



# **Modelling the impact of economic Coercion**

**Symposium on countering economic coercion**

**Australian Strategic Policy Institute  
6-7 October 2022**

## Methodology

# The impact of economic coercion is measured through three core modules using a general equilibrium model and trade data analysis

### Module 1

#### Modelling the impact of economic coercion in different scenarios

- Model alternative scenarios of economic coercion on different countries and sectors
- Different countries
  - We will look at the impact of trade bans on G7 countries (USA, UK, Canada, Japan, France, Germany, Italy) and Australia
- Different sectors
  - We will model the impact of trade sanctions targeting different sectors: mining, energy, agriculture, durable manufactured goods, non-durable manufactured goods and services
- This implies 42 scenarios in total

#### Sources of insight:

- G-Cubed (G20) model
- Data from the Global Trade Analysis Project

### Module 2

#### Identifying the countries and industries at risk of economic coercion

- Develop a clear framework on when economic coercion is a realistic threat
  - Extent of trade dependency
  - Availability of alternative customers
  - Price drop required to clear market
  - Capacity to withstand price drop
- Apply the theoretical framework to global and domestic datasets to identify risks
  - Countries
  - Industries
  - Companies
- Case studies: G7 countries + Australia

#### Sources of insight:

- Global and domestic datasets, including GTAP, COMTRADE, ABS, WTO, IMF, WTO ,
- Desktop research

### Module 3

#### Policies to defence against, and respond to, economic coercion

- The scenarios in modules 1 and 2 will reveal the key variables that influence the severity and scale of economic coercion
  - These include monetary policy and exchange rate frameworks, fiscal policy responses, the flexibility of product, capital and labour markets
- We will model alternative responses from the country that is impacted by coercion
  - These could include retaliatory tariffs, financial restrictions, restrictions on foreign investment
- We will measure the trade-offs and domestic consequences of different policies

#### Sources of insight:

- G-Cubed (G20) model
- Desktop research

# A general equilibrium model with real and financial sectors is needed to show how economies adjust, or don't adjust, to economic coercion

G-Cubed is a multi-country, multi-sector, intertemporal general equilibrium model summarized in McKibbin and Triggs (2018)<sup>1</sup>. It represents the world as 24 autonomous blocks. Each region in G-Cubed is represented by its own multi-sector econometric general equilibrium model with highly disaggregated, multi-sectoral flows of goods and assets between them

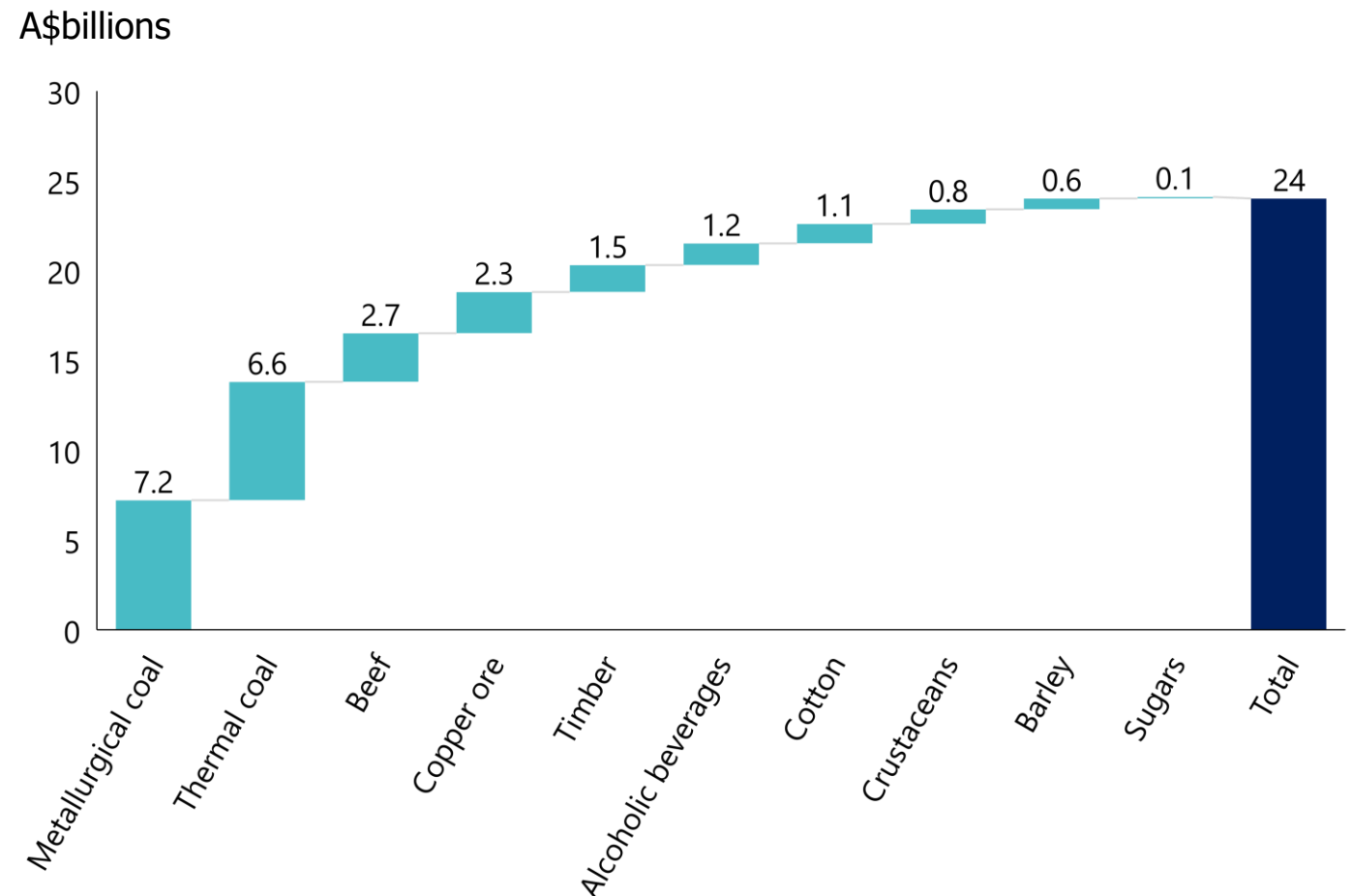
<b>24 countries/regions</b> <ol style="list-style-type: none"><li>1. Australia</li><li>2. Argentina</li><li>3. Brazil</li><li>4. Canada</li><li>5. China</li><li>6. Rest of euro zone</li><li>7. France</li><li>8. Germany</li><li>9. Indonesia</li><li>10. India</li><li>11. Italy</li><li>12. Japan</li><li>13. Korea</li><li>14. Mexico</li><li>15. Russia</li><li>16. Saudi Arabia</li><li>17. South Africa</li><li>18. Turkey</li><li>19. United Kingdom</li><li>20. United States</li><li>21. Rest of OECD</li><li>22. Rest of Asia</li><li>23. Other oil producers</li><li>24. Rest of world</li></ol>	<b>6 sectors</b> <ol style="list-style-type: none"><li>1. Energy</li><li>2. Mining</li><li>3. Agriculture</li><li>4. Non-durable manufacturing</li><li>5. Durable manufacturing</li><li>6. Services</li></ol>	<b>3 economic agents</b> <ol style="list-style-type: none"><li>1. A representative households</li><li>2. A representative firm (in each sector)</li><li>3. A Government</li></ol> <p>Households and firms are forward-looking and backward-looking</p>
	<b>2 links between countries</b> <ol style="list-style-type: none"><li>1. Goods (trade)</li><li>2. Money and financial assets (bonds, equities and foreign exchange)</li></ol>	<b>3 markets</b> <ol style="list-style-type: none"><li>1. Goods and services</li><li>2. Factors of production</li><li>3. Money and financial assets (bonds, equities and foreign exchange)</li></ol>

