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Australia's export mix, industrial base and economic resilience challenge

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EXECUTIVE SUMMARY

Introduction

- Global connections have long given individual living standards and the Australian economy as a whole a boost. But they also expose the domestic economy to risks, and it is these risks rather than the opportunities that are receiving increased focus in Australian commentary. Specific risks being raised include the trade and investment fallout from geopolitical tensions and a relative shift in global demand away from fossil fuels as the world responds to climate change.
- In the face of these risks, there are concerns about Australia's export resilience. Resilience refers to an ability to bounce back when hit by a shock, as well as a capacity to adapt to, and shape, structural trends that may unfold more gradually. If a domestic political consensus supportive of openness is to be maintained, a convincing response to these concerns will be required.
- Resilience in the face of adverse shocks and shifts is made more challenging if Australia's export basket is unusually concentrated by market destination, product classification or both. Or put more colloquially, if Australia has 'too many eggs in one basket'. And if it does, what have been the consequences of this concentration beyond the export basket for the domestic industrial base and broader economic performance and resilience?
- To assess whether Australia's export basket is unusually concentrated, this report benchmarks it against the baskets of other high-income, medium-size peer economies, including Canada, France, the UK, Switzerland, the Netherlands, the Republic of Korea and Taiwan.

Export market concentration

- Having a top market that accounts for between 25-30 percent of total goods exports is found to be par for the course amongst the peer group over the period of analysis. Australia mostly conforms to this benchmark.
- It was only in 2020 that Australia differed markedly when 41 percent of its goods exports went to China. This was up from 32 percent in 2015. The scale of this recent exposure and the associated risks are, however, moderated by several considerations. Some of the goods that Australia exports to China feed into global value chains with the final consumer being located elsewhere. When this is accounted for, China's share of Australia's total falls by around five percentage points. Further, many of the goods Australia sells to China are traded in global markets. If the China market is closed, global markets adjust and new opportunities for Australia's exports are created in other economies.
- Australia is far from alone in the Asia-Pacific region in having a significant exposure to China. Despite serious geopolitical tension, the share of Taiwan's goods exports going to China rose from 25 percent in 2015 to 30 percent in 2020. Globally, nearly three-quarters of countries now trade more goods with China than with the US.
- The jump in China's share of Australia's goods exports between 2015 and 2020 was overwhelmingly an iron ore price story. Iron ore prices in the vicinity of US\$200/tonne are a temporary phenomenon: when they fall, China's share of Australia's goods exports will return closer to the peer average. Take away iron ore from Australia's export basket and in 2020 China's share of the remaining total almost halves to 22 percent. Last year, China accounted for 68 percent of global seaborne iron ore imports. The next biggest importer was Japan with just eight percent. The implication is that Australia's exposure to China is mostly a symptom of the prominent place that iron ore occupies in the export basket.

- Looking beyond the top market exposure to the combined share of the next four largest markets, Australia's exposure is shown to have been consistently in the middle of the pack.
- In terms of services exports, Australia's top market share – China at 20 percent of the total – also does not stand out as unusual when compared with peer economies.

Export product concentration

- In contrast to metrics around market concentration where Australia's exposures mostly do not stand out, the degree of product concentration found in Australia's goods export basket mark it as an outlier.
- Between 1990 and 2020, the top product share of Australia's goods exports rose from 13 percent (coal) to 33 percent (iron ore). This was markedly higher than the peer average of six percent and 15 percent, respectively. If the combined share of the next four largest products is examined, in Australia's case this rose from 24 percent in 1990 to 36 percent in 2020. Once again, this was markedly higher than the peer average of 14 percent and 20 percent, respectively.
- In 2020, primary goods accounted for more than 80 percent of total Australian goods exports. This was eight times the peer average. The flip-side was the share of manufactures fell to just 15 percent. This contrasted with a peer average of 82 percent.
- Aside from being heavily weighted towards primary goods, Australia's goods export basket was also distinguished by a lack of complexity. In 2020, 98 percent of Australia's primary goods exports were in unprocessed form, compared with a peer average of 42 percent. The share of simply transformed manufactures (STMs) in total manufactured goods exports stood at 30 percent, compared with a peer average of 12 percent.
- The surge in the value and share of primary goods in Australia's goods export basket, particularly unprocessed ones, reflected a rational response to leverage Australia's natural factor endowments to benefit from strong global demand. That said, peers with export baskets more orientated towards manufactures and complex goods were mostly able to match Australia's performance. And as product concentration increased, the resilience of Australia's export basket was negatively impacted.
- Australia's services exports are also highly concentrated relative to peers, focused on the product classification of travel.

Interdependence of export mix with industrial structure

- Changes in Australia's export mix are interdependent with the domestic industrial base. Spurred by strong overseas demand, mining has grown from seven percent of value-added output in 1985 to 12 percent today, making it the largest single sector. Owing to the capital-intensive nature of mining production, its direct employment share only rose marginally from 1.5 percent to 1.8 percent. In the case of Canada, another geographically large economy with extensive natural resources, the mining sector accounts for five percent of output.
- The counterpart of the increased prominence of mining in the industrial base has been a relative shrinking of manufacturing. In 1985, manufacturing was the largest sector the Australian economy in terms of both output and employment, accounting for 15 percent and 16 percent, respectively. By 2019, however, this had fallen to seven percent of output and employment. Australia now has the lowest share of manufacturing amongst peers by a considerable margin.

- This transformation of the industrial base was accelerated by the commodities boom of the early 2000s, which elevated the exchange rate and made it harder for domestically-produced manufactures to compete. In 2020, Australia ran a trade deficit in elaborately-transformed manufactures (ETMs) equal to 9.5 percent of gross domestic product (GDP). Canada was next closest with an ETMs deficit of 7.8 percent, while the peer average was a surplus of 2.5 percent. In contrast to Australia, several peers are more heavily engaged in intra-industry trade: ETMs are both exported and imported in large volumes, leading to small sector balances as these flows mostly net out.
- While Australia's changed industrial structure has brought benefits in terms of output and income growth, the implications for broader economic resilience are more concerning as, for example, sovereign manufacturing production capacity has been eroded. There have also arguably been adverse implications for overall productivity growth and income inequality.

Policy next steps

- In documenting that Australia is an outlier in terms of its export product structure and industrial base, this report prompts and serves as a basis for an informed discussion and debate around appropriate public policy responses. While recognising that government intervention can potentially ameliorate risks, it comes with costs too, and there is significant scope for a divergence between best intentions and actual policy effectiveness.



Pedal to the stock/Shutterstock

1. Introduction

In November 2020, BHP Chief Executive Officer Mike Henry delivered a home truth about Australia's economy: 'Other nations may aspire to succeed in self-sufficiency and autonomy. Australia simply isn't built to succeed under this model'.¹

Australia's prosperity has long depended on being able to sell locally-produced goods and services on a global stage. In the 1950s, 'riding on the sheep's back' via the wool trade helped deliver a standard of living that was amongst the highest in the world. Living standards in Australia continue to be world-leading thanks to a modest population of just 26 million being connected to a global market of eight billion. Wool has been joined by coal, iron ore and wine. Services like education have been added to the export basket as well.

Firm-level data show that, on average, exporters in a given industry provide more jobs and invest more in the Australian economy than non-exporters. Their labour productivity is higher too, translating to higher wages paid to staff.²

But global connections also expose the domestic economy to risks, and it is these risks rather than the opportunities that are receiving increased focus in Australian commentary. Specific risks being raised include the trade and investment fallout from geopolitical tensions and a relative shift in global demand away from fossil fuels as more countries respond to climate change.



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In the face of these developments, there are concerns about Australia’s export resilience. Resilience refers to an ability to bounce back when hit by a shock, as well as a capacity to adapt to, and shape, structural trends that may unfold more gradually. If a domestic political consensus supportive of openness is to be maintained, a convincing response to these concerns will be required.

Resilience in the face of adverse shocks and shifts is made more challenging if Australia’s export basket is highly concentrated by market destination, product classification or both. Or put more colloquially, if Australia has ‘too many eggs in one basket’.

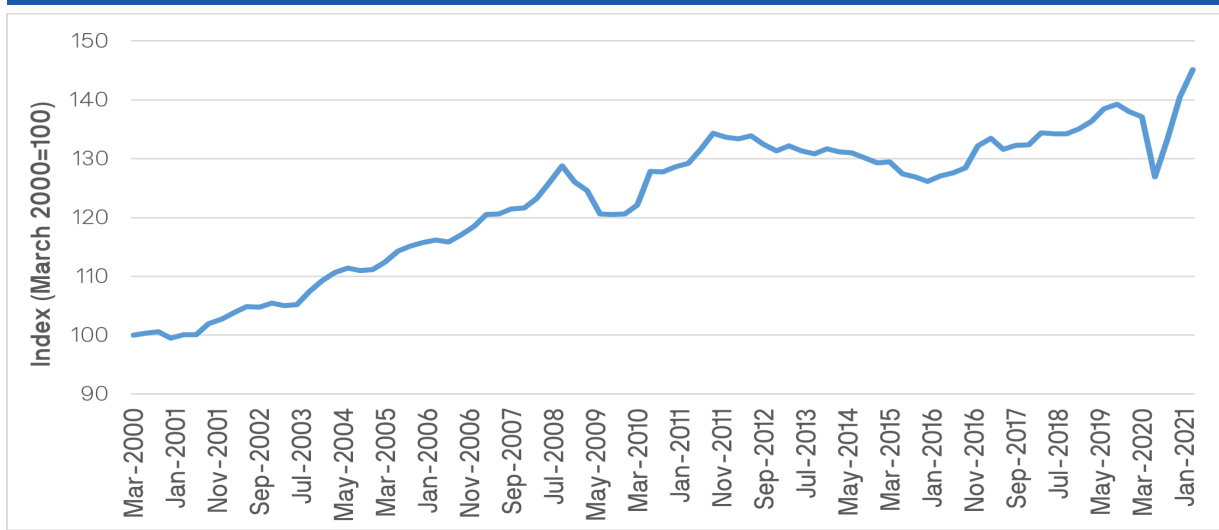
Resilience in the face of adverse shocks and shifts is made more challenging if Australia’s export basket is highly concentrated by market destination, product classification or both.

