ECB FORUM ON CENTRAL BANKING

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Ports of Power

EUROPEAN CENTRAL BANK

EUROSYSTEM

Chinese Investments in Ports and the European Trade Network

- Maritime trade is the backbone of global commerce
- Ports are **trade gateways**
- Global: **90%** of goods value moves by sea
- Europe: **~¾** of extra-EU trade enters via seaports
- This **dependence** is concentrated in a *few* critical **deep-water ports**
- Ownership of these critical ports has shifted, with **Chinese state-owned** enterprises holding significant stakes

EU exposure to China: two distinct waves

€213
Exports to China

€518
Imports from China

- **China Shock 1.0**: Trade integration
- **China Shock 2.0**: Trade + ***geopolitics***
  (critical inputs, key technologies, other dependencies + *infrastructure*)

China docks in Europe

- **24** port deals from Antwerp to Piraeus
- Port acquisitions exceed €**9.1bn** (2004-2021)
- **0.7%** of total EU-inward FDI
- Handle ~**10%** of EU port terminal capacity
- **Maritime Silk Road**, seaborne leg of the Belt and Road Initiative (BRI)
- EU is a partner + a terminal node

BRI

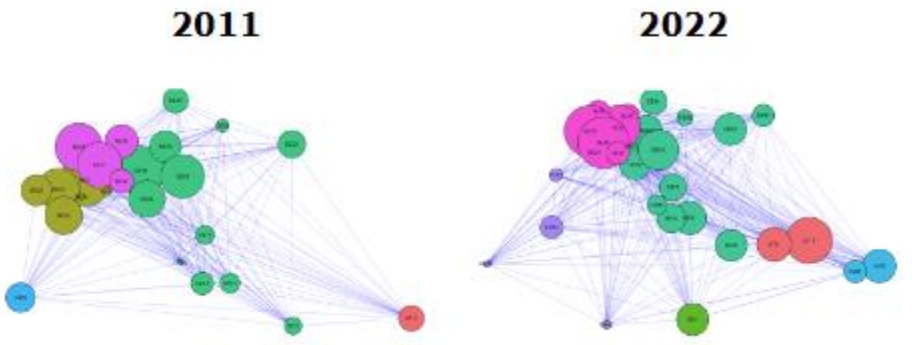
Research Question

How do **Chinese investments in ports** change the **European port network**?

- Do the most exposed regions experience trade **expansion** or **contraction**?
- How does the **composition** and **direction of trade links** change?
- Do **trade corridors** shift, and if yes, how?

I leverage ***two sources of variation***:
1. The staggered roll-out of COSCO's port investments
2. Region–industry cell variation in pre-treatment exposure to these ports

Why study the trade network?



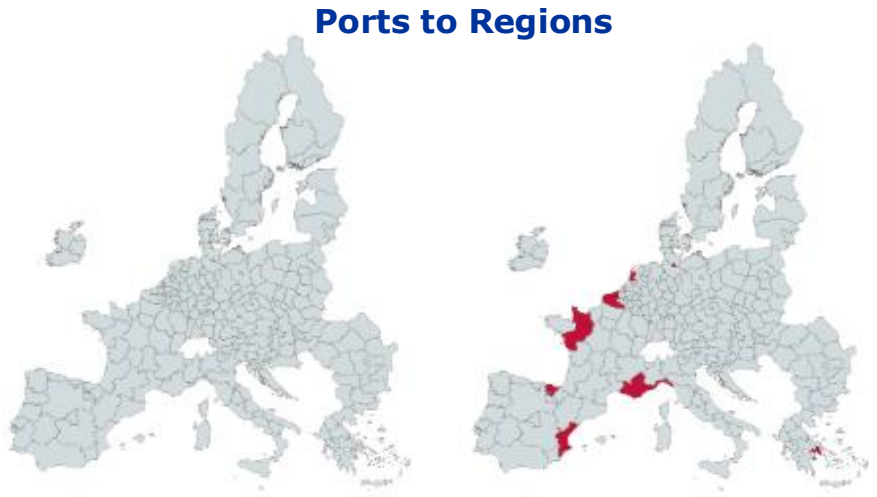
- The trade network within the Single Market is often assumed to be stable.
- **In practice:** the intra-EU subnational network has changed substantially.

