

Infrastructure, political alignments, and inefficiency in the global maritime network

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Advanced topics in trade and IO

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Global politics and transportation infrastructure efficiency

- In spatial economics, evaluating efficiency of transportation systems is central.
- Many recent research has documented that inefficiencies are pervasive in observed transport systems (Fajgelbaum and Schaal, 2020; Allen and Arkolakis, 2022; Brancaccio et al., 2023; Almagro et al., 2024; Buchholz, 2021).

Then why are transport networks inefficient?

- One reason: Investment driven by **political preferences** vs. **sole aggregate welfare considerations** (P. Fajgelbaum et al., 2024).
- **Our goal:** evaluate how political preferences shape global infrastructure investment, focusing on China's Belt and Road Initiative (BRI) port projects.

This project

Part 1: How does China's political preference shape infrastructure investment, and do Chinese-financed ports create trade discrimination effects?

1. Evaluate how political incentives affect China's port infrastructure investment decisions (accounting for economic incentives like mineral reserves).
2. Effects of port infrastructure on bilateral trade flows (dual-use, critical minerals, etc).

Part 2: How does political distortion & other non-economic incentives lead to inefficient infrastructure investment?

Literature review

- Infrastructure investment, transportation network, and trade
 - Myrto's new working paper; Allen and Arkolakis (2022); Fajgelbaum and Schaal (2020); Bordeaux JMP; Wong and Fong working paper, etc.
 - **New!** Location choice of ports from global planner's perspective.
- Shipping industry, trade, and supply chain
 - BKP 2018; Fan et al., 2019; Heise working paper; Leibovici's working paper, etc.
 - **New!** Generates trade flows in counterfactuals that reflect these.
- Political economy and infrastructure financing
 - Kleinman et al. (2024); Fan et al. (2025); P. Fajgelbaum et al. (2024).
 - **New!** Political preferences and their impacts on returns to infrastructure investment accounting for sea-level rise.

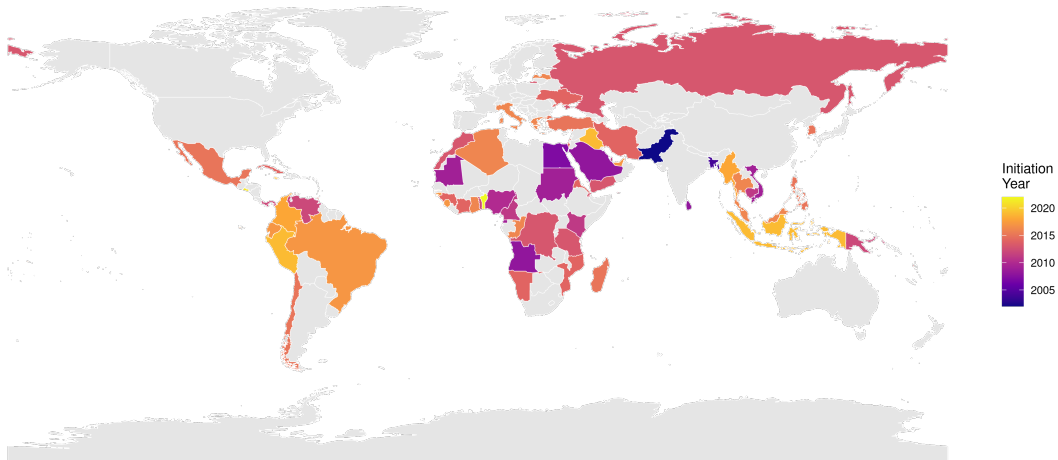
Institutional background: Belt and Road Initiative (BRI)

- Launched by China around 2013 to enhance global trade and connectivity.
- Backed by Chinese state agencies, SOEs, and financiers (AIIB, Silk Road Fund).
- Covers more than 68 countries, including 65% of the world's population and 40% of the global gross domestic product as of 2017.
- Major investments in global seaports (e.g., Gwadar, Piraeus, Hambantota).

Given just the sheer scale of the BRI, carefully documenting its impacts and the underlying patterns of investment is crucial.

Map of BRI sea-port investment

Countries with Port Initiation by Year



Data

Bilateral trade flow data: Ideally at port-level.

- Portwatch data (Daily count of port calls, estimates of import volumes and export volumes for 1802 ports around the world).
- Comtrade/BACI data (Annual country-level bilateral trade flow data).
- Vizion data (Monthly port export/import data from 2022).
- Maybe Panjiva?

China's port finance data: Collections of China's financing of port infrastructure.

- China's Official Seaport Finance Dataset by AidData.
- China's Overseas Ports finance data by report from Council on Foreign Relations.

