Global Value Chains and Supply Chain Resilience

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Global Value Chains

- GVCs increasingly important in production: productivity benefits but complex production networks

### Foreign Intermediate Input Usage: G7

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<th>Year</th>
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<th>DEU</th>
<th>FRA</th>
<th>GBR</th>
<th>JPN</th>
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Source: WIOD

### Questions:
- Do GVCs transmit shocks across locations?
- Are the aggregate effects large?
- Should supply chains be “re-nationalized”?
- What makes supply chains resilient?
Implications of GVCs: Shock Transmission
Boehm, Flaaen, and Pandalai-Nayar (2019)

- Shocks from one country can impact production/consumption in another country through GVC links

Example: 2011 Tōhoku Earthquake

- Earthquake measured 9.0 $M_w$
- Tsunami: Wave Heights Exceeding 7m
- 1% of Physical Capital Damaged or Destroyed
- Significant death toll
- Widespread power outages

Source: USGS
Implications of GVCs: Shock Transmission
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Source: USGS
Large Drop in Japanese Industrial Production/ U.S. Imports from Japan Fall

Japanese Industrial Production

US Imports
Dip in U.S. Industrial Production

The graph shows deviations from trend (HP-Filtered) for U.S. Durable Goods Production and U.S. Manufacturing Production from July 2010 to January 2012. There is a notable dip in both series in 2011, followed by a recovery.
U.S. Affiliates of Japanese Multinationals

Implication – in the short-run supply chains inflexible, producers cannot easily find new suppliers (low elasticity).
Other foreign affiliates exhibit similar importing behavior:

- 12 percent of cost due to imported inputs from source country
- 45 percent of imports from source country
- Large majority is intra-firm

It’s not simply the auto sector

- Motor vehicles industry represents roughly 40% of total gross output of Japanese affiliates
- Splitting the estimates by motor-vehicle and non motor-vehicle does not reveal qualitatively different results
Are the Aggregate Effects of Transmission through GVCs Large?
Bonadio, Huo, Levchenko and Pandalai-Nayar (2021)

► **Application:** Covid-19 led to lockdowns of varying intensity across the world

► Questions:

1. What is the GDP impact of transmission through supply chains of the pandemic shock?

2. Should supply chains be “renationalized” to increase a country’s resilience?
GDP impacts large and heterogeneous: avg $\approx -30\%$

- Role of production network: avg one-quarter of decline due to transmission
GDP Responses

▶ Should supply chains be “renationalized”?

▶ In general, no!
Renationalization of supply chains: average GDP decline similar

- reducing reliance on foreign supply chains increases reliance on domestic supply chains
- whether or not renationalization helps depends on relative intensity of home lockdown
Supply Chain Resilience

- Evidence so far we want the most resilient supply chains
- Maintain productivity advantages
- More flexible in response to shocks – minimize transmission effects
- **Question**: What makes a supply chain resilient?
Supply Chain Resilience: Evidence from Indian Firms
Khanna, Morales and Pandalai-Nayar (2022)

- Setting: heterogeneous Covid-lockdowns with firm-to-firm supply chain data

Buyer-Supplier Disruptions
Characteristics of Resilient Supply Chains: Firms

▶ Buyers that are larger, purchase differentiated products with more complex supply chain less affected
Characteristics of Resilient Supply Chains: Suppliers

- Less separation from largest suppliers or suppliers who dominate the sales of their product
- More separation, less new link formation when many potential suppliers
Conclusion

- GVCs increasingly important in production
- Many benefits, but can also transmit shocks with large effects
- Designing flexible/resilient supply chains: new evidence on what resilient GVCs are
- More evidence needed!