
Hidden Exposure: Measuring U.S. Supply Chain Reliance

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BPEA Panel, 28 September 2023, Washington DC

Outline & Apologies

1. Many things in paper we don't have time to present

General apology for 'sins of omission'

2. Outline: 'Global Supply Chain (GSC) disruptions'

- Links that make up GSCs
- Shocks that disrupt GSCs
- Policies that mitigate GSC disruptions

LINKS: Conceptual background

Business v Economic Approaches

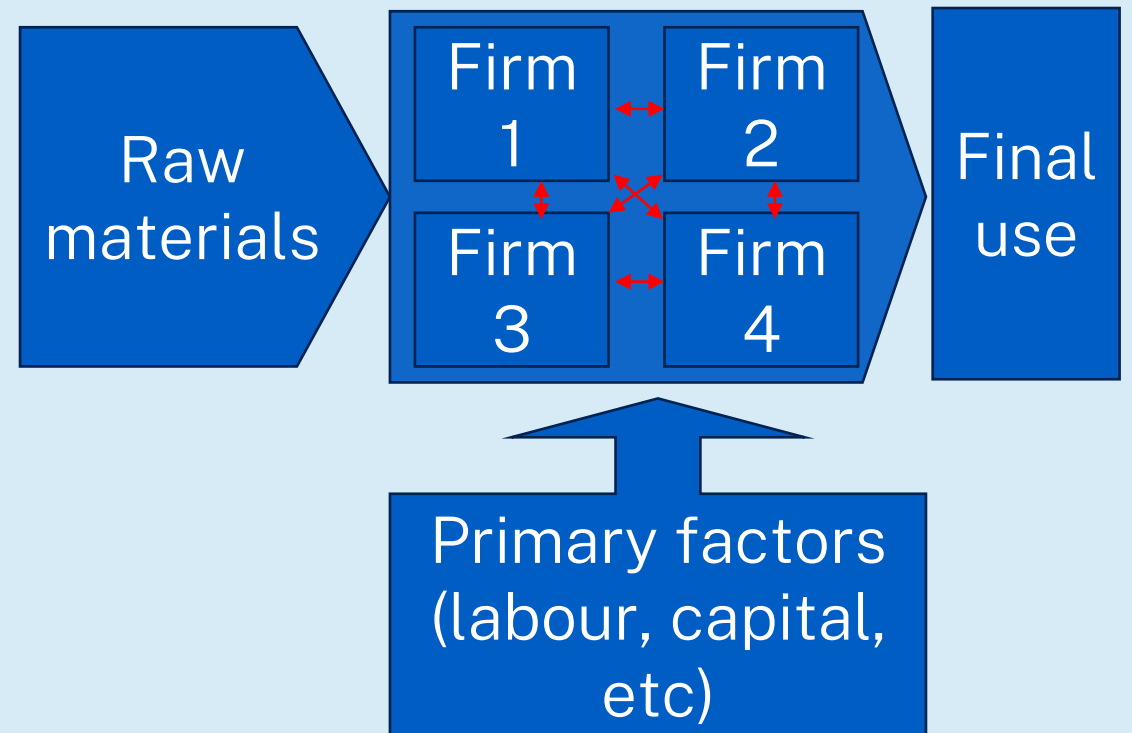
Business view (chain)

Single firms



Economics view (matrix)

All firms



What tools do we need to measure links?

1990s vibe: Global Value Chain (GVC) = links are productive

- Wanted to measure “where is the work was actually done?”
- Focus on ‘value added trade’ → measures like “Backward Linkages”

2020s vibe: GSC = links are vulnerable

- Want to measure “who is sending what to whom?”
- Focus on ‘gross trade’

Ambassador Bridge example

- In 2021/22, we developed new measures based on gross trade
 - OECD will include them in their 2023 database update

Two types of gross trade measures

1. “Face Value” basis:

Intermediates purchased from tier-1 suppliers
(data)

2. “Look Through” basis:

All intermediates purchased directly & indirectly via suppliers’ purchases from other suppliers
(calculated)

Example

LINKS:

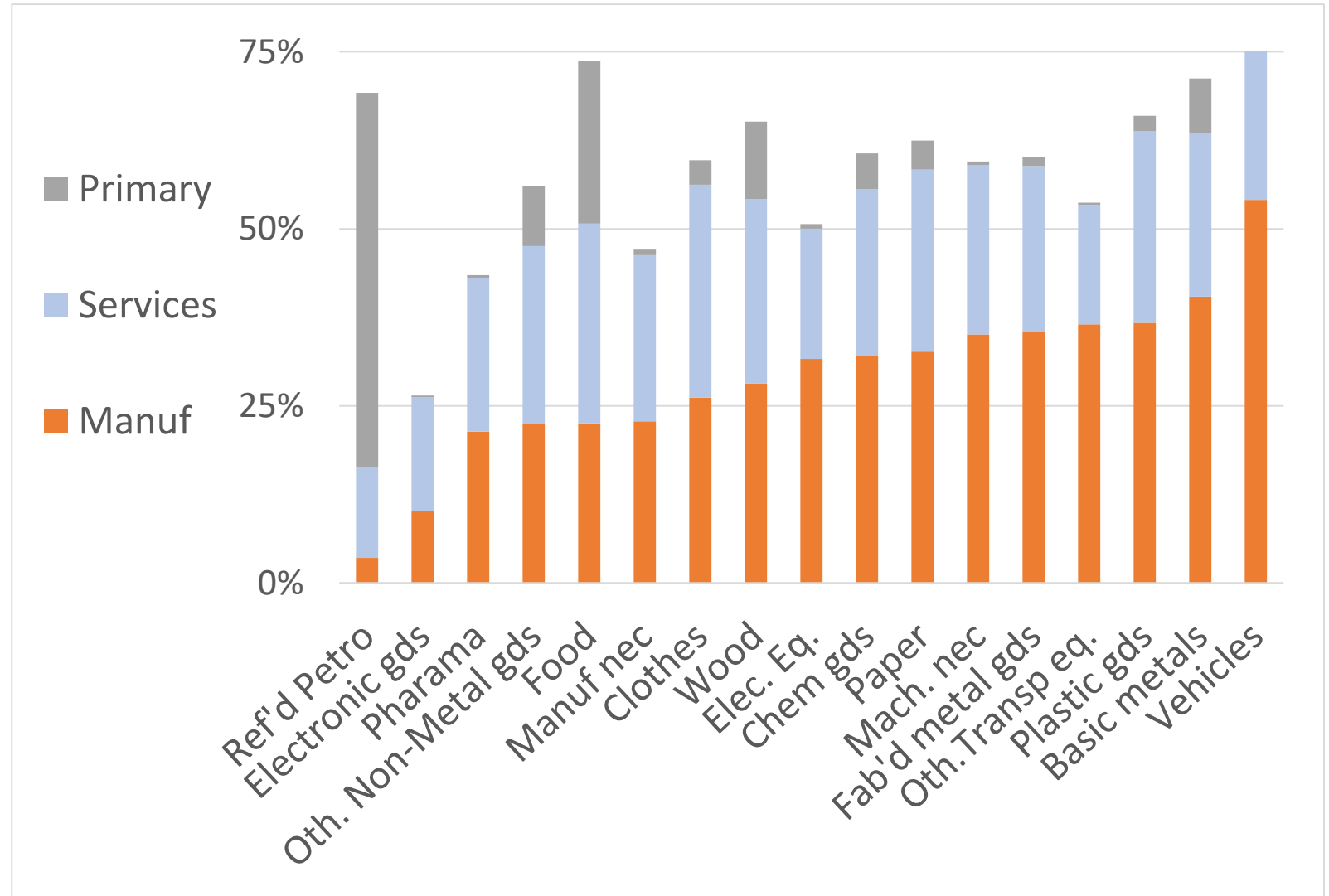
Basic facts:

