

Global Value Chains and Supply Chain Resilience

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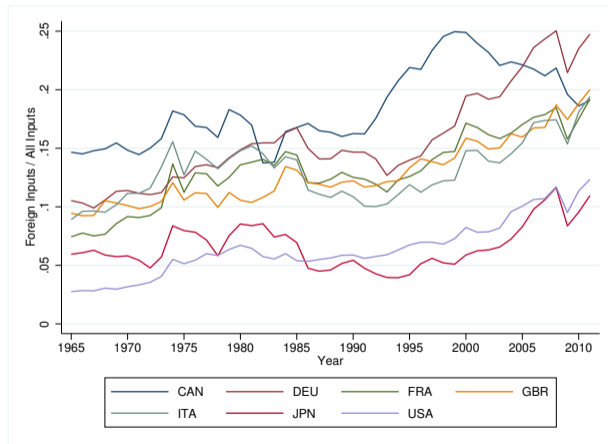
UT Austin & NBER

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Global Value Chains

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

Foreign Intermediate Input Usage: G7



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?

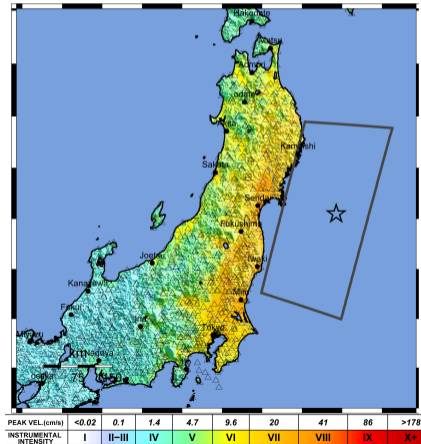
Implications of GVCs: Shock Transmission

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

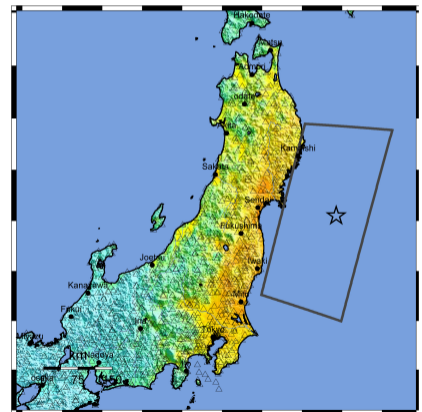


Source: USGS

Implications of GVCs: Shock Transmission

Boehm, Flaaen, and Pandalai-Nayar (2019)

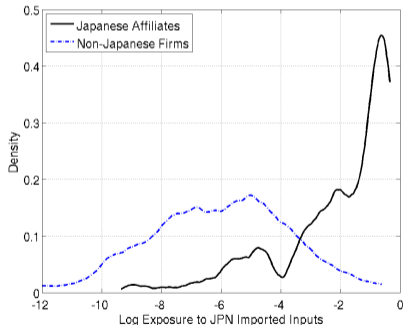
- ▶ Shocks from one country can impact production/consumption in another country through GVC links



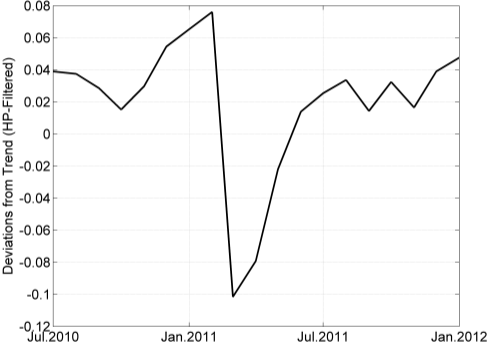
PEAK VEL.(cms)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: USGS

