

# On the Design of Effective Sanctions: The Case of Bans on Exports to Russia

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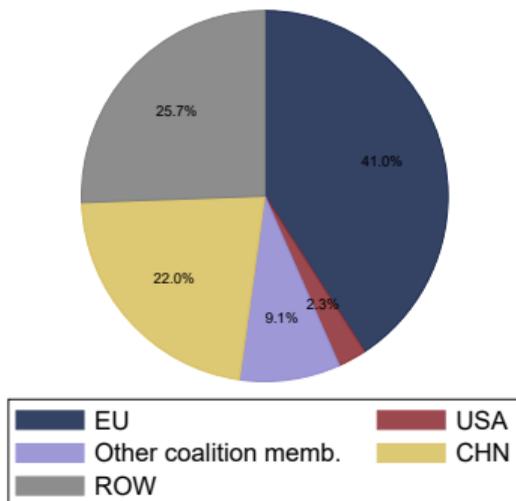
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# Motivation

- In response to the Russian invasion of Ukraine, the EU, the US, and their allies have imposed comprehensive sanctions on Russia
  - Financial sanctions
  - Sanctions on individuals
  - Restrictions on imports from Russia
  - Restrictions on exports to Russia

# Importance of Coalition for Russian Imports

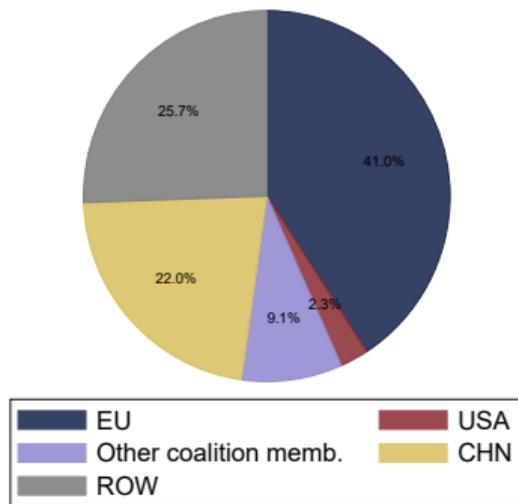
## Country Shares of Russian Imports



- Coalition: EU, US, AUS, CAN, GBR, JPN, KOR, TWN,

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Source: Own illustration based on [www.atlas.cid.harvard.edu/](http://www.atlas.cid.harvard.edu/)

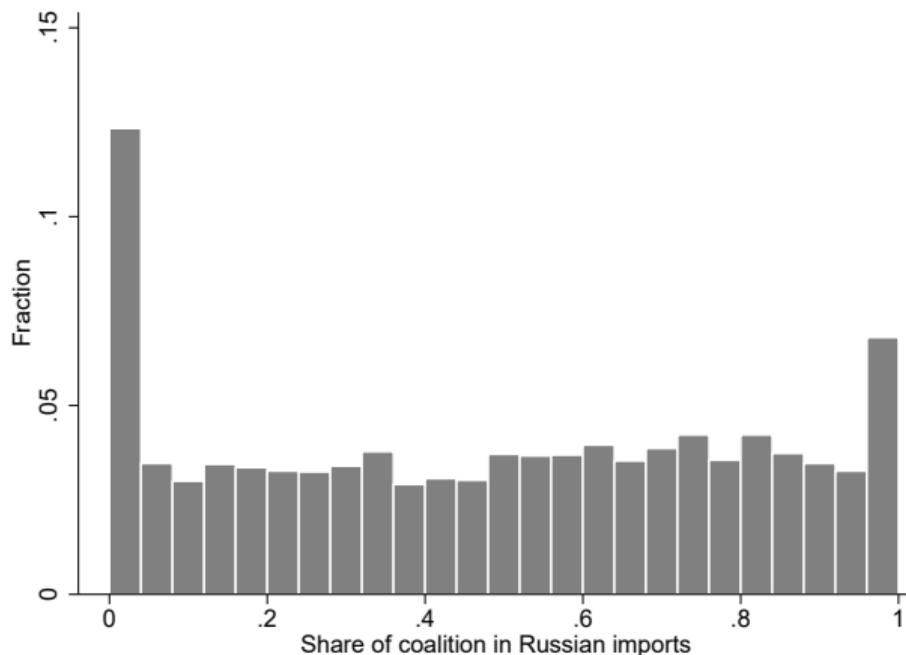


- Pre-crisis

- EU-share in Russian imports: 40%;  
Russian share in EU exports: 2%
- EU share in Russian oil (gas) exports: 50% (75%);  
Russian share in EU oil (gas) imports: 25% (40%)