There are, of course, gains that come from concentrating on some markets and products rather than others. Budget papers produced by the Australian Treasury since the early 2000s have shown that Australia’s economic prospects have been boosted by its major trading partners, in particular China, growing faster than the world average.³ Similarly, specialising in the production and export of mining and energy products was instrumental

in delivering a 45.1 percent increase in income per-capita between March 2000 and March 2021 (Figure 1).

The relevant analytical question then is whether Australia’s export basket is ‘unusually concentrated’. And if it is, what have been the consequences of this concentration beyond the export basket for the domestic industrial base and broader economic performance and resilience? These are the questions with which this research report deals.

Figure 1. Australia's real net national disposable income per-capita



Source: Australian Bureau of Statistics.⁴

2. Benchmarking Australia's export basket

A recent report by the Australian government's Productivity Commission argued that, 'Australia is often misconstrued for having especially concentrated export markets...but in fact, Australia is not an outlier'.⁵ This assessment was based on an analysis showing that Australia's top 10 markets and top 10 products accounted for 79.3 percent and 67.8 percent of total exports, respectively. Both figures were close to the global averages of 71.5 percent and 70.7 percent.

[T]his report undertakes a potentially more instructive apples-for-apples comparison by benchmarking Australia's export basket against a peer group of other high-income, medium-sized economies from various regions.

However, this assessment is potentially vulnerable to a two-fold critique. First, it could be argued that the choice of metric does not accurately reflect the nature of the risk. Concerns around Australia's export market concentration do not relate to its top 10 markets but rather are more narrowly focused on the single top market. Second, it is debatable whether a 'global average' represents an appropriate benchmark to

gauge Australia's export basket concentration. Instead, this report undertakes a potentially more instructive apples-for-apples comparison by benchmarking Australia's export basket against a peer group of other high-income, medium-sized economies from various regions:

- Canada (North America);
- France, the UK, Switzerland, the Netherlands (Europe); and
- the Republic of Korea and Taiwan (Asia).

As documented in Appendix 1, these seven economies share broad similarities with Australia in terms of population, aggregate economic size and income per-person. There are differences too, such as with respect to overall exposure of each economy to exports. Variation in geographical size and factor endowments will also have implications for the composition of export baskets. It is to be expected, for example, that Australia's export basket will feature commodities to a much greater extent than Taiwan, which has a geographical size around half that of Tasmania.



3. Export market concentration

In much Australian commentary concerns around export resilience are framed in terms of an excessively large, top market exposure: ‘too many eggs in the China basket’.⁶ Figure 2 shows that amongst peer economies a top market share of 25-30 percent is par for the course over the period of analysis. In 2020, the top market share of Australia’s goods exports was China at 41 percent. This was significantly higher than the peer average of 30 percent and second only to Canada’s top market share - the US at 73 percent.

A qualification to China’s 41 percent share in 2020, however, is that a component of this trade feeds into global value chains. Research by economists at the Reserve Bank of Australia (RBA) found that a significant driver of China’s demand for commodities from economies like Australia was its exports of manufactured goods elsewhere.⁹ That is, the final consumer of Australia’s goods exports to China may not be in China. According to OECD data, if Australia’s goods exports are calculated in value-added rather than gross terms – an adjustment that attempts to control for the impact of global value chains – China’s share of the Australian total is lowered by around five percentage points.¹⁰

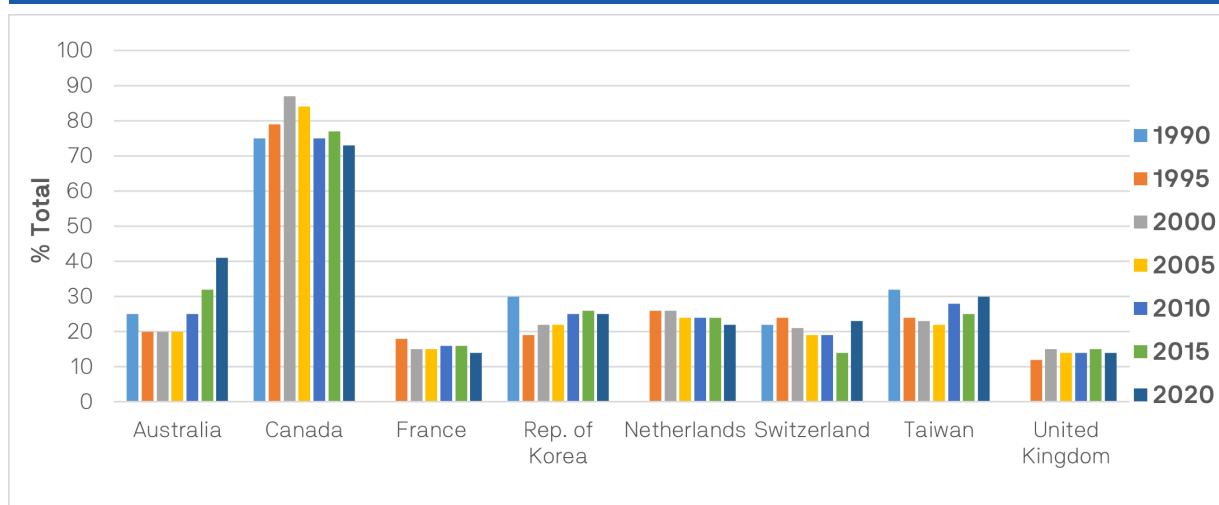
Figure 2 also shows that Australia’s relatively high exposure to its top market is only a recent phenomenon. In 2015, Australia’s top market

was China with a 32 percent share, just three percentage points higher than the peer average in that year of 29 percent. In 2010, Australia’s top market was China with a 25 percent share, three percentage points below the peer average of 28 percent.

If the period of analysis was extended back further, other instances would appear in Australia’s trade history when a top market other than China has exceeded the 25-30 percent band. In 1972, for example, Japan’s share of Australia’s goods exports stood at 30.8 percent, while in 1952 the UK’s share was 40.7 percent.¹¹ Some observers might contend that the risk associated with such exposures were not as large because unlike China today, Japan and the UK were more geopolitically aligned with Australia. Similarly, while Canada’s top market share today is much higher than Australia’s, it is exposed to the gravitational pull of the US economy, a ‘like-minded’ liberal democracy.

Yet for economies in the Asia-Pacific like Australia, having a significant exposure to China is closer to the rule rather than the exception. Taiwan has had China as its top market since 2005. In 2020, 30 percent of Taiwan’s goods exports went to China, despite serious geopolitical tensions between the two. China has also been the Republic of Korea’s top market since 2015 with around a 25 percent

Figure 2. Top goods export market - share of total (1990 - 2020)



Source: UN Comtrade Database,⁷ Taiwan Bureau of Foreign Trade⁸ and author calculations.

Note: Due to availability of data, values for France, the Netherlands and the UK begin in 1995.

share. The broader global context is that by 2020, nearly three-quarters of countries traded more goods with China than with the US.¹² It is also debatable the extent to which geopolitical alignment protects and promotes trade. In 1973, Australian agricultural producers were hit when the UK made the decision to join the European Common Market. In 2020, the US signed a bilateral trade pact with China that included the latter committing to better market access and greater purchases of American goods, thereby placing some Australian exporters at a disadvantage.

Yet for economies in the Asia-Pacific like Australia, having a significant exposure to China is closer to the rule rather than the exception.

Aside from a significant exposure to China being the norm in the Asia-Pacific region, a factor mitigating the associated risks is that many of the goods Australia sells to China are traded in global markets. In the event the China market is closed to Australian exports - as it now is for a variety of goods - the global market adjusts and creates new opportunities for Australian producers in other economies. 'Grey markets' also help in the adjustment by routing goods around official sanctions and re-connecting Australian producers with Chinese buyers.¹³ A key point is that markets perform

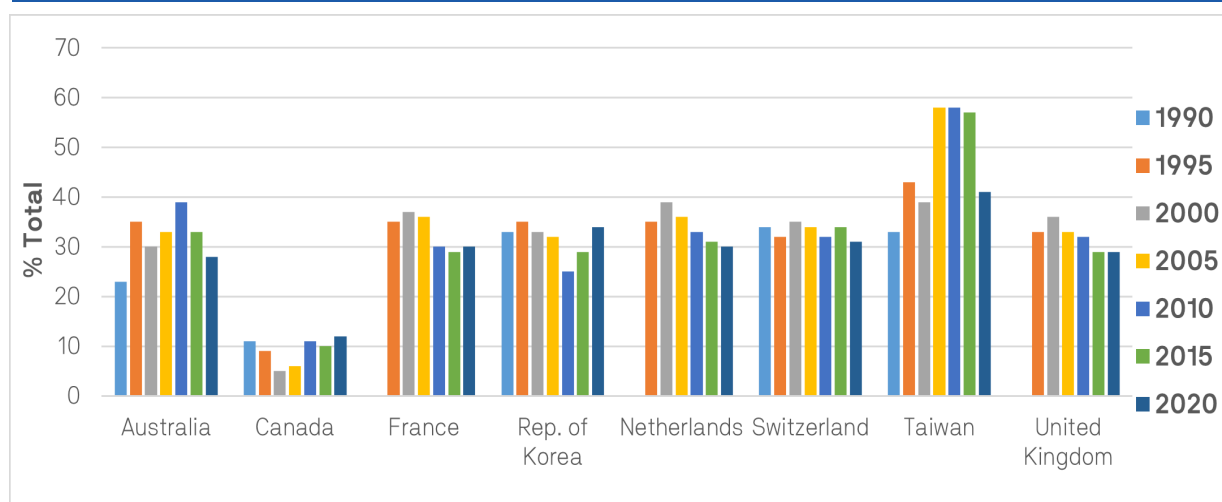
the adjustment: no public policy interventions are required.

