Foreign Ships in U.S. Waters

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U.S. Shipping Fees on Chinese Ships

- Section 301 introduces two fees, effective October 14, 2025:
  - A fee on Chinese-operated ships, set at $50 per net ton per U.S. port rotation (up to five times per year).
  - A fee on Chinese-built ships, applied per net ton or per container (whichever higher), starting at $18 per NT in 2025 and rising to $33 by 2028.
- Both fees apply independently when a vessel is Chinese-built and Chinese-operated.
- In the model, we interpret these measures as per-container taxes on shipping services from affected fleets:
  - Each fee raises the effective user price ρ_n for the relevant fleets.
  - This increase maps into higher effective shipping costs κ_e on routes served by those fleets.
  - The implied ad-valorem equivalents are:
    - about 48 percent for Chinese-operated ships, and
    - between 17 and 32 percent for Chinese-built ships over the phase-in period.

Incidence Roadmap: Efficiency vs. Resilience (Big Picture)

Goal. Decompose welfare effects of U.S. fees on China-linked fleets into first- and second-moment components.

Newbery & Stiglitz (1981,1984), Donaldson (2025)

Small-change decomposition.

$$\Delta \ln W \;\approx\; \underbrace{-\sum_{\ell} w_\ell \, \Delta\mu_\ell}_{\text{(F) First moment: efficiency loss}} \;+\; \underbrace{\frac{\Gamma}{2}\sum_{\ell} w_\ell \, \Delta\sigma_\ell^2}_{\text{(R) Second moment: resilience gain}},$$

$$\mu_\ell = \mathbb{E}[\ln C_\ell], \qquad \sigma_\ell^2 = \mathrm{Var}(\ln C_\ell),$$

where C_ℓ is the delivered cost on lane/market ℓ and w_ℓ is an exposure weight.

- Surcharges $\Rightarrow \Delta\mu_\ell > 0$ on affected services $\Rightarrow$ *first-order* losses (F).
- Diversification/reliability $\Rightarrow \Delta\sigma_\ell^2 < 0 \Rightarrow$ *second-order* gains (R).

Way ahead.

1. **Today:** quantify (F);
2. **Next:** quantify (R) with aggregate and dis-aggregate risk.

Welfare Elasticities of Shipping Fees: Spatial $\times$ Shipping

Chain rule (E2).

$$\frac{d\ln W}{d\ln T_{e,m}} = \sum_{e'} \underbrace{\frac{d\ln W}{d\ln \kappa_{e'}}}_{\text{Spatial response}} \cdot \underbrace{\frac{d\ln \kappa_{e'}}{d\ln T_{e,m}}}_{\text{Shipping response}},$$

where $T_{e,m}$ scales the cost of services on edge e provided by m (China-linked), and $\kappa_{e'}$ are route costs.

Spatial response.

Allen, Fuchs & Wong (2025)

$$-\frac{d\ln W}{d\ln \kappa_e} = \rho\, \Xi_e \left(M^{\text{in}}_{o(e)} + M^{\text{out}}_{d(e)}\right), \quad \rho = \frac{1+\alpha+\beta}{1+\beta(\sigma-1)+\alpha\sigma}.$$

- Ξ_e: baseline usage (routing weight); $M^{\text{in/out}}$: node multipliers; ρ: model scaling.

Shipping response (summary).

$$\frac{d\ln \kappa_{e'}}{d\ln T_{e,m}} = \underbrace{\mathbf{1}\{e'=e\}\,\chi_{e,m}}_{\text{direct}} + \underbrace{\psi_{e'} \sum_{n} a_{e',n}\,\phi_{n;\,e,m}}_{\text{fleet rents}} + \underbrace{(1-\psi_{e'})\,\delta_{e'}\,g_{e'e}\,\chi_{e,m}}_{\text{routing + congestion}}.$$

- Direct pass-through $\chi_{e,m}$ scaled by exposure and price share; ripples via rental markets and detours.

Policy Implementation (Special Case) & Lane-Level Measurement

Special case (E3). No spatial externalities ($\alpha = \beta = 0$) and no congestion ($\delta = 0$):

$$\frac{d\ln W_m}{d\ln T_{e,\mathrm{CHN}}} = \underbrace{\Xi_e\, s_{e|\mathrm{CHN}}}_{\text{direct exposure}} + \underbrace{\sum_{e'} \Xi_{e'}\, \psi_{e'} \sum_n a_{e',n}\, \phi_{n;e,\mathrm{CHN}}}_{\text{fleet-rental spillovers}} .$$

Lane×size effective tariff (data object).