# Importance of Coalition for Russian Imports

## Share of Coalition in Russian Imports Across Products

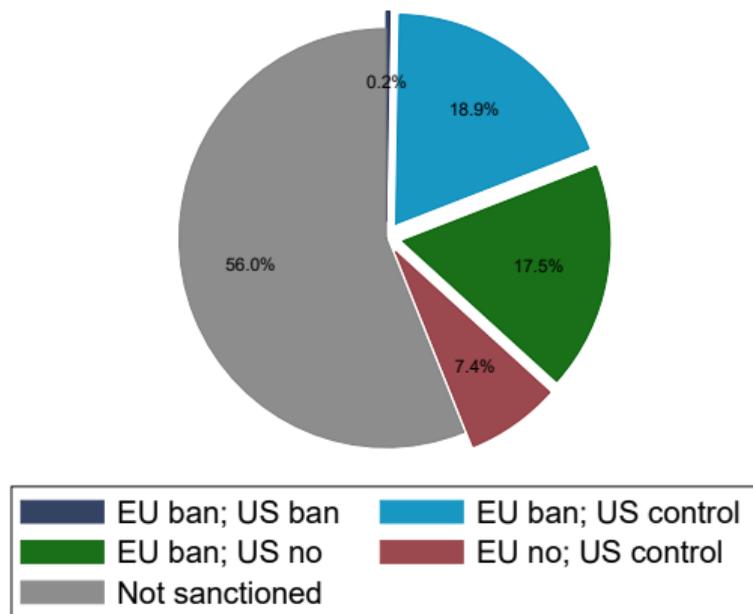


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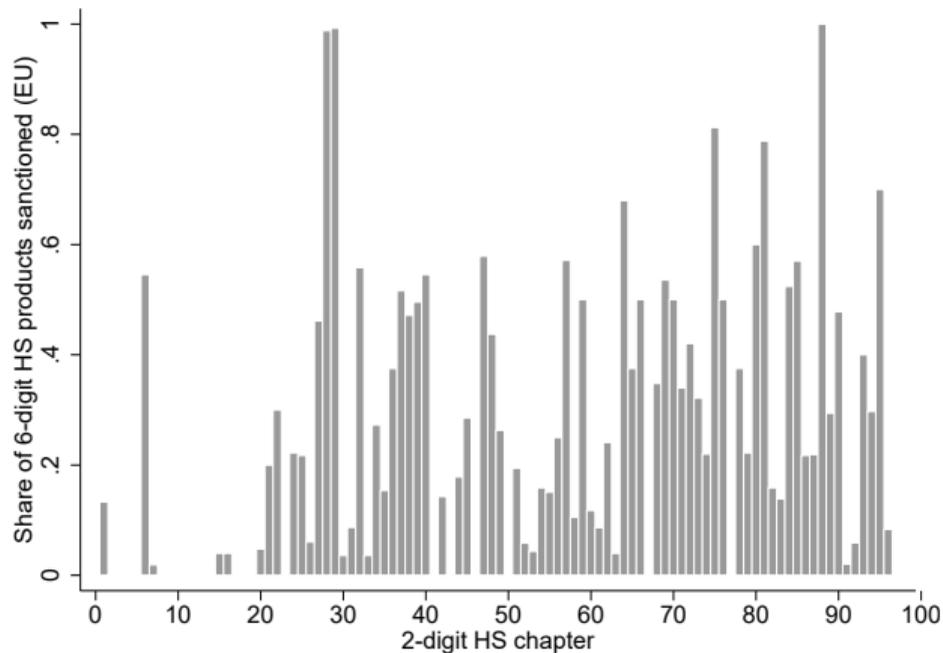
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# Share of Products Sanctioned



Source: Own illustration based on [www.globaltradealert.org/](http://www.globaltradealert.org/)

# Share of 6-digit HS Products within 2-digit HS Chapter Sanctioned by EU



Source: Own illustration based on [www.globaltradealert.org/](http://www.globaltradealert.org/)

# Research Questions

- What is the impact of bans on exports?
- How can they be designed most effectively?
- At the level of 5000 6-digit HS products?
- What are the benefits from improved coordination of sanctions?

