South Australian Productivity Commission

Research Discussion Paper no. 3

South Australia's growth state industries: a source paper on competitiveness

January 2021

Government of South Australia

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About the South Australian Productivity Commission

The Commission provides the South Australian Government with independent advice on facilitating productivity growth, unlocking new economic opportunities, supporting job creation and removing existing regulatory barriers.

Premier and Cabinet Circular PC046 sets out the objectives and functions of the Commission; how inquiries are referred to the Commission, undertaken and reported on; and how the Commission and public sector agencies work together.

The Commission was established to assist the government to:

- improve the rate of economic growth and the productivity of the South Australian economy in order to achieve higher living standards for South Australians;
- improve the accessibility, efficiency and quality of services delivered or funded by government;
- improve South Australia's competitiveness for private sector investment;
- reduce the cost of regulation;
- facilitate structural economic changes while minimising the social and economic hardship that may result from those changes;
- take into account the interests of industries, employees, consumers and the community;
- increase employment;
- promote regional development; and
- develop South Australia in a way that is ecologically sustainable.

The Commission is supported by the Office of the South Australian Productivity Commission (OSAPC) which is an attached office of the Department of the Premier and Cabinet. The Chair of the Commission also serves as the Chief Executive of the OSAPC.

For more information on the Commission, including circular PC046, visit the website at www.sapc.sa.gov.au.

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1. Introduction

This paper provides a broad exploratory assessment of some of the factors likely to affect competitiveness of the South Australian Government's *Growth State* industries.[1]

The assessment addresses a range of factors that may be of interest to decision makers. It considers indicators which provide insight into industry competitiveness, the scope for improvements in competitiveness, and the factors that bear on competitiveness.

Data are presented to indicate whether the state has revealed advantage or not. This gives an indication of the degree of competitiveness of South Australia within the particular industry.

South Australia's revealed advantages and disadvantages may arise from natural resource endowments or from acquired features of the state economy including its institutions, population characteristics, innovation environment, density of firms and so on. To the extent that there are robust indicators which quantify aspects of these advantages and disadvantages, they are considered. But the unfortunate reality is that the data are very limited. Attention is also given to indicators that have a bearing on competitiveness such as innovation activity. Policy makers will naturally be interested in what they can do to make the state more attractive as an investment destination and therefore the paper presents information regarding investors' views about what is important to their choices between investment locations.

This paper first provides a brief description of key aspects of competitiveness that affect each of the industries—some of which are generic and some of which are specific to the industry. It then turns to a review of the available statistical indicators relating to competitiveness. These indicators show some aspects of an industry's competitive situation, but they cannot capture all dimensions of competitiveness due to existing data limitations and are considered as illustrative rather than definitive.

The assessment of competitiveness is compromised by a lack of data relating to the Growth State industries and the inability for some of these industries to be reliably defined using standard ANZSIC codes. This introduces the risk that assessments become skewed towards what is measurable and lose sight of unmeasured factors which are still fundamentally important. To mitigate this risk the paper closes with reflections on what is missing from the evidence but potentially important.

The Commission has aimed to present data based on the definitions of the growth state industries where possible. In some cases, there is not a complete alignment and the analysis should be treated with some caution and as indicative only.

Examination of new data sources, such as BLADE (Australian Bureau of Statistics), has shown the potential to measure economic activity in a manner more consistent with the Growth State industry definitions and provide further insights into industry competitiveness. The analysis presented here has not drawn on such new data sources, which is an area for future work.

[1] Further information is available at <https://www.growthstate.sa.gov.au/sectors>

2. Key competitiveness concepts and how they apply to the sector

When we speak of the competitiveness of an industry within a region, we usually have in mind a comparison with out-of-region competitors in that industry. The local industry is competitive in so much as it is able to win market share in the relevant product markets—both domestic and external. For example, South Australia's motor vehicle industry was able to compete with overseas suppliers in the Australian domestic market when it enjoyed trade protection, but it lost competitiveness when protection was removed.

But product market conditions are not the only dimension of industry competitiveness. Firms in a local industry must also compete for inputs. For example, grape growers and stone fruit growers may compete for scarce irrigation water and one of these industries may be more or less competitive than the other depending on a number of factors such as the market price of their outputs. Moreover, there may be competition between local industries in local markets. For example, the gas sector competes with the electricity sector to meet household energy requirements.

