Global Networks, Monetary Policy and Trade

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Tariffs and Macroeconomy

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- Unbalanced trade and incomplete markets,
- Heterogeneous monetary policy regimes.

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Results:

- Propagation depends on monetary policy regime $\rightarrow$ derive *NKOE Leontief inverse*
- Network makes inflation more persistent and decline in output bigger
- 2025 tariffs $\Rightarrow$ stagflation in US: $\Delta\pi^{US}$ = +0.7 pp on impact, LR RGDP$\downarrow$ 0.7%
- Reversed tariff threats $\Rightarrow$ declining Y_t, π_t via expectations.

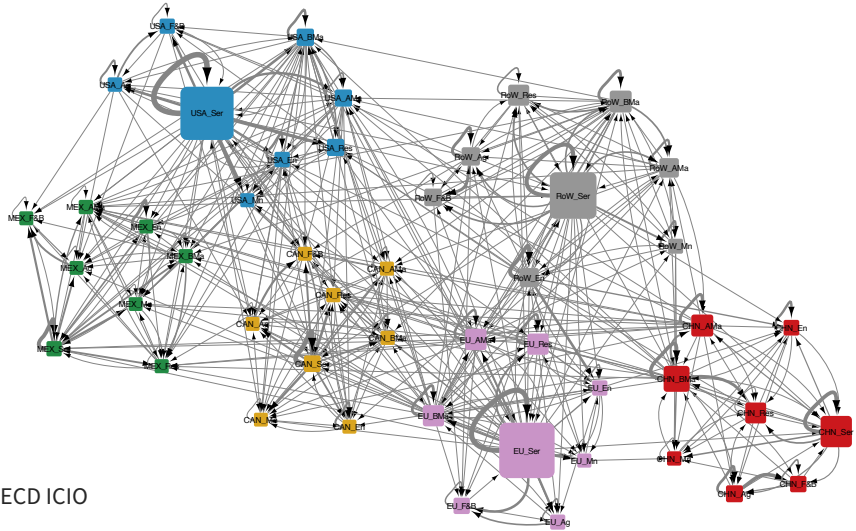
We connect to three large bodies of literatures

- Trade:
  - **Tariffs—a central question since Hume (1758) and Ricardo (1817).**
  - di Giovanni and Levchenko (2010), Johnson and Noguera (2012), Chaney (2014), Dix-Carneiro (2014), Johnson (2014), Koopman et al. (2014), Caliendo and Parro (2015), Adao et al. (2017), Rodríguez-Clare et al. (2020), Dhyne et al. (2021), …
  - Recent Reviews: Costinot and Rodríguez-Clare (2014), Bernard and Moxnes (2018), Johnson (2018), Antrás and Chor (2022).

- Open Econ Macro:
  - Erceg et al. (2018), Barattieri et al. (2021), Monacelli (2025), Bergin and Corsetti (2023), Bianchi and Coulibaly (2025), Cuba-Borda et al. (2025), Ho et al. (2022), Itskhoki and Mukhin (2025), Auclert et al. (2025), Werning et al. (2025), Qiu et al. (2025).