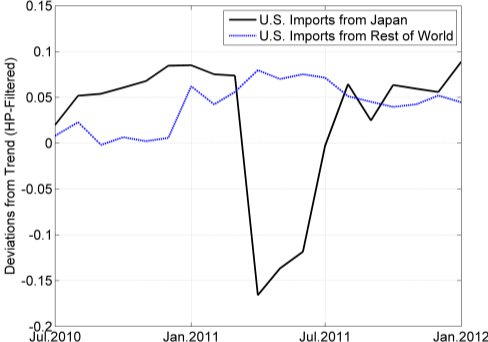
US Firms' Exposure



Large Drop in Japanese Industrial Production/ U.S. Imports from Japan Fall

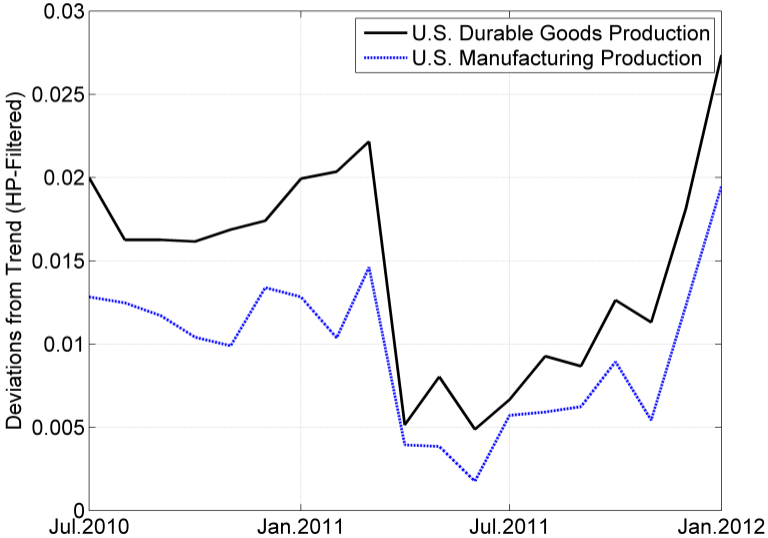


Japanese Industrial Production

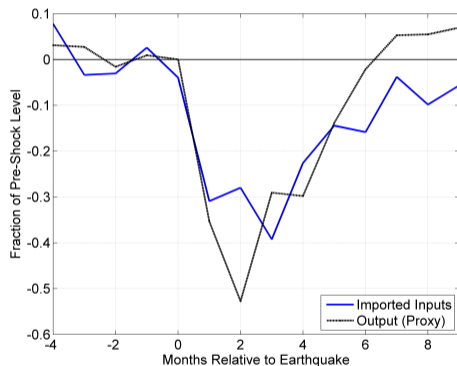
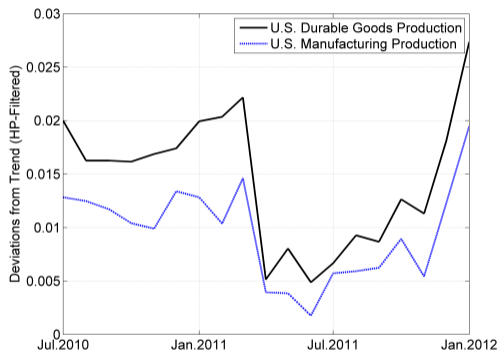


US Imports

Dip in U.S. Industrial Production



U.S. Affiliates of Japanese Multinationals



- Implication – in the short-run supply chains inflexible, producers cannot easily find new suppliers (low elasticity).

External Validity

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

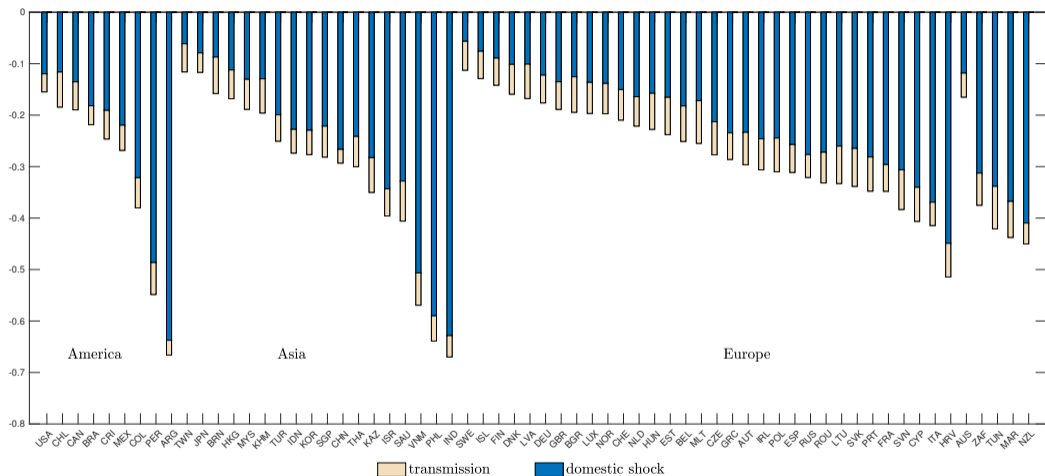
- ▶ Motor vehicles industry represents roughly 40% of total gross output of Japanese affiliates
- ▶ Splitting the estimates by motor-vehicle and non motor-vehicle does not reveal qualitatively different results

Are the Aggregate Effects of Transmission through GVCs Large?