Looking beyond the top market exposure to the combined share of the next four largest markets, Figure 3 shows Australia's exposure has consistently been in the middle of the pack.

The data presented in Figures 2 and 3 reveal Australia to only be an outlier in a limited sense with respect to export market concentration: having 41 percent of its gross goods exports going to China in 2020. This raises the question of what led to the nine percentage point jump in China's share since 2015.

The answer is overwhelmingly an iron ore story. Even more specifically, it is an iron ore price story. Data from China's customs agencies show the annual value of China's goods imports from Australia increased by US\$41 billion between 2015 and 2020. Iron ore accounted for US\$34.8 billion, or 85 percent of the increase. While the volume of China's iron ore imports from Australia rose by less than 20 percent during this period, the value nearly doubled as prices rose sharply.¹⁶ This carries several implications.

Figure 3. Combined 2nd to 5th largest goods export partners - share of total (1990 - 2020)



Source: UN Comtrade Database,¹⁴ Taiwan Bureau of Foreign Trade¹⁵ and author calculations.

Note: Due to availability of data, values for France, the Netherlands and the UK begin in 1995.



First, even with China's current, relatively high share of Australia's goods export basket, the resilience of this basket is unlikely to be tested in the short and medium term because Chinese steel mills have few alternative supplier options for iron ore. In 2020, Australia accounted for 53 percent of global seaborne iron ore exports and was the only major supplier in China's region. The other significant global supplier was Brazil, accounting for 24 percent of the world total.¹⁷

Second, the surge in the iron ore price that has been behind China's rising share is likely to be a temporary rather than permanent phenomenon. The 2021-2022 federal budget assumes an iron ore price of US\$55 per tonne by the end of March 2022, down from around US\$200 more recently.¹⁸ The implication is that an expected natural adjustment in the global iron ore market will return the top market share of Australia's goods exports back closer to the peer average.

Finally, an assessment that Australia's goods export basket is vulnerable because of an excessively large, top market concentration is mostly a misdiagnosis. Last year, China accounted for 68 percent of global seaborne iron ore imports.¹⁹ The next biggest importer was Japan with just 8 percent. These numbers make plain that if iron ore maintains its prominent place in Australia's goods export basket, China will inevitably be a principal

market destination. Take away iron ore and in 2020 China's share of Australia's good exports almost halves from 41 percent to just 22 percent.

Last year, China accounted for 68 percent of global seaborne iron ore imports. The next biggest importer was Japan with just 8 percent. These numbers make plain that if iron ore maintains its prominent place in Australia's goods export basket, China will inevitably be a principal market destination.

Turning to services exports, these account for 22 percent of Australia's total exports. This compares with a peer average of 27 percent. In 2018, Australia's top market for services exports was China, accounting for a 20 percent share. While greater than the top market share for France, which was the US at 12 percent, this was less than the UK's exposure to the US at 23 percent and Canada's exposure to the US at 57 percent.²⁰ Recent data for France, the Republic of Korea, the Netherlands and Taiwan were unavailable.

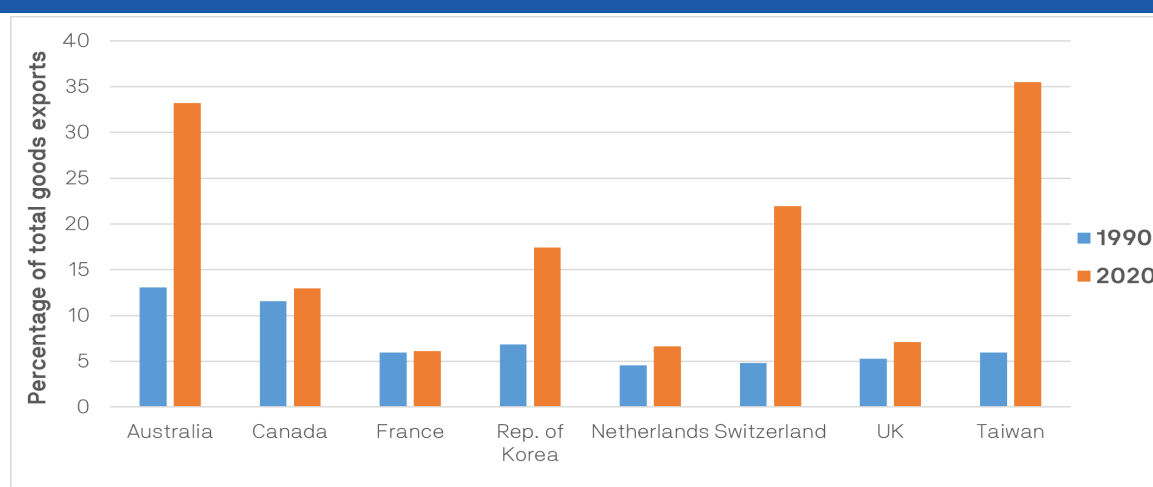
4. Export product concentration

Using Harmonized System (HS) trade classification codes at the four-digit level, Figure 4 shows the proportion of total goods exports accounted for by the top product in the case of Australia and peer economies. In 1990, Australia's top product was coal, accounting for 13.1 percent of the total. This was the highest amongst peers and considerably higher than the average of 6.4 percent. By 2020, the share of Australia's top product – now iron ore – had more than doubled to 33.2 percent. This compared with a peer average of 15.4 percent. The only economy to have a top product share larger than Australia was Taiwan with 'electronic integrated circuits'.

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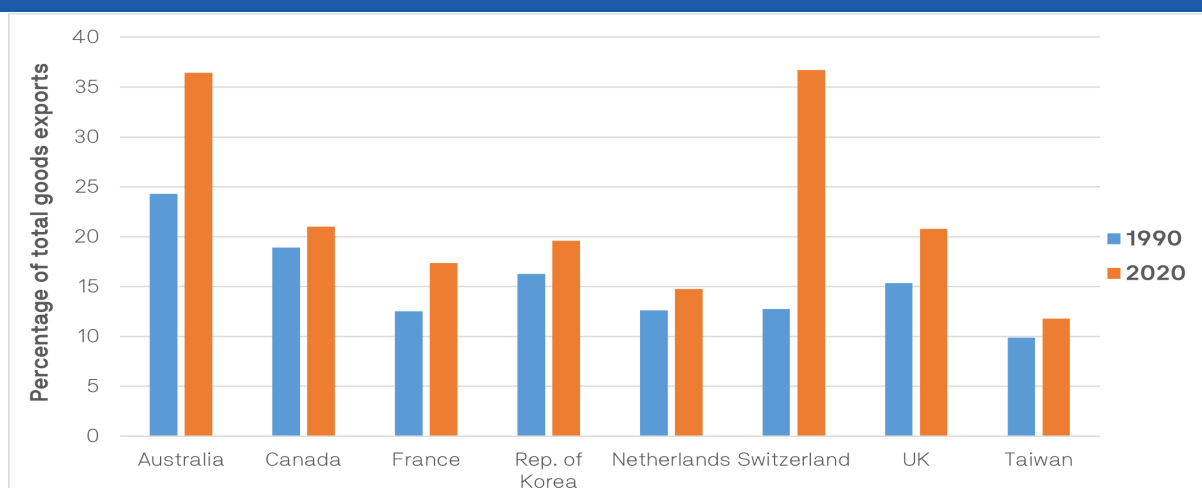
Figure 5 shows the combined share of the 2nd to 5th top products in total goods exports. In 1990 this share was 24.3 percent for Australia, compared with a peer average of 14.0 percent. By 2020, the share for Australia had grown to 36.4 percent. The peer average was 20.3 percent. In other words, even beyond the top product of iron ore, Australia's goods export basket was relatively concentrated.

Figure 4. Top product share of total goods exports (1990 & 2020)



Source: UN Comtrade Database,²¹ Taiwan Bureau of Foreign Trade²² and author calculations.
Note: Due to availability of data, values for France, the Netherlands and the UK begin in 1995.

Figure 5. Combined 2nd to 5th top products share of total goods exports (1990 & 2020)



Source: UN Comtrade Database,²³ Taiwan Bureau of Foreign Trade²⁴ and author calculations.
 Note: Due to availability of data, values for France, the Netherlands and the UK begin in 1995.