Face value basis

Supply chain exposure varies widely by US sector & By type of input

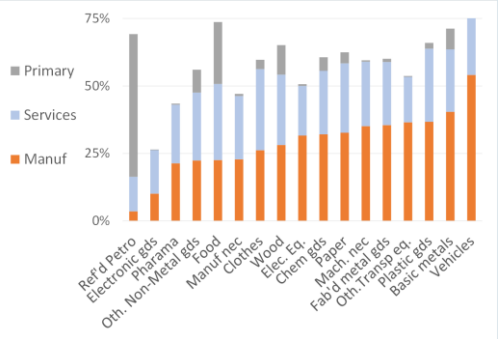
2018 (latest year)

Purchased Intermediates (Domestic + Foreign) as % of Gross Production

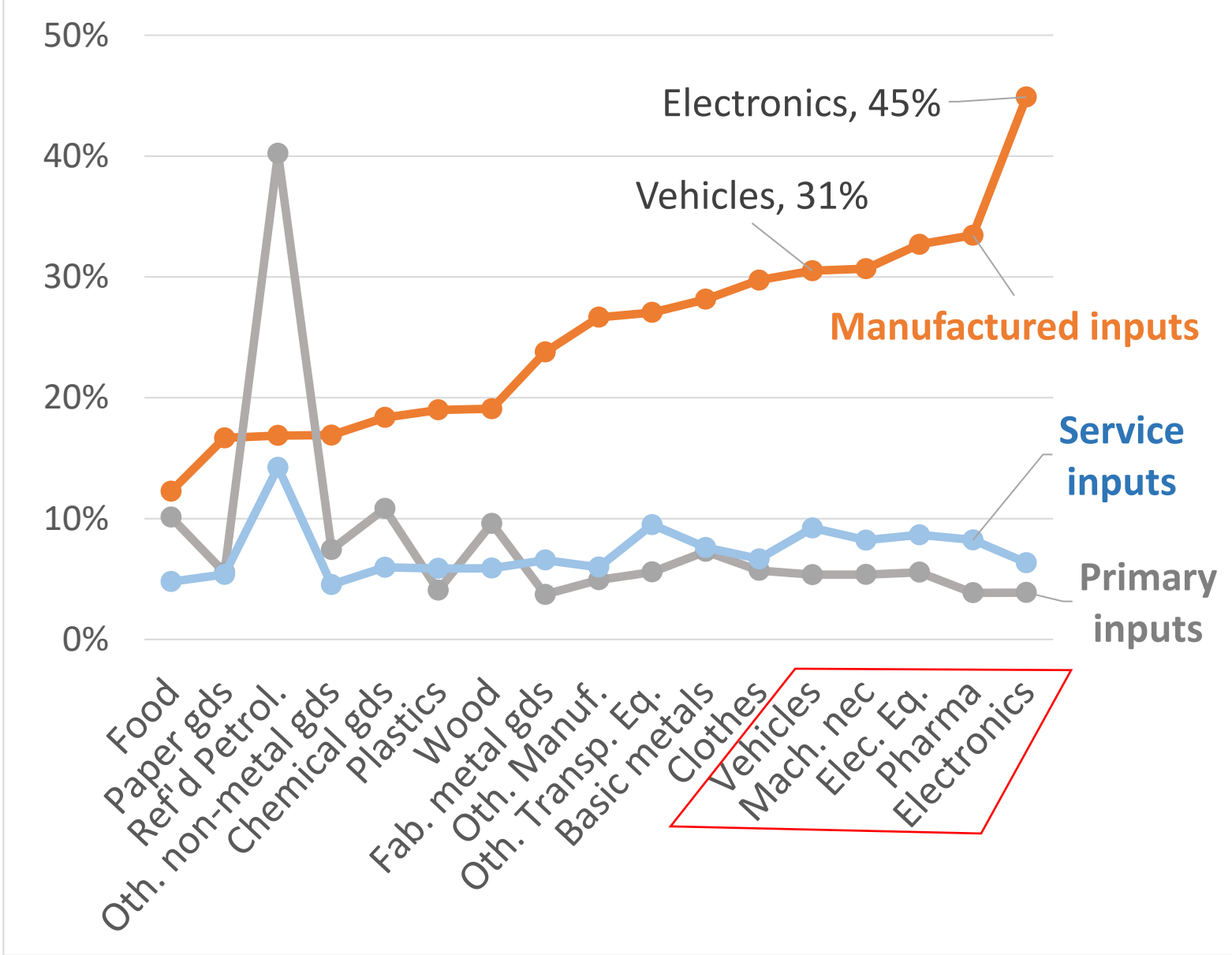


Foreign exposure is most important for manufactured inputs

2018 (face value)



Foreign share of intermediates



LINKS:

Basic facts:

Look through basis

Share of look-through manufactured inputs by sector & country 2018

1. US is the main supplier to the US, 88% on average.
2. China is the top foreign supplier – but not dominant, 3.5% of 12%

Supplier:	All sector average
US	88%
All foreign	12%
China	3.5%
Canada	1.2%
Mexico	1.0%
Japan	0.8%
Germany	0.7%
Korea	0.6%
All others	4.6%

Share of look-through manufactured inputs by sector & country 2018

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Supplier:	Vehicles	Mach nec	Basic Metals	Elec.& Optic. Eq.	Oth. Transp eq
US	78%	83%	84%	84%	84%
All foreign	22%	17%	16%	16%	16%
China	5.1%	4.9%	2.9%	5.5%	4.6%
Canada	2.1%	1.4%	2.6%	1.5%	1.2%
Mexico	3.4%	1.8%	1.7%	1.6%	1.3%
Japan	2.6%	1.4%	0.8%	0.9%	1.3%
Germany	1.5%	1.1%	0.9%	0.7%	0.9%
Korea	1.4%	0.9%	0.7%	0.8%	0.8%
All others	5.7%	5.3%	6.6%	5.0%	6.0%

