

Resilience of Supply Chains

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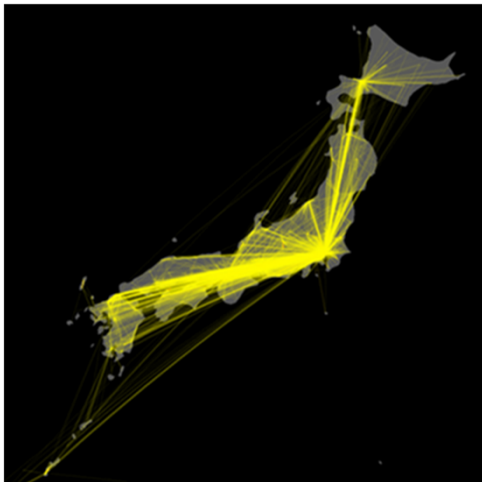
Summary of the Talk

- Economic effects of supply chain disruptions (particularly disruption of upstream products) can be substantial.
- Diversification of supply chain partners across countries can result in resilience.
- Current supply chains may not be resilient because of heavy reliance on China.
- Diversification may also be helpful to avoid economic coercion.

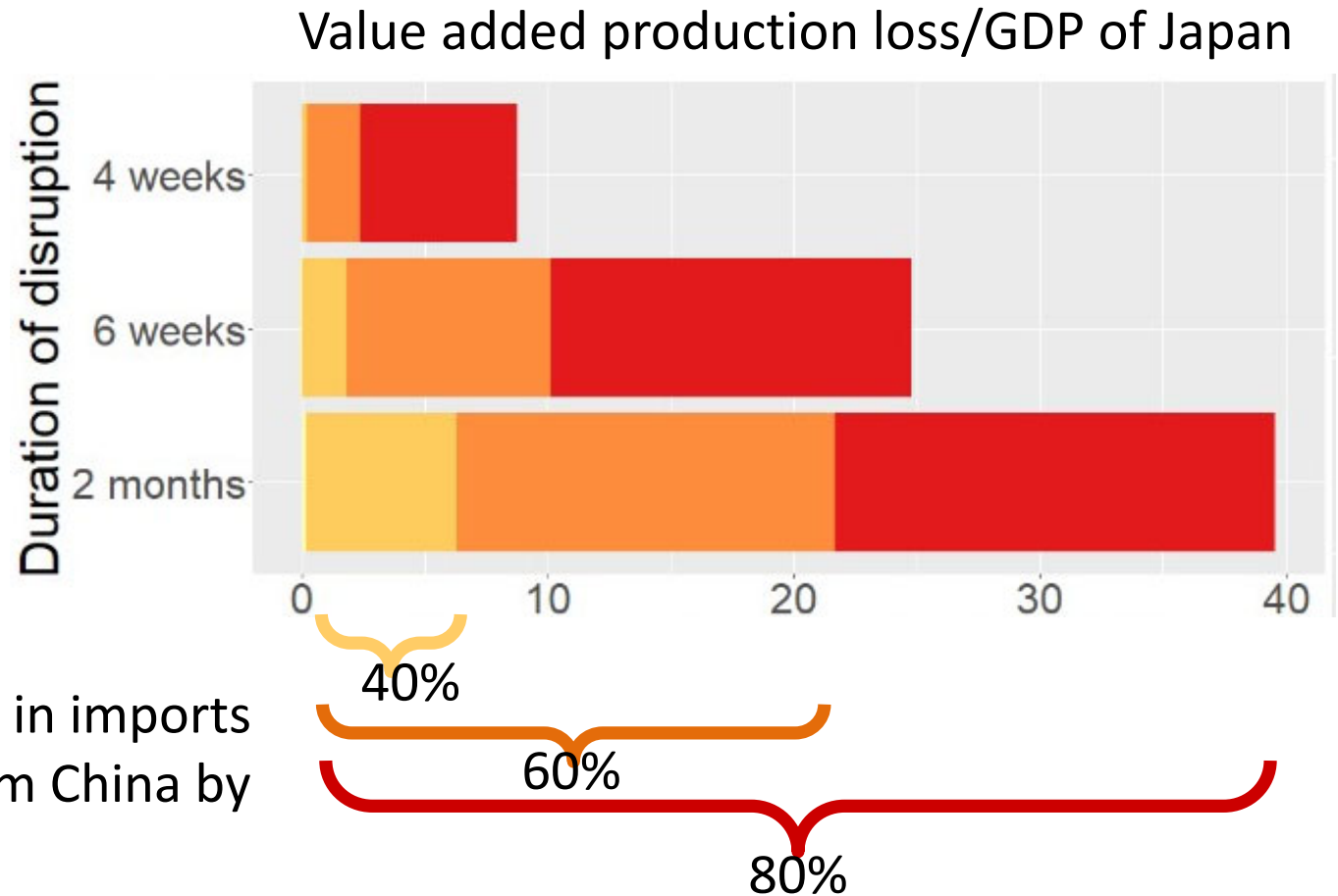
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Heavy reliance on a particular country → vulnerable supply chains

Simulation using rich data
for 1 million companies and
4 million supply-chain ties