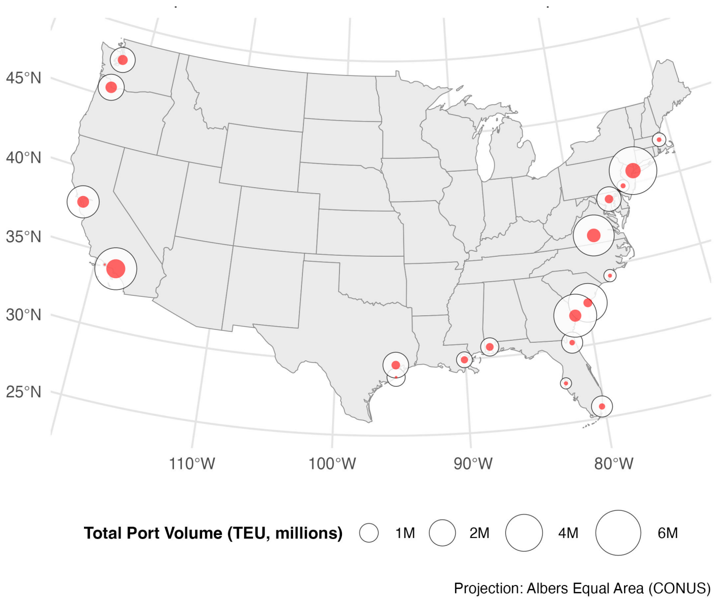
$$\tau^{\mathrm{eff}}_{e,t} = \sum_b \tau_{b,t}\; s_{\mathrm{CHN}}(e,b)\; s^{\mathrm{imp}}_{\mathrm{ship}}, \qquad \text{(size-specific rate)} \times \text{(exposure)} \times \text{(shipping share)}.$$

Aggregation to EV/GDP.

$$\frac{\Delta \mathrm{EV}_t}{Y} \approx -\kappa \sum_e w_e\, \tau^{\mathrm{eff}}_{e,t}, \qquad w_e = \mathrm{TEU}_e \Big/ \sum_{e'} \mathrm{TEU}_{e'} .$$

- Inputs: $\{\tau_{b,t}\}$ (policy schedule by size), $s_{\mathrm{CHN}}(e,b)$ (Chinese-built share), $s^{\mathrm{imp}}_{\mathrm{ship}}$ (shipping cost share), w_e (lane weights).
- Interpretation: (E1)⇒(E2)⇒ implement via $\tau^{\mathrm{eff}}_{e,t}$ and volume weights; set κ from theory/Excel mapping.

U.S. Import Dependence



From Model to Data: Lane-Level Equivalent Variation

Goal: Implement welfare effects using *lane-level* exposure and *ship-size–specific* ad valorem rates.

- **Unit of analysis:** directed lane $e = (o \to d)$ and size bin $b \in \{< 3\text{k}, 3\text{k–}8\text{k}, 8\text{k–}12\text{k}, 12\text{k–}17\text{k}\}$.
- **Lane effective tariff (period t):**

$$\tau^{\text{eff}}_{e,t} = \sum_b \underbrace{\tau_{b,t}}_{\text{ad valorem by size}} \cdot \underbrace{s_{\text{CHN}}(e,b)}_{\text{Chinese-built TEU share on }(e,b)} \cdot \underbrace{s^{\text{imp}}_{\text{ship}}}_{\text{shipping share in import price}} .$$

- **Aggregate incidence (EV as share of GDP):**

$$\frac{\Delta \text{EV}_t}{Y} \approx -\kappa \sum_e \underbrace{w_e}_{\text{lane TEU weight}} \tau^{\text{eff}}_{e,t}, \qquad w_e = \frac{\text{TEU}_e}{\sum_{e'} \text{TEU}_{e'}}.$$

- **Inputs from data:**
  - $\tau_{b,t}$: size-specific ad valorem rates (Oct 2025, Apr 2026/27/28). Calculation Rates
  - $s_{\text{CHN}}(e,b)$: Chinese-built share by lane and size (from builder country & TEU).
  - $s^{\text{imp}}_{\text{ship}}$: shipping-cost share in import prices (e.g., $\approx 5\%$).
  - w_e: lane volume weights from observed TEU.
- **Interpretation:** compute *policy* $\times$ *exposure* $\times$ *pass-through* at the lane$\times$size level, then volume-weight to obtain national EV (with welfare mapping κ, e.g. $\kappa = 0.25$).

Estimated Welfare Effects of U.S. Fees on Chinese Ships

Equivalent variation implied by the phase-in of Section 301 shipping fees:

Date	Ad-valorem fee (%)	EV ($ bn)	EV / GDP (%)	Effective tariff (%)
October 2025	0.20	$3.43	0.01%	0.05%
April 2026	0.25	$4.44	0.02%	0.06%
April 2027	0.30	$5.31	0.02%	0.07%
April 2028	0.35	$6.17	0.02%	0.08%

- **Gradual escalation:** Losses rise from $3.43 bn at 0.20 to $6.17 bn at 0.35, passing through $4.44 bn (0.25) and $5.31 bn (0.30).
- **Aggregate scale:** EV/GDP increases from 0.01% (Oct 2025) to 0.02% (Apr 2028).