



# 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

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- **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.



## Data

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- 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:  $A \rightarrow B$ : B uses inputs from A



# Network Characteristics

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- **Centrality measures**

Forward PageRank

Backward PageRank

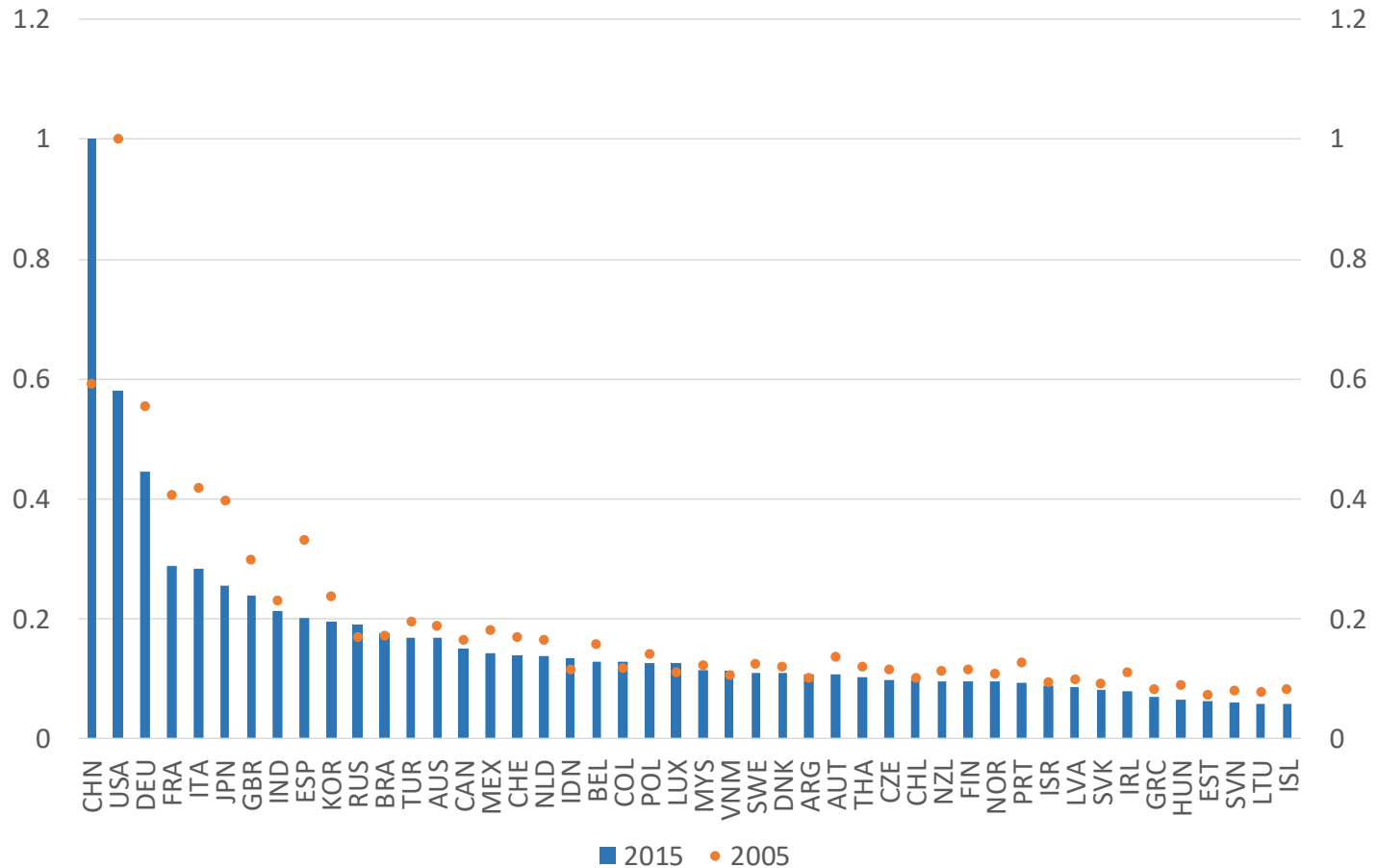
- **Community detection**

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

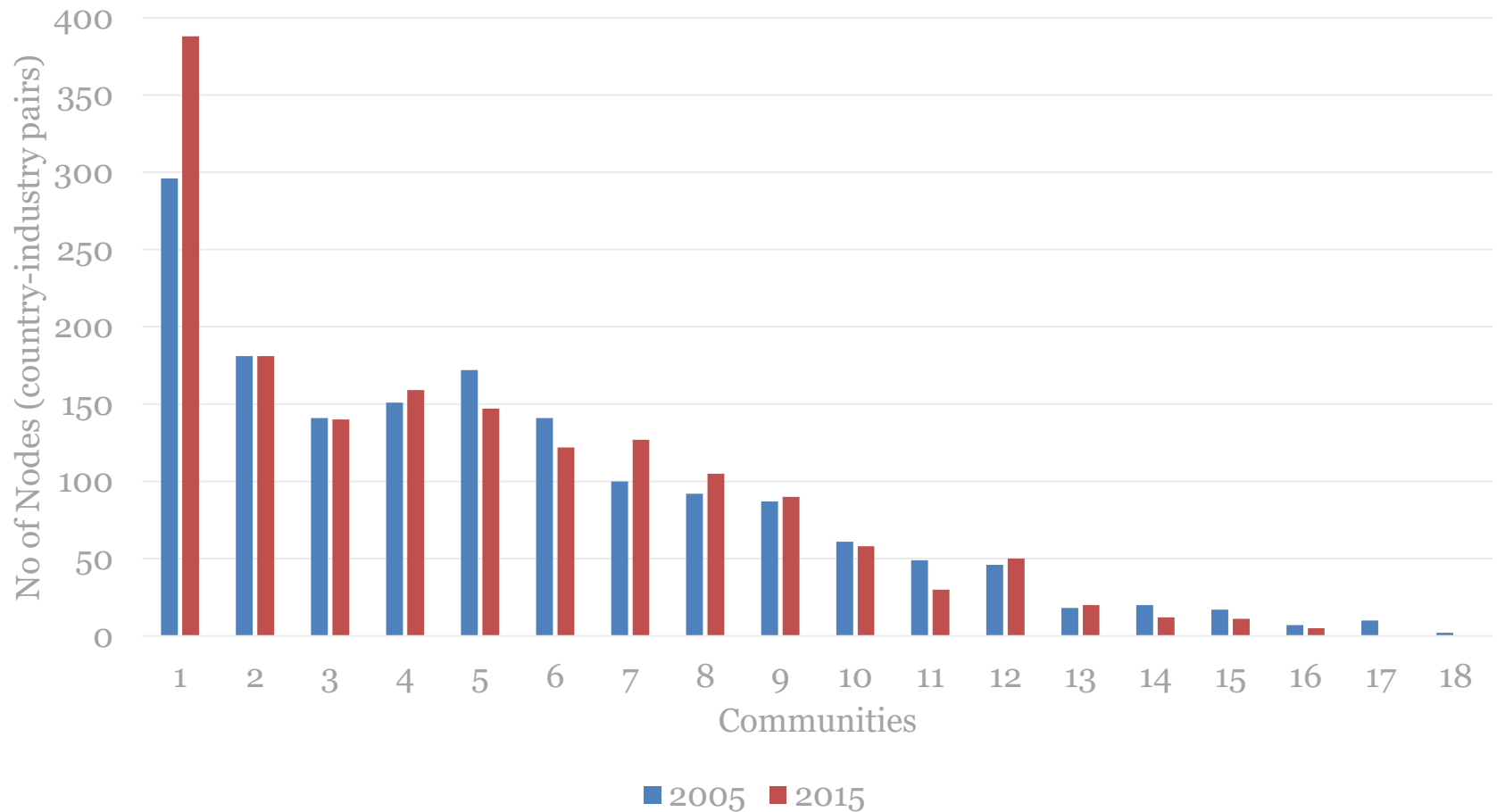


# Top 20 most central industries in 2005 and 2015

2005		2015	
USA	Motor vehicles, trailers and semi-trailers	CHN	Computer, electronic and optical products
CHN	Computer, electronic and optical products	USA	Motor vehicles, trailers and semi-trailers
USA	Construction	DEU	Motor vehicles, trailers and semi-trailers