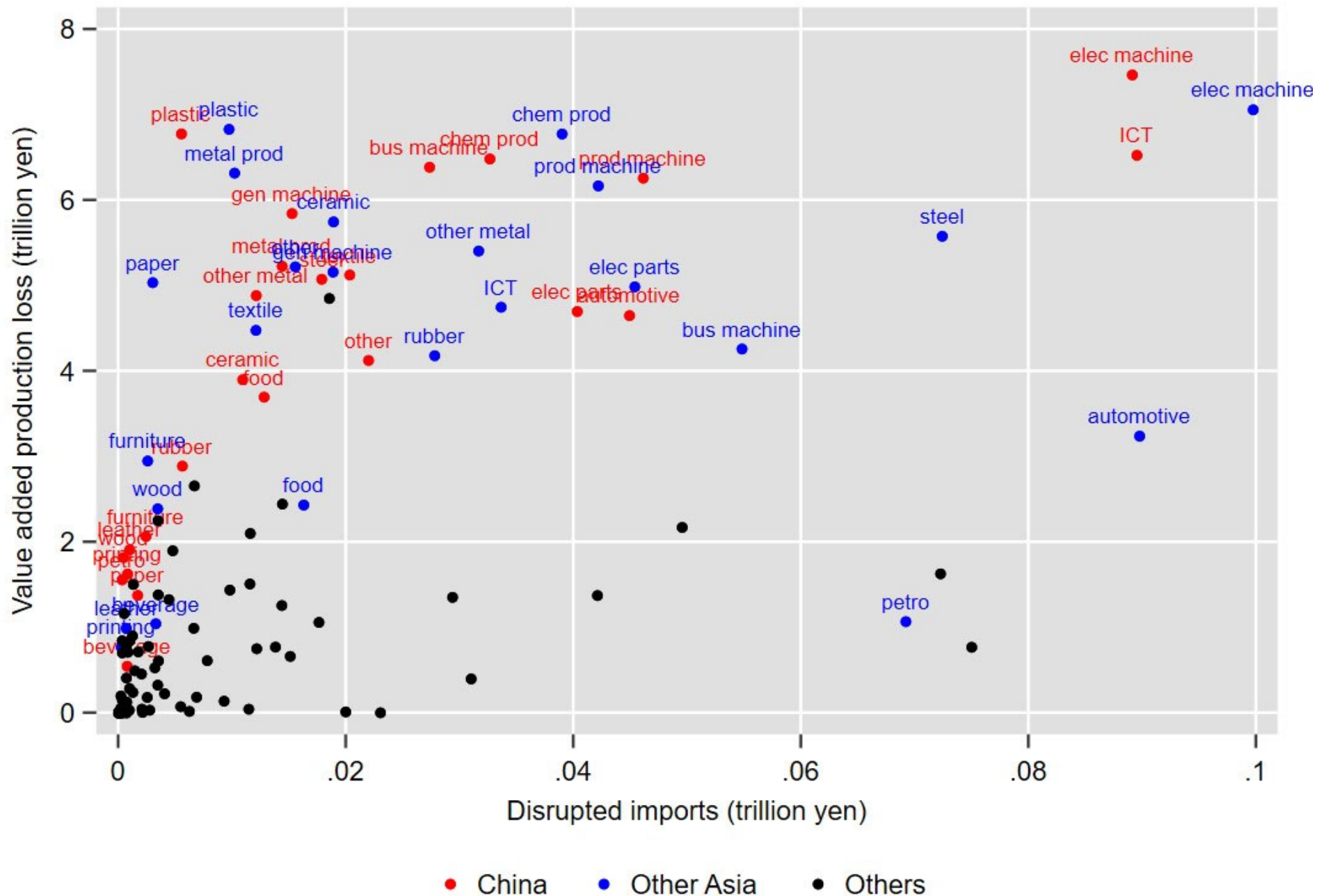
Reduction in imports
from China by



**A small difference in the level of "decoupling"
may result in a large negative economic effect.**

Inoue and Todo,
2023, PLOS ONE.

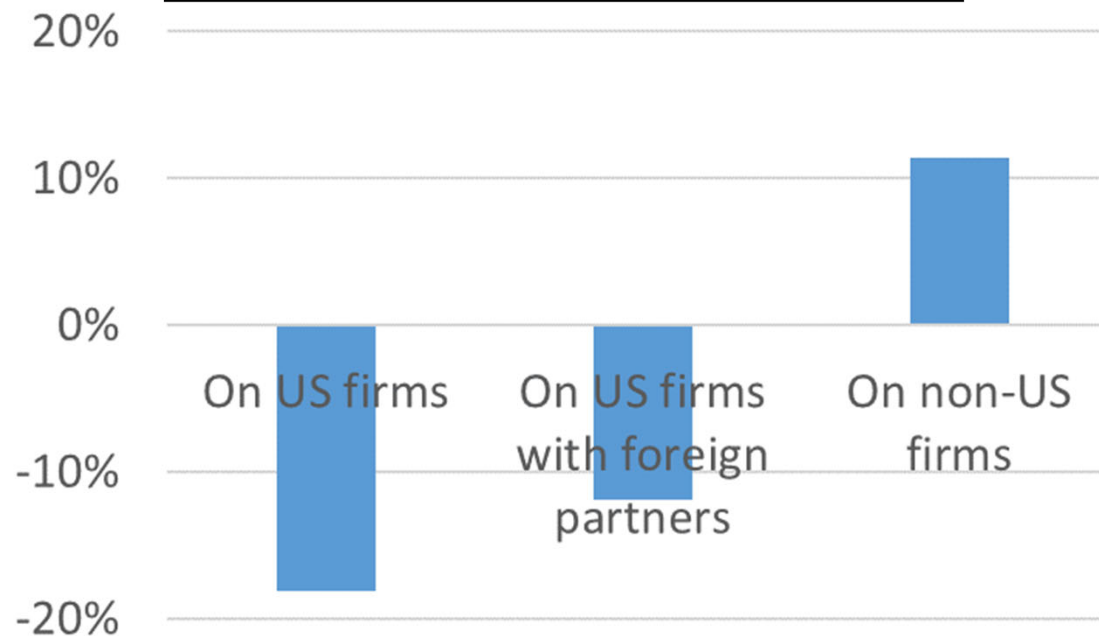
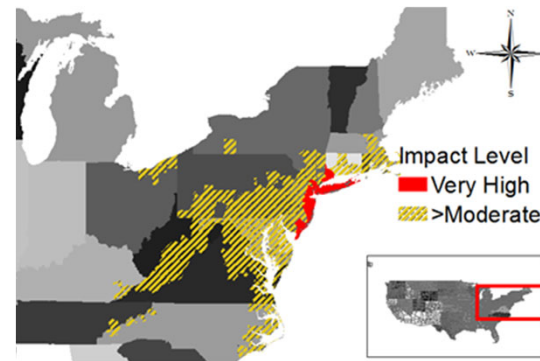
Larger effect of import disruption of upstream products



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Geographically diversified supply chains are resilient

Effects of supply-chain links with a firm damaged by Hurricane Sandy in the US on sales growth



Firms with foreign partners were less affected by supply chain disruptions.