These considerations illustrate that competitiveness is ultimately a holistic concept. A firm that cannot compete in its product market because its costs are too high can also be seen as a firm that is unable to secure low enough costs in its input markets. For example, the Australian motor vehicle industry was unable to procure labour at the low costs available to its competitors in less-developed-countries overseas. A lack of competitiveness may also be interpreted as a lack of efficiency in transforming inputs into output. For example, the small scale of Australia's motor vehicle manufacturers deprived them of economies of scale achieved by overseas competitors and thus contributed to their weak competitive position.

The measurement of these dimensions of competitiveness is challenging. This is especially the case when we seek to make *interregional* comparisons of competitiveness because statistical indicators are not readily available for many of the dimensions we ideally would address. The situation is better when we make comparisons *through time* as there is a better availability of indicators with a consistent comparison base, e.g. price indicators and output indicators.

Because data sources are limited, analysis needs to take into account not just *direct* measures of competitiveness but also *indirect* indicators which are believed to be affected by competitive circumstances. The use of indirect indicators is necessary given the inadequacy of direct data. But it means analyses need to be clear about the meaning of statistical indicators that are presented. Analyses should also avoid drawing too much from indicators that have ambiguous explanations. To illustrate, movements in the price of water for one region relative to another may be a fairly direct indicator of changes in competitiveness, but the implications of changes in the quantity of water consumed are less clear.

This paper presents competitiveness indicators under five themes, these being: comparative advantage, cost structure, productivity and efficiency, innovation and other. A comprehensive list of the indicators is presented in Table 1.

Table 1: Summary of competitiveness indicators by industry

	Comparative advantage	Cost structure	Productivity and efficiency	Innovation	Other
Agriculture, food and wine	• Ratio of net exports to production • SA share of overseas exports	• Cost category shares compared with all industries	• Land price growth • Litres of milk per cow • Rates of return by farm size • Size distribution of farms	• R & D spending • Prevalence of innovation in business • Barriers to innovation in business	• Factors impinging on competitiveness
Minerals and energy	• Ratio of net exports to production • SA share of overseas exports	• Cost category shares compared with all industries	• Multifactor productivity in Australian mining	• R & D spending • Prevalence of innovation in business • Barriers to innovation in business	• Investment attractiveness • Policy environment • Factors impinging on competitiveness • Effective rates of protection
International education	• Share of overseas exports of education services • Share of international student enrolments, by sector and country	• Cost of living indexes	• Global ranking of local institutions • Student ranking of Australian universities	• Student perceptions of teaching quality	• Safe environment
Tourism	• Share of: national tourism gross state product • Share of national tourism employment • Inbound international passengers • Direct international flights • Tourism accommodation occupancy rates • Share of overseas exports of travel services	N/A	• Labour productivity in tourism services	• International awareness	• Factors impinging on competitiveness • Area of protected reserves
Defence and space	• Ratio of net exports to production • SA share of overseas exports	• Cost category shares compared with all industries	N/A	• R&D spending	• Factors impinging on competitiveness

	Comparative advantage	Cost structure	Productivity and efficiency	Innovation	Other
Health and medical industries	• Ratio of net exports to production • SA share of overseas exports	• Cost category shares compared with all industries	N/A	• R & D spending • Number and value of National Health and Medical Research Council (NHMRC) research grants and share of Australian grants • SA share of Australian clinical trials expenditure	• Factors impinging on competitiveness
Hi-tech	• Ratio of net exports to production • SA share of overseas exports	• Cost category shares compared with all industries	N/A	• R & D spending • Availability of venture capital funding	• Factors impinging on competitiveness
Creative industries	• Share of national creative industries exports • Share of creative industries businesses • Share of businesses and employment in film, television and digital games development • Share of national drama production expenditure: shooting and post-production, digital and visual effects. • Share of video game development full time employees and studios	• Live performance attendance and revenue • Share of cinema capacity and box office revenue • Attendance rates at selected cultural venues and events	N/A	• SA share of higher education enrolments in creative arts	• Factors impinging on competitiveness • Foreign-born population

3. What the indicators of competitiveness tell us

3.1 Food, Wine and Agribusiness

Comparative advantage

When resources are mobile across uses—even if only in the long-run—we can expect them to be deployed to the uses in which they generate most value for their owners. The deployment of resources in an economy will therefore reflect its underlying *comparative advantage* i.e. the activities in which it is most productive.[2]

This leads to indicators of so-called *revealed comparative advantage:* indicators that are based on actual patterns of activity and are interpreted as revealing information about underlying comparative advantage. Here we consider two indicators of revealed comparative advantage, both of which rely on trade patterns.