# The Australian media and many leading commentators got it wrong when it came to the impact of China's trade restrictions

### Key points

- China announced trade restrictions covering \$24 billion of Australia's exports.
- The Australian media and leading commentators panicked.
- They warned the Australian economy was about to lose \$24 billion.
- They were wrong.
- Some industries suffered, but on the whole the economy was not significantly impacted.
- How did we get it so wrong?
- We failed to appreciate how prices, exchange rates, markets and economies automatically adjust when hit with a trade shock.
- Understanding these adjustments are key to defeating economic coercion.

China's trade restrictions against Australia



# Economic coercion results in a range of negative effects and offsetting positive effects for an economy

### Key points

- The net effect of economic coercion on an economy depends on the relative magnitude of these opposing forces
- The result will differ between industries and between countries

### Modelling economic coercion

- We can use a sophisticated general equilibrium model to estimate the impact of economic coercion on the victim and the aggressor
- We can model a range of scenarios across different sectors and different countries
  - Sectors: Energy, mining, agriculture, manufacturing, services
  - Countries: Australia, Canada, Korea, Lithuania

### Negative effects

- Reduced prices
- Reduced output
- Reduced investment
- Reduced employment

## AUSTRALIAN ECONOMY

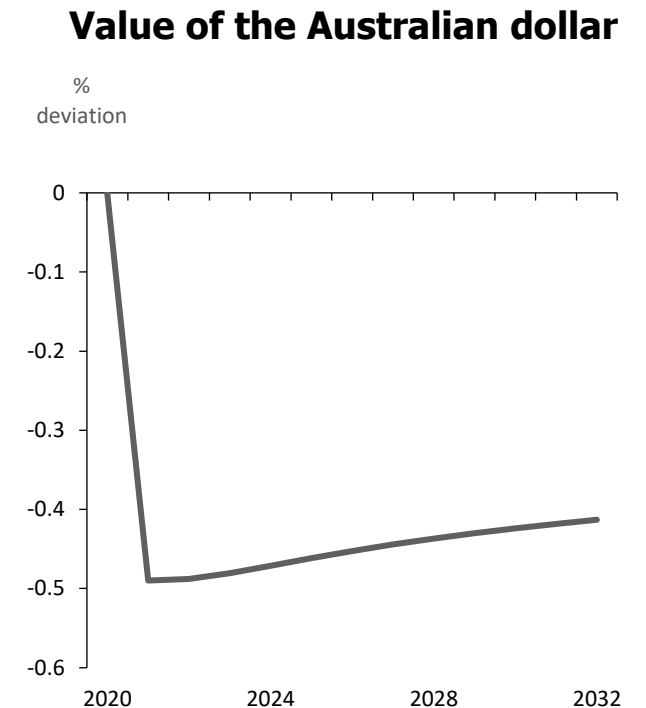
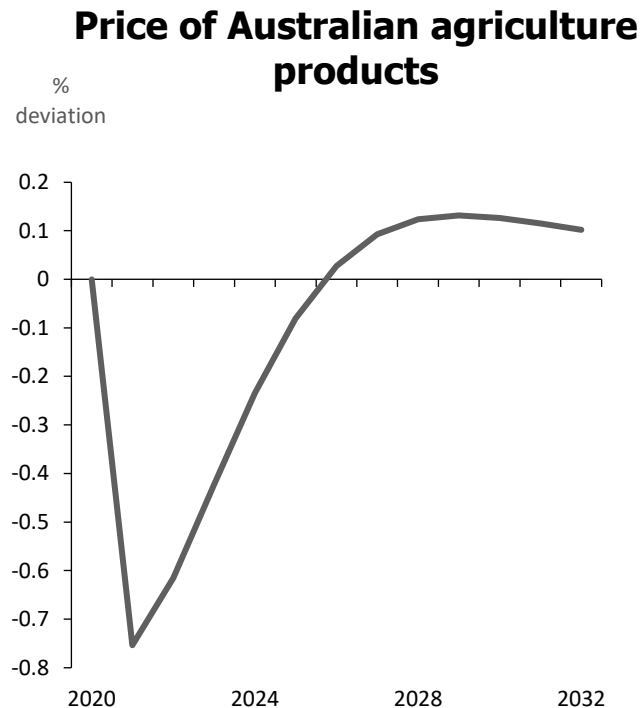
### Offsetting effects

- Lower exchange rate
- Alternative customers
- 'Musical chairs'
- Market adjustments

# For a trade ban on Australian agriculture, two key offsetting effects are prices and the exchange rate

### Key points

- Suppose China imposes a ban on the importation of agriculture products from Australia.
- The first thing that happens is that the price of Australian agriculture products falls.
- If China buys less agriculture products, they also need fewer Australian dollars so the exchange rate falls, too.
- Both help offset the impact of the shock by making Australian agriculture products cheaper than those from overseas.
- A lower exchange rate boosts agriculture exports as well as all other exports.