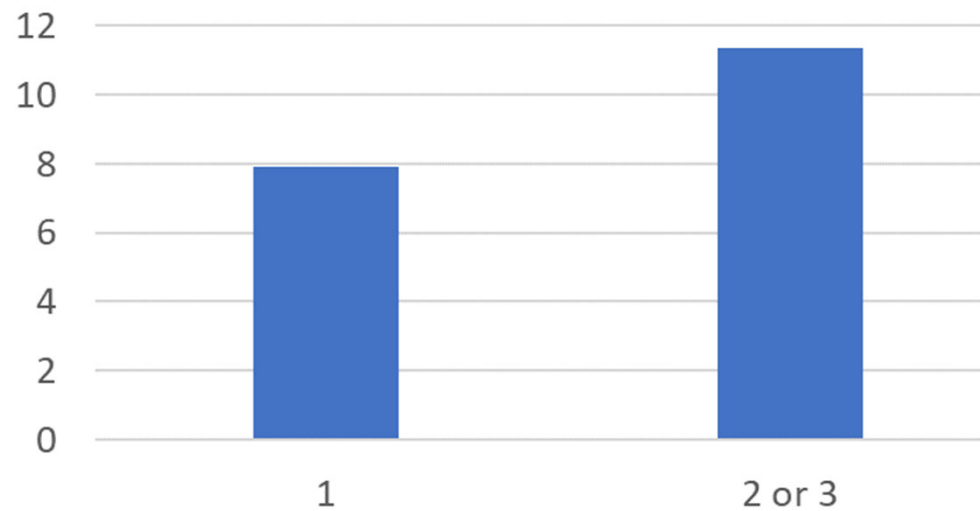
Substitution among suppliers and clients

Kashiwagi, Todo, Matous (2021), Rev. Int. Econ.
Analysis using firm-level data for publicly listed firms in the world.

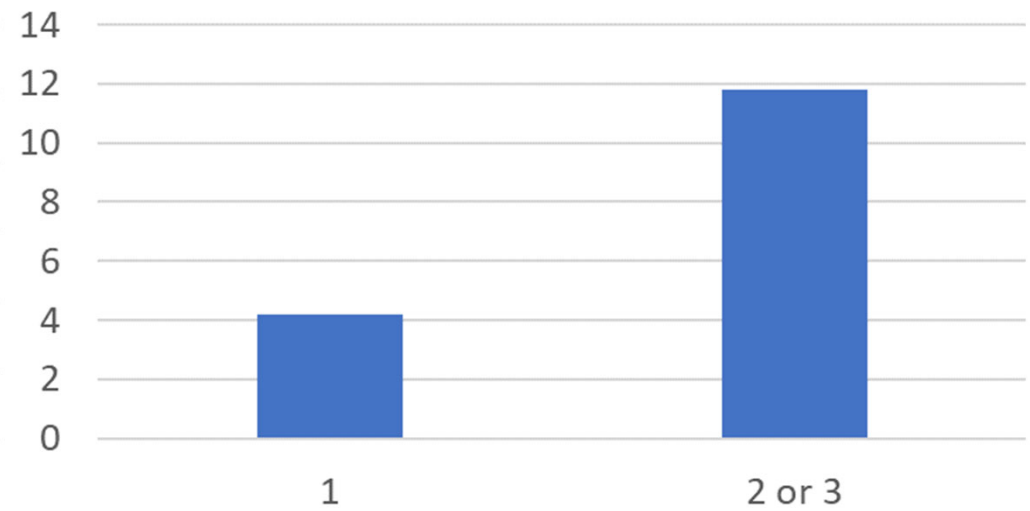
Internationally diversified supply chains are resilient

Share of resilient firms in ASEAN and India in the COVID-19 pandemic (%)

Resilient firms: shrink transaction with 1 customer/supplier
because of pandemic but increase transaction with another



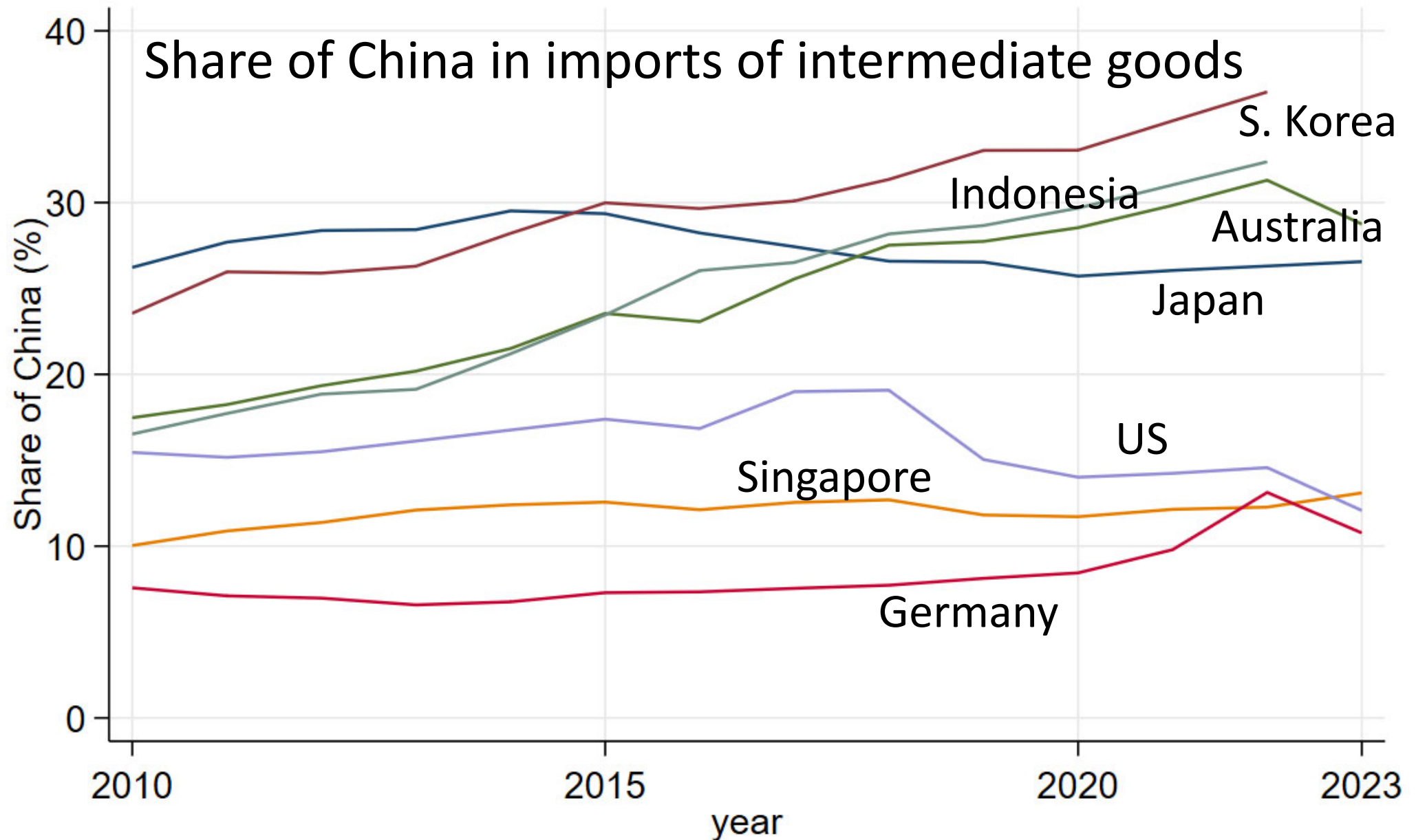
Number of countries
where top 3 customers are located