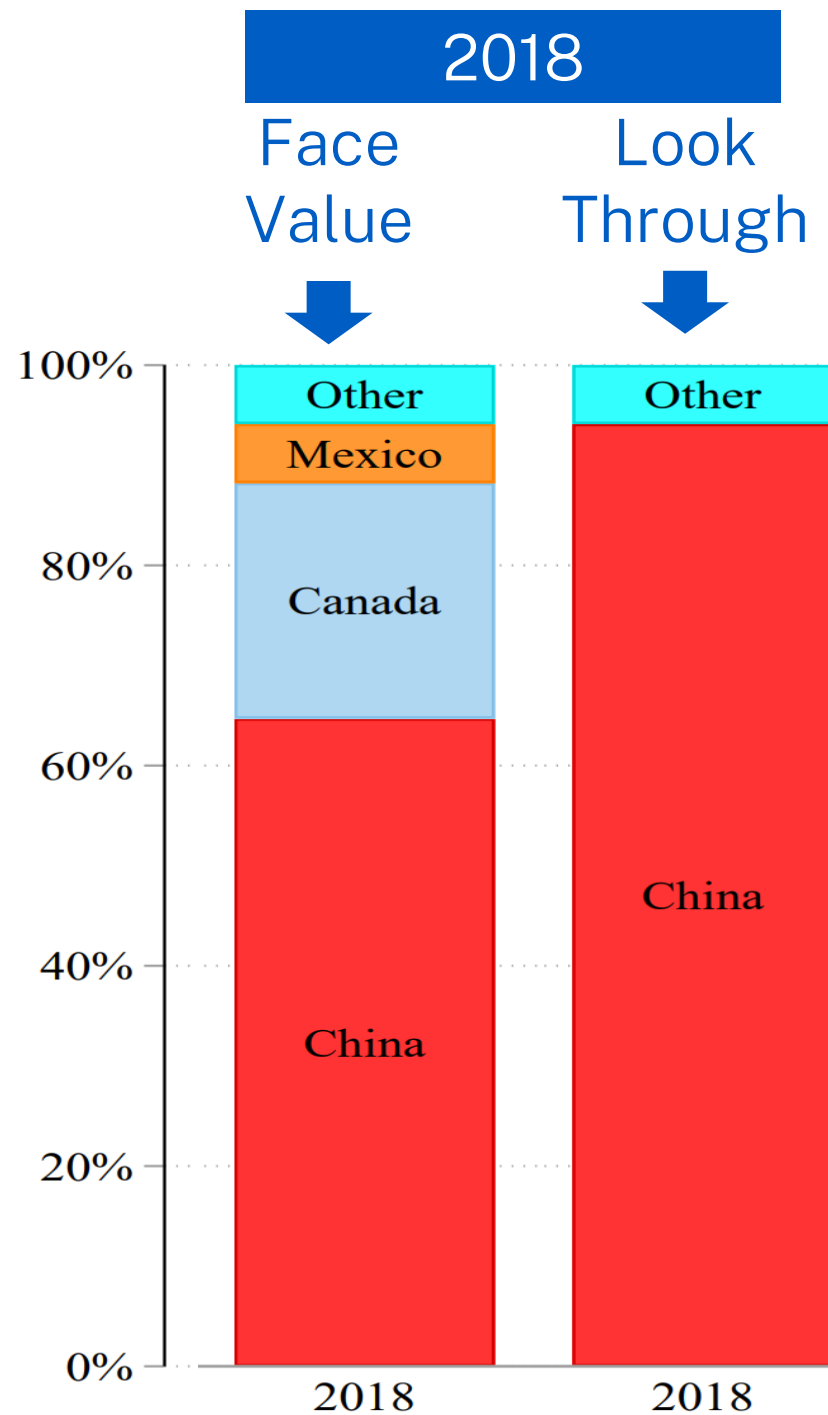
LINKS:

Hidden exposure, Take 1

Look-through vs face-value
exposure

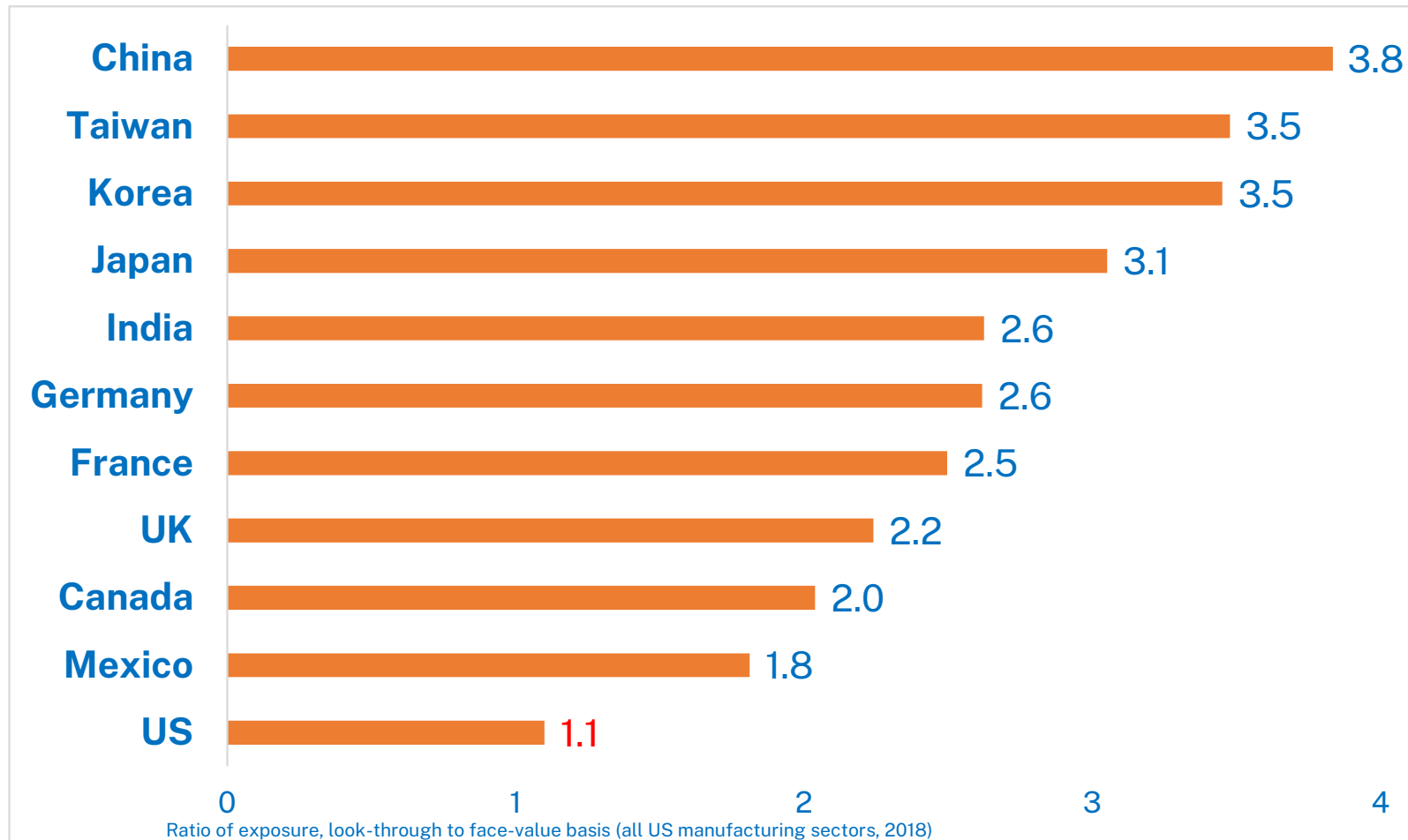
Who is the top US supplier?