Bonadio, Huo, Levchenko and Pandalai-Nayar (2021)

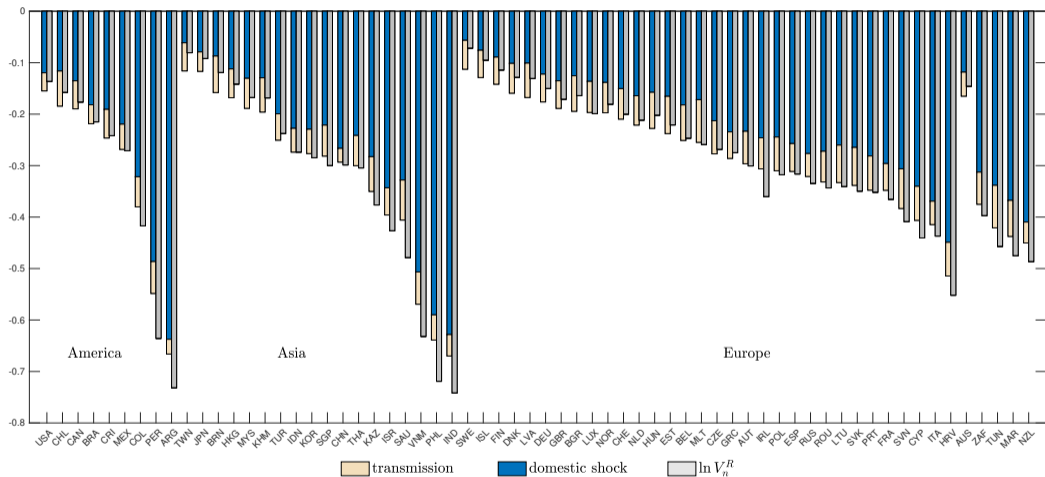
- ▶ **Application:** Covid-19 led to lockdowns of varying intensity across the world
- ▶ Questions:
 1. What is the GDP impact of transmission through supply chains of the pandemic shock?
 2. Should supply chains be “renationalized” to increase a country’s resilience?

GDP Responses



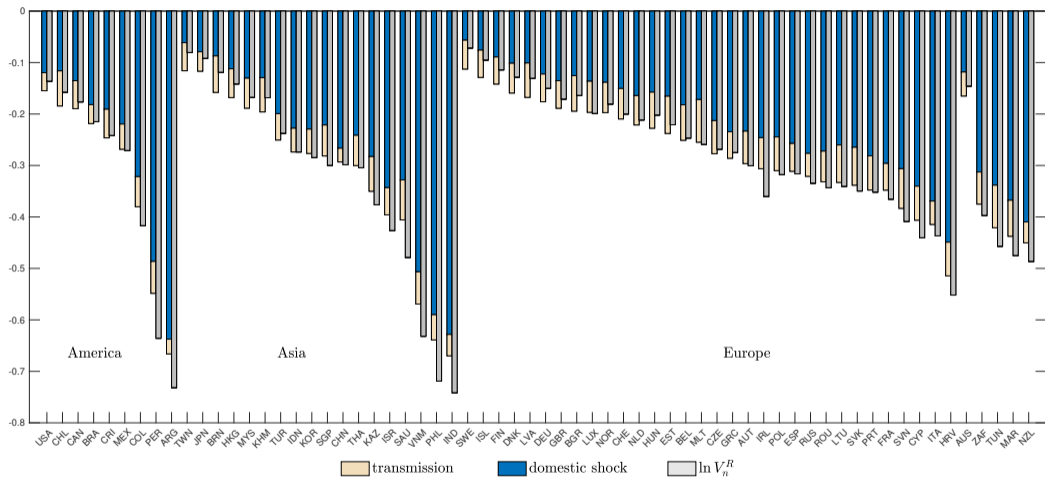
- ▶ GDP impacts large and heterogeneous: avg $\approx -30\%$
- ▶ Role of production network: avg one-quarter of decline due to transmission

GDP Responses



- ▶ Should supply chains be “renationalized”?
- ▶ In general, no!