# Lower prices and a lower exchange rate makes Australia's exports cheaper, encouraging new customers to step-up

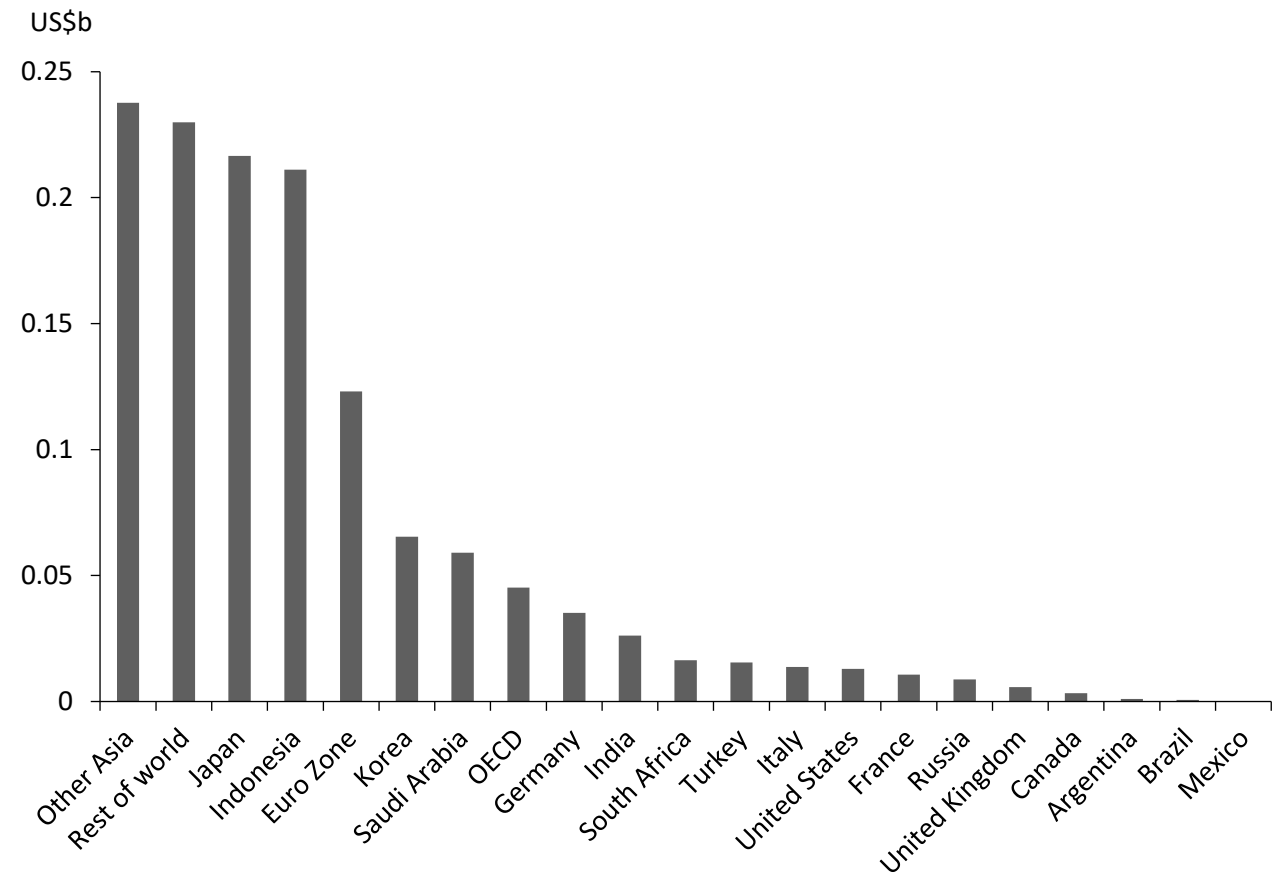
### Key points

- The alternative buyers for Australian agriculture are predominantly in Asia.
- The modelling suggests that the most likely buyers are Vietnam, Japan, Indonesia, Europe, Korea and other ASEAN countries.

### The 'musical chairs effect'

- There is another important offsetting 'musical chairs effect'.
- If China buys less beef from Australia and more beef from Brazil, the price of beef in Brazil goes up. Countries that used to buy from Brazil now buy from Australia instead.
- Ironically, the result is that more countries buy from Australia because China buys less from Australia.

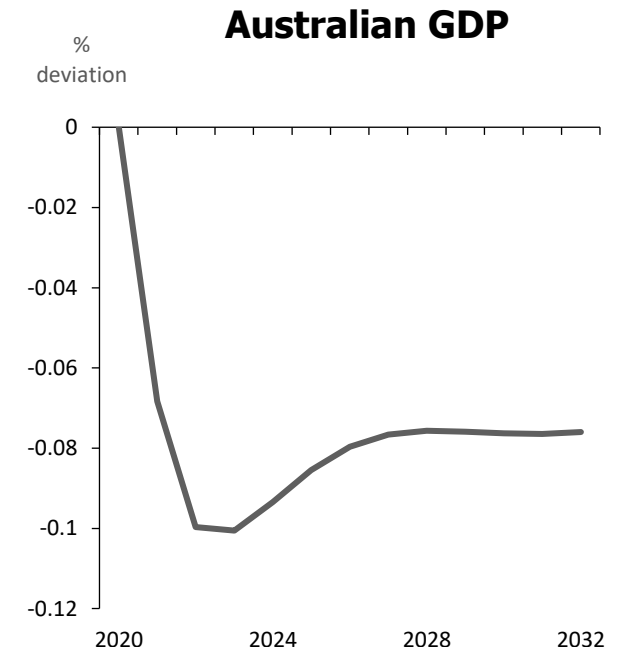
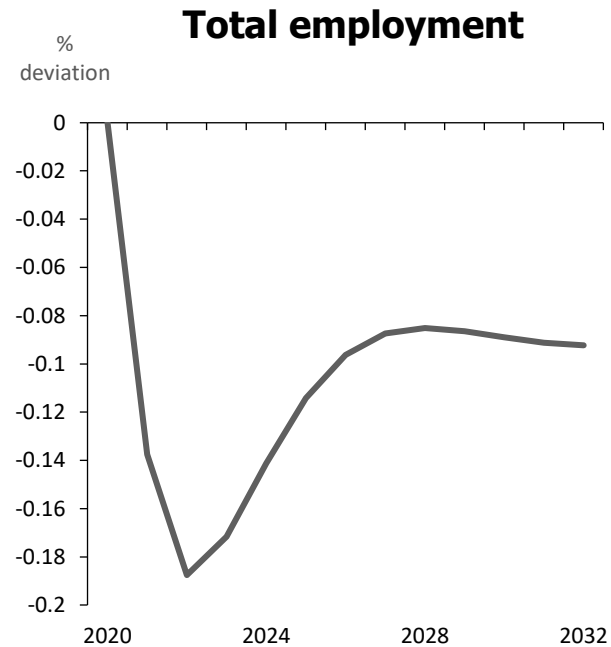
### Alternative buyers for Australian agriculture



# The net effect on the Australian economy is small given much of the potential damage is offset

### Key points

- The overall effect on the economy is relatively small.
- The impact on employment is less than 0.2 per cent in the second year.
- The impact on GDP is only 0.1 per cent in year 3 and 4 after the shock.
- This is because much of the shock is offset by lower prices, a lower exchange rate, our ability to find alternative markets, the ability of workers to find new jobs, the ability of investors to redeploy their capital.
- These results are strikingly similar to what happened when China imposed trade tariffs on Australia, the majority of which targeted agriculture.