% of the manufacturing sectors



US look-through exposure to China is 3.8 times higher than its face-value exposure

Ratio of look-through to face-value exposure by country (all manufacturing sectors)

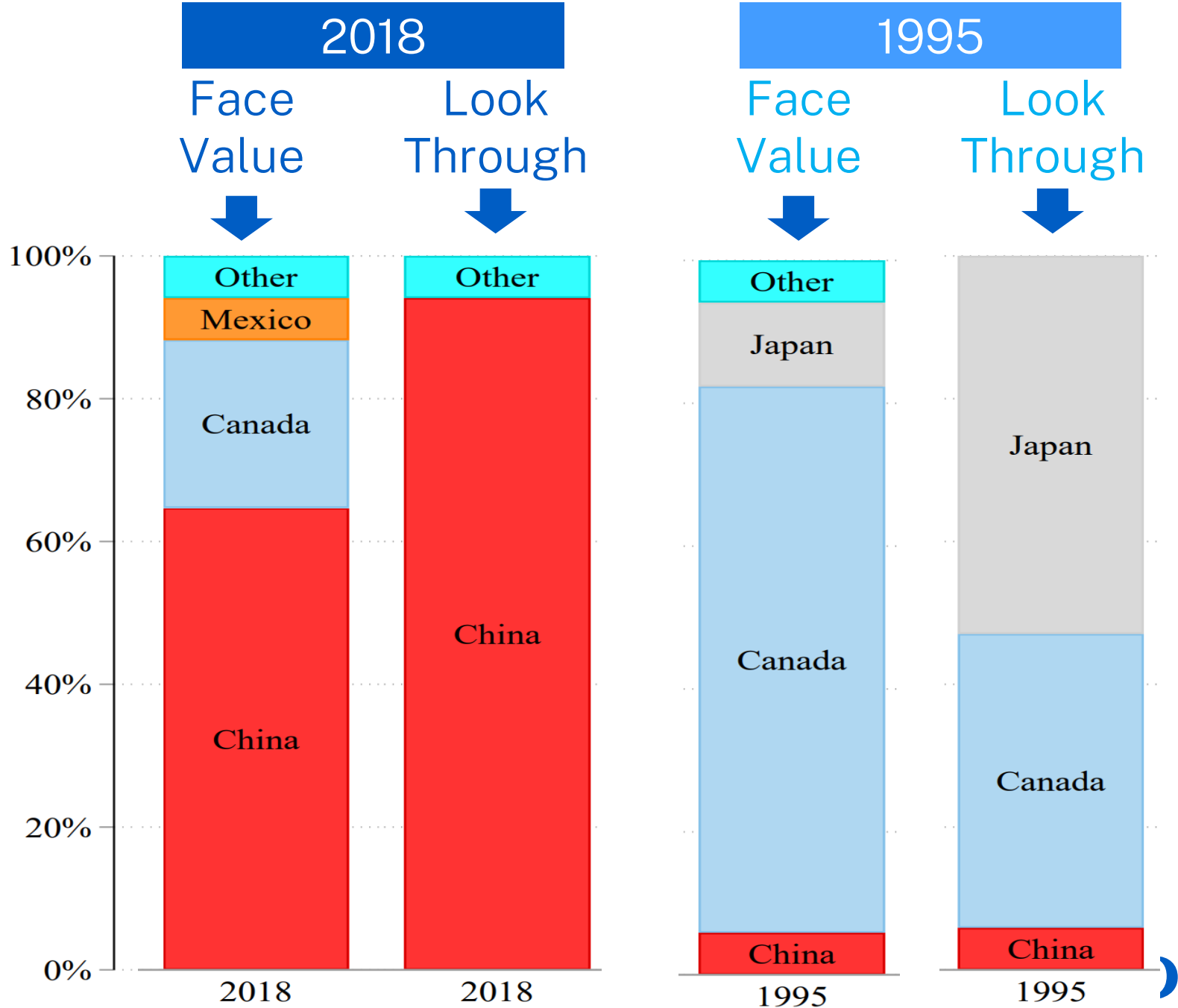


Ratio of exposure, look-through to face-value basis (all US manufacturing sectors, 2018)

LINKS:
Hidden exposure, Take 2

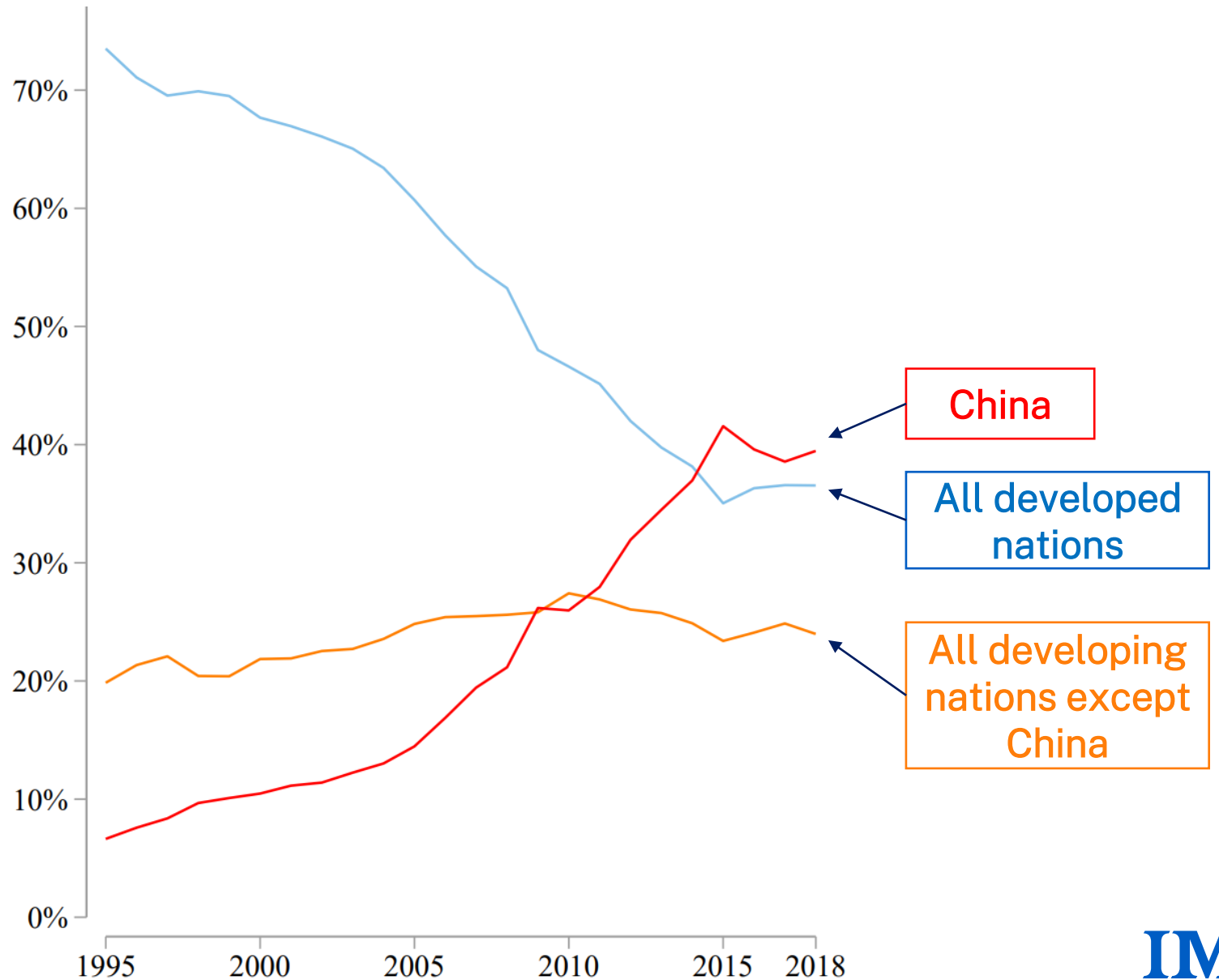
Rapid, geographic concentration
of sourcing

Exposure to China rose rapidly.