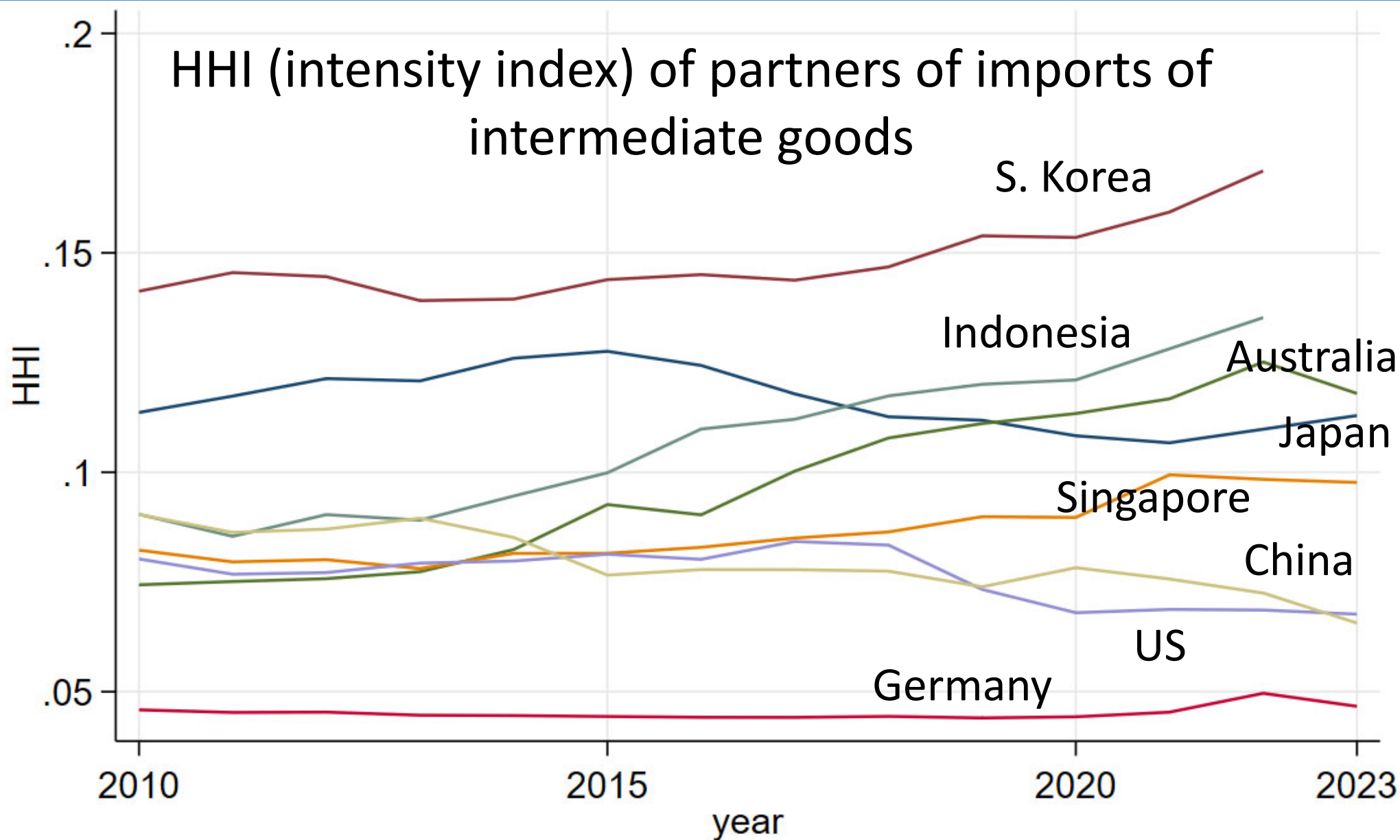
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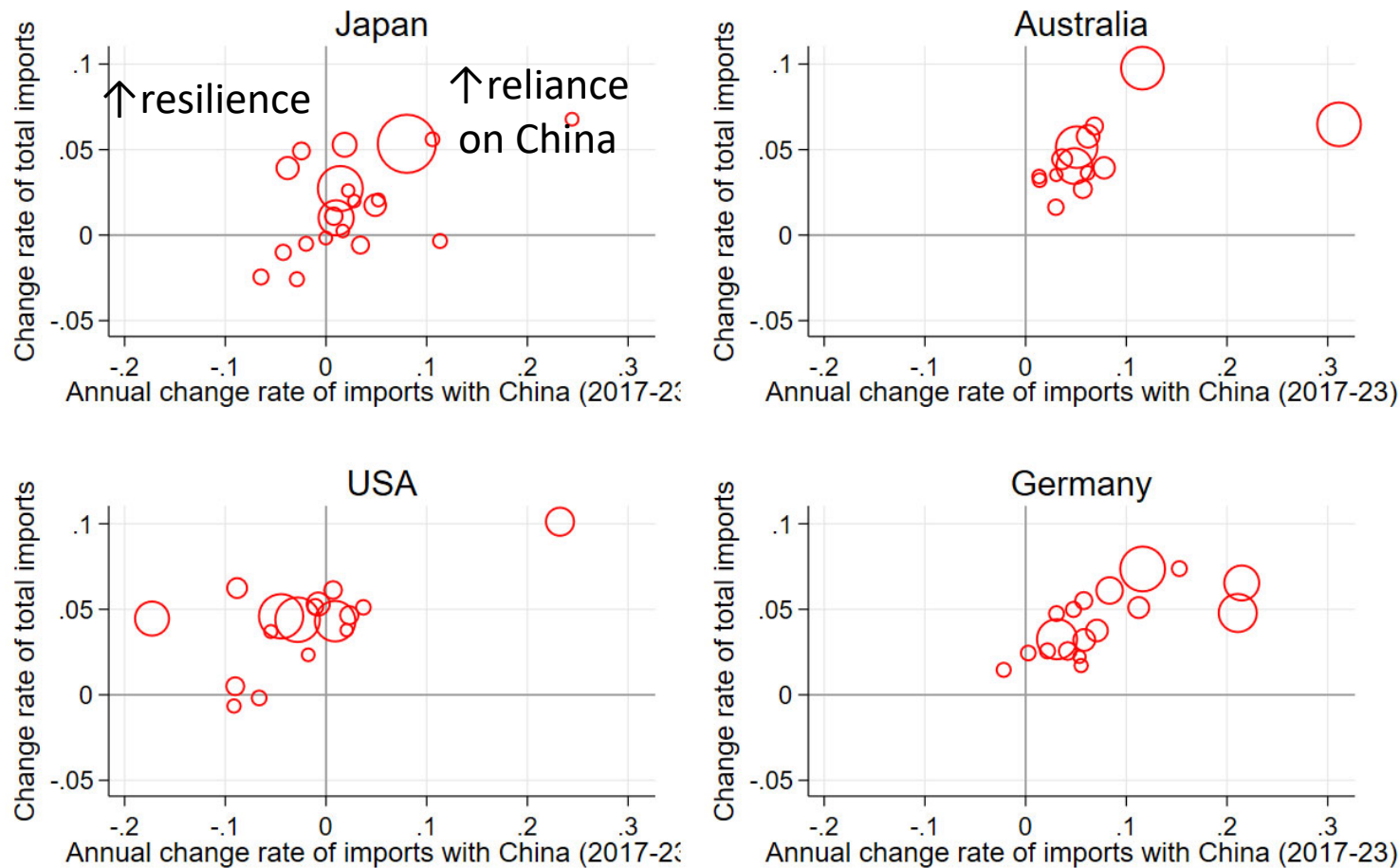
Many Asian countries heavily rely on China in supply chains



