The Determinants of Retaliation in International Economic Conflict: A Difference-in-Difference Design

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Terminology

1. **Punitive economic measures (PEMs)**
   - Economic sanctions, tariffs, etc.
   - Goal: change policy of another state
2. **Sender**: (coalition of) sanctioning state(s)
3. **Target**: sanctioned state
4. **Retaliation:** Initial target adopts punitive economic measures against initial sender

Research Questions

When do the targets of PEMs **retaliate**?

Relevance

- Sanctions and other PEMs **increasingly important** foreign policy tools
- Retaliation is key to understanding the **causes of economic conflict**
  - Retaliation is a **source** of economic conflict
  - (The threat of) retaliation is a **deterrent** of starting an economic conflict
- PEMs can be used to enable and sustain **collective action…**
  (Barrett, 2016; Hepburn, Stern, & Stiglitz, 2020; Nordhaus, 2015;)
  - … if there is no retaliation

Argument

Focus on H1-H2b to keep it simple

Relative **material power**

- *H1: Retaliation is **more likely** if the initial **sender is materially weak** compared to the target*

IO support

- *H2a: Retaliation is **less likely** if an **IO supports** the initial PEMs*
  (Abbott & Snidal, 1998; Bapat & Morgan, 2009; Drezner, 2000)
- *H2b: If the initial sender is **relatively weak**, **IO support** for the initial PEMs is associated with a **disproportionately large reduction** in the likelihood of **retaliation***
- *H2c: PEMs adopted by relatively **weak senders** are **more likely to have IO support***

Inducements

- *H3a: Retaliation is **less likely** if the **target receives** internal or external **inducements** if it cooperates*
- *H3b: If the initial sender is **relatively weak**, **inducements** to cooperate are associated with a **disproportionately large reduction in retaliation** likelihood*
- *H3c: Relatively **weak senders** are **less likely** to provide targets with **inducements** to cooperate*

The Data

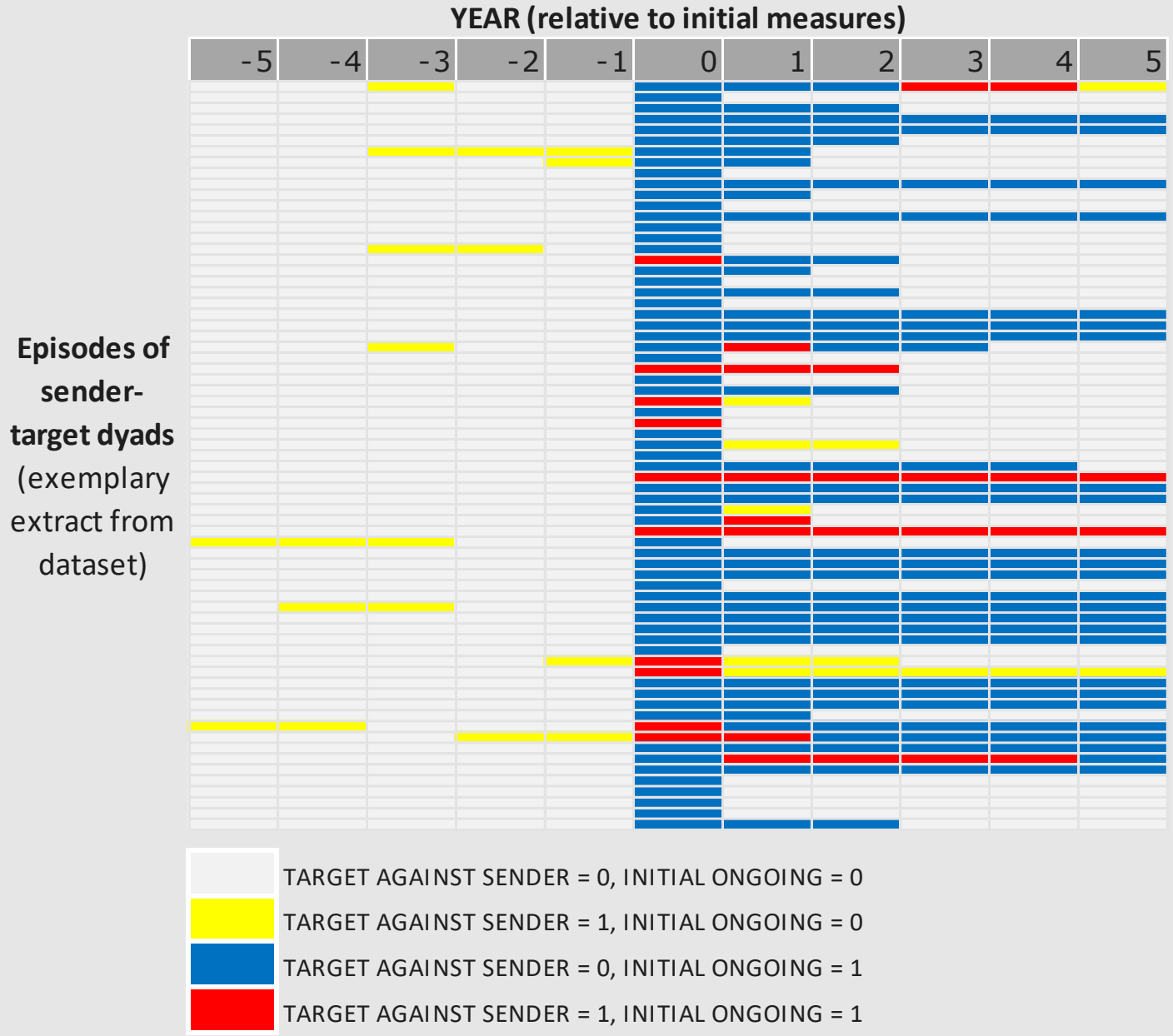
Existing dataset
TIES dataset provides 2,007 episodes of economic conflict between single sender and target state