China's production of manufactured intermediates rose rapidly & is now dominant

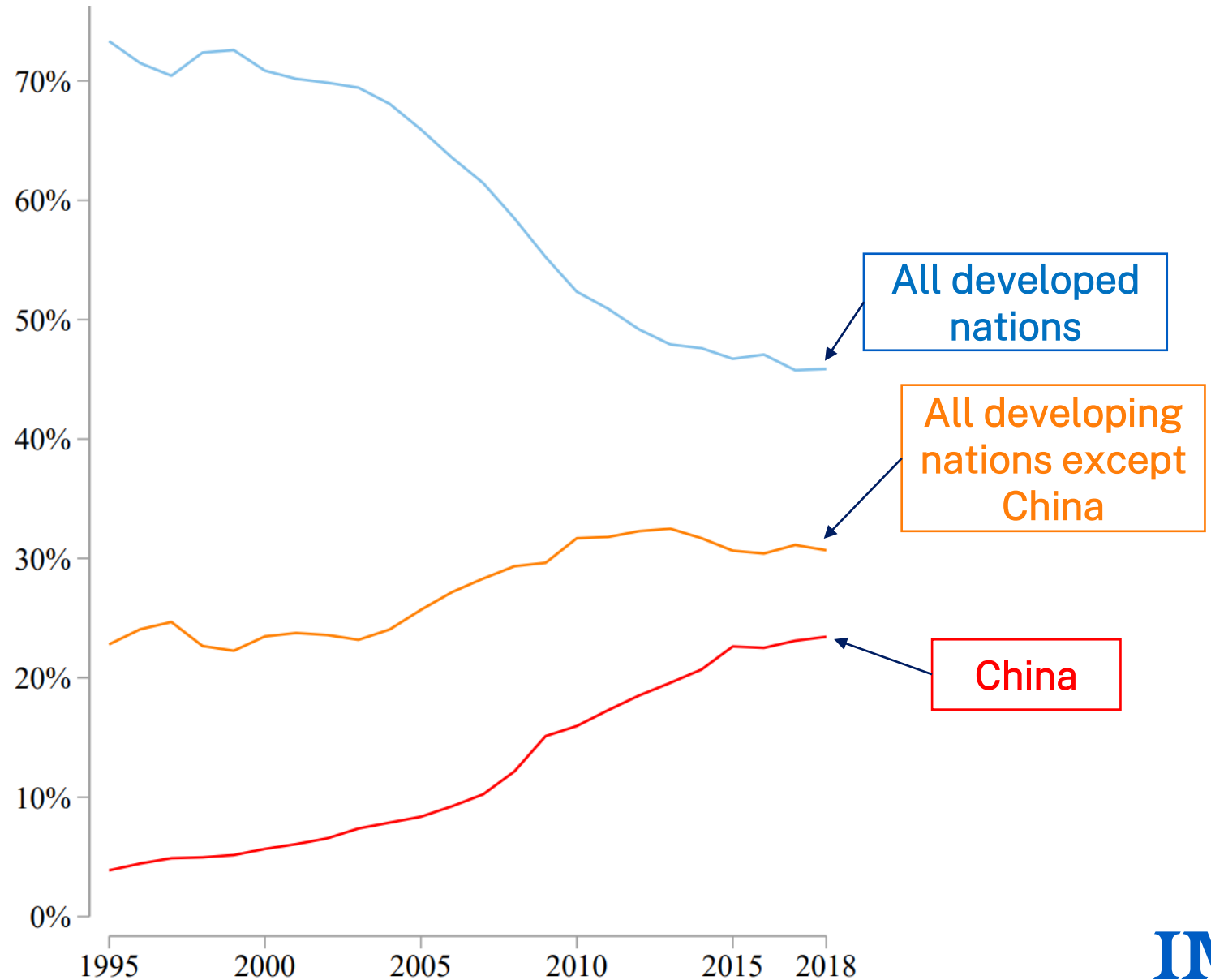
Manufactured intermediate production (% of world)



China less dominant overall

China has a revealed comparative advantage in intermediates

Manufacturing production (% of world)



SHOCKS: Organizing framework

3 sources of shocks & 2 types

- Supply, Demand, vs Connectivity (not mutually exclusive & contagious)
- Idiosyncratic vs Systemic (line in sand)

Table 3.1: Taxonomy of sources and nature of shocks, with examples.

	Supply	Demand	Connectivity
Idiosyncratic (isolated, simple)	Factory closure, labor strikes, extreme weather, etc.	Single product demand surge, etc.	Single port closure, single firm cyber- attack, etc.
Systemic (multi-sector, multi- market, complex interactions)	Pandemics, trade wars, large-scale extreme weather, etc.	Sector-wide preference shifts, multi-product, multi- sector boycotts, embargoes, etc.	Massive hurricanes, military conflicts, large-scale hacking, etc.

Source: Authors' elaboration.