DEU	Motor vehicles, trailers and semi-trailers	USA	Public admin. and defense; compulsory social security
USA	Public admin. and defense; compulsory social security	MEX	Motor vehicles, trailers and semi-trailers
CAN	Motor vehicles, trailers and semi-trailers	USA	Construction
USA	Wholesale and retail trade; repair of motor vehicles	USA	Other business sector services
USA	Other business sector services	CHN	Construction
MEX	Motor vehicles, trailers and semi-trailers	USA	Wholesale and retail trade; repair of motor vehicles
USA	Human health and social work	USA	Human health and social work
USA	Food products, beverages and tobacco	CHN	Electrical equipment
USA	Computer, electronic and optical products	CHN	Basic metals
USA	Transportation and storage	CHN	Chemicals and pharmaceutical products
DEU	Food products, beverages and tobacco	USA	Food products, beverages and tobacco
USA	Machinery and equipment, nec	GBR	Arts, entertainment, recreation and other service activities
USA	Chemicals and pharmaceutical products	CAN	Motor vehicles, trailers and semi-trailers
KOR	Computer, electronic and optical products	CHN	Machinery and equipment, nec
DEU	Machinery and equipment, nec	DEU	Food products, beverages and tobacco
GBR	Arts, entertainment, recreation and other service activities	CHN	Motor vehicles, trailers and semi-trailers
MYS	Computer, electronic and optical products	KOR	Computer, electronic and optical products



# Less but more dense production hubs have emerged





# Diffusion Mechanism

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## 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*

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

$$k_i^{in} = \sum_j w_{ij}$$

$$k_i^{in/infected} = \sum_{j \in I} w_{ij} \text{ where } I = \text{set of infected nodes}$$

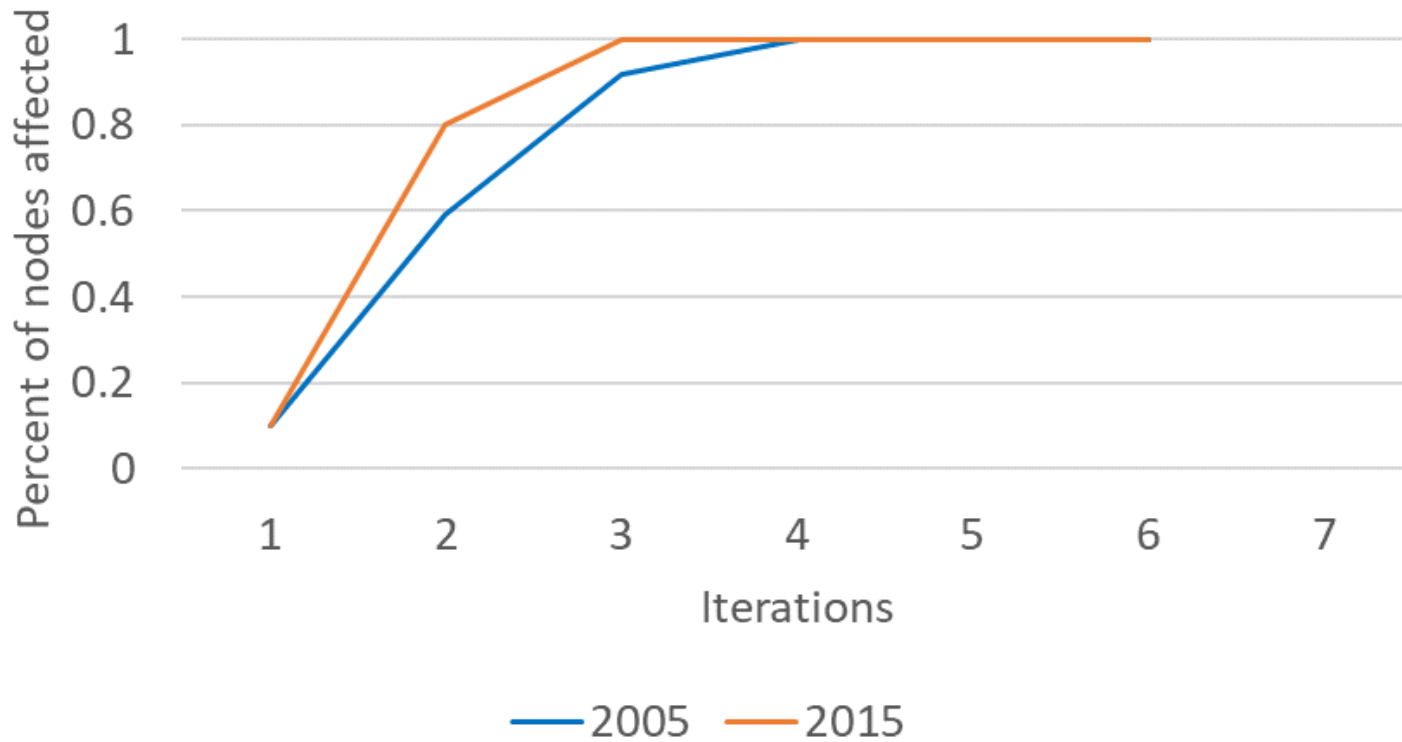
- Node infected if  $k_i^{in/infected} / k_i^{in} > \varphi_i$