The Australian government’s Trade Import and Export Classification (TRIEC) system can be used to further explore export product concentration. The TRIEC system assigns goods exports according to their sector of origin and level of processing complexity. Broad sectors include primary goods, manufactured goods and ‘other goods’.²⁵

Figure 6 shows that in 1990, primary goods accounted for 57 percent of Australia’s total goods exports. Manufactured goods added another 33 percent, while ‘other goods’ – principally confidential export items and non-monetary gold – made up the balance. Australia’s 57 percent share of primary goods was, by far, the highest in the peer group. Canada was second with a share less than half that, while the peer average was nine percent. The flipside to Australia’s unusually high primary goods share was an unusually low manufactured goods share. At 33 percent, this compared with a peer average of 89 percent.

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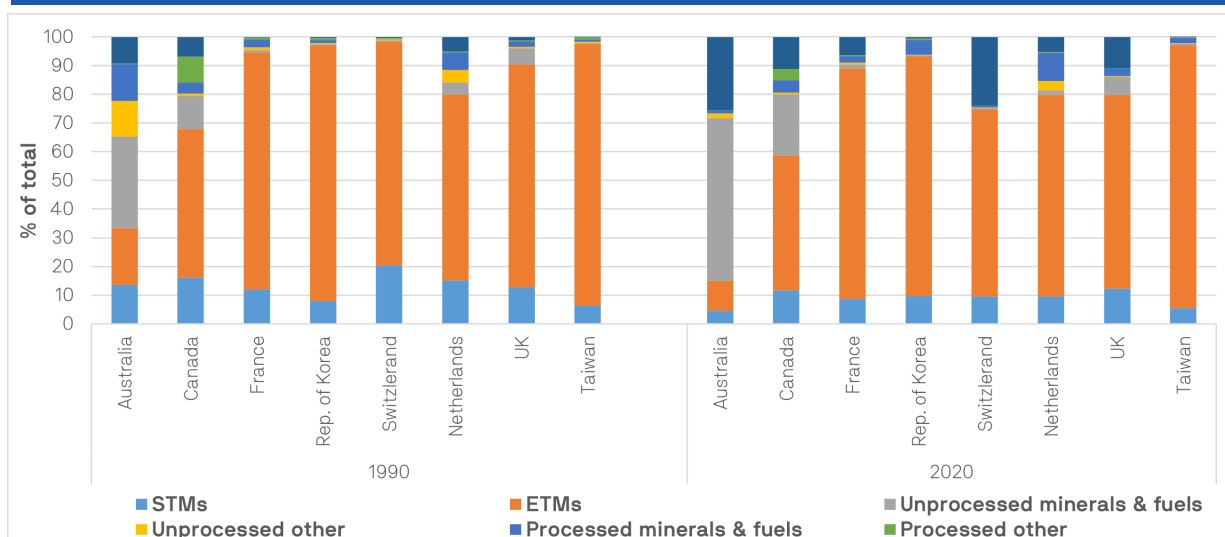
Aside from being heavily weighted towards primary goods, Australia’s goods export basket in 1990 was also distinguished by a lack of complexity. Figure 6 also shows that of Australia’s primary goods exports, 77 percent took an unprocessed form. This compared with the peer average of 48 percent. The same pattern is seen for manufactured goods. In Australia’s case, simply transformed manufactures (STMs) accounted for 41 percent of manufactured goods exports. The peer average was 15 percent.

Figure 6 also shows that in 2020 the share of primary goods in Australia's goods exports edged up further to 59 percent. This was six times the peer average of 10 percent. In fact, the share of primary goods in Australia's case was even higher. 'Other goods' were mostly primary products too, pushing the primary goods share of the total above 80 percent, or eight times the peer average.²⁹ Australia's manufactured goods share fell from 33 percent in 1990 to 15 percent in 2020. The average share for the peer group fell too but more modestly from 89 percent to 82 percent. In other words, despite Australia having a much smaller manufactured goods share to begin with, it still recorded a more pronounced decline – 18 percentage points against seven percentage points.

The already large complexity gap between Australia's goods exports and the peer group also widened. In 2020, 98 percent of Australia's primary goods exports were in unprocessed form, up from 77 percent in 1990. Meanwhile, the average for the peer group fell from 48 to 42 percent. The share of STMs in Australia's manufactured goods exports fell from 41 percent to 30 percent, an advancement in levels of complexity. Nonetheless, this share of STMs remained well above the peer average of 12 percent.

The already large complexity gap between Australia's goods exports and the peer group also widened. In 2020, 98 percent of Australia's primary goods exports were in unprocessed form, up from 77 percent in 1990. Meanwhile, the average for the peer group fell from 48 to 42 percent.

Figure 6. Goods exports proportion of total - by type of product (1990 vs. 2020)



Source: UN Comtrade Database,²⁶ Taiwan Bureau of Foreign Trade²⁷ and author calculations.

Note: 1. Due to availability of data, values for France, the Netherlands and the UK begin in 1995.

2. UN HS codes have been converted to TRIEC classifications via a concordance exercise.²⁸

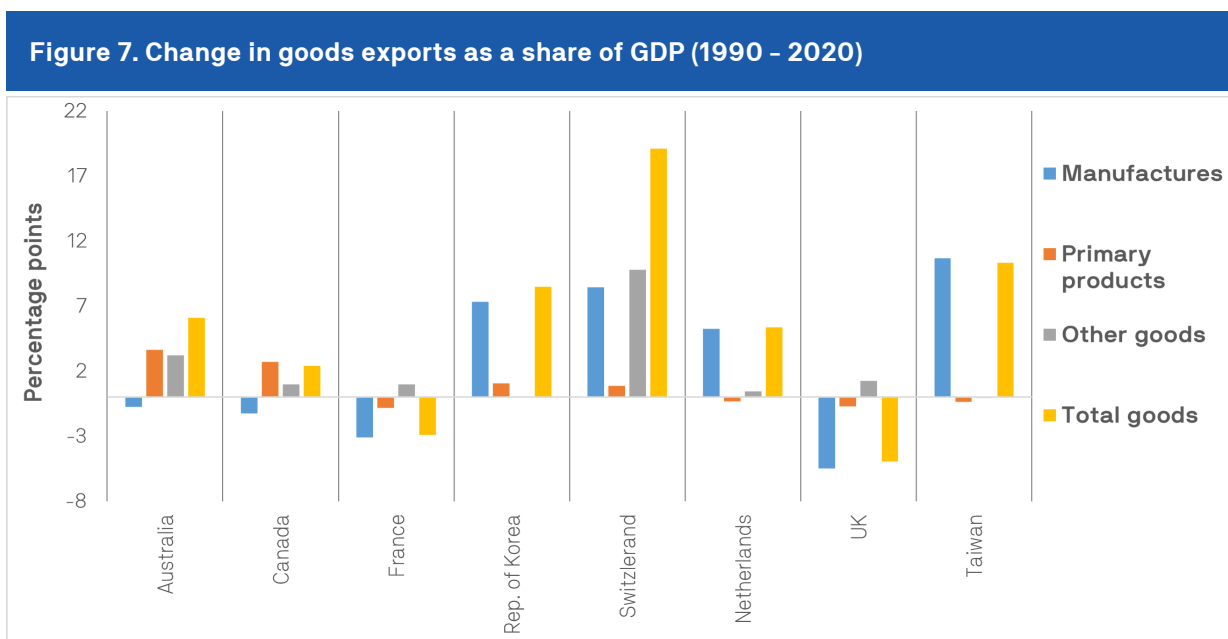
3. Due to availability of data, Taiwan data includes the top 1000 products only.

The surge in the share of primary goods, particularly unprocessed ones, reflected a rational response that leveraged Australia's natural factor endowments in response to strong global demand. The Australian economy was delivered a boost. That said, in output terms at least, peers with export baskets more orientated towards manufactures and complex goods were mostly able to match Australia's performance. Figure 7 shows that between 1990 and 2020 the ratio of Australia's goods exports to gross domestic product (GDP) rose by 6.1 percentage points, owing strongly to primary products. This was only marginally greater than the peer average, which rose by 5.4 percentage points. Switzerland and the Republic of Korea led the rankings with jumps of 19.1 and 8.5 percentage points, respectively. While Australia gained via primary goods, the Republic of Korea, Switzerland, the Netherlands and Taiwan received an even larger contribution via manufactures.

Turning to services, data pertaining to product concentration are patchier than for goods. In 2015, the services export category of 'travel', encompassing education and tourism, accounted for 62 percent of Australia's total services exports. The peer average (excluding Taiwan and Switzerland) for the top services export category was 33 percent.³³

The findings of this section provide strong evidence that Australia's export basket is unusually concentrated by product. In contrast, the evidence presented in Section 3 is much weaker that Australia is an outlier in terms of market concentration. These results serve to provide a more accurate diagnosis of the source of Australia's export resilience challenge.

The surge in the share of primary goods, particularly unprocessed ones, reflected a rational response that leveraged Australia's natural factor endowments in response to strong global demand.



Source: UN Comtrade Database,³⁰ IMF,³¹ Taiwan Bureau of Foreign Trade³² and author calculations.

- Note: 1. Due to availability of data, values for France, the Netherlands and the UK begin in 1995.
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Box 1. The carbon headwind facing Australia's goods exports

Having become increasingly concentrated around the category of unprocessed minerals and fuels, the resilience of Australia's export basket is challenged by accelerated global action on climate change.