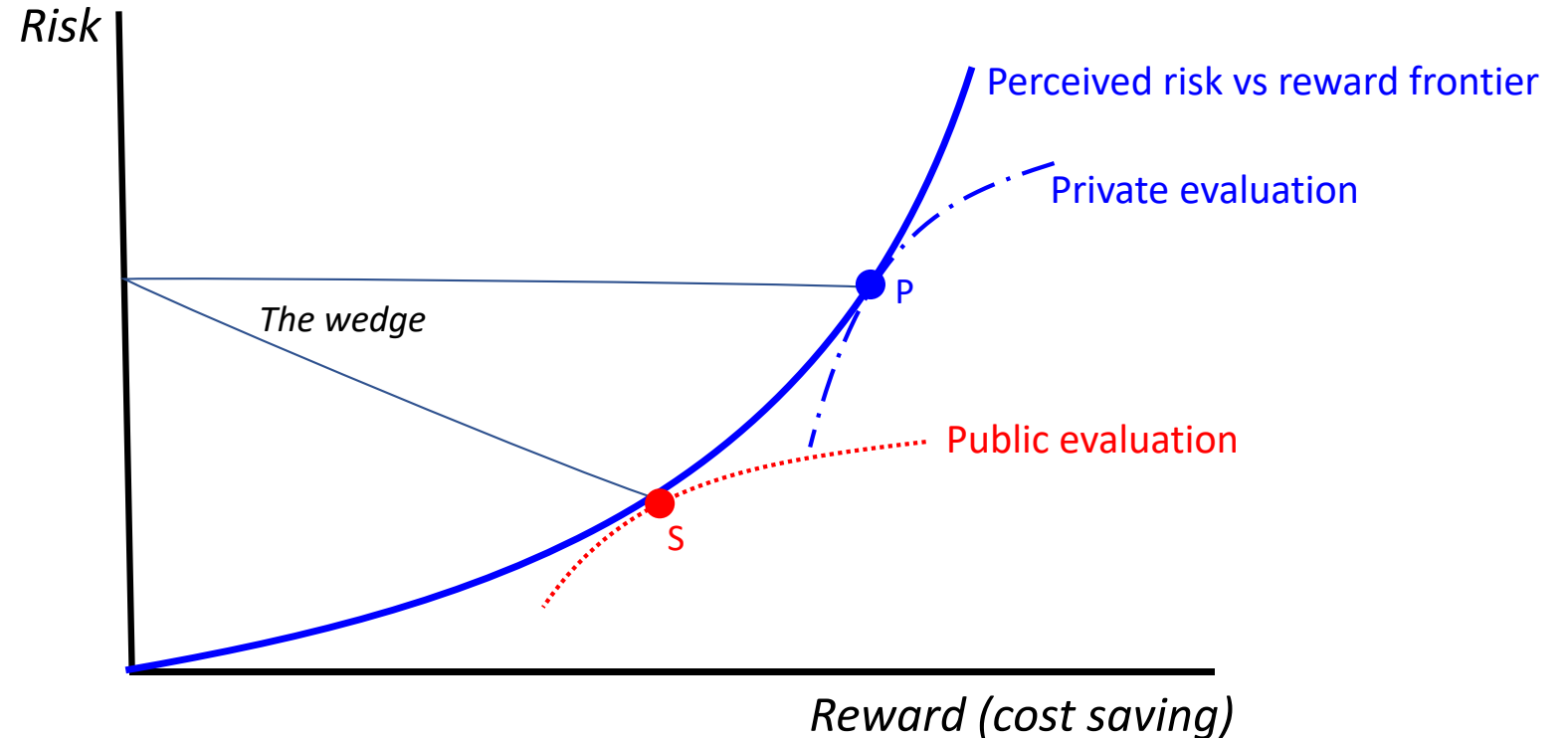
POLICY:
Organizing
framework, not
empirical work

Pigouvian
wedge not
right

Risks, not
externality

When is policy justified?

(given that firms are optimizing on supply chain risk)



Source: Baldwin R, Freeman R. 2022. Risks and Global Supply Chains: What We Know and What We Need to Know. Annual Review of Economics. DOI: 10.1146/annurev-economics-051420-113737.

What goes into the wedge?

Analogies from:

- ‘Farms & Arms’,
- Financial Sector,
- Example: Strategic Petroleum Reserve

Take away?

- Foreign supply chain exposure: Bigger but not that big.
- It's bigger than common measures suggest, but only 12% on average across US manufacturing sectors.

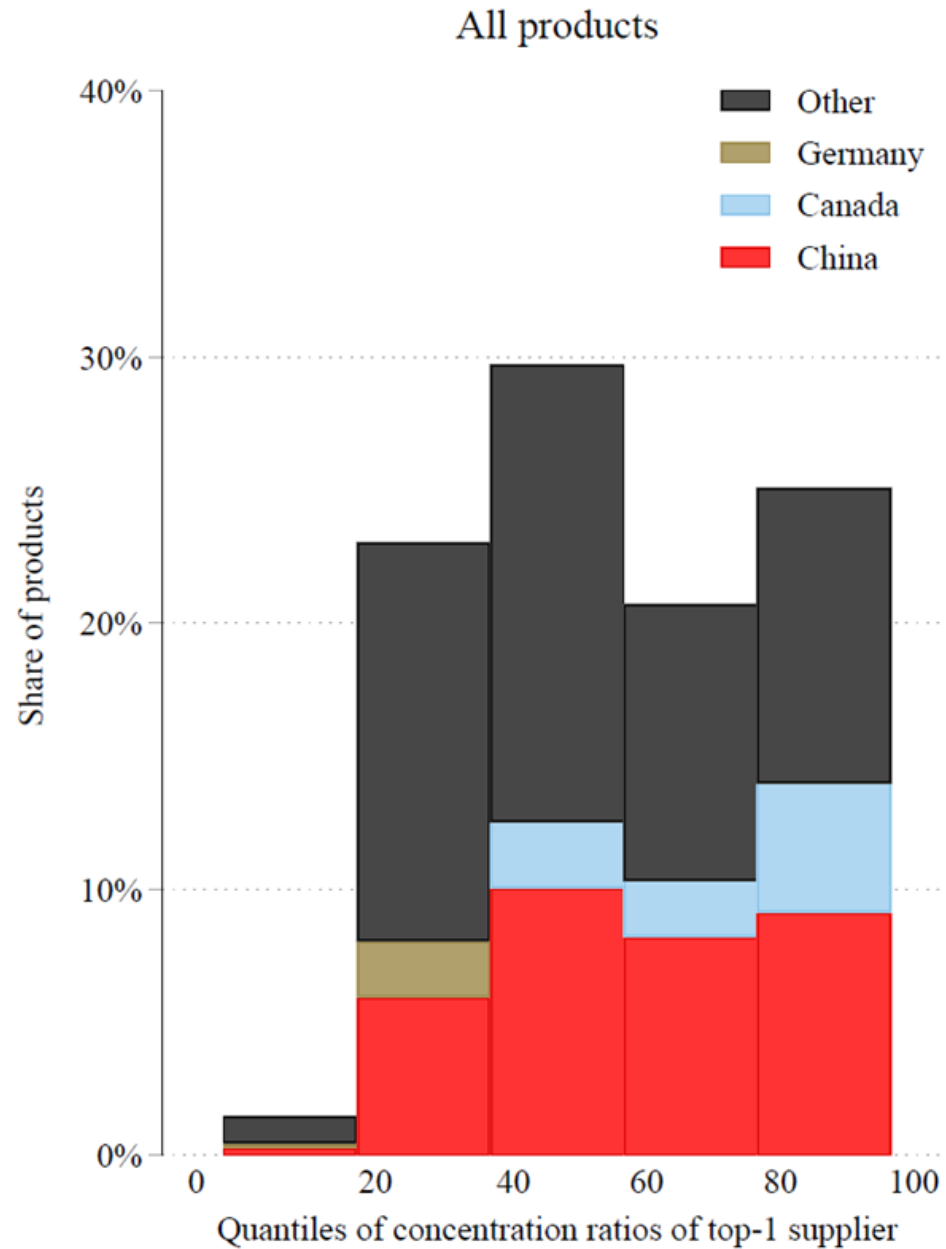
Thank you for listening

Clearly, MUCH more theoretical & empirical research is needed on links, shocks & policy