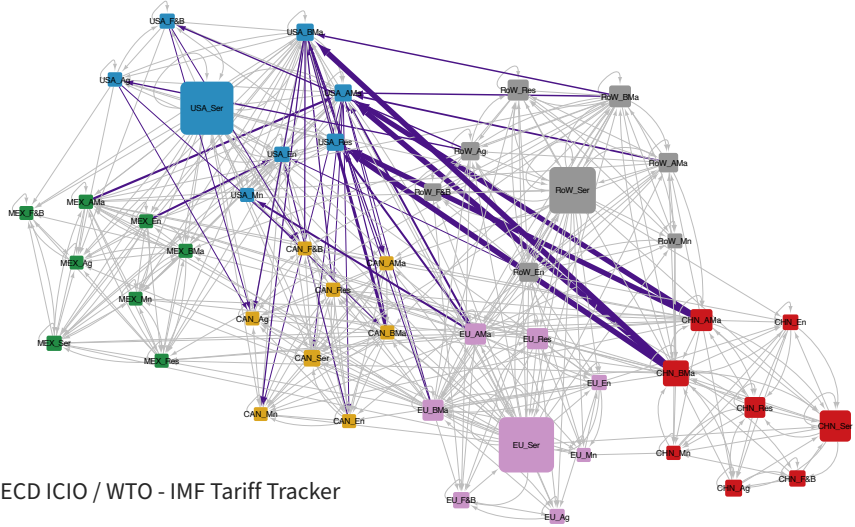
- Production Networks:
  - Rubbo (2023), Baqaee and Farhi (2024), Baqaee and Farhi (2022), Long and Plosser (1983), Foerster et al. (2011), Acemoglu et al. (2012), Atalay (2017), di Giovanni et al. (2023), Silva (2024), Liu (2019), Pasten et al. (2020, 2024), Bigio and La'o (2020), La'O and Tahbaz-Salehi (2022), Foerster et al. (2022), Vom Lehn and Winberry (2022), Huo et al. (2025).

Can global trade and supply chains be re-wired?



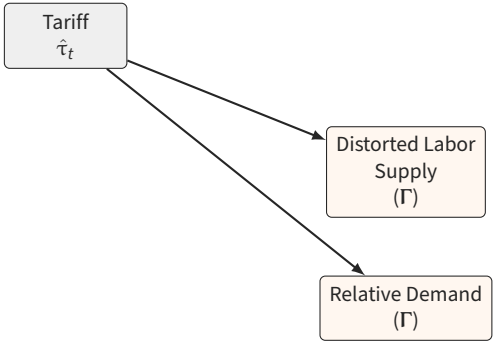
Source: OECD ICIO

2025 Tariffs



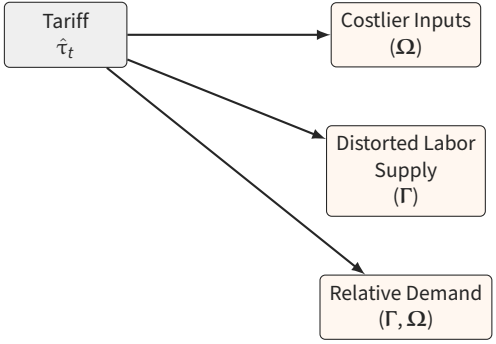
Source: OECD ICIO / WTO - IMF Tariff Tracker

Primitives in Nested CES



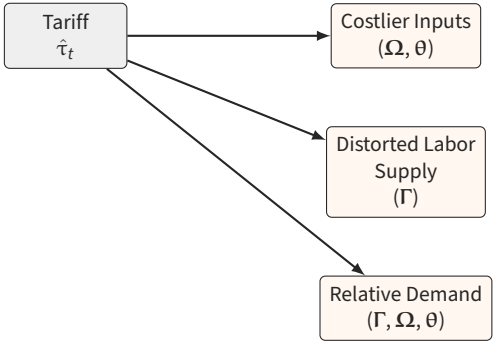
Consumption shares Γ: ToT gains vs. distorted labor supply

Primitives in Nested CES



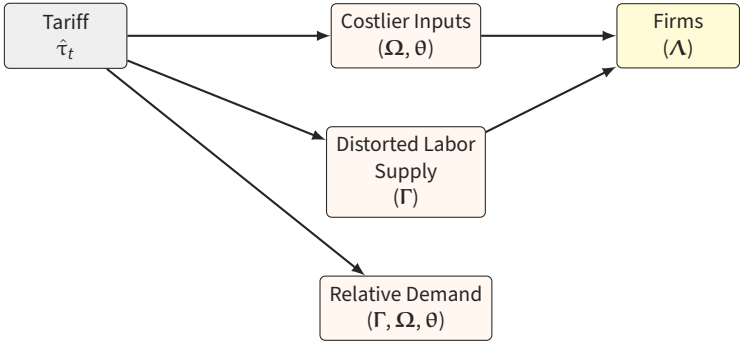
I-O matrix $\mathbf{\Omega}$: ToT gains vs. higher marginal cost propagated by network

