Specialization, Complexity & Resilience in Supply Chains

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Trade, Value Chains and Financial Linkages in the Global Economy

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Summary

▶ **Theoretical background**: canonical multi-country multi-sector I-O models match global trade but are inadequate to understand supply chains' resilience/bottlenecks/reshoring,...

▶ **This paper**: theory of supply chains that delivers a model-consistent and welfare-relevant notion of resilience (as a function of search frictions, specialization, complexity)

▶ **Key result**: if production is complex, i.e., multiple complementary inputs are needed to produce final output, the **decentralized equilibrium is less resilient than optimal**

  – Decentralized equilibrium features over-specialization of intermediate producers

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Optimal Ownership Structure /1

▶ Under the **decentralized equilibrium**, intermediate producers' **specialization** solves

$$\text{Effect of specialization of } j \text{ on own surplus} = \text{Marginal cost of specialization}$$

▶ Under the **efficient allocation**, intermediate producers' **specialization** solves

$$\text{Effect of specialization of } j \text{ on own surplus} + \text{Effect of specialization of } j \text{ on surplus of all other } i \neq j = \text{Marginal cost of specialization}$$

▶ The red term comes from **missing internalization** among intermediate producers (and not, e.g., from HHs' preferences)

▶ Can **horizontal integration** among intermediate producers restore efficiency?

- **Policy**: promote domestic champions that can produce critical inputs

- Does (a stretched version of) the model support this goal?

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Additional Comments

1. **Heterogeneity of final producers**: over-specialization might still hold with heterogeneous final producers, but **assortative matching** may amplify/attenuate it?

    - E.g., **PAM**: larger benefits of specialization BUT lower business-stealing externality

2. **No notion of international trade**: yet the debate about disruptions/bottlenecks/reshoring is mostly in open economy $\Rightarrow$ how can **trade policy** enhance supply chains resilience?

3. **Theory-consistent measurement of resilience?**

$$f^N = \left[1 - \exp\{-\lambda\bar{\phi}\}\right]^N$$

    - How would you measure λ (search frictions), $\bar{\phi}$ (av. specialization) and N (complexity)?

    - An empirical **resilience index** would be very valuable

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