Supply chains of many Asia-Pacific countries are not well diversified, while those of China and the US are



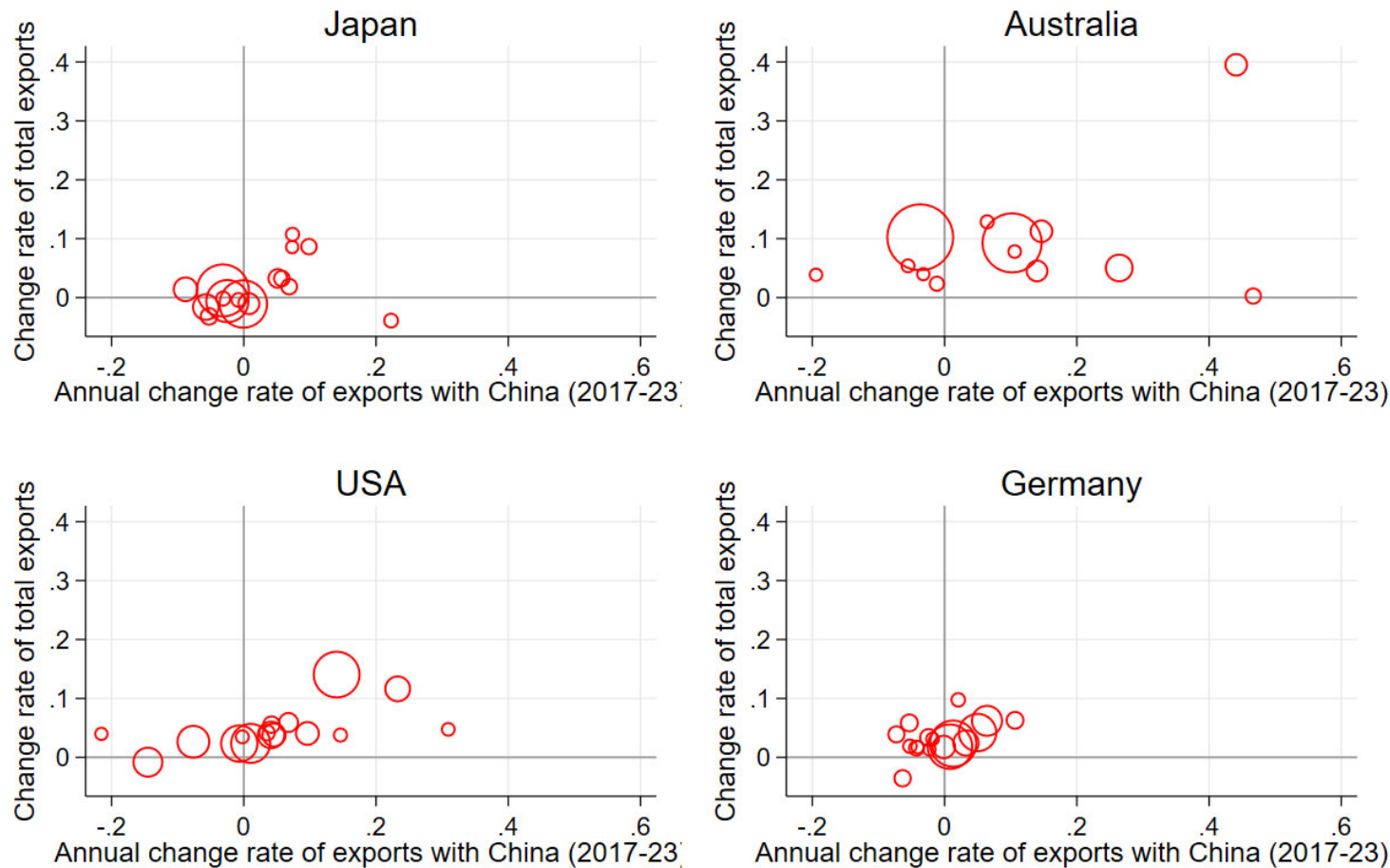
Changes in imports in total and from China