The first indicator that we consider is the ratio of net exports to production. Net exports are calculated as exports minus imports and inclusive of both overseas and interstate trade. The data source is the Victoria University Regional Model (VURM) database input-output table which provides synthetic estimates of exports and imports by industry.[3] It must be noted there are inherent limitations in using this database, particularly in measuring the sector's competitiveness. It is however useful for illustrative purposes at a broader level.

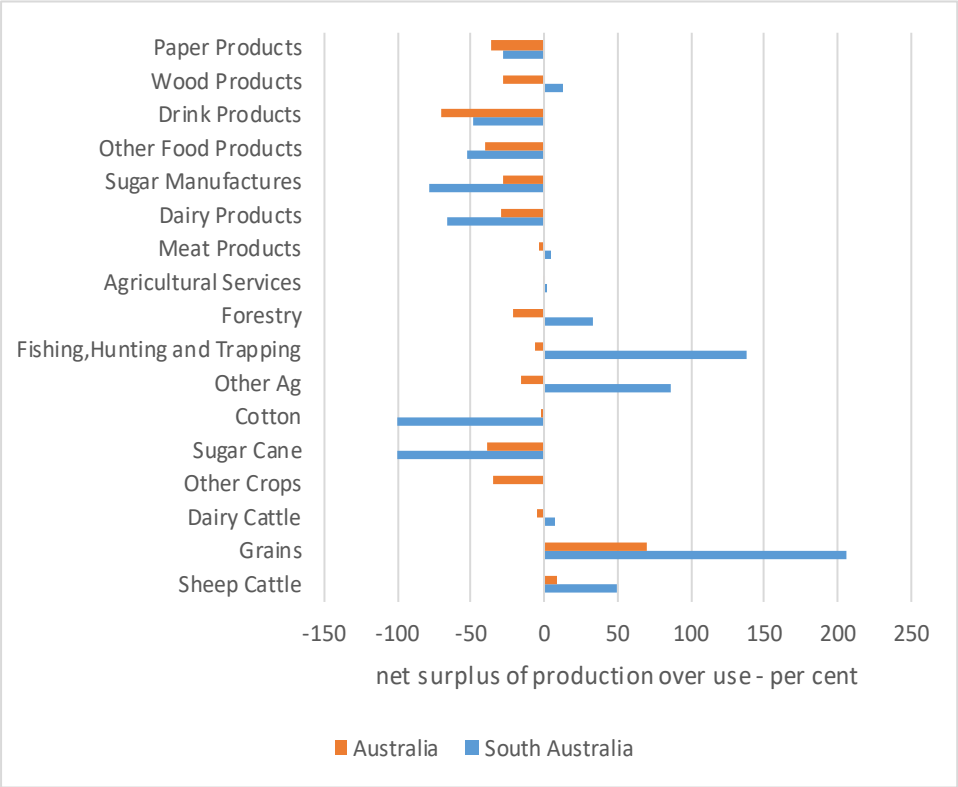
The VURM data indicate that across all industries South Australia's production fell short of consumption by 9 per cent. This reflects inter alia South Australia's relatively old age structure and below average incomes—meaning a relatively high proportion of capital incomes flowing into the state for retirees and net transfers into the state as a result of the redistributive effects of the Commonwealth Budget.

South Australia's production of food, wine and agribusiness (FWA) commodities fell short of its use of these commodities by 13 per cent in 2016-16. There are markedly different patterns for the industries that make up the sector, (see Figure 1). Production greatly exceeded local use for grains (by 206 per cent), fishing, hunting and trapping (138 per cent), other agriculture (86 per cent – this sector includes grapes and other fruit) and sheep and cattle (49 per cent). Production fell short of use, not surprisingly, for sugar cane and cotton. In the food and beverage manufacturing sectors South Australia was roughly in balance for meat manufacturing but significantly in deficit for sugar manufacturing (-79 per cent), dairy manufacturing (-66 per cent), other food products (-52 per cent) and, surprisingly, beverage and tobacco products (-48 per cent—although South Australia exports a lot of wine it also imports a lot of beverages and virtually all of its tobacco products).