# Overview

- 1 Compare sanctioned vs non-sanctioned products
- 2 Derive theoretically-grounded criterion that can inform bans on exports at a detailed level of disaggregation using readily available data
  - Apply to Russia: identify target products for additional export restrictions
  - Cost to sanctioned country are highly convex in market share of sanctioners
- 3 Quantitative analysis:
  - Export bans are generally effective: Estimated welfare loss to Russia  $\sim$  100 times larger than for coalition countries
  - Re-designing sanctions based on theoretical criterion would increase welfare loss to Russia by  $\sim$  60% with little to no effect on coalition
- 4 Conclusion

# Literature

## Quantitative trade models

- Caliendo and Parro (2015); Costinot and Rodriguez-Clare (2014); Baqaee and Farhi (2019, 2021); Cakmakli et al (2021)

## Literature on sanctions

- Surveys: Kaempfer and Lowenberg (2007); Peksen (2019); Felbermayr et al. (2021)

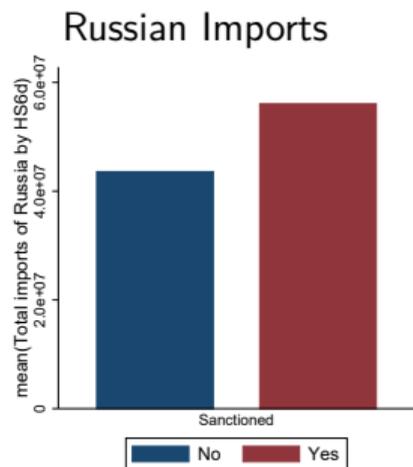
## Sanctions in Trade Models, e.g.

- Crozet and Hinz (2020); Hinz and Monastyrenko (2022); Bachmann et al. (2022); Evenett and Muendler (2022a,b); Felbermayr et al. (2022); Sturm (2022); Imbs and Pauwels (2022); Chowdry et al (2022)

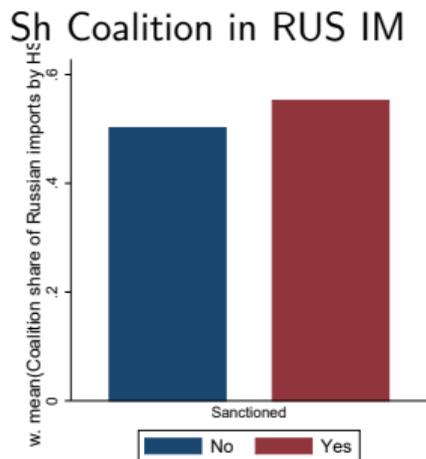
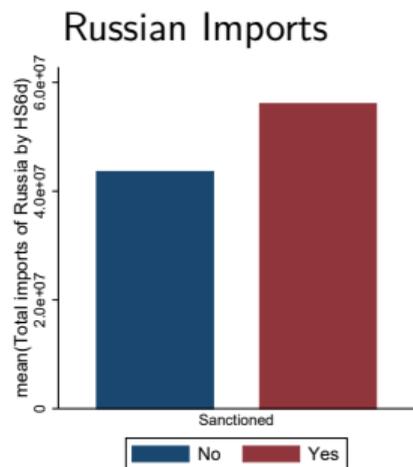
# Preliminary Considerations

- Broadly speaking, an export ban by a coalition of countries should have a large impact on the Russian economy if it affects products
  - ① that are important for the Russian economy
  - ② where Russia relies heavily on imports from Coalition countries
  - ③ these imports are difficult to replace
    - local production or imports of the same product from third countries
    - substituted by other products
    - substituted over time (depending on time horizon of sanctions)