Geopolitical relationships index, critical mineral, dual-use goods index

- Geopolitical relationships: Fan et al. (2025) and/or ICEWS data.
- Critical mineral and dual-use goods: Alekseev and Lin (2024) and/or Choi and Iqbal (2025)

Empirics 1: Political alignment \Rightarrow Port investment

Constructing bilateral geopolitical relations

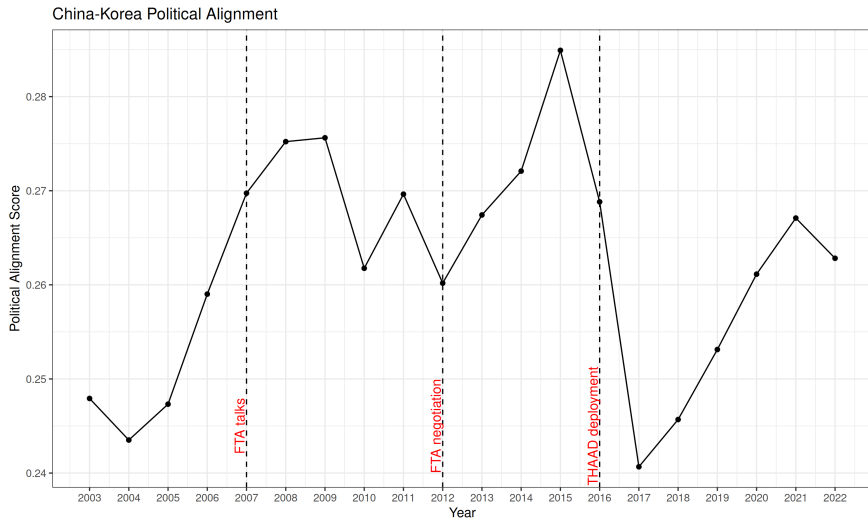
How to measure geopolitical relations between countries?

- Traditional method: UN voting patterns.

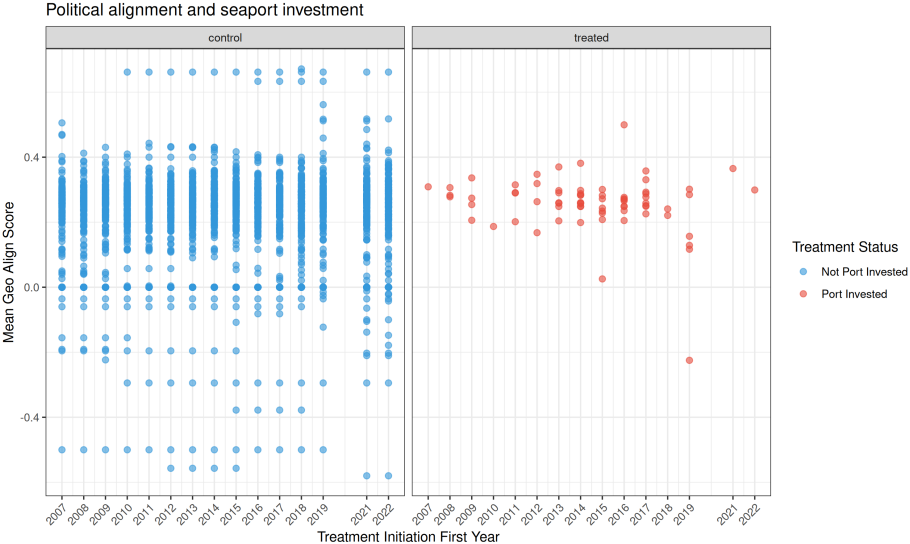
Our method: Build event-based bilateral geopolitical alignment measure similar to Fan et al. (2025)

- Use ICEWS database to collect bilateral events and related intensity scores.
- Construct yearly bilateral relation scores.
- **Advantage:**
 1. Captures actual bilateral interactions that directly affect economic relationships.
 2. Provides substantial within-dyad variation, essential for causal identification through panel estimation.

Political score: Korea and China



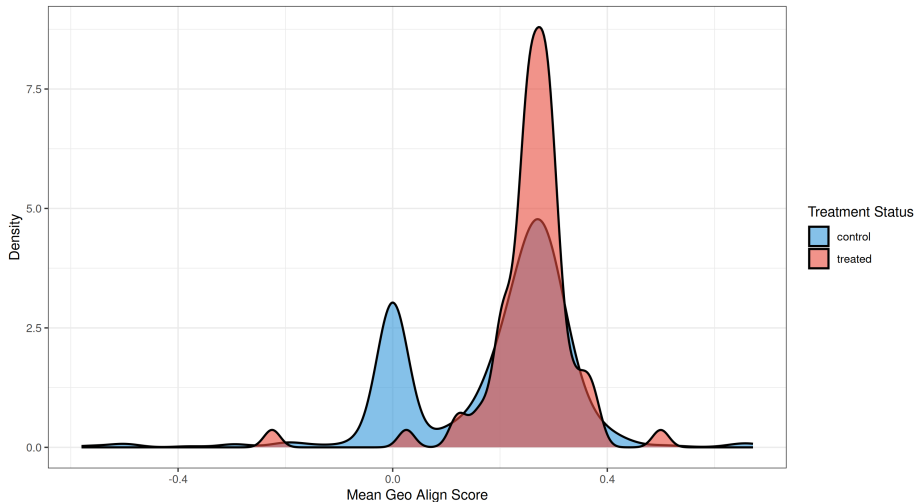
Political alignment \times sea-port investment



Political alignment \times sea-port investment

Distribution of Mean Geo Align Score

Comparison between Treated and Control Groups



Regression specification

Part 1 goal: Impact of political preferences (alignment) on port infrastructure investment.