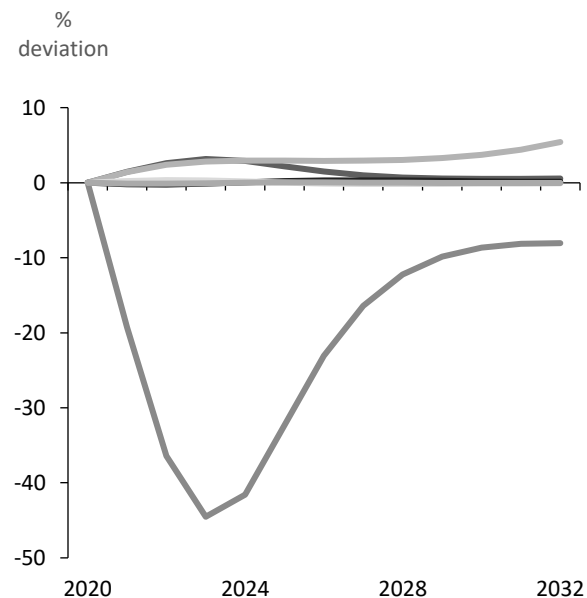


# Even though the aggregate impact is small, the impact on particular sectors and locations is much bigger

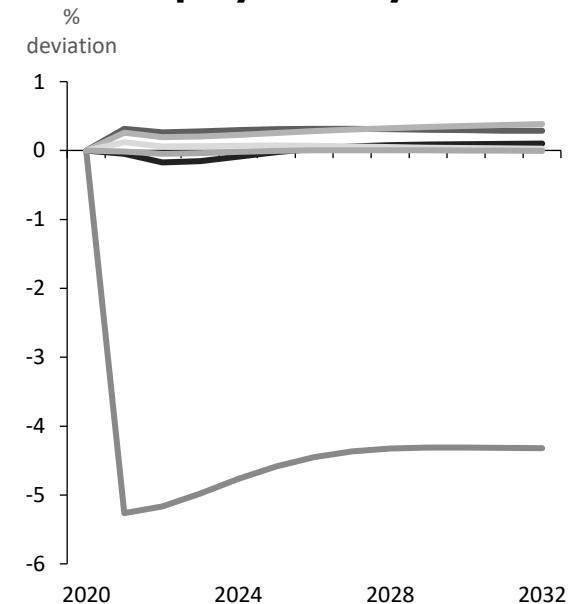
### Key points

- The overall costs to the economy might be small, but the costs to individual sectors and locations can be big.
- Australia's agriculture output falls by 4 per cent, although this is partially offset by increased production in other sectors of the economy because of the lower Australian dollar.
- Less production in agriculture means less investment and less employment.
- Investment in agriculture is 45 per cent lower than it would have been three years after the trade ban is imposed.
- Employment in agriculture is 5 per cent lower than it otherwise would have been.
- Agriculture firms see their stock market values fall by 9 per cent in a single year.

### Output by sector



### Employment by sector



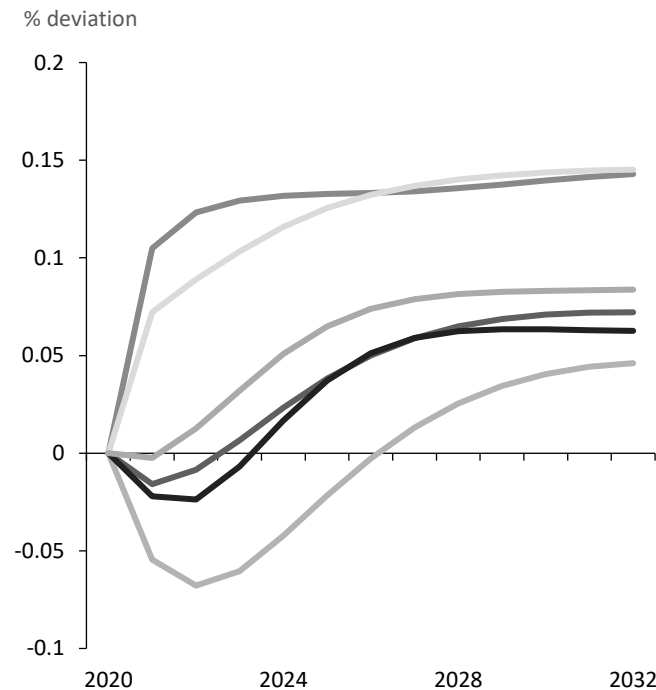
# Remember that trade restrictions hurt China, too, particularly by pushing up prices and hurting consumption and investment

### Key points

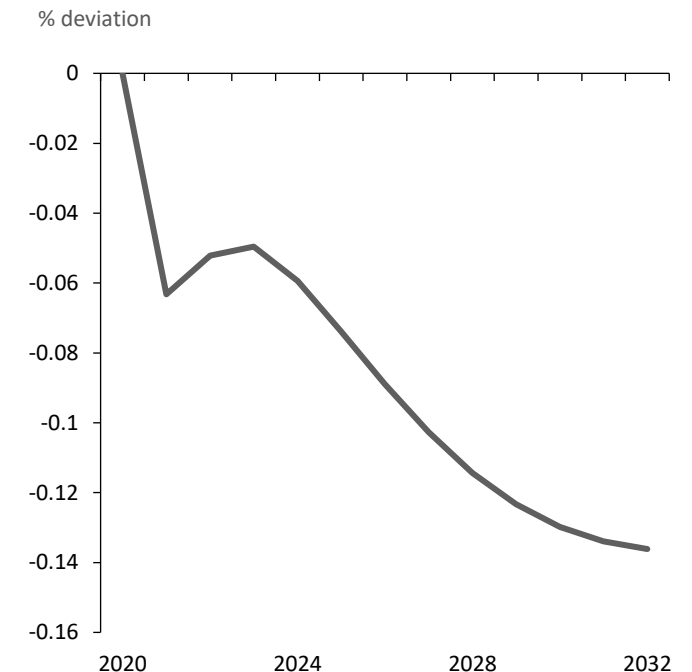
- Tariffs and trade restrictions are a tax on your own citizens.
- Prices in China increase not only for agriculture products but also for all the sectors that use agricultural products as inputs.
- More expensive goods and services mean less consumption for Chinese households.
- Aggregate investment in China falls because of reduced consumption and higher interest rates to fight inflation.
- The net effect on Chinese GDP is negative.