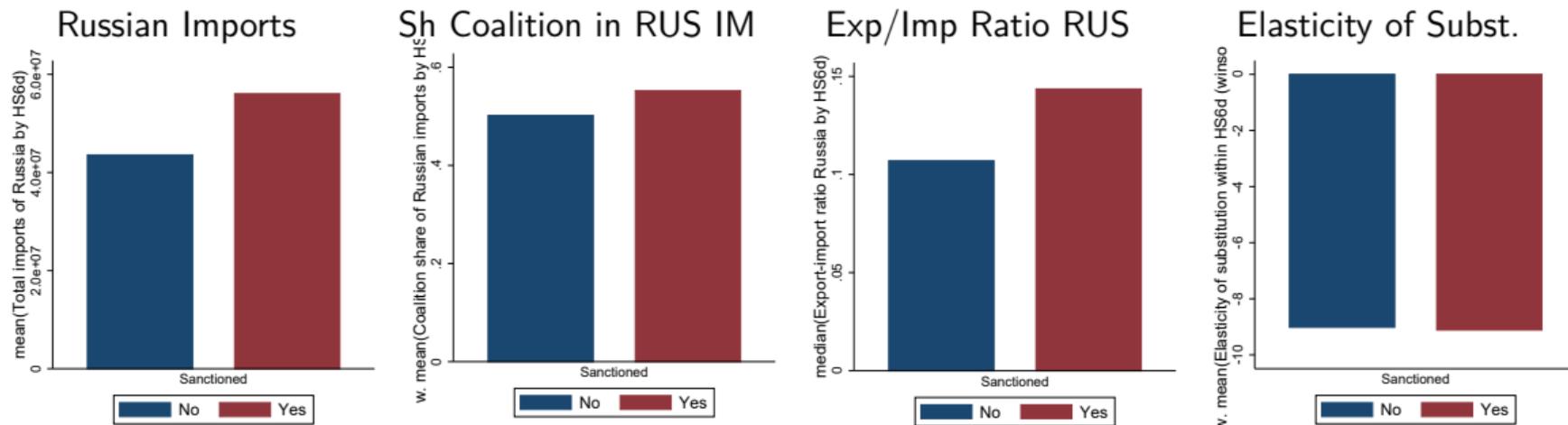
# Overview of Existing EU Sanctions



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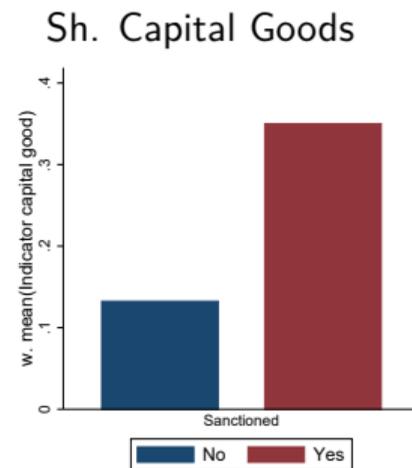
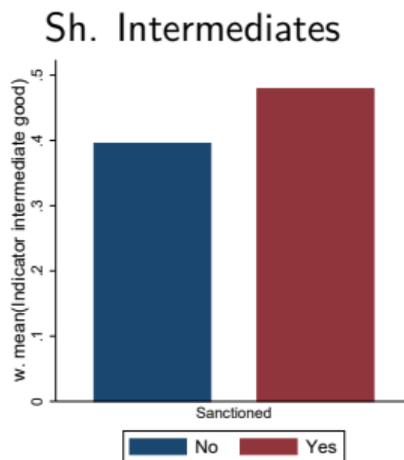
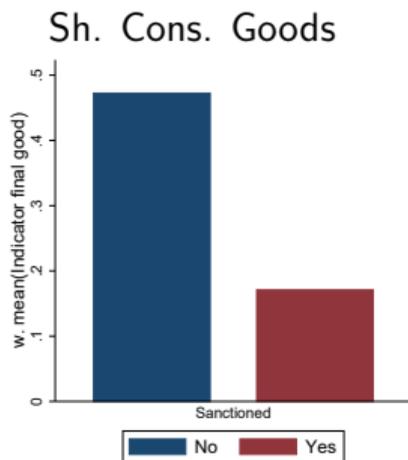


# Overview of Existing EU Sanctions



Source: Own illustration based on [www.globaltradealert.org/](http://www.globaltradealert.org/), [www.atlas.cid.harvard.edu/](http://www.atlas.cid.harvard.edu/), Fontagné et al (2022)