Primitives in Nested CES



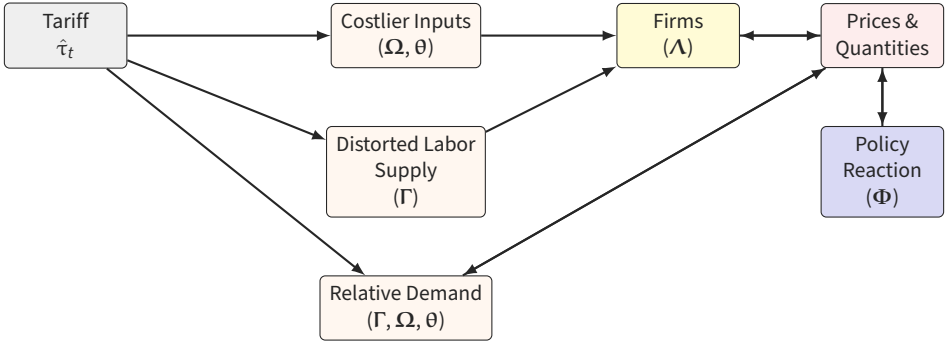
EoS θ: high $\theta \Rightarrow$ easy to substitute $\Rightarrow \hat{Y}_t \uparrow$ or low $\theta \Rightarrow$ complements & bottlenecks, $\rightarrow \hat{Y}_t \downarrow$

Primitives in Nested CES



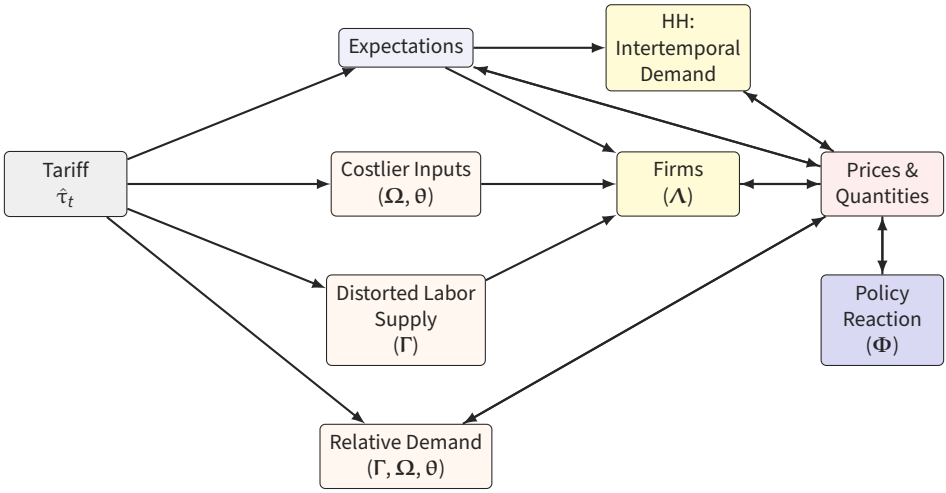
Stickiness $\boldsymbol{\Lambda}$: Low $\Lambda \Rightarrow$ flatter NKPC or high $\Lambda \Rightarrow$ steeper NKPC

Primitives in Nested CES



Policy Φ: response to $\pi_t^C \Rightarrow$ tariffs contract demand

Primitives in Nested CES



Tariffs lead to intertemporal tradeoffs $\Leftrightarrow$ expectations

5-Equation Global New Keynesian Representation

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NKIS+TR:

$$\sigma(\mathbb{E}_t\hat{\mathbf{C}}_{t+1} - \hat{\mathbf{C}}_t) = \underbrace{\Phi\pi_t^C}_{\hat{i}_t} - \mathbb{E}_t\pi_{t+1}^C$$