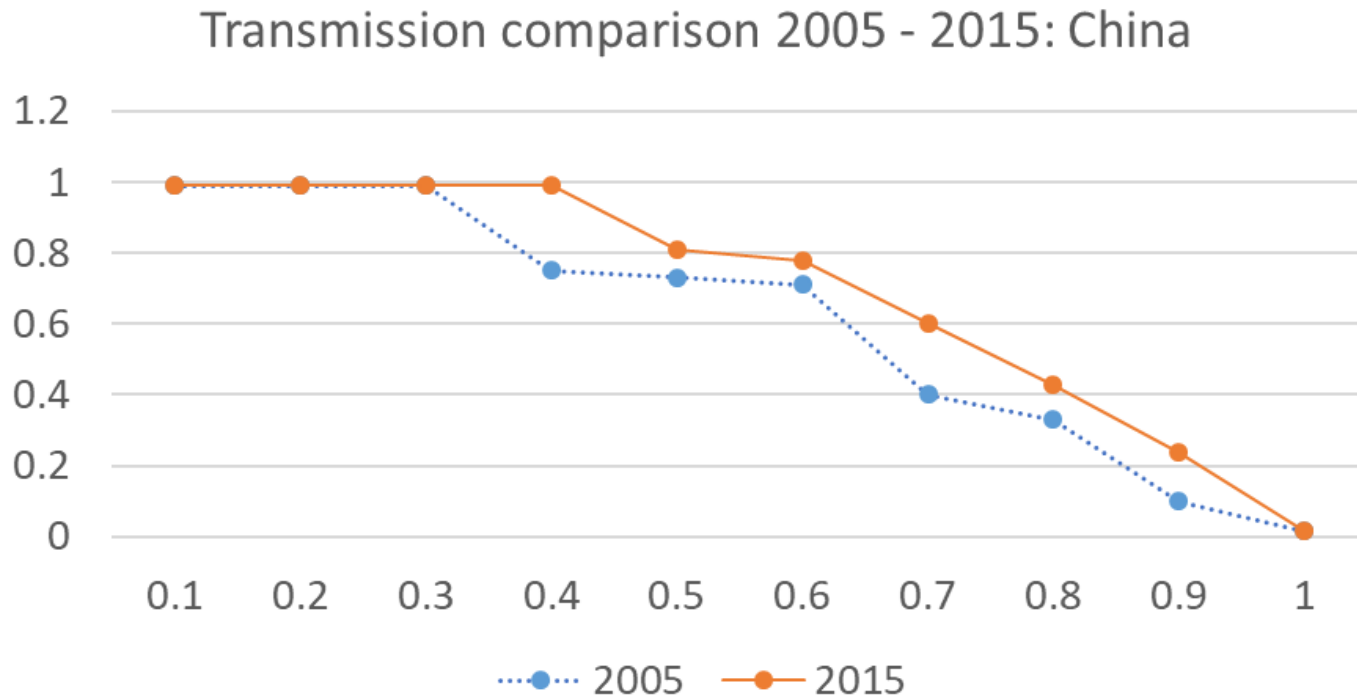
# Shock transmission over time

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





# Shock transmission over different thresholds



Source: OECD calculations.



# Summary

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## **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