# Overview of Existing EU Sanctions



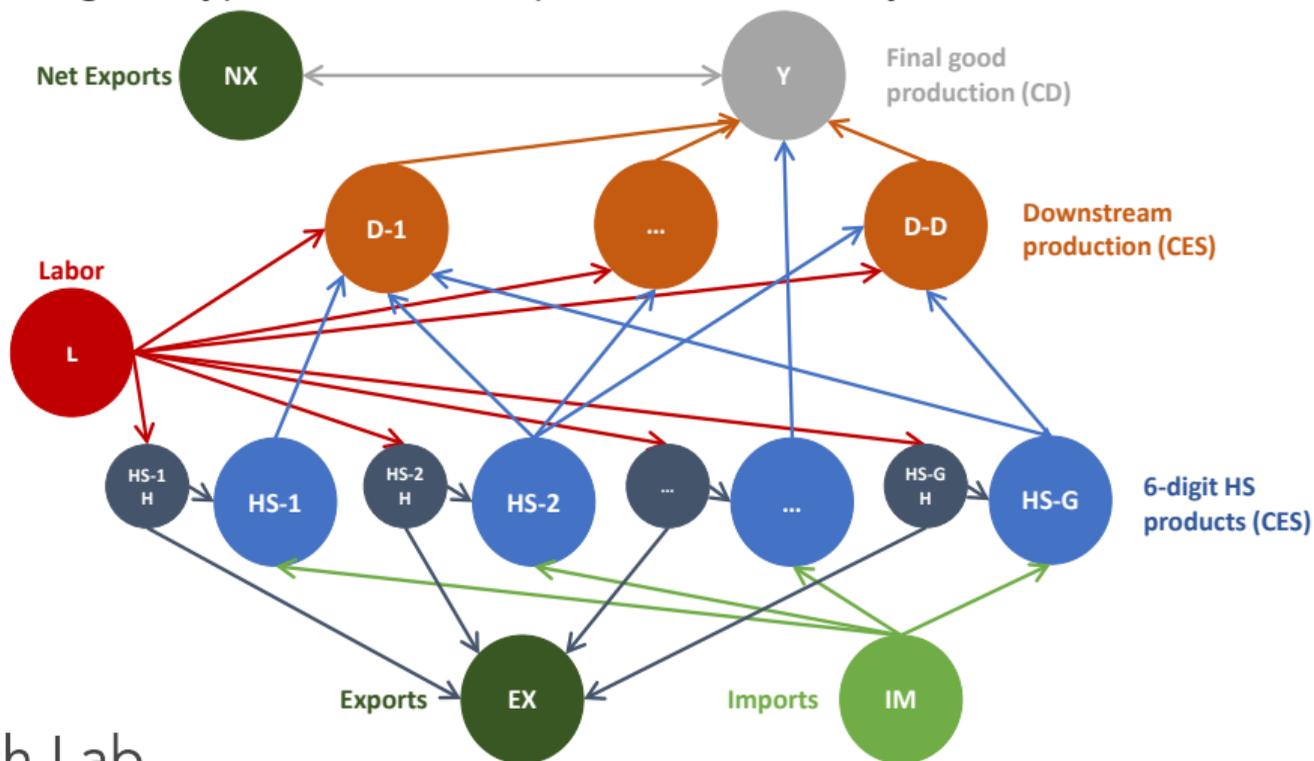
Source: Own illustration based on [www.globaltradealert.org/](http://www.globaltradealert.org/), [www.atlas.cid.harvard.edu/](http://www.atlas.cid.harvard.edu/), Broad Economic Categories

# Discussion

- Previous discussions suggest room for increasing effectiveness of sanctions
  - Can we formalize these arguments?
  - How to prioritize different dimensions?
- Build on Baqaee and Farhi (2019, 2021) to analytically characterize the economic costs to a sanctioned country from a ban on exports of a product to this country

# Economic Environment

- 'Armington'-type model with a production hierarchy



# Main Result

## Proposition

*Consider a ban on exports to Russia of product  $g$  by coalition countries. The impact on the Russian economy of this ban is*

$$\Delta \ln(Y) \approx \lambda^g \left[ \frac{1}{\sigma^g - 1} \ln(1 - \Omega_{CO}^g) + (\theta^g - 1) \left[ \frac{1}{\sigma^g - 1} \ln(1 - \Omega_{CO}^g) \right]^2 \right] \quad (1)$$