5-Equation Global New Keynesian Representation

Expectations

NKIS+TR: $$\sigma(\mathbb{E}_t\hat{\boldsymbol{C}}_{t+1} - \hat{\boldsymbol{C}}_t) = \underbrace{\boldsymbol{\Phi}\boldsymbol{\pi}_t^C}_{\hat{\boldsymbol{i}}_t} - \mathbb{E}_t\boldsymbol{\pi}_{t+1}^C$$

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CPI: $\hat{\boldsymbol{P}}^C_t = \boldsymbol{\Gamma}\,\hat{\boldsymbol{P}}^P_t + \boldsymbol{L}^C_{\mathcal{E}}\,\hat{\mathcal{E}}_t + \boldsymbol{L}^C_{\tau}\,\hat{\tau}_t$

Consumer Prices | Consumption Weights | Producer Prices | ER | Tariff

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NKPC:

$$\underbrace{\hat{\boldsymbol{P}}^P_t}_{\substack{\text{Producer}\\ \text{Prices}}} = \underbrace{\boldsymbol{\Psi}_{\boldsymbol{\Lambda}}}_{\substack{\text{Leontief}\\ \text{Inverse}}} \left[\hat{\boldsymbol{P}}^P_{t-1} + \underbrace{\boldsymbol{\Lambda}}_{\text{Stickiness}} \underbrace{\left(\boldsymbol{\alpha}\,(\underbrace{\hat{\boldsymbol{P}}^C_t + \sigma\hat{\boldsymbol{C}}_t}_{\boldsymbol{W}_t}) + \boldsymbol{L}^P_{\mathcal{E}}\hat{\mathcal{E}}_t + \boldsymbol{L}^P_{\tau}\hat{\tau}_t\right)}_{\text{Transformed MC}} + \beta\mathbb{E}_t\hat{\boldsymbol{P}}^P_{t+1}\right]$$

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Labor Supply Distortion

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Labor Supply Distortion

Costlier Inputs

NKPC:

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BoP: $\beta\underbrace{\hat{V}_t}_{\text{Debt}} = \underbrace{\hat{V}_{t-1}}_{\text{Debt Dynamics}} + \underbrace{\Xi_2\hat{\boldsymbol{C}}_t + \Xi_3\hat{\boldsymbol{P}}^P_t + \Xi_4\hat{\mathcal{E}}_t + \Xi_5\hat{\tau}_t}_{\text{NX Response to AD \& ToT}}$

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Relative Demand

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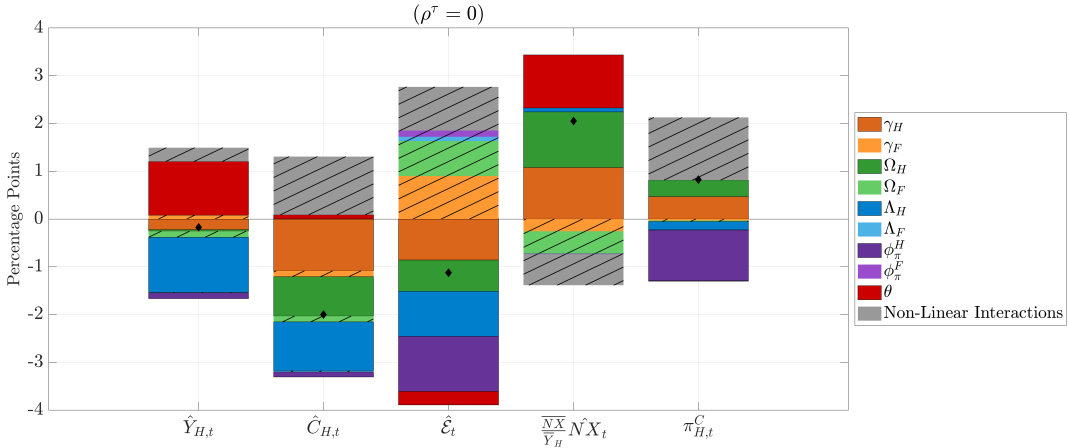
+ inflation definition