Recoded to panel format with 11 observations per sender-target dyad (YEAR -5 to YEAR 5)
-> 22,077 panel observations

Dependent variable
Measures by initial target against the initial sender (TARGET AGAINST SENDER)

Treatment
Initial measures by the sender against the target in place (INITIAL ONGOING)

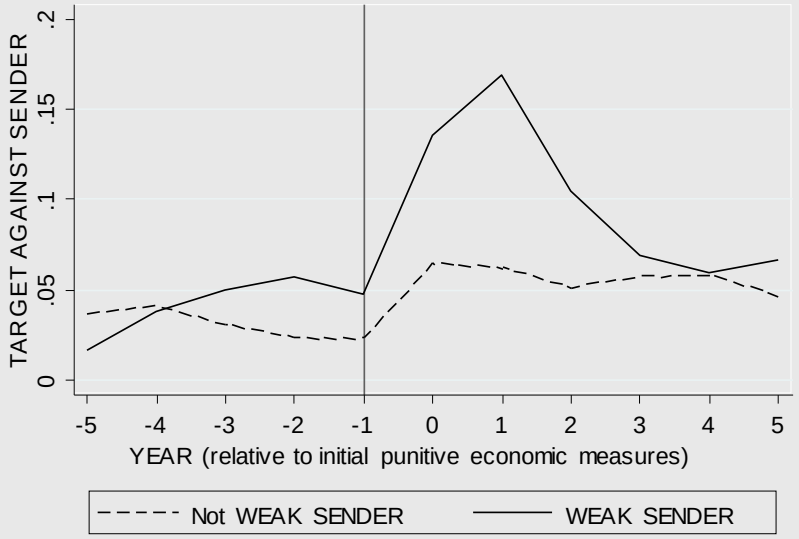
Advantage
Time variation allows for within-dyad comparison of likelihood of measures by TARGET AGAINST SENDER when measures are in place with when they are not



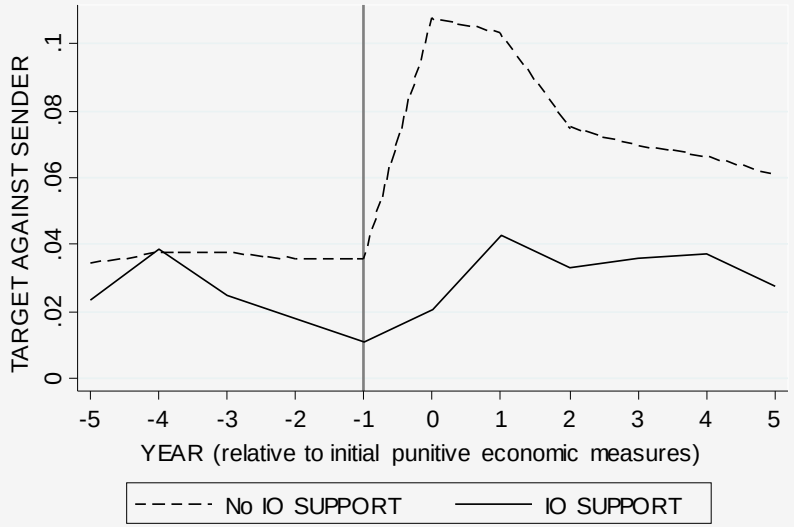
Parallel trends

Parallel pre-treatment trends are fundamental assumption of DiD

Materially weak sender (H1)