Novel Dataset

- Hand-collected data on port acquisitions
- **1.5** million truck-level shipments **× 368** NUTS2 regions **× 48** quarters (2011–2022) **× 20** industries

Identification

Ports to Regions



Defining the Shock

$$\{0, \quad t < T_p,$$

COSCO acquires port p.

Scaling by Investment Intensity

$$\widetilde{D}^{\text{TEU}}_{p,t} = D_{p,t} \times \text{TEU\_capacity}_p,$$
$$\widetilde{D}^{\text{equity}}_{p,t} = D_{p,t} \times (\%\ \text{equity}_p).$$

Baseline Port-Region Reliance Metric

$$\text{port\_rel}_{p,ij} = \frac{w_{ij \to p}}{\sum_{d \in \mathcal{D}} w_{ij \to d}}.$$

Constructing the Exposure Dose

$$\exp_{p,ij,t} = D_{p,t} \times \text{port\_rel}_{p,ij} \quad \text{and} \quad \text{exposure}_{ij,t} = \sum_{p \in \mathcal{P}} \exp_{p,ij,t}$$

- **Stepwise "dose":** each port's shock flips on only at its acquisition.
- **Weighted impact**: regions more reliant on an early-acquired port receive a larger "injection" of exposure sooner.
- **Continuous intensity**: exposure accumulates across acquired ports.

Event Study with Continuous Treatment

$$y_{ijt} = \sum_{k=-K_0}^{K_1} \beta_k \left[\text{exposure}_{ij,t}\right]_{t-T_{\max}=k} + \alpha_{ij} + \gamma_t + \varepsilon_{ijt},$$

where

$$\left[\text{exposure}_{ij,t}\right]_{t-T_{\max}=k} = \sum_p D_{p,t}\, \text{port\_rel}_{p,ij} \quad \text{evaluated at } t - T_{\max} = k.$$

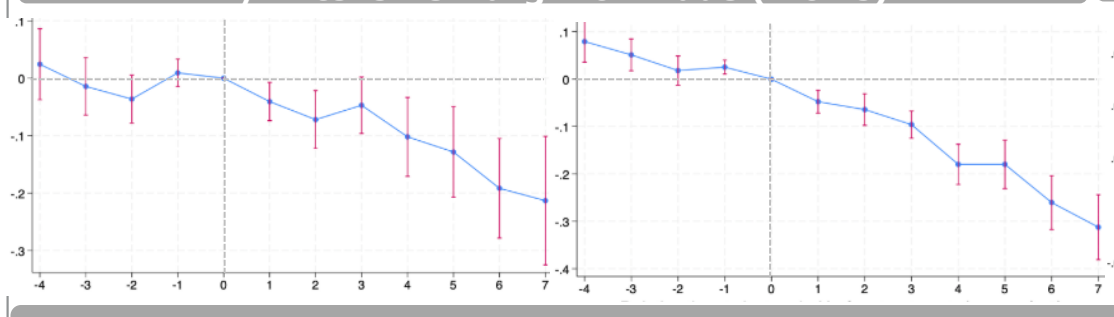
- Origin–industry and time fixed effects included
- β captures the dynamic effect of exposure at event time k
- **Dynamic DiD estimator** → no TWFE bias
- Estimator: de Chaisemartin & d'Haultfoeuille (2024)

Institutional Timing & Exogeneity

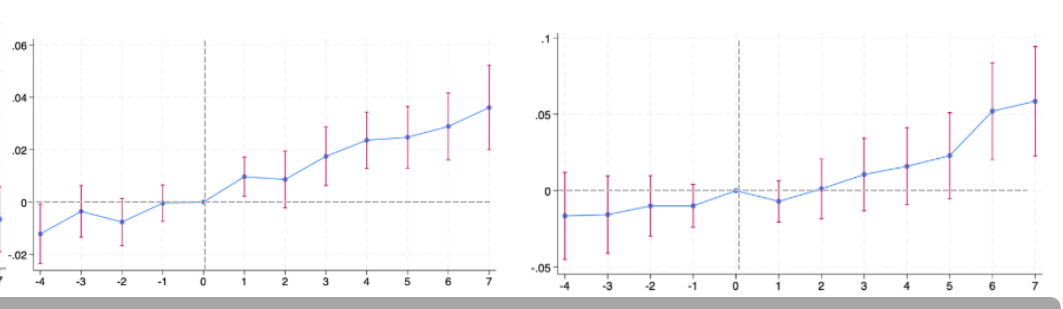
- Selection is **strategic**
- …*but* timing is **institution-driven** and **plausibly exogenous**
- I leverage **staggered shocks × differential pre-reliance** for identification