While only accounting for 0.3 percent of the world's population, domestic use sees Australia responsible for around 1.4 percent of global fossil fuel combustion emissions. This is despite Australia having a much lower energy-hungry manufacturing share of GDP than peer economies. If fossil fuel exports like coal and liquefied natural gas (LNG) are included, Australia's global carbon footprint grows to five percent.³⁴

The US has re-joined the Paris Agreement, major economies have committed to deadlines for achieving carbon neutrality and in July 2021 G20 finance ministers collectively endorsed carbon pricing for the first time.³⁵

The most direct risk to Australia's energy exports comes from a relative shift abroad to using renewable energy sources for electricity production, albeit fossil fuels like LNG will have a role to play in the energy transition. In the longer term however, there is the prospect of energy sources such as hydrogen replacing both coal and LNG in the production of materials like 'green steel' and 'green cement'.

Australian government departments have recognised that a role exists for public policy to assist in the management of this challenge by facilitating a transition in the mix of Australia's energy exports towards renewables.³⁶

Another risk to the modest volume of Australia's manufactured goods exports is carbon price-adjustment tariffs. Producers in jurisdictions with a carbon price incur an added cost. This is leading to governments in these economies contemplating the introduction of an equalisation tariff applied to imports from jurisdictions where a carbon price is absent. The European Parliament recently adopted a resolution supporting a Carbon Border Adjustment Mechanism, while the Biden administration in the US has also mooted the possibility of a similar scheme. The production of key Australian manufactured goods exports like aluminium, zinc and copper are potentially vulnerable because they tend to rely on coal-fired electricity generation.

5. Interdependence of export mix with the industrial base

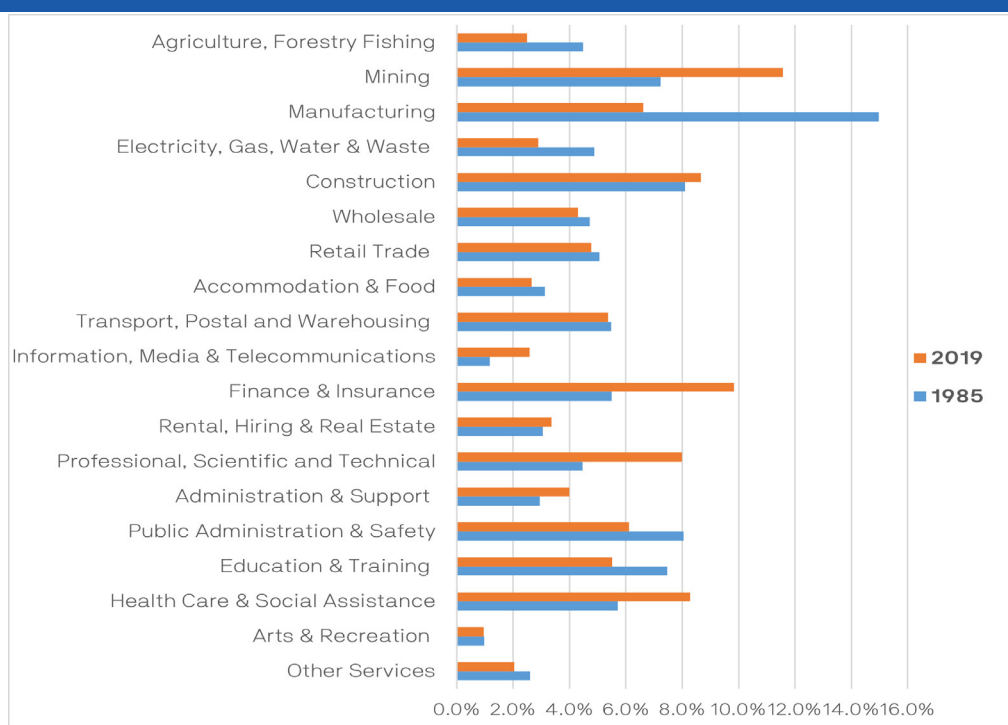
The marked changes in the composition of Australia's exports have not stopped there. They have also affected the domestic industrial base. In turn, changes in the industrial base have fed back into the export basket, reinforcing its altered composition over time.

[T]he mining industry increased its share of Australian total value-added from seven percent in 1985 to 12 percent in 2019. This vastly exceeds that of Australia's peers.

The Australian economy has undergone large shifts in the structure of both output (Figure 8) and employment (Figure 9) over the last four decades. Mining now has the largest output of any industry. Spurred by strong overseas demand, the mining industry increased its share of Australian total value-added (similar to GDP) from seven percent in 1985 to 12

percent in 2019. This vastly exceeds that of Australia's peers. Even in Canada, another geographically large economy with extensive natural resources, the share of mining was five percent of GDP.³⁷ The surge in the output share of mining was not, however, matched by an equivalent rise in its direct share of employment. Owing to the capital-intensive nature of production in mining, the sector's direct share of employment was 1.5 percent in 1985 and this increased marginally to 1.8 percent in 2019.

Figure 8. Industry share of total value-added (1985 - 2019)

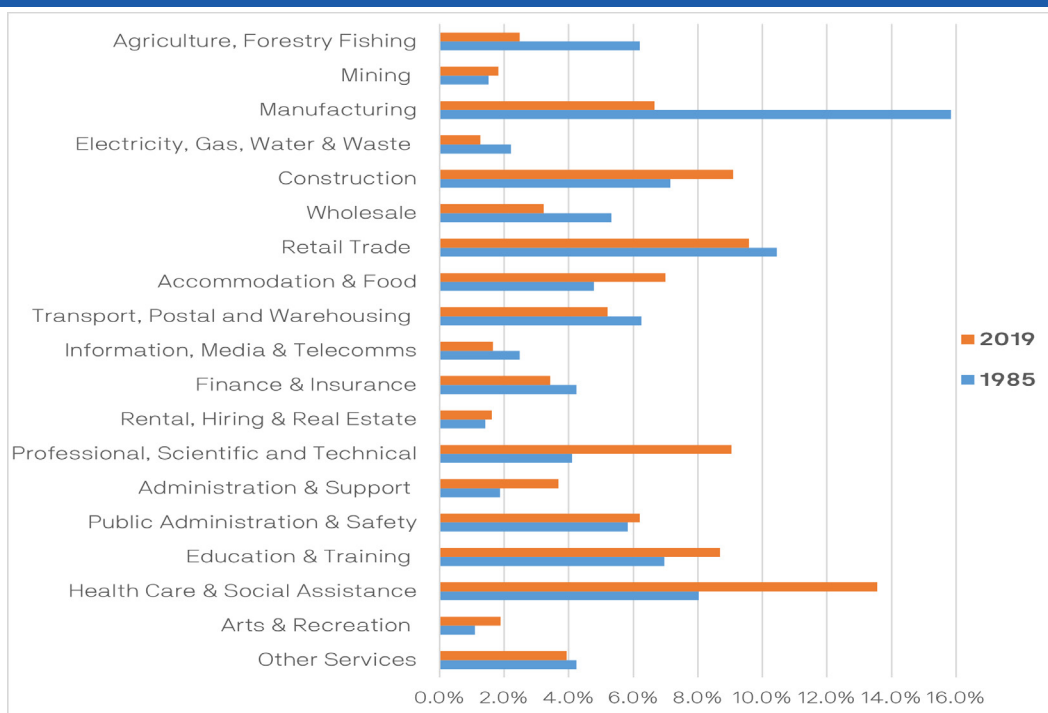


Source: Australian Bureau of Statistics³⁸ and author calculations.

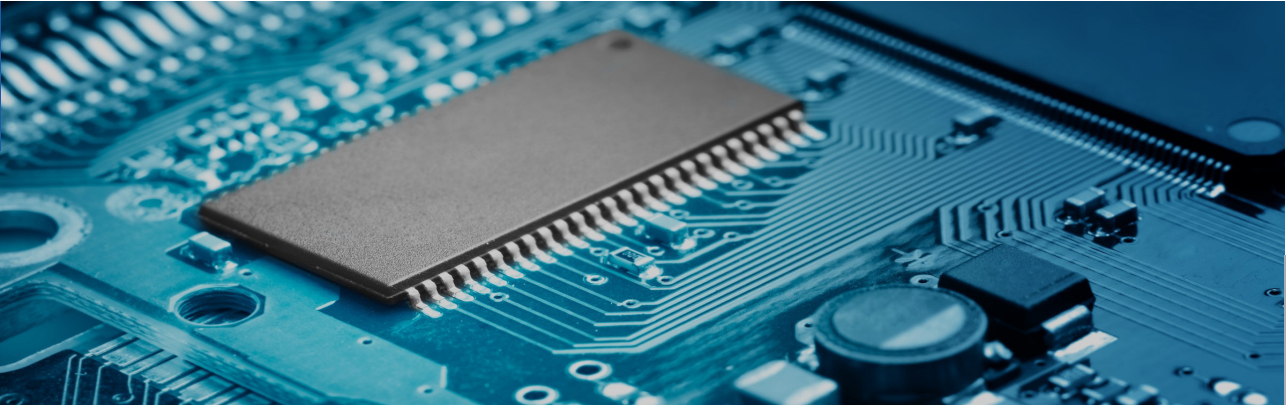
Mining's increased prominence in Australia's export basket and industrial base has had a counterpart: a relative shrinking of manufacturing. The previous section highlighted that Australia's export basket has come to be characterised by an unusually low share of manufactures. The same observation can be seen in Australia's industrial base. In 1985, manufacturing was the economy's largest industry sector at 15 percent. By 2019, however, this fell to seven percent (Figure 8). Manufacturing also began the period by providing the largest industry share of employment at 16 percent. By 2019, this had fallen to 6.7 percent (Figure 9). Australia now has the lowest manufacturing share of output amongst peer economies by a considerable margin (Figure 10). Almost all of Australia's peers experienced a decline in this industry, reflecting deep structural changes among high-income nations. However, the decline was particularly large in Australia, despite this beginning from an already relatively low base.