- The US has successfully reduced its reliance on China in imports and maintained total imports after the US-China decoupling.
- Australia has strengthened its reliance on China.
- Japan is in the middle.

Notes: Each circle shows a commodity at 2-digit level of the HS code with its share > 1%. The size of each circle represents the share of the commodity. Source: UN Comtrade.

Changes in exports in total and to China



- The US and Australia have successfully increased their exports to China.
- Japan has reduced its exports of many commodities in total and to China.

Notes: Each circle shows a commodity at 2-digit level of the HS code with its share > 1%. The size of each circle represents the share of the commodity. Source: UN Comtrade.

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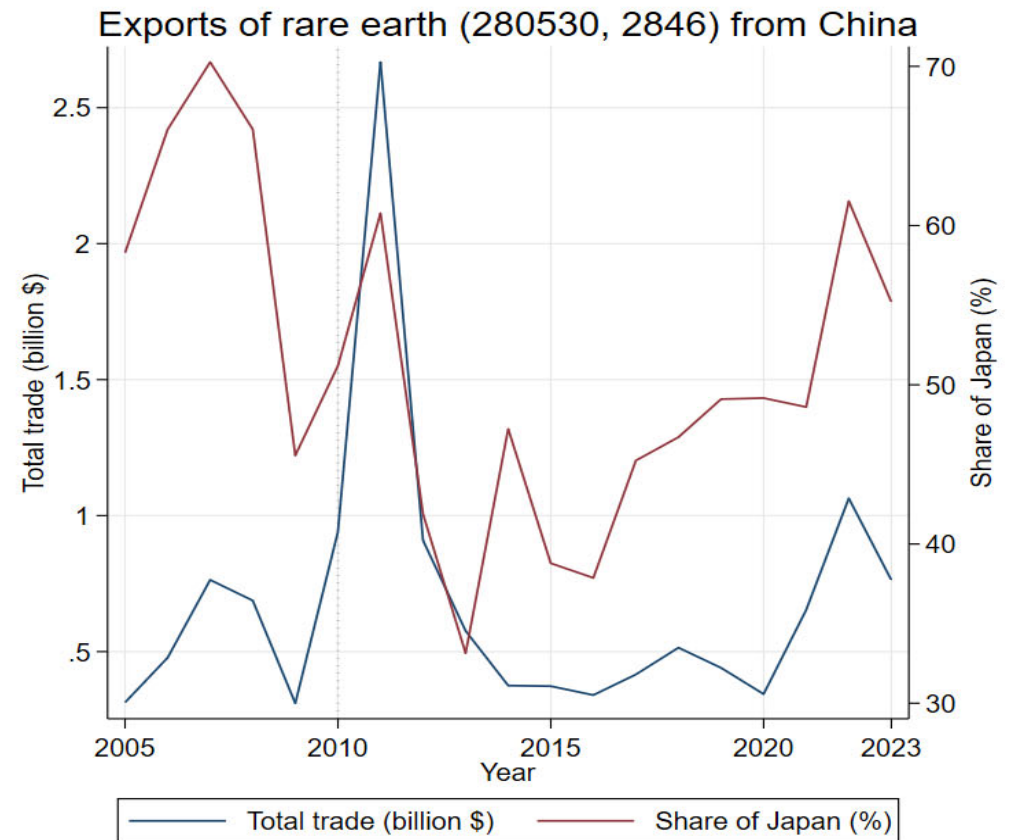
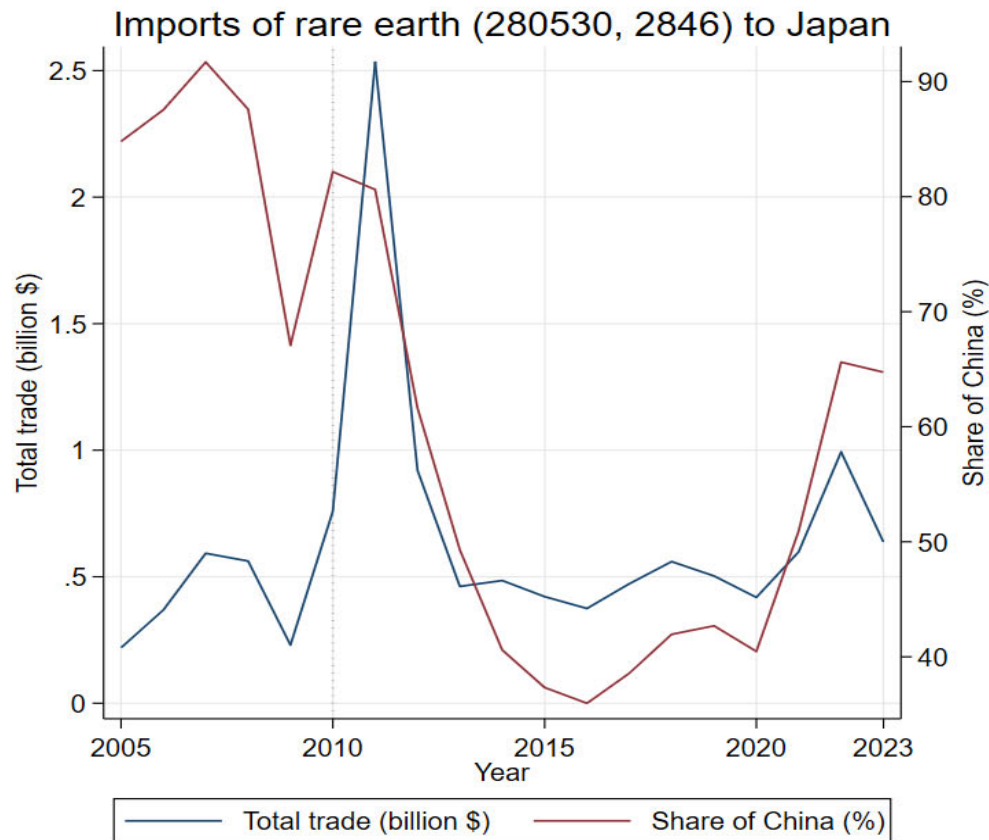
How can we avoid economic coercion?