[2] The distinction between *comparative advantage* and *absolute advantage* can be illustrated with a simple example. Suppose a block of land in South Australia can produce a net-of-cost yield of $10,000/ha growing grapes and $20,000/ ha growing almonds. And suppose a block of land in Western Australia can produce a net-of-cost yield of $8,000 growing grapes and $4,000 growing almonds. In this situation South Australia's comparative advantage is in growing almonds and Western Australia's comparative advantage is in growing grapes. South Australia has an *absolute advantage* growing both grapes and almonds and Western Australia has no absolute advantage in anything. But there is land to be used in each state, and its use will be determined by its comparative advantage, assuming that the owners seek to maximise their returns.

[3] They are 'synthetic' in the sense that they are model-generated rather than being generated from administrative and survey returns which identify the profile of activity within an industry. The data do not exist to compile state input-output tables directly.

Figure1: Net surplus of production over use of products by industry sector, South Australia and Australia (%) 2015-16



Source: SACES calculations from VURM data

The second indicator of revealed comparative advantage that we consider is South Australia's share of overseas exports. A drawback of this measure is that it contains no information about interstate trade. However, it is based on a detailed commodity classification and is available for 2018-19.

In 2018-19 South Australia accounted for 3.1 per cent of Australia's overseas exports. Table 2 shows that this state's share of Australian exports was far above this average for alcoholic beverages (this being attributable to wine), fresh fish and vegetables; with these categories exports share was of the order of 10 times as large as the all-goods share. Wheat, feeding stuff for animals, meat and edible meat offal, oil seeds and fruits used in the production of edible oil, fruit and nuts, crustaceans, molluscs and aquatic invertebrates, unmilled barley and cereal preparations all had export shares at least twice the all-goods share.

Table 2: Value of food and agricultural exports in which South Australia holds large shares of the Australian totals, 2018-19 (for products where South Australia exports over $50 million)

SITC 3-digit	Overseas exports from South Australia ($m)	Overseas exports from Australia ($m)	SA share of Australia %
Alcoholic beverages	1,978.1	3,379.2	58.5
Vegetables, fresh, chilled, frozen or simply preserved and roots, tubers and other edible vegetable products, not elsewhere specified, fresh or dried	358.6	1,197.1	30.0
Fish, fresh (live or dead) chilled or frozen	141.1	358.0	39.4
Feeding stuff for animals (excl. unmilled cereals)	193.3	1,340.0	14.4
Fruit and nuts (excl. oil nuts) fresh or dried	289.8	2,429.0	11.9
Wheat (incl. spelt) and meslin, unmilled	583.5	3,657.3	16.0
Oilseeds and oleaginous fruits of a kind used for the extraction of soft fixed vegetable oils (excl. flours and meals)	140.2	997.3	14.1
Meat and edible meat offal, fresh, chilled or frozen (excl. meat and meat offal unfit or unsuitable for human consumption and meat of bovine animals)	735.0	5,162.8	14.2
Cereal preparations and preparations of flour or starch of fruits or vegetables	67.3	934.6	7.2
Barley, unmilled	138.0	1,382.1	10.0
Crustaceans, molluscs & aquatic invertebrates, live, fresh, chilled, frozen, dried, salted or in brine; crustaceans, in shell, cooked by steaming or boiling; flours, meals & pellets of crustaceans or aquatic invertebrates, fit for human consumption	111.0	1,022.6	10.9
Total all commodities	**11,716.0**	**372,621.0**	**3.1**