Primitives at Work: Linear Contributions



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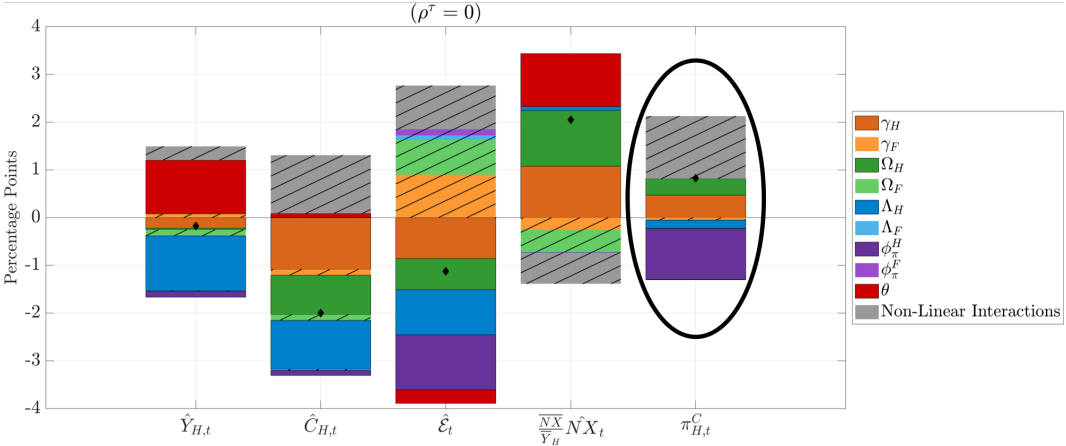


Shock Propagation: The Anatomy of Leontief Inverse

- Under flexible prices, the Standard Leontief Inverse:

$$\Psi = [\, \boldsymbol{I} - \boldsymbol{\Omega} \,]^{-1}.$$

- Under fixed nominal demand:

$$\Psi_{\Lambda} = \left[\boldsymbol{I} \left(1 + \underbrace{\beta}_{\text{Discount F.}} \right) + \underbrace{\boldsymbol{\Lambda}}_{\text{Stickiness}} \left(\boldsymbol{I} - \boldsymbol{\Omega} \right) \right]^{-1}.$$

- Under a Taylor rule:

$$\Psi_{\phi} = \left[\boldsymbol{I}(1+\beta) + \boldsymbol{\Lambda} \left[\boldsymbol{I} - \boldsymbol{\Omega} + \underbrace{\alpha}_{\substack{\text{Labor} \\ \text{Shares}}} \left(\underbrace{\boldsymbol{\Phi}}_{\substack{\text{Central Bank} \\ \text{Sensitivity}}} - \boldsymbol{I} \right) \underbrace{\Gamma}_{\substack{\text{Consumption} \\ \text{Shares}}} \right] \right]^{-1}.$$

- Solving DGE yields: $\Psi_{\phi} \Rightarrow \Psi_{\phi}^{NKOE}$

Analytical Solution: Decomposing the Impact on Inflation

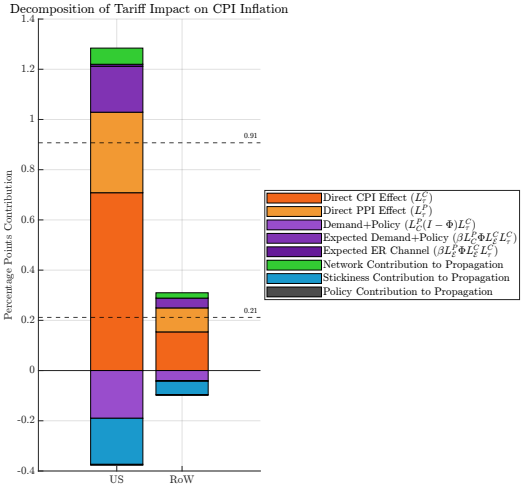
U.S. and RoW, 10% reciprocal tariffs.