In 1985, manufacturing was the economy's largest industry sector at 15 percent. By 2019, however, this fell to seven percent. Manufacturing also began the period by providing the largest industry share of employment at 16 percent. By 2019, this had fallen to 6.7 percent. Australia now has the lowest manufacturing share of output amongst peer economies by a considerable margin.

Figure 9. Industry share of total employment (1985 - 2019)



Source: Australian Bureau of Statistics³⁹ and author calculations.

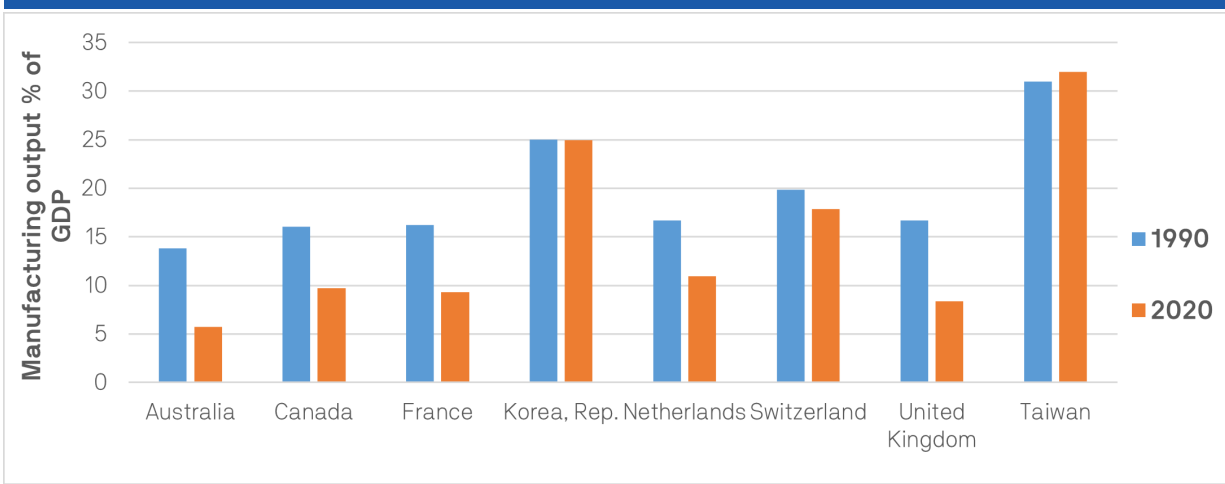


To understand the relative shrinking of manufacturing in Australia’s industrial base, it is necessary to look beyond the export basket. Australia has also developed an import basket unusually concentrated around ETMs. Figure 11 shows that in 1990 Australia recorded an overall goods trade deficit of 1.9 percent of GDP. This was driven by a large trade deficit in ETMs equal to 6.9 percent of GDP. This deficit in ETMs far exceeded that of Australia’s peers. Offsetting this, in part, was a trade surplus in unprocessed minerals and fuels equal to 2.6 percent of GDP. Such inter-industry trade was also prominent in the Republic of Korea and Taiwan, albeit in the opposite fashion: a large trade surplus in ETMs stood alongside a trade deficit in unprocessed minerals and fuels. Other peers, meanwhile, maintained a much higher proportion of intra-industry trade. For example,

ETMs are both exported and imported in large volumes, leading to sector balances of 2.0 percent of GDP or less as inflows and outflows mostly net out.

This transformation of the industrial base was accelerated by the commodities boom of the early 2000s, which elevated the exchange rate and made it harder for domestically-produced manufactures to compete. In 2020, Australia ran a trade deficit in elaborately-transformed manufactures (ETMs) equal to 9.5 percent of gross domestic product (GDP), while the peer average was a surplus of 2.5 percent.

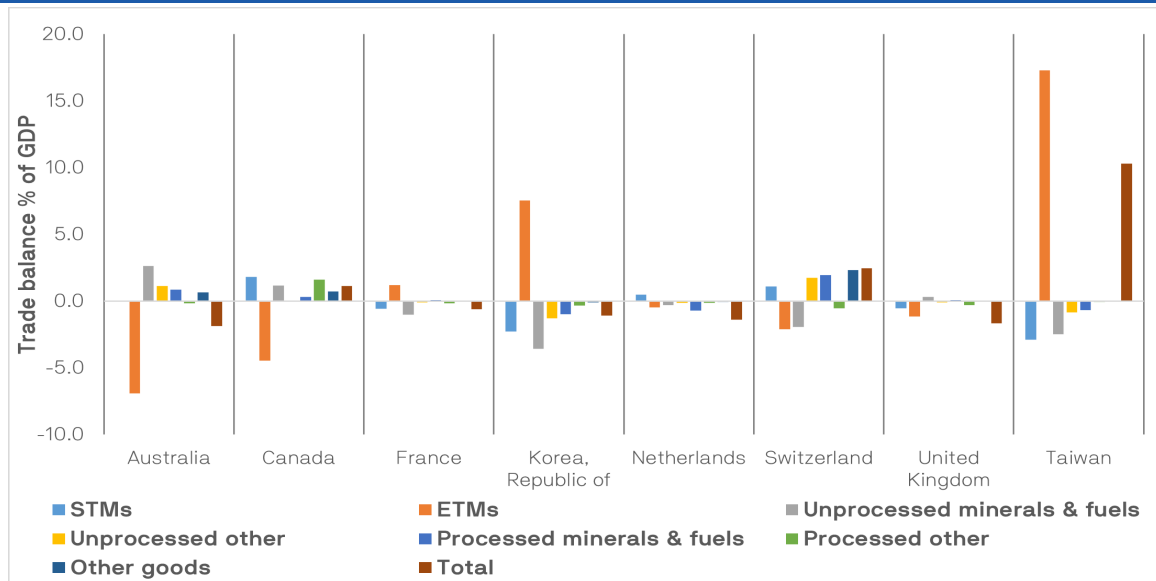
Figure 10. Manufacturing output share of GDP (1990 & 2020)



Source: World Bank,⁴⁰ DGBAS Executive Yuan⁴¹ and author calculations.

Note: Due to availability of data, values for Canada range from 1997 - 2017.

Figure 11. Sector trade balance as % of GDP (1990)

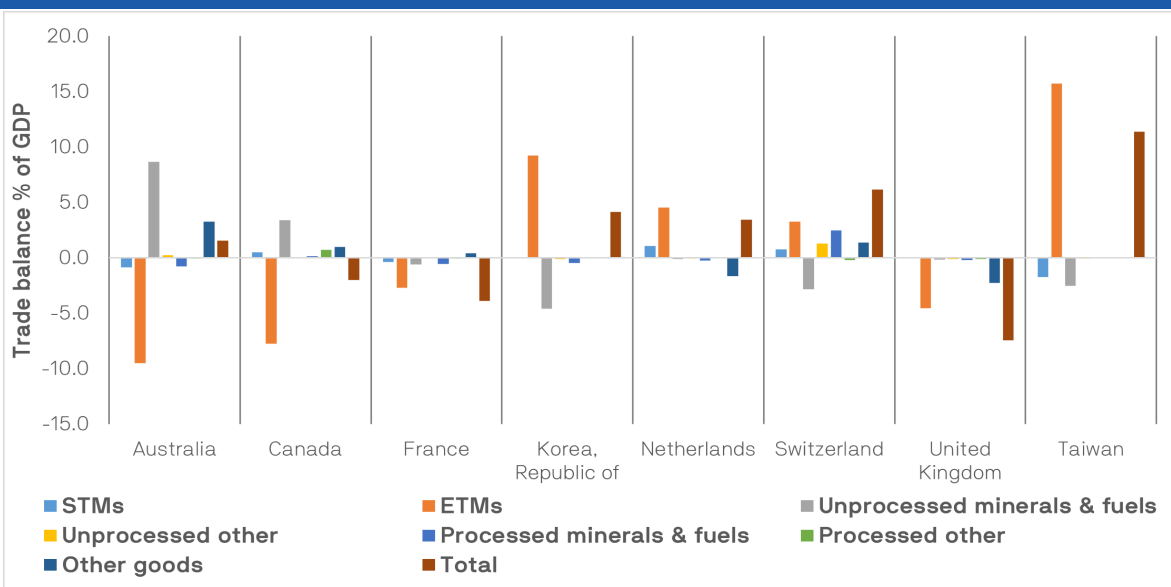


Source: UN Comtrade Database,⁴² IMF,⁴³ Taiwan Bureau of Foreign Trade⁴⁴ and author calculations.
 Note: 1. Due to availability of data, values for France, the Netherlands and the UK begin in 1995.
 2. UN HS codes have been converted to TRIEC classifications via a concordance exercise.
 3. Due to availability of data, Taiwan data includes the top 1000 products only.