IO support (H2a)



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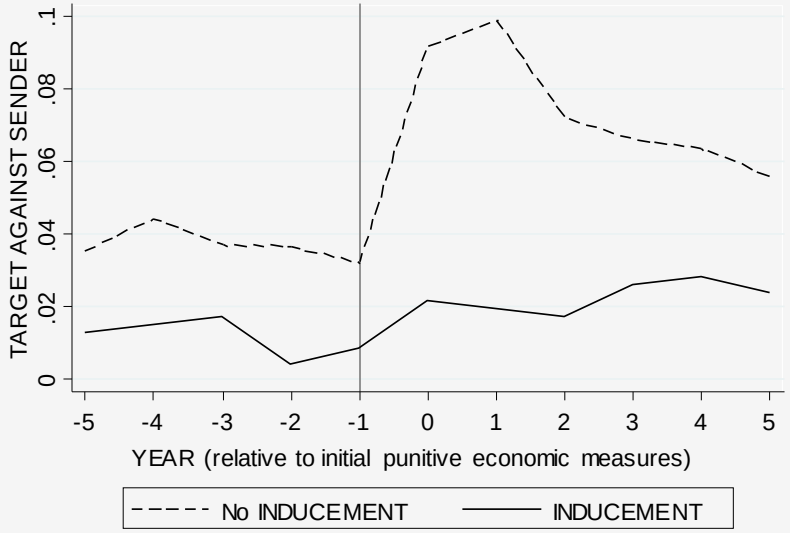

1. **Pre-treatment** trends **parallel**
2. Trends change with **treatment as hypothesized**

Difference-in-difference (DiD) design

Instead of comparing treated and untreated units, I compare different treatments
(Duflo, 2001; Fricke, 2017)

IO support model (exemplary)

$$TARGET\ AGAINST\ SENDER_{itd}$$
$$= c_1 + \beta_1\ (\boldsymbol{IO}_i \times INITIAL\ ONGOING_{it}) + \gamma\ INITIAL\ ONGOING_{it}$$
$$+ \sum_{i=1}^{2,007} \delta_i\ EPISODE_i + \sum_{d=1940s}^{2010s} \mu_t\ DECADE_d\ +\ \varepsilon_{itd}$$

Main Results

Dependent variable
Measures by initial target against the initial sender (TARGET AGAINST SENDER)

Interpretation
Linear OLS model

Binary DV

Can interpret coefficients as percentages

Notes on table
Robust standard errors in parentheses; standard errors clustered by EPISODE
*** p<0.001, ** p<0.01, * p<0.05

VARIABLES	(1) *BASIC*	(2) *WEAK SENDER*	(3) *IO*	(4) *IO INTERACTION*	(5) *INDUCE. TO COOPERATE*	(6) *INDUCE. INTERACTION*	(7) *FULL*	(8) *INSTRUMEN. VARIABLE IO*
WEAK SENDER (H1)		**0.072***		**0.113***		**0.068***	**0.111***	**0.122***
		(0.017)		**(0.025)**		**(0.018)**	**(0.026)**	**(0.022)**
IO SUPPORT (H2a)			**-0.046***	**-0.028***			**-0.029***	**-0.031***
			(0.010)	**(0.011)**			**(0.011)**	**(0.013)**
IO X WEAK SENDER (H2b)				**-0.103***			**-0.106***	**-0.135****
				(0.030)			**(0.030)**	**(0.050)**
INDUCEMENT TO COOPERATE (H3a)					**-0.046***	**-0.028***	**-0.029***	**-0.029*****
					(0.010)	**(0.011)**	**(0.011)**	**(0.009)**
INDUCEMENT X WEAK SENDER (H3b)						**-0.137***	**-0.165***	**-0.171****
						(0.031)	**(0.046)**	**(0.054)**
INITIAL EPISODE ONGOING	0.041***	0.023***	0.053***	0.032***	0.047***	0.031***	0.041***	0.042***
	(0.006)	(0.006)	(0.008)	(0.009)	(0.007)	(0.008)	(0.010)	(0.007)
EPISODE FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DECADE FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instru. var. (IO SUPPORT and IO X WEAK SENDER)	No	No	No	No	No	No	No	Yes
Constant	0.041***	0.040***	0.041***	0.042***	0.039***	0.040***	0.042***	^
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Observations	20,922	20,350	20,922	20,350	20,922	20,350	20,350	20,350
Number of EPISODES	1,902	1,850	1,902	1,850	1,902	1,850	1,850	1,850