Results

1/ Intensive Margin of Trade (Flows)



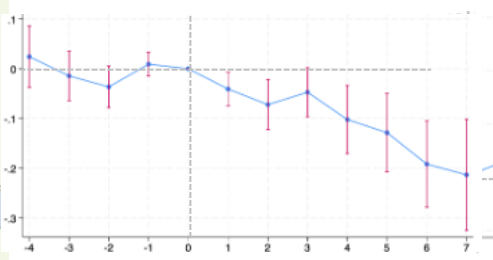
2/ Extensive Margin of Trade (HHI indices)



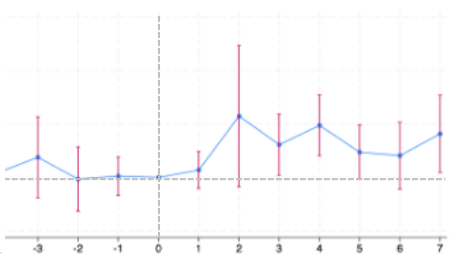
3/ Trans-European Transport Network (TEN-T) & Trade Corridors

#	Corridor	BRI-aligned
1	Baltic–Adriatic Corridor	✓
2	North Sea–Baltic Corridor	×
3	Mediterranean Corridor	✓
4	Orient/East-Med Corridor	✓
5	Scandinavian–Mediterranean Corridor	×
6	Rhine–Alpine Corridor	×
7	Atlantic Corridor	×
8	North Sea–Mediterranean Corridor	×

Western-EU corridors



BRI-aligned corridors



- Trade **volumes:** ***relative*** **declines** in more exposed regions
- Trade links: ***relatively*** **more concentrated** (higher HHI)
- Evidence of corridor reallocation toward BRI-linked routes
- Network centrality changes

Mechanism: Network Reallocation

Benchmark: Ownership shouldn't matter.
Here: Coordination at key nodes **reweights flows.**

1a) Trade/network theory:

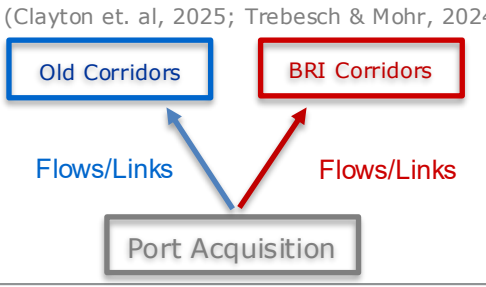
- Small nodal cost or reliability changes propagate
- Vertical integration shifts routing incentives
- Inland trade reallocates across corridors (Allen & Arkolakis, 2014;2021)

$$GC_{r,p,t} = Price_{p,t} + \theta_1 Time_{p,t} + \theta_2 Reliability_{p,t} + \theta_3 Coordination_{p,t}$$

1b) Geoeconomics perspective:

- Control over nodes reshapes interdependence (Clayton et. al, 2025; Trebesch & Mohr, 2024)
- …even without tariffs or formal trade policy
- Infrastructure embeds strategic routing, e.g.:

$$\max_{a_{p,t} \in \mathcal{A}} \underbrace{\Pi_{p,t}(a_{p,t})}_{\text{commercial profit}} + \lambda \underbrace{S_{p,t}(a_{p,t})}_{\text{strategic component}}$$
$$\text{s.t.} \quad GC_{r,p,t} = GC_{r,p,t}(a_{p,t}), \quad r^*_{i,t} \in \arg\min_r GC_{r,t}.$$



Extra: Granular Freight Data Reveals Hidden Trade Patterns

Granular freight data captures:
- **Transshipment dynamics:** rerouting, hub shifts, network reconfigurations
- **Fraud-related signatures:** reporting patterns and logistical schemes associated with customs-fraud investigations (e.g. Calypso in Piraeus)