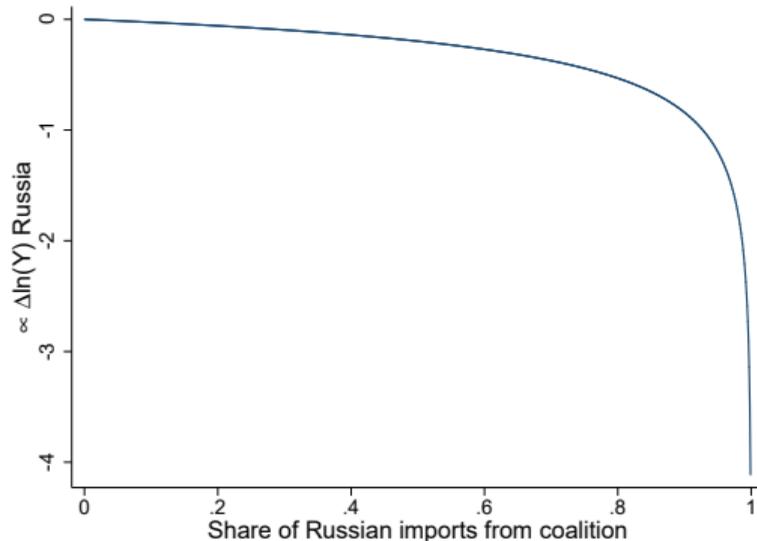
- $\lambda^g$ : Absorption (Domar-weight) of  $g$
- $\Omega_{CO}^g$ : Coalition market-share for  $g$  in Russia
- $\sigma^g$ : Elasticity of substitution across varieties of  $g$
- $\theta^g$ : elasticity of substitution across inputs of the downstream buyers of  $g$   
(consumer goods vs intermediates)



# Importance of Coalition Market Share

## Corollary

*There are large gains from coordinating sanctions among a broad coalition of countries and from sanctioning products with a large market share of the coalition in Russia.*



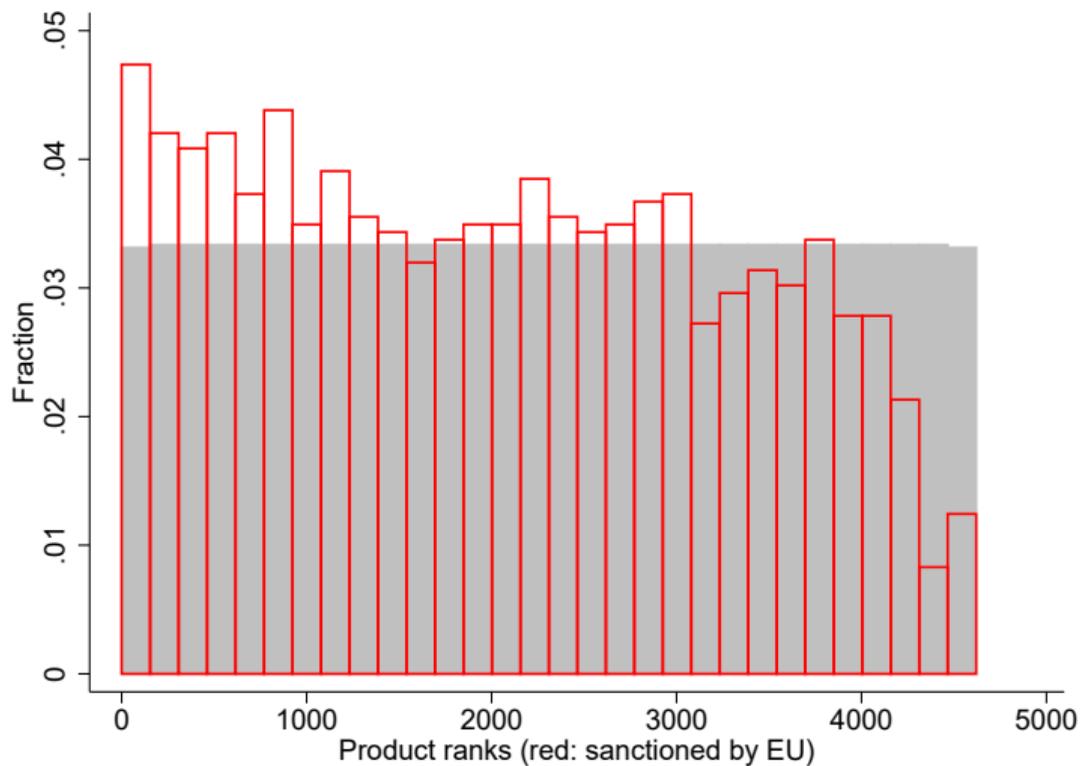
Parameters:  $\sigma^g = 5$ ,  $\theta^g = .2$