**China's goal is presumably to maximise pain for the target country and to minimise pain for their own economy**

### Prices in China



### Consumption in China

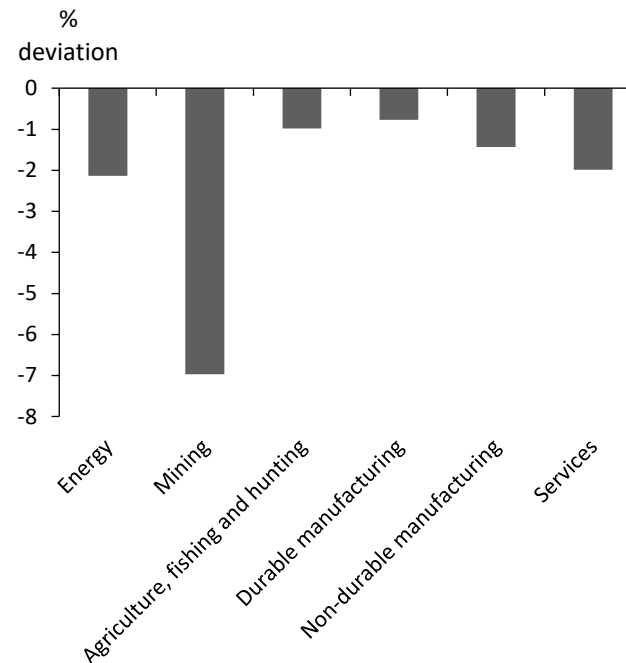


# If China wants to maximise pain for Australia and minimize economic pain on itself, it will target Australia's services sector

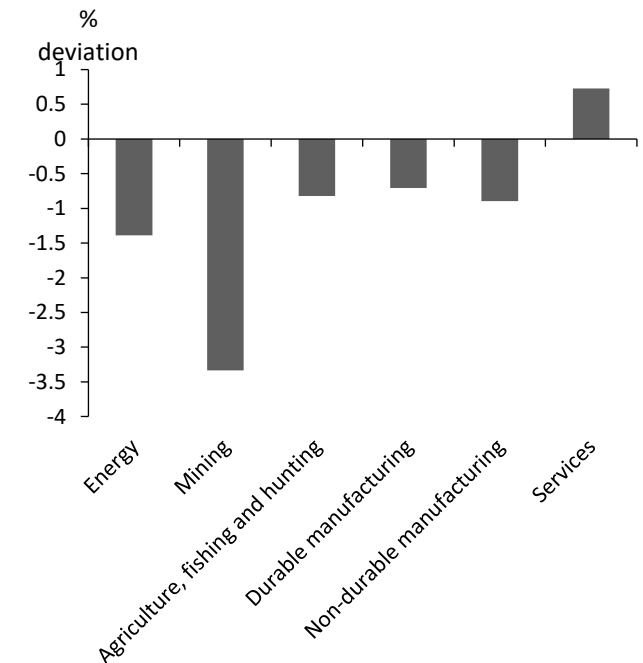
### Key takeaways

- Australia exports a range of services to China, primarily education services (through Chinese students who study in Australia), travel and tourism.
- Australian GDP is reduced by 2 per cent over 10 years if China bans the importation of services from Australia.
- The impact on China from such a ban, however, is positive. This is because Chinese students, tourists and travellers will substitute Australian universities and tourist destinations for those in China.
- China is less likely to target Australia's mining or energy sectors because the economic pain for China is large.

### Australian GDP



### Chinese GDP

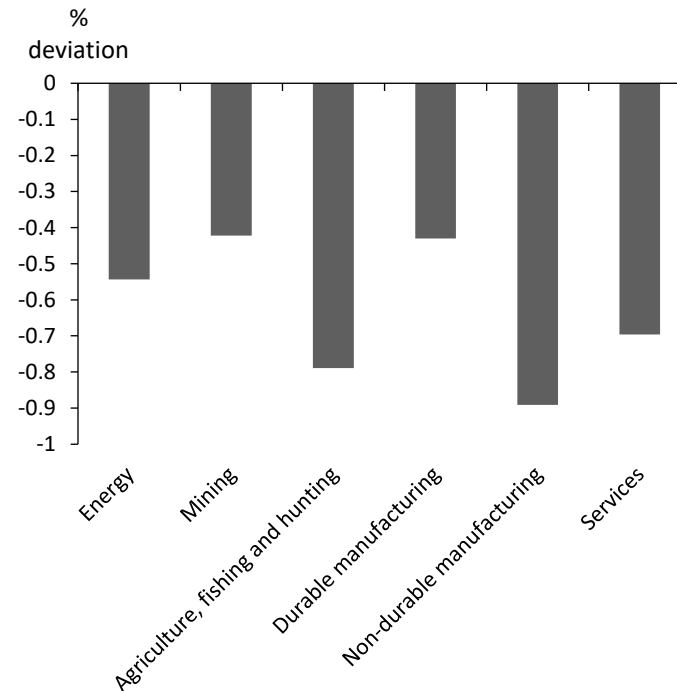


# China is most likely to target Canada's durable manufacturing and services sectors

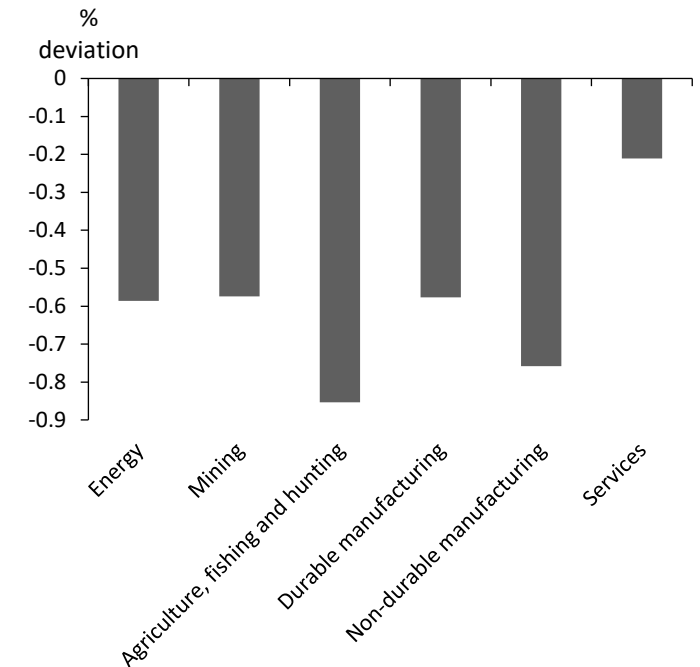
### Key takeaways

- Trade bans against Canada's services and durable manufacturing sectors have the biggest negative impact on Canada's GDP while having the smallest negative impact on China.
- The impact on China from trade sanctions against Canada is almost one-for-one when it comes to non-durable manufacturing.
- Interestingly, China's economy suffers more than Canada's economy when trade sanctions are targeted to their energy sector.
- Targeting durable manufacturing and services has less of an impact on China because it has its own strong industries (meaning domestic substitution is possible) and there are alternative sellers available internationally too.