GDP Responses



► 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

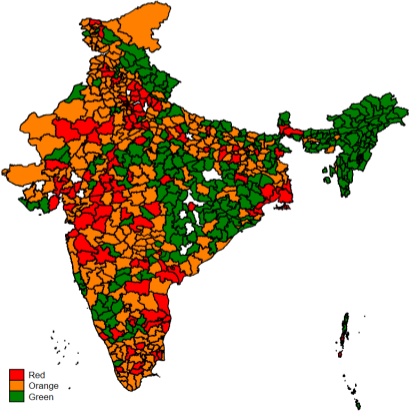
Supply Chain Resilience

- ▶ 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?

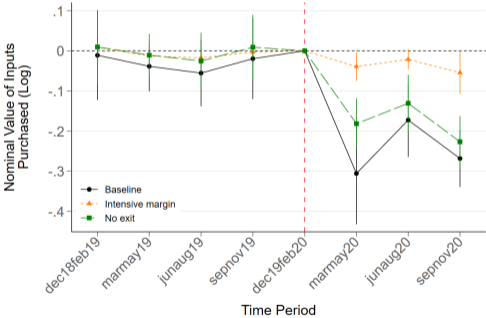
Supply Chain Resilience: Evidence from Indian Firms

Khanna, Morales and Pandalai-Nayar (2022)

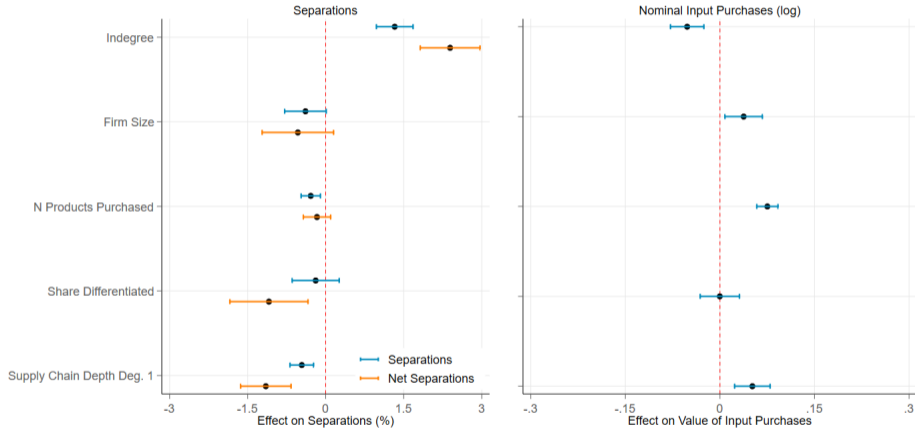
► Setting: heterogeneous Covid-lockdowns with firm-to-firm supply chain data



Buyer-Supplier Disruptions

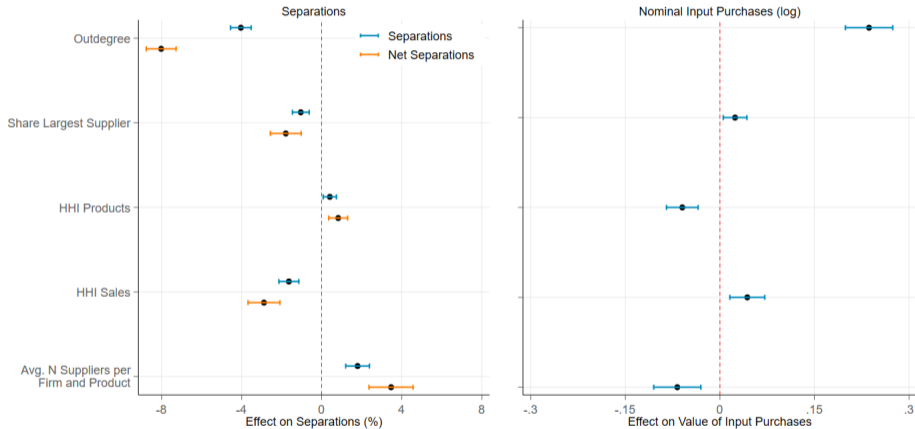


Characteristics of Resilient Supply Chains: Firms



- 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!