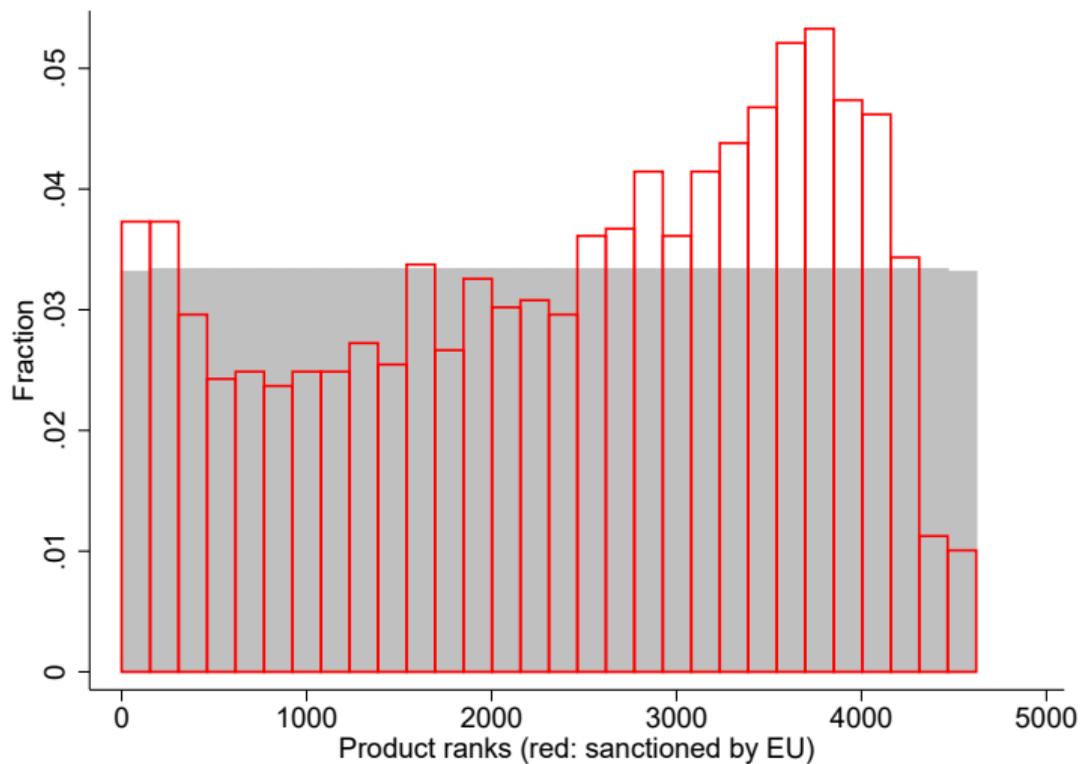
# Taking Proposition 1 to data

- Data
  - $\lambda^g, \Omega_{CO}^g$ : atlas.cid.harvard.edu and ITPD-E
  - $\sigma^g$ : Fontagné et al (2022)
  - $\theta^g$ : 1 for consumer goods, .2 for intermediates (based on Broad Economic Categories, rev. 4; Atalay (2017); Boehm et al. (2019); Herrendorf et al. (2013))