### Impact on Canada GDP



### Impact on China GDP

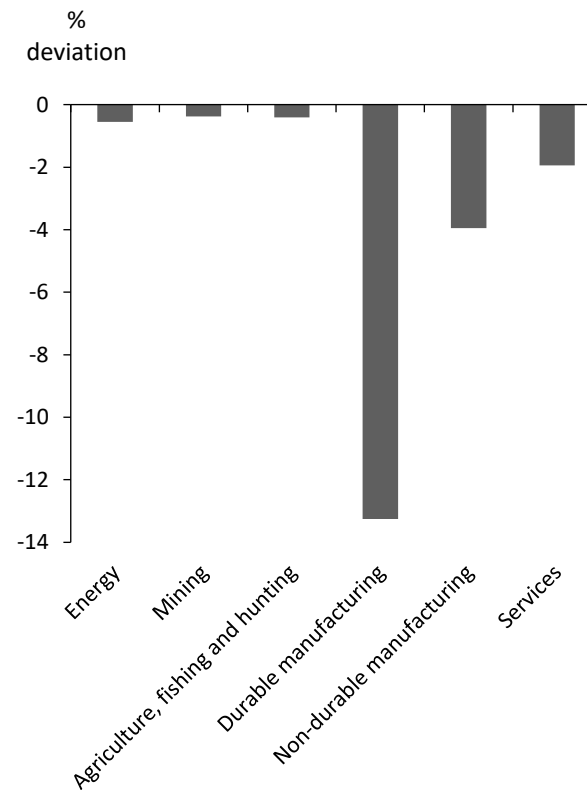


# Targeting South Korean durable manufacturing hurts China, too, but the overall effect is much more painful for South Korea

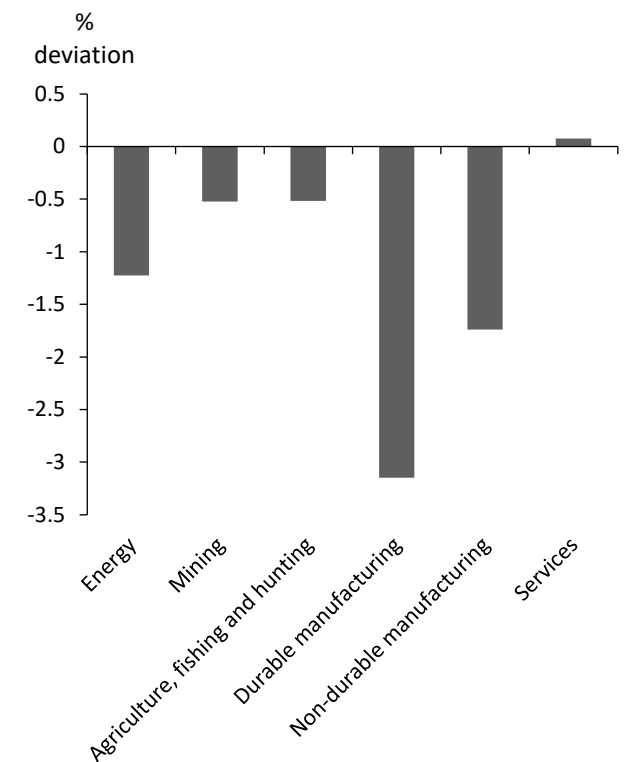
### Key takeaways

- For Korea, the services sector is the most effective sector for China to target in relative terms because it reduces Korean GDP but increases Chinese GDP
- In absolute terms, the impact of services sanctions on South Korea is still comparatively small
- A trade ban targeting Korea's durable manufacturing sector has a much more substantial impact on South Korea. The impact on China is also larger – GDP is 3 per cent lower than it otherwise would have been.

### South Korean GDP



### Chinese GDP

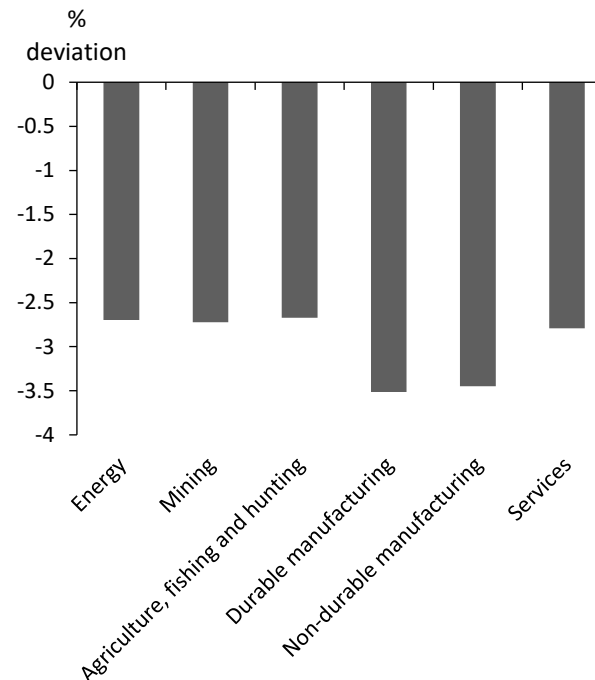


# Other than services, the proportional impact on China is similar to the impact on Lithuania so there is no obvious target

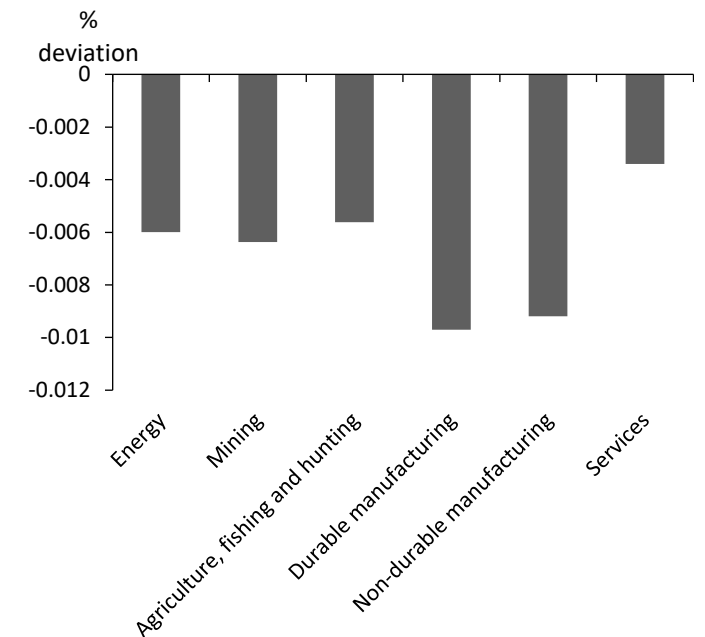
### Key takeaways

- For Lithuania, services are again the most likely target given the disproportionate impact that a trade ban on services has on Lithuania compared to China.
- The impact on Lithuania's other sectors are proportionate to the impact on China meaning that the relative economic pain caused to Lithuania is the same as that caused to China.