Based on analytical solution, the impact of a one-time tariff on CPI inflation is:

$$\frac{\partial \pi_t^C}{\partial \tau_t} = \underbrace{L_\tau^C}_{\text{Direct CPI Effect}} + \underbrace{\Gamma L_\tau^P}_{\text{Direct PPI Effect}}$$

$$+ \underbrace{\Gamma \alpha (\mathbf{I} - \Phi) L_\tau^C}_{\text{Demand+Policy}} + \underbrace{\beta \Gamma \alpha \Phi \tilde{L}_{\mathbf{E}}^C L_\tau^C}_{\text{Expected Demand+Policy}}$$

$$+ \underbrace{\beta \Gamma L_{\mathbf{E}}^P \Phi \tilde{L}_{\mathbf{E}}^C L_\tau^C}_{\text{Expected ER Channel}} + \underbrace{\Gamma \left(\Psi_\phi^{NKOE} \Lambda - \mathbf{I}\right) \mathbf{Z}}_{\text{Propagation via Network \& Stickiness}}$$



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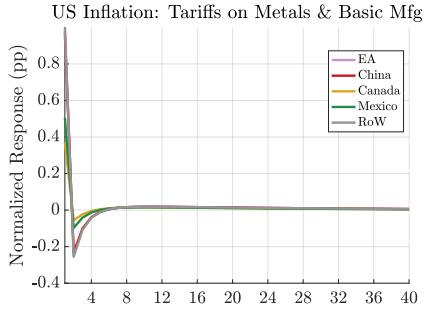

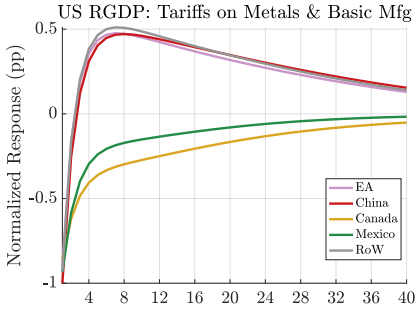

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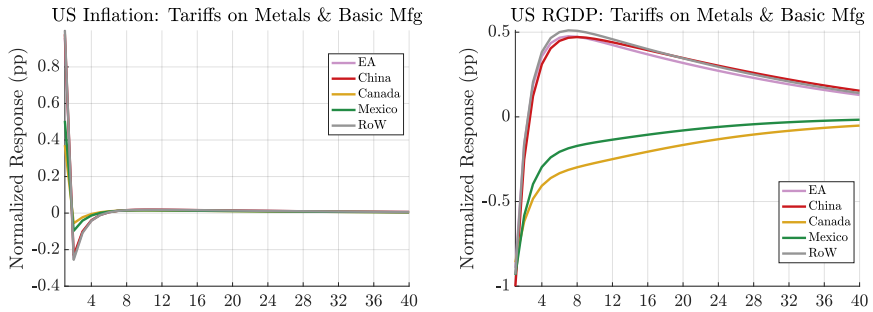
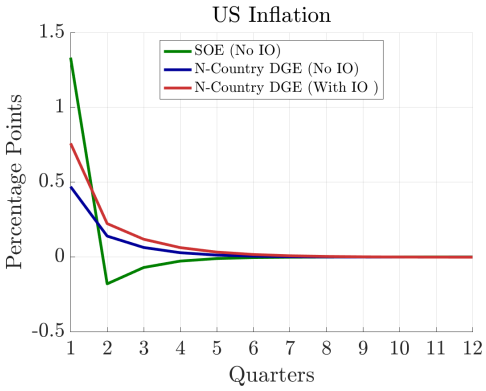