# EU Sanctions vs Product Ranking Based on (1)



# EU Sanctions vs Product Ranking by Cost per Foregone Exports



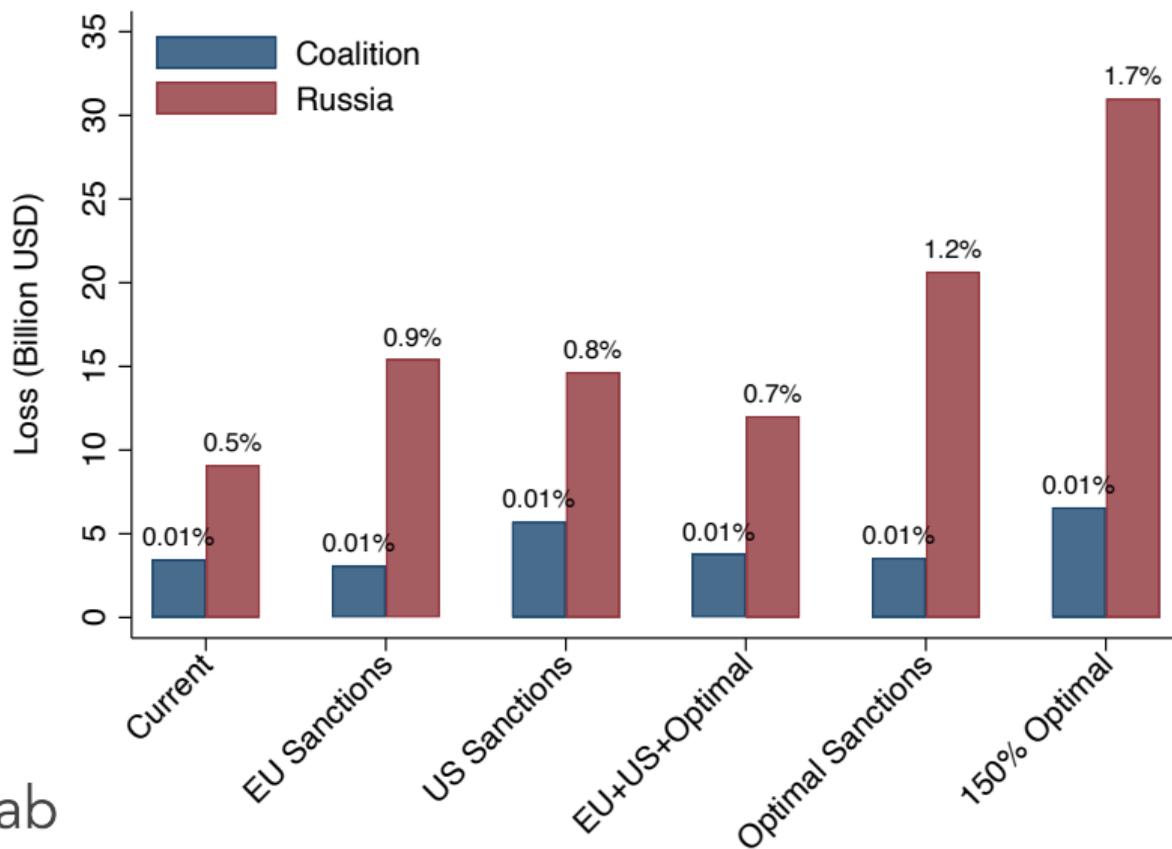
# Quantitative Analysis

- Analytical results: sanctioning one product at a time & ignore cost to coalition
- Quantitative Analysis based on WIOD data
  - Multi-industry 'Armington' with international input-output linkages (at WIOD level) and sector-specific labor
  - Industry-level trade-cost shocks on exports to Russia
    - Same direct effect on Russian industry-level price indices as export bans in baseline economy with  $\sim 5000$  products

Parameter	Value	Description
$\sigma^g$	Fontagné et al (2022)	Elasticity of substitution across HS-6 level varieties
$\theta^d$	Caliendo and Parro (2015)	Elast. of substitution across HS-6 level products in aggregation to WIOD industries
$\xi^d$	Caliendo and Parro (2015)	Elasticity of substitution across WIOD varieties
$\epsilon$	0.2	Elasticity of substitution across intermediate inputs
$\phi$	0.6	Elasticity of substitution between labor and intermediates
$\epsilon^f$	1	Elasticity of substitution between sectors in consumption



# Quantitative Results



# Discussion and Conclusion

- Theoretically-grounded, readily implementable criterion that helps targeting export bans at a detailed level of dis-aggregation
- Highlights importance of coordinated sanctions among broad coalition
- Quantitative analysis of sanctions against Russia:
  - Export bans very effective policy instrument for sanctions
  - Improved coordination and concentration on products with highest impact on Russia could increase cost to Russia by  $\sim 60\%$  with little to no-effect on coalition

# Limitations

- Focus on economic costs
  - Important dimension
    - Trade sanctions were '*designed to maximise the negative impact of the sanctions for the Russian economy while limiting the consequences for EU businesses and citizens*' (European Council and Council of the EU, 2022)
- Other dimensions are important as well, e.g.
  - Disrupting war machinery and energy sector
  - Harming elites vis-à-vis general population
  - Political economics
  - Re-exports
  - Retaliation