Event study design (IV)

$$y_{it} = \beta_1 D_{it} + \beta_2 D_{it} \times M_{it} + \gamma X_{it} + \delta_i + \delta_t + \varepsilon_{it}.$$

- y_{it} : Port investment initiation (post-treatment) indicator from China to country i at time t .
- D_{it} : Geo-political relations between China and country i at time t from Fan et al. (2025).
- M_{it} : Level of mineral reserve.
- **Identification strategy:** Lagged geo-political relations as IV? Shift-share-ish IV accounting for both lagged geo-political relations and trade flow?

Empirics 2: Port investment \Rightarrow Trade flow

Regression specification

PPML model

$$X_{ipt} = \exp[\beta_0 \text{PORT}_{it} + \beta_1 \text{PORT}_{it} \times \text{PRODUCT}_p + \Gamma' X_{it} + \chi_{p2t} + \gamma_{ip2}] \\ \times \varepsilon_{ipt}.$$

- i is country. Since j is always China, we suppress the notation.
- p is HS code 6-digit product indicator.
- PORT indicates if the post investment was announced/initiated or completed.
- PRODUCT is indicator for products that are classified as dual-use and/or critical mineral.
- X_{it} is control including: Population, GDP, Trade agreement.
- FEs: product (2-digit)-time, country-product (2-digit).

Result: Export from China to other countries

	PPMLHDFE	PPMLHDFE with product	PPMLHDFE	PPMLHDFE with product
Treatment Initiation	0.165*** (0.047)	-0.175*** (0.065)		
Treatment Initiation X Product		0.681*** (0.063)		
Treatment Completion			0.137** (0.056)	-0.172** (0.081)
Treatment Completion X Product				0.644*** (0.059)
Controls	Yes	Yes	Yes	Yes
Country product FE	Yes	Yes	Yes	Yes
product time FE	Yes	Yes	Yes	Yes
Num. obs.	15309603	15309603	15309603	15309603
Num. groups: product_time_fe	1632	1632	1632	1632
Num. groups: import_product_fe	17962	17962	17962	17962
Pseudo R ²	0.560	0.561	0.559	0.560

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Result: Export from other countries to China

	PPMLHDFE	PPMLHDFE with product	PPMLHDFE	PPMLHDFE with product
Treatment Initiation	0.103 (0.067)	0.186 (0.175)		
Treatment Initiation X Product		-0.239 (0.419)		
Treatment Completion			0.101 (0.082)	0.346*** (0.107)
Treatment Completion X Product				-0.836** (0.358)
Controls	Yes	Yes	Yes	Yes
Country product FE	Yes	Yes	Yes	Yes
product time FE	Yes	Yes	Yes	Yes
Num. obs.	13182415	13182415	13182415	13182415
Num. groups: product_time_fe	1632	1632	1632	1632
Num. groups: export_product_fe	13629	13629	13629	13629
Pseudo R ²	0.554	0.554	0.554	0.555

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Identification: Additional endogeneity issue

1. Additional controls: Outward MNE activity, FDI, etc.
2. IV: Exogenous variations in geopolitical relationships,
3. **Synthetic DiD.**
4. Leveraging monthly-level trade flow.

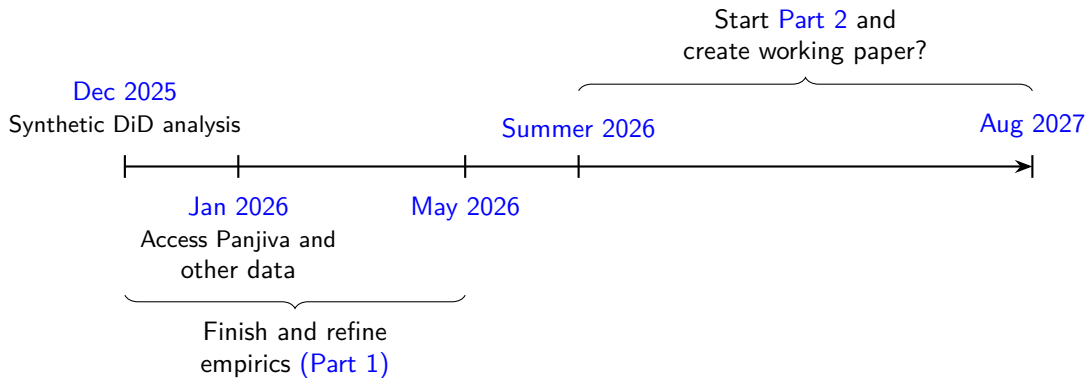
Next step

Current step: A first pass (with less ideal data and specification).

Next step

- **Improved data:** Monthly data on product trade flow, Panjiva, data on mineral reserve, data on Chinese finance/FDI/MNE activity, etc.
- **Improved specification:** Apply synthetic DiD to build a matched control group.

Timeline



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