In 2020, Figure 12 shows Australia’s overall goods trade deficit had turned into a trade surplus of 1.6 percent. The trade deficit in ETMs, however, had expanded further from 6.9 percent to 9.5 percent of GDP. Canada was the only peer to display any degree of similarity with a deficit in ETMs of 7.8 percent. The peer

average balance in ETMs, meanwhile, was a surplus of 2.5 percent. Australia’s widening ETMs deficit was accompanied by an expansion in the trade surplus of unprocessed minerals and fuels, which jumped from 2.6 percent to 8.6 percent of GDP.

Figure 12. Sector trade balance as % of GDP (2020)



Source: UN Comtrade Database,⁴⁵ IMF,⁴⁶ Taiwan Bureau of Foreign Trade⁴⁷ and author calculations.
 Note: 1. UN HS codes have been converted to TRIEC classifications via a concordance exercise.
 2. Due to availability of data, Taiwan data includes the top 1000 products only.

6. Interpreting changes in Australia's industrial base

Over the last two decades expansion of international demand for Australia's natural resources produced a large rise in the terms of trade, or export prices rising faster than import prices. The exchange rate strengthened accordingly in view of the Australian dollar being widely regarded by markets as a 'commodity currency'. By the early 2010s, the terms of trade had hit highs not seen in a century.⁴⁸ Over the first two decades of this century the real trade-weighted exchange rate peaked at 80 percent above the level in 2000.⁴⁹ In 2021, it remains around 30 percent above the average for the 1990s.⁵⁰

As the RBA explains, the effect of a high Australian dollar is to raise 'the relative price of Australian produced goods and services, thereby shifting demand – both domestically and internationally – away from the non-resource traded sectors of the Australian economy'.⁵¹ In other words, the sustained high value of the Australian dollar was and is an important factor in reducing the competitiveness and size of domestic non-commodity trade exposed sector, including manufacturing, and shifting domestic demand to imports (as evidenced by the large rise in imported ETMs) and to non-trade exposed domestic services.

There is widespread agreement that the commodities boom-induced rise in the terms of trade had these effects on domestic patterns of consumption, production and industrial structure. However, just as there are differing interpretations on the economic implications of increased market and product concentration in the nation's exports, with some emphasising a variety of heightened potential risks and others more focused on the realised benefits, so too there are differing interpretations as to the longer-term effects and desirability of these changes in the structure of Australia's industrial base.

On the one hand, such shifts in the share of output and employment across industries induced by a high and sustained exchange

rate, are viewed as an advantageous and an essential part of 'structural adjustment' in a market economy. The core assumption of this view is that the free movement of capital and labour across industries in response to price changes is central to the welfare of the nation and in particular productivity growth, as productive resources shift to industries that offer the highest return for their services. In 2011, Gary Banks, then-chair of the Productivity Commission, argued structural change over the last decades reflects 'the beneficial nature of the current reallocation of jobs within the economy from lower to higher valued activities'. The shift to increased domestic production of services is indicative of an economy responsive to changing consumer demand and benefitting from the large terms of trade boost. These shifts are due 'to us being richer than we were and consuming more goods and (especially) services'.⁵²

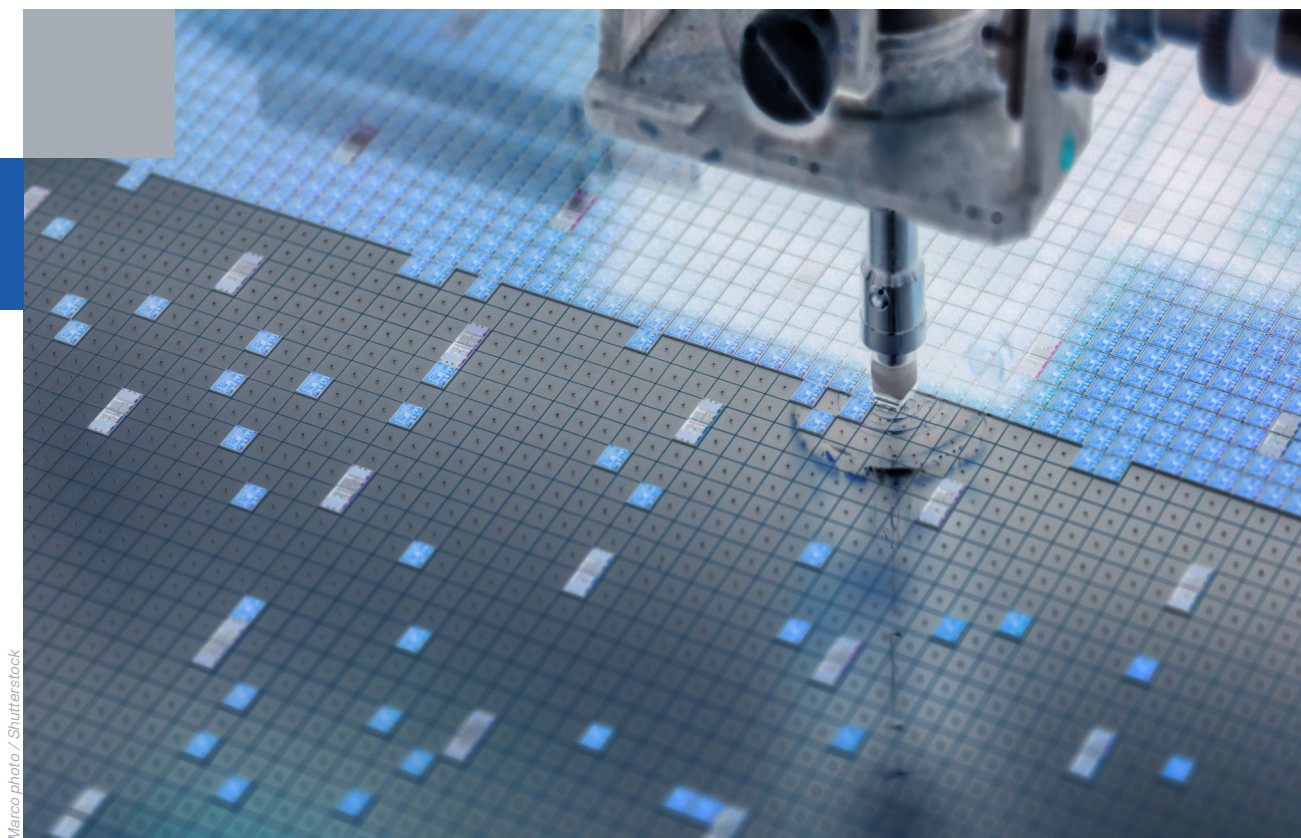
On the other hand, the research literature also provides a different perspective on these structural changes, colloquially known as the 'Dutch disease' (named after the nation which underwent similar structural changes to Australia from the early 1970s caused by the boom in North Sea gas) and the rise of 'Baumol' service industries (named after the economist who first identified and articulated their properties). Whilst accepting all of the causes and effects of structural change induced by the commodities boom, as outlined above, this perspective also argues that these changes to the composition of industries will be persistent, extending for some years or even decades after the initial sustained exchange rate appreciation.⁵³

The major reasons for this are first, that once domestic buyers substitute imported manufactures and services over domestic production, purchasing and supply infrastructure and long-term contracts become oriented to these arrangements. Second, once a nation's manufacturing skills base erodes it can take many years to re-train workers and re-construct manufacturing oriented vocational and university facilities that have been converted to other uses. Finally, econometrician Peter Brain also argues that

large exchange rate fluctuations induced by cyclical commodities booms (and busts) cause investors to impose a high risk-premium on investment in non-commodity tradeables and this is an important factor behind the decline of manufacturing.⁵⁴ In 2016, the RBA reported empirical support for the Dutch disease thesis in that over several decades both imports and exports of manufactures have become less responsive to appreciation or depreciation in the value of the Australian dollar: ‘There is evidence, both via the Bank’s business liaison program and in academic literature, that this is a structural phenomenon’.⁵⁵

One implication of these sustained effects is reduced resilience if the economy is subsequently struck by adverse shocks and shifts. For example, the issue of a domestic manufacturing industry in relative decline feeds directly into current local and international debates about ‘sovereign production capacity’ (see Box 2).

One implication of these sustained effects is reduced resilience if the economy is subsequently struck by adverse shocks and shifts.



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Box 2. Sovereign production capacity

Recent disruptions to international supply chains caused by the COVID-19 pandemic, such as around medical personnel protective equipment and computer chips, have intensified focus on the domestic supply capacity of essential goods and services. The possibility of international disputes directly or indirectly involving Australia, resulting in disruption to international commerce, also brings attention to sovereign production capacity.⁵⁶

Determining what are 'strategic' and/or essential supplies is a complex and arguable task and will not be attempted here.⁵⁷ Nonetheless, the findings presented in this report with respect to changes in Australia's industrial structure are germane to current debates about sovereign production capacity. The key point is that Australia's unusual trade structure and the changes this has wrought on the industrial structure predispose the economy to vulnerability from international manufacturing supply chain shocks.

