CONNECTIVITY COUNTS: HOW IS THE GEOGRAPHY OF INTERNATIONAL TRADE LINKAGES CHANGING AND WHAT IS THE EFFECT ON INTERNATIONAL SHOCK TRANSMISSION?

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Objectives

• **Evolution** of interconnectivity and centrality of international trade before and after the global financial crisis

• **Variation** in the contagion of pre- and post-crisis trade shocks.
• Inter-Country Input-Output (ICIO), OECD TiVA (2018)
  – 64 countries
  – 36 industries
  – 2005 - 2015

Network:
• Nodes: country – industry pairs
• Weights: input transaction flows from a country/industry to a partner country/industry
• Edges are directed: A→B: B uses inputs from A
Network Characteristics

- Centrality measures
  Forward PageRank
  Backward PageRank

- Community detection
  Louvain algorithm
China has emerged as the most important hub of global trade

Relative Centrality by country, 2005 and 2015

Note: Page-Rank Measure. Centrality reflects the relative importance of a country in the world input-output network, taking into account the size of its trade activity (total exports), the number of trading partners and the importance of these partners in the overall network.

Source: OECD Secretariat
### Top 20 most central industries in 2005 and 2015

<table>
<thead>
<tr>
<th>2005</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA Motor vehicles, trailers and semi-trailers</td>
<td>CHN Computer, electronic and optical products</td>
</tr>
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<td>USA Motor vehicles, trailers and semi-trailers</td>
</tr>
<tr>
<td>USA Construction</td>
<td>DEU Motor vehicles, trailers and semi-trailers</td>
</tr>
<tr>
<td>DEU Motor vehicles, trailers and semi-trailers</td>
<td>USA Public admin. and defense; compulsory social security</td>
</tr>
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<td>MEX Motor vehicles, trailers and semi-trailers</td>
</tr>
<tr>
<td>CAN Motor vehicles, trailers and semi-trailers</td>
<td>USA Construction</td>
</tr>
<tr>
<td>USA Wholesale and retail trade; repair of motor vehicles</td>
<td>USA Other business sector services</td>
</tr>
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<td>USA Wholesale and retail trade; repair of motor vehicles</td>
</tr>
<tr>
<td>USA Human health and social work</td>
<td>USA Human health and social work</td>
</tr>
<tr>
<td>USA Food products, beverages and tobacco</td>
<td>CHN Electrical equipment</td>
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<tr>
<td>USA Computer, electronic and optical products</td>
<td>CHN Basic metals</td>
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<tr>
<td>USA Transportation and storage</td>
<td>CHN Chemicals and pharmaceutical products</td>
</tr>
<tr>
<td>DEU Food products, beverages and tobacco</td>
<td>USA Food products, beverages and tobacco</td>
</tr>
<tr>
<td>USA Machinery and equipment, nec</td>
<td>GBR Arts, entertainment, recreation and other service activities</td>
</tr>
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</table>
Less but more dense production hubs have emerged
Diffusion Mechanism

Watts threshold model

- **Seed**: country-industry pairs adopt a given behavior – trade restrictions

- **Threshold**: fraction of the number of neighbors that need to adopt the behavior before imitating

- \( W = [w_{ij}] - input weighted linkages \)

\[
\varphi_i = \Delta(G) \text{ for all } i \\

k_{in}^i = \sum_j w_{ij} \\

k_{in/infected}^i = \sum_{j \in I} w_{ij} \text{ where } I = \text{set of infected' nodes} \\

- Node infected if \( k_{in/infected}^i / k_{in}^i > \varphi_i \)
Shock transmission over time

Transmission comparison 2005-2015
10% of nodes adopt trade restrictions

Source: OECD calculations.
Shock transmission over different thresholds

Source: OECD calculations.
Summary

**Network structure:**
- Relative important sectors
- Clusters formation

**Shock transmission**
- Trade restriction shocks transmit faster and the cost of negative shocks will be higher post-crisis than pre-crisis
THANK YOU
Increased density pre and post crisis

![Graph showing increased density pre and post crisis](image)