Restriction on exports of rare earth from China to Japan in 2010

Product (HS code)	Trade value (million \$, 2009)	China's share in Japan's imports (2009)	Japan's share in China's exports (2009)
Rare-earth metals (280530)	65	83.5%	88.9%
Compounds of rare-earth metals (2846)	89 (330 in 2008)	58.7% (83.5%)	32.3% (58.1%)
Data processing machines (8471)	7,600	67.0%	5.7%
Telephone sets (8517)	5,400	52.3%	3.2%

- Products with Japan's heavy reliance on China are targeted
- Products with China's heavy reliance on Japan can still be targeted
- Products with large trade values may not be targeted.

How can we avoid economic coercion?



- Japan's reliance on China in imports of rare earth declined drastically after 2010.
- Japan's total imports were stable until 2020, possibly due to innovation of alternative technologies.
- But Japan's reliance on China and total imports are rising recently.

How can we avoid economic coercion?

Restriction on imports of several products from Australia to China in 2020

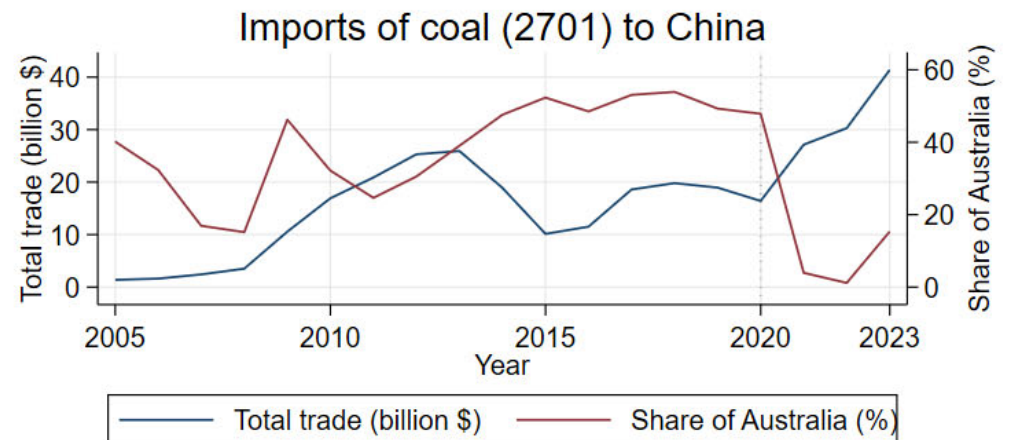
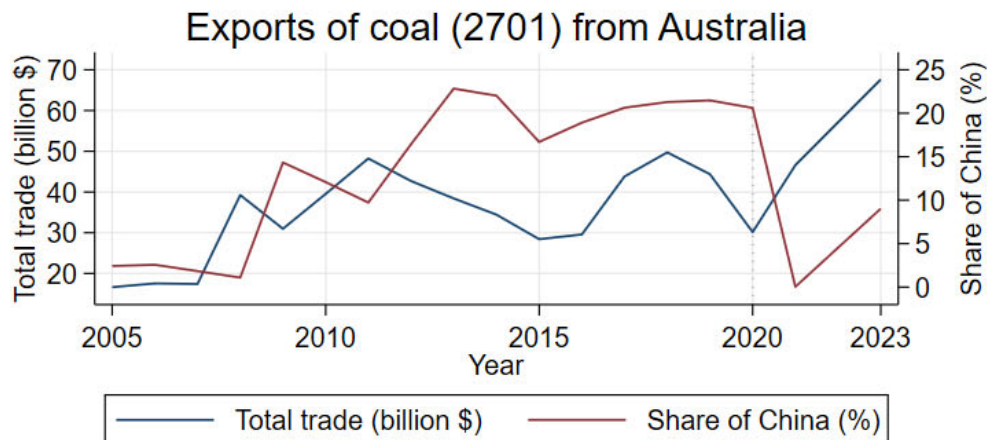
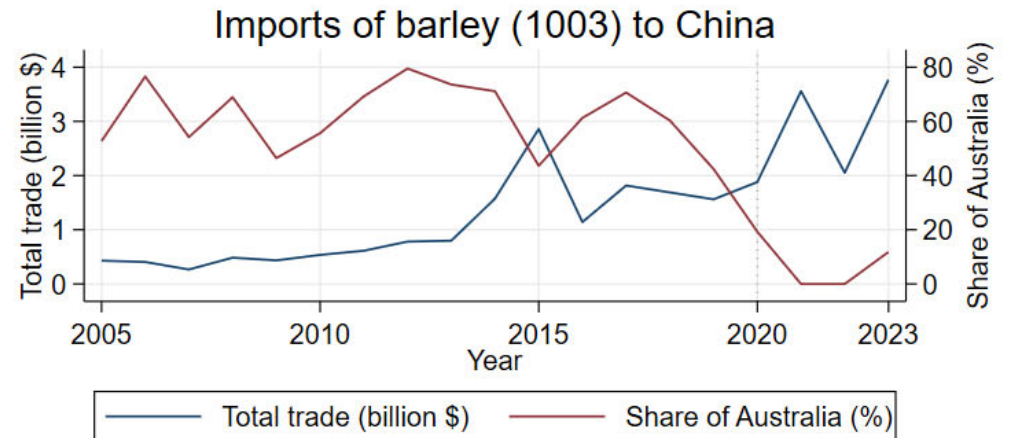
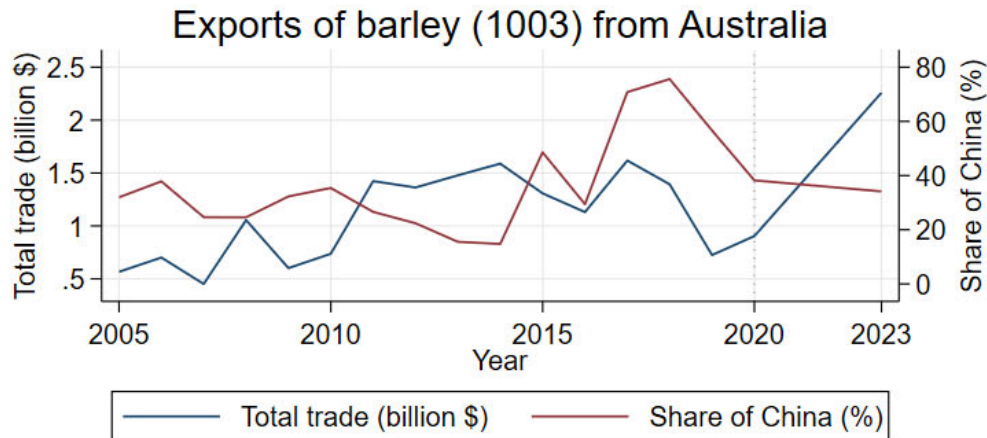
Source: UN Comtrade.