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Robustness Tests

1. Control for **15 types of disputed issue** (incl. instrumental variable)
2. Limit dataset to **original 1,412** TIES observations
3. Only **threat** and only **imposition** cases
4. **Controls** for RIVALRY and TRADE LINKAGE
5. Various definitions of **WEAK SENDER**
   a) Alternative GDP cut-offs
   b) Continuous log GDP ratio
   c) Material capability score
6. Breakdown of **INDUCEMENT TO COOPERATE** variable
7. **Logit model**, instead of OLS

Case Studies

Verify causal mechanisms in the context of international environmental politics

	EU airline directive (2012)	**Montreal Protocol on Substances that Deplete the Ozone Layer** (1989-today)
Sender	**EU**	Initial coalitions: **US, Canada, Nordic countries, and several other European** relatively strong proponents (more countries joint progressively)
Target	Rest of world	Two types of targets: (1) countries producing chlorofluorocarbons (CFCs) and other ozone depleting substances (ODS); (2) countries consuming them
Retaliation (DV)	**Yes** (27 countries, incl. US, China, and Russia threatened retaliation, forcing EU to retreat)	**No**
Relative material power (H1)	EU **relatively weak** compared to entire outside world	Initial coalition **relatively strong** (because more countries and because developing countries back then accounted for smaller share of global GDP)
IO support (H2a)	**No** (I argue that in the case of PEMs the EU should be viewed as a state actor, not an IO)	**Yes** (UN)
IO x weak sender (H2b)	Weak sender but no IO (interaction = 0)	Strong sender and IO (interaction = 0)
Inducements (H3a)	Internal inducements: **very low** External inducements: **no**	Internal benefits: **high** External benefits: **yes**

Conclusion

Methodological

- DiD analysis effectively identifies **"excess" conflict** associated with the initial PEMs

General

- **Powerful** senders rely on their **economic might** to deter retaliation
- **Weak senders** rely on **IO support**
- **Inducements** to cooperate also reduce the likelihood of retaliation

Environmental

- **Climate change** is increasingly becoming a **source of PEMs**
  (Colgan et al. 2021)
- **PEMs** can enable and sustain **collective action**…
  (Barrett, 2016; Hepburn, Stern, & Stiglitz, 2020; Nordhaus, 2015)
- …, but only if there is no retaliation

Thank you!

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References

Abbott, K. W., & Snidal, D. (1998). Why States Act through Formal International Organizations. *The Journal of conflict resolution, 42*(1), 3-32. doi:10.1177/0022002798042001001

Bapat, N. A., & Morgan, T. C. (2009). Multilateral Versus Unilateral Sanctions Reconsidered: A Test Using New Data. *International Studies Quarterly, 53*(4), 1075-1094. doi:10.1111/j.1468-2478.2009.00569.x

Barrett, S. (2016). Coordination vs. voluntarism and enforcement in sustaining international environmental cooperation. *Proceedings of the National Academy of Sciences of the United States of America, 113*(51), 14515. doi:10.1073/pnas.1604989113