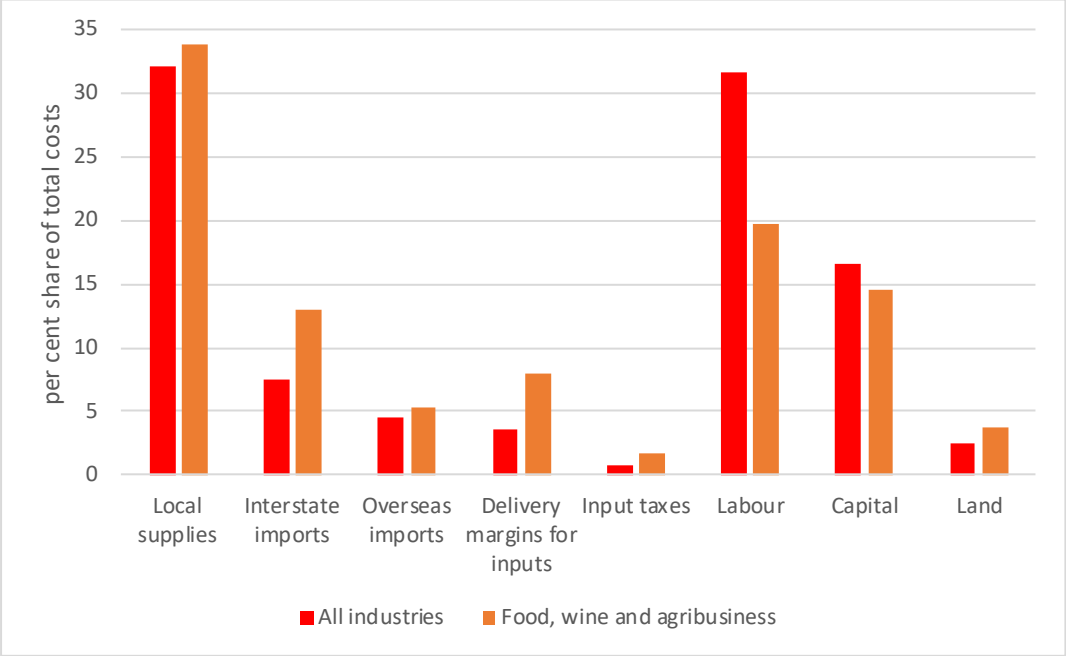
Source: ABS data customised for the Queensland Government Statistician's Office.[4]

[4] https://www.qgso.qld.gov.au/statistics/theme/economy/international-trade/exports>

Cost structure

The FWA sector cost structure is intensive in intermediate inputs. Intermediate inputs account for 62 per cent of its costs and primary inputs (labour, capital and land) for the remaining 38 per cent, (see Figure 2). In this respect it differs significantly from the all-sectors cost structure, in which intermediate inputs account for 48 per cent and primary inputs 52 per cent of total costs.

Figure 2: Cost structures, food wine and agribusiness compared to all sectors – per cent shares of total, 2015-16



Source: SACES analysis of VURM database

Productivity

Productivity indexes can be used to identify changes in the efficiency with which firms combine inputs to produce output, and these changes generally result from innovations and improvements in the operating environment of some sort. This approach can work reasonably well for comparisons through time but spatial differences in productivity reflect location-specific differences that make it hard to identify any differences in innovation culture.

The ABS produces indexes of multifactor productivity at the broad industry level for Australia as a whole, but not for the individual states. These indexes are substantially impacted by seasonal conditions and there is therefore little point in seeking to identify short-term movements in underlying productivity. But over the last three decades multifactor productivity in agriculture, forestry and fishing has grown by about 2 per cent per annum for Australia as a whole.

(ABARES) notes that the agricultural sector is vulnerable to climate when it comes to measuring productivity.[5] In a recent assessment of productivity trends it concludes that research and development (R&D) has contributed to productivity growth in Australia through

[5] ABARES, *Agricultural productivity estimates* (2019).

higher-yielding, pest and disease resistant varieties of crops, improved harvesting techniques and improved genetics for livestock.[6]

Land values are likely to reflect the future earnings that can be expected from farming. Indeed, in a long-run sense, notional land rents arise as a residue when the optimised costs of production on the land are deducted from the optimised value of production from the land. Thus, increases in prospective farm productivity and profitability levels could be expected to boost land values. A variety of other factors would also be relevant, most notably expected returns on holding alternative assets, and there is some evidence that falls in expected returns have led to asset price increases across the economy broadly over recent years.

Table 3 shows median land prices in 2018 and 10-year compound growth rates for South Australia. Agricultural land prices grew at an average 3.7 per cent per annum over the decade to 2018 which is more than 1 percentage point stronger than general price inflation. This figure appears to be affected by compositional effects, as price growth was stronger than that in each of the farm size bands shown in the table. The overall picture is that farm prices have risen ahead of inflation over recent years. It is not clear how much of this should be attributed to optimism about farm productivity and profitability.