### Lithuanian GDP



### Chinese GDP



## What makes an industry or country vulnerable to economic coercion?

# The modelling shows that there are a range of factors that make industries and countries more susceptible to coercion

- 1 How many alternative customers you have
- 2 The volume of demand from those customers. Can it fill the gap?
- 3 The musical chairs effects: what happens to the unmet demand from the source of the coercion?
- 4 The flexibility in your exchange rate
- 5 The flexibility in your labour market: Unemployment won't go up if people relocate industries and locations for new jobs
- 6 The flexibility of your product markets: how easily businesses can relocate
- 7 The flexibility of your financial markets: how easily investments can move their money elsewhere
- 8 The response of fiscal and monetary policy: government supports for retraining, relocating and reskilling

# The experiences of targeted countries highlight four factors that shape economic coercion risk

1

## Trade dependence

- Industries or regions reliant on trade with China face higher costs and slower adjustment.
- *In 2020, China accounted for 97% of Australia's timber log exports and 93% of rock lobster exports.*

2

## Market diversity and depth

- Concentrated global markets mean fewer alternative destinations and bigger price impacts.
- Finding new markets easier for bulk goods than more differentiated products.
- *Scarcity of markets for premium red wine and small timber logs impeded adjustment.*

3

## Production flexibility

- Producers may subvert sanctions through substitution or altering production techniques.
- *Australian timber producers adapted by chipping logs and delaying thinning; cattle farmers rebuilt herds.*

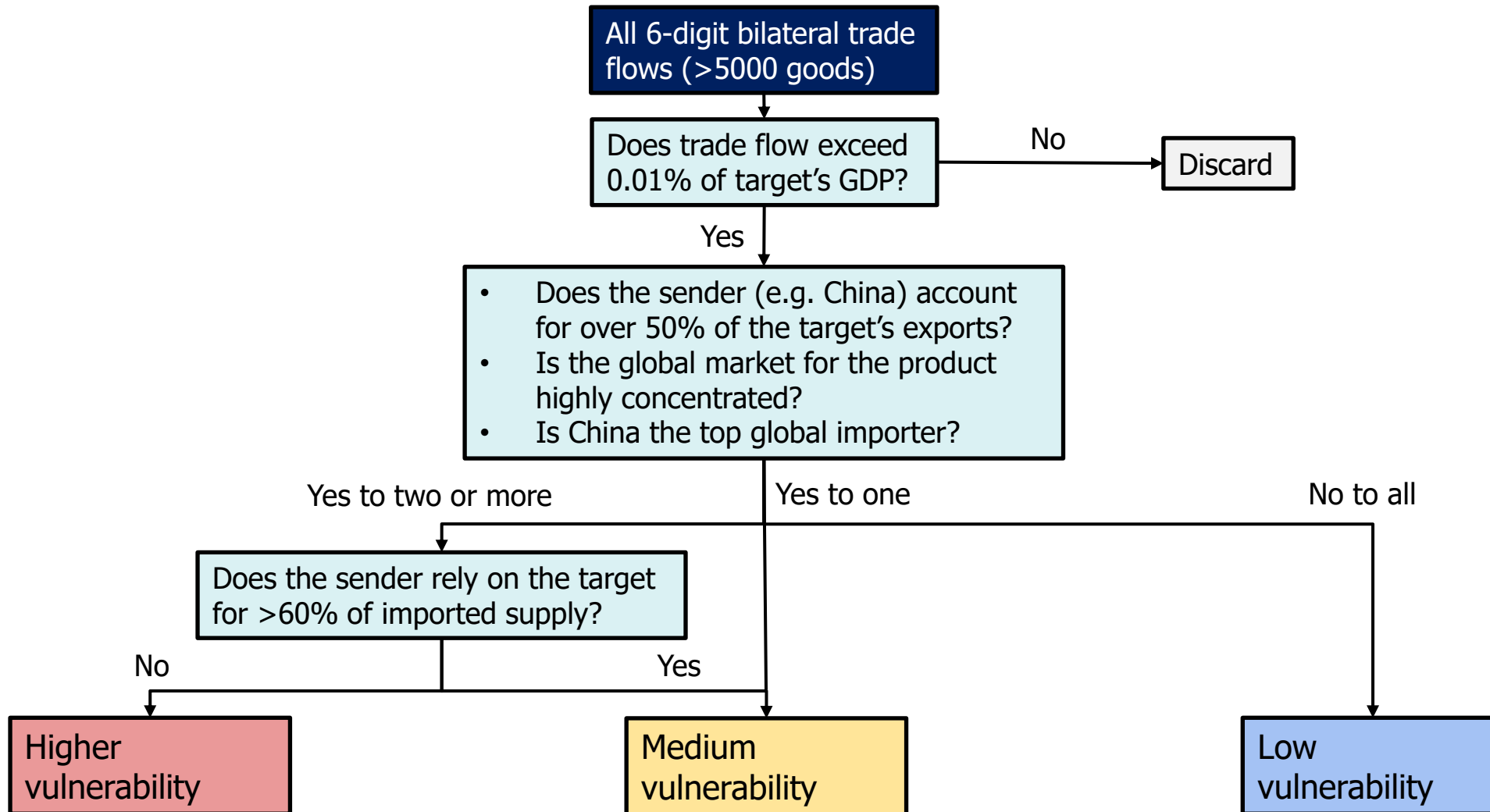
4

## Domestic incentives

- Sanctions may serve domestic political objectives or interest groups in China.
- *The 2011 rare earths dispute with Japan coincided with industry policy goals.*



# Based on these drivers, trade data is analysed to categorise sectors with high trade dependence and low market diversity



# Australia's vulnerable exports are worth more than those of any G7 country, but many are strategic materials for China

## Key points

- There are 33 goods where exports to China exceed 0.01% of Australia's GDP.
- Our framework classifies 10 'higher' and 16 'medium vulnerability' export goods. The total, 26, is the second-highest of the eight countries analysed.
- In 2021, 'higher vulnerability' exports were worth US\$6.7b and 'medium' were worth US\$132.2b. Iron ore, where there is high interdependence, accounts for \$103.3b.
- Strategic raw materials and green-tech inputs like nickel and manganese predominate. About half of Australian exports to China are from the mining sector.

