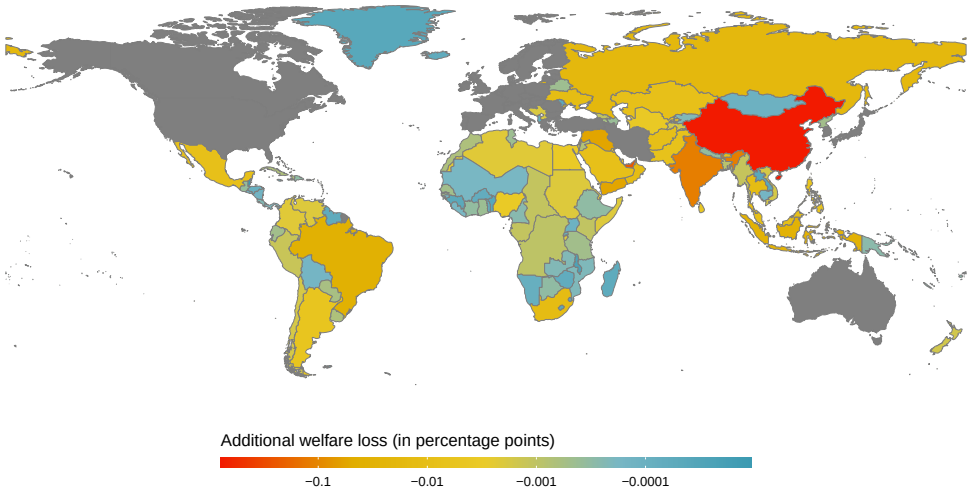

**(b)** Imports



# Sectoral trade cost shock — Russia



# Scenario 3: New coalition partners: Welfare loss imposed on Iran



# Scenario 3: New coalition partners: Welfare loss imposed on Russia