

# Australia remade

BUILDING THE LUCKY COUNTRY  
EDITION 8

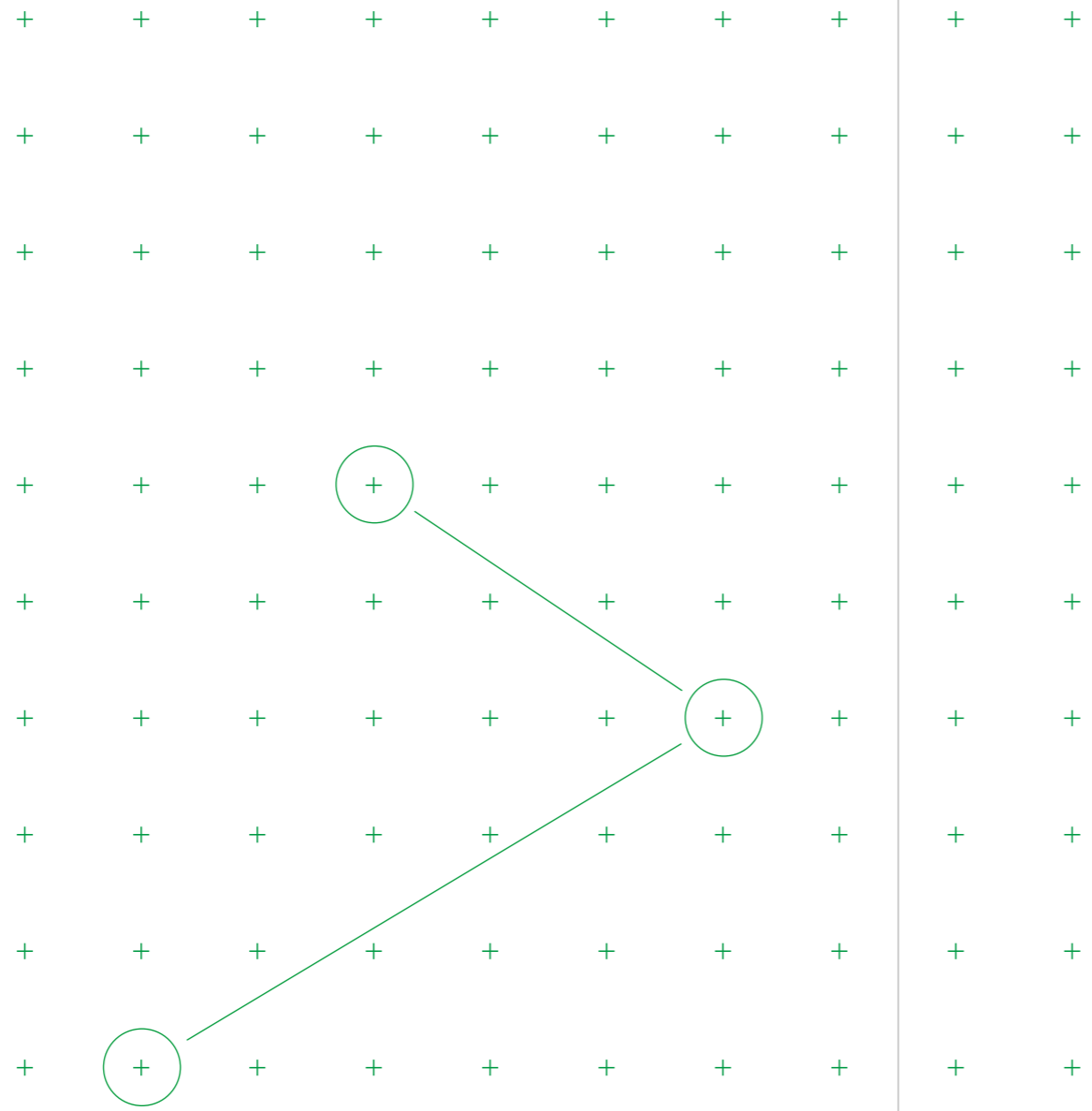
## A country fit for the age of disruption

An in-depth economic analysis on unlocking future growth



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The *Building the Lucky Country* series has been developed to prompt debate and conversations across business, industry associations, government and the media on issues facing Australia.



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**Today, Australia stands in a different world with new rules.**

**As economies begin to bounce back from the COVID-19 pandemic, Australia has an opportunity to define its future.**

**T**he decisions we make – the way we recover, the size of our ambition and the appetite for structural economic reform – will determine the future of Australia in a post-pandemic world, and how resilient, adaptable and connected we will be.

Today, we live in a world surrounded by uncertainty, and the rulebook is being rewritten at a faster pace than ever before. The signposts of change are everywhere. Disruption such as technology, climate change, demographic shifts, global tensions and (of course) a pandemic are now sweeping through the economy, altering the fundamental economic relationships between land, labour and capital.

We see this impact on the pillars of our economy and society, such as trust in our civic institutions and each other. These are the conditions for increased fragmentation, further uncertainty and greater volatility.

When confronted with this different world – of accelerating change in the economy, geopolitics and society – it is easy to retreat to the familiar. But as some countries, businesses and individuals take an easier route, others will embrace risk-taking and entrepreneurial purpose to solve humanity's biggest challenges.

There are new opportunities alongside pockets of economic decay. And it is in volatility and uncertainty that we

will find the remedies for new growth and development, whether in business models and product innovation or improved dialogue between consumers and producers, and between citizens and government.

As humans, we're inclined to treat shocks as temporary, with a return to what we know as 'normal', as the natural conclusion. We think of change as a slow and steady march with occasional punctuation. This brings stability and predictability to our daily lives – because, for the most part, tomorrow will almost certainly look like yesterday.

Yet, in overlooking the pace and scale of change, we miss what is happening directly in front of us.

Change is rarely incremental and linear. Our economic and business paradigms are undergoing structural shifts. Organisations and people have felt this acutely – yet, the current, static view of the economy offers very little explanation of what is happening. In a more uncertain world, we need a clear frame to make sense of the changes around us.

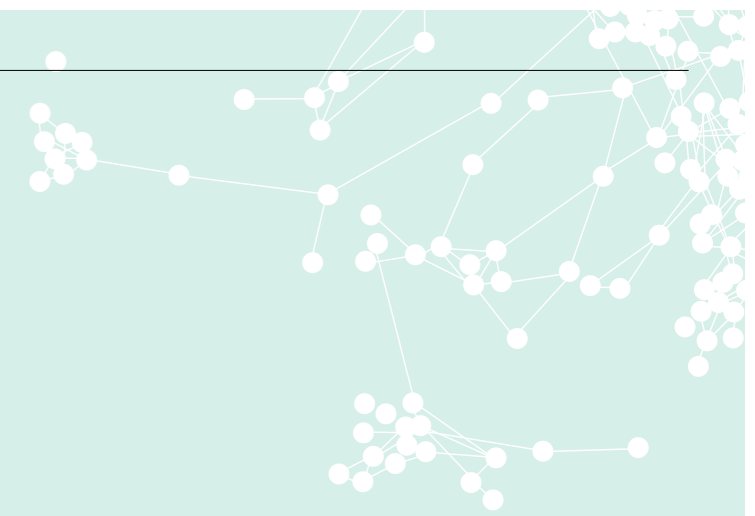
We have reached an inflection point. *Australia remade: A country fit for the age of disruption* offers a strategic lens through which to view our current challenges – a new framework for policy makers and organisations to build resilience and a vision for the economic future we must create together.

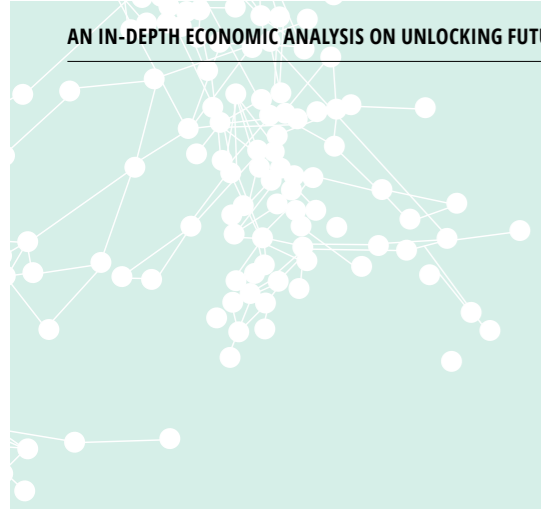
At the heart of this report is a new conception of change to help make sense of the disruption around us. Systems undergo transitions and our economic and social structures are inherently complex adaptive systems, in contrast with the mechanistic and incremental formulas that sit behind traditional strategic and economic models.

Our measure of Australia's economic complexity – *The Economic Sophistication Index* – echoes the warnings inherent in the 2021 Intergenerational Report.<sup>1</sup> Australia's economic performance is not as good as it would seem, and there are structural dangers lurking in plain sight, such as our declining productivity performance.

Australia is out of position on what really matters in a world that's more interconnected and moving at a faster pace – where the ecosystems we play in, and how we play in them, matter more than ever. Our analysis shows we lack both economic complexity and the systems that allow us to respond to change, such as innovation and a risk-intelligent entrepreneurial culture. We are not as connected in the global trade and geopolitical system as we should be to take advantage of the changing environment. And this puts our future prosperity at risk.

Despite our challenges, there is still time to act and position our economy for future prosperity. We have many of the building blocks to make this





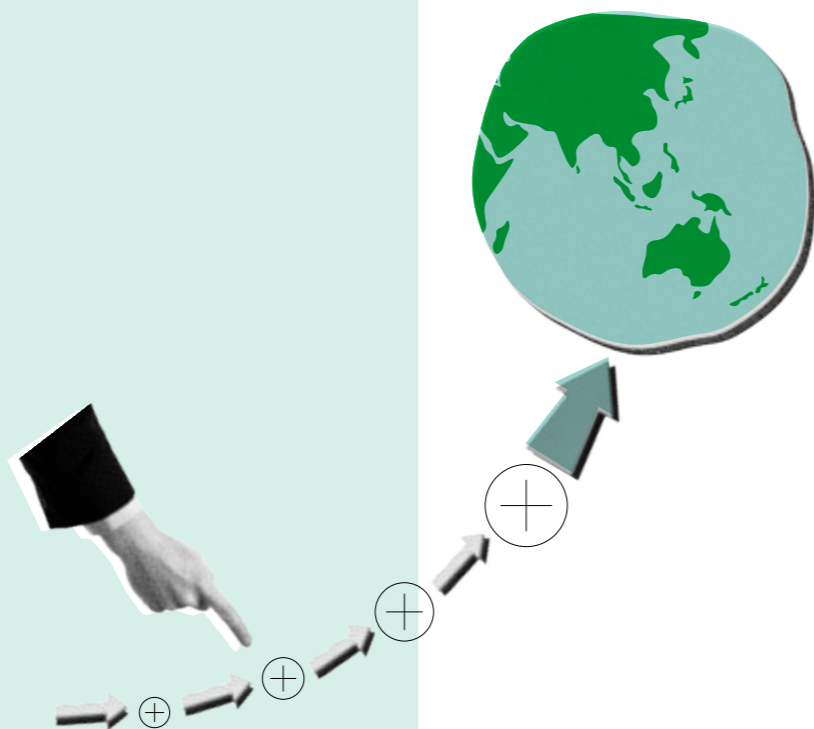
a reality: access to strategic minerals, renewable energy assets, proximity to the growth engine of Asia, successful agriculture exports, good education infrastructure and industry-leading digital technology. But to improve our resilience to external shocks, we need to move beyond these foundations and target tomorrow's opportunities.

For business leaders, communities and policy makers, understanding structural change and how we make sense of a seemingly more fragmented world – which we no longer recognise and feels increasingly less likely to return to normal – is more important than ever.

Australia needs a national mindset focused on building resilience: being prepared for change, fostering innovation and diversity, and developing new and adaptable capabilities. Our connectedness as a nation should not be a function of geography and history. It is our challenge, and our imperative, to find unique and differentiated ways to contribute to the global economy by leading in critical growth domains. This report is born from the discussions and consultations we have had with companies, communities, workers, governments and citizens – who are all sensing the tectonic shifts taking place and working to make sense of new opportunities to thrive.

Out of uncertainty and volatility comes the opportunity for Australia to shape a new future. This will require us to eschew short-termism in favour of the long run, to embrace risk and foster greater innovation, and to recalibrate our national strategy in an ever-changing landscape to create new markets, goods and services.

This is an ambition, no less, than to build an Australian economy fit for the modern world.



“It is easy to be wise after the event.”

*Arthur Conan Doyle,  
The Complete Sherlock Holmes*

**Rebuilding after the COVID-19 pandemic**

It would be remiss for this report to not explicitly address the COVID-19 pandemic. Today, vaccinations are rolling out across the developed world and governments are lifting lockdowns in response to this increased protection. However, the same cannot be said for poorer countries where daily death tolls are still recording historic highs. While it will be a matter of when, not if, global vaccination rates reach the required levels to minimise the threat of the virus, there is still a long way to go before the world can move past this health crisis.

Yet, advanced economies are on the threshold of a post-pandemic boom. Forecasts for economic growth continue to be revised upwards, and rich countries are expected to outpace trend growth at a rate not seen since the post-war boom of the 1950s. While it seems not five minutes have passed since the doom and gloom headlines at the beginning of the pandemic, this reversal of fortune is consistent with the aftermath of other massive disruptions such as war and health crises. As we move through the vaccine roll out, the trade-off from closed borders becomes starker and more expensive.

**Isolationism is not a fit-for-purpose policy for Australia's economic development.**

As crises often do, the COVID-19 pandemic has brought on a period of introspective questioning: of the ethical implications of economic inequality, trust in global and local institutions, and trade-offs made in the relentless march of capitalism. Time will tell whether these forces are strong enough to permanently disrupt the status quo. In the meantime, uncertainty and volatility prevail.

Today's task is to keep asking questions, gathering evidence and equipping ourselves with the knowledge to prepare for the uncertainties of the future. Critically, we must use the pandemic as a burning platform to recover and rebuild by addressing the enormous economic and social structural challenges that have been in the too-hard basket for far too long.

Where the current, static view of the economy offers very little explanation of disruption, this report looks to a different lens – complexity – to help us understand how to innovate, adapt and recognise that our networks and connections are key to our strengths.

# Putting disruption to work



**“We are on the edge of chaos**  
because that’s where, on  
average, we all do the best.”

*M. Mitchell Waldrop,  
Complexity: The Emerging Science  
at the Edge of Order and Chaos*

## Examining uncertainty

**O**ur belief in incremental and linear change, and our fragmented rather than systems view of the world, has blinded us to the underlying structural shifts taking place in our economies and societies, the probabilities of risks being realised and the opportunities missed.<sup>2</sup>

The underpinnings of the global economy have long been changing. Even as it seemed nothing could disrupt the march of technology, the integration of supply chains and the bringing down of borders to create a more globalised world – the seeds of disruption were being sown through emerging inequalities and a decline in trust.

The lesson of the past 50 years? The shocks we have witnessed have never really been black swans – their origins were lurking in plain sight.<sup>3</sup>

A sense of complacency in business and policy has created myopia from the realities of change. Oligopolistic market structures abound with fierce protection of the status quo, while at the same time, entrepreneurs and start-ups keep emerging, stealing market share from incumbents and creating new markets.<sup>4</sup>

Uncertainty seems to be the word of our time.<sup>5</sup> It’s a time where rules and models of the past seem to be breaking down; a time where ethical, social, environmental and commercial domains are colliding.

In examining uncertainty, we realise that solving the problems we face first requires an understanding of the nature of problems. Not all problems are characteristically the same. Different types of problems require different ways of looking at the world and different methods of analysis.<sup>6</sup>

MAKING AUSTRALIA'S LUCK  
BUILDING AUSTRALIA'S RESILIENCE

## Examining uncertainty

There is a world of difference between things that are complicated and things that are inherently complex.

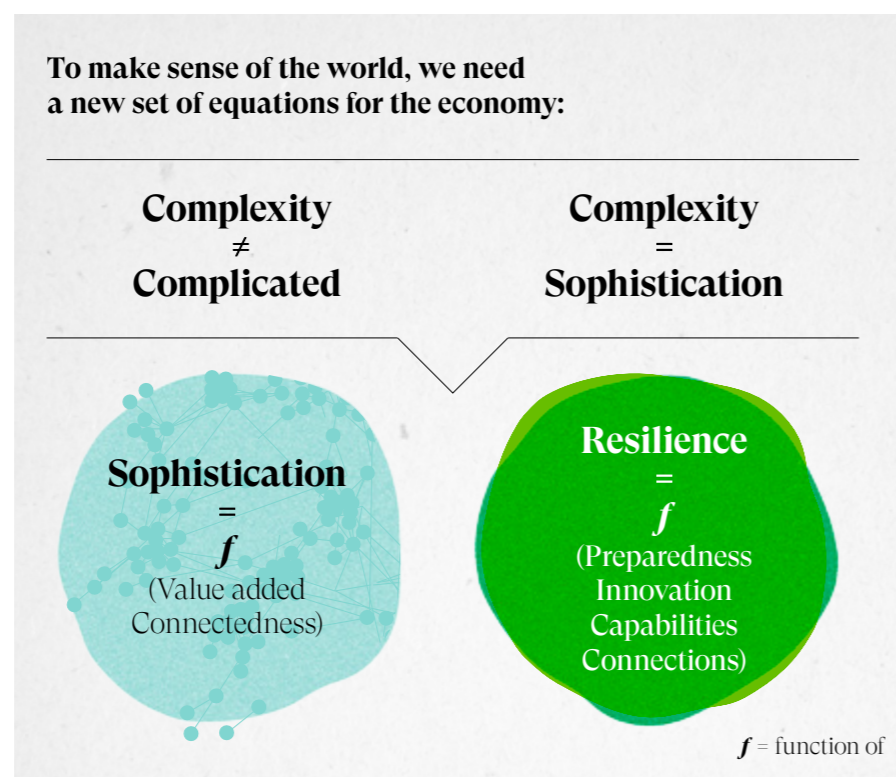
When things are complicated, we can assess causes and consequences linearly, and the solution – nearly every time – is to simplify. But as things get more integrated, through a network of connections, a complexity emerges which requires a different approach.

The world as we know it is definitely more complicated. But we also now know we can move beyond the angst of complication to the beauty of sophistication.

**This is what lies at the heart of complexity economics – moving from complicated to sophisticated.** It is this that we explore through this report as a new way of understanding our economy and building ambition for the future.

We need to see problems in a new light. Not all are simple or even complicated. Many of the *wicked problems* we face are inherently complex; requiring a new lens, new tools and new methods to solve them. This is as true for individual organisations navigating a rapidly changing landscape, as it is for policy makers setting a course for higher and better economic growth and improved prosperity for our nation (Figure 1).

**Figure 1** A new set of economic equations  
Source: Deloitte Access Economics



In a world of change, we need tools and models that are about change, including:

1. Rethinking *risk* from the perspective of time (long run) and scope (multitude of forces on multiple fronts) and the role of *innovation* to survive and thrive in the long run
2. Strategic frameworks which provide for *rapid decision cycles*
3. Models of management which continuously *sense, orient* one's position, *experiment* and make *choices*
4. Understanding value chains and supply chains, which leads us to the importance of *ecosystems*.

**Economic dynamism** allows organisations, economies and societies to grow and prosper by innovating and adapting to ever-changing circumstances. This is driven by vision and curiosity, embracing risk and diversity of thinking, inventiveness and the humility to know what we don't know and thus explore the possibilities of the unknown.

**Economic complexity** reflects this and provides a framework where we can think about how things combine in creative ways: sensing changes in the landscape, identifying opportunities for growth and encouraging innovation to find new solutions. Good complexity is about improving sophistication; bad complexity is simply becoming more complicated.

**The more sophisticated one becomes, the more one is employing the strategies to sense changes, be prepared and add value by harnessing the power of networks, thus enabling an organisation or an economy to evolve over time.**

This reframes our endeavours in business and the economy – from the short term and a narrow purpose, to the long term and a higher order. This is best described by James Carse<sup>7</sup> in terms of the distinction between finite and infinite games, where evolving decision cycles and choices become far more important to success and key to strategy.

This act of adapting and evolving is what resilience is all about.



James Carse defines two kinds of games – finite and infinite – a distinction which has application in business and economic strategy. At its core, this distinction is created by differences in:

**Purpose:** A finite game is played with winning as the endgame, while an infinite game is all about continuing the play.

**Timeframe:** A finite game is well defined with strong rules, a narrow purpose (e.g., for revenue or cost) and a shorter time horizon. An infinite game is all about the longer term based on the relationships between players (e.g., with customers and citizens) and the evolutions which take place in the game to keep it going.

**Mindset:** There are numerous forces which drag businesses and economies away from the mindset of longevity and building resilience. These include short-termism, the discounting of innovation for the near-term gain and narrowly focused metrics of success with the illusion of the longer term. To be precise, in a world governed ultimately by uncertainty and surprise, resilience is defined not in *training to predict surprises* but in *being educated to adapt* to the unknowns.

Understanding this strategic distinction is not just to understand the 'rules' and maximise winning in the short to medium term, but to drive adaptability in the business and economy, knowing that unpredictable shocks will hit, but that organisations can flex and innovate to survive.

## The Lucky Country

The Australian economy has changed over the past 50 years, growing in both scope and scale. Our economy has performed well over this time. Impacts from global and domestic shocks have been minimal and our bank account has kept on growing.

But success breeds complacency.

We've put too many eggs in too few baskets. China's growth and relentless demand for our natural resources created a tailwind that boosted Australia's economy for decades. Since 2003, a fundamental driver of Australia's fortunes emerged – the shift in China-driven coal and iron ore prices. This led to a fundamental improvement in revenues well beyond what was showing up in traditional output and unemployment measures.<sup>8</sup>

Put simply, we have been lucky. Having been deliberate and strategic in opening connections with China in the early to mid-1970s, we've certainly reaped the rewards, but also sat on our laurels. By relying on our luck and taking China's relentless demand as a given, **our economic performance has been strong, but our economy has become inherently fragile.**

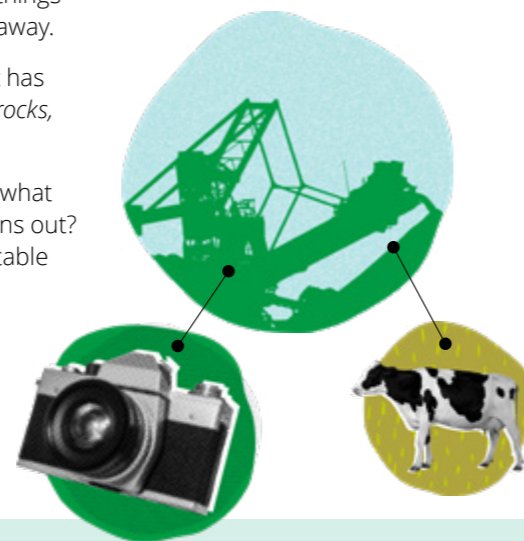
Our complacency in letting the good times roll has come at a cost. Australia has not built the capabilities and capacity to ensure the resilience of our economy.

And with half a century of hindsight, it's of little surprise that we have an economy characterised by low

manufacturing capabilities and missed opportunities from not commercialising our strong research.<sup>9</sup> We have not built the business or structural foundations required for a diversified, resilient economy. We were complacent with our success: we dug things up or grew things and simply shipped them away.

It is no wonder our output has colloquially been labelled *rocks, crops and cameras*.

Luck is not a strategy – so what happens when our luck runs out? What will absorb the inevitable shocks to our economy?



### Shock absorbers and resilience

Think about the construction of infrastructure: bridges in windy areas are built to be flexible and sway; buildings in earthquake-prone regions are designed with a degree of flexibility to absorb shock. Flexibility, not rigidity, is built into these structures to absorb external shocks, while supports and strengths are required to keep them standing.

The same concept applies to the economy. An economy needs flexibility to absorb shocks as they ripple through. But there needs to be enough strength in capabilities and capacity that the economy can forge new economic growth paths.

It is an often misunderstood notion that to simply adopt someone else's innovation or solution is simple and cheap. This is far from the truth. To stare down shocks, economies and organisations need to adapt through innovation and adopt the best ideas around them. Both require constant investment and a true belief in embracing diversity of thought.

## The end of an era

Australia has ridden a growth wave for half a century – but this growth is coming to an end. The task we are faced with now is how to create a new wave of economic growth. How do we move beyond the Lucky Country?



### Forces of change

Even before 2020, the global economic landscape was one of constant change due to powerful global and local forces, including:

- Growth in Asia shifting the demand for what the world has to offer and, through new-found economic power, altering the geopolitical landscape across the world
- Demographic shifts occurring before our eyes
- The unstoppable march of urbanisation
- Ubiquitous technology and innovation
- The breakdown of trust in domestic and global institutions and relationships
- Pressures and damages caused by climate change and the shift towards decarbonisation.

As a consequence, businesses face challenges on multiple fronts, including:

- Business models being turned upside down by technology-empowered consumers demanding greater personalisation
- Blurring lines between producers and consumers, heralding the age of co-design, co-creation and co-production
- Platform technologies undermining traditional investment models and shifting barriers to entry
- Increased expectations of social corporate responsibility and shareholder value, which can be bewildering for corporate executives as they navigate difficult societal issues
- The rise of new generations of workers with different expectations, which is throwing talent systems into turmoil and driving new forms of communications and management
- Regulators and policy makers playing catch-up with innovations such as AI, introducing a new form of uncertainty into the market.

## The end of an era

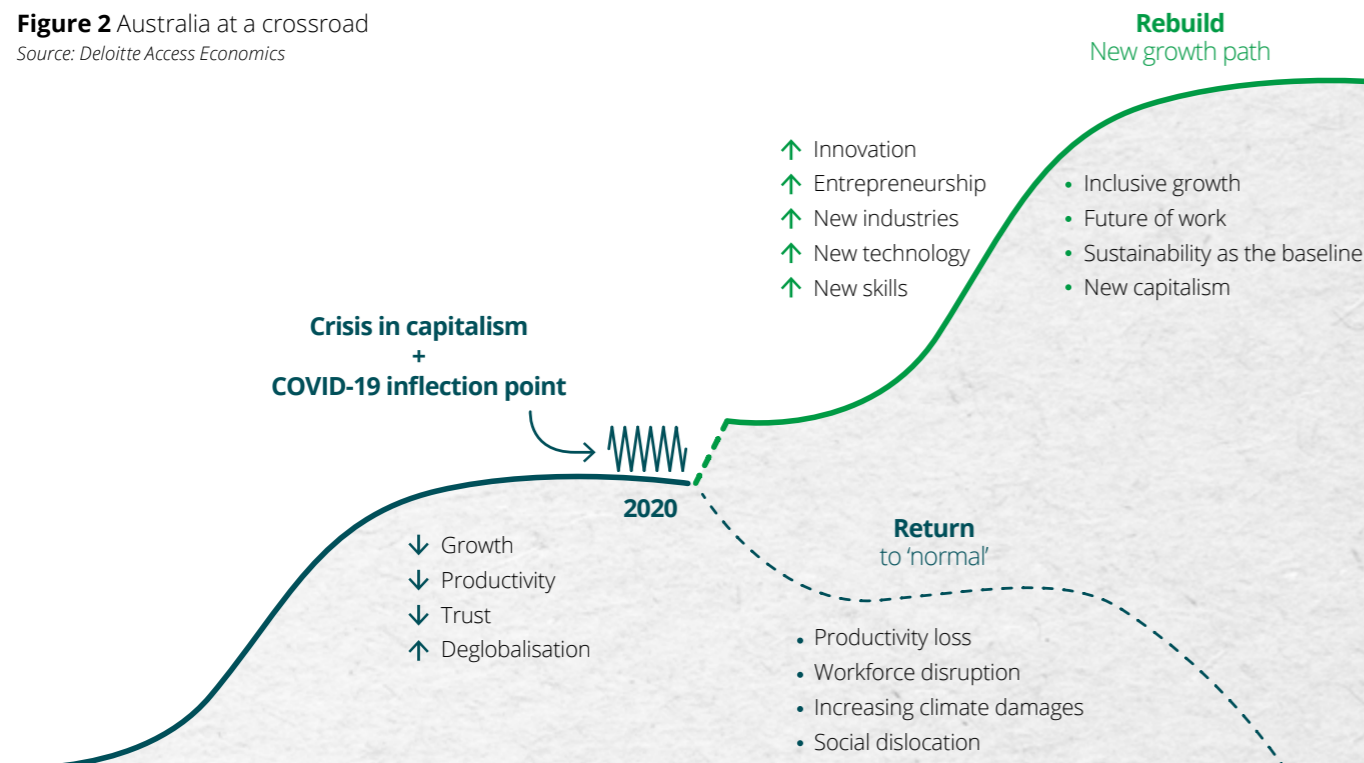
At crossroads such as these, there is turbulence, chaos and uncertainty (Figure 2). What we were experiencing before the pandemic, and will continue to experience after it, is *multidimensional change* as the economy tries to *simultaneously* reconcile the impacts of globalisation, technological disruption and environmental challenges.

Australia has reached a critical point. When an economy is in a growth phase, as the Australian economy has been, everything is okay – until it isn't.

When it becomes noisy and disruptive, things start to break down and a framework based on increased adaptability and building shock absorbers is necessary to move the economy to new growth.

**When an economy is in a growth phase,** as the Australian economy has been, everything is okay – until it isn't.

**Figure 2** Australia at a crossroad  
Source: Deloitte Access Economics



To find new growth trajectories requires diversification as well as inventiveness. Without diversification and innovation, an economy won't be able to adapt quickly and absorb shocks. This is what resilience looks like.

Australia has many of the building blocks to create new growth and improve resilience. This includes access to strategic minerals, renewable energy assets, proximity to the growth engine of Asia, successful agriculture exports, good education infrastructure and industry-leading digital technology.

**But we need to move beyond these foundations** to create a future-ready economy. Our challenge and our imperative is to find unique and differentiated ways to contribute to and connect with the globe.

**It starts by understanding how sophisticated our economy is** and pinpointing areas of future opportunity. After all, when we can see our true potential, we can take the necessary steps to unlock it.



# From complicated to sophisticated



**“Learn how to see.**  
Realise that everything connects to everything else.”  
*Leonardo da Vinci*

## A new way of thinking

**E**conomies have traditionally been seen in a static sense, where economic activity is a well-oiled machine, behaving exactly as we would expect.<sup>10</sup> In this way of thinking, a person always acts rationally – making decisions based on what will bring them the greatest benefit. When everyone acts rationally, the economy also experiences optimum benefits and is continually brought back to a state of equilibrium.

This lens reduces the economy to a simple set of equations and one aggregate variable: Gross Domestic Product (GDP). But as a rudimentary figure, GDP is only capable of conveying a limited range of information about a country's economy.<sup>11</sup>

In reality, people don't always act rationally. The economy is made of interacting parts, with people making their spending and investment

decisions based on their backgrounds and lived experience. Around them, the landscape of the economy is also constantly changing and evolving.

Viewing the economy through a traditional economic lens comes at a price. It risks filtering out exploration, creation and transitory phenomena – essentially anything in an economy requiring adjustments.<sup>12</sup> These changes are important to the growth and development of an economy.

When the economy continues along an uninterrupted path, many interactions weave through society and individual actions can be summed up to see patterns which are predictable and make sense. But disruption makes these interactions more complex.

That's why an economic complexity lens is important: *the complexity, or sophistication, of an economy drives economic growth.*

BUILDING AUSTRALIA'S LUCK  
RESILIENCE

## An economic complexity lens

**D**espite the name, economic complexity is not about things being more complicated. Instead, it's about **understanding and increasing the levels of sophistication in an economy.** For Australia, becoming more sophisticated will help us to transform and compete on the global stage.

Countries each have a different mix of skills, ideas, technologies, equipment and materials that can be used to produce a different mix of goods and services. These factors – the productive knowledge or productive capabilities – determine the frontiers of what an economy can produce and how much it can grow.<sup>13</sup>

This knowledge is key to a country's potential for economic growth. But it's not just the amount of knowledge embedded in an economy that's important. It's also the diversity of knowledge people hold and their ability to combine and make use of it through complex webs of interactions<sup>14</sup> – in short, the sophistication of knowledge.

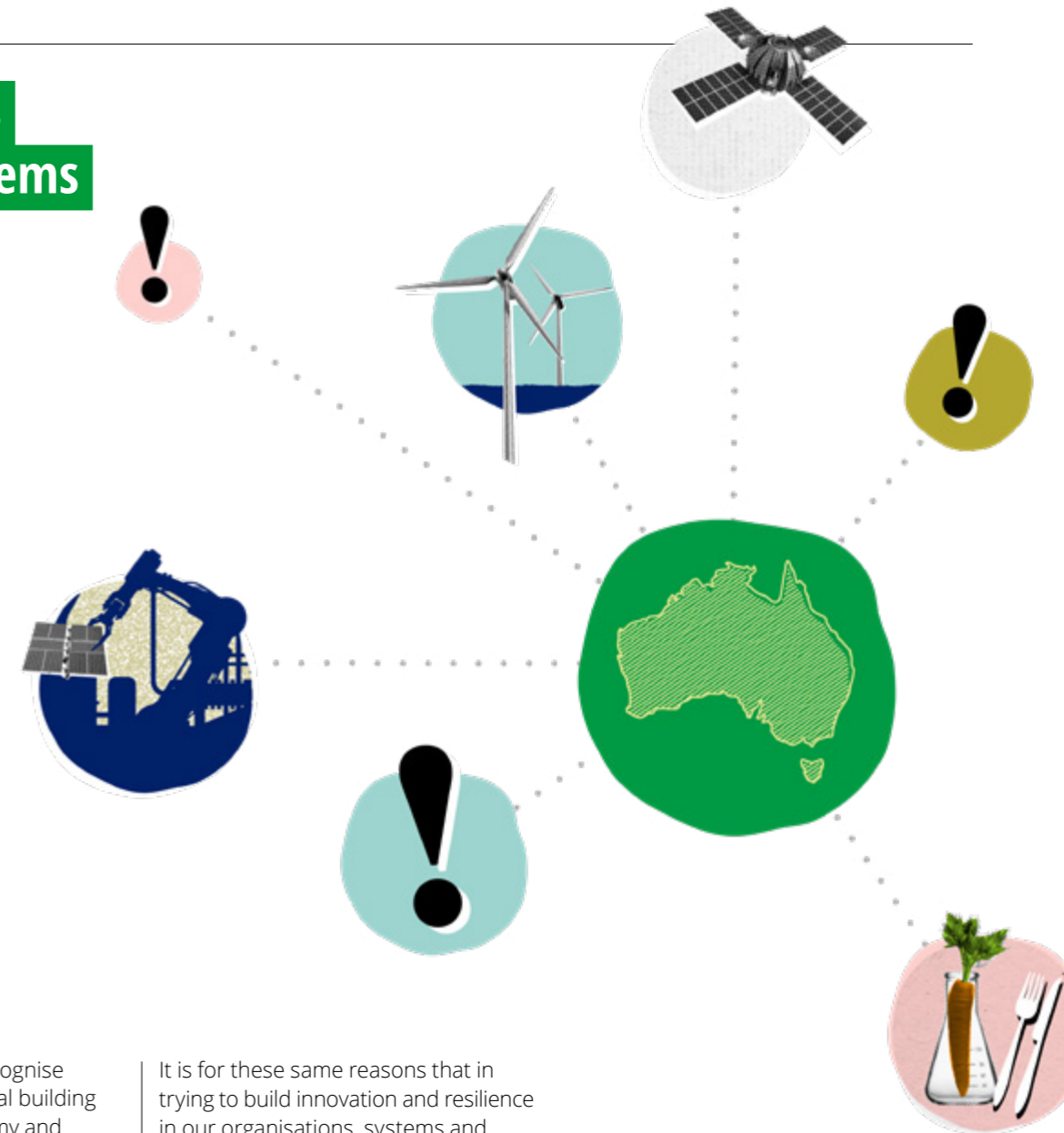
Economic complexity considers the sophisticated interactions and feedback between people, organisations, government and the wider system<sup>15</sup> as new behaviours are discovered and the economy continues to change.

A complex economy comes from leveraging the capabilities instilled in its productive structure, the information embedded in its networks and the adaptive ability and resilience that comes from both.

Through this report, we use economic complexity as a lens to analyse the economies of Australia and other countries across the globe. In doing so, we can determine how sophisticated these economies are, and how they can improve their potential for growth.



## Connections and ecosystems



**I**t is important to recognise that the foundational building blocks of an economy and society – citizens, consumers, workers, businesses, communities – are connected.

This means that transactions are no longer simple or contained. For example, the changes brought about by the response to climate change will mean business interests are no longer narrowly defined, but include the performance of the supply chain and a view of the workforce. In this case, the issues of the supply chain, workforce, investors and changing consumer preferences all weigh in on the value for shareholders. It represents a myriad of relationships which affect an organisation's response to this issue.

It is for these same reasons that in trying to build innovation and resilience in our organisations, systems and economy, *ecosystems* are increasingly the object of analysis and strategy, rather than the narrowly conceived balance sheet of an entity.

That is, to understand your business, you need to understand the businesses around you.

While there are significant shifts required to adopt a systems view in policy making, the insights from our economic complexity analysis are critical for businesses. As our economy emerges from the pandemic, business leaders must be acutely aware of the underlying structural changes that are shifting the commercial and economic landscape around them.

# Measuring economic sophistication



“**Complexity economics** sees the economy as in motion, perpetually ‘computing’ itself – perpetually constructing itself anew.”

*W. Brian Arthur, Complexity economics: A different framework for economic thought*

## The Economic Sophistication Index

A country's economic sophistication is not just about what it produces or how well it does it, but also the networks in which the production of goods and services occurs and its resilience to unexpected events. By measuring economic sophistication, we can understand how to build a more prosperous Australia.

The Economic Sophistication Index (Chart 1) expands the existing measures of economic complexity beyond the diversity of countries' export baskets. It considers the capabilities of an economy by looking at the *value add* and *connectedness* of industries across global economies.

**Countries with a high rank on The Economic Sophistication Index are those that perform well across both value add and connectedness.**

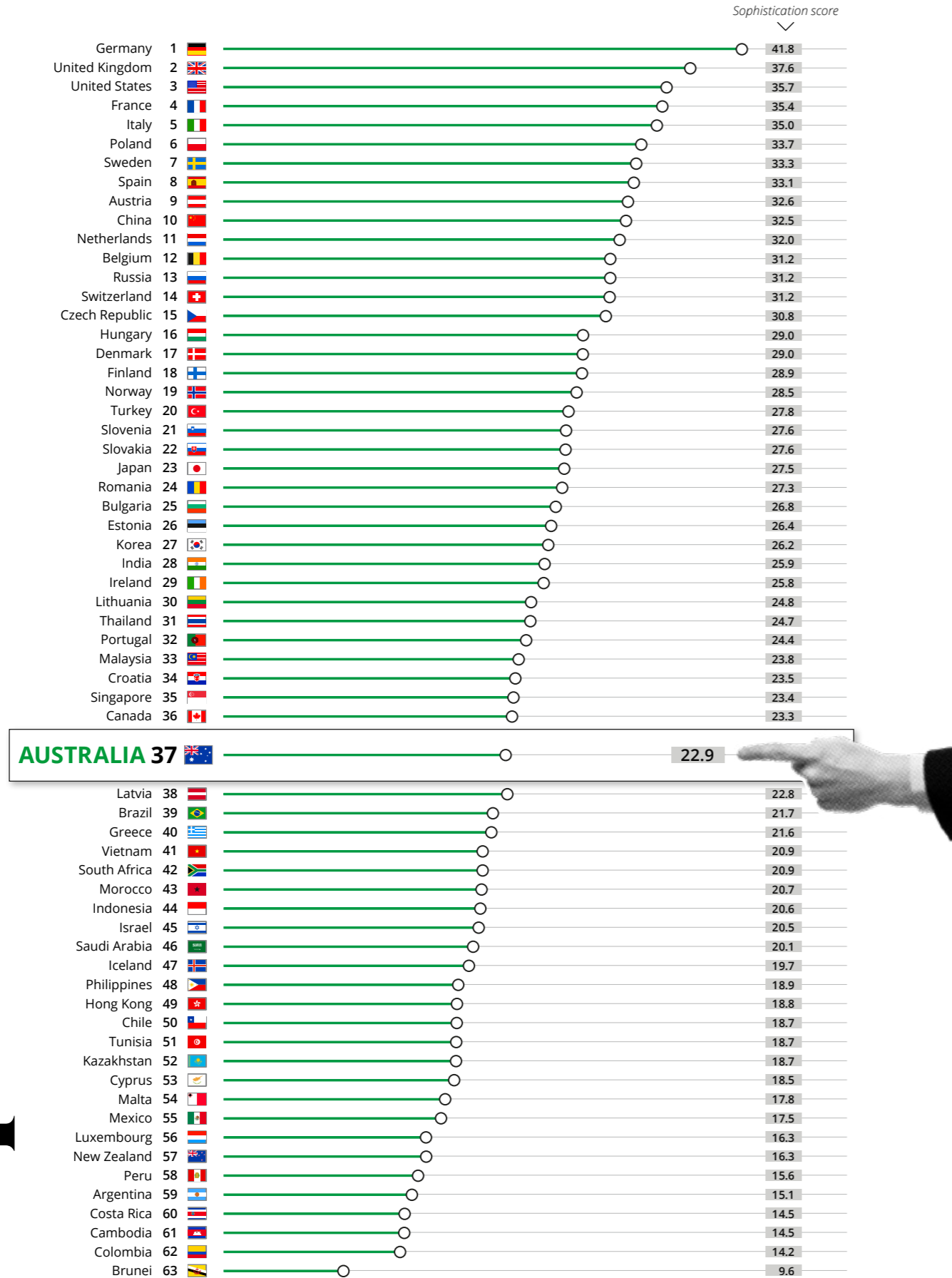
These countries can be thought of as more resilient; the diversification and sophistication of production channels minimises the risk of shocks disrupting their growth.

The Industry Sophistication Index (Chart 2) shows the level of sophistication of industries globally (an average of all global industries) compared to the sophistication of Australia's industries. Australia outperforms the global average sophistication level of some industries, such as mining and metals, but underperforms against the global average of other key industries, such as business services and wholesale and retail trade.

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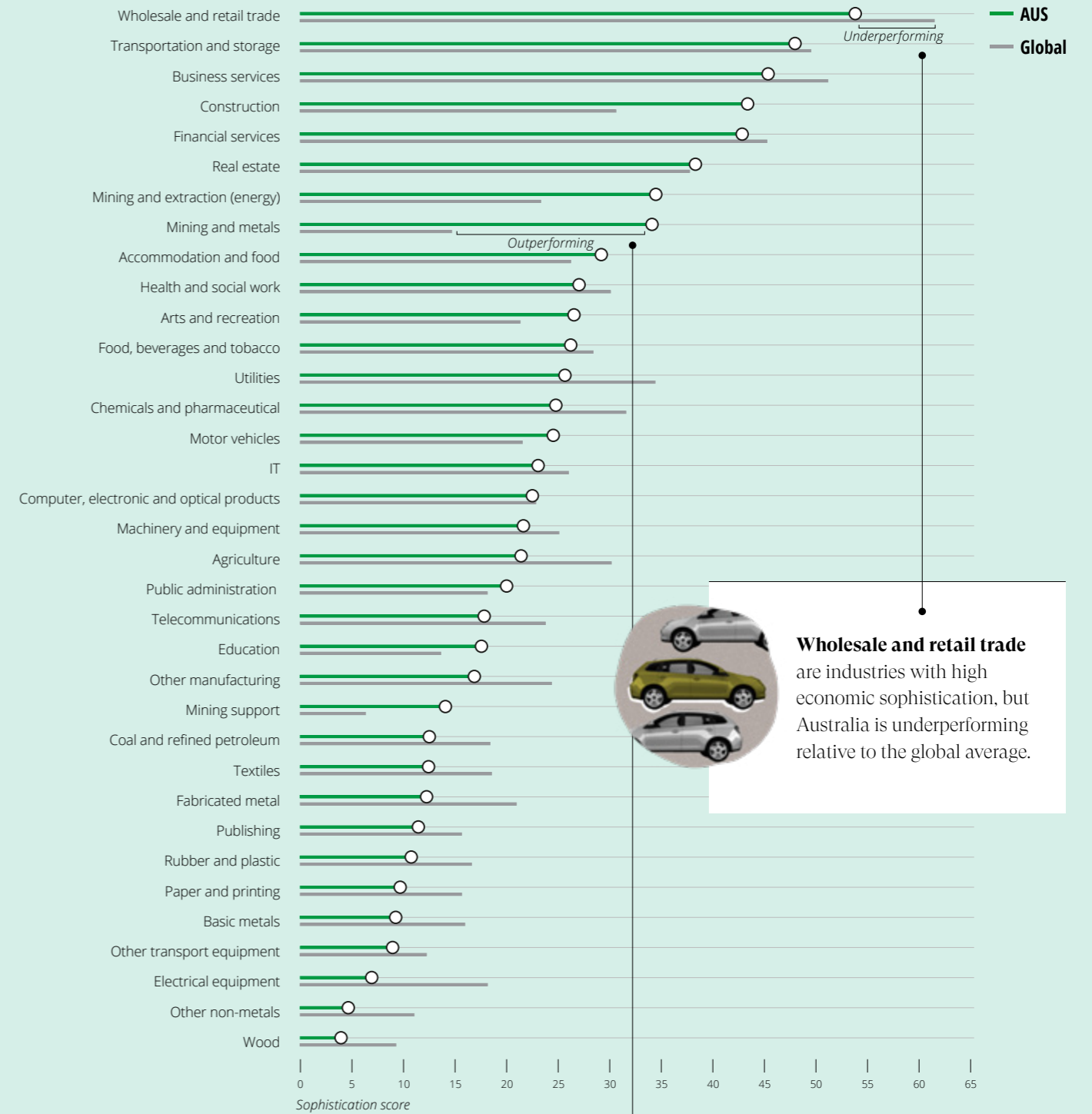
**Chart 1** The Economic Sophistication Index

Source: Deloitte Access Economics



**Chart 2** The Industry Sophistication Index

Source: Deloitte Access Economics



**Wholesale and retail trade** are industries with high economic sophistication, but Australia is underperforming relative to the global average.



**Mining and metals are not Australia's most sophisticated industries**, but we are producing with a greater level of sophistication than the rest of the world.

# Sophistication Index

## The Economic Sophistication Index



**Figure 3** Example of global value chain for steel products

Source: Deloitte Access Economics (2021); OECD (2021)<sup>16</sup>

### A closer look at our measure: Value add

**Value add** refers to improvements in a country's production ability which increase the return on their investment. That is, they can either produce goods or services more efficiently (through upskilling, investment or R&D), or move into other industries in which they can operate more effectively and where comparative advantages already exist. For Australia, this means moving beyond natural resources, agriculture and tourism.

The Economic Sophistication Index captures value add in global trade. The goods and services traded around the world today are comprised of many inputs from various countries, as illustrated in the example of the global value chain for steel products (Figure 3).

In fact, about 70% of international trade involves global value chains as services, raw materials, parts and components cross borders – often numerous times. Using this measure, we are

able to better understand a country's productive capability in adding value to global value chains.

For example, Australia's integration with global value chains is still largely tied to and defined by our resources and geography.

Australia's relatively lower value add, which is discussed later in the report, stems largely from our reliance on less complex economic activities such as raw commodity production and associated manufacturing.

**Connectedness** as a measure infers the quality, adaptability and resilience of a country's networks.

Connectedness looks at how embedded a country is within networks in the global economy. The more connections a country has, the more it is exposed to a wide range of flows of people, knowledge and information.

**It's not just the number of connections that matter, but the quality of those connections.**

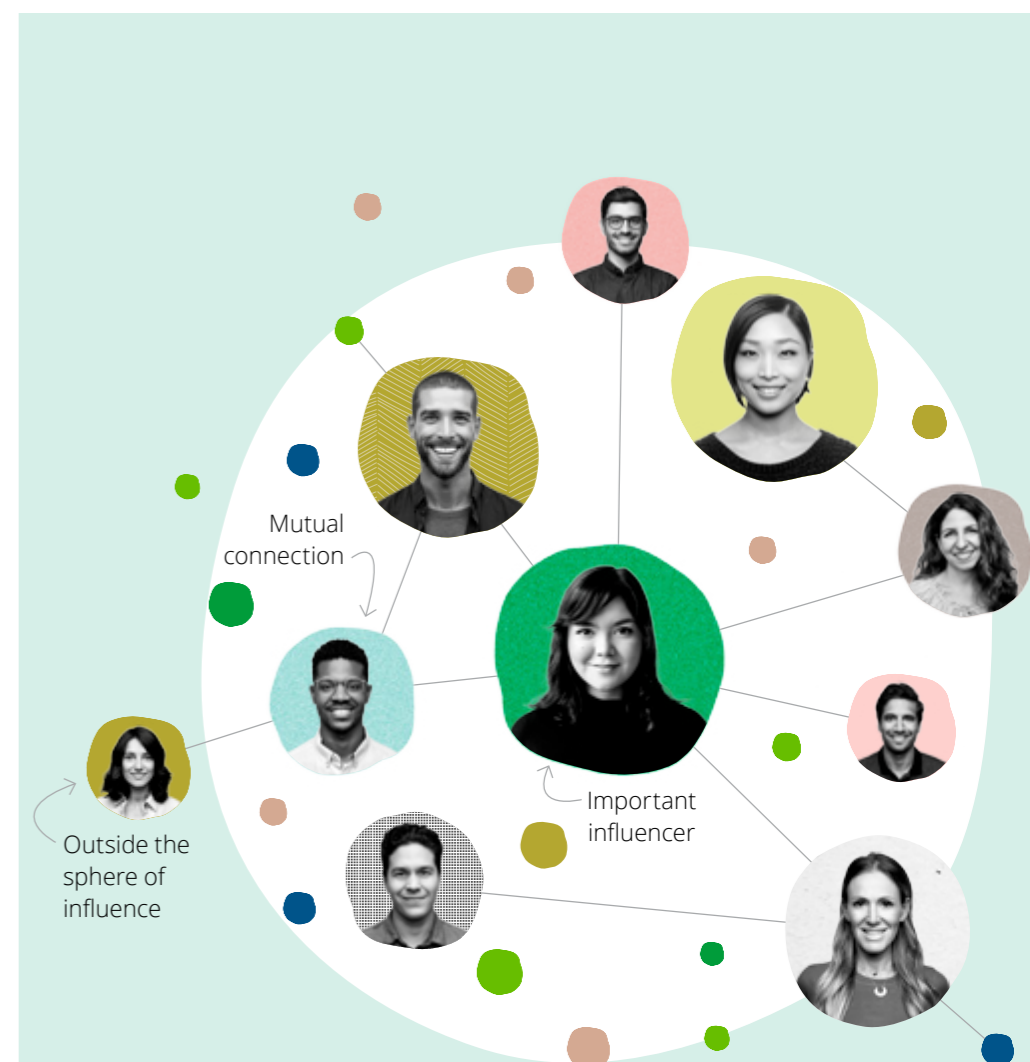
A country with higher connectedness has a greater diversity of production, destination and source markets (and industries), and connections into strong value chains within the global network.

Recent global economic shocks have highlighted the fragility of supply chains and the risks that come with economic dependence on a few key markets and industries.

Connectedness provides a good way to look at how the nature and depth of relationships in the supply and trade chains can create value for Australia.



**Watch Deloitte Access Economics Director Kelly Heaton talk about unpacking economic complexity**



**Figure 4** Example of social connectedness

Source: Deloitte Access Economics

### A closer look at our measure: Connectedness

The Economic Sophistication Index captures connectedness across industries and global economies.

Connectedness is used to measure the level of influence of a connection within a network. It can identify which industries or countries have a wide-reaching influence within the global economy.

A good analogy for connectedness is our social connections as individuals (Figure 4).

For example, how connected are you to an important influencer on LinkedIn? Are you directly connected with this person and therefore well embedded in this sphere of influence? Do you have a mutual connection who could invite you into it?

The more closely connected you are to important influencers, the more impact you can have in a network.

# Why does sophistication matter?

## Sophistication drives growth

Countries that improve their economic sophistication experience higher average GDP per capita growth over time (Chart 3). It is not just the score, but its improvement that matters.

Take South Korea as an example. Between 2005 and 2015, South Korea's economic sophistication score increased over 10% on the back of improvements in both its connectedness and value add. Across the same period, South Korea averaged GDP per capita growth

of 4.1%. By comparison, Canada and Australia both saw their economic sophistication scores decline over the same period and grew at an average of just 2.5% and 3.4% respectively.

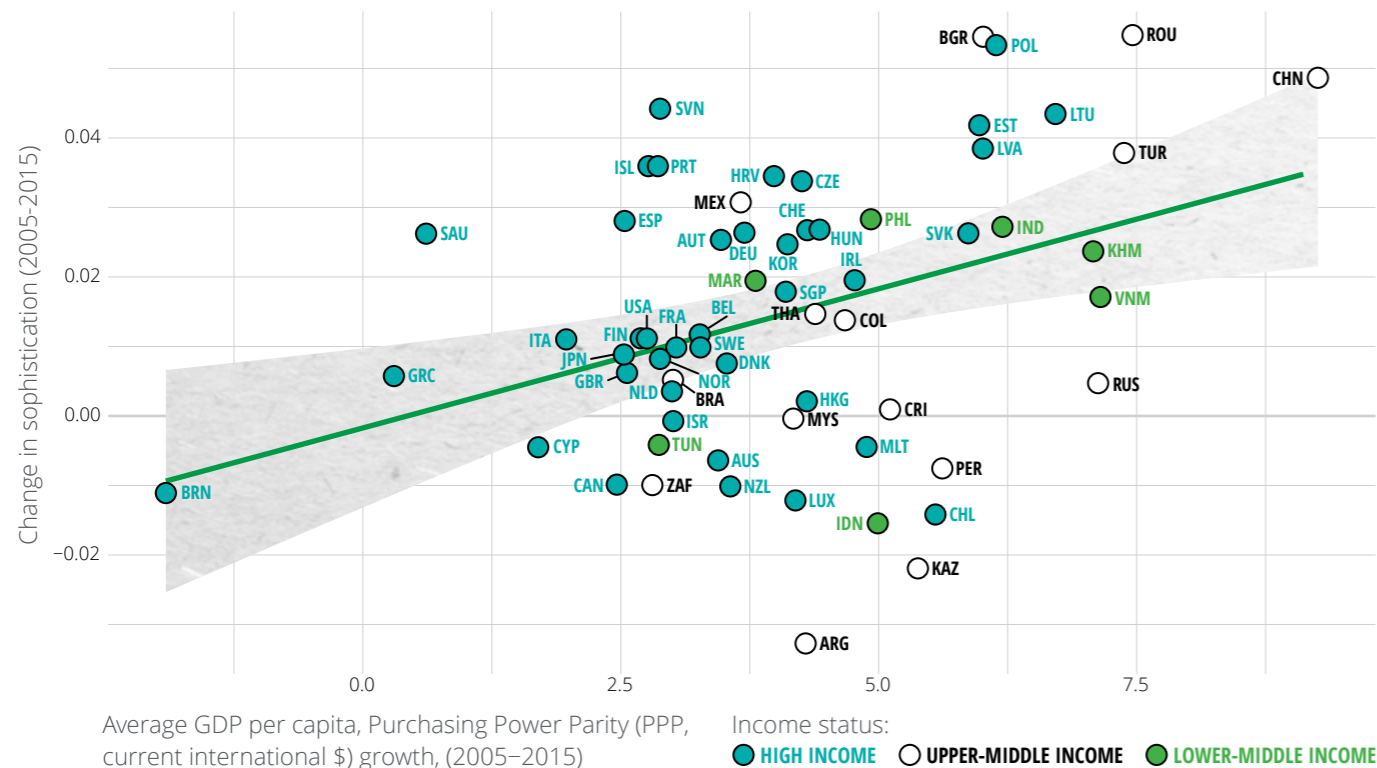
The rationale for such a relationship is twofold. First, improvements in a country's production ability (as measured through value add) essentially increases the return on their investment, either through more productive efficiency or the expansion of more effective production into new industries.

Second, improvements in a country's connectedness expands the markets in which they can operate. In turn, they can expect greater opportunities to grow in these markets as well as increased knowledge transfer – further improving value add. Countries with a higher sophistication score also have lower volatility in their income growth.

Combined, it suggests countries with favourable economic sophistication scores (and improvement in these scores) are likely to experience both higher per capita output growth and are more resilient to economic shocks.

**Chart 3** Economic sophistication and average GDP per capita growth, 2005-2015

Source: Deloitte Access Economics



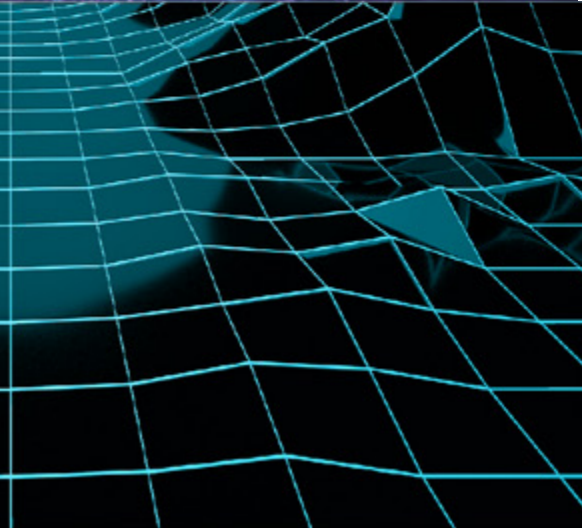
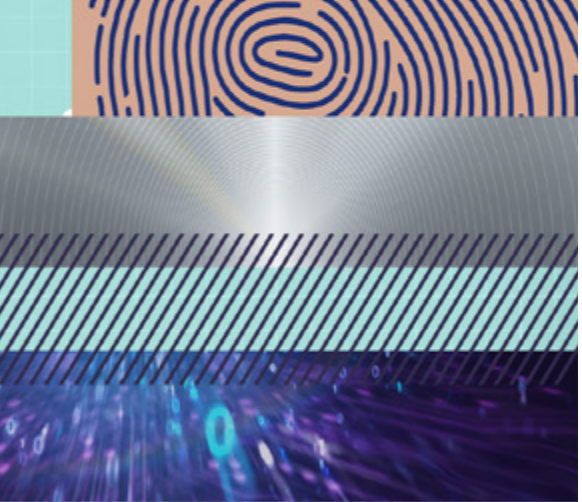
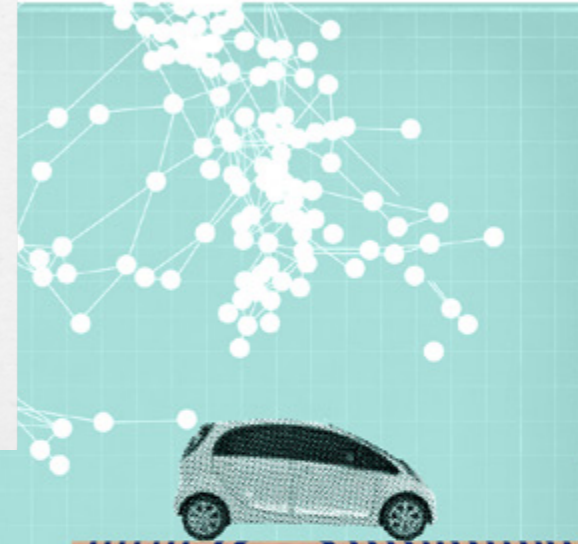
## Innovation is key

A robust economy must be able to adapt and grow. The process of innovation – systemic research and development, experimentation, commercialisation and diffusion – is actually how an economy progresses and adapts to shocks.

But innovation isn't just about having good ideas, it's also about adopting existing ones<sup>1</sup>. There must be the right capabilities (skills, technology, and flexibility in business models and organisational structures, and access to existing knowledge and innovation) to diffuse ideas through an economy, regardless of where the ideas have come from.

People, businesses and markets do not operate in a vacuum but are part of a complex, global economy. This also means that the innovation process is not undertaken in a closed environment. It is the dynamic interactions and collaboration between players within networks that underpins the constant innovation process.

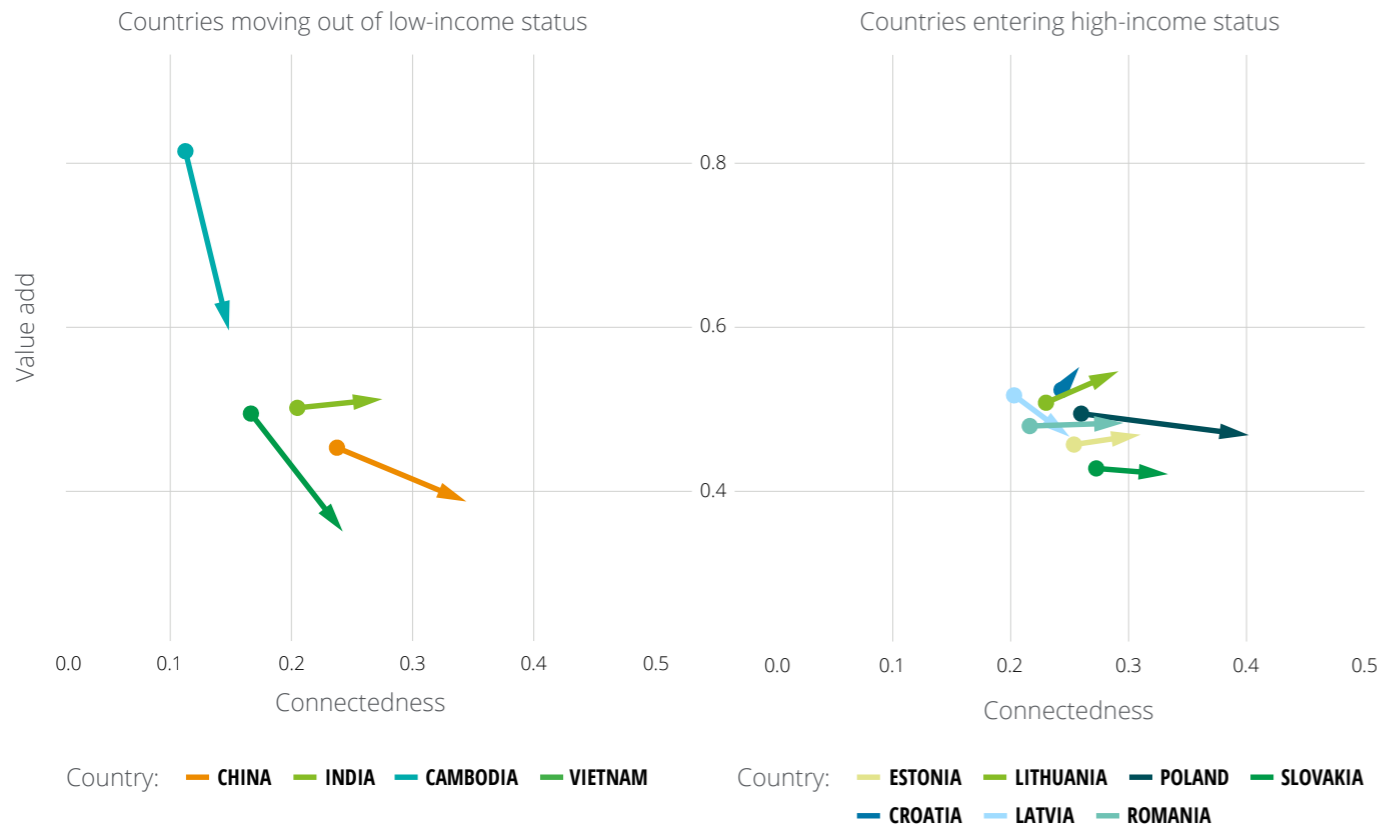
Source: Deloitte Access Economics (2021), Mokyr, J. (1990)<sup>17</sup>



## Why does sophistication matter?

**Chart 4** Change in economic sophistication components (select countries), 1995 to 2015

Source: Deloitte Access Economics



### Sophistication spurs development

Movements in sophistication scores (and the components within them) can help explain the development profiles of countries (Chart 4).

A feature of developing economies is a dependence on primary industries, such as mining and agriculture.

Key to their development is the transition to a more diversified economy, including to manufacturing and finally the development of services industries.

Initially, we see a fall in value add as countries expand the composition

of their economies from primary industries to secondary industries (such as manufacturing and construction). This decline in value add reflects the costs associated with developing new industries, including skills and financial investments. Indeed, countries are moving from industries of comparative advantage to new industries where competitive advantages are not yet developed.

At the same time, the expansion into secondary industries sees countries become more connected in the global economy, allowing for greater knowledge transfer (through human capital and technology) and exposure to larger potential markets.

As countries continue developing, their connectedness within the global economy further improves. In many cases, they also improve in value add, owing to greater educational outcomes (leading to higher skilled workforces) and investment in R&D which allows for the development of additional competitive advantages.

### Sophistication creates resilience

Our analysis shows that complexity is critical to building resilience. Countries with higher Sophistication Index scores experience fewer shocks to their growth (Chart 5).

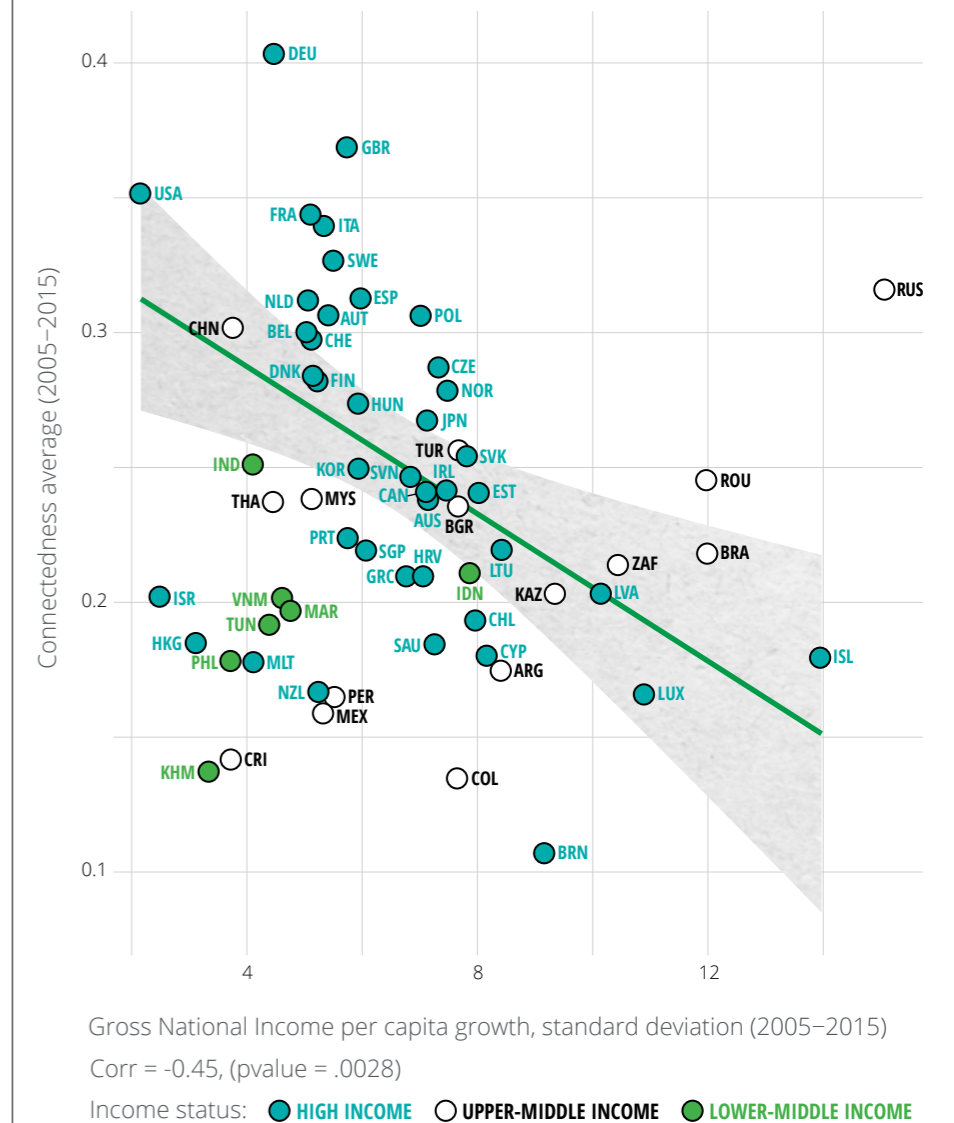
For example, Germany is highly connected within the global economy. For the years between 2005 and 2015, it experienced a remarkably stable income growth trajectory, despite the global financial crisis (GFC) and European debt crisis. Germany's ability to adapt to these challenges by moving between supply chains and markets was key to this success.

Structural change is inevitable. Things simply becoming more complicated is no driver of resilience in the long run. Indeed, as things get more complicated, more energy is used just to maintain the existing structure, setting in train diminishing marginal returns.<sup>18</sup>

This poses strategic questions for businesses in understanding the market landscape and developing structures and operating models to not only increase value add, but foster diversity and innovation. This is true for public policy as well.<sup>19</sup>

**Chart 5** Connectedness and income growth volatility

Source: Deloitte Access Economics



In the field of biology, diversity is represented through mutations – it is how evolution proceeds and adaptation takes place. This is a dynamic process, not an end state.

Consider genetic variations in agricultural crops as an example. Where a particular strain of crop is shown to be highly productive and cost efficient, these benefits can be instantly wiped out after a pest or disease infects the field.

In 2019, Panama disease<sup>20</sup> swept across banana farms in Asia, Australia, the Middle East and Africa.

It wreaked havoc because the types of bananas being grown were genetically narrow and diversity had been sacrificed for the shorter-term gains of homogeneity. Genetic narrowness can provide great benefits for a period of time, but it is only when genetic diversity exists that the survival rate of crops from an external shock increases.

When it comes to the economy, the same principle applies. **Diversification in the production of goods and services provides resilience from external shocks hitting the economy.**

**Case study:  
China's path  
to sophistication**

China's remarkable growth has seen it move from a low-income country reliant on primary industries to an upper middle-income country in the space of just 15 years (Chart 6).<sup>21</sup> It's achieved this by exceptionally developing its domestic economy and strategically pursuing global integration – a function of population growth, domestic spending initiatives and ambitious foreign and economic policies (including the Belt and Road Initiative).

Over the past few decades, China has transformed its economy from one heavily reliant on agriculture to the manufacturing and services powerhouse of today.

Over this time, China has become a growth pole in the global economy. Key to this has been the country's expansion of global networks. Today, China is one of the most connected countries in the global economy. This has allowed its manufacturing sector to boom, with the expansion of available markets spurring investment in the country.

Across the same period, China's value add declined, reflecting the diversification of its economy (Chart 6). Next in China's development is a move towards a more service-based economy.

At that point, we can expect the country's value add to improve.

China's approach to AI is a good case study of growing its complexity and value add. In 2017, China released the *New Generation Artificial Intelligence Development Plan*. The plan outlines an ambition to reach a competency level commensurate with the United States with an industry size of around RMB 150 billion by 2020; the desire for the AI industry to generate significant technological breakthroughs and grow to a size of RMB 400 billion by 2025; and become the global leader in AI with an industry size of around RMB 1 trillion by 2030. It is no wonder that the heart of the US-China trade war is the battle over intellectual property and technology.

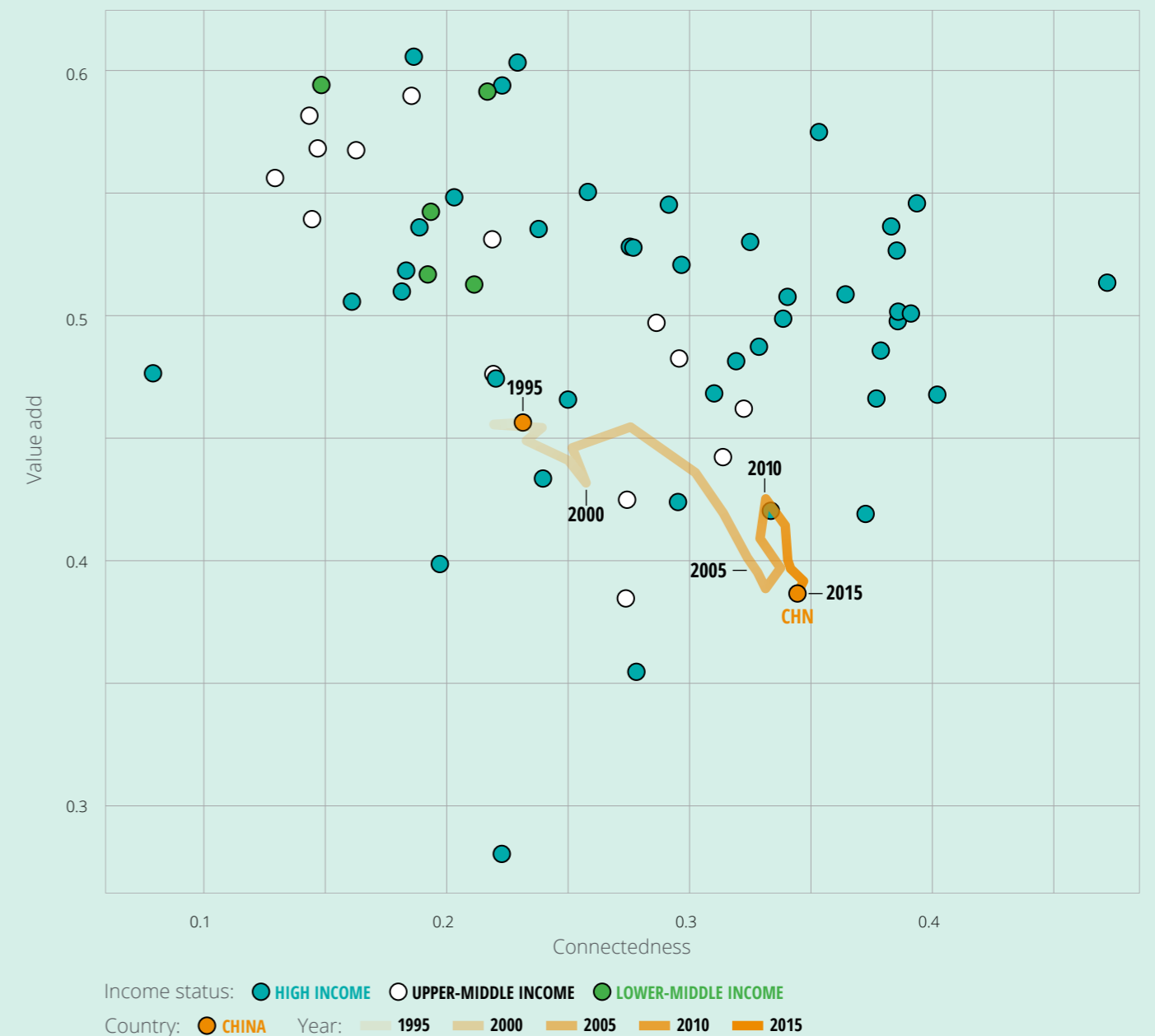
China's economic development and integration into the global economy is impressive, but not a surprise. Every action it has taken has been strategic and targeted. The words 'Made in China' – the label we see on so many everyday items in our lives – has become emblematic of these deliberate and strategic objectives.<sup>22</sup>

Through geopolitical and economic lenses, the rise of China is significant. From the perspective of economic complexity, it is easier to see the objectives of the Belt and Road initiative and also understand the real risks of decoupling in global economic growth.

**The words 'Made in China'** – the label we see on so many everyday items in our lives – has become emblematic of these deliberate and strategic objectives.

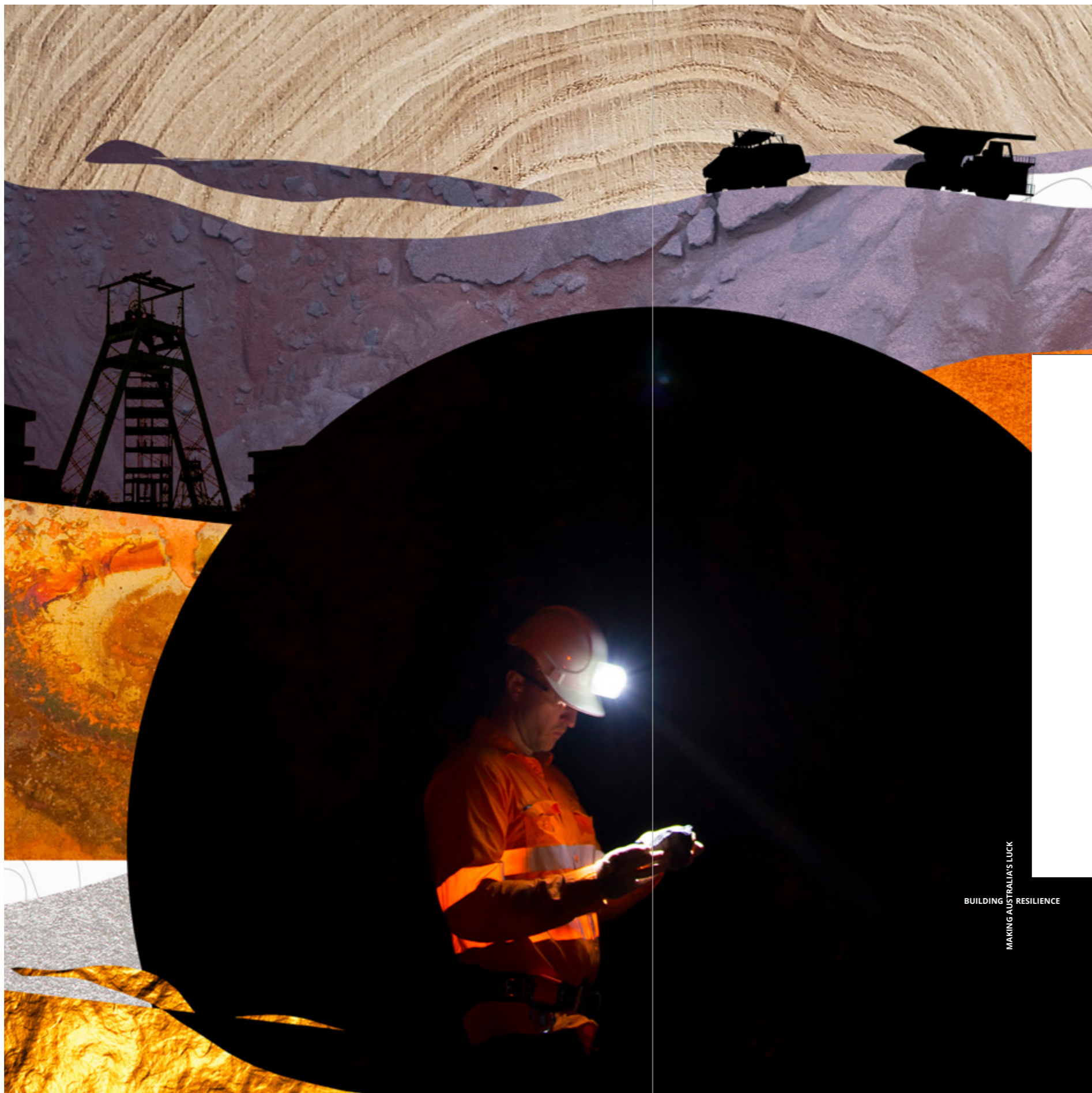
**Chart 6** Value add and connectedness, 2015

Source: Deloitte Access Economics





# Are we moving up the sophistication curve?



MAKING AUS  
TRALIA'S LUCK  
BUILDING AUS  
RESILIENCE

“A nation more concerned with styles of life than with achievement has managed to achieve what may be the most evenly prosperous society in the world... Australia has not deserved its good fortune.”

*Donald Horne, The Lucky Country*

## Australia's lessons on economic sophistication

Australia's economy has defied expectations. Despite hitting major headwinds in the past – the GFC, a major drought, bushfires and the COVID-19 pandemic – we have always emerged stronger.

Australia's resources, energy, agriculture and tourism have kept us going. These industries have been critical to our success, wealth and prosperity. But Australia has made a trade-off: making money at the cost of becoming more sophisticated.

In financial terms, we are strong. But what about in terms of our capabilities?

## Australia's lessons on economic sophistication

Australia has many comparative and competitive advantages that we can amplify and build on to create a more diverse, sustainable and connected economy. But we need to move beyond these foundations to build a more prosperous future.

The Economic Sophistication Index provides five key insights on the Australian economy:



### 1 We're not as successful an economy as we think we are

Australia's successful industries are not our most sophisticated. We have lower value add and weaker connectedness compared to other high-income countries.



### 2 We've relied on luck and it's created complacency

China's push for development has created a relentless demand for Australia's natural resources. But we've placed all our eggs in one basket, rather than developing sophisticated global supply links.



### 3 We've neglected sectors with the greatest future potential

Natural resources, agriculture and tourism have been critical to Australia's success, but this focus has detracted from investing in areas which have the largest potential yield in the future economy. This includes upstream activities such as R&D and design, and downstream activities such as distribution, marketing and after-sales services. Nearly 60% of Australian production occurs at a lower level of economic sophistication than the global average.



### 4 We're not well connected to the rest of the world

Australia has strong connections to important global value chains through mining and resources. However, these connections are few and fragile in the context of the geopolitical environment.



### 5 We're at risk of the 'tyranny of distance' again

New technologies, increasing consumption in the developing world and shifts in trade mean value chains are becoming regional. Given our remoteness, Australia will need to work harder to build high-profile connections across Asia and beyond.



# 1.

## We're not as successful an economy as we think we are

Looking only at the headline statistics, Australia has a successful economy.

Until the COVID-19 pandemic, Australia experienced 28 years of uninterrupted economic growth – the longest period of economic expansion unbroken by recession ever in a developed country.<sup>23</sup>

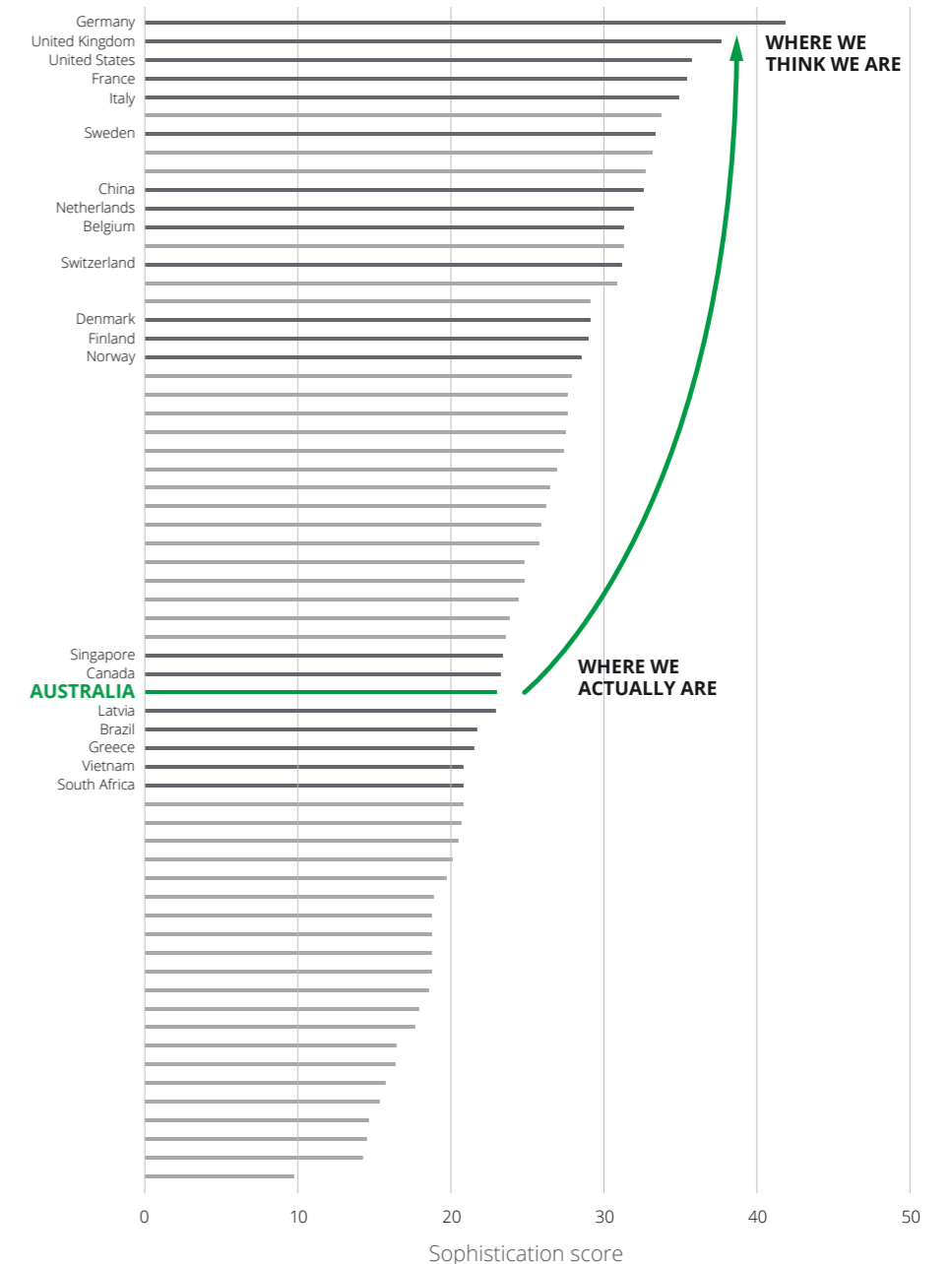
Pre-pandemic, Australia was the world's 14<sup>th</sup> largest economy, despite being home to just 0.3% of the global population.<sup>24</sup> In terms of GDP per capita, we sit amidst the countries we would typically expect to – the United States, Denmark, Singapore, Sweden and the Netherlands (Figure 5).

# 37<sup>th</sup>

Australian ranking

Chart 7 Economic Sophistication Index

Source: Deloitte Access Economics



## Australia's lessons on economic sophistication

The mining, agriculture and tourism industries have brought about great wealth for our economy over the past three decades. They underpin our geographically dispersed population, exports and labour market, as well as other industries such as construction, transport, manufacturing and retail trade.

But if we start to dig below these headline measures, **Australia's economy is less robust than we think.** Our most successful industries are not our most sophisticated.

By not focusing on the areas in the economy which can bring us continuing value, we are risking our economic future.

In contrast, the countries at the top of the Economic Sophistication Index rankings – Western European economies and the United States – are service economies. They have strong value add in production and are highly connected to global networks.

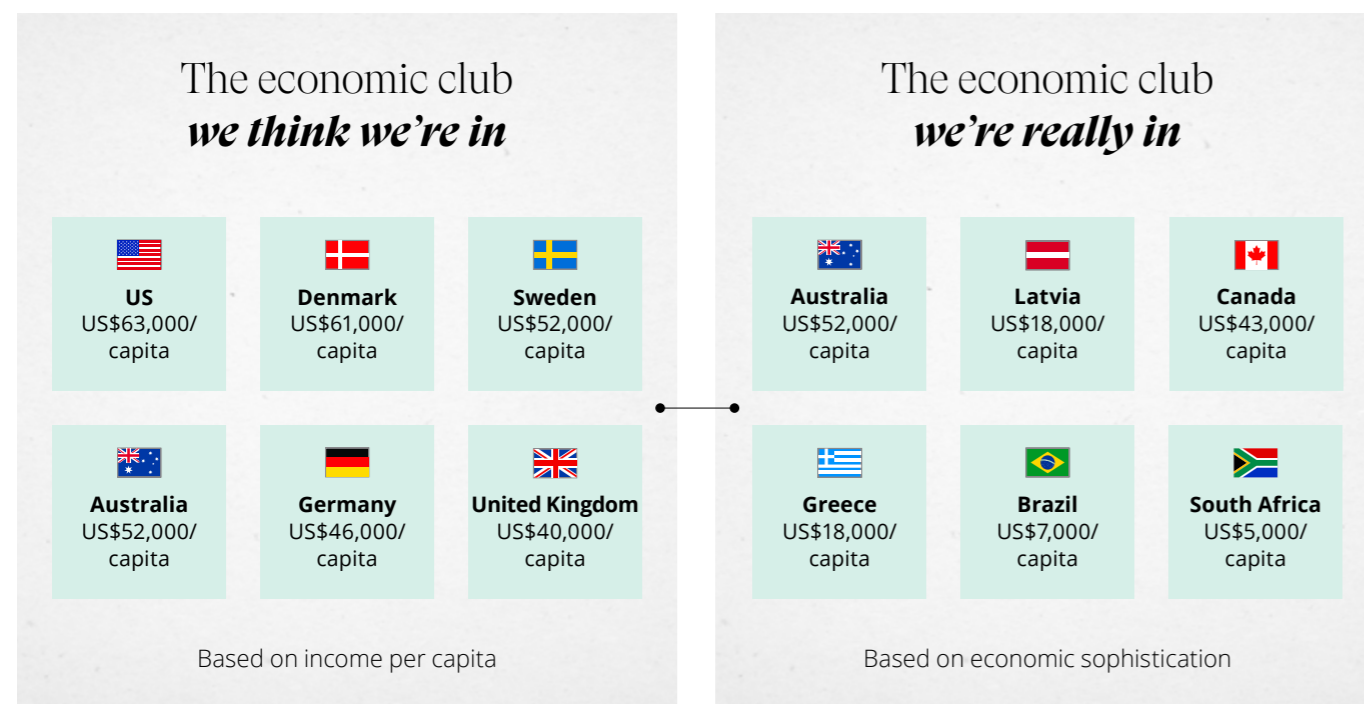
Australia may be a country of great wealth and prosperity. But our lower value add and weaker connectedness compared to our high-income compatriots has come at the cost

of investing in and enhancing the productive and adaptable capabilities in our economy.

Australia has low manufacturing sophistication. We have poor commercialisation of our research and development. Our innovation process is hindered, and our capabilities are left wanting. These factors did not matter when we were on a growth path fuelled by rocks, crops and cameras. But when disruption comes, and a shock penetrates the industrial structure and foundation of our economy, they will matter significantly.

**Figure 5** A comparison of economic clubs: GDP per capita vs economic sophistication

Source: World Bank, US dollar, GDP per capita, 2020



# 2

## We've relied on luck and it's created complacency

Australia's success has been driven partly by good luck and partly by good policy. But the luck part can't be minimised.

The impact is clear when we compare our resources-driven boom of the last 20 years to an earlier period in the 1990s, where the economy experienced increasing productivity growth. When it came to the resources boom in the 2000s, productivity fell significantly (Chart 8). With high global prices driven by Chinese demand, mining companies focused on extracting as much material from the ground as they could, rather than efficiently producing minerals and energy at the lowest possible cost.<sup>26</sup>

More recently, the global pandemic could have spelled the end of Australia's luck. And once again, a combination of a timely policy response and the strength of iron ore prices and China's demand has meant Australia has done better than anticipated. Australia's economic contraction was limited to 2.5% in 2020 and now, economic growth is 1.6% higher than pre-pandemic levels. But the latest lockdowns highlight how fragile this is – our success so far in the pandemic is no guarantee of our future recovery.<sup>27</sup>



## Australia's growth trajectory

What does 28 years of unbroken economic expansion look like?

**1990s:** Australia's prosperity was driven by rapid growth in productivity thanks to structural reforms like deregulation and floating the Australian dollar.

**2000s:** Australia continued to experience rapid growth in incomes, driven by high export prices for metals and energy, and investment in Australia's resources industries.

**2013 onwards:** Economic growth continued, but with slower growth in total output, stagnant output per person and a decline in the typical household's real wages and income per person.

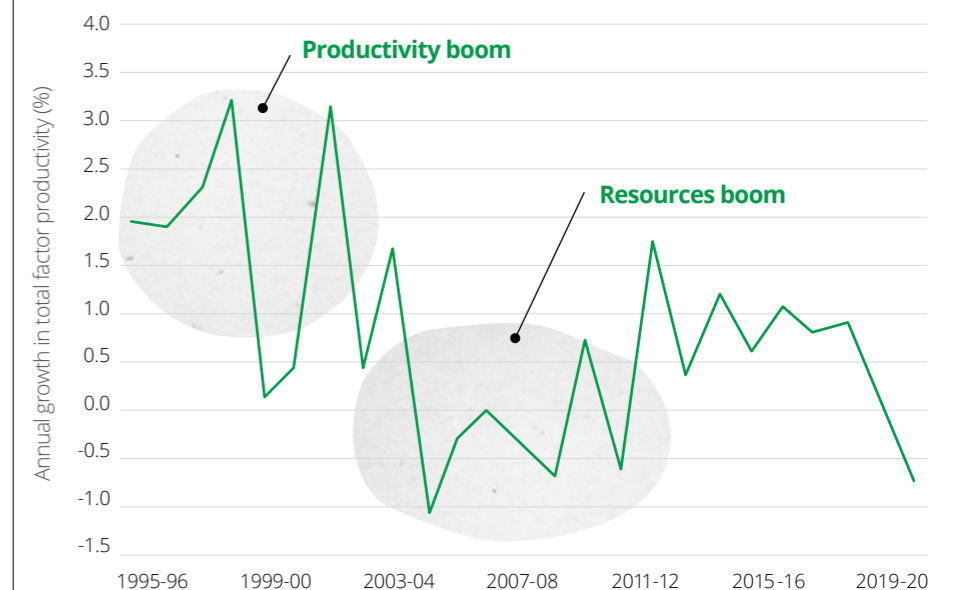
Source: Deloitte Access Economics (2021), Garnaut (2021)<sup>25</sup>

There is still a fair slog ahead in overcoming our complacency and ensuring the future resilience of the Australian economy. Businesses are getting started by transforming their strategies as they realise there doesn't need to be a trade-off between productivity and income. In fact, when capabilities and productivity leap in Australia, all incomes will eventually rise.<sup>28</sup>

Our complacency for letting the good times roll has come at the cost of economic sophistication and resilience. **By relying on our luck and taking China's relentless demand as a given, our economy is increasingly fragile.**

**Chart 8** Australia's productivity growth over time

Source: Australian Bureau of Statistics, cat. no. 5260.0.55.002



## Australia's lessons on economic sophistication

# 3

### We've neglected sectors with the greatest future potential

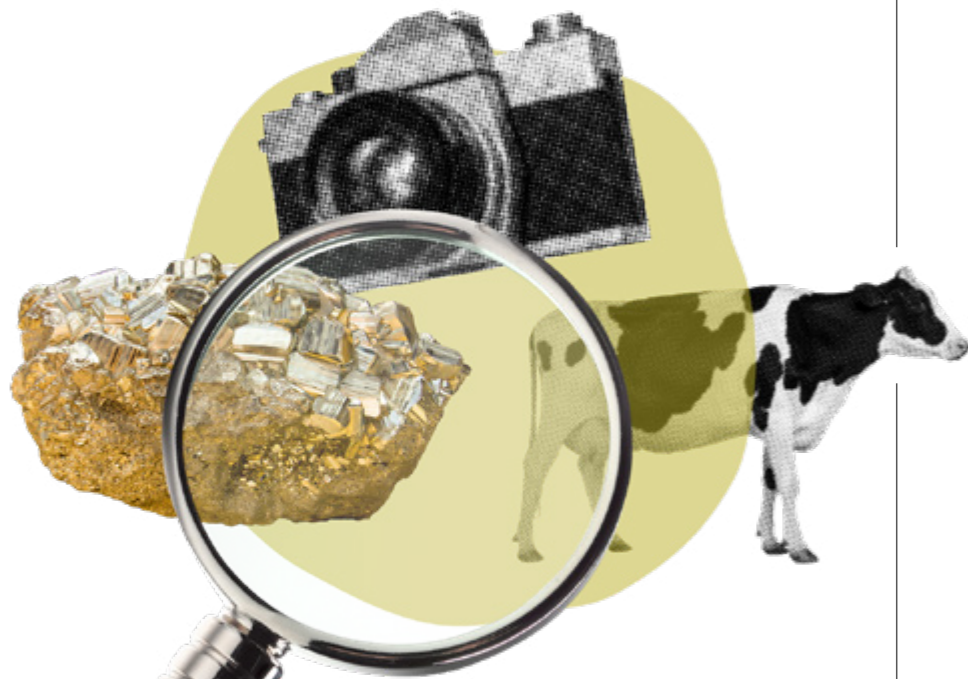
Natural resources, agriculture and tourism have been critical to our success and will continue to be an important foundation of Australia's economy. This focus, however, has come at the cost of investing in other parts of the economy with the greatest potential.

Mining and tourism (Chart 9) are not our most sophisticated industries, but we are producing with a greater level of sophistication than the global average. What does that mean? We are *good* at rocks and cameras.

Agriculture is a different story. We are not only producing at a low level of sophistication, we are doing so below the global average level of sophistication. Agriculture may be fundamental to our economy, but we're not as good at it as we have thought.

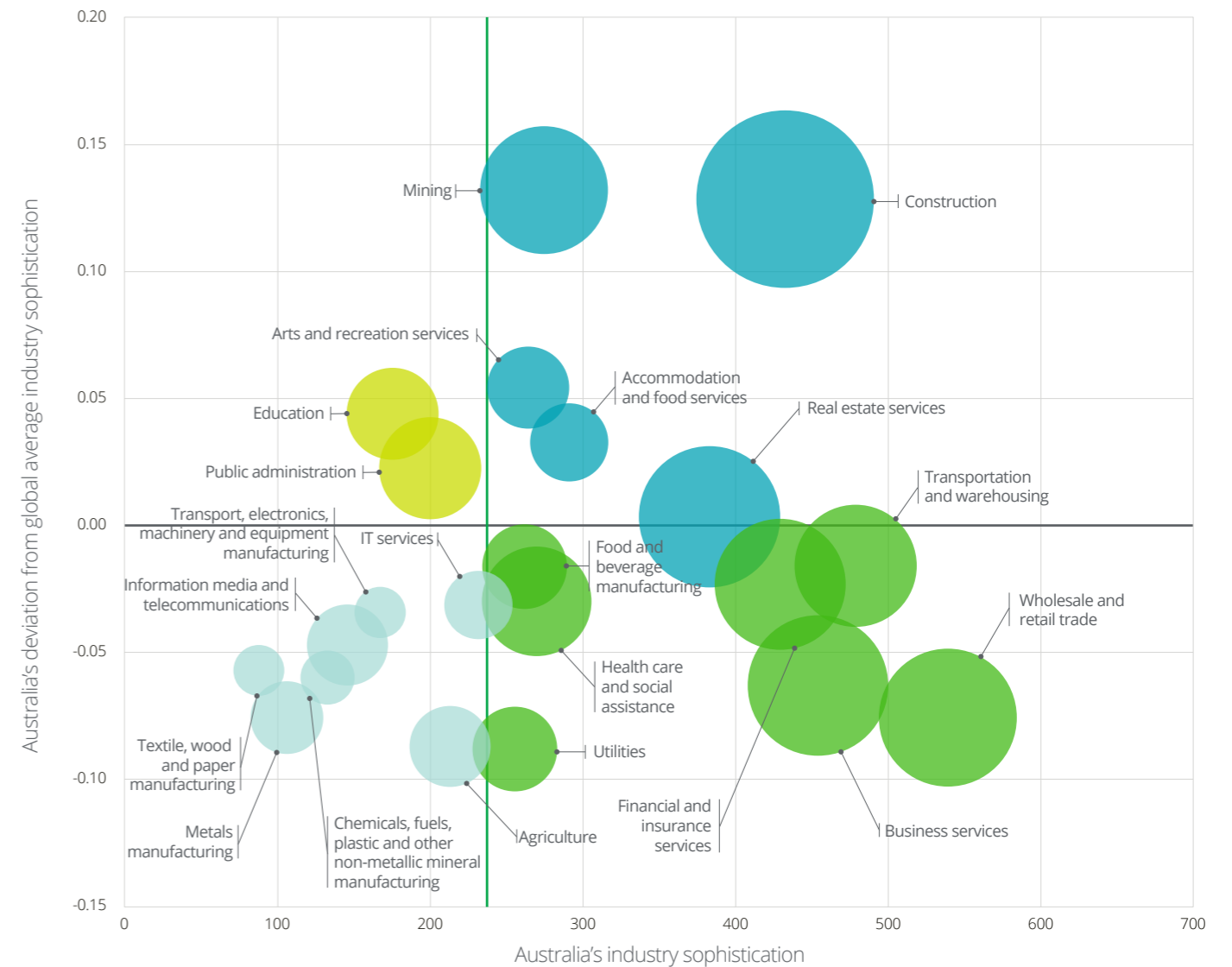
Looking at Australia's industry sophistication, nearly 60% of Australian production occurs at a level lower than the global average (Chart 9). Business services, financial services, wholesale and retail trade are industries with high economic sophistication, but Australia is underperforming.

Nearly **60%** of Australian production occurs at a sophistication level lower than the global average



**Chart 9** Australia's industry sophistication as compared to the global average

Source: Deloitte Access Economics (2021)

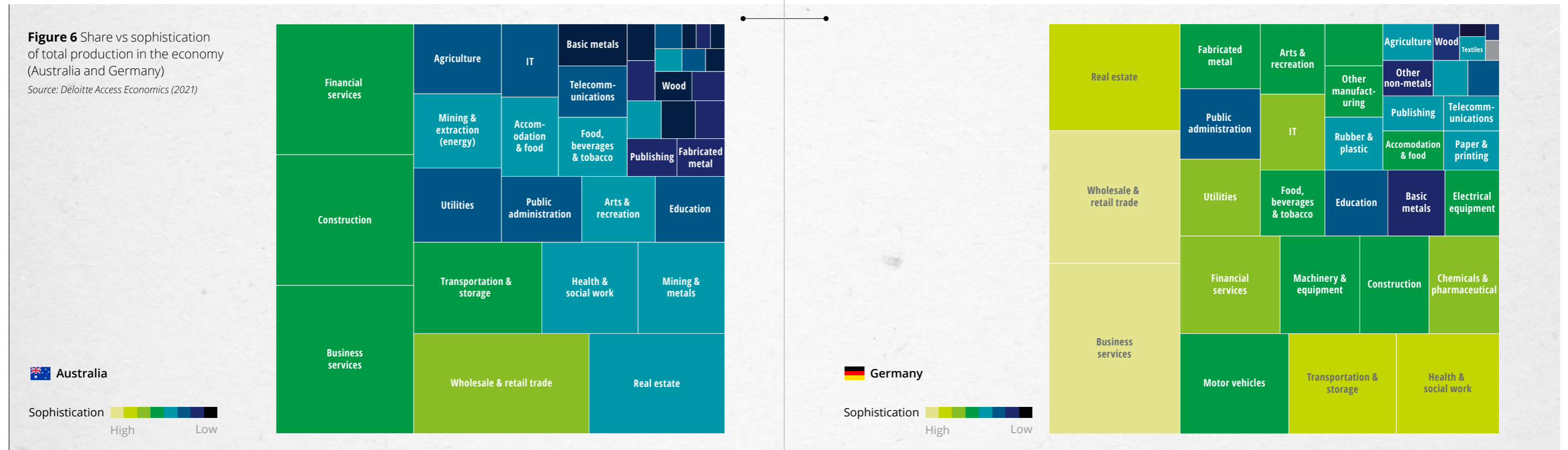


Note: size of bubble is Australia's value of total production

## Australia's lessons on economic sophistication

**Figure 6** Share vs sophistication of total production in the economy (Australia and Germany)

Source: Deloitte Access Economics (2021)



While Australia has been focusing its efforts in areas where we make money, global networks and value chains have been evolving and growing more knowledge intensive around us.

Within many industries, value creation and value add is shifting to upstream activities such as R&D and design and to downstream activities such as distribution, marketing and after-sales services. In some industries, these activities are adding more value to goods and services than the production process. Overall, investment in intangible assets now outpaces investment in physical plants and equipment.<sup>29</sup>

The best performing countries focus on areas of their economic activity which deliver greater value add and higher sophistication. For example, Germany, which sits at the top of

the index, is the most sophisticated economy with high levels of both value add and connectedness (Figure 6). It is directing its productive efforts, through investments and innovation, into industries with greater sophistication dividends – such as business services and wholesale and retail trade – and it plays at the centre of the global economy. The country is at the forefront of the productive capabilities that will be foundational in future global value chains.

In Figure 6, the size of the industry 'block' indicates its relative share of total production in the economy. The colour of the block reflects the level of sophistication of production within each industry – with the lightest being the most sophisticated. Consider the contrast between Australia's relative production sophistication and Germany's.

Germany has a large share of its production in industries with greater sophistication (shown in the lighter colours). In the industries where Australia's greatest production share sits, we're producing goods and services well below the sophistication level of Germany. **We've traded off income for economic sophistication.**

In Australia, we've focused our efforts on mining and tourism, which are not our most complex industries nor where the greatest share of our production sits. However, these are the areas where the money has been flowing from.

**The cost of being an economy of rocks, crops and cameras is that we've missed the opportunity to invest in greater value creating industries and move our economy up the sophistication curve.**



### A link in the innovation chain

The link between health and the economy has never been stronger than during 2020 – when the COVID-19 pandemic swept through the world. Australia produces globally recognised health research and we punch above our weight compared to other countries. Australia also has a renowned health delivery sector. But we lack the capabilities to transform our research into solutions.

When there was a shock to the system, like COVID-19, we didn't have the capabilities to hit the ground running. Without the manufacturing capacity or technology in place to make our own vaccines, the Australian Government had to undergo extensive negotiations to access adequate supplies of the COVID-19 vaccine from overseas manufacturers.

In the preceding years, Australia missed a trick in not tooling up in the manufacture of mRNA vaccines. This will be needed in the future given the prospects of the mRNA breakthrough and computational biology to establish advances in health and in generating business in the economy. Once again, Australia is paying the price of complacency.

## Australia's lessons on economic sophistication

# 4

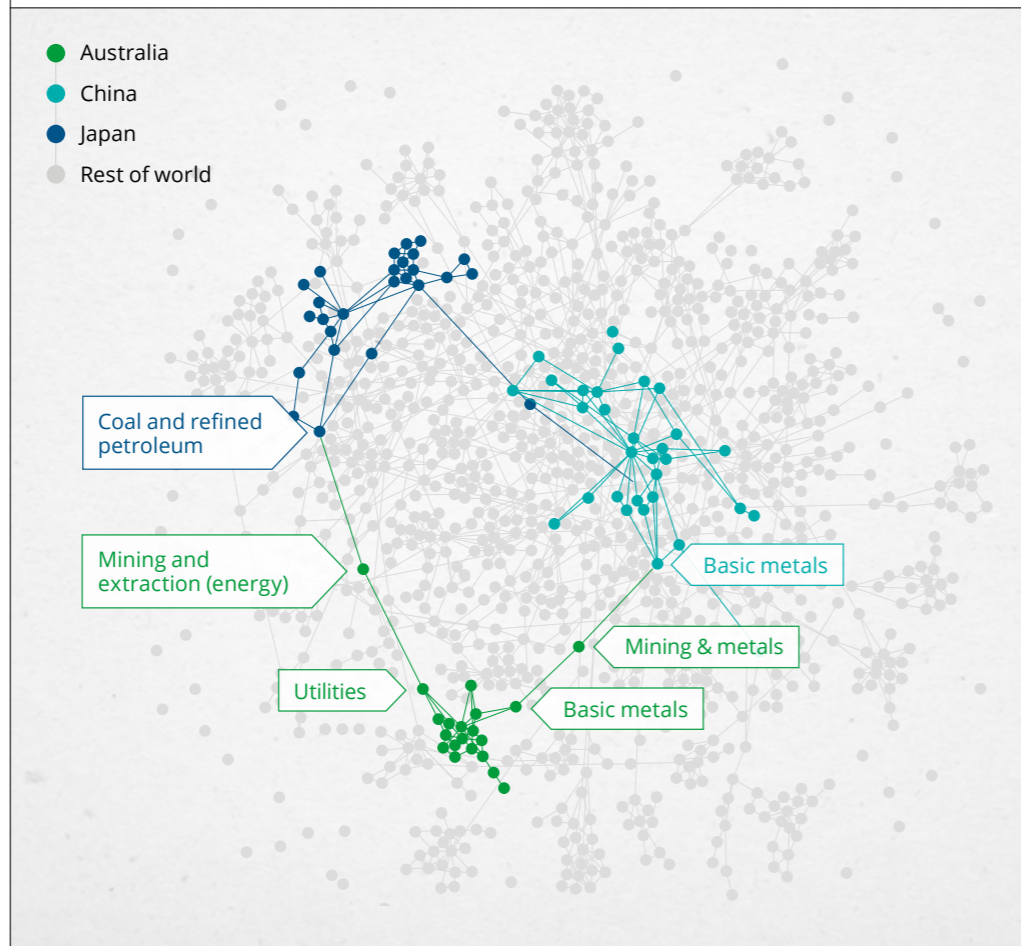
### We're not well connected to the rest of the world

Australia's mining production is our strongest gateway to global networks. The participation of Australia in global value chains is mainly driven by our downstream production, as other countries intensively use Australian natural resources in their exports.<sup>30</sup>

While we have limited connections to the global economy, the ones we do have are strong. Australia's largest export sectors, mining and resources, lead directly into central value chains in the global network – to Japan via the automotive industry and to China through value chains like steel manufacturing (Figure 7).<sup>31</sup>

In particular, it is through Chinese metals that Australia is linked to the world. Around one-third of the output of Chinese metals manufacturing relies on foreign demand.<sup>32</sup> This means that through our metals being sent to China, we are indirectly connected to other countries and exported goods in the global network.

**Figure 7** Australia's economic network connections map  
Source: Deloitte Access Economics



Dots represent industries in each country included in this analysis. Lines between the dots represent the connections between these industries (based on trade in value added).

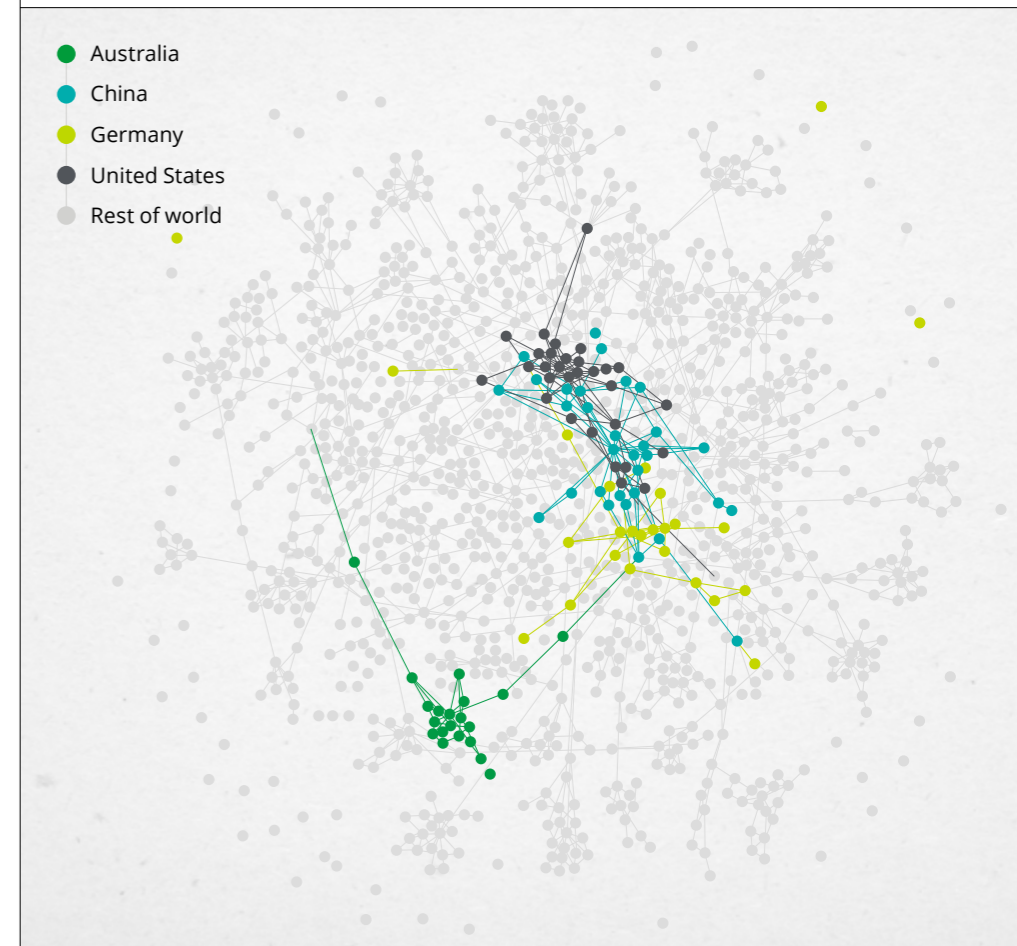
**But Australia's connections are inherently fragile, in part because we have so few.** Think about international education and agriculture: the flow of international students all but stopped during the pandemic, and China continues to announce changes to its agricultural policies which impact on Australian exporters. You only need to consider Australia's wine industry to grasp just how crippling China's decisions can be to our local producers.

Sitting on the periphery of the global network, we have too few connections to ensure the overall resilience of the Australian economy, regardless of how strong the connections are.

The global economic network map (Figure 8) shows that countries like the United States, China and Germany are highly integrated and embedded within global networks for both countries (represented by the colours) and industries (represented by the nodes). This is in stark contrast to Australia, which sits on the fringe of global networks. We have very few industries connected to global networks and very few connections to other countries.

**The more high-quality connections a country has, the more its supply chains are prepared for and can capitalise on unexpected events.** Businesses heavily reliant on strong but few connections are also inherently fragile. There is a need for Australian organisations to better connect and contribute to the global economy to improve their resilience.

**Figure 8** Global economic network map  
Source: Deloitte Access Economics



Dots represent industries in each country included in this analysis. Lines between the dots represent the connections between these industries (based on trade in value added).

## Australia's lessons on economic sophistication

# 5

### We're at risk of the 'tyranny of distance' again

Globalisation has benefited Australia through opening our access to global trade markets. But equally, it has highlighted how expensive it is for us as a remote island at the intersection of the Pacific and Indian Oceans – the tyranny of distance.

The evolution of technology and a shift to digital in the trade of goods and services saw much of this disadvantage dissipate over the years. Trade became easier, the transaction cost of doing business eased<sup>33</sup> and we became complacent.

As the rotation of global growth turned towards Asia, we continued to benefit from a growing and thriving

China, but were still yet to leverage our proximity to the economic growth in the broader Asia Pacific region.<sup>34</sup>

Then COVID-19 hit. Deglobalisation and nationalism has once again reinforced Australia's isolation. The fact that Australia is an island made it easy to close borders, helping to not only contain the virus but also keep the economy running. This has led to a health and economic performance that outstripped many other countries.

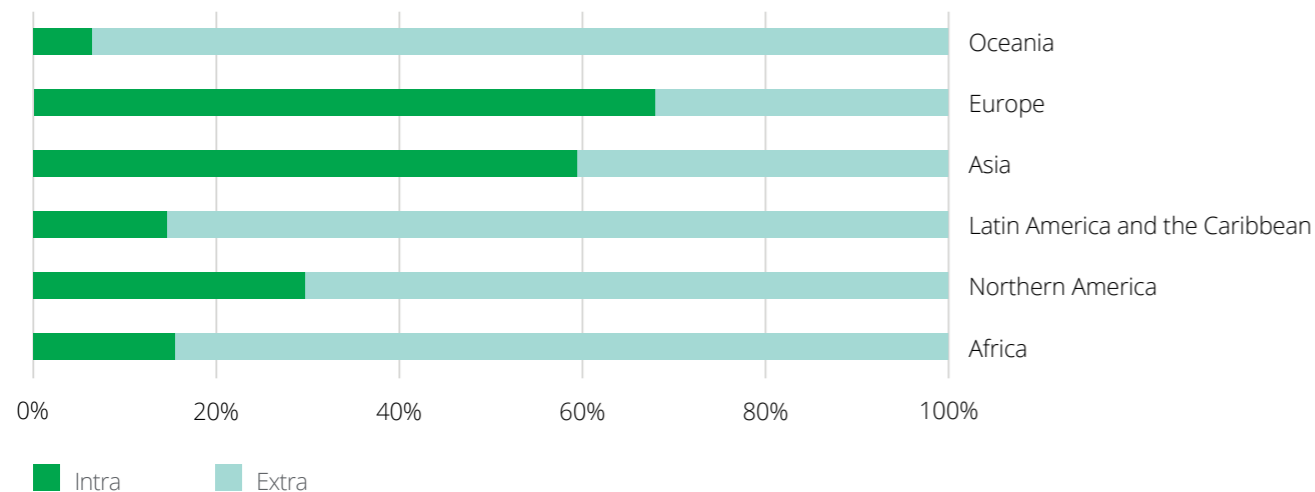
But Australia's geographic isolation from world markets hampers our participation in global value chains.<sup>35</sup> Long-haul trade across the global economy became more prevalent after China entered the World Trade Organisation in 2001 and as transportation and communication

costs fell, with a ripple effect of increasing participation in global value chains occurring across other countries.<sup>36</sup> The share of trade in goods that occurred within a given region, rather than long-haul trade across the globe, declined from 51% in 2000 to 45% in 2012. Now that trend is reversing.<sup>37</sup>

**The biggest drivers of regionalisation are increasing trade flows within Europe and within the Asia Pacific region, particularly trade centred on China.** In 2019, 68% of all European exports were to trading partners on the same continent. In Asia, this rate was 60% (Chart 10). Australia is at a disadvantage as it sits at a far-flung distance from global markets, except for the fastest growing bloc in the world – Asia.<sup>38</sup>

**Chart 10** Intra- and extra-regional exports, 2019 (percentage of total exports)

Source: United Nations UNCTAD (2020)



"In a global economy, it pays to hedge against volatility by diversifying. If we can count India in our top three export destinations and if we can tap more two-way investment between our countries, Australia's exposure to global risk is reduced. A strong economic relationship with India strengthens Australia's economic resilience."

*Former Secretary of the Department of Foreign Affairs and Trade, Peter Varghese<sup>40</sup>*

It is no surprise that countries leading the way in economic sophistication are from Europe and the Asia Pacific region.

These economies are highly connected and integrated in both innovation and intricate value chains (in industries such as automotive and electronics) which are experiencing the most pronounced shifts towards regionalisation. In these industries, proximity is a necessity due to just-in-time sequencing production processes.<sup>39</sup>

Supply chains are also extending into smaller neighbouring economies with lower labour costs. For example, as rising labour costs place China's competitive advantage at risk, it could extend into the neighbouring Asia Pacific region with lower labour costs, where proximity is still key.

**New technologies, increasing consumption in the developing world and shifts in trade to our region mean goods-producing value chains will continue to make their production footprints more regional and less long haul.** Australia is going to have to work hard to not only overcome distance as a barrier to being embedded in global value chains, but also to evolve as the global value chains do.

It means that Australia will need to work much harder to build value into connections across Asia, including into rapidly growing economies like India.

# What if...



**“Both in explaining the past and in predicting the future... we focus on what we know and neglect what we do not know, which makes us overly confident in our beliefs.”**

*Daniel Kahneman, Thinking, Fast and Slow*

## Possible futures

**P**icture this: geopolitical tensions with China worsen, leaving Australian trade out in the cold. Or global momentum for meaningful action on climate change catches Australia off-guard.

But what if we seized the mantle of reform and improved our economic sophistication instead? These are all possible future scenarios. Is Australia prepared for these challenges?

In an interconnected and ever-changing world, uncertainty is certain. Geopolitical tensions, technology advancements and climate change make our global economy ripe for disruption.



## What if... China turns off the tap?

China has been pivotal to Australia's success. This trading relationship has helped drive forward Australia's living standards and incomes.

However, it has created a dependence on – and even permanent expectation of – China's demand. What if those ties were to cease? How would Australia be impacted?

Australia has more to lose than most if China were to turn off the tap (Chart 11). In the traditional economic sense, Australia's exports would take a hit, with flow on impacts to businesses and households. More than a third of our exports go to China. And the impact of China turning its back on particular sectors is already being felt due to trade tensions – the headwinds to lobster, beef, coal and wine being the most recent.

But what is less understood is how the demise of this trading relationship would impact Australia's economic sophistication. The results would be significant, with Australia among the worst affected in the global rankings (Chart 11). The consequences for Australia's economy from a drop in economic sophistication would run much deeper than the impact on headline economic statistics.

**Australia's future economic capability, its resilience to shocks and its ability to thrive in the 21<sup>st</sup> century would be at significant risk if we are not thoughtful or careful.**

Our Sophistication Index ranking would drop to a low of 42<sup>nd</sup> in the global economy, falling below that of Greece and Brazil (Chart 11). Both countries have struggled through economic crises for the better of two decades – and their incomes remain almost a third below that of Australia's today.

Unsurprisingly, Australia's mining sector would take one of the biggest hits to economic sophistication, followed by manufacturing and mining support services (Chart 12).

But mining is broad and not all of it goes to China. Energy mining – predominately LNG – would be less impacted, supported by connections to Japan and South Korea. Exports of coal to India and Japan would support some quarrying activity.

The extent to which we can build hydrogen into an export economy and drive the exploration and development of new rare earth minerals would provide some cushioning – if we achieve this.

Regardless, **all sectors of the economy would be impacted** (Chart 12). Australia's services industries would be exposed by the lack of tourists, particularly in arts and recreation, and accommodation and food services. Real estate would similarly hurt from a fall in demand. And agriculture would also suffer, as China is a massive destination for crops and meat.

Any transition away from China will not come easily; we are lagging in the capability to move into the value chains demanded by the most sophisticated economies. So, if such a transition became time critical, Australia would be caught short; we would be paying the heavy price of complacency. It would mean much greater trade and diplomatic investments to drive a sustained pivot from an over-reliance on China.

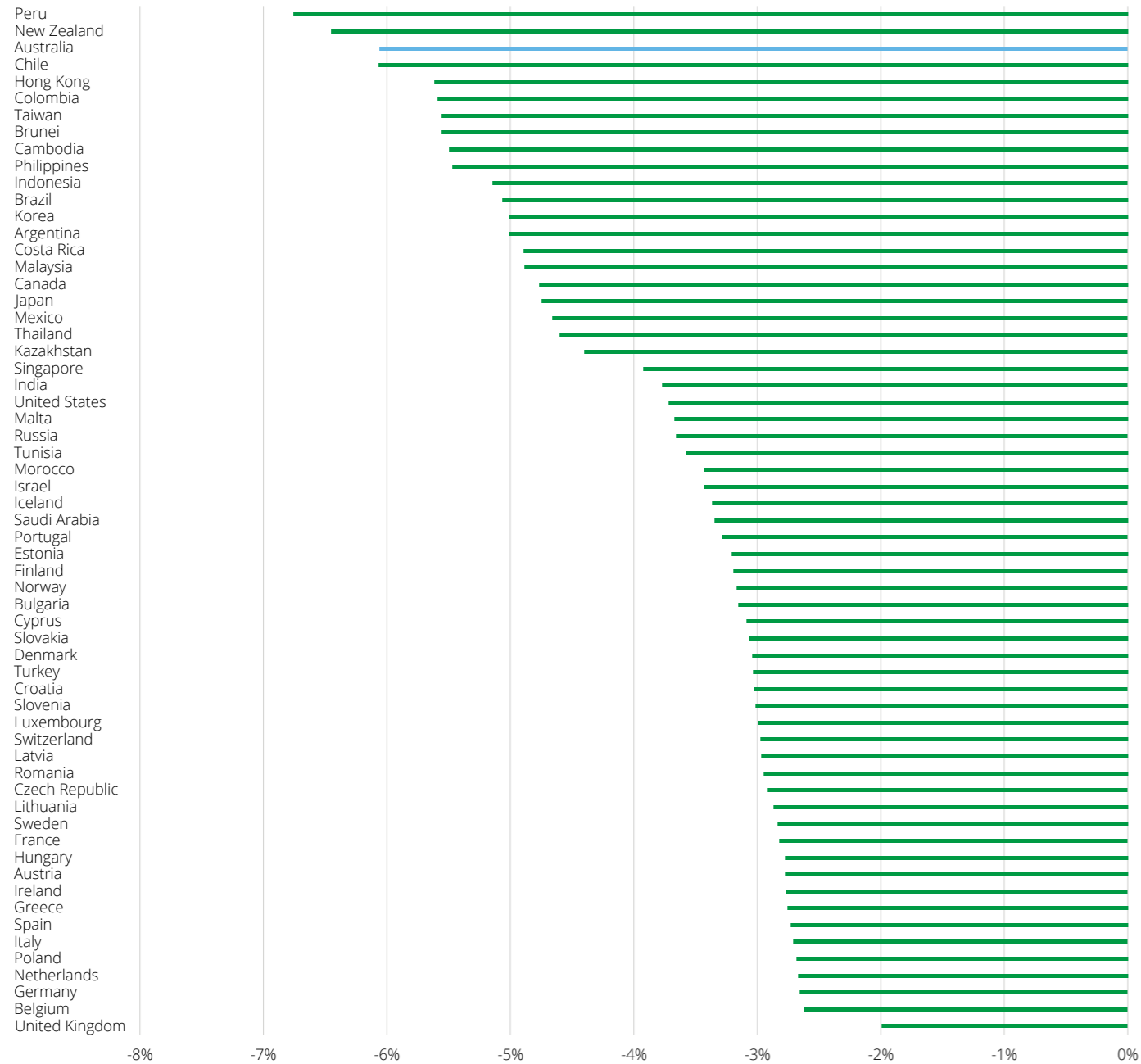
Without a strategic trade and investment plan, a crisis with China would hurt businesses and households alike. Incomes would be slashed, jobs would be lost and business investment would crawl to a standstill while uncertainty roared and foreign direct investment whispered.



### What if... China turns off the tap?

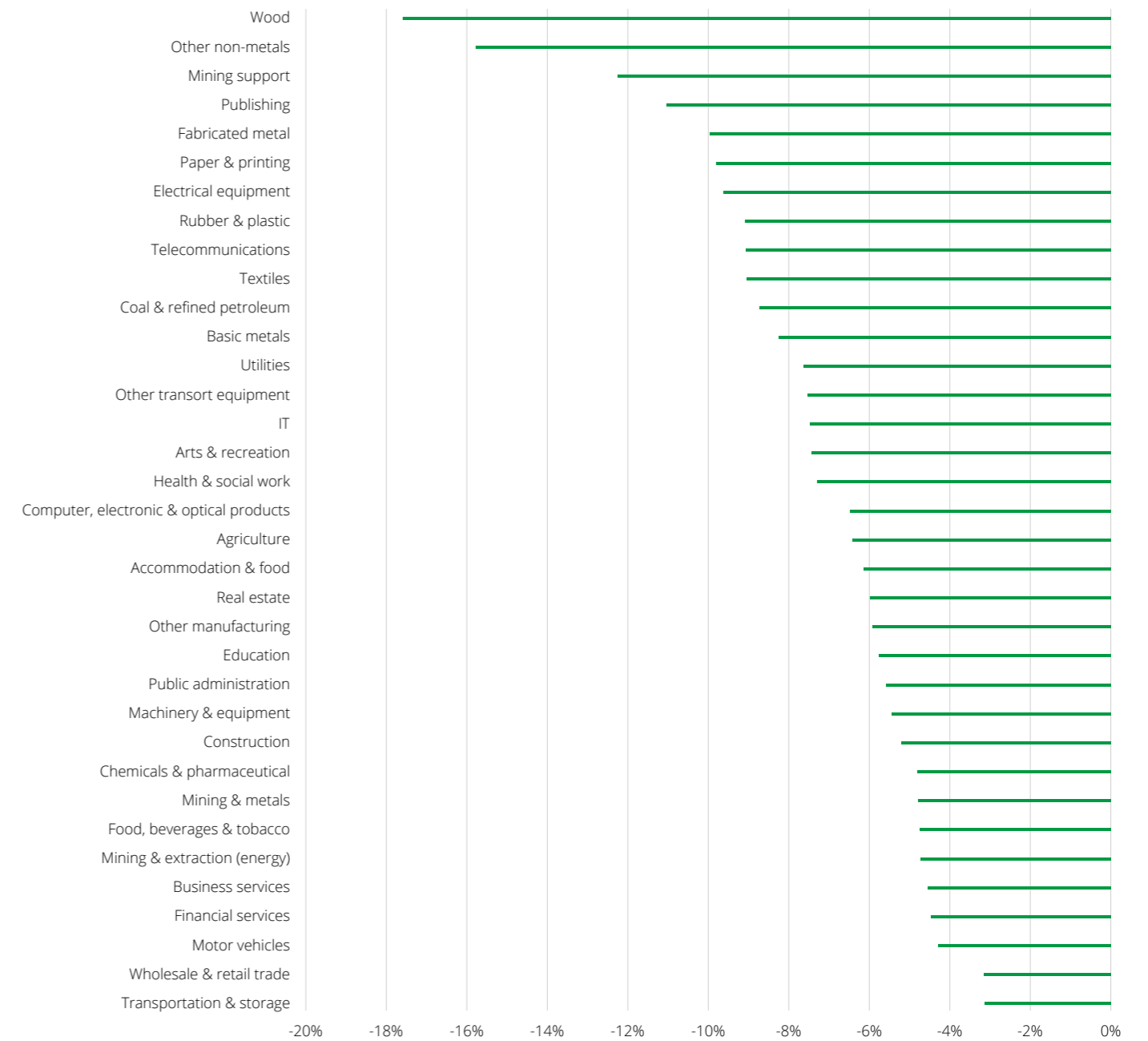
**Chart 11** Decline in Economic Sophistication Index by country if China undertook unilateral action to stop trade

Source: Deloitte Access Economics



**Chart 12** Decline in Economic Sophistication Index by Australian industry if China undertook unilateral action to stop trade

Source: Deloitte Access Economics



## What if... Australia fails in its climate change transition?

Climate change is an increasing threat to our economy. But momentum around the world is shifting dramatically. The International Climate Summit held in April 2021 saw leaders step up their climate commitments. New geopolitical positions have formed and there has been increased action by investors and financiers which will drive capital flows significantly in the years ahead.

What if Australia's action on climate change continues to lag the global community and, in response, overseas governments introduce limits on our high emission intensity production flows?

**This would be devastating for the Australian economy.** Australia is one of the highest carbon emitters on a per capita basis in the world. Key exports – LNG, coal and iron ore – are highly emission intensive. Australia's reliance on coal-powered electricity (making up 54% of electricity generation in 2020)<sup>41</sup> makes manufacturing a significant contributor to emissions.

**In this scenario, Australia's ranking on the Sophistication Index would drop to 49<sup>th</sup> and be on par with Kazakhstan and Tunisia** – countries with average incomes more than six times lower than our own.

Australia's high value add industries would be removed from the global network, drastically reducing connections with China, Japan and South Korea.

Australia's mining and manufacturing sectors would be most impacted with falls in economic sophistication of up to 95% (Chart 13). Our global connections would be severely reduced, and our insufficiently diverse networks elsewhere would make a transition difficult.

Less emissions intensive industries would be less impacted, although not insignificant falls would be seen in industries adjacent to mining and manufacturing as important connections are severed. Mining support services, electrical equipment and transport equipment would all see falls in sophistication. Again, the lack of connections to lower emitting sectors globally would make it difficult for these industries to transition into new value chains quickly.

**Importantly, it's these high emitting sectors that built the foundations for much of Australia's current global connections.** Through our iron ore exports to China and LNG exports to Japan, Australia's key connections to the global economy are highly emissions intensive. Indeed, the massive fall in sophistication – despite much of the falls being confined to 10 industries – highlights Australia's existing vulnerabilities.

**The Australian industries most at risk from inaction on climate change are some of our most complex industries. Transport and logistics could be badly affected, as well as key parts of mining.**

The fall in Australia's sophistication would be dire. Incomes would be slashed and our standard of living would be drastically cut, while unemployment would rise sharply. Our vulnerability to future economic or climate shocks would see investment drain from the country.

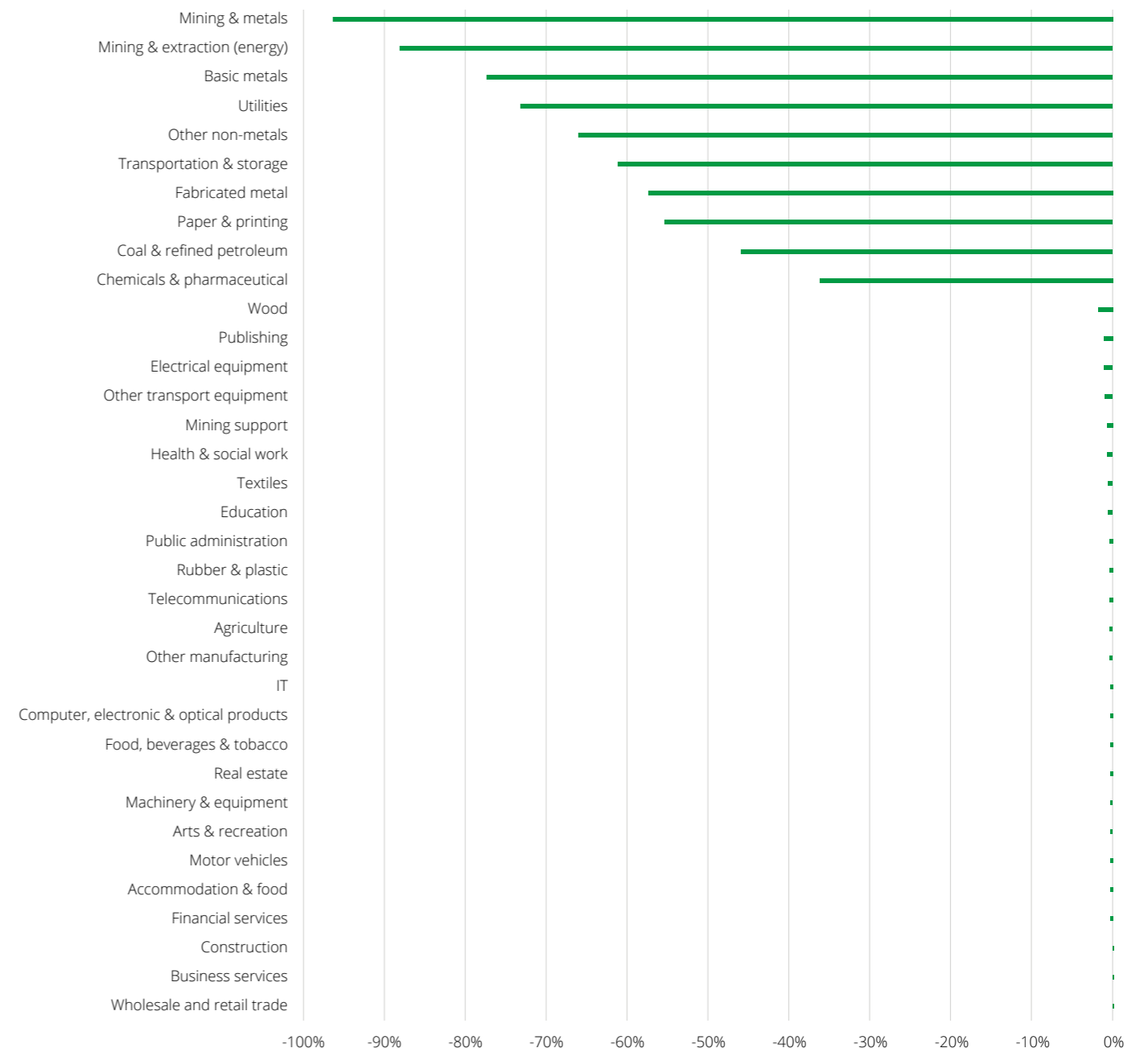
In short, the world would no longer want what we have. And our lack of connections with the global economy would make changing or responding very hard.

**54%**  
of Australia's electricity  
is coal powered



**Chart 13** Decline in Economic Sophistication Index by Australian industry if Australia fails in its climate transition

Source: Deloitte Access Economics



## What if... Australia fails in its climate change transition?

### What if everyone got caught out?

The previous scenario explores the possibility that Australia is caught out by local inaction on climate change.

But international cooperation is no guarantee – so what would happen if all global policy makers make the same mistake? What if the consequences of climate change forces their hands and a smooth transition to a low emission

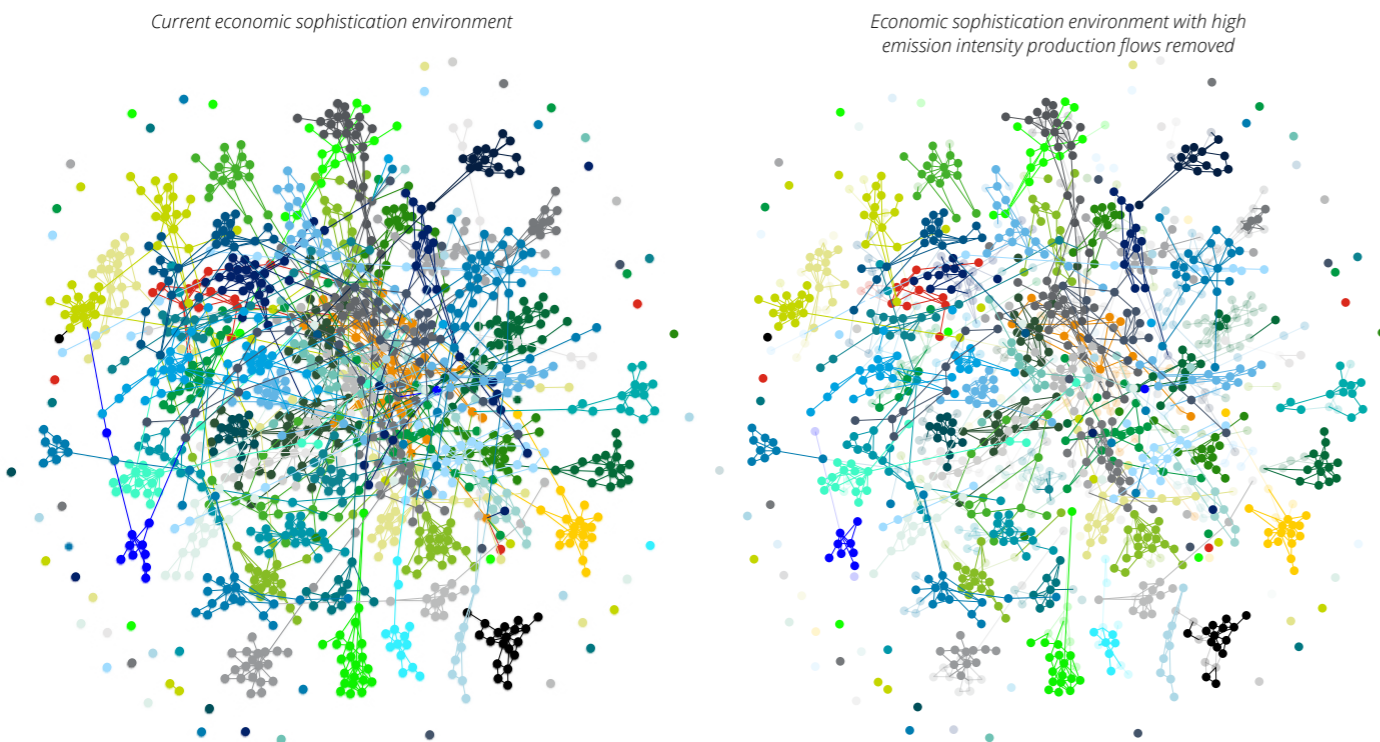
future is no longer possible? What if the changing climate forces the closure of high emission production flows at once?

The global economy would drastically change. Figure 9 compares the existing global network with one that limits high emission production flows. The substantially sparser network demonstrates the role that fossil fuels have traditionally played in connecting the global economy.

These links will need to be replaced with alternative sources so the global economy can continue to advance while protecting against the impacts of climate change.

**Figure 9** Current economic sophistication environment versus that with high emission intensity production flows removed

Source: Deloitte Access Economics



Dots represent industries in each country included in this analysis. Lines between the dots represent the connections between these industries (based on trade in value added).

## What if... Australia boosts its economic sophistication?

Taking a more optimistic view of the future, what if everything went to plan for Australia? What if Australia improved its level of sophistication? How would the economy look and how would Australia benefit?

This scenario looks at the optimal economic sophistication for Australia. It finds where the world operates best and connects Australia to it. In doing so, it pulls connections to Australia. It lifts our productive ability to the

best performing country in each industry, ensuring our value add becomes world leading.

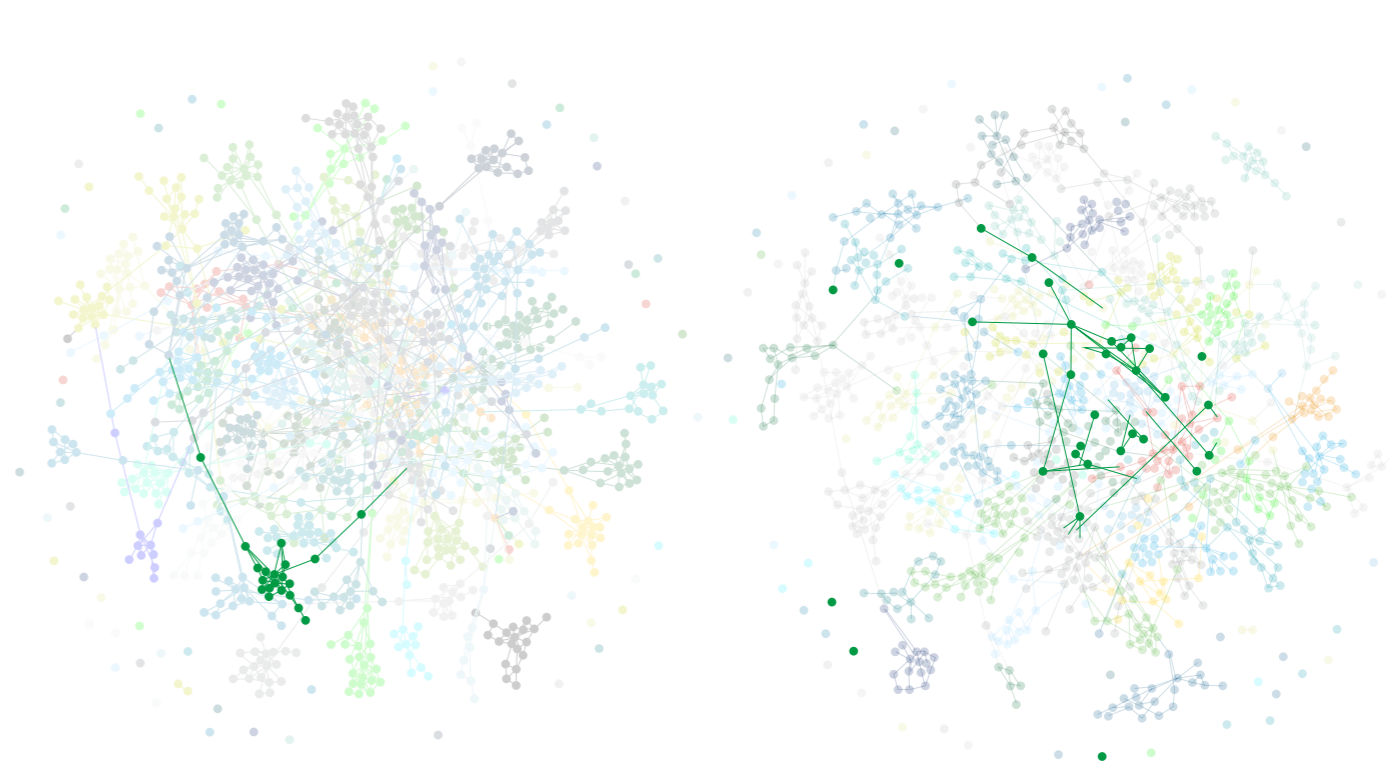
This is a world where Australia directs more business investment and fosters increased trade linkages into the rising Asian economies (Figure 10). We also open up markets into Africa, where population growth will be significant in the years to come, and increase goods and services into global markets. Australia can

export energy in manufactured products, not just the raw energy – this is value adding in the future of sustainable energy.

If Australia were successful, our Economic Sophistication Index score could more than double, placing Australia above even the highest performers today.

**Figure 10** Australia's current connections versus if Australia optimised for economic sophistication

Source: Deloitte Access Economics



Dots represent industries in each country included in this analysis. Lines between the dots represent the connections between these industries (based on trade in value added).

## What if... Australia boosts its economic sophistication?

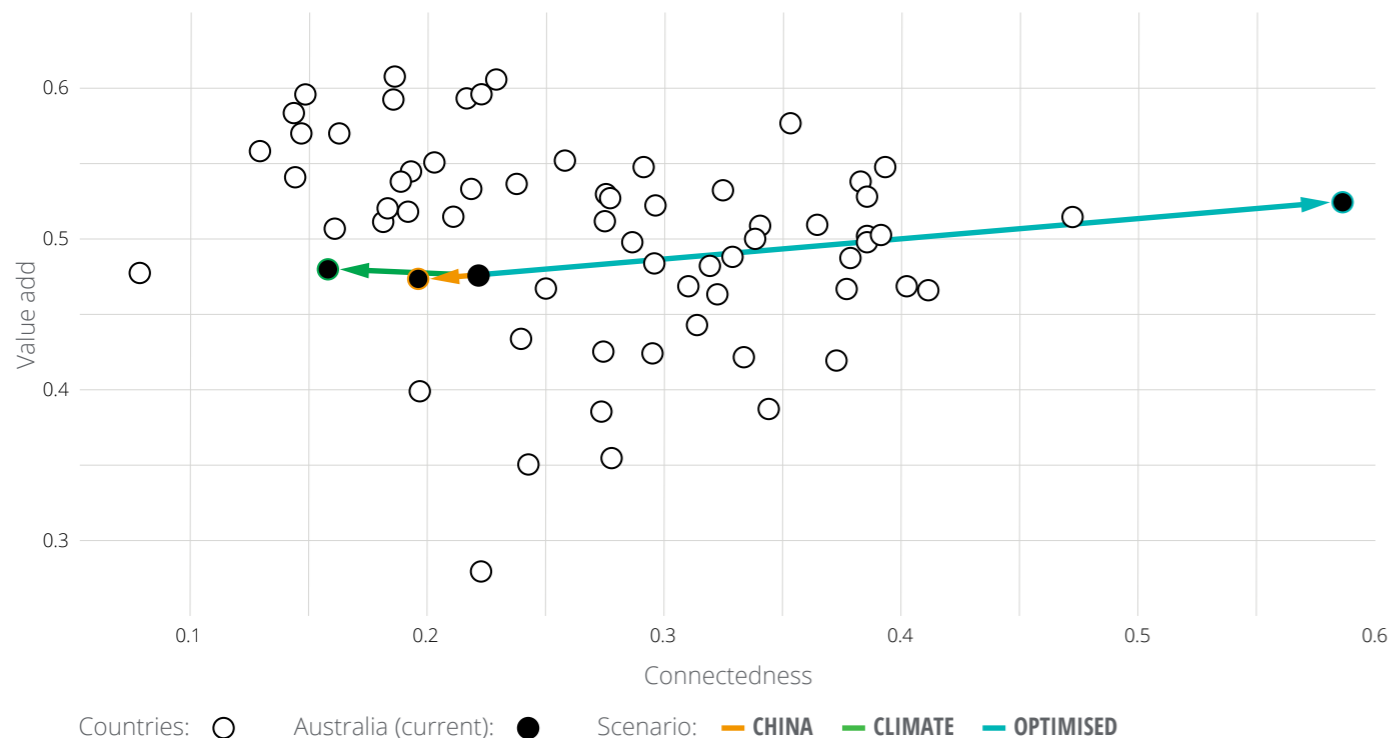
But this would require a **drastic shift in the structure** of the Australian economy. It would see Australia increase its business services sectors, reduce connections with China and diversify in line with countries like Germany, the United Kingdom and the United States.

Our computer, electronic and optical manufacturing would be substantially larger as would our education industry. And we'd be a larger player in chemicals and pharmaceuticals. These industries would embed us within global value chains.

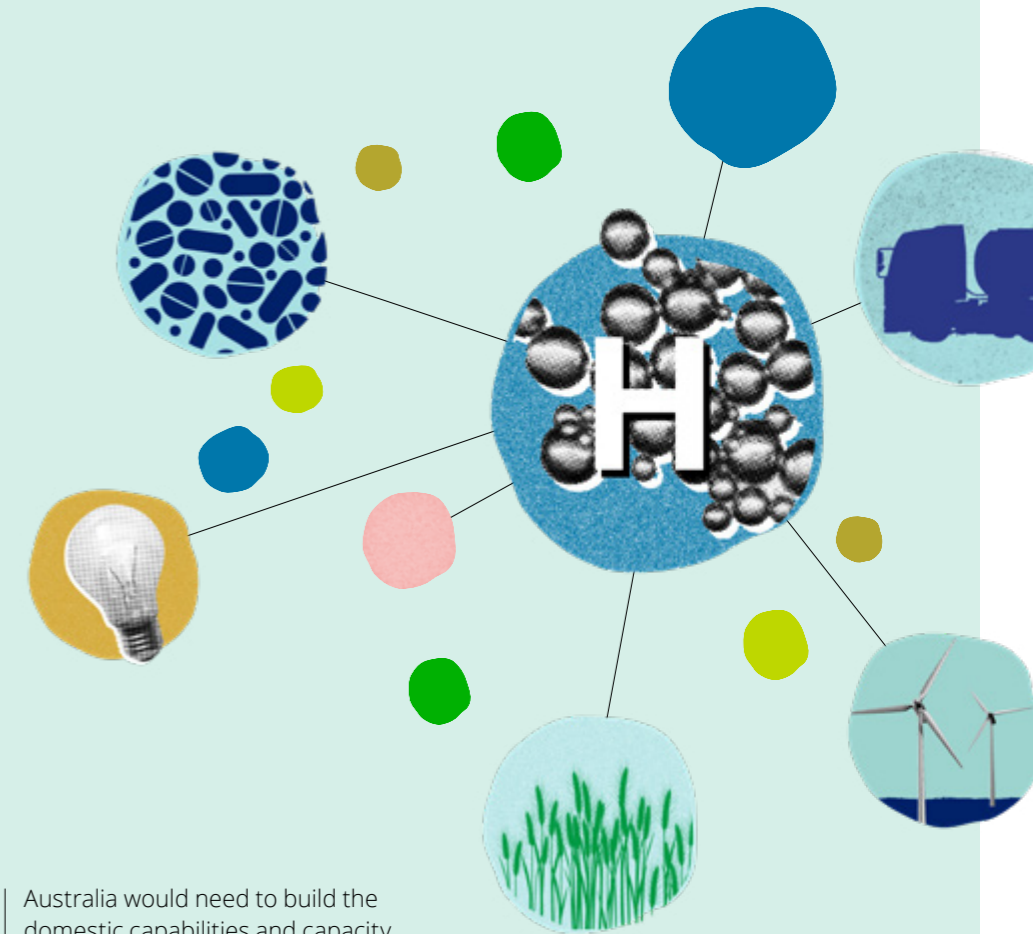
If we were successful in this endeavour, we'd see our incomes rise and vulnerability to shocks fall. We'd be more nimble in how we respond to future challenges and better prepared to make the most of new and emerging opportunities.

Australia has the potential to be an integrated and sophisticated player in the global economy, but we begin from an almost standing start.

**Chart 14** Change in Australia's Economic Sophistication Index components under each scenario



## Case study: Building a hydrogen industry



As the global economy rapidly decarbonises and transformation occurs across energy sectors, opportunities arise. A question posed frequently is: can Australia be a net exporter of hydrogen energy to the world?

For this to be realised, we need to start from the bottom up.

Leveraging Australia's hydrogen export industry first requires building a commercially robust domestic hydrogen industry. To achieve this, we would need significant policy reforms, investments and structural disruption across capital and labour markets.

The use cases that are most prospective include where hydrogen is a chemical feedstock, such as steel, ammonia and chemicals production, and where having a high energy density is critical, such as in heavy transport applications.

Australia would need to build the domestic capabilities and capacity to create a viable industry.

This includes being able to produce enough to supply domestic consumption in the target use cases. Once cost competitiveness is realised, we could expand and scale into what are likely to be highly competitive export markets.

Building these domestic capabilities increases value add and Australia's complexity in the process. Investing in the skills, technologies and infrastructure required to make the domestic industry viable would create complexity dividends that could flow to other sectors across Australia – such as manufacturing – to move up their own respective value chains.

# Building our resilience



“...strategy is not so much about the act of navigation as it is about a process of wayfinding. We only know as we go.”

*Robert C.H. Chia and Robin Holt,  
Strategy without design*

## Complexity economics in action

**A**ustralia needs to meet the challenges of disruption head on. The antidote to uncertainty is not the predictability that comes from rigidity and uniformity, it's having the resilience to adapt to and thrive in a changing environment.

To succeed, we must do this together. Our country is the sum of the

institutions, organisations and people within it – what we all do is important. How can we build better resilience in our organisations?

The pandemic has exposed Australia's burning platform for change and transformation. We need to move from complacency and static success, to focus on building resilience. We need optionality in the face of uncertainty. We need agility in the face of disruption.

“Abandon the urge to simplify everything, to look for formulas and easy answers, and to begin to think multidimensionally, to glory in the mystery and paradoxes of life, not to be dismayed by the multitude of causes and consequences that are inherent in each experience – to appreciate the fact that life is complex.”

*M. Scott Peck, The Road Less Traveled*

MAKING AUSTRALIA'S LUCK  
BUILDING RESILIENCE

## Complexity economics in action



Navigating uncertainty requires greater diversification of our economy and investment in areas like innovation, experimentation, risk-taking, skills and adaptive know-how across industries and the workforce.

But to achieve this, Australia needs economic settings which encourage entrepreneurship, new business formation and investment in the new drivers of economic growth. We need to embrace diversity of thinking and innovation by harnessing new technologies, education and research systems which build capabilities. There is a need for a risk culture which promotes innovation and experimentation and is designed to capture the value of collaboration and serendipity.<sup>42</sup> Social discourse

must be broad, respectful and built around a shared value of progress.

This shift starts in each and every organisation. Until and unless business reorients its strategies in the face of uncertainty and structural change, the economy will not.

The pandemic has taught us to think about how prepared we are for change and disruption. Through a focus on **preparedness, innovation, capabilities and connections**, boards and executives can consider:

- The global and local scenarios which help define longer-term goals and illuminate new sources of value
- The innovation and risk appetite required to create new products and services the market will need

- Developing capabilities to facilitate change and keep the organisation future ready
- The importance of partnerships as the cornerstone of a new operating model and market presence.

Resilience is not an end state but a mechanism to adapt, built into all aspects of an organisation, industry or economy. By continually building resilience, we're developing the capacity not just to operate within the parameters of dynamic and uncertain systems, but to thrive.

An entrepreneurial spirit is key to creating a future-focused economy. Navigating uncertainty and an ever-changing landscape requires greater diversification and investment in areas like innovation, experimentation, risk-taking, skills and adaptive know-how across industries and the workforce.

## How to build resilience

**W**hile change is inevitable, the nature and impact of that change is impossible to predict. For this reason, organisations should focus on looking ahead: preparedness is more important than prediction, and resilience is more effective than reaction.

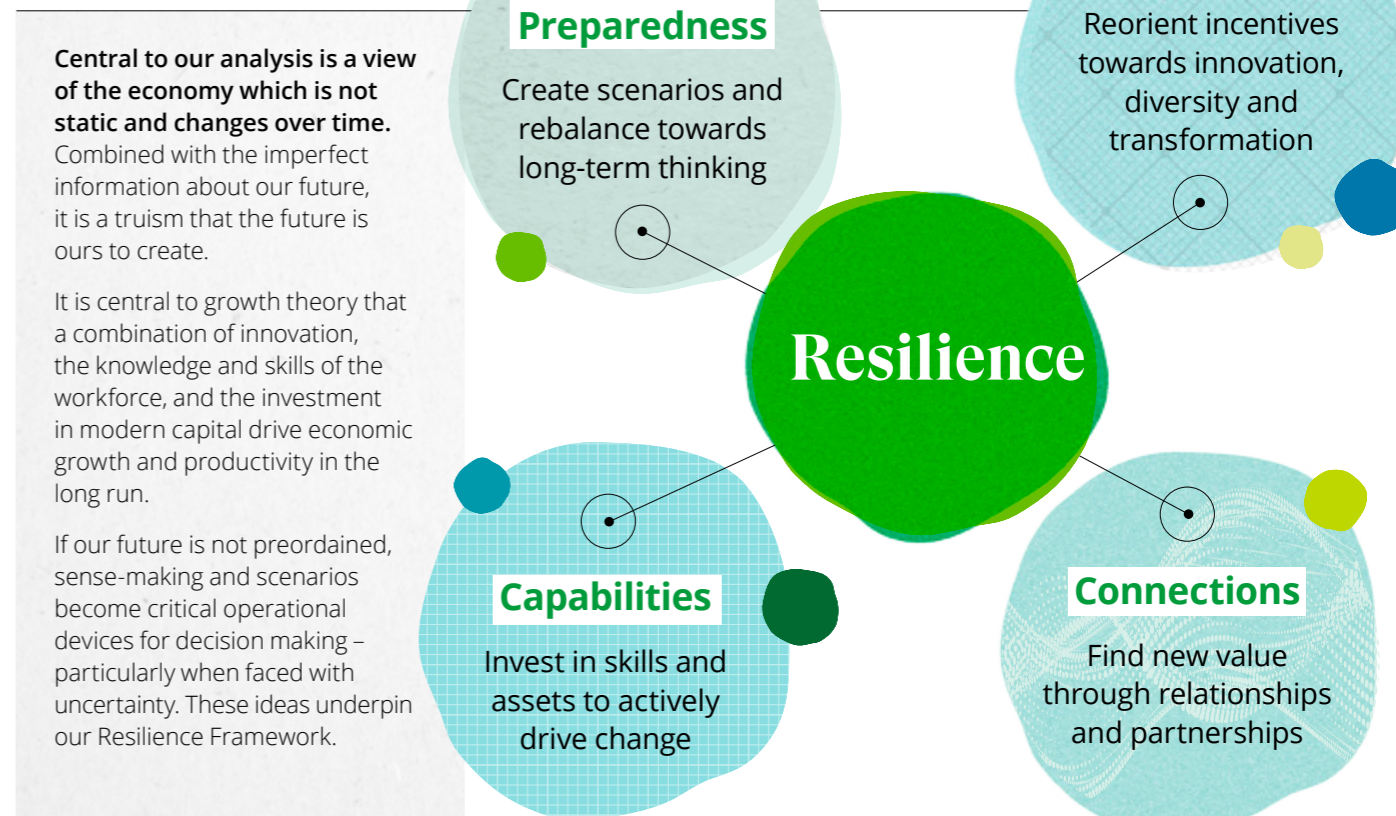
Building resilience – into supply chains, management decisions, the workforce, markets and the economy – has become one of the top priorities of leaders through the pandemic. While it was arguably important before COVID-19, the stark realities of toilet paper shortages, unused vaccines, hybrid working, and lockdowns have given attention to the idea of resilience. Yet, defining, designing

and implementing resilience thinking is still in its infancy.

Our analysis considers resilience as a function of preparedness, innovation and the establishment of the right incentives to navigate through uncertainty, the capabilities to drive change and the elevation of the central role of connections in strategy.

Figure 11 Resilience Framework

Source: Deloitte



## A closer look at the resilience framework

### Preparedness – Better sensing

In an ever-changing landscape, to sit on one's laurels is to go backwards. This is the essence of competition, and it is dynamic. Hard-earned gains of the past get easily and quickly eaten away by complacency.

Information is power when uncertainty rules. The power of preparedness, vigilance against risks from near and adjacent, and the unceasing search for opportunities are critical. Sensing, scenario planning and analysis are integral and systematic components of an organisation's approach to strategy. Together, they can help boards and management prepare by unblocking information flows, optimising for analysis and insight and opening the aperture from 'what is' to 'what if'.

Insights into the changing market are more important than ever. In scenario analysis, adopt the **adage: think global, act local**. Use this as a frame for rethinking the fundamentals of your organisation, and to experiment with new business and operating models. Evolve your position in the market in a way that considers and responds to how **customers have been disrupted** and how their expectations, tastes and preferences have changed.

Resilient organisations embed themselves in external networks and employees are important connectors, taking on the role of 'active sensors' –

detecting, scanning and adapting to fluctuating customer needs. Building a culture of constant environmental sensing helps organisations be open to what they are seeing and how it will impact the organisation: both the opportunities and the threats.

Bring the notion of infinite games into your scenario thinking, **running and re-running simulations** to help understand the dynamics at play. The disruption of recent times has shown that while the future can't be predicted, it can be prepared for. It is possible to know what weak signals to be looking for and **adjust strategic choices** accordingly, and to know what incentives, capabilities and connections can help in building resilience.

### Innovation – Right balance

Inertia breeds a lack of agility.

Modernising the Australian economy is a task for true transformation and incentives are critical to getting this right. Being more resilient requires a reorientation of incentives towards **innovation and diversity**. If change abounds, risk appetite comes into focus. It is important to assess the capacity and capability of your organisation to innovate, the incentives that support this and your mindset as leaders. Too often, these incentives are backward looking – solving a behaviour or problem of yesterday, instead of seizing the innovation of tomorrow.

For governments, this is about **investments which build the platforms for growth** in the future – investments in analytics and data, in the take up of new technologies, and incentives for new business formation and investment.

For businesses, it is a case of **assessing the risk and reward structures**.

Is collaboration and experimentation rewarded enough? To what extent is failure recognised as creating new information or seen as a negative? Is building relationships with suppliers, customers and partners a meaningful component of an executive's day? How is sales information feeding back into product development and marketing campaigns, or are workforce silos preventing the flow of information to make meaningful and coordinated decisions? Is the risk appetite of the board and management aligned with the volatility and uncertainty in the market?

At its core, incentives need to address a culture of short-termism and risk averseness if we are to realise the long-term potential of our economy and steward the transformations needed for long-term prosperity.

### Capabilities – At the cutting edge

Change takes place at the edges of markets and businesses and then works its way in. Those who are prepared recognise that new capabilities are needed to ride the wave of change. **Acquiring new capabilities will itself drive change.**

Organisations need to become adaptive with new skills, systems and interactions to navigate uncertainty. They must also ensure that feedback loops across business units and workforce types, or between sales and strategy, can generate insights on new sources of emerging value and the capabilities required to capitalise on these.

The **need for new capabilities is inevitable** if change is a certainty. This requires ongoing evaluation of how technology is used and optimised in the context of constant change. It manifests in how **new technologies** are used to transform operations, create new sources of value (make the market) or to disrupt incumbents (take the market).

For organisations to thrive in the longer term, it is critical to build adaptive muscles to quickly reorient themselves to whatever reality emerges. **Adaptable organisations** also put purpose and meaning at the core of what they do, especially in these challenging and volatile times. A key step for leaders is to focus on their

core organisational mission and remove anything that pulls attention away from it.

When there is uncertainty, **diversity of thought** becomes critically important. Most organisations have thrived with a clear strategic focus, well-established skill set and predictable offering in the market. But when uncertainty threatens the strategic focus, a new mindset and capabilities may be required.<sup>43</sup>

Complexity demands leadership and versatility. In an adaptive context, three leadership capabilities become paramount: the ability to energise, empower and connect.

### Connections – Richer relationships

Through the last 50 years of the macroeconomic growth cycle, well-established connections have paid handsome dividends for businesses.

But as the macroeconomic cycle breaks down and generates volatility, new connections and the nature of existing connections become the focus.

Across industries and sectors, supply chains are being disrupted and connections are being simultaneously broken, created and changed.

Connections, which underpin relationships, take time, understanding and investment. But they also form the basis of the new operating models of the future. Adaptable organisations

tap into the capabilities of their partners, alliances and talent beyond their own borders.

Boards and executives need to focus on **building new partnerships** and to deliberately review and stratify existing partnerships, enabling different levels of engagement based on the strength of existing and new relationships.

Connections are critical in being prepared for and responding to disruption. These partnerships – across the market, in communities and with individuals – represent **an investment in building trust** and will be important in connecting to key ecosystems.

As leaders, it's therefore important to build better connections: in supply chains, with and across adjacent sectors, across the globe, with research institutions and with other organisations. By doing so, organisations will be able to better mitigate risks and realise opportunities for new growth.





## Lessons on complexity

Questions boards and executives can ask

### Preparedness – Better sensing

- 1 Is how we think about **strategy** too rigid or traditional? How does our **sensing system** operate and how does it inform decision making? Are we continually assessing and learning – and **adjusting our strategic choices** accordingly?
- 2 How have our **customers been disrupted**? Do we know how their expectations, tastes and preferences have changed or are likely to change?
- 3 Do we understand how disruption has accelerated **changes in the employer-worker relationship**? Are we ready for how it might evolve further? Do we understand our purpose and its importance to our employees? Are we considering the worker of the future, digital workers and work reinvention?
- 4 How well do we understand the needs of our **investors and shareholders**? Are underlying investment views shifting in our favour or against?

### Innovation – Right balance

- 5 How do we encourage **innovation from within** while accepting disruption from **outside**? Do we have the right incentives in place at an organisational, sector and whole of economy level? How robust are our business **performance metrics**? How dynamic are they? Do we have a performance view for the long term? Do we reward calculated risk-taking and **reward failure with learning** as well as success?
- 6 Are we innovating enough? Is our innovation focused and disciplined? Are we experimenting with **new business or operating models**? Are we innovating with our ecosystem rather than in isolation? Do we have an **organisational learning** culture or capability?



### Capabilities – At the cutting edge

- 7 How are we seeking to become an **adaptive organisation**? Are we shifting our operating model and management philosophy to one that supports enterprise agility? Are we hiring differently or more of the same? Are we encouraging **diversity of thinking** and **experimentation**?
- 8 In the face of constant change, is our **technology** play optimal? How can we **use new technologies** (such as AI) to transform our operations, create new sources of value or disrupt incumbents including ourselves? Are we investing enough in technology? Are we using these new technologies to stay ahead, or just keep pace with the field?

### Connections – Richer relationships

- 9 Which **ecosystems** do we want to play a part in and for what purpose? How will we **connect into them** to unlock opportunity? Do we have connections with and across adjacent sectors? What are we doing with these connections to enhance our competitive advantage and create value? Are we playing a long game in our connections, **building relationships for 2030 and beyond**?
- 10 How is **volatility** and complacency playing out with our **supply chain**? Do we have the right relationships and are they strong, weak or simple? Do we have options or alternatives?

# Unlocking Opportunity



“The more complex the network is, the more complex its pattern of interconnections, the more resilient it will be.”

*Fritjof Capra, Speaking Nature's Language: Principles for Sustainability*

## The Lucky Country

When Donald Horne first released his book *The Lucky Country* in 1964, he was pointing out that Australia's prosperity was largely due to its inheritance of British habits and manufacturing know-how.

He was doubtful that Australia deserved its luck and argued it would run out if Australia failed to lift its game.

Fast forward to 2021 and the intention of the title phrase still holds true. While Australia's economic dependence has pivoted from Britain to China, it remains a case of remarkably good luck that Australia's economic performance has been so strong, particularly during the pandemic.

MAKING AUSTRALIA'S LUCK  
BUILDING RESILIENCE

## Beyond the Lucky Country



**C**omplexity economics has shown us if we lift the hood on Australia's economy and look deeper than the headline statistics, there is a lot of work that needs to be done to ensure our continued prosperity. More investment is needed to move up the economic value chain, shore up domestic capabilities and diversify our connections.

Australia has reached a critical point. The impacts of a year of lost schooling, displaced workers, job insecurity and disconnection will play out for many years to come. Coinciding with existing waves of disruption – like climate and technological change – the pandemic has rendered the world more uncertain than ever.

**For Australia to build a country fit for disruption**, we need to meet the challenges of that disruption head on. The antidote to uncertainty is not the predictability that comes from rigidity and uniformity, it's having the resilience to adapt and thrive. By embracing dynamism, we can navigate changing

circumstances and continue to prosper. This is true at the individual level and it is for businesses and institutions too.

**For Australia to build a country fit for growth**, we need to recognise we are part of a complex, global economy full of ideas and solutions; wants and needs; and opportunities and challenges. No business, industry or country works in isolation and it takes a joined up or ecosystem view to identify where to move next.

**For Australia to build a country fit for the future**, we need to elevate our ambitions above rocks, crops and cameras. We need to increase our appetite for risk and support it by investing in the capabilities that will drive our future prosperity.

**Organisations should ask:** What role do we want to play in shaping a new, more economically sophisticated Australia?

## Take an ecosystem lens

**F**or individuals, businesses and economies, the idea of building resilience extends our thinking beyond just ourselves. By definition, it brings us into contact with others – collaborations, partnerships and competition.

Increasingly, as we better understand social behaviour and the underlying connectedness of our economy and society, **we recognise that cooperation matters just as much as competition** – highlighting the importance of ecosystems.

The concept of economic ecosystems challenges the traditional view of the economic landscape – from linear supply chains and narrowly bounded industries to dynamic networks based on shared capabilities and a united value proposition. An ecosystem perspective flips the question of “What do you do?” into the much deeper question of “What *can* you do?” It recognises that in a world characterised by uncertainty, having a clear definition of “What I can do” will yield a more resilient future.

Ecosystems do not have universally defined boundaries and standard compositions like industries and markets. The structure of an ecosystem is determined by how its elements combine to deliver on a common purpose – be that a market, end user or problem.

Ecosystems are as relevant for entire industries as they are for individual businesses. In exploring ecosystems,

our analysis considered the extent to which they can help us to:

1. **Fill gaps in the market:** growth can be achieved by drawing on existing strengths to fill gaps in the market which emerge through better exploration and understanding of market demand.
2. **Play into a new game:** investing in building new competitive advantages will move Australia up the sophistication curve by adding value in our supply chains and extending the connections we have in the market.
3. **Solve for market problems and make an impact:** by using our human capital to solve existing and emerging market problems, we can create new offerings that have a lasting impact on the market.

Our analysis points to seven key ecosystems which will matter for Australia in the years ahead. These will build on our existing strengths, create new competitive advantage and produce what the world needs as it responds to the same structural shifts driving fundamental change at home. Increasing our participation in and contribution to each of these ecosystems will propel Australia further up the sophistication curve, making us fitter and better able to navigate the challenges and opportunities which lie ahead.

Some of these ecosystems will allow us to amplify our natural advantages and build upon our foundations of natural resources, agriculture and

tourism. Others will move us beyond these to be more relevant and connected, and to find new opportunities for future growth.

Each of these opportunities is both global and local, and this is by design. Narrowly focusing on meeting local demands and competing in markets at home is unlikely to deliver the economic returns that befit a country of Australia's economic potential. At the same time, the need for local capability and resilient local supply demands a renewed focus on domestic opportunities.

This isn't about picking winning sectors or focusing on specific industries. It's about drawing on Australia's unique strengths, resources and capabilities to meet global demands to:

- **Feed the world**
- **Decarbonise the world**
- **Shape the future of health**
- **Look to the sky (and beyond)**
- **Manufacture the future**
- **Satisfy the senses**
- **Service the world's businesses**

## Take an ecosystem lens



## Feed the world

The demand for Australian food is strong, driven by the quality of our products. Yet, the core industries involved in Australia's food production – agriculture, forestry and fishing – are among our least sophisticated, with low value add compared to global competitors and limited export markets.

To unlock more value, we need to challenge the traditional linear supply chain and think in a more circular way about primary inputs, knowledge, innovation and technologies.

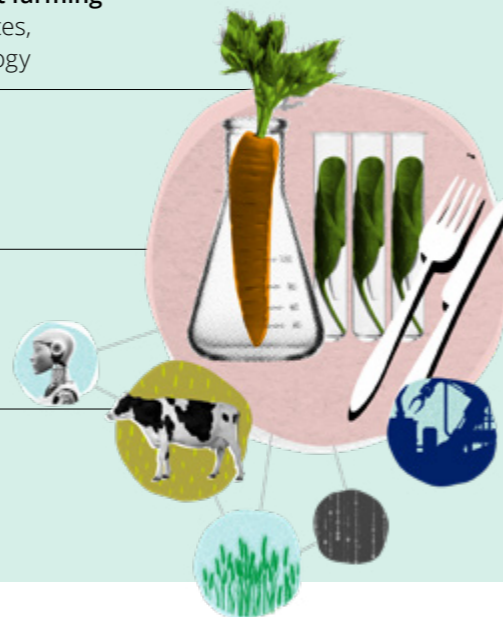
### To bring this to life, Australia must:

Understand end consumer expectations, particularly in relation to the **personalisation of wants and needs**, to inform capital investment and production processes

Utilise novel technologies across sectors and innovation across production processes to drive **smart farming** in reaction to changing consumer preferences, environmental challenges and new technology

Move away from relying on dominant single markets and **connect to new markets** (e.g., Southeast Asia) with a high demand for quality nutrition and luxury products

Increase resilience to climate variability by using technologies, new processes, **scenarios and data analytics** to inform decisions.



## Decarbonise the world

With our competitive advantage in rich natural resources, technologies and energy, Australia can take part in the move to global decarbonisation. We have an opportunity to climb the Economic Sophistication Index by producing new sustainable energy as well as using it in the manufacture of goods.



### To bring this to life, Australia must:

Align energy and industrial policy settings and regulation across all levels of government and industry, with a specific focus on **long-term transformation**

Focus on **new energy** generation, the production of minerals processing, the manufacture of metals, abatement technologies and the creation of markets for carbon farming and offsets

Develop technology that accelerates a transition from traditional energy generation and distribution to drive **networked energy systems** (more localised energy generation) and new market development

Drive the development and attraction of **green finance** to power investment in all industries and build better connections between fintech and energy tech

**Partner with other economies** that are seeking to invest in green technologies, but lack Australia's natural advantages (e.g., green hydrogen).

## Shape the future of health

The focus of health is shifting from treatment to wellness using digital and virtual technology as enablers. Australia can create new value by turning our world-class health research into implementable health and wellbeing solutions and by adopting new technology to improve everyone's health.

Unlocking this value requires new relationships between our health system, universities, entrepreneurs and fund managers, and global collaborations across manufacturing, technology and research.

### To bring this to life, Australia must:

Drive a focus on **world-class, innovative health education and research**

Invest in digital platforms, analytics and AI to drive **personalisation of health care treatment and outcomes along with new payment and operating models**

Move from a reactive to **preventative health** model utilising technology and data to improve virtual health care access and early diagnosis and intervention

Invest in building world-class health **manufacturing capabilities** in Australia with a clear focus on **commercialising research** through the use of venture capital strategies

Implement population health strategies underpinned by **data sharing and interoperability** to make Australia *the* home for clinical trials and research.



## Take an ecosystem lens

### Look to the sky (and beyond)

Australia is globally competitive in the areas of the space industry we have chosen to play in, with a strong emerging track record. But to mature this ecosystem, Australia needs to grow its capabilities from niche research and manufacturing to the delivery of end-to-end products and services (e.g., moving from specific satellite components to Australian-made satellites launched on Australian rockets).

#### To bring this to life, Australia must:

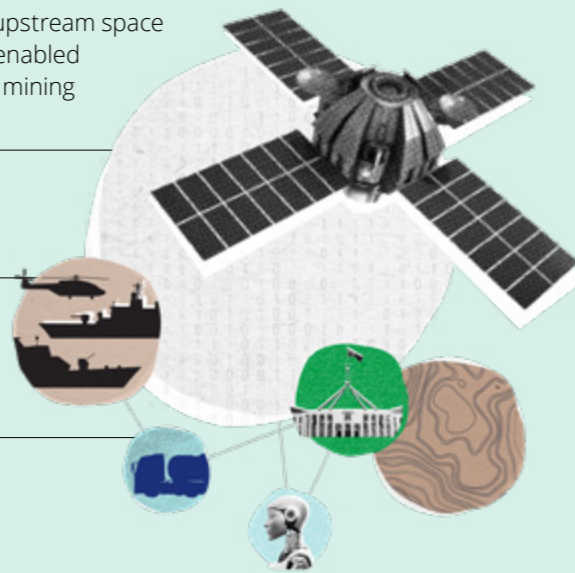
**Collaborate locally to compete globally**, developing the critical mass and demonstrated flight experience required to supply the global market

Focus on where Australia can **add the most value** in the global ecosystem, particularly in the manufacture and launch of satellites and rockets (and associated components)

**Increase connections** between the upstream space industry and the end users of space-enabled data such as agriculture, aviation and mining to increase economic dividends

Capitalise on existing industries and **commercial opportunities** such as security and defence expenditure

Commercialise the significant research undertaken in universities to **create new offerings** and fill gaps in the local supply chain.



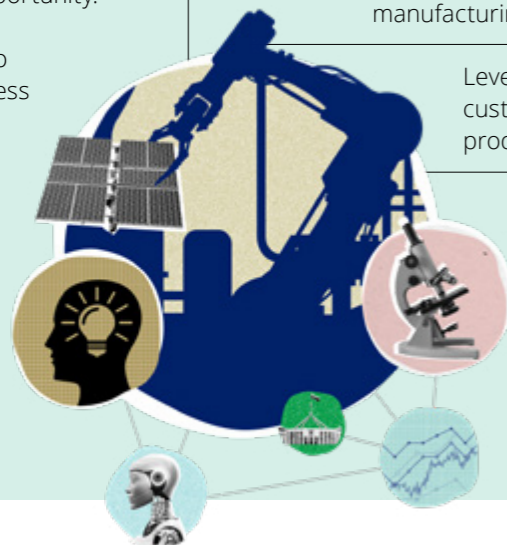
#### To bring this to life, Australia must:

Develop and **connect manufacturing hubs** with Australia's strengths in resources, green energy, agriculture, health and space to drive ecosystem development

Focus on **scaling start-ups** and **small businesses** and connecting them to global supply chains

Drive new **product innovations** through advanced manufacturing technologies such as 3D printing

Leverage **data and feedback systems** to drive customer insights into faster and more focused product and services development.



### Manufacture the future

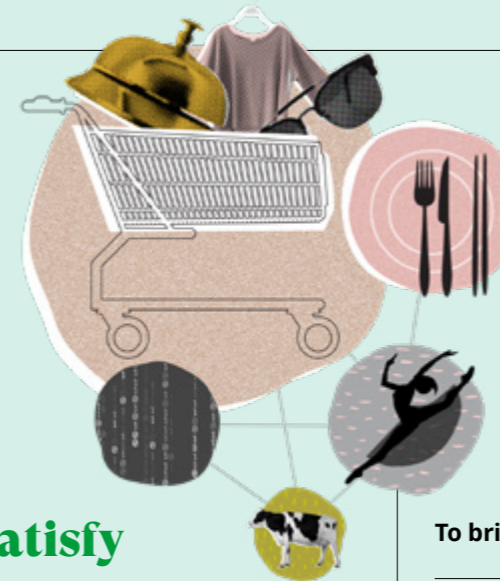
To play a greater role in global manufacturing, Australia should have a clear focus on moving up the value chain by connecting advanced manufacturing with the areas of greatest economic opportunity. To do this, Australian manufacturers need to improve competitiveness and sophistication, scale up and build more resilient supply chains.

### Satisfy the senses

There is no ecosystem more agile and ever-changing than one that follows the demands of consumers, including travel, fashion, restaurants and cafés, hotels, retail, arts and cultural experiences, and on-demand content. Australian organisations need to continue to be responsive and innovative by co-designing products, services and experiences with consumers seeking to satisfy their senses at home and away.

### Service the world's businesses

A significant opportunity exists to export B2B services such as engineering, telecommunications, professional services and financial and insurance services to markets in our region. More economically sophisticated countries such as the United Kingdom and the United States have done this to great effect. Advances in virtual and digital technology create opportunities for Australian companies to export their know-how to meet the increasingly sophisticated needs of clients with tailored services, both in Australia and abroad.



#### To bring this to life, Australia must:

Use digital platforms to build feedback loops with consumers to gather insights, **innovate**, and **address their wants, needs and expectations**

Use technology to build a better understanding of the customer and **provide personalisation** while maintaining customer privacy

Meet **customer expectations** on ethical trading, sourcing and sustainability

Embrace 'phygital' – **connected customer experiences** across both physical and digital platforms.

#### To bring this to life, Australia must:

Capitalise on its strengths in professional services, technical services, insurance, telecommunications and information technology and **sell these services into the global market**, particularly Asia

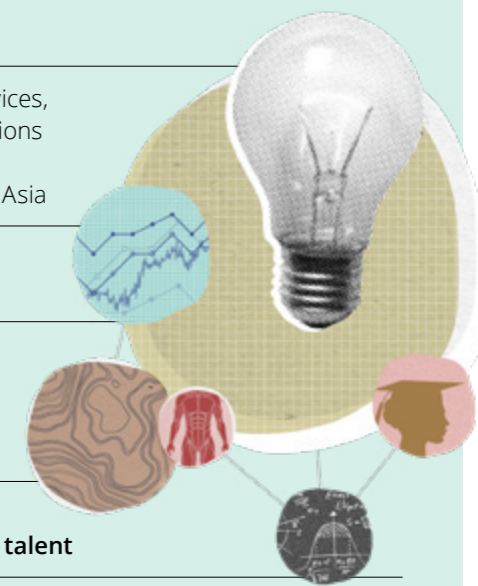
Double down and **commercialise intellectual property**

Rethink organisational design for **greater agility** and reinvent the value propositions for a highly mobile knowledge-economy workforce

**Invest** in the workforce, internal capabilities and employee experience to **lead the war on talent**

Ensure **'virtual work'** done remotely is considered in future tax treaties.

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# Appendix A Methodology

## The Economic Sophistication Index

Based on the methods of economic complexity, the Economic Sophistication Index combines two components – value add and connectedness – to get a holistic understanding of economic sophistication. A technical description of these components – and how they are combined – is included below.

### Data

This analysis combines detailed data on production and value add flows across countries and industries.

The OECD Inter-Country Input-Output (ICIO) tables gross production flows from 1995 to 2015 between industries and countries. This is matched to the Trade in Value Added (TiVA) dataset, which considers the value added by each country in the production of goods and services consumed worldwide.

All analysis is conducted on a time-series basis, allowing for changes in industry composition, workforce attributes and policy decisions.

### Value add

Deloitte Access Economics' measure of value add calculates the ratio of value added to overall production within each production flow, excluding taxes and subsidies. Mathematically, it is shown below:

$$VA\ Index_{i,j} = VA_{i,j} / Prod_{i,j}$$

Where  $i$  and  $j$  are two distinct industries,  $VA$  is value added in production between industries  $i$  and  $j$  and  $Prod$  is gross production flow between industries  $i$  and  $j$ .

A country's total VA index can be represented as:

$$VA\ Index_c = \sum_{i=1}^n \sum_{j=1}^n VA_{i,j,c} / \sum_{i=1}^n \sum_{j=1}^n Prod_{i,j,c}$$

### Connectedness

Connectedness is measured using the eigenvector measure of centrality. Eigenvector centrality is used to measure the *level of influence of a node within a network*. Each node (industry in each country) within the network is given a score: the higher the score, the greater the level of influence within the network.

This score is relative to the number of connections a node will have to other nodes. Connections to high-scoring eigenvector centrality nodes contribute more to the score of the node than equal connections to low-scoring nodes.

To put this into context, a node with a high degree score (i.e., many connections) may only have a relatively low eigenvector centrality score because many of those connections are with similarly low-scored nodes. Also, a node may have a high betweenness score (indicating it connects disparate parts of a network) but a low eigenvector centrality score because it's still some distance from the centres of power in the network.

We use eigenvector centrality to identify which industries/countries have a wide-reaching influence within the global economy.

For our network,  $G=(V,E)$ , where  $G$  is the network comprising  $|V|$  vertices (nodes) and  $E$  edges, the centrality score of vertex  $v$  (notated by  $x_v$ ) is equal to:

$$x_v = \frac{1}{\lambda} \sum_{j \in M(v)} x_j$$

And equivalently:

$$x_v = \frac{1}{\lambda} \sum_{j \in G} a_{v,j} x_j$$

Where  $M_v$  is the set of neighbours of  $v$ ,  $\lambda$  is a constant and  $x_j$  is similarly defined:

$$x_j = \frac{1}{\lambda} \sum_{t \in G} a_{j,t} x_t$$

Where  $a_{v,j}$  is the adjacency matrix, with  $a_{v,j} = 1$  where vertex  $v$  is connected to vertex  $j$ , and  $a_{v,j} = 0$  otherwise.

The adjacency matrix is subsequently weighted by each country's production share. That is, where the flow of production between nodes represents a higher share of a country's total production, these connections are more strongly weighted. This relationship occurs with diminishing returns, reflecting a natural ceiling in industry importance.

The solution is iteratively solved using repeated substitution until convergence is achieved.

This process is repeated twice. The first adheres to the directionality of the network. That is, connections can only flow in the direction of production flows. The second process loosens this requirement. This is to ensure the two-way benefits of knowledge transfer are fully captured between industries and countries. The final connectedness score for each vertex/node is the average of the directed and non-directed eigenvector centrality scores.

A country's overall connectedness score is equal to the average connectedness value for each of its nodes.

### The Economic Sophistication Index

The final measure of economic sophistication combines both measures of connectedness and value add. This occurs at each industry and country production flow.

Where in measuring connectedness each flow is weighted by the country's production share, the Economic Sophistication Index further weights this by the value add ratio of that flow ( $VA\ Index_{ij}$ ).

Again, the solution is iteratively solved using repeated substitution until convergence is achieved and calculated with and without directionality.

## Defining complexity

Complexity can be defined as the way multiple components of a system interact to produce behaviour which is not explained using standard causal analysis. Emergent or non-reducible behaviour is the result where the outcome is greater than the sum of its parts.<sup>44</sup> In a technical sense, it can range from deterministic models such as that encapsulated by chaos theory and the popular Lorez attractor<sup>45</sup> (of butterfly-effect fame), to self-organising systems which are partly open systems with characteristics such as non-probabilistic uncertainty.<sup>46</sup>

# Appendix B

## Detailed results

### The Economic Sophistication Index



Rank	Country	Code	Connectedness score	Value added score	Sophistication score
<b>1</b>	<b>Germany</b>	<b>DEU</b>	<b>0.47</b>	<b>0.52</b>	<b>0.42</b>
	<b>Rest of the world</b>	<b>ROW</b>	<b>0.41</b>	<b>0.47</b>	<b>0.40</b>
<b>2</b>	<b>United Kingdom</b>	<b>GBR</b>	<b>0.39</b>	<b>0.55</b>	<b>0.38</b>
<b>3</b>	<b>United States</b>	<b>USA</b>	<b>0.35</b>	<b>0.58</b>	<b>0.36</b>
<b>4</b>	<b>France</b>	<b>FRA</b>	<b>0.38</b>	<b>0.54</b>	<b>0.35</b>
<b>5</b>	<b>Italy</b>	<b>ITA</b>	<b>0.39</b>	<b>0.50</b>	<b>0.35</b>
6	Poland	POL	0.40	0.47	0.34
7	Sweden	SWE	0.39	0.53	0.33
8	Spain	ESP	0.36	0.51	0.33
9	Austria	AUT	0.39	0.50	0.33
10	China	CHN	0.34	0.39	0.32
11	Netherlands	NLD	0.39	0.50	0.32
12	Belgium	BEL	0.38	0.47	0.31
13	Russian Federation	RUS	0.32	0.46	0.31
14	Switzerland	CHE	0.34	0.50	0.31
15	Czech Republic	CZE	0.37	0.42	0.31
16	Hungary	HUN	0.38	0.49	0.29
17	Denmark	DNK	0.32	0.53	0.29
18	Finland	FIN	0.34	0.51	0.29
19	Norway	NOR	0.30	0.52	0.28
20	Turkey	TUR	0.29	0.50	0.28
21	Slovenia	SVN	0.33	0.49	0.28
22	Slovak Republic	SVK	0.33	0.42	0.28
23	Japan	JPN	0.28	0.53	0.27
24	Romania	ROU	0.30	0.48	0.27
25	Bulgaria	BGR	0.31	0.44	0.27
26	Estonia	EST	0.31	0.47	0.26
27	Korea	KOR	0.30	0.43	0.26
28	India	IND	0.28	0.51	0.26
29	Ireland	IRL	0.32	0.48	0.26
30	Lithuania	LTU	0.29	0.55	0.25

Rank	Country	Code	Connectedness score	Value added score	Sophistication score
31	Thailand	THA	0.27	0.43	0.25
32	Portugal	PRT	0.28	0.53	0.24
33	Malaysia	MYS	0.27	0.39	0.24
34	Croatia	HRV	0.26	0.55	0.24
35	Singapore	SGP	0.28	0.36	0.23
36	Canada	CAN	0.24	0.54	0.23
37	Australia	AUS	0.22	0.48	0.23
38	Latvia	LVA	0.25	0.47	0.23
39	Brazil	BRA	0.22	0.53	0.22
40	Greece	GRC	0.22	0.60	0.22
41	Vietnam	VNM	0.24	0.35	0.21
42	South Africa	ZAF	0.22	0.48	0.21
43	Morocco	MAR	0.22	0.59	0.21
44	Indonesia	IDN	0.21	0.51	0.21
45	Israel	ISR	0.23	0.61	0.20
46	Saudi Arabia	SAU	0.19	0.61	0.20
47	Iceland	ISL	0.18	0.52	0.20
48	Philippines	PHL	0.19	0.52	0.19
49	Hong Kong	HKG	0.20	0.55	0.19
50	Chile	CHL	0.18	0.51	0.19
51	Tunisia	TUN	0.19	0.54	0.19
52	Kazakhstan	KAZ	0.16	0.57	0.19
53	Cyprus	CYP	0.19	0.54	0.19
54	Malta	MLT	0.20	0.40	0.18
55	Mexico	MEX	0.19	0.59	0.17
56	Luxembourg	LUX	0.22	0.28	0.16
57	New Zealand	NZL	0.16	0.51	0.16
58	Peru	PER	0.14	0.54	0.16
59	Argentina	ARG	0.15	0.57	0.15
60	Costa Rica	CRI	0.14	0.58	0.15
61	Cambodia	KHM	0.15	0.60	0.14
62	Colombia	COL	0.13	0.56	0.14
63	Brunei	BRN	0.08	0.48	0.10

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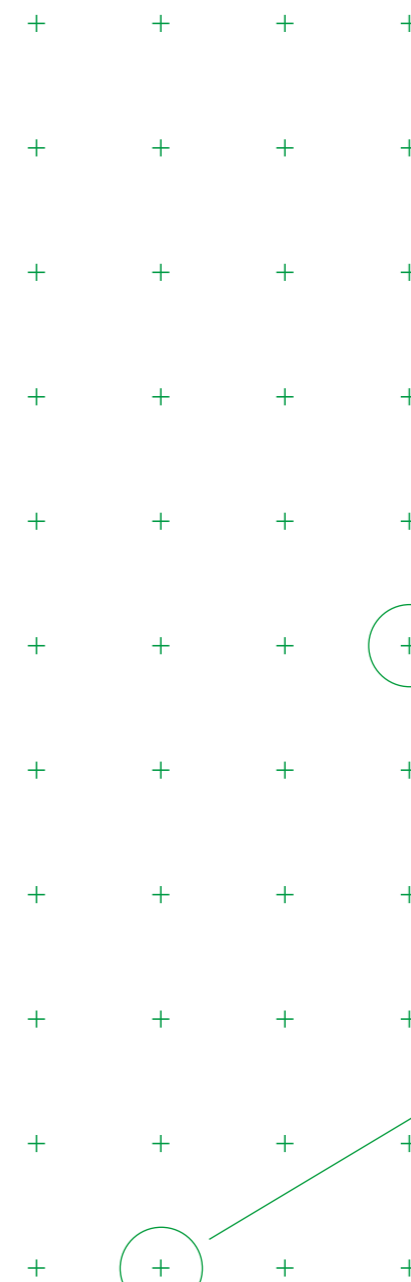
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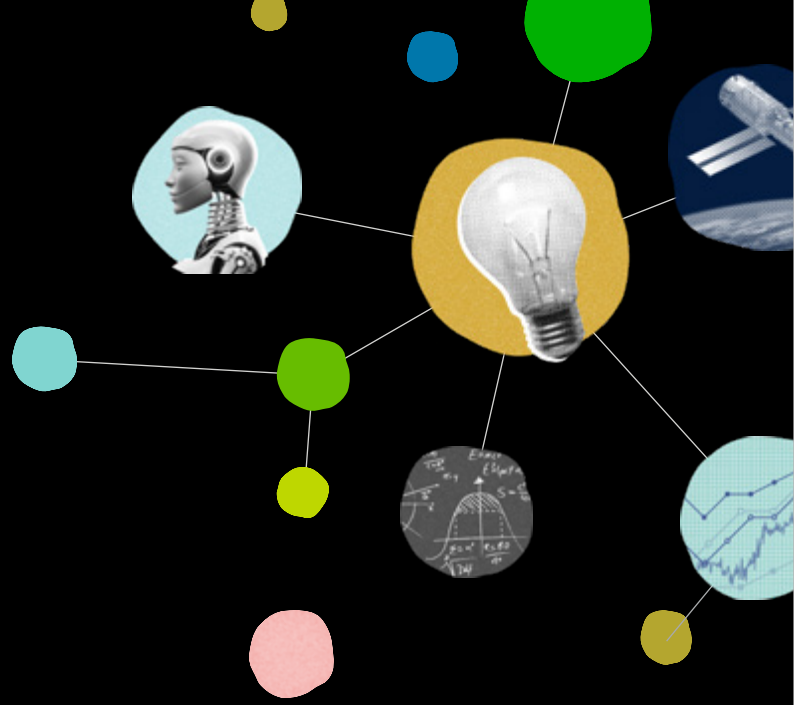
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## Creative story

In this edition of *Building the Lucky Country*, we use collage to bring the key themes of our report to life. The act of layering diverse elements reflects the complex world we live in today, while the tactile, humanistic quality of the art form highlights the role of people in shaping our future. After all, it's only by working together to grow our strengths, improve our skills and drive prosperity that we can truly build a Lucky Country.

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