Product (HS code)	Trade value (million \$, 2009)	China's share in Aus exports (2009)	Aus share in China's imports (2009)
Wine (2204)	790	38.5%	35.5%
Barley (1003)	410	56.7%	42.4%
Coal (2701)	9,500	21.5%	49.3%
Iron ores and concentrates (2601)	54,900	82.2%	61.2%

Similar to Japan's case

- Products with Australia's heavy reliance on China are targeted
- Products with China's heavy reliance on Australia can still be targeted
- Products with large trade values may not be targeted.

How can we avoid economic coercion?

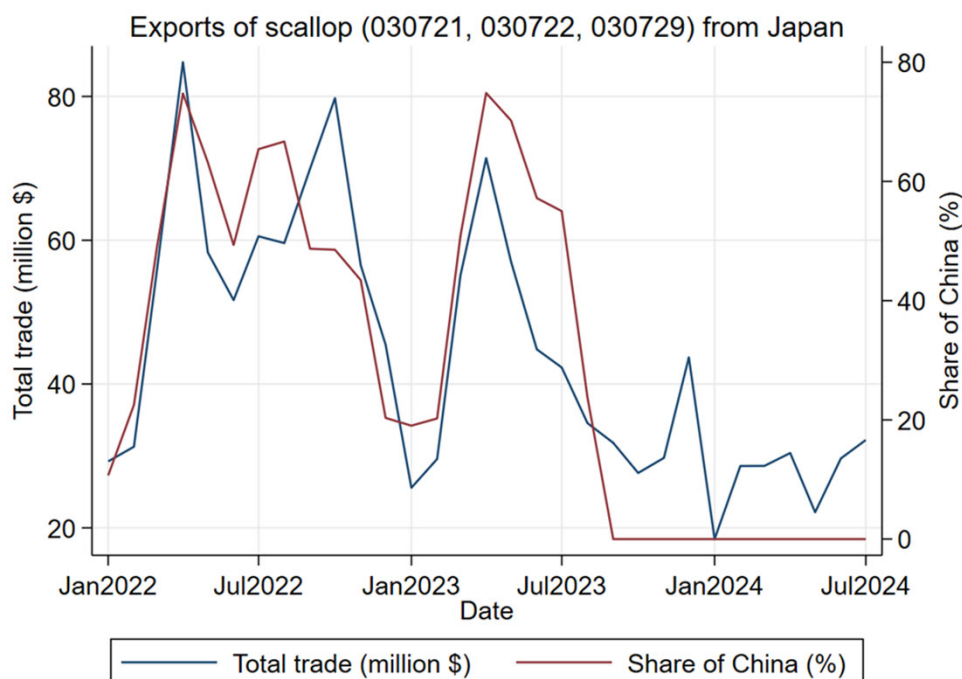


- Australia successfully reduced its reliance on China but increased total exports.
 - The pre-coercion reliance was not that heavy. (+ policy?)
- China also successfully diversified importer countries and increased total imports.

How can we avoid economic coercion?

Restriction on exports of fishery products from Japan to China in 2023

Product (HS code)	Trade value (million \$, 2022)	China's share in Japan's exports (2022)	Japan's share in China's imports (2022)
Fish (03)	550	27.9%	2.7%
Frozen scallops (030722)	350	56.0%	97.4%



- Japan has not successfully diversified export partners after the coercion.
- Needs to learn from Australia.

Policy implications

The effect of the disruption of essential materials
(e.g., due to economic coercion or conflicts)
can be substantial.



need to create more flexible supply chains
by diversification and innovation

Policy Implications

- Optimal level of intervention to balance between economic benefits and national security
 - Economic security policies: Restrictions on trade and investment
 - Industrial policy: Subsidies
 - Evidence is not enough.
- Specific policies to be suggested
 - Information provision and matching: foreign market, security risks, legal issues
 - Industrial policies: supporting innovation, pro-competition, wider targets (including material suppliers and machinery firms in the semiconductor industry)
- Economic growth is also important for national security.