Slides for Q&A

Concentration of face Value exposure

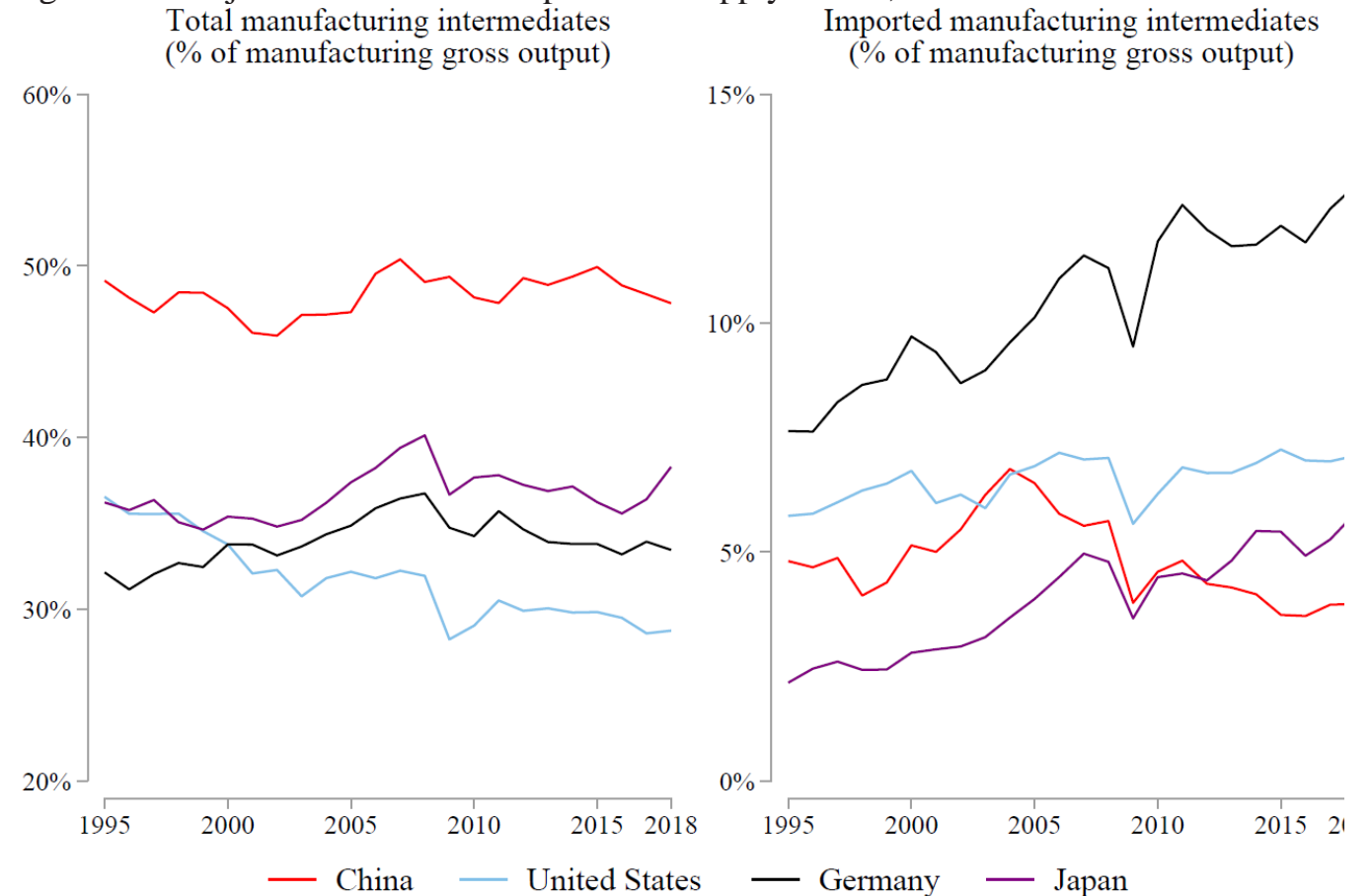
Using HS10 trade data (face value)



International comparisons

- China is more exposed overall but less exposed to imported intermediates
- And its foreign exposure is declining

Figure 2.9: Major manufacturers' exposure to supply chains, 1995-2018

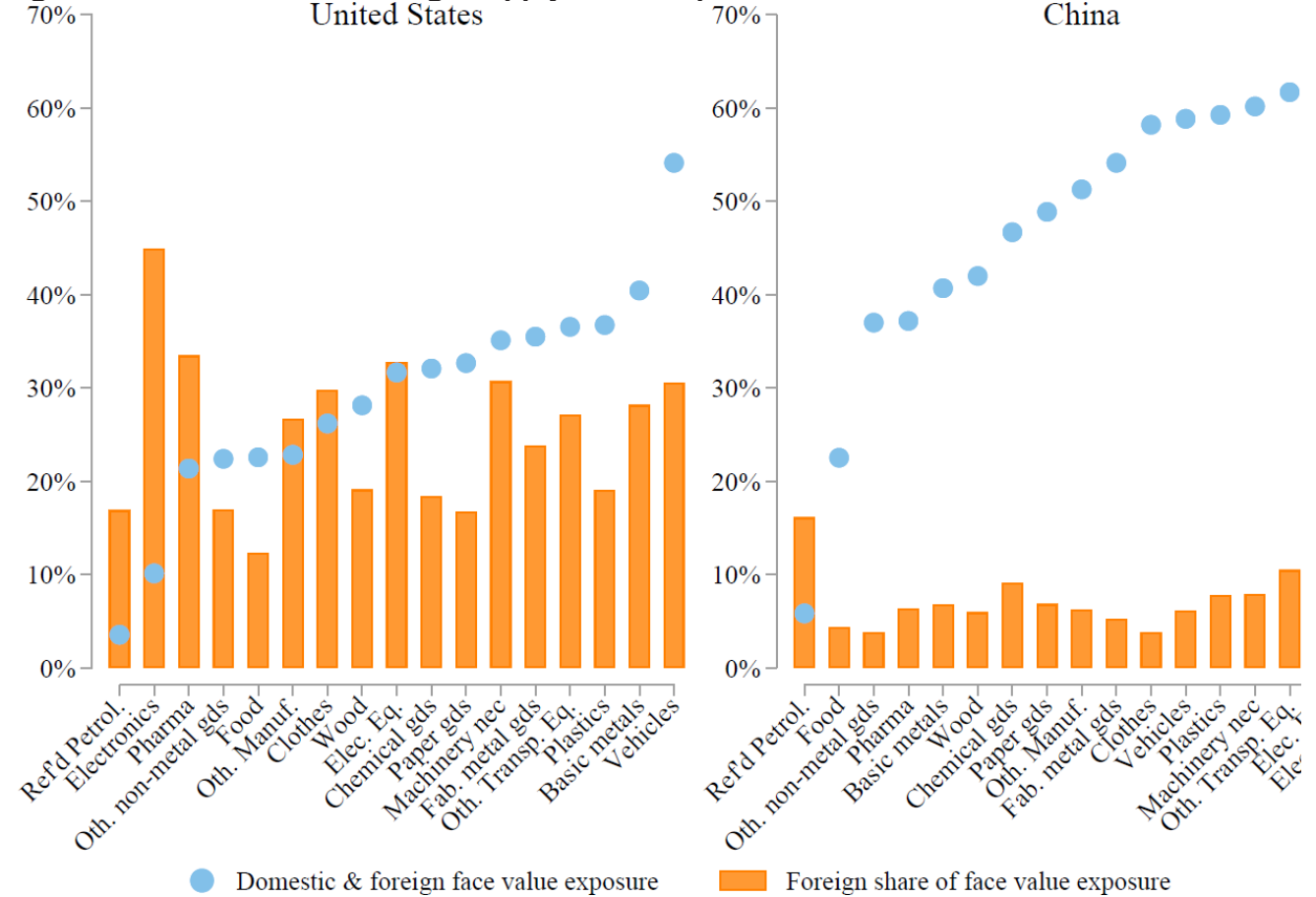


Source: Authors' calculations based on OECD 2021 ICIO tables. Notes: The left panel shows manufacturing intermediate inputs as a share of manufacturing gross output. The right panel shows the imported manufacturing intermediates as a share of manufacturing gross output.

