Production Networks and Firm-level Elasticities of Substitution

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Basic Motivation

- The welfare loss from the increase in the cost of a good is larger if the elasticity of demand for the good is low.
  - This statement holds in undergraduate intermediate micro
  - Baqaee, Farhi (2019): It is exacerbated in a production network, especially for key inputs.
- Estimating the elasticity of demand is challenging due to classic endogeneity concerns: Separately identifying supply from demand shocks.
- This paper: Use the distinction between red, orange and green zones in India.

Identification idea

- VAT data on firm-to-firm transactions from India
- Covid disproportionately increases the cost and decreases the demand of firms in red zones relative to other firms.
  - For example, the sales of a firm in a red zone to its partner in a green zone is affected by the increase in cost of the producing firm, but the demand is (relatively) unaffected.
- It is exogenous to the firm: Firms didn't strategically locate in red/green/orange zones anticipating COVID.

1. Full use of network structure

- Consider the examples of firms located in red zone:
  - Supplier A's suppliers are all also in the red zone
  - Supplier B's suppliers are mostly in green zones

  $\Rightarrow$ The cost of Firm A increases relative to Firm B with COVID.
  - Firm C's buyers are all also in the red zone
  - Firm D's buyers are mostly in green zones

  $\Rightarrow$ The sales of Firm C decrease relative to Firm D with COVID.
- Suggestion: Use Leontief matrices to calculate the firm-specific exposure to demand and supply shocks.

2. Zeros

- The number of transactions decreased from 7,808,325 in April/June of 2019 to 3,201,081 in April/June of 2020. At least for some buyers, the elasticity of demand was (negative) infinity.

- Without considering the zeros, the paper may be underestimating the elasticity of demand.

- This may explain some counter-intuitive findings:

  - The estimated elasticity is $\hat{\varepsilon} = -0.4$. Firms don't set prices at inelastic sections of their demand ($\hat{\varepsilon} > -1$)
  - Sectors with a low-elasticity of demand (Table 6) are not very differentiated, e.g., $\hat{\varepsilon}_{\text{clothing}} = 0.34$
  - Adão, Carrillo, Costinot, Donaldson, Pomeranz (2021)

- Suggestion: Develop a theory with heterogeneous buyers or inventory management à la Alessandria, Kaboski, Midrigan (2010, 2010, 2011, 2015) to account for the decrease in number of transactions.

Summary

- The identification of demand and supply elasticities through heterogeneous zones in India is a very nice idea.
- Implementation would improve with data on number of transactions and the rich network structure.