Table 3: South Australian farmland transactions, growth over the decade to 2018 (%)

Median $/ha			
Parcel size (ha)	**2018 value ($) Median per hectare**	**Change (%)**	**10-year compound annual growth rate (%)**
30-100	8,465	14.0	5.0
100-200	4,319	-0.1	4.7
200-300	3,851	67.2	5.6
300+	1,666	23.0	4.2
Overall	4,174	17.0	3.7

Source: Rural Bank, Australian Farmland Values Report (2019).

A number of partial productivity indexes are available at the state level for parts of the FWA sector. However, they tend not to have available the comprehensive output and input data that are needed for meaningful productivity indexes. Instead they relate to specific factors—such as yields per hectare—without controlling the quality dimensions of output or covering broad input requirements.

A particular issue when making spatial comparisons of productivity in FWA is the need to control for the features of the natural resource base. Much South Australian agricultural land has relatively low rainfall levels and potentially also other deficiencies in soils that lead to lower yields than in states like Victoria. Indicators that cannot control for these factors will never give useful information on whether differences in farm operating practices, the regulatory environment, etc. contribute to material differences in regional productivity.

There have been some significant innovations in fruit and vegetable growing in South Australia over recent years, such as the development of solar-powered year-round horticulture on a large scale. A number of factors lie behind the success of these new

[6] *Ibid*.

developments: innovative approaches to plantation layouts, microclimates and water supplies, a large scale of operation and large long-term sale contracts.

The size distribution of farming enterprises impacts significantly on agricultural productivity. ABARES says that:[7]

> Larger farms tend to be more profitable, invest more, and generate a higher rate of return on capital than smaller farms. Moreover, larger farms have more capacity to reduce their marginal costs through scale, and a greater ability to invest in productivity-enhancing capital additions.

ABARES data show that there is a strong correlation between rates of return on capital and farm sizes as indicated by revenue. Taking broadacre farming for the three years 2016-17 to 2018-19 as an example, the average rates of return in the smallest 20 per cent of farms were actually negative while the rates of return for the top 20 per cent were around 8 per cent. ABARES farm financial survey data indicate that the size profile of South Australia's broadacre farms is similar to Australia's.[8] Even so, the substantial differences in returns across farms of different sizes suggests that there are productivity gains available in South Australia from consolidating to larger farms.

Innovation

Innovation is important for industry competitiveness across a number of fronts. By finding and adopting new technologies to produce their products, firms increase their efficiency and cost competitiveness. By innovation in the products that they offer, to better meet customer needs, firms improve their competitive position in product markets.

Research and development (R&D) spending data provide information about the extent of investment in new knowledge. Much innovation happens through other channels, e.g. the purchase of new capital equipment, the adoption of new production methods and marketing methods, the purchase of new IT and so on—but R&D spending does give an indication of firms' own efforts to discover new ways to produce and to redesign products. In addition, the link between R&D spending and local innovation and competitiveness is imprecise: if the knowledge that comes from R&D is disseminated outside the state as well as within it then any beneficial impacts on the state's competitive position may be diminished.

In 2017-18 South Australian businesses in the agriculture, forestry and fishing, food manufacturing and beverage and tobacco manufacturing sectors spent $55 million on R&D, (see Table 4). This amounted to 6.8 per cent of the national spend. South Australia's R&D intensity—indicated by cents of R&D spending per dollar of sales and services income—was a little lower than the national average: in South Australia the sector spent 0.33 cents per dollar of income whereas nationwide the average spend was 0.41 cents per dollar of income.

Higher education institutions in South Australia spent $72 million on research in the fields plant production and plant primary products, animal production and animal primary products.[9] This amounted to a 14.0 per cent share of the national total, which is a high

[7] Christopher Boult, *Disaggregating farm performance statistics by size, 2018–19* ABARES research report, Canberra, (March 2020).
[8] ABARES, *Physical, financial and selected distributions estimates for all broadacre* (2020). While there are some differences between the South Australian and Australian farm size profiles they are materially small and also statistically insignificant.
[9] The ABS publishes R&D spending separately for businesses and the higher education sector. The industry classifications in these sectors do not align exactly with the definition of food, wine and agribusiness herein but an approximate match can be achieved. It is not possible to aggregate across these institutional sectors on an ANZSIC basis as the higