

ADVANCED MANUFACTURING  
**BUILDING RESILIENCE IN AUSTRALIAN MANUFACTURING**

2018



Simone De Peak/Fairfax Syndication

## HMS Group – Digging in through hardship

**HMS**  
GROUP



Howard Mining started as a mining services company in Newcastle in 2008, just before the global financial crisis hit. It subsequently grew when I was asked to supply additional labour on mine sites. But the end of the mining boom forced us to re-evaluate everything.

When mining became extremely tough, we switched to being a registered training organisation, which we had established concurrently. This allowed us to respond to the economic conditions and manage the slowdown.

At the same time, I had an idea for what I called the HMS Mini Loader, for cleaning under ore delivery belts and in other hard-to-access areas. Counterintuitively during a downturn, I hired staff to help me design the machine. Our firm invested heavily in research and development, but raising capital was incredibly difficult.

As we were a small company with an innovative but undeveloped product, our risk profile was high. Very few investors were prepared to step up during the period of incredible global financial disruption. A few investors indicated that they were interested, but if I did not hit their targets, they would take shares out of my business. The best we were offered was a three-year term.

I turned to HunterNet for help and we were invited to join a trade mission to China, where we met a strategic partner. I then travelled to China every six weeks for more than a year. We received Commonwealth commercialisation assistance and were able to make the Mini Loader and export it to China. Without the grant, this may not have been possible.

Our first export to China gave us the experience and confidence to approach new markets and we now have loaders in the South American market, including three new machines in Brazil. At the same time, we continue to invest in research and development, and lift our skills to meet new technical challenges.

We have a clear point of difference: there are no machines on the global market that can compete with ours on a like-for-like basis – on build quality, reliability or maintainability. There are other cheaper machines, but they don't stack up.

Overcoming difficulties to develop a superior product and reach new markets has broadened what we can offer. Though we have mainly targeted coal mining, where the loader offers an exceptionally quick return on investment, it has applications in other industries. For example, it can be fitted with attachments such as a road sweeper and forks, and it will keep evolving.

There's no doubt that the development and production of the Mini Loaders has been challenging. Many people said they love our machines and asked if they could loan one. However, with very little capital in the beginning, our company could not afford to make machines to lend. While this impeded our growth, it did not dent our ambitions.

The 10 years have been hard, but I have kept my drive and my positive attitude. You should never give up. From a company owner's point of view, it can be a lonely road as well, but you really have to know you don't have to do it alone. You can and should ask for help and advice.

We are now sharing the benefits of our success with the broader manufacturing community in Newcastle because we strongly believe that it's possible to manufacture in Australia. If we work smarter and collaborate with each other, I'm confident that there is a large opportunity for us today and that we can create even more opportunities for our kids in the future.

**Jamie Howard**, Group Managing Director



## Sutton Tools – Learning from a century of achievement

**suttontools**  
world class cutting tools



As you'd expect, we are incredibly proud of our achievements, and humbled by the fact we have reached the milestone of 100 years in business. This is a pretty special achievement for a family company and, importantly, a manufacturing business. Getting to this point has taken the efforts of countless hardworking, talented and dedicated staff.

A pivotal point in our recent history happened in the mid-1990s. We had been fortunate enough to navigate our way through our last official recession. Unfortunately, many other manufacturers and some of our customers fell by the wayside. Things were looking okay and we were feeling quite pleased with ourselves.

However, one of the things we learnt from that recession was that if we were to maintain our production levels, let alone grow, we needed to look at markets beyond Australia. Along with other Australian manufacturing companies, there was a major push at the time for us to embrace our Asian neighbours and have less of a focus on our traditional European and North American trading partners. So this was where our first significant export drive began.

We had touted ourselves as Australia's premium tool manufacturer, which we probably were at the time. But because of our focus on the domestic market and local competitors rather than what was happening abroad, the world had passed us by. Exporting quickly uncovered some sobering truths. Our specifications were out of date, our geometries were old-fashioned – wrong material, inconsistent quality, too expensive. Even our packaging was no good!

At this point, we had to make an important decision. Should we retreat and just focus on our domestic market? Or should we do what needed to be done to take on the challenge, compete on a global scale and get our products where they needed to be?

Perhaps somewhat out of pride and a large amount of stubbornness, we chose the latter. We wanted to benchmark ourselves against the best tool companies in the world, and we set the goal of not only matching but surpassing them.

We learned to look outside our business and our industry to gain inspiration from other great companies. We wanted ideas we could adapt to make them our own, but most importantly we wanted to make them even better. We decided to embrace the difficult.

One relevant example was how we developed our micro-diameter forming taps for the electronics industry. In many electronic devices such as smartphones, laptops or tablets, there are dozens of micro-holes that require threads.

This was a massive challenge, creating a tool 1 millimetre in diameter with a thread pitch of 0.25 millimetres – the equivalent of the thickness of two human hairs. For us this was certainly embracing the difficult.

Developing this tool has taken more than a decade – and it is still going. Every aspect of the product had to be painstakingly engineered, starting from material selection, blanking, heat treatment, form and thread grinding, micro-polishing, PVD coating – not to mention the capital investment required.

We often contemplated giving it up as just too hard. But we stuck at it, not only for the pride of getting that product to work successfully, but more importantly because of what it did for all our other products and our manufacturing processes. What we learned from 10 years of development – which included countless setbacks, costly errors, customer returns and scrapped production – we have incorporated across our product range.

Pleasingly, I can say that now we are one of only a few approved, accredited suppliers to Foxconn, which is the world's largest manufacturer of consumer electronics, employing more than 1.3 million people across multiple continents. For those of you with an iPhone, a Kindle or a Nintendo, it was made by Foxconn and hopefully a few of our tools helped in the process.

So 100 years on, we now export more than 50% of the products we manufacture. Today we can go into any market in the world knowing our tools can not only compete with the best in the market, but often surpass them. The journey has not stopped and it never will.

**Peter Sutton**, Managing Director

## Australia is home to one of the most volatile manufacturing industries in the world

The average **Australian manufacturing industry** swells 20% above its trend size in upcycles and 20% below its trend size during downturns.



# 26%

of Australia's most profitable manufacturers prior to the global financial crisis were among the lowest performing after the crisis

# The loss of 1 customer

» 30% would have moderate to significant impact on their business

» 10% would force their business to shut down

## Resilient manufacturers display superiority, diversity and/or flexibility

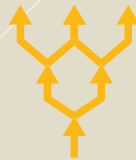


### Superiority:

firms that possess an unassailable competitive advantage by offering products or services for which there are minimal substitutes during downturns

#### For example:

Global manufacturers with consistently strong R&D investments reported 2.4 percentage points higher earnings growth during recent downturns compared with the industry average.



### Diversity:

firms with a competitive advantage across diverse product segments, services offerings and/or export markets

#### For example:

Successful manufacturers diversify through targeting export markets; integrate products into multiple global supply chains; and identify new customers within existing product segment industries to minimise reliance and exposure to a single industry, market or customer.



### Flexibility:

firms that are able to manage costs flexibly or swiftly shift their business focus to industries with solid demand during a downturn

#### For example:

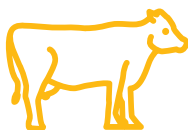
Global manufacturers that introduced flexible cost structures in the years before a downturn reported 3.6 percentage points higher annual earnings growth than the industry average during the actual downturn.



### Mining and automotive industries

16–27%

of firms outperformed their industry by growing earnings during recent contractions in the mining and automotive industries, in Australia



### Dairy industries

3/4

of resilient manufacturers in dairy products use flexible cost models, particularly in relation to how they manage suppliers and employees



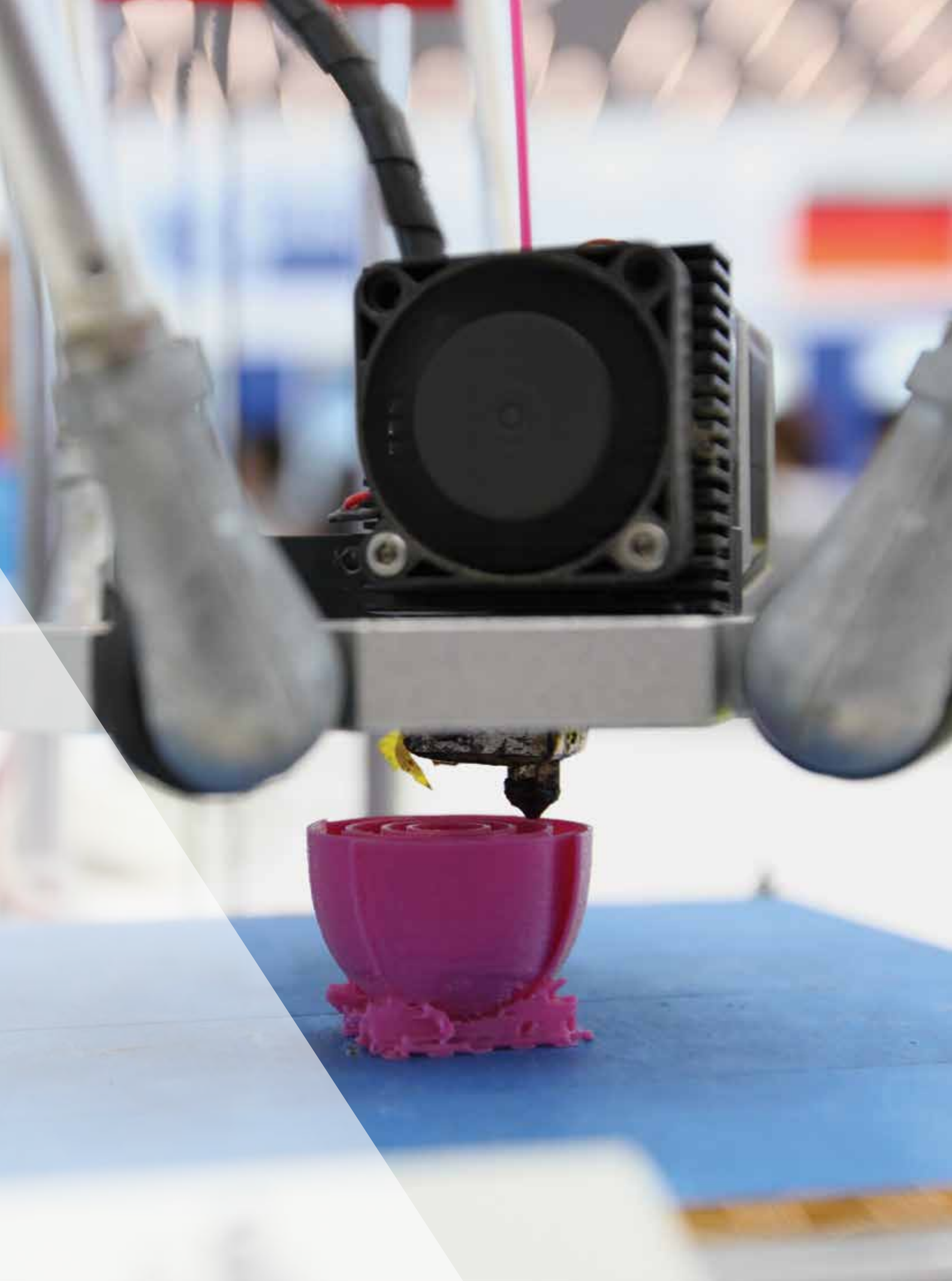
### Motor vehicle and motor vehicle parts manufacturing industry

More than 1/4

of firms in that industry still managed to increase revenue, when the industry contracted by 30% between 2012 and 2016

\* Analysis covers 136 firms with publicly available financial data in Orbis database.





## FOREWORD

There is no crystal ball that can predict the next crisis. Being a competitive manufacturing business today does not necessarily mean that these same success factors future-proof the business for tomorrow. What we can be sure of, however, is that Australia is currently home to one of the most volatile manufacturing industries in the world.

In this report, the Advanced Manufacturing Growth Centre reveals that across our manufacturing industry, jobs and revenues swell and contract by 20 per cent during economic upswings and downturns. This is unfortunate for a thriving and dynamic industry since it does not allow for predictable smooth growth.

We believe that companies can take concrete steps to mitigate this volatility. As you may read in the opening pages, both HMS Group and Sutton Tools understood the risks of complacency and locking in to a too narrow manufacturing strategy.

HMS Group, Sutton Tools, and the other case studies detailed in this report, succeed because they have pushed forward with a mix of relentless innovation, collaboration and knowing the factors which make them globally competitive. In their own ways, they exemplify the key messages on resilience in accord with competitiveness strategies we urge our industry to adopt. They display:

**Superiority** – offering a technically superior product or service

**Diversity** – possessing a competitive advantage across product or service segments

**Flexibility** – introducing an agile and responsive business model

There is also a role for governments. Programs and advice offered through the variety of commonwealth and state initiatives must align with competitiveness and resilience priorities to boost longer-term performance. The government should reconsider how their incentives can encourage greater commercial outcomes resulting from industry and research institution co-operation; and reconstitute teaching methods to lift our vocational- and territory-level curriculum. Better business training for seasoned managers can also be included.

We trust you will find the recommendations contained in this report helpful to identify ways to be more resilient and to future-proof yourselves.



A handwritten signature in black ink that reads "Jens Goennemann".

**Dr Jens Goennemann**  
**Managing Director**

Advanced Manufacturing Growth Centre Ltd

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Kimberley Group

Laing O'Rourke

Manufacturing Excellence Roundtable NSW

MH Group

Sinsolve Pty Ltd

Snacks Brands

Sutton Tools

Victorian Automotive Chamber of Commerce





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## EXECUTIVE SUMMARY

The Advanced Manufacturing Growth Centre (AMGC)'s Sector Competitiveness Plan 2017 found that Australian manufacturers can grow the nation's output by 25% to 35% above trend by 2026.

This will primarily be achieved by businesses enhancing their value proposition to customers and feeding innovative products and services into global supply chains, rather than lowering costs. However, manufacturers must be resilient as well as competitive in order to ensure longer-term performance (Exhibit 1). Australian manufacturing is highly volatile. Even successful manufacturing companies can lose their advantage when, for example, their industry enters a period of contraction or if customer tastes change.

The purpose of this report is to embed a new mindset of resilience within Australian manufacturing, resulting in practical actions and tangible results. Resilient firms can be defined as those that outperform their industries during periods of volatility by displaying higher than average earnings. This means that when revenues and profits slump, they survive, adapt and grow more quickly (or contract more slowly) than their industry peers.

### Exhibit 1

**This study investigates what drives resilience in firms, which combines with competitiveness to enable long-term performance**



Source: Analysis conducted by AlphaBeta and McKinsey and Co.

## Australian manufacturing is unusually volatile

Today, Australia is home to some of the most volatile manufacturing industries in the industrialised world. Analysis commissioned by AMGC finds that local manufacturers, ranging from motor vehicle and parts manufacturers to cheese producers, have experienced much larger changes in fortune over the past three decades than their counterparts in other advanced economies. Over recent decades, average output across Australian manufacturing sub-industries has swelled to 20% above trend during economic upswings, while contracting to 20% below this level during downturns. This compares with much more modest deviations of 14% in the UK, 10% in the US and 8% in Germany.<sup>2</sup>

Managing ups and downs is extremely challenging for Australian manufacturers. Companies must constantly reassess their priorities in response to political uncertainty, sudden swings in input prices, exchange rate fluctuations, changing customer demand and other sources of volatility. A temporary industry contraction can lead to dwindling sales revenue and profit. At worst, it can challenge a company's survival. For example, Australia experienced a net loss of 6,000 manufacturing firms during the global financial crisis and its aftermath between 2008 and 2012. About one in four local manufacturers suffered a severe blow to their earnings, sliding from the top quartile of earnings growth in the pre-crisis years to the lowest quartile in the years after.

## Business factors driving resilience

Still, in tough economic times, some companies manage to outperform by growing more or contracting less than their industry at large. For example, Australia's motor vehicle and parts industry contracted by 30% between 2012 and 2016 when Ford, Holden and Toyota focused domestic operations away from assembly and towards areas such as engineering and design. Yet more than one-quarter of firms still managed to increase sales. Their business models were resilient enough to weather a significant industry-wide downturn.

AMGC's analysis of three Australian manufacturing industries reveals shared features among resilient firms, but also some industry-specific factors, that contribute to relative outperformance during periods of volatility. (These findings are also largely corroborated by AMGC's analysis of global firm-level data.) For example, about 90% of resilient firms in

the motor vehicle and parts industry are exporters, and more than 60% have strong international connections or participate in global value chains. As a result, these firms can rely on overseas customers to cushion falls in domestic demand. In mining and construction equipment, more than 80% of resilient manufacturers are technical leaders, investing heavily in research and development (R&D) and focusing on unique product or market niches. In dairy products, three-quarters of resilient manufacturers use flexible cost models, particularly in relation to how they manage suppliers and employees. This helps them to lower outgoings when revenue falls.

## Three resilience strategies

Embedding a mindset of resilience will help Australian manufacturers succeed in good times and bad, and position the sector as an ongoing source of innovation and prosperity in the economy.

The key message of this report is that every manufacturing company has an opportunity to succeed through downturns if it identifies the source of volatility that it faces and adopts a corresponding resilience strategy.

AMGC has identified three proven resilience strategies for firms.

1. **Superiority:** superior firms possess an unassailable competitive advantage by offering technically superior products or services that are unique within the market, and highly valued irrespective of accompanying conditions.
2. **Diversity:** diversified firms possess a competitive advantage across diverse product segments, service offerings or geographically diverse export markets. This enables them to respond to shifting consumer tastes or reduced overall demand.
3. **Flexibility:** flexible firms possess an agile business structure allowing them to manage fluctuations in input costs or change industry focus in the event of a downturn.

<sup>2</sup> In this report, volatility refers to the average ratio of the standard deviation of fluctuation in an industry's output from a linear trend to the industry's size. See Appendix for volatility calculation methodology. This volatility is significant, even after accounting for structural changes and inflation.

## Recommendations for firms

There is significant room for Australian manufacturers to make resilience an integral part of their business strategy. Currently, only a minority of Australian manufacturers are taking practical steps to create a buffer against external shocks.

- › To build **superiority**, firms should collaborate with research institutions, invest in R&D; develop services bundled with major projects to ensure their products cannot be substituted in the event of an industry contraction; and build workforce skills.
- › To build **diversity**, firms should identify diverse export markets; integrate products into multiple global supply chains; and identify new customers within existing product segment industries to minimise reliance and exposure to a single industry, market or customer.
- › To build **flexibility**, firms should build collaborative agreements with suppliers to allow for cost flexibility; access cash and liquid assets to provide working capital in downturns; use customisable or modular production techniques; and flexibly deploy their workforces to serve clients across different industries.

## Recommendations for governments

The Australian Government also has a role to play in supporting manufacturing companies to become more resilient. The findings of the study are relevant to existing government support for manufacturers. Existing government industry assistance,<sup>3</sup> such as the Entrepreneurs' Programme or export promotion activities, can use the findings of the study to:

- › inform who is eligible or targeted for support (for example, by providing assistance to firms that exhibit resilience traits or have resilience strategies in place e.g. low customer concentration)
- › ensure that advisers and facilitators who provide business management services and innovation support understand how to look for markers of firms that are exposed to volatility and how firms can build resilience (for example, through simple checklists for advisers)
- › reinforce the importance of government assistance that promotes superiority in product (e.g. innovation assistance), or diversity in customers (e.g. assistance from Austrade to help companies make better use of trade agreements and diversify into new export markets).

3 Business and industry assistance programs funded by the Australian Government include the Entrepreneurs' Programme; Venture Capital programs; the Industry Skills Fund; Education and Training Advisers; Innovation Connections; the R&D Tax Incentive; the Cooperative Research Centres Programme; and the Tradex Scheme.





# 1 AUSTRALIAN MANUFACTURING IS UNUSUALLY VOLATILE

## 1.1 OVERVIEW

The Advanced Manufacturing Growth Centre (AMGC)'s Sector Competitiveness Plan 2017 found that Australian manufacturers can grow the nation's output by 25% to 35% above trend by 2026. This will primarily be achieved by businesses enhancing their value proposition to customers and feeding innovative products and services into global supply chains, rather than lowering costs. Nonetheless, Australia is home to one of the most volatile manufacturing industries in the developed world. Even highly successful manufacturing companies can lose their advantage when their industry enters a period of contraction. More than just competitiveness, manufacturers must exhibit resilience to ensure longer-term performance.

Chapter 1 of this report demonstrates the volatility of Australian manufacturing by using data from the Australian Bureau of Statistics (ABS) and the Organisation for Economic Co-operation and Development (OECD) to examine the trajectory of three sub-industries. These are motor vehicle and parts manufacturing; dairy manufacturing; and mining and construction equipment manufacturing. The question of how Australian firms can bolster their resilience to handle volatility is addressed in chapters 2 and 3.

## 1.2 EXPLAINING MANUFACTURING VOLATILITY

Australian manufacturers have experienced large fluctuations in industry output over the last three decades, even after accounting for inflation and structural change in the economy.<sup>4</sup> AMGC's analysis shows that between 1996 and 2015, average output across various Australian manufacturing sub-industries rose 20% above trend during upswings and contracted 20% below trend during downturns (see Exhibit 2). This is despite relatively benign conditions in the broader Australian economy, and no national recession recorded in the same period.

The manufacturing industry in Australia is much more volatile than elsewhere in the world. As shown in Exhibit 2, well-known advanced manufacturing nations such as the United States, France and Germany experience about half the output volatility of Australia.<sup>5</sup> Manufacturing has always been affected by changes in the wider economy, such as shocks to input prices, exchange rate fluctuations, changing consumer demand and government policy shifts.

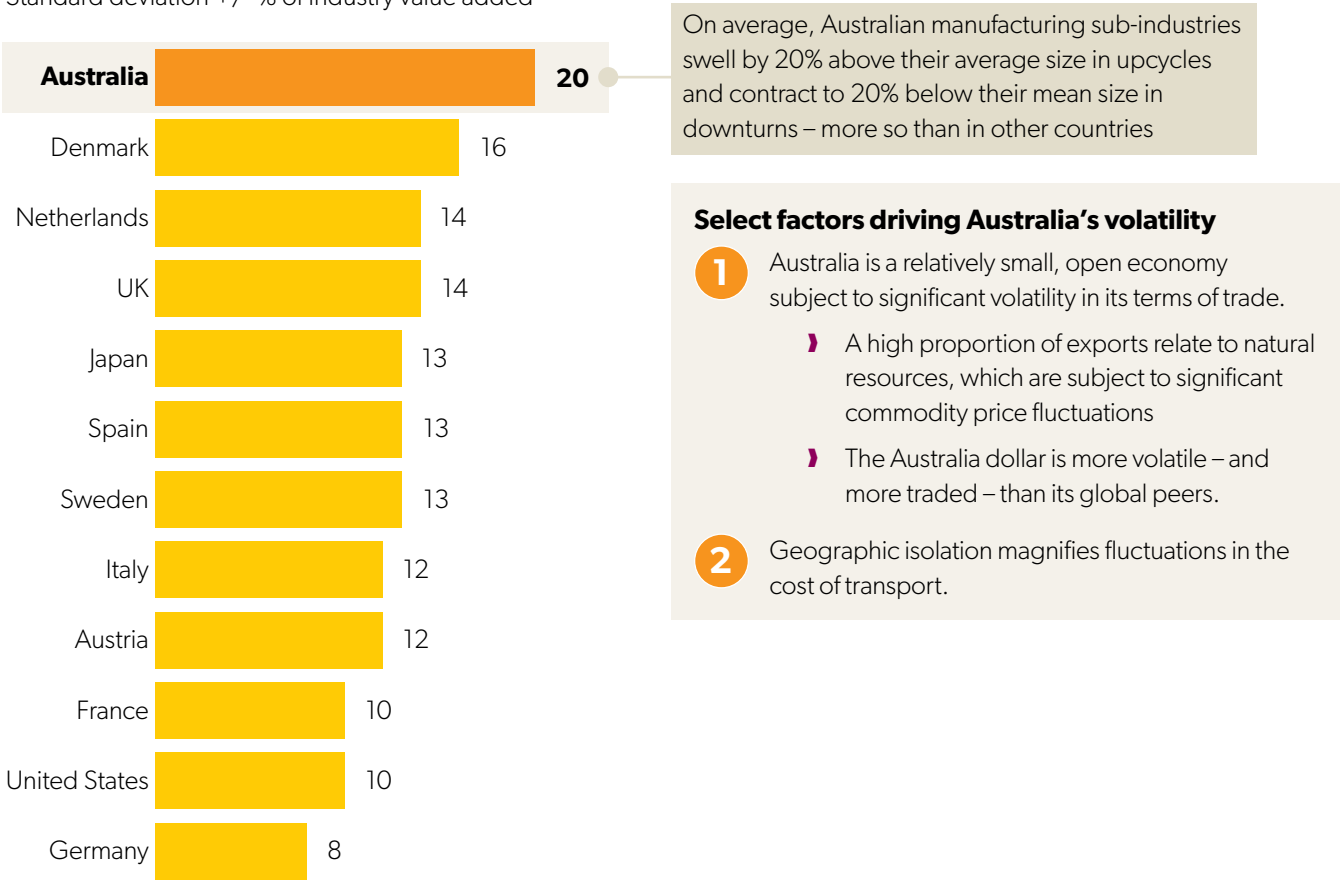
- 4 Australian Bureau of Statistics and Organisation for Economic Co-operation and Development data on industry value added was used to develop a picture of volatility in industries. Industry output was de-trended to account for inflation and structural changes in the economy using regression analysis. The residual of this regression represents the cycles above and below trend output. The standard deviation was calculated and divided by the mean size of the industry to arrive at a coefficient of variation. See the Appendix for details on the method of calculating volatility.
- 5 In this report, volatility is the average ratio of the standard deviation of fluctuation in an industry's output from a linear trend, compared to the industry's size. See the Appendix for details on the method of calculating volatility.

For Australian manufacturing companies, the challenges are perhaps even more pronounced. Firms operating in this small, open, resource-driven economy often find themselves facing rapid and unpredictable global fluctuations in price and demand. For example, Australia’s currency has fluctuated more steeply over the last 20 years than have many peer economies.<sup>6</sup> Likewise, a large proportion of Australia’s exports are natural resources, which are highly exposed to fluctuations in global commodity prices. At worst, a temporary industry contraction can challenge a company’s very survival. During the global financial crisis (GFC) and subsequent economic downturn between 2008 and 2012, about 45,000 Australian manufacturers closed their doors while just 39,000 new firms were formed.

**Exhibit 2 – Resilience is important because Australia is home to one of the most volatile manufacturing industries in the world**

**Average volatility of international manufacturing industries**

Standard deviation +/- % of industry value added



Note: Volatility was calculated between 1996 and 2015, using Australian two-digit manufacturing sub-industries and equivalently disaggregated overseas manufacturing sectors, based on OECD data. See the Appendix for details of this methodology.

Source: OECD Structural Analysis (STAN) Database for international data, ABS Industry Value Added for Australian data. Analysis conducted by AlphaBeta and McKinsey and Co.

6 See the Appendix for further analysis of volatility in Australian macroeconomic conditions. Australia’s terms of trade are some of the most volatile in the world, reflecting the fact that the Australian dollar is more traded and volatile than its peers, and that a high proportion of Australia’s exports are natural resources subject to significant commodity price fluctuations. Separately, Australia’s geographic isolation magnifies the volatility of transport costs.

# 1 AUSTRALIAN MANUFACTURING IS UNUSUALLY VOLATILE

## 1.3 VARIATION AMONG MANUFACTURING SUB-INDUSTRIES

Some manufacturing industries are more affected by cyclical ups and downs than others (see Exhibit 3). Drawing on ABS data, AMGC analysed the output performance of three manufacturing sub-industries between 1987 and 2015: motor vehicle and parts, dairy products, and mining and construction equipment.

The overall findings are as follows.

- ▶ The Australian motor vehicle and parts industry is highly sensitive to exchange rates and global trade patterns. On average, the industry's output fluctuated by 30% between 1987 and 2015.<sup>7</sup>
- ▶ Mining and construction equipment manufacturers are driven by shifting demands from key customers in the building construction and mining industry. On average, the industry's output fluctuated by 21%.
- ▶ Manufacturers of cheese and other dairy products are highly sensitive to changes in weather, exchange rates and global trade flows. This sensitivity caused the industry's output to fluctuate by an average of 22% during various booms and busts between 1987 and 2015. For example, Australian butter producers lost a major export market when Russia introduced dairy import bans, retaliating against sanctions imposed by several Western governments over the 2014 Crimea conflict.<sup>8</sup>

7 AMGC used ABS Industry Value Added data to develop a picture of volatility in industries. Industry output was de-trended using regression analysis, to account for inflation and structural changes in the economy. The residual of this regression is shown in the cycles above and below trend output. AMGC calculated the standard deviation and it divided by the mean size of the industry to arrive at a coefficient of variation. See the Appendix for details on the methodology for calculating volatility.

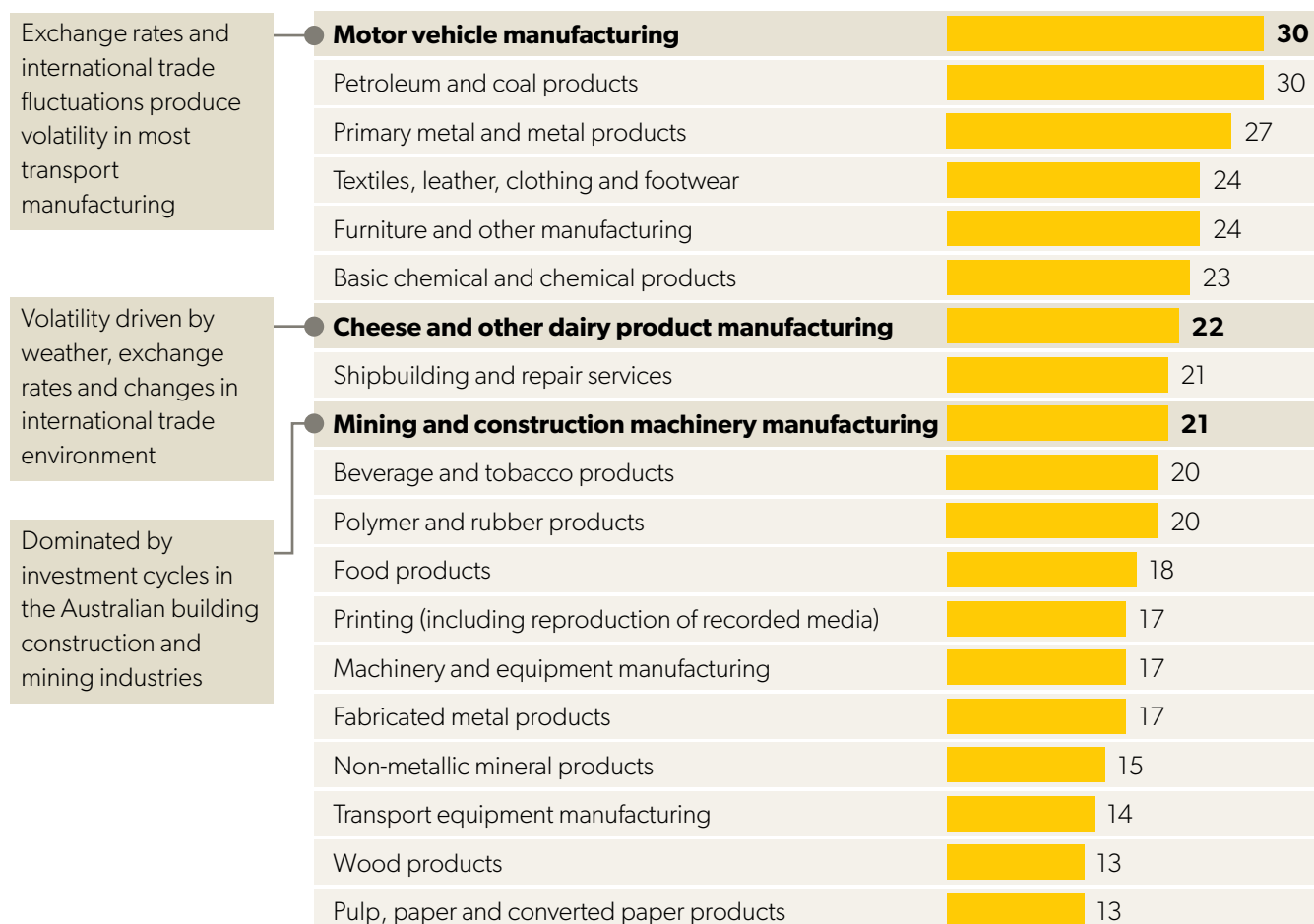
8 See USDA Foreign Agricultural Service (2016), *Russian Federation. Dairy and Products Annual. Import embargo provides limited benefits to dairy*, p. 26. Available at: [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Dairy%20and%20Products%20Annual\\_Moscow\\_Russian%20Federation\\_10-19-2016.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Dairy%20and%20Products%20Annual_Moscow_Russian%20Federation_10-19-2016.pdf).



### Exhibit 3 – Some of Australia’s manufacturing industries have been more volatile than others, with different sources of volatility

#### Average volatility of Australian manufacturing industries

Standard deviation +/- % of industry value added



Note: All two-digit Australia and New Zealand Standard Industrial Classifications industries in manufacturing, except for the selected three- and four-digit industries identified. Volatility was calculated over the period from 1987 to 2015. See the Appendix for details on this methodology.

Source: ABS National Accounts and Industry Value Added Data 1987–2015. Analysis conducted by AlphaBeta and McKinsey and Co.

# 1 AUSTRALIAN MANUFACTURING IS UNUSUALLY VOLATILE

## 1.4 VARIATION AMONG FIRMS

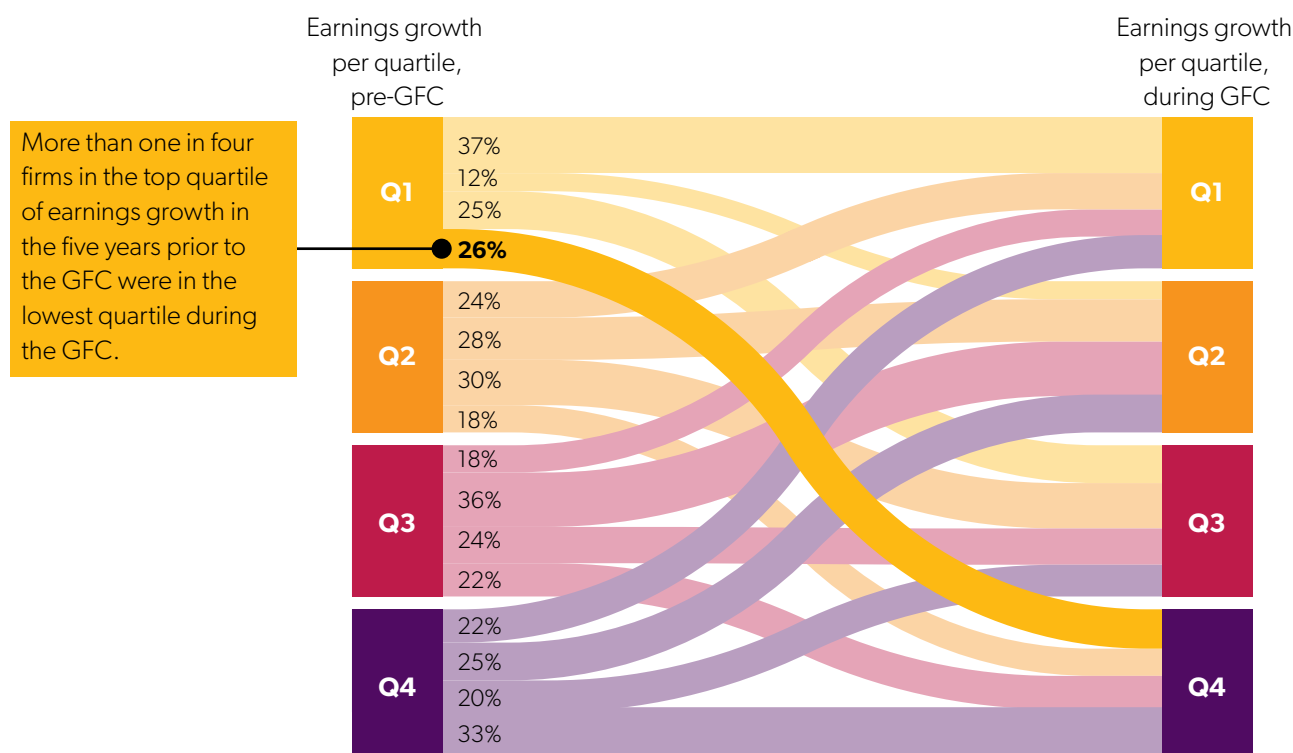
Navigating volatility is a challenge for every manufacturer. This volatility can affect an entire nation's economy or a small sub-industry, and arrive at any time. Firms that are profitable during good times do not necessarily succeed during downturns. This is illustrated by the performance of publicly listed Australian manufacturing firms in the wake of the 2008 global financial crisis (see Exhibit 4). Around one in four (26%) of Australia's most successful manufacturers – those in the top quartile of earnings growth prior to the downturn – ended up among the weakest performers once the crisis had passed.<sup>9</sup>

At the same time, some manufacturers manage to outperform their industry by growing, even during challenging downturns. For example, more than a quarter of the firms in the Australian motor vehicle and parts industry still managed to increase revenue between 2012 and 2016 even as the industry contracted by 30%, due largely to changes in government policy and the announced closure of Australian assembly plants.<sup>10</sup> Similarly, 16% of mining and construction machinery firms increased their output over that period, even as overall industry output declined by almost a quarter due to Australia's subsiding mining boom.<sup>11</sup>

### Exhibit 4 – Profitable firms in good times can struggle with growth during downturns

#### Flow of Australian manufacturing firms between performance quartiles in the years before and during the GFC

Percentage of firms, growth in earnings before income and tax (EBIT)



Note: Sample of 301 Australian publicly listed manufacturers. 'Pre-GFC' is 2003–07' and 'during GFC' is 2008–12

Source: Australian publicly listed companies. Analysis conducted by AlphaBeta and McKinsey and Co.

9 Compustat data from 301 Australian manufacturing firms was used to compare quartile performance before the GFC (2003–07) and during the GFC (2008–12). See the Appendix for details on this calculation methodology.

10 Analysis covers 136 firms with financial data publicly available in the BvD Orbis database.

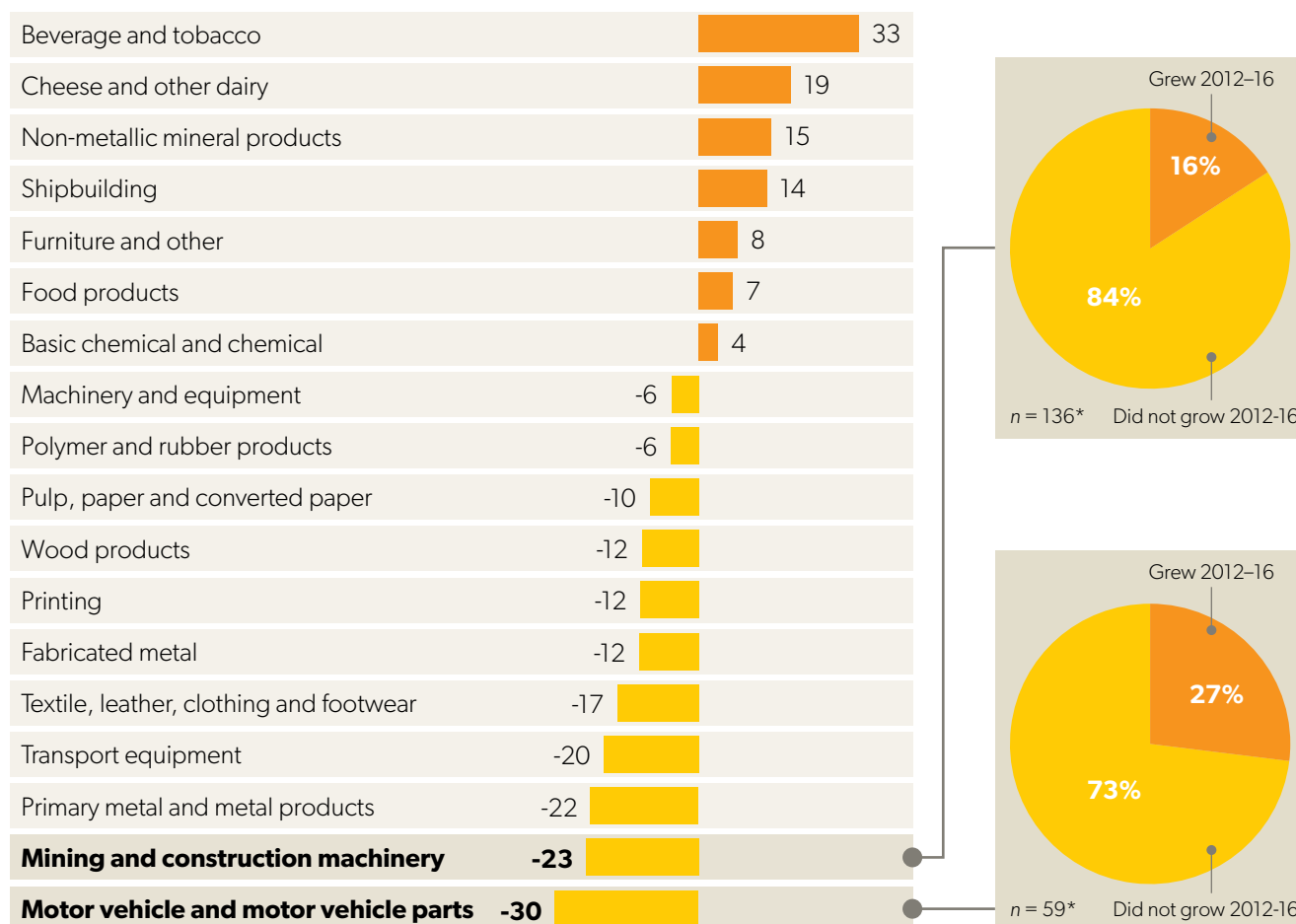
11 Analysis covers 59 firms with financial data publicly available in the BvD Orbis database.



## Exhibit 5 – Even through difficult industry-wide downturns, some companies outperform the industry by growing

### Change in size of Australian manufacturing industries

Change in industry value added from 2012–16 (%)



Note: \*Sample includes publicly listed firms and large private firms with available financial data in the BvD Orbis database for 2012–16.

Growth here may be partially due to a substitution effect between large and small firms, but this cannot be distinguished in underlying data.

Source: ABS Industry Value Added estimates 2012–16; BvD Orbis data with available fields. Analysis conducted by AlphaBeta and McKinsey and Co.

## SUMMARY

- ▶ Australia has one of the most volatile manufacturing industries in the world.
- ▶ Firms are affected by changes in the wider economy, such as shocks to input prices, exchange rate fluctuations, changing consumer demand and government policy shifts.
- ▶ In recent decades, dairy products, mining and construction equipment, and motor vehicle and parts manufacturing have been subject to different sources of volatility and therefore represent useful case studies.
- ▶ Some firms manage to outperform their industry by growing even during challenging downturns.

## 2 THE BUSINESS FACTORS DRIVING RESILIENCE

### 2.1 OVERVIEW

Given the significant volatility in Australian manufacturing, it is vital for firms to understand the factors that drive them to exhibit resilience during downturns. Using qualitative and quantitative evidence, Chapter 2 of this report offers a detailed analysis of why some firms survive and even thrive during volatile times, while others do not. While there are multiple concepts and definitions of resilience (see Exhibit 6), in this report resilience is measured as ‘stability through shocks’. Specifically, resilient firms outperform their industries during periods of volatility by displaying higher than average earnings growth. When revenues and profits slump, resilient firms can survive and grow more quickly (or contract more slowly) than their industry peers.

Resilient firms outperform their industries during periods of volatility.

#### Methodology

To understand what drives resilience, AMGC interviewed industry experts and company representatives with insights into 50 highly resilient Australian manufacturing firms. Next, these responses were further classified according to the sub-industry level. Relevant manufacturing sub-industries included as part of the analysis were dairy products, mining and construction equipment, and motor vehicle and parts. Finally, global firm-level data from Compustat was used to test and corroborate the Australian research.

In this report resilience is measured as ‘stability through shocks’. Specifically, resilient firms outperform their industries during periods of volatility by displaying higher than average earnings growth.

**Exhibit 6 – This study investigates what drives some firms to be resilient, which is defined as performing better than other firms in an industry during a downturn**

There are multiple concepts of resilience.		This study focuses primarily on resilience measured as ‘firm stability through shocks’.	
1	Stability through shocks	<ul style="list-style-type: none"> <li>» <b>Concept:</b> more resilient firms exhibit relative strength through industry downturns.</li> <li>» <b>Measurement:</b> the difference between a firm’s earnings growth and the average earnings growth of its industry during a downturn.</li> </ul>	<ul style="list-style-type: none"> <li>» While all of these concepts are relevant to resilience, this study focuses on ‘firm stability through shocks’ i.e. the ability of a firm to perform relatively better than other firms in its industry during a downturn period.</li> </ul>
2	Longevity	<ul style="list-style-type: none"> <li>» <b>Concept:</b> more resilient firms are in business longer than less resilient firms.</li> <li>» <b>Measurement:</b> firm survival rates.</li> </ul>	<ul style="list-style-type: none"> <li>» When revenues and profits slump, resilient firms are able to survive and grow more quickly (or contract more slowly) than the average firm in their industry.</li> </ul>
3	Enduring market position	<ul style="list-style-type: none"> <li>» <b>Concept:</b> a company maintaining its relative performance.</li> <li>» <b>Measurement:</b> its rank in earnings growth versus other firms in the industry.</li> </ul>	<ul style="list-style-type: none"> <li>» Resilience concept is measurable and comparable across sub-industries.</li> </ul>
4	Sustained growth	<ul style="list-style-type: none"> <li>» <b>Concept:</b> Long-term earnings growth over time.</li> <li>» <b>Measurement:</b> variation in annual earnings growth through time.</li> </ul>	<ul style="list-style-type: none"> <li>» Performance is defined as growth in EBIT.</li> </ul>

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## 2.2 BUSINESS CHARACTERISTICS OF RESILIENT MANUFACTURERS

AMGC's qualitative analysis identified several business characteristics as crucial in establishing resilience.

The following five attributes were found to apply to more than half of the firms analysed (see Exhibit 7 and the Appendix for full details):<sup>12</sup>

- ▶ **Technical leadership:** More than two-thirds (70%) of resilient manufacturers make more 'advanced' products or use more advanced technology than their peers. Essentially, these firms are able to successfully harness innovation that allows them offer specialised, high-value solutions to customers involving unique intellectual property content. Enjoying this position of industry leadership – and having the ability to deliver what no other competitor does – clearly correlates with the ability to retain business during an industry downturn.
- ▶ **Product diversity:** Almost two-thirds (64%) of resilient manufacturers have created a diversified product offering, lowering their risk of being overly dependent on a single product or customer.

- ▶ **Investment in research and development (R&D):** About 60% of resilient manufacturers invested strongly in research and development in the years leading to a downturn. This allowed them to innovate and remain ahead of their competitors when the downturn hit.
- ▶ **Export focus:** More than half (56%) of resilient manufacturers sell their products to foreign markets. These exporters are more insulated from shocks in the domestic economy and could easily shift between markets during periods of volatility.
- ▶ **Flexible production:** More than half (54%) of resilient manufacturers are highly flexible. This means their business models allow them to quickly shift their focus from poorly performing industries, markets and products to better performing ones.

Beyond these five characteristics, AMGC's analysis found that there is no one-size-fits-all solution to helping Australia manufacturing firms become more resilient. Many firms used different sources of resilience in addition to the ones listed above, and these often varied significantly between industries.

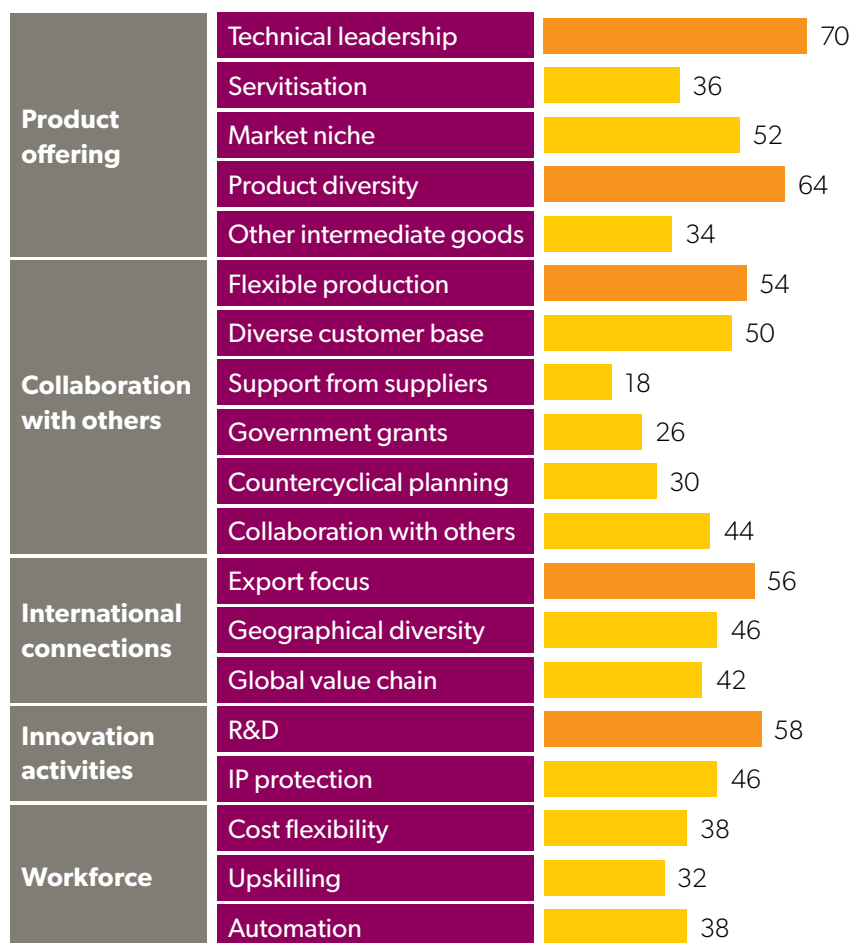
<sup>12</sup> Company representatives or industry experts were asked what factors enabled a firm to outperform its industry in a recent downturn. These factors were grouped into several categories for the purpose of the study, relating to a firm's business strategy, product offering, global trade links, innovation activities and workforce composition. See the Appendix for full details on this methodology

## Exhibit 7 – Common factors supporting resilience across manufacturing include technical leadership, product diversity, export focus and R&D

### Factors that drove resilience through volatility

**All firms**  
Proportion of firms (n=50), %

■ Frequently cited ■ Less frequently cited



### Key drivers of resilience in Australian manufacturing

Some factors, like:

- Technical leadership
- R&D
- Product diversity
- Flexible production

seem to be common across all industries as drivers of resilience.

Other factors seem to be drivers of resilience only in response to certain types of volatility.

The problem we have in Australia is that in good times, people chase business and don't stop to think about what's going to keep their business going when the good times dry up.

**Industry participant**, AMGC consultation

Note: Sample included 50 firms in Australia – 13 in automotive and automotive parts, 14 in construction and mining equipment manufacturing, nine in dairy product manufacturing, two in shipbuilding and 12 in other manufacturing industries.

Source: Analysis conducted by AlphaBeta and McKinsey and Co.



# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## 2.3 MOTOR VEHICLE AND PARTS MANUFACTURING

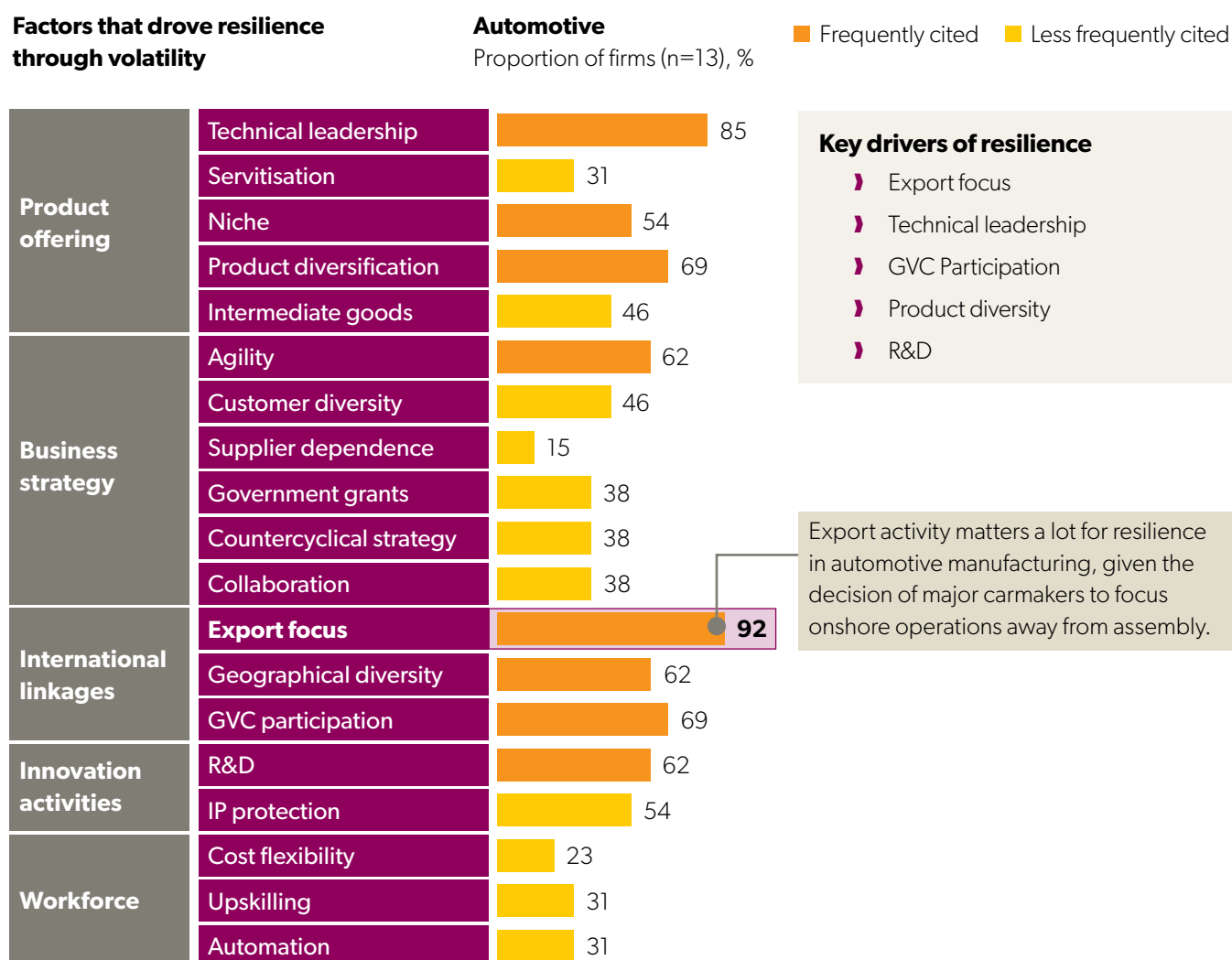
By further classifying survey responses according to each manufacturing sub-industry, it is possible to draw more specific insights into the effectiveness of particular resilience strategies. Key drivers of resilience among motor vehicle and parts firms include:<sup>13</sup>

- ▶ **Technical leadership:** Among the resilient firms surveyed, 85% exhibit technical leadership in their product offering, often producing specific materials or niche parts rather than actually assembling entire cars. These firms managed to retain an international competitive advantage despite losing domestic customers. About 60% of firms specifically cite R&D as an important factor that contributes to their resilience.
- ▶ **Product diversity and flexible production:** The ability to shift business emphasis between different products and industries is particularly important for resilience in this sector. About 70% of resilient manufacturers have a diverse product offering and 54% of resilient firms were able to shift into other industries – such as aerospace manufacturing or equipment parts manufacturing – during a downturn.
- ▶ **Export focus:** About 90% of resilient firms in the motor vehicle and parts industry are exporters, and more than 60% have diverse international connections or participate in global value chains. As Australian motor vehicle and parts manufacturers have shifted their onshore operations towards design and away from assembly in recent years, being an exporter offers a viable global customer base to help cushion a challenging period of domestic transition.

<sup>13</sup> See Exhibit 8. The study analysed a sample of 13 firms in motor vehicle and parts manufacturing. Company representatives or industry experts were asked what factors enabled a firm to outperform the industry in a recent industry downturn. These factors were grouped into several categories for the purpose of the study, relating to a firm's business strategy, product offering, global trade links, innovation activities and workforce composition. See the Appendix for full details of this methodology.



## Exhibit 8 – Technical leadership and export focus build resilience in automotive firms facing a changing Australian automotive industry



If we didn't have clients overseas and the ability to shift our business focus to exports, we would have been goners in 2014.

**Industry participant**, AMGC consultation

Even in the worst times, one thing we did not do is cut our R&D. Staying innovative is everything in this business.

**Industry participant**, AMGC consultation

Source: Based on qualitative analysis was based on a survey with Australian industry experts. Analysis conducted by AlphaBeta and McKinsey and Co.

# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## Carving a unique mould



### Background

MH Group of companies (MHG) is an Australian manufacturer founded in 1970, originally as an importer of automotive parts. The company has since transformed to become a leading manufacturer of automotive glass and injection-moulded plastic components – from engine covers to exterior decorative parts – for the automotive industry.

### How did MHG stay resilient through a period of volatility?

MHG foresaw changes in the Australian automotive sector and sought to diversify its customer base – geographically and by industry.

In 2012, MHG opened a new plant in Thailand to expand its footprint in the region and supply injection-moulded parts to vehicle manufacturers in the Asia Pacific. It also pivoted its automotive glass business into the building and construction industry. In line with the new business focus, it purchased Flat Glass Industries in 2016, an Australian manufacturer of processed architectural glass.

Moving into a different segment of the glass industry enabled MHG to retain its workers, even as the overall automotive industry in Australia shed thousands of production jobs in recent years. MHG soon gained a competitive edge in the architectural glass industry, thanks to the expertise it had developed in areas such as quality assurance and lean manufacturing.

The firm currently has about 400 employees in Australia and Thailand, and an annual revenue of approximately \$80 million.

We had two choices – either we shut down manufacturing in Australia and go off into the sunset, or else we find some other kind of manufacturing to do. We did the latter because we believe in manufacturing in Australia.

Industry participant, AMGC consultation

### Exhibit 9 – MHG demonstrates resilience thanks to international engagement and agility

#### Basic information

**Company:** MHG Asia Pacific

**Headquarters:** Melbourne, Australia

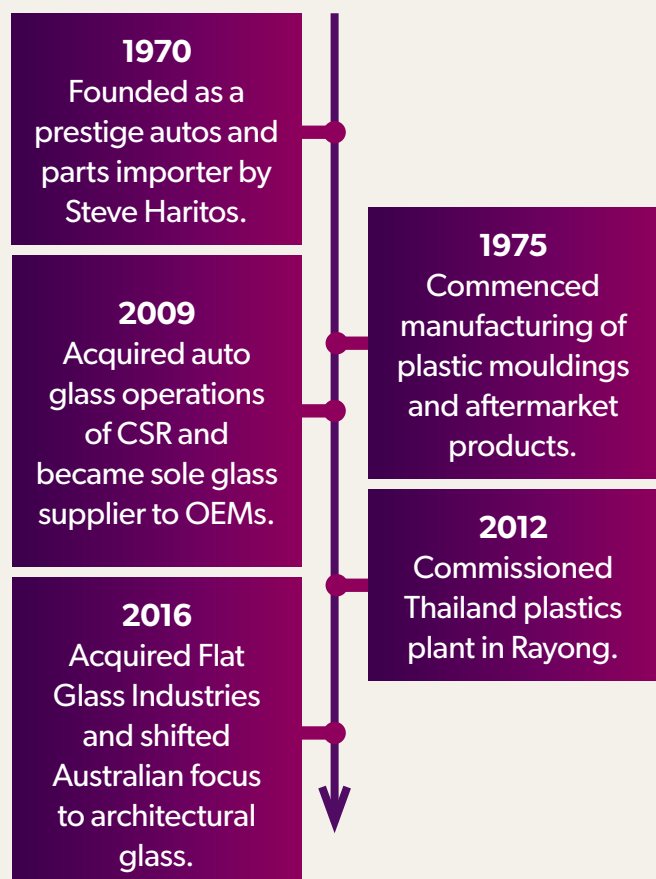
**Employees:** ~400 employees in Australia and Thailand

**Revenue:** approx. \$80 million in 2016

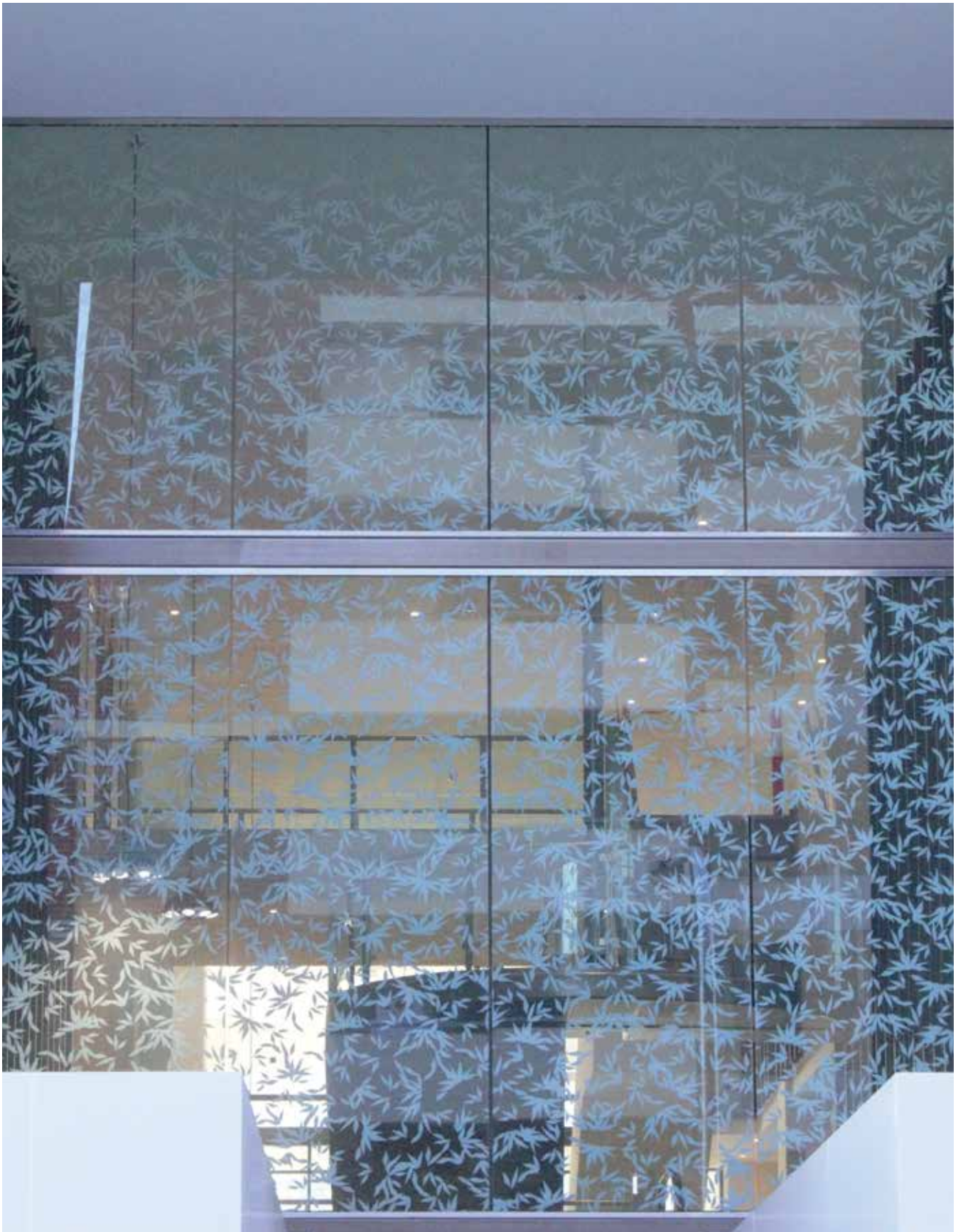
**Key products:** automotive plastics, automotive glass and architectural glass

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

#### Analysis







# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## 2.4 MINING AND CONSTRUCTION EQUIPMENT MANUFACTURING

Today, Australia is home to world-leading manufacturers in the mining and construction equipment industry. This is despite significant volatility driven by the commodity and investment cycles. Key factors supporting resilience include:<sup>14</sup>

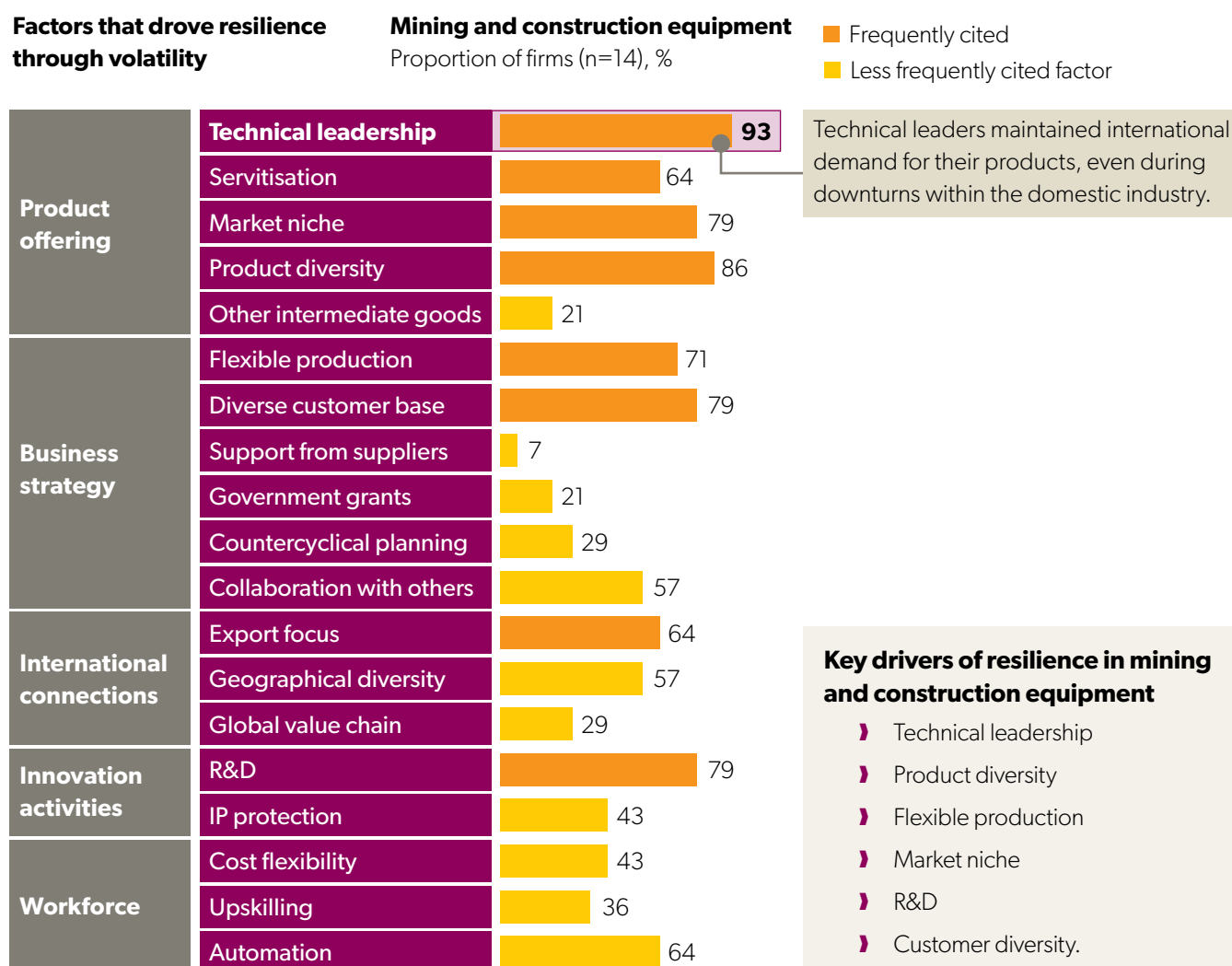
- › **Technical leadership:** More than 90% of resilient firms in mining and construction equipment manufacturing are technical leaders in their field. This allows them to maintain demand even as their industry endures difficult times. About 80% of companies are specifically focused on particular product or market niches. The same proportion are heavily engaged in R&D.
- › **Product diversity:** More than 80% of resilient firms offer several different products. This allows them to cater to different types of mining or construction, as well as the downstream supply chain. In addition, about two-thirds of firms offer services to complement these products.
- › **Flexible production:** About two-thirds of resilient manufacturers in the mining and construction equipment sector have the flexibility to shift between industries, which is important given the cyclical nature of their downstream markets.

<sup>14</sup> See Exhibit 10. AMGC analysed a sample of 14 firms in construction and mining equipment manufacturing. Company representatives or industry experts were asked what factors enabled a firm to outperform the industry in a recent industry downturn. AMGC then grouped those factors into several categories for the purpose of the study, relating to a firm's business strategy, product offering, global trade links, innovation activities and workforce composition. See the Appendix for full details of this methodology.





**Exhibit 10 – Mining and construction equipment manufacturers are more resilient when they are technical leaders and have diverse product offerings and customer base**



The downturn in mining was in many ways a good thing for the business because it allowed them to focus capabilities on other industries.

**Industry participant**, AMGC consultation

The most resilient players are able to switch emphasis between mining and construction depending on the market.

**Industry participant**, AMGC consultation

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## H.I. Fraser – How a small manufacturer of submarine couplings became a global engineering service specialist



**Company:** H.I. Fraser Pty Ltd

**Headquarters:** Sydney, Australia  
(secondary offices in Perth and Melbourne)

**Employees:** <100

**Revenue:** approx. \$35 million in 2016

**Key products:** design, construction, supply, maintenance and certification of niche hydraulic, pneumatic and vacuum systems

### Background

H.I. Fraser is a privately owned Australian company, specialising in the design, manufacture and maintenance of integrated gas, liquid and waste systems comprising pumps, valves and other engineered parts including manifolds and panels.

### How does H.I. Fraser remain resilient during periods of volatility?

H.I. Fraser recognised early on that it must compete on value, rather than cost, to survive in markets where many foreign rivals are buoyed by subsidies and national industrial policy. The company has built resilience against cyclical swings in the resources industry by applying strategies of:

- » **Superiority:** H.I. Fraser has found a niche solving complex engineering problems for large customers such as BHP-Petroleum and the Australian Navy. Its ability to provide unique proprietary knowledge means that H.I. Fraser aims to be a “price setter”, rather than a “price taker”.

- » **Diversity:** Originally founded in the 1950s as a reseller for valves used in naval ships and submarines, the company has since expanded significantly to become a high-value niche provider of professional services. Today, H.I. Fraser designs and engineers specialist hydraulic, pneumatic and vacuum systems. It offers logistics support and maintenance, and also performs technical assessments and audits. It services clients in half a dozen countries across seven industries – navy, defence, rail, offshore oil & gas, commercial marine, building, industrial gas and aerospace.

- » **Flexibility:** Covering a wide range of industries and often working on projects across various stages has helped H.I. Fraser to navigate periods of volatility. The company is very agile in responding to client needs, thanks to a team of highly skilled engineers, technicians and support staff often travels to more than eight countries per year to work on demanding projects that range from designing sewerage systems for heritage-listed city hotels to building hydraulic systems for offshore LNG rigs.

During the recent resources cycle we were shielded a bit because we work across a number of different markets and we also work across different project stages. This smoothens things out for us.

**Chris Williams,**  
Managing Director at H.I. Fraser Pty Ltd

### H.I. Fraser Group project examples:

- › Manufactured niche hydraulic couplings for Australian-built **Collins class submarines**.
- › Supplied valves and other components to a majority of the **major oil and gas projects** in Australia.
- › Equipped natural gas production and processing facilities along Victoria's iconic **Great Ocean Road** with more than 300 valves.
- › Supplied over 22,500 components at 99.5% quality acceptance to the **Air Warfare Destroyer** project competing on a level playing field against global competition.
- › Was assigned to look after niche, technically challenging aspects of valve system maintenance in the global **Joint Strike Fighter program** – as the only small and medium-sized business on the list of approved contractors.
- › Supplied trade waste collection system in 1 Bligh St, an **office building** with a six-star sustainability rating in Sydney.



# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## 2.5 DAIRY MANUFACTURING

Resilience is important to the long-term performance of dairy manufacturing firms, especially because of the industry's high exposure to input cost fluctuations caused by weather. Key factors supporting resilience include:

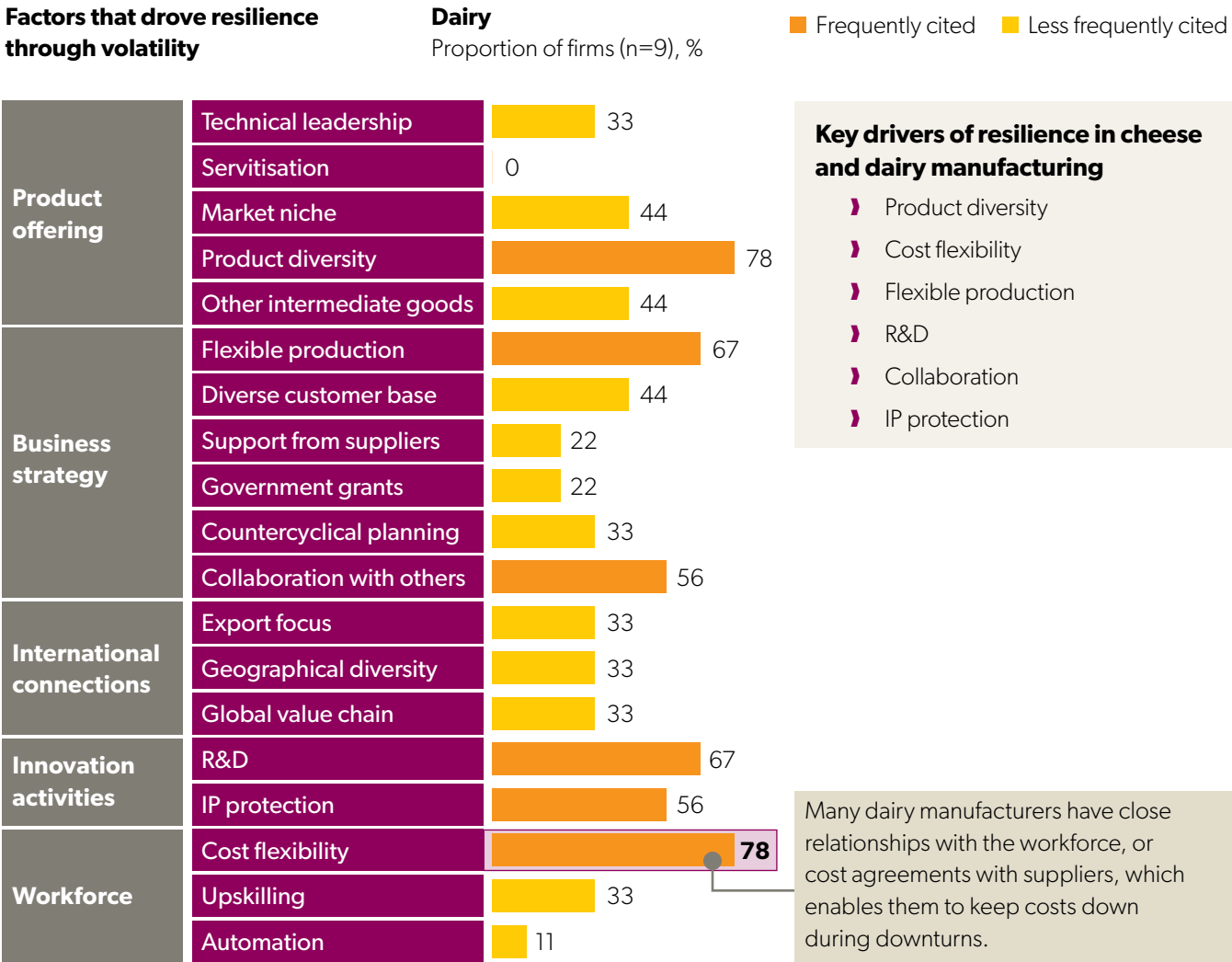
- › **Cost flexibility:** Three-quarters of resilient dairy manufacturing firms use flexible cost models, including in relation to labour costs, to help lower outgoings when revenues drop. This could include hiring workers on a seasonal basis or promoting job-sharing. Many firms cited close workforce engagement, a strong balance sheet and collaborative relationships with suppliers as factors that allowed them to ride out periods of spiking input costs.

- › **Flexible production and product diversity:** More than two-thirds of resilient firms have diversified their product offering and become highly agile when it comes to shifting operations between different business segments.
- › **R&D:** Two-thirds of resilient firms rely on continuous innovation to maintain a competitive advantage.

15 AMGC analysed a sample of nine dairy manufacturing firms. Company representatives or industry experts were asked what factors enabled a firm to outperform the industry in a recent industry downturn. AMGC grouped these factors into several categories for the purpose of the study, relating to a firm's business strategy, product offering, global trade links, innovation activities and workforce composition. See the Appendix for full details of this methodology



**Exhibit 11 – Resilience in cheese and dairy manufacturing is driven by cost and production flexibility, product diversity and R&D**



Firms that competed on high-value products in the Australian market were better off than high-volume low-value players.

**Industry participant**, AMGC consultation

Because it is run as a family business, [the firm] was able to come to an arrangement with their workforce that meant they were able to survive the difficult period and everyone was able to keep their jobs.

**Industry participant**, AMGC consultation

Source: Analysis conducted by AlphaBeta and McKinsey and Co.



# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## Ashgrove Cheese – Turning raw milk into premium cheddar to escape global dairy price swings



**Company:** Ashgrove Cheese Pty Ltd

**Headquarters:** Elizabeth Town (Tasmania), Australia

**Employees:** <100

**Revenue:** approx. \$20 million in 2016

**Key products:** milk, specialty cheese, cream, butter

### Background

Ashgrove Cheese is a family-owned dairy farm and cheese-making business in Northern Tasmania.

### How does Ashgrove Cheese remain resilient during periods of volatility?

Several generations of the Bennett family have transformed the business, which originally started as a mixed farming operation with a dairy herd, sheep and vegetable crops. Declining wool prices and a stagnation in the vegetable industry led founders Michael and John Bennett in the late 1980s and early 1990s to focus solely on dairy. They began to modernize their milking equipment and built a cheese factory adjacent to the farm.

Their goal was to gain independence from low and volatile global dairy prices by producing a variety of artisanal cheeses for premium restaurants and delis. Using their own milk to manufacture premium quality cheese allowed the Bennetts to integrate their supply chain and add value to the raw commodity onsite.

They also opened their business to tourism, investing in a farm shop and café, and started running educational cheese-making tours. This has strengthened the Ashgrove Cheese brand, which won multiple food industry awards in recent years. Heightened interest from overseas visitors has also increased Ashgrove Cheese's export potential. So far, it has only been selling a small share of its cheeses abroad, including to Hong Kong.

A strategy of diversification and flexibility helps Ashgrove Cheese thrive even in volatile times. For example, low prices in the skim milk powder industry recently prompted management to shift its focus on the butter market where prices have skyrocketed following a global surge in demand.

Adding to the resilience of the business is its position as a manufacturer of handcrafted specialty cheeses, such as traditional cloth-matured and Wasabi-flavoured cheddars, for a high-value, niche market. Despite the labour intensity of artisanal cheese-making, Ashgrove Cheese continuously invests in state-of-the-art technology to lower production costs and increase its output.

The idea was that by creating our own product and finding our own markets, we'd be more independent from global commodity price swings.

**Richard Bennett,**  
Managing Director at Ashgrove Cheese Pty Ltd



## Timeline:

**1980s:** Bennett family runs a mixed farming operation with sheep, dairy cows and vegetables

---

**1983:** Brothers Michael and John Bennett form Ashgrove Farms partnership together with their wives

---

**1990:** Investment in new rotary dairy, in line with new focus on dairy

---

**1993:** Construction of Ashgrove Cheese factory

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**1994:** Farm shop opens to cater for tourists

---

**2001:** Ashgrove Cheese Factory becomes separate business

---

**2010:** Investment in new milk bottling and cheese packaging plant to keep up with growing sales

---

**2012:** Company wins 23 awards from various food industry bodies, boosting its reputation

---

**2017:** Investment in factory expansion with the goal of tripling cheese production to 1,500 tons a year.

# 2 THE BUSINESS FACTORS DRIVING RESILIENCE

## 2.6 DRIVERS OF RESILIENCE AMONG INTERNATIONAL FIRMS

Global company data supports the above understanding of the drivers of manufacturing resilience in Australia. To ascertain this, AMGC measured the performance of about 1,100 publicly listed manufacturing firms in seven developed economies during 40 industry-specific downturns over the past 20 years.<sup>16</sup> The markets chosen were Canada, France, Germany, Italy, Sweden, the United Kingdom and the United States. Manufacturers that exhibited characteristics such as cost flexibility, R&D investment, workforce productivity and a strong balance sheet in the five years preceding a downturn enjoyed higher average earnings growth during the downturn than their competitors.

For example, firms in the top quartile for cost flexibility outperformed their peers by 3.6% per year during a downturn. Firms with higher levels of R&D investment beat their peers by 2.4% each year.

This illustrates two key points.

- ▶ Exhibiting particular characteristics can significantly improve a company's resilience.
- ▶ It is essential to plan and build resilience in the years leading up to a potential downturn. Firms that failed to do so were more affected by industry volatility than those that did.

<sup>16</sup> AMGC used Compustat data to run a quartile regression that measured EBIT outperformance of the industry average throughout the length of a downturn, against several independent variables including cost flexibility, R&D investment, workforce productivity and balance sheet position. See the Appendix for the full details of this methodology.



## Exhibit 12 – International firms that outperform during downturns have higher levels of cost flexibility, labour productivity and R&D, and a stronger balance sheet than their peers

We analysed ~40 downturn periods across manufacturing sub-industries in seven countries – the UK, the US, Canada, France, Germany, Italy and Sweden – between 1985 and 2016, with a sample of ~1100 manufacturing firms.



Note: Downturn is defined to be a period of at least three consecutive years of negative performance in an industry with at least ten firms. All coefficients of the related quantile regressions are significant at the 10% of significance (cost flexibility and R&D at the 1% level). Compustat data includes publicly listed firms and other major firms for which financial data is publicly available.

Source: Compustat data. Analysis conducted by AlphaBeta and McKinsey and Co.

### SUMMARY

- It is vital for Australian manufacturers to understand what drives some companies to outperform their peers during downturns.
- AMGC's analysis reveals some shared business characteristics of resilient firms, but also explanatory factors that are specific to particular industries.
- For example, about 90% of resilient manufacturers in the motor vehicle and parts industry are exporters, cushioning their exposure to domestic demand fluctuations.
- In mining and construction equipment, more than 80% of resilient manufacturers are technical leaders in their field, investing heavily in research and development (R&D) and focusing on unique product or market niches.
- In dairy products, three-quarters of resilient manufacturers use variable cost models, particularly in relation to suppliers and employees. This helps them to lower outgoings when revenue falls.
- Global firm-level data corroborates these Australian findings.

# 3 RECOMMENDATIONS FOR COMPANIES

## 3.1 OVERVIEW

Drawing on the findings of chapter 2, this chapter offers practical guidance to Australian manufacturers to improve their resilience by pursuing one or more of three strategies: (1) superiority (2) diversity and (3) flexibility. It is important to note that becoming a more resilient firm also assists in becoming a more competitive one. However, firms that are competitive during strong economic periods do not necessarily succeed during downturns. Therefore, Australian manufacturers should view competitiveness and resilience as dual priorities in achieving long-term performance. As shown in Exhibits 13 and 14, many (though not all) of the factors driving competitiveness and resilience overlap.

**Exhibit 13 – In the 2017 SCP, AMGC found that successful advanced manufacturers focus on three sources of competitiveness – notably value differentiation**

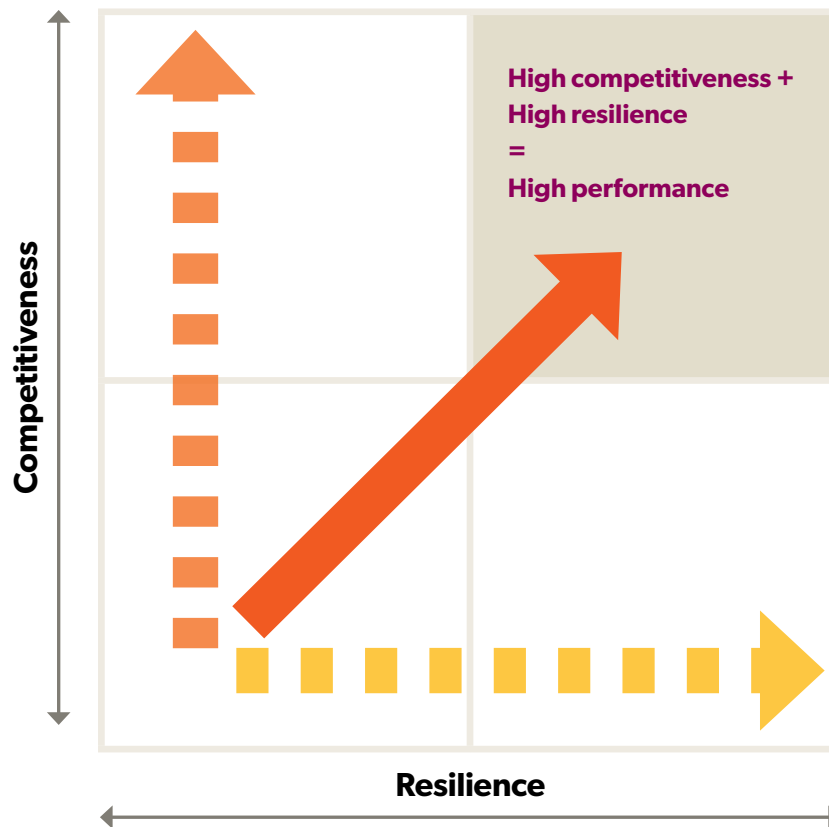
Three sources of competitiveness	Examples of ways to drive competitiveness, as explored in the 2017 Plan
<b>1</b> <b>Improve value</b>	<ul style="list-style-type: none"> <li>Manufacturers can increase their competitiveness by improving their value proposition to customers, e.g.: <ul style="list-style-type: none"> <li>Manufacturers can increase the value of their products through <b>innovation and technological improvement</b> which gives their products a distinctive performance and value proposition</li> <li>Manufacturers can increase the value of their products by providing <b>value-adding services</b> which improve their function, utility and life-cycle</li> </ul> </li> </ul>
<b>2</b> <b>Shift market focus</b>	<ul style="list-style-type: none"> <li>Manufacturers can increase their competitiveness by moving into higher-potential products and markets in which their proposition is more distinctive, e.g.: <ul style="list-style-type: none"> <li>Manufacturers can improve their competitiveness by identifying and entering <b>high-growth / high-value product segments</b></li> <li>Manufacturers can improve their competitiveness by identifying and entering <b>under-served geographies</b> and participating in <b>global value chains</b></li> </ul> </li> </ul>
<b>3</b> <b>Reduce cost</b>	<ul style="list-style-type: none"> <li>Manufacturers can increase their competitiveness by reducing their costs, e.g.: <ul style="list-style-type: none"> <li>Manufacturers can reduce their costs by reducing the <b>cost of their inputs</b>, such as transport, energy, materials</li> <li>More <b>advanced production techniques</b> which enable greater output with existing resources can improve efficiency and reduce costs per unit</li> <li>Manufacturers can reduce their costs per unit by <b>increasing their scale</b> and sharing overheads and other fixed costs</li> </ul> </li> </ul>

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

# 3 RECOMMENDATIONS FOR COMPANIES

## Exhibit 14 – Firms need to think of competitiveness and resilience together to deliver sustained performance

Many of the factors that drive resilience also drive competitiveness



### Competitiveness

- Improving value proposition to customers through innovation and technical leadership and value-adding services
- Shifting market focus by moving into higher-potential products and markets, including niches
- Reducing cost through improved labour productivity, advanced production techniques and increased scale

### Competitiveness and resilience factors

- An unassailable competitive advantage derived from, for example, internationally
- Diversified offerings in services as well as products

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

### Resilience factors

- Spreading risk across a number of product segments (including different industries) and geographic markets
- Capacity to flex costs, access cash and shift production toward adjacent industries and modify business structure rapidly

To achieve high performance, firms can boost their competitiveness and resilience factors



## 3.2 THREE STRATEGIES TO BUILD RESILIENCE

AMGC recommends three strategies for Australian manufacturers seeking to outperform their industries during downturns. These are by no means mutually exclusive; many firms may develop them in parallel or change them over time. However, they do offer a clear framework for firms to improve their chances of success in the face of volatility.

- › **Superiority:** Superior firms are resilient by virtue of their unassailable competitive advantage. They might possess internationally recognised technical leadership in a specific product or market niche. They might also have a highly capable and productive workforce, and the expertise to provide associated services to a particular market segment or export destination.
- › **Diversity:** Diversified firms outperform during downturns by spreading risk. Specifically, they compete on value across various product segments or develop geographically diverse export markets and multiple global supply chains. They may also provide associated services to a particular market segment or export destination.
- › **Flexibility:** Flexible firms have agile business structures, allowing them to shift production towards adjacent industries and products during downturns. They can also modify their cost structures, including via tailored workforce arrangements and agreements with suppliers. They support their viability by ready access to cash and other liquid assets they can use to provide working capital.

**Exhibit 15 – Resilient Australian manufacturers employ one or more of three key strategies**

Resilient firms pursue strategies that are:		
Superiority	Diversified	Flexible
<p>Deeply competitive firms outperform the industry during downturns by maintaining relative outperformance against peers, due to an <b>unassailable competitive advantage</b>.</p> <p>These firms have:</p> <ul style="list-style-type: none"> <li>› Internationally recognised <b>technical leadership</b> in a product or market <b>niche</b></li> <li>› Expertise to provide associated <b>services</b> to market segment or export destination</li> <li>› A highly capable and <b>productive workforce</b></li> </ul>	<p>Diversified firms outperform the industry during downturns by <b>spreading risk</b> across a number of product segments and geographies. These firms:</p> <ul style="list-style-type: none"> <li>› Compete on value across <b>diverse product segments</b>, or</li> <li>› Develop <b>geographically diverse</b> export markets and <b>multiple global supply chains</b></li> <li>› Provide associated <b>services</b> to market segment or export destination</li> </ul>	<p>Flexible firms outperform the industry during downturns by ‘flexing their costs’, and are able to change business structure rapidly at the onset of a downturn. Flexible firms have:</p> <ul style="list-style-type: none"> <li>› The <b>agility</b> to shift production toward adjacent industries and products</li> <li>› The ability to <b>flex variable costs</b> during downturn situations, including via arrangements with workforce</li> <li>› <b>Collaborative agreements with suppliers</b> that allow cost flexibility</li> <li>› <b>Access to cash</b> and other liquid assets to provide working capital</li> </ul>

Firms employing these resilience strategies are more likely to outperform their industry average during downturns

Source: Expert interviews. Analysis conducted by AlphaBeta and McKinsey and Co.

# 3 RECOMMENDATIONS FOR COMPANIES

**Exhibit 16 – Different sources of volatility may require different resilience strategies in response**

In manufacturing industries where volatility is driven by ...	For example ...	A key strategy that promotes resilience is ...
<b>Investment cycles in other parts of the economy</b>	<ul style="list-style-type: none"> <li>› Mining equipment manufacturing</li> <li>› Construction materials manufacturing</li> </ul>	<b>Flexibility</b> – the ability to shift between industries allows firms to take advantage of upcycles without becoming reliant in downturns
<b>Volatility in the cost of inputs</b>	<ul style="list-style-type: none"> <li>› Metal products</li> <li>› Dairy products</li> <li>› Petroleum and coal products</li> </ul>	<b>Flexibility</b> – firms are more insulated from cost volatility if they have agreements with suppliers and workforce ability to flex costs during downcycles
<b>Changes in the customer taste vs. consumer demand</b>	<ul style="list-style-type: none"> <li>› Dairy products</li> <li>› Textile, clothing and footwear</li> <li>› Automotive and parts</li> </ul>	<b>Diversity</b> – spreading risk among several product offerings allows firms to be more resilient to changes in ‘consumer demand’ affecting one of their products
<b>Trade changes and exchange rate fluctuations</b>	<ul style="list-style-type: none"> <li>› Food and beverage products</li> <li>› Chemical products</li> </ul>	<b>Superiority</b> – firms that compete on value rather than price due to strong technological or product advantage are less likely to be affected by changes in relative purchasing power due to exchange rates
<b>Changes in domestic government policy</b>	<ul style="list-style-type: none"> <li>› Automotive and parts manufacturing</li> <li>› Shipbuilding</li> </ul>	<b>Diversity</b> – firms with business outside Australia are less reliant on domestic government support and more resilient to changes

Source: Expert interviews. Analysis conducted by AlphaBeta and McKinsey and Co.

### 3.3 ACHIEVING MINDSET CHANGE

There is significant room for Australian manufacturers to make resilience an integral part of their business strategy. According to modelling by AMGC based on the latest comprehensive ABS business survey data (see Exhibit 17), only a minority of Australian manufacturers are currently taking steps that would have the effect of buffering them against external shocks.



#### SUPERIORITY

JUST

5%

More than half (54%) of the Australian manufacturing sector's entire R&D spending comes from just 5% of firms<sup>17</sup>, even though R&D investment drives greater resilience.

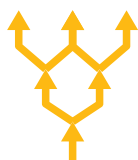
ONLY

4%

of Australian manufacturers have R&D **collaborations with universities** and research institutions in place.

ONLY ABOUT ONE IN TEN

protect their **intellectual property** using patents.<sup>18</sup>



#### DIVERSITY

ABOUT

30%

of Australian manufacturers claim that the **loss of a single client** would have a 'moderate' to 'large' impact on their business. An additional 10% claim it would force the business to close.<sup>19</sup>

#### RELIANCE

on a single customer makes these firms especially **exposed to fluctuations** in the broader industry, and works against their resilience.

FEWER THAN ONE IN SIX

manufacturers are engaged in export markets.<sup>20</sup> This means that the vast majority of firms are **highly exposed to demand fluctuations** within Australian industries. Without having access to export markets, these firms have no buffer against a domestic downturn.



#### FLEXIBILITY

ALMOST 30%

of manufacturing firms introduced or **significantly improved operational processes** in the last year. In comparison, the economy-wide average was 16%.

GOOD NEWS

This represents some good news for the sector, as it suggests that manufacturing firms are **more flexible** than firms in other industries.<sup>21</sup>

<sup>17</sup> Advanced Manufacturing Growth Centre, Defining 'advanced manufacturing' for governments and companies 2017. [https://www.amgc.org.au/Attachment?Action=Download&Attachment\\_id=27](https://www.amgc.org.au/Attachment?Action=Download&Attachment_id=27)

<sup>18</sup> Australian Bureau of Statistics, *Innovation in Australian Business 2014–15*, cat no: 8158.0. Available at: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8158.0>.

<sup>19</sup> Australian Bureau of Statistics, *Selected Characteristics of Australian Businesses 2015–16*, cat no: 8167.0. Available at <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8167.0>.

<sup>20</sup> Australian Bureau of Statistics, *Selected Characteristics of Australian Businesses 2015–16*, cat no: 8167.0. Available at: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8167.0>.

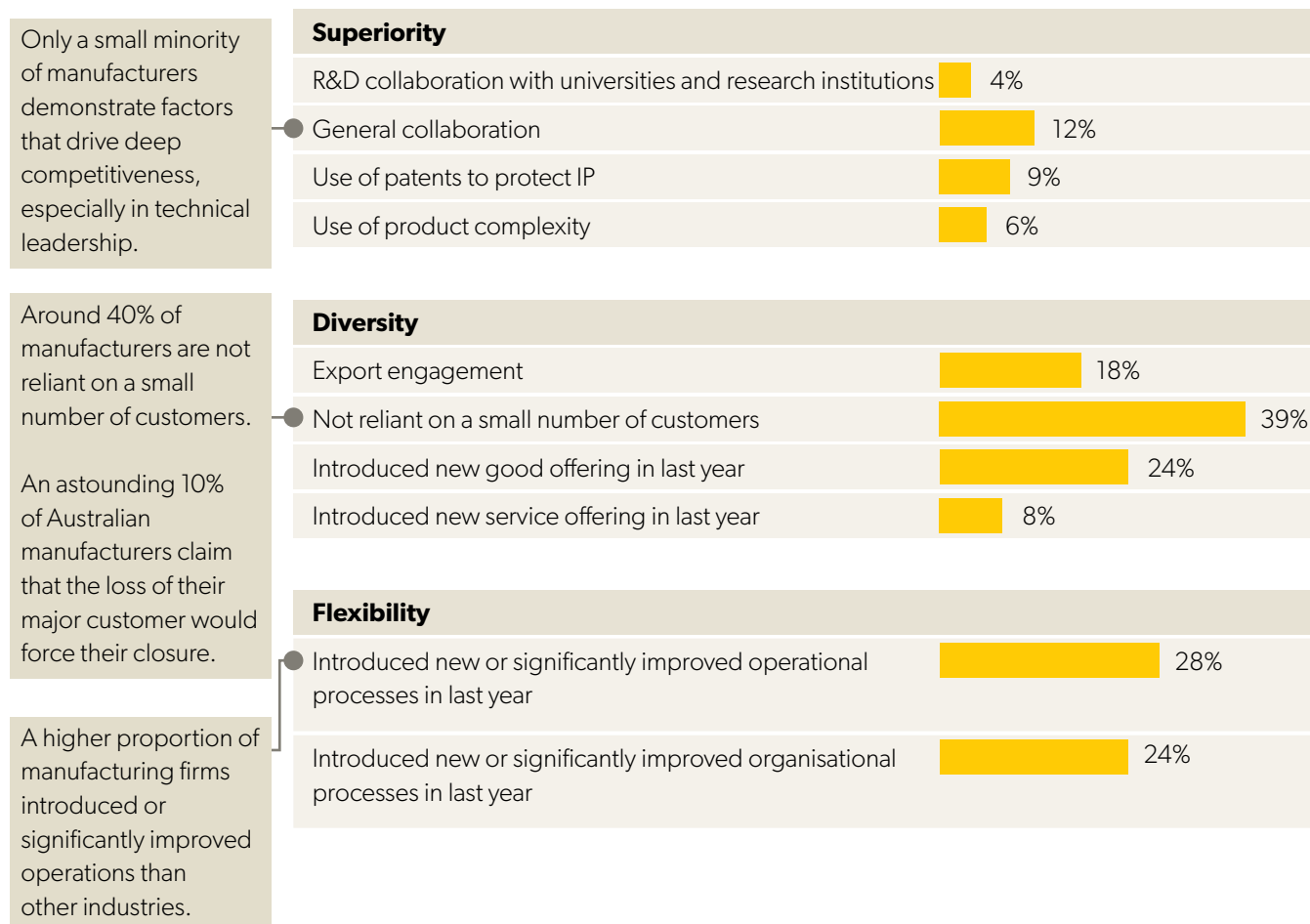
<sup>21</sup> Australian Bureau of Statistics, *Innovation in Australian Business 2014–15*, cat no: 8158.0. Available at: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/8158.0>.

# 3 RECOMMENDATIONS FOR COMPANIES

## Exhibit 17 – Australian manufacturers need to focus on improving factors that drive firm resilience

### Resilience characteristics in Australian manufacturers

Proportion of firms exhibiting characteristic



Source: Australian Bureau of Statistics: Business Expenditure on R&D, Australian National Accounts, and Business Characteristics Survey; OECD statistics on science, technology and innovation. Analysis conducted by AlphaBeta and McKinsey and Co.

### 3.4 RECOMMENDATIONS FOR COMPANIES

To sharpen the focus of Australian manufacturers on pursuing the resilience strategies of superiority, diversity or flexibility, AMGC offers firms the following guidance:

#### Superiority

Superior firms enjoy an unassailable competitive advantage. They tend to offer specialised products and services that involve a high intellectual property component. They also possess strong expertise, backed by extensive collaboration with the research sector.

AMGC strongly believes that more Australian manufacturers should focus on cultivating these qualities and developing a value proposition that is unique. For example, companies could:

- › **increase investment in business-led R&D** across products and industries
- › **collaborate with researchers** across product segments and industries, drawing on the technological expertise of the Australian research sector by proactively seeking opportunities to collaborate
- › **work with other businesses** to bundle innovative product lines and services, allowing firms to build on each other's expertise and diversify their exposure
- › **hire higher-skilled technicians and professionals** who are capable of conducting R&D and building technical leadership, allowing firms to build proprietary expertise independently, complementing their wider collaboration efforts
- › **develop services that complement product offerings**, to build deeper and longer-term relationships with customers. This could include offering post-sale diagnostic, repair or training services as part of the product sale, to help firms understand their clients' needs
- › **upskill the existing workforce and support its development**, which could help firms achieve superiority via improvements in productivity and research output.

#### Diversity

Diversified manufacturers spread the risk of operating in a volatile commercial environment by competing across multiple product segments, service offerings and geographic locations. AMGC encourages more local firms to focus on developing international connections and being continually attuned to emerging market opportunities. For example, companies could:

- › **identify and reach geographically diverse export markets.** Shifts in consumer demand can often affect entire regions, putting at risk manufacturing firms that are exposed to a narrow set of export markets
- › **integrate products into multiple global supply chains.** This can help firms gain exposure to multiple industries, and build relationships with international manufacturers
- › **develop products or service offerings across multiple segments**, spanning different geographies and/or different industries of customers
- › **identify new customers within existing market segments**, to prevent concentration of the customer base.

#### Flexibility

Flexible manufacturers typically possess agile supply chain agreements and a labour force that is capable of adapting to changing seasonal or market demands. They are also characterised by ready access to liquidity. AMGC suggests that more Australian manufacturers should:

- › **build collaborative agreements with suppliers that allow for cost flexibility.** Firms that are able to secure flexible arrangements while meeting suppliers' needs will be best positioned to manage costs during volatile periods
- › **engage with the workforce to manage cost and productivity during downturns**, for example by training employees to shift more easily between production processes or service types
- › **introduce production techniques such as modularisation** to take advantage of upswings or avoid downswings where possible
- › **maintain cash on their balance sheet** so they have access to working capital during downturns.

# 3 RECOMMENDATIONS FOR COMPANIES

## Exhibit 18 – Companies can build resilience by diversifying and focusing on actions to build competitiveness and flexibility

To develop this resilience strategy ...	Firms should focus on ...
<b>Superiority</b> Superior firms outperform industry peers during downturns due to an <b>unassailable</b> competitive advantage.	<ul style="list-style-type: none"> <li>Increasing business-led R&amp;D across products and industries</li> <li>Collaborating with researchers and other firms</li> <li>Developing services associated with major products to create longer term relationships with customers</li> <li>Engaging and building skills within workforce to improve productivity</li> </ul>
<b>Diversity</b> Diversified firms outperform the industry during downturns by <b>spreading risk</b> across a number of product segments and geographies.	<ul style="list-style-type: none"> <li>Identifying and reaching geographically diverse export markets</li> <li>Integrating products into multiple global supply chains</li> <li>Developing products or service offerings in a number of product segments, spanning different geographies and/or different industries of customers</li> <li>Identifying new customers within existing market segments to prevent concentration of the customer base</li> </ul>
<b>Flexibility</b> Flexible firms outperform the industry during downturns by flexing their costs and being able to change business structure rapidly.	<ul style="list-style-type: none"> <li>Building collaborative agreements with suppliers that allow for cost flexibility</li> <li>Engaging with workforce to develop the ability to flex variable costs during downturn situations</li> <li>Introducing production techniques like modularisation and other highly customisable production technologies</li> <li>Accessing cash and other liquid assets to provide working capital in downturns</li> <li>Training the workforce to shift flexibly between production processes</li> </ul>

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

### SUMMARY

- Australian manufacturers should view competitiveness and resilience as dual priorities in achieving long-term performance.
- More manufacturers need to take steps to buffer against external shocks.
- To build superiority, firms should collaborate with research institutions, invest in R&D, build workforce skills and develop services that complement product offerings.
- To build diversity, firms should identify additional export markets, integrate products across multiple global supply chains and identify new customers within existing product segments.
- To build flexibility, firms should collaborate with suppliers to allow for cost flexibility, have ready access to cash and liquid assets, use modular production techniques and create agile workforces.







# 4 RECOMMENDATIONS FOR GOVERNMENT

## 4.1 OVERVIEW

The Federal Government has a crucial role to play in supporting the resilience of manufacturing firms and many business advice and support programs already do this indirectly. In this chapter, AMGC recommends that Government considers opportunities to enhance these programs to more explicitly support firm resilience and continue to improve firms' access to international markets by liberalising trade relations and encouraging use of trade agreements, given the findings of this report.

## 4.2 TARGETING EXISTING PROGRAMS TO BUILD RESILIENCE

A range of Federal Government programs provide vital support to Australian manufacturers at different stages of a firm lifecycle – including advice on start-up and growth, funding for innovation, and connections to research institutes to enhance R&D. Many of these programs indirectly support resilience, and connections to research institutes, in particular by supporting R&D and companies connecting to export markets. R&D is a key driver of product or technical leadership and export markets are a key driver of diversity.

The findings of this report however suggest that only a minority of manufacturing firms currently exhibit key factors that drive resilience. Accordingly, more can be done to support Australian firms to be more resilient, both to support the firms themselves and to enhance value for money for Government, ensuring the firms that are supported through existing programs also survive through periods of volatility.

Discussions with representatives from Federal Government departments have highlighted a range of potential improvements and a willingness to identify ways to better support resilience. These potential improvements to programs are outlined in high level below, however Departments are encouraged to draw on the expertise of program advisors who interact with businesses to develop a more detailed response.

### Australian Small Business Advisory Services Digital Solutions

The Australian Small Business Advisory Services (ASBAS) – Digital Solutions program supports the Australian Government's commitment to deliver low cost, high quality, digital advisory services to Australian small businesses.

#### What does it offer?

The \$18.02 million ASBAS Digital Solutions funding round will run over three years from 2 July 2018 to 30 June 2021. It will fund business advisory service providers to deliver low-cost, high-quality digital advisory services to small businesses located in the metropolitan and regional parts of the following three coverage areas:

- \$6.09 million for Area 1 – New South Wales and the Australian Capital Territory
- \$5.68 million for Area 2 – Queensland, the Northern Territory and Western Australia
- \$6.25 million for Area 3 – South Australia, Victoria and Tasmania.

Successful service providers will offer direct services to small businesses through a combination of channels and formats, including face to face, online video calls, webchats, interactive webinars and phone calls. Small businesses will be able to access the services for a small contribution fee. The services will include assessment of small businesses' needs, tailored digital engagement plans where required, and advisory support in relation to one or more of the priority digital capabilities:

- › websites and selling online
- › social media and digital marketing
- › using small business software
- › online security and data privacy.

For more information, visit [www.business.gov.au/assistance/australian-small-business-advisory-services-asbas](http://www.business.gov.au/assistance/australian-small-business-advisory-services-asbas)

## Running and growing a business

The Department of Industry, Innovation and Science's **Entrepreneurs' Programme** is the Australian Government's flagship initiative to improve business competitiveness and productivity. It uses experienced industry advisers and facilitators to ensure businesses get the advice and support they need to improve their competitiveness and productivity, and to seek growth opportunities. The programme includes several elements including:

- › **Accelerating Commercialisation**, which provides advice and funding to help entrepreneurs, researchers and businesses overcome the challenges of commercialising new products, processes and services
- › **Innovation Connections**, which helps connect SMEs to the most appropriate source of expertise, technology and advice to meet their research and development needs, through a national network of innovation facilitators and grant funding
- › **Business Management Services**, which provides business evaluations, including holistic analysis of operations and recommendations for improvement.

Government could build a stronger awareness within the Entrepreneurs' Programme and its clients of the challenges related to volatility, and of strategies that can build resilience. It could do this by ensuring appropriate advisor expertise, by providing tools for businesses to understand resilience and by reviewing funding criteria and assessment. More specifically, it could:

1. Encourage companies to pursue diversity, for example by:
  - › encouraging existing companies to commercialise a new product or offering in an adjacent industry
  - › prioritising support for companies where there is diversity, rather than concentration, in the customer base
  - › encouraging companies to consider the potential export markets for their product and ways for the product to be exposed to export markets with different industry cycles.
2. Ensure that advisors are equipped to:
  - › assess whether companies are highly exposed to volatility
  - › assess whether companies exhibit resilience factors
  - › identify opportunities for diversity and technological superiority in providing advice.
3. Expand the number of facilitators to increase connections between firms and universities.
4. Target funding and assess candidates for assistance based on their capacity for technical leadership and/or export potential.
5. Ensure that advisors:
  - › are aware of markers that reveal where a company is exposed to volatility
  - › are aware of factors that help a company improve resilience
  - › possess checklists or screening tools that enable them to check whether companies exhibit superiority, diversity or flexibility.

# 4 RECOMMENDATIONS FOR GOVERNMENT

## Exporting

- ▶ Austrade plays an important role in supporting resilience of Australian manufacturing through identification of export opportunities and supporting SME entry into new markets and sectors. This is important for helping the 40% of manufacturing firms with customer concentration to diversify and find new markets. Austrade has however identified potential to better support firms through a whole of government approach to guide multinational corporations (MNCs) towards the diverse capabilities they are increasingly seeking and preparing the Australian industry for this shift in focus. This would include:
  - Developing a common approach to provide a compendium of Australian capabilities to ensure companies are identified for cross-sector, cross-border opportunities.
  - Educating the Australian industry to ensure adaptability of products, services and solutions as well as SME ability to position themselves professionally with MNCs.
  - Understanding and promoting Australian competitive advantages so businesses can take advantages of opportunities, bid and increase their chances to participate in tenders and MNC global value chains.
- ▶ AMGC supports this initiative and believes the findings on resilience provide a case for this strategy.
- ▶ There are several channels through which the Government currently supports exports, and these channels are opportunities to promote diversity to build resilience:
  - **FTA opportunities:** The Government can support more firms to make use of FTAs and become involved in export markets. It can do so by making firms aware of the FTA opportunities available to them. Currently, fewer than one in five Australian exporters use free trade agreements (FTAs) where they are available.<sup>22</sup>
  - **New markets:** Although Australia has FTAs with 10 of its top 15 trading partners, agreements with key partners like the UK, India, the European Union, Hong Kong and Taiwan remain unfinished. Supporting new trading markets would allow firms to diversify and build resilience.
  - **Trade facilitation:** Australia should support international efforts to remove behind-the-border barriers and harmonise product requirements, allowing firms to more easily enter new markets.
  - **Trade in services:** The Australian Government should continue to liberalise the trade in services. This would allow firms to build resilience by diversifying their offerings in foreign markets.
  - **Multilateral progress and harmonisation:** Progress at the multilateral level, including the harmonisation of market rules and requirements, would make it easier for Australian firms to expand into export markets.



<sup>22</sup> HSBC, *Australian companies under-utilising Free Trade Agreements*.

Available at: <http://www.about.hsbc.com.au/news-and-media/australian-companies-under-utilising-free-trade-agreements>.

## Exhibit 19

### Government assistance can help drive resilience in manufacturing companies

Existing Government assistance for industry, including business advisory services, innovation and export assistance, can help to encourage diversity, superiority and/or flexibility:

- › **Expand advisor expertise** – ensure advisors understand how a company can be unduly exposed to volatility and what drives resilience, so businesses can be advised on how to improve resilience.
- › **Better target funding** – review funding criteria to ensure assistance is targeted, where appropriate, at initiatives that will enhance resilience e.g. help businesses expand into new geographical markets or technologically superior products.
- › **Increase proactive connections** – consider increasing funding for support services that increase the number and quality of R&D connections and better connect Australian SMEs with MNCs through information on capability and capacity for cross-sector or cross-border opportunities.

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

### SUMMARY

- › Federal government industry assistance can help to drive resilience among Australian manufacturers.
- › In particular, this could include refining parts of the Entrepreneurs' Programme to ensure advisors have the right skills and knowledge to advise firms and funding is targeted where possible.
- › Governments should also continue to push for trade liberalisation, supporting local firms to differentiate and diversify their offerings in international markets.





## 5 CONCLUSION

This report has identified three key factors that allow manufacturing firms to outperform peers during industry downturns – in other words, to be ‘resilient’ against shocks. It has also outlined the steps business and government leaders can take to build this resilience in Australian manufacturing firms.

Resilient manufacturers pursue the three common strategies of:

- › **superiority:** developing an unassailable competitive advantage by offering products or services for which there are minimal substitutes during downturns
- › **diversity:** developing a competitive advantage across diverse product segments, service offerings or geographically diverse export markets
- › **flexibility:** developing a flexible business structure to manage costs or change industry focus in the event of a downturn.

There are practical steps Australian manufacturers can take to build resilience and be prepared for downturns.

- › To build **superiority**, firms should collaborate with research institutions, invest in R&D; develop services bundled with major projects to ensure their products cannot be substituted in the event of an industry contraction; and build workforce skills.
- › To build **diversity**, firms should identify diverse export markets; integrate products into multiple global supply chains; and identify new customers within existing product segment industries to minimise reliance and exposure to a single industry, market or customer.

- › To build **flexibility**, firms should build collaborative agreements with suppliers to allow for cost flexibility; access cash and liquid assets to provide working capital in downturns; use customisable or modular production techniques; and flexibly deploy their workforces to serve clients across different industries.

Governments can assist manufacturing companies in their efforts to become more resilient, including by providing tailored support at different stages of the business services pathway and offering expert advice. Governments could also support resilience in the manufacturing industry by encouraging companies to make better use of trade agreements, and by securing freer access to export markets.



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# 6 APPENDIX

## 6.1 METHODOLOGY

### 6.1.1 Volatility analysis

Volatility was measured using regression analysis of industry value-added (IVA) contributions to gross domestic product (GDP) (see Exhibit A.1). To measure volatility, a line was fitted to account for trend changes in the size of the industry, such as inflation or structural economic changes. Each IVA series was de-trended by subtracting the pointwise estimate of the linear regression. The residuals were then treated as the 'cyclical component'. For each cyclical component, the standard deviation was calculated and divided by the mean size of the industry to arrive at a coefficient of variation; that is, the measure of volatility used in this study.

Volatility was measured across different countries, sectors and industries.

- ▶ Average volatility of international manufacturing industries was calculated over the period from 1996 to 2015. International comparisons used the OECD Structural Analysis (STAN) Database at the SITC Rev. 4 two-digit level. Australian comparison used the ABSIVA data at the two-digit level.
- ▶ Average volatility of Australian manufacturing industries was calculated over the period from 1987 to 2017. Manufacturing was measured at the two-digit level – except selected three- and four-digit industries – so that industries of similar sizes could be compared.

Different calculations were used for other volatility calculations.

- ▶ The Sankey diagram measured the flow of Australian firms between performance quartiles in years before and during the GFC. Australian manufacturing firms with financial data available between 2003 and 2012 were selected from Compustat (N=301). The firms were divided into four quartiles of performance based on growth in EBIT in 2003–07 and then again in for 2008–12. The Sankey diagram maps the transition of firms between these quartiles before and after the GFC.
- ▶ The growth diagram measures changes in the size of Australian manufacturing industries. Change in IVA at the two-digit (and selected four-digit) level between 2012 and 2016 were graphed. For the two highlighted sectors, financials for publicly listed firms and large private firms with available financial data were downloaded from the BvD Orbis database. The samples were restricted to those with at least three years of available financials between 2012 and 2016. Those with estimates calculated by BvD (rather than real data) were excluded. An average growth in revenue figure was calculated for the remaining firms (n=136 for mining and construction equipment manufacturing and n=59 for motor vehicle and parts manufacturing). Those with an average growth or more than zero were deemed to have grown between 2012 and 2016.

## Exhibit A.1

### We used data on industry value added to develop a picture of volatility in industries

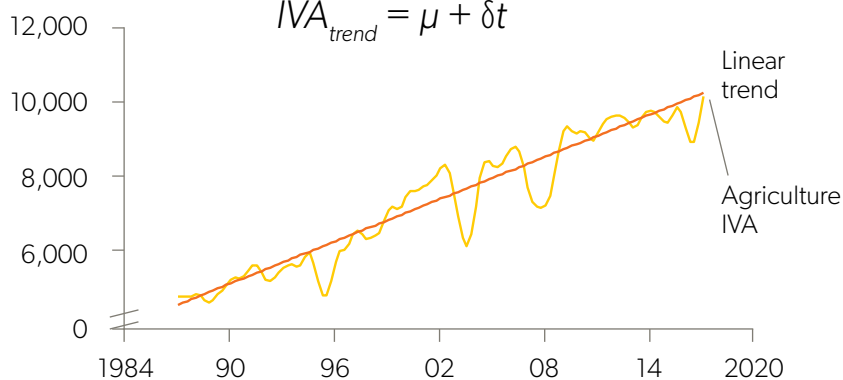
#### Step

1

Calculate linear trend in IVA to account for inflation effects and structural economic change.

#### Example calculation

$$IVA_{trend} = \mu + \delta t$$

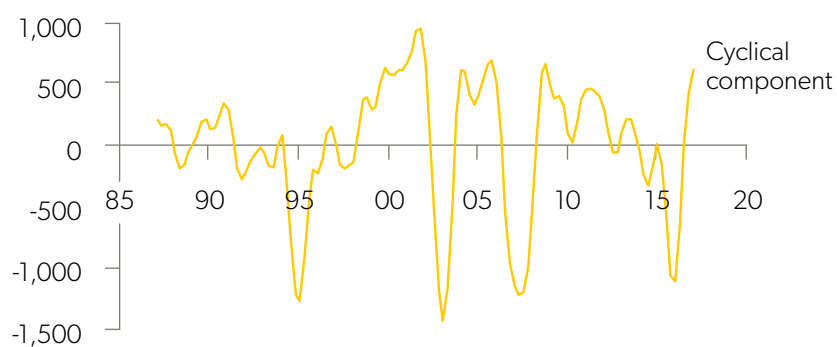


#### Step

2

Detrend IVA to leave cyclical component.

$$IVA_{industry} = IVA_{trend} + IVA_{cyclical}$$



#### Step

3

Measure volatility of cyclical component.

$$\text{Volatility} = \text{coefficient of variation} = \frac{sd(IVA_{cyclical})}{mean(IVA_{industry})}$$

Source: ABS, OECD StAN.<sup>1</sup> Analysis conducted by AlphaBeta and McKinsey and Co.

<sup>1</sup> Note: Method partly based on Cariolle, J. (2012). Measuring Macroeconomic Volatility. FERDI Working Paper No. 12.

# 6 APPENDIX

## 6.1.2 INTERNATIONAL FIRM ANALYSIS

The sample included 1,147 manufacturing firms through 40 downturn periods across manufacturing sub-industries in seven countries – the US, Canada, the UK, France, Germany, Italy and Sweden – between 1985 and 2016.

To identify downturns, AGMC used data from the OECD STAN Database on downturn periods in (two-digit) manufacturing sectors at the country level. A downturn was defined to be three consecutive years of contraction at the industry level.

Financial data from 1985 to 2016 regarding manufacturing firms from a number of countries was downloaded from Compustat. Firms in the Compustat dataset that existed at the beginning of these downturns were identified. Analysis was restricted to downturns where at least 10 firms were involved at the start. This resulted in a sample size of 1,147 manufacturing firms through 40 downturn periods in seven countries.

Quartile regression was conducted to measure EBIT outperformance of the industry average throughout the length of a downturn. The independent variables were quartile performance in the five years leading up to a downturn in cost flexibility, R&D investment, workforce productivity and balance sheet (see Exhibit A.2).

## 6.1.3 AUSTRALIAN FIRM ANALYSIS

Fifty resilient Australian manufacturers were analysed to determine the qualitative factors promoting business outperformance during recent periods of industry volatility. The sample comprised 13 in motor vehicle and parts manufacturing firms; 14 in construction and mining equipment manufacturing; nine in dairy product manufacturing; two in shipbuilding; and 12 in other manufacturing industries.

Interviews with company representatives or industry experts familiar with selected companies underpinned the quantitative analysis (see Exhibit A.3 for questions and A.4 for the list of experts interviewed). Interview partners were asked to answer a key question: What factors enabled a firm to survive a recent industry downturn? These were grouped into several categories for the purpose of the study, covering each firm's business strategy, product offering, global trade links, innovation activities and workforce composition.

**Exhibit A.2 – Glossary of success metrics in Compustat data**

Metric	Calculation method
 <b>Cost flexibility</b>	Change in revenue/ Change in Cost
 <b>R&amp;D investment</b>	R&D spend/sales
 <b>Workforce productivity</b>	Sales/employment
 <b>Strong balance sheet</b>	Cash holdings/sales

Source: Compustat. Analysis conducted by AlphaBeta and McKinsey and Co.





# 6 APPENDIX

**Exhibit A.3 – To investigate what drives resilience during volatility in Australia, we conducted a qualitative analysis of 50 firms that survived downturns**

Question: What factors enabled the firm to survive through a downturn in the industry?		
Product offering	Technical leadership	Did the firm have a technological or product advantage that customers value?
	Servitisation	Did the firm shift business towards services associated with product?
	Niche	Was the product highly specialised and niche?
	Product diversity	Did the firm spread risk across multiple product offerings?
	Intermediate goods	Did the firm produce intermediate goods?
Business strategy	Agility	Was the firm able to shift between different industries/products?
	Customer Diversity	Did the firm have a diverse, balanced customer base?
	Supplier Dependence	Was the firm dependent on a single or small number of suppliers?
	Government Grants	Did the firm receive government assistance during a downturn?
	Countercyclical strategy	Was the firm planning for downcycles through booms?
	Collaboration	Did the firm collaborate with other firms or institutions (e.g. joint buying, joint R&D)?
International linkages	Export intensity	Was the firm focused towards export markets?
	Geographical diversity	Did the firm have geographically disperse export markets?
	GVC participation	Was the product part of a global value chain?
Innovation activities	Research and development	Was the firm investing in research and development prior to the downturn?
	IP Protection	Did the firm have patents or other protections for IP?
Work-force	Cost Flexibility	Did the firm have the ability to flex variable costs, including labour?
	Upskilling	Did the firm invest in skilling its employees (e.g. ongoing training)?
	Automation	Did the firm shift towards less labour-intensive production?

Source: Analysis conducted by AlphaBeta and McKinsey and Co.

## 6.2 VOLATILITY IN AUSTRALIA

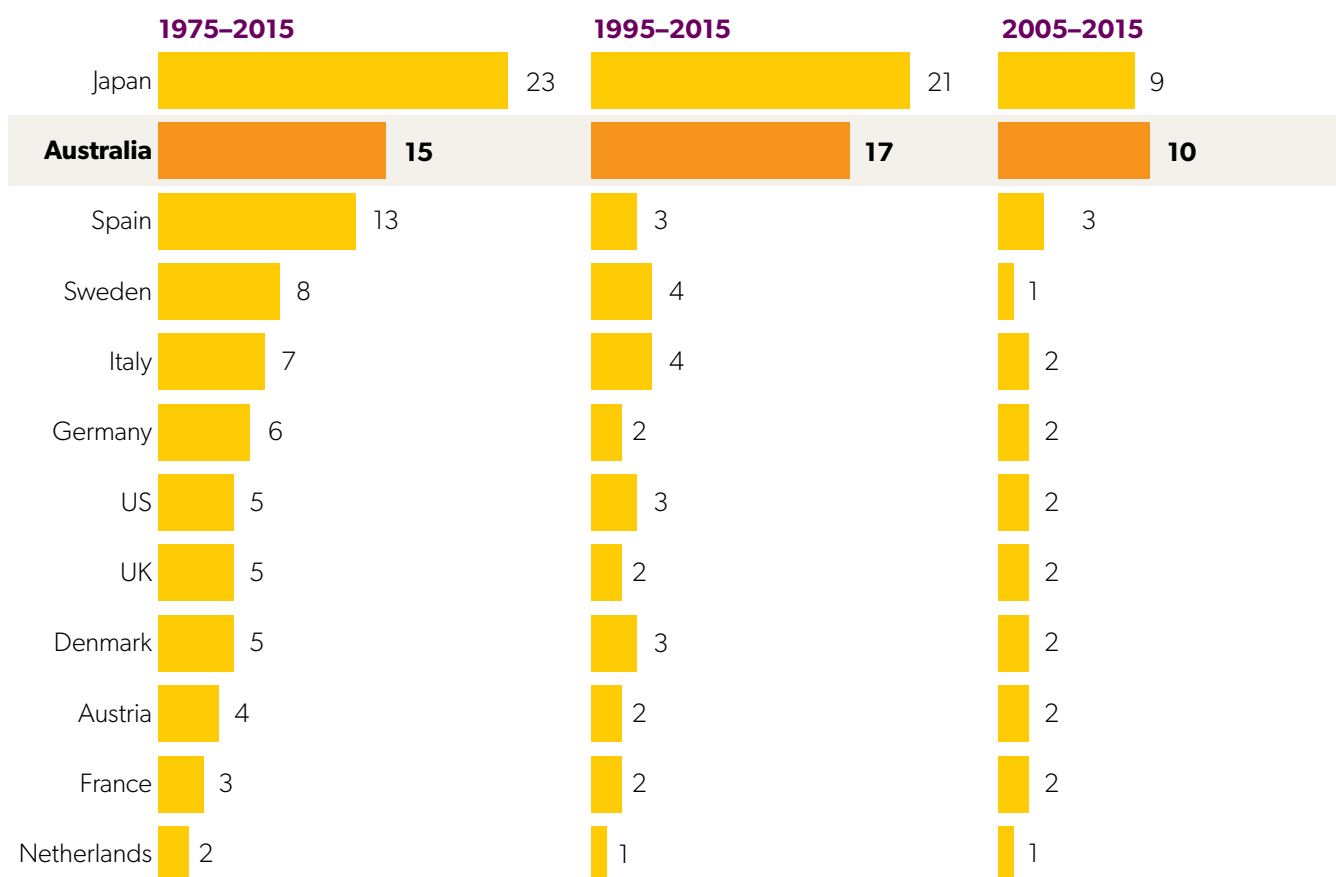
Australian manufacturing is unusually volatile. On average, Australian manufacturing sub-industries swell by 20% above their average size in upcycles and contract to 20% below their mean size in downturns – more so than in other countries. Australia's manufacturing industry is volatile because the economy is relatively small, open and subject to significant swings in its terms of trade, and geographic isolation magnifies fluctuations in the cost of transport.

Australia's terms of trade are among the most volatile in the world (see Exhibit A.4). From 2005 to 2015, they were more volatile than all major global economies.

### Exhibit A.4 – Australia's terms of trade are among the most volatile in the world

#### Average volatility of annual terms of trade

Standard deviation of terms of trade



Note: Volatility calculated by taking the standard deviation of annual terms of trade recordings

Source: OECD. Analysis conducted by AlphaBeta and McKinsey and Co.



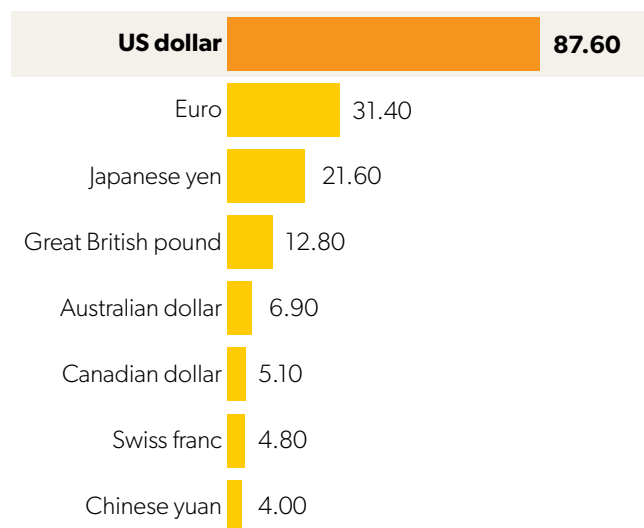
# 6 APPENDIX

Australia's terms of trade are more volatile because the Australian dollar is more traded and more volatile than its peers. In 2016, the Australian dollar was the fifth most traded currency in the world despite Australia being the 22nd largest economy (see Exhibit A.5), making it much more volatile than other currencies (see Exhibit A.6).

## Exhibit A.5 – In 2016, Australia's currency was the fifth most traded in the world

### Currency distribution of OTC foreign exchange turnover

Percentage share of average daily turnover in April 2016



1 Adds to 200% because of two-way trade

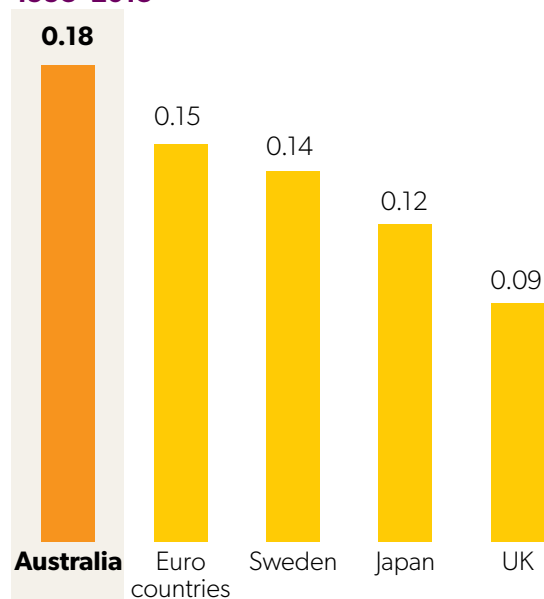
Source: Bank for International Settlements. Analysis conducted by AlphaBeta and McKinsey and Co.

## Exhibit A.6 – Australia's currency is also very volatile

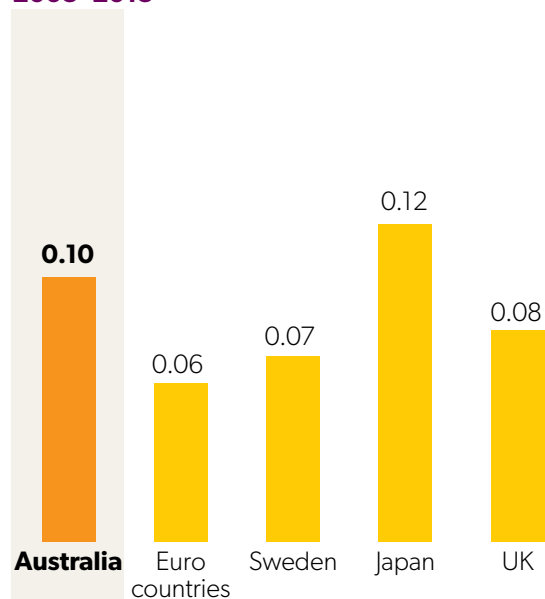
### Average volatility of annual exchange rate

Standard deviation of monthly USD exchange rates

#### 1995–2015



#### 2005–2015



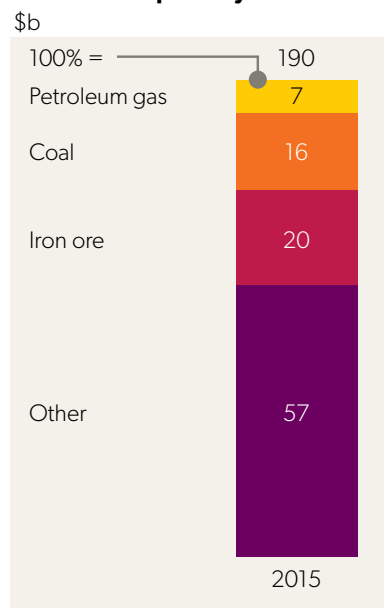
Note: Volatility calculated by taking the standard deviation of annual exchanges rate, with 2015 normalised to 1

Source: OECD. Analysis conducted by AlphaBeta and McKinsey and Co.

Australia's terms of trade are also volatile because natural resources make up a large proportion of Australia's exports, and they are subject to significant commodity price fluctuations (see Exhibit A.7).

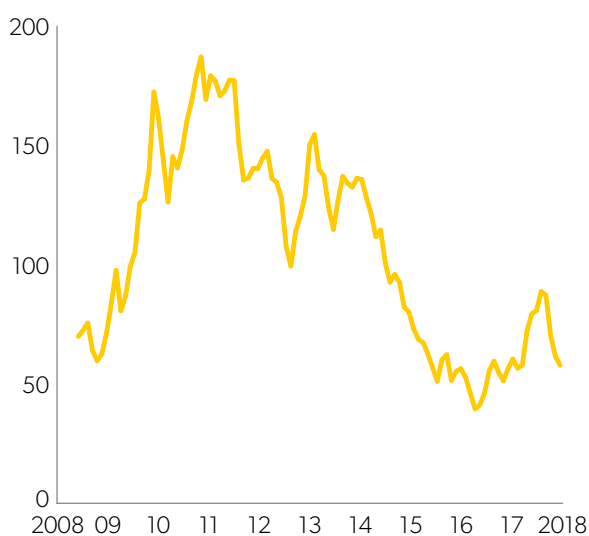
### Exhibit A.7 – Australian exports are vulnerable to commodity price swings

#### Australian exports by revenue



#### Iron ore spot price

Average monthly USD/Metric tonne

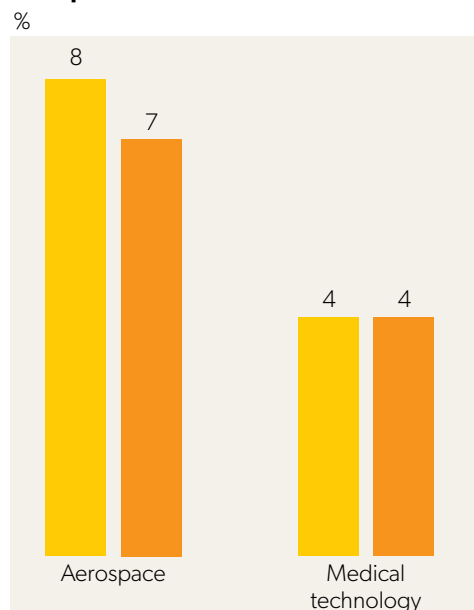


Source: Observatory of Economic Complexity; IMF. Analysis conducted by AlphaBeta and McKinsey and Co.

Separately, Australia's geographic isolation magnifies volatility. Transport costs are higher for Australian manufacturers than for overseas manufacturers (see Exhibit A.8), so Australian firms are more exposed to rising transports costs – such as shipping costs.

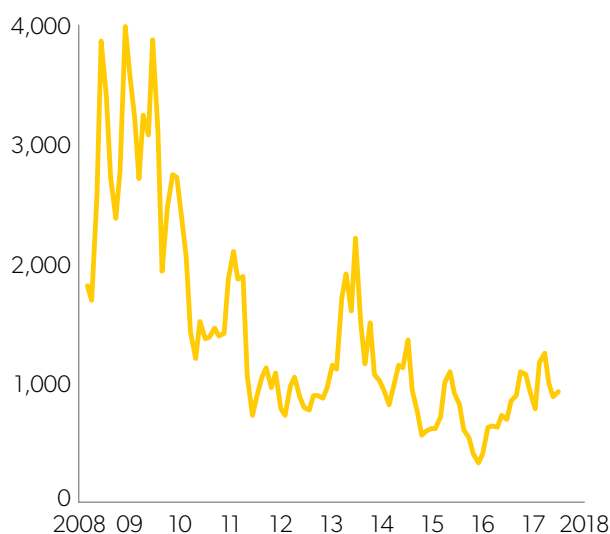
### Exhibit A.8 – Australia's transport costs are also subject to volatility

#### Transport as a share of costs



#### Baltic Dry Shipping Index

Average monthly US\$



1 Benchmark compares Australian manufacturers shipping to Germany with US manufacturer shipping to Germany

Source: SCP; Quandl. Analysis conducted by AlphaBeta and McKinsey and Co.



# 6 APPENDIX

## GLOSSARY

Term	Definition
<b>Cost competitiveness</b>	A competitive strategy that emphasises reductions in cost, so a firm can use lower prices to capture a larger market share, or boost profits at a given revenue point. AMGC emphasised this strategy in its <i>Sector Competitiveness Plan 2017</i> as essential to building the competitiveness of Australian manufacturing firms.
<b>Diversity</b>	A competitive strategy of being present across multiple product segments, service offerings or geographic markets, to spread the risk of being affected by adverse conditions in any one segment or market. For example, a firm that caters to both local and international markets might be more able to withstand general economic downturns in the national economy. This also supports a firm's ability to be resilient.
<b>Flexibility</b>	A competitive strategy that strengthens the ability of a firm to change its products, services, processes or clients, supporting its ability to be resilient. In particular, flexibility refers to a firm's ability to adjust its costs (for example, by having variable contracts with suppliers) and change its business structure (for example, by having a well-trained workforce that can adopt new production methods).
<b>Market focus</b>	A competitive strategy that seeks to strengthen a firm's performance by seeking out new geographic or product markets. AMGC emphasised this strategy in its <i>Sector Competitiveness Plan 2017</i> as essential to building the competitiveness of Australian manufacturing firms.
<b>Resilience</b>	The ability of firms to maintain stability despite external shocks. In this report, resilience refers specifically to firms' ability to maintain earnings growth that is above the industry average during periods of volatility.
<b>Servitisation</b>	A competitive strategy of offering services for sale attached to manufactured products. This includes selling workforce training and instruction sessions in conjunction with a new machine.
<b>Superiority</b>	The ability of a firm to compete against the market by offering a distinct product, service or way of operating that is difficult for other firms to emulate. For example, some firms may specialise in a niche product, cater to a tailored sub-industry of clients or offer a unique companion service, supporting the firm's ability to be resilient. This is distinguished from 'competitiveness' broadly, which refers to the ability of a firm to compete across any number of other strategies.
<b>Technical leadership</b>	A firm's ability to successfully offer products and services – or use production processes – that are more technically advanced than those of its competitors.
<b>Value differentiation</b>	A competitive strategy of providing distinct products or services so that the firm has fewer direct competitors in the market. AMGC emphasised this strategy in its <i>Sector Competitiveness Plan 2017</i> as essential to building the competitiveness of Australian manufacturing firms.
<b>Volatility</b>	Variation in the output of an industry over a given period of time. This report measures volatility as the average ratio of the standard deviation of the fluctuation in an industry's output from a linear trend, compared to the industry's size. See above for details on the volatility calculation methodology.





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