US v China comparisons

- China is more exposed overall but less exposed to imported intermediates
- And its foreign exposure is declining

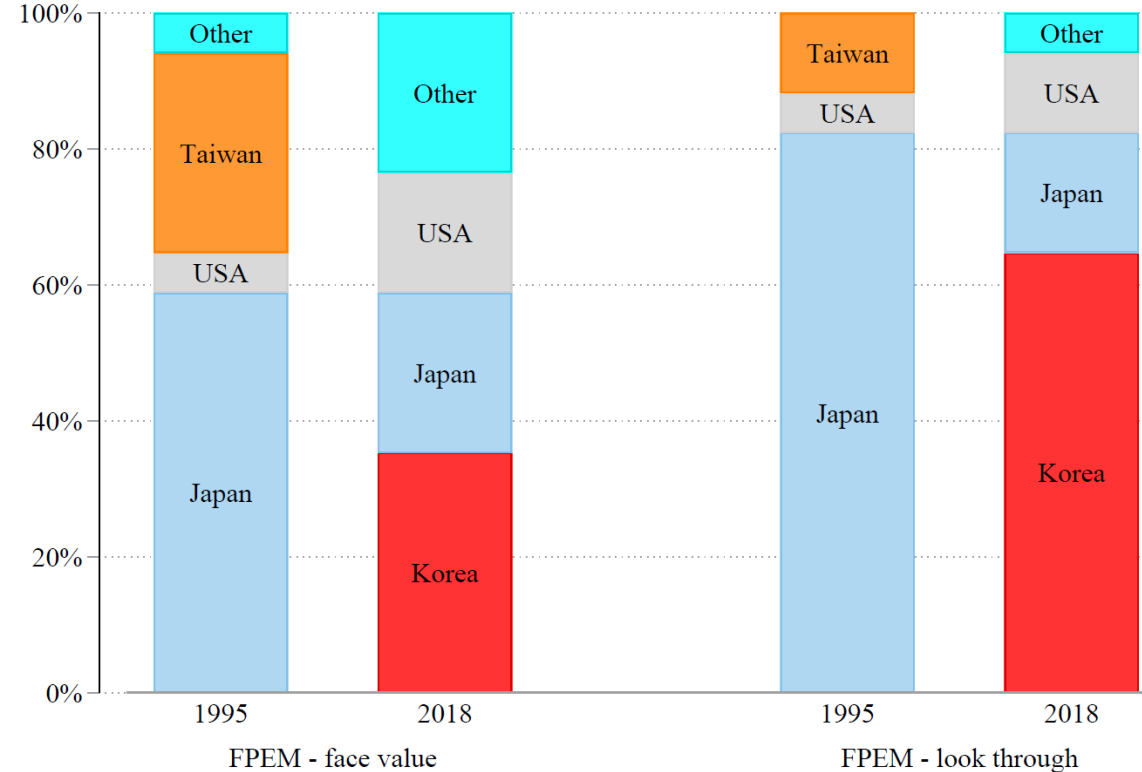
Figure 2.10: Overall and foreign supply chain exposure, US versus China, 2018



Source: Authors' calculations based on OECD 2021 ICIO tables. Notes: This figure shows total (i.e. domestic and foreign) and imported (i.e. foreign) manufacturing intermediate inputs on a face value basis (as % of a sector's gross output). The blue dots in the United States panel are repeated from Figure 2.1.

China's hidden exposure is to Korea

Figure 2.11: Top foreign supplier of industrial inputs to Chinese manufacturing sectors, 1995 versus 2018

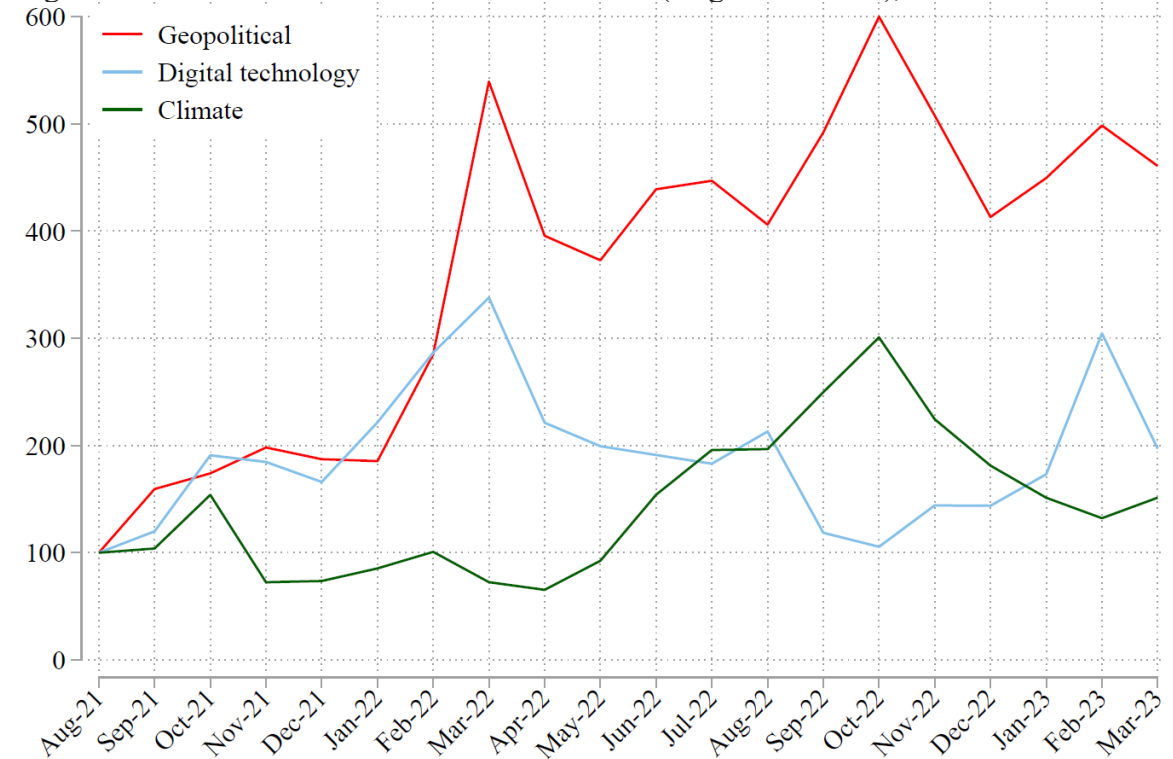


Source: Authors' elaboration based on 2021 OECD ICIO tables. Notes: This figure shows the share of Chinese manufacturing sectors for which the top supplier is Japan, Korea, USA, Taiwan or Other. FPEM stands for Foreign Production Exposure: Import Side (See Baldwin, Freeman, and Theodorakopoulos 2022).

Sources of future shocks

WEF survey-based gauge

Figure 3.1: WEF's Global Value Chain Barometer (Aug. 2021 = 100), 2021-2023



Source: WEF 2021 (data provided to authors upon request). Note: Values indexed to 100 in August 2021.