Sector description	Value of exports to China (2021, mil USD)	Global import concentration (2021)	CHN share of AUS exports (2021, %)	AUS share of CHN imports (2021, %)	Top importer (2021)
<b>Higher vulnerability</b>					
Nickel (unwrought, not alloyed)	\$2426	Low	<b>66</b>	37	China
Aluminium ores and concentrates	\$1226	Moderate	<b>98</b>	28	China
Manganese ores and concentrates	\$993	Low	<b>73</b>	25	China
<b>Medium vulnerability</b>					
Iron ores and concentrates	\$103,324	High	<b>81</b>	<b>68</b>	China
Liquefied natural gas (LNG)	\$14,380	Low	38	37	China
Semi-manufactured gold (e.g. bars)	\$5247	Low	<b>53</b>	<b>81</b>	UK
<b>Lower vulnerability</b>					
Wheat	\$881	Low	13	32	Indonesia
Aluminium oxide	\$460	Low	10	46	Russia
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Source: created with data from CEPII ([2023](#)).

# Australia tops the G7+1 countries in number, but not value, of vulnerable import goods

## Key points

- There are 87 goods where imports to China exceed 0.01% of Australia's GDP.
- Our framework classifies 56 'higher' and 21 'medium vulnerability' import goods. The total, 77, is the highest of the eight countries analysed.
- 'Higher vulnerability' goods were worth US\$27.8b in 2021, while 'medium' goods were worth \$5.0b. The total is less than one-quarter of Australia's vulnerable export value.
- As with other countries, electrical appliances dominate, alongside other manufactures like furniture, toys and plastics.

Sector description	Value of imports from China (2021, mil USD)	Global export concentration (2021)	CHN share of AUS imports (2021, %)	AUS share of CHN exports (2021, %)	Top exporter (2021)
<b>Higher vulnerability</b>					
Laptop computers	\$4314	Low	<b>96</b>	2	China
Mobile phones	\$3168	Low	<b>77</b>	2	China
Telecoms apparatus	\$1713	Low	<b>52</b>	2	China
<b>Medium vulnerability</b>					
Televisions	\$478	Low	38	3	China
Taps/valves for pipes, boilers, vats	\$355	Low	32	3	China
Car tyres	\$345	Low	42	5	China
<b>Lower vulnerability</b>					
Cars with smaller (<1500cc) engines	\$478	Low	28	7	Germany
Monoammonium phosphate (fertilizer)	\$306	Low	38	14	Morocco
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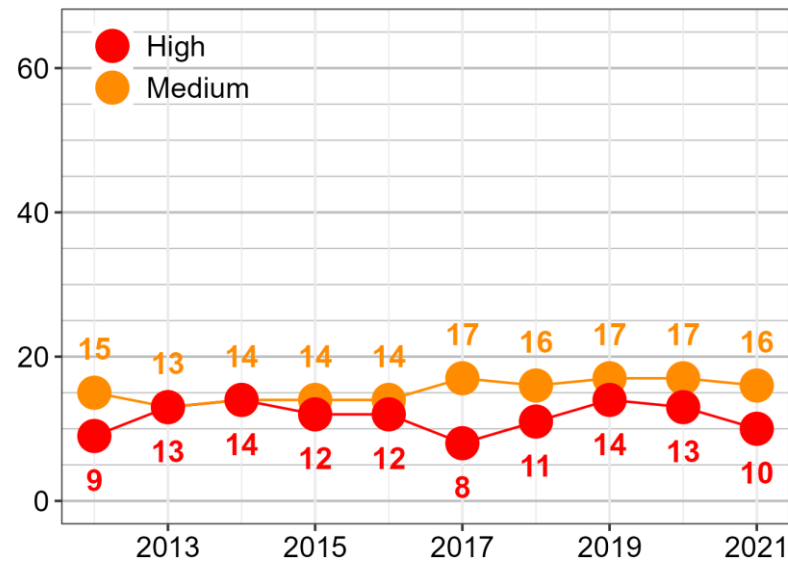
Source: created with data from CEPII ([2023](#)).

# Australia's number of vulnerable imports has grown over time to include a broader range of manufactures

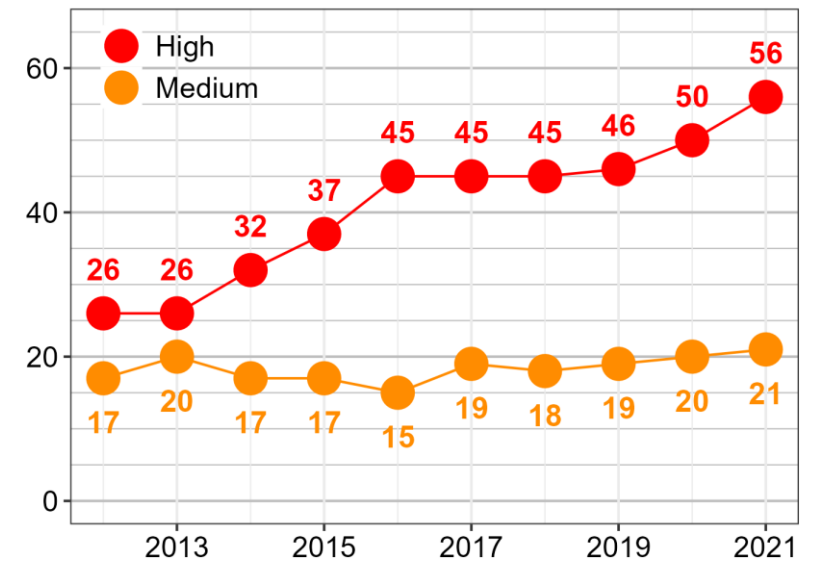
## Key points

- Australia's number of vulnerable exports has remained steady in recent years.
- The small drop in 2021 (26 exports compared to 31 in 2019) reflects the sanctions. Cotton, barley, rock lobsters, roundwood, and copper ores fell off the list.
- Import goods rose from 43 in 2012 to 72 in 2021, as China grew as an exporter of electrical appliances.
- While the number of imports is higher than exports, the value of exports is higher, even excluding iron ore. This was unique among the countries analysed, reflecting Australia's trade surplus with China.

Number of export goods by vulnerability



Number of import goods by vulnerability



Source: created with data from CEPII ([2023](#)).