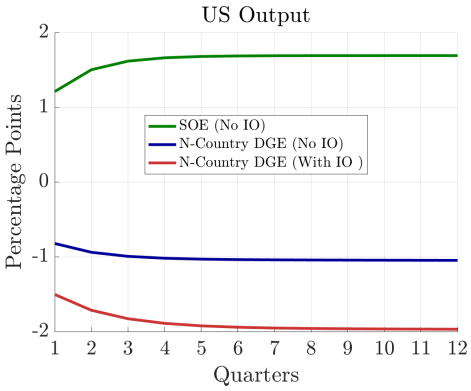
- International risk sharing mutes network impact ($\psi \uparrow$: financial autarky)

$$\frac{\partial \hat{\boldsymbol{P}}_t^P}{\partial \tau_t} = \left[(\boldsymbol{\Psi}_\phi \boldsymbol{\Lambda})^{-1} + \boldsymbol{\Theta}_1\right]^{-1} \left[\boldsymbol{\Theta}_2 - \left(\boldsymbol{L}_{\mathbf{E}}^P \frac{\partial \hat{V}_t}{\partial \hat{\tau}_t}\right)\psi\right]$$

Inflation-Output Tradeoff with Global Production Networks

Near-permanent tariff and w/o MP Response



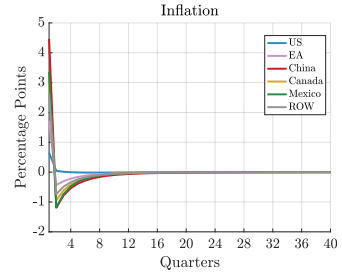


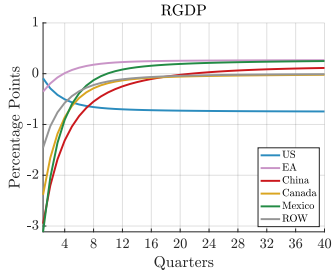
2025: Tariff Threats and Trade War

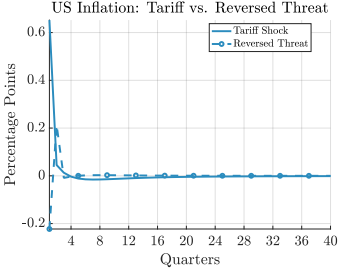
- Implemented tariffs (mostly unilateral), country-sector.
- Near-permanent shock.
- Policy non-reactive, $\rho_m^n \to 1$ and $\phi_\pi^n \to 0$ in TR:

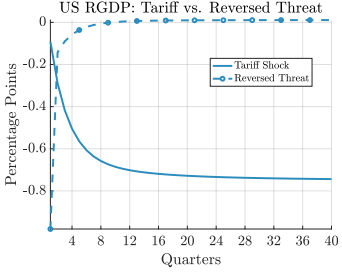
$$i_{n,t} = \rho_m^n i_{n,t-1} + \phi_\pi^n \pi_{n,t}$$

- **Reversed threat:**
  - Future tariffs announced at $t = 1$
  - At $t = 2$ no tariffs implemented.









Takeaways

1. The macro impact of tariffs depends on five primitives:
   - Home/Foreign bias in consumption (γ)
   - Home/Foreign bias in production (Ω) with input complementarity (θ)
   - Price stickiness (Λ)
   - Monetary policy regime and responsiveness (ϕ_π)

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3. 2025 Tariffs:
   - US: π_t 0.7 pp on impact; 0.1-0.7 percent output decline
   - Without policy intervention, non-US inflation on impact, followed by deflation
   - EA and Mexico LR increase in output.