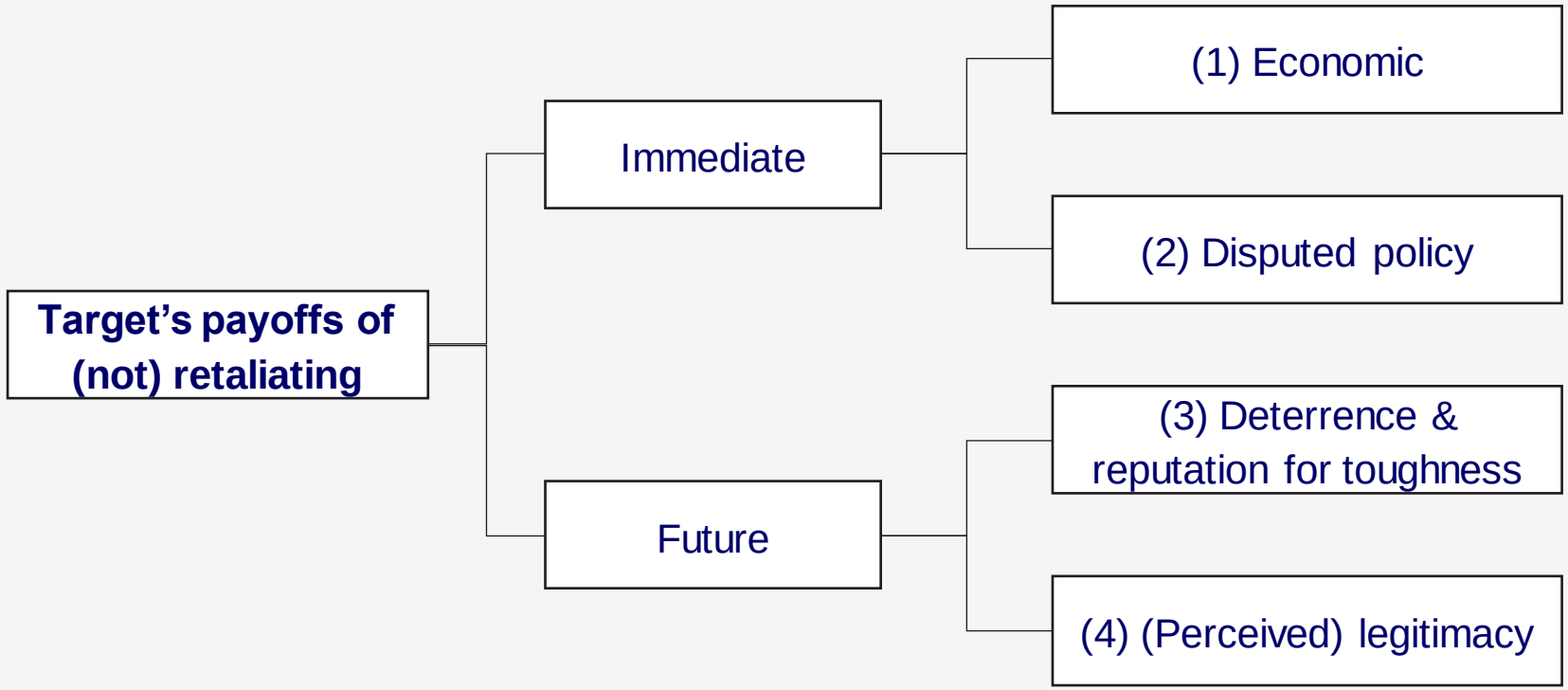
Colgan, J. D., Green, J. F., & Hale, T. N. (2021). Asset Revaluation and the Existential Politics of Climate Change. *International Organization, 75*(2), 586-610. doi:10.1017/S0020818320000296

Drezner, D. W. (2000). Bargaining, Enforcement, and Multilateral Sanctions: When Is Cooperation Counterproductive? *Int Org, 54*(1), 73-102. doi:10.1162/002081800551127

Hepburn, C., Stern, N., & Stiglitz, J. E. (2020). "Carbon pricing" special issue in the European economic review. *Eur Econ Rev, 127*, 103440-103440. doi:10.1016/j.euroecorev.2020.103440

Nordhaus, W. (2015). Climate Clubs: Overcoming Free-riding in International Climate Policy. *The American Economic Review, 105*(4), 1339-1370. doi:10.1257/aer.15000001

Targets consider **four types of payoffs** when deciding whether to retaliate



Difference-in-difference (DiD) design

Full model

$$
\begin{aligned}
&TARGET\ AGAINST\ SENDER_{itd} \\
&= c_1 + \beta_1\ (\boldsymbol{IO}_i \times INITIAL\ ONGOING_{it}) \\
&+ \beta_2\ (\boldsymbol{WEAK\ SENDER}_i \times INITIAL\ ONGOING_{it}) \\
&+ \beta_3\ (\boldsymbol{IO}_i \times \boldsymbol{WEAK\ SENDER}_i \times INITIAL\ ONGOING_{it}) \\
&+ \beta_4\ (\boldsymbol{INDUCEMENT}_i \times INITIAL\ ONGOING_{it}) \\
&+ \beta_4\ (\boldsymbol{INDUCEMENT}_i \times \boldsymbol{WEAK\ SENDER}_i \\
&\times INITIAL\ ONGOING_{it}) + \gamma\ INITIAL\ ONGOING_{it} \\
&+ \sum_{i=1}^{2,007} \delta_i\ EPISODE_i + \sum_{d=1940s}^{2010s} \mu_t\ DECADE_d\ +\ \varepsilon_{itd}
\end{aligned}
$$