A sectoral index of sovereign production capacity is manufacturing import penetration or share of imports in total turnover of domestic manufacturing industries (Table 1). For manufacturing as a whole imports are the equivalent of 70 percent of domestic supply and for seven of the 15 industries imports are the equivalent of 50 percent or more of local supply. This arguably is indicative of potential supply chain vulnerability. The vulnerability is especially acute in higher technology industries such as chemicals and polymer products (including pharmaceuticals) and industrial and transport equipment. In the latter two industries the weighted average ratio of imports to domestic supply is two to one. Economist Jim Stanford has argued that Australia has the lowest share of 'self-sufficiency' in manufactures amongst all OECD members.⁵⁸

Concerns around sovereign production capacity should not, however, be over-simplified or exaggerated. A recent report by the Productivity Commission reports that Australia's supply chains generally proved resilient in response to the pandemic. The Commission also emphasised that producing more goods at home is only one risk mitigation strategy and in many cases may not be the most effective one.⁵⁹ Meanwhile, moving away from manufactures, Australia's sovereign capacity to produce food, for example, is ample with the Australian Bureau of Agricultural and Resources Economics and Sciences concluding last year that, 'Australia is one of the most food secure nations in the world'.⁶⁰

Table 1. Domestic turnover of manufactures minus imports; Imports as a percent of total turnover of domestic manufacturing, Australia (2018 - 2019)

	Domestic turnover minus imports \$bn	Imports as % of domestic turnover
Food Products	78.1	16.2%
Primary Metal and Metal Products	44.3	21%
Fabricated Metal Products	22.1	33%
Non-Metallic Mineral Products	18.1	16%
Beverage and Tobacco	12.6	26%
Wood Products	11.9	17%
Printing	7.1	11%
Pulp, Paper	7.0	33%
Basic Chemical and Chemicals	5.9	82%
Polymer Product and Rubber Products	3.9	75%
Furniture and Other Manufacturing	-3.2	143%
Petroleum and Coal Products	-8.1	145%
Textile, Leather, Clothing and Footwear	-10.9	241%
Transport Equipment	-16.0	155%
Machinery and Equipment	-51.1	227%
Total Manufacturing	121.7	70%

Source: Australian Bureau of Statistics.^{61, 62, 63}

Another implication relates to productivity growth. As noted above, sustained high exchange rates have constrained the non-commodities traded sectors of the Australian economy. This is directly problematic for productivity growth given that trade exposed firms are, on average, more productive than less trade exposed firms because of the dynamic gains from exporting such as more intense competition and learning from foreign market contacts including customers, suppliers and competitors. Support for this proposition is that at 24 percent Australia has the fourth lowest share of exports as a share of GDP across the 38 member OECD and as shown earlier, these exports are dominated by unprocessed mineral and agricultural commodities. The OECD average export propensity is 30 percent of GDP.⁶⁴

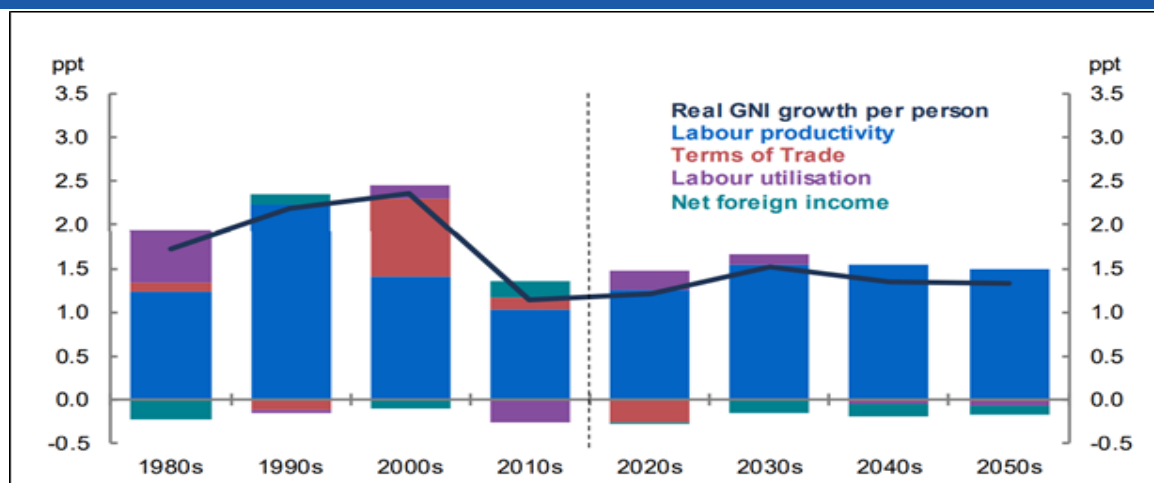
Further, some decades ago, the economist William Baumol found that the evolving industrial structure of high-income nations predisposed them to lower productivity growth and that this was driven by the increased share of income spent on services, some of which were subject to a definite ceiling on the rate of output per worker – so-called ‘Baumol industries’.⁶⁵ The changes in the industrial structure associated with the ‘Dutch disease’ can accelerate the growth of ‘Baumol-industries’. Indeed, standard analysis of resource sector expansion is precisely that domestic demand shifts more to services.⁶⁶ Activities like tourism, child and aged care,

cafes, cleaning, personal transport and hairdressing cannot be readily mechanised or automated and are subject to low capital input per worker. Other sectors like health, social assistance, construction and education are subject to different but apparently equally binding limits on the rate of output per worker. The mining sector, on the other hand, although highly productive can only directly engage a small proportion of the workforce.⁶⁷

The long-run result of structural change is a split or bifurcation in the industrial structure into high and low productivity growth sectors (Table 2). It is evident that, in general, industries with high productivity growth contributed less to employment growth. Services industries such as Health and Social Assistance, Retail, Transport, Accommodation and Food, Education and Training and Construction mostly experienced productivity growth well below average. In 1985, 65 percent, or close to two-thirds, of total employment was in industries with below average level of productivity, but by 2019 this had increased to 75 percent.⁶⁸

Agencies such as the Productivity Commission and NSW Treasury have argued these trends have important implications for the long-run future rate of overall productivity growth and living standards. The ‘shift to service industries can be viewed as a headwind for productivity growth’.^{70, 71}

Figure 13. Contributions to national income growth



Source: Australian Government Department of the Treasury.⁷⁴

Moreover, historically there has been a strong positive correlation between the level of labour productivity across industries and the level of wages.⁷² In simple terms, high productivity industries pay more than low productivity industries. There is not the space to investigate this further, but it is clearly possible the bifurcation in productivity across industries may be a factor in growing income inequality given strong jobs growth in industries with below average productivity.

commodities boom and associated terms of trade boost masked the structural deterioration of productivity performance, which now limits national income growth. Given that population and labour force participation are anticipated to add little if anything to growth over the next 40 years, the heavy lifting will have to be done by productivity-enhancing measures if Australia is to achieve the desired increase in living standards over this period (Figure 13).⁷³

The recently released Intergenerational Report (IGR) highlights the fact that the early 2000s

Table 2. Industry labour productivity and contribution to total employment growth, Australia (1985 - 2019), ranked by labour productivity

	Labour productivity CAGR	Contribution to total employment growth
Information, Media and Telecomms	5.1%	0.7%
Finance and Insurance	3.8%	2.6%
Wholesale	2.6%	0.9%
Agriculture, Forestry and Fishing	2.4%	-1.5%
Mining	2.3%	2.2%
Transport, Postal and Warehousing	1.9%	4.1%
Manufacturing	1.5%	-3.3%
Electricity, Gas, Water and Waste	1.5%	0.2%
Retail Trade	1.5%	8.7%
Rental, Hiring and Real Estate	1.3%	1.8%
Health Care and Social Assistance	0.9%	19.5%
Other Services	0.9%	3.6%
Construction	0.9%	11.2%
Professional, Scientific and Technical	0.8%	14.4%
Public Administration and Safety	0.4%	6.6%
Administration and Support	0.3%	5.6%
Education and Training	-0.1%	10.5%
Accommodation and Food	-0.2%	9.4%
Arts and Recreation	-0.3%	2.7%
Total	1.4%	2.0*

Source: Australian Bureau of Statistics.⁶⁹

7. Policy next steps

In documenting that Australia is an outlier in terms of its export product structure and industrial base, the findings of this report prompt and serve as a basis for an informed discussion and debate around appropriate public policy responses. While recognising that government intervention can potentially ameliorate risks, it comes with costs too, and there is significant scope for a divergence between best intentions and actual policy effectiveness.



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Appendix 1.

A selection of peers for Australia excludes mega-economies like the US and China. Their massive domestic markets make living standards less dependent on international trade. Peer selection would also exclude smaller, high-income countries such as New Zealand, Singapore and Denmark because they lack the same economic and strategic weight to absorb volatility from abroad and to shape their domestic and external environments. It would further leave out a host of low and middle-income countries because they do not have the same level of resources or institutions of equivalent quality to mitigate the risks.

There are, of course, some notable differences in the high-income, medium-sized peer economies that have been selected. One such difference is with respect to the overall exposure of the economy to exports. At 24 percent in 2019, Australia's export-to-GDP ratio is the lowest in the group by a considerable margin. The highest is the Netherlands at 83 percent. There are some straightforward considerations that help to explain this. For example, previous research finds that the distance to potential trade partners is negatively related to the export share of GDP, thus drawing attention to Australia's relatively

isolated geography. But the observation also raises questions about whether the full benefits of selling to a global market are being captured.

Appendix Table 1. Peer benchmarking by population, GDP and income per-capita - World rankings (2019)

Country	Population	GDP	Income per-capita
Australia	55	13	12
Canada	39	10	20
France	21	7	26
Korea, Rep.	28	12	32
The UK	22	6	23
The Netherlands	67	18	13
Switzerland	100	21	4
Taiwan	56	22	39

Source: The World Bank⁷⁵ and author calculations.

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