Global Supply Chains in the Pandemic

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Cross-Border Supply Chains Transmit Shocks

- Covid-19 led to lockdowns of varying intensity across the world
- Most of the world interconnected by cross-border supply chains

This leads to a number of questions:

1. How much does supply-chain transmission contribute to pandemic-GDP drop?
2. Should supply chains be “renationalized”?
3. Does unilateral reopening mitigate the effect of the shock?
What We Do

1. Build a quantitative model with trade and production networks
   - 64 countries, 33 sectors, 23 occupations, based on Huo, Levchenko, Pandalai-Nayar (2020)
   - analytical influence vector to calculate impact of shocks
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2. Evaluate role of global supply chains during “Pandemic” (labor supply) shock
   - shock calibration: work-from-home intensity + country lockdown stringency
   - decomposition: domestic shocks vs transmission, PE vs GE
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Framework in Brief

- Influence matrix: only require observed shares and relevant elasticities

\[
\ln H = \left( \mathbf{I} - G \right)^{-1} \Pi^O \Delta^{-1} \ln \xi
\]

- Domestic shocks vs transmission

\[
\ln V_n = \sum_{j=1}^{J} \omega_{nj} (1 - \alpha_j) \eta_j \quad \ln H_{nj} = \sum_{\ell} s_{nn\ell} \ln \xi_{n\ell} + \sum_{m \neq n} \sum_{\ell} s_{m\ell n} \ln \xi_{m\ell}
\]

\(D_n\) Domestic Influence \(T_n\) Foreign Transmission

- Trade vs Renationalization

\[
\ln V_n - \ln V_n^R = \sum_{\ell} \left( s_{nn\ell} - s_{nn\ell}^R \right) \ln \xi_{n\ell} + \mathcal{T}_n
\]

\(\mathcal{T}_n\) Change in Domestic Influence
Results: GDP Responses

- labor shock: $\ln \xi_{n\ell} = -(1 - \text{work from home}_\ell) \times f(GRT_n)$
- GDP impacts large and heterogeneous: avg -29.6%
- role of production network: avg 23.3% of decline due to transmission
Model Fit

Industrial Production

US Sectoral Employment Declines
Renationalization of supply chains: average GDP decline similar

- reducing reliance on foreign supply chains increases reliance on domestic supply chains
- in a worldwide lockdown, does not mitigate GDP decline
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- reducing reliance on foreign supply chains increases reliance on domestic supply chains
- in a nationwide lockdown, does not mitigate GDP decline
Conclusion

- Covid-19 lockdown driven labor supply shock generates large GDP declines
  - parsimonious shock fits well data declines in IP (corr=0.56), cross-sector employment (corr=0.61)
  - 23.3% of effect due to transmission through global supply chains

- Renationalization unlikely to make economies more resilient to pandemic shocks
  - trade allows countries to “import” looser lockdowns abroad
  - conclusions similar with renationalization of individual sector supply chains

- (In paper:) Unilateral reopening by large countries has significant mitigation effects
  - U.S. reopening increases GDP of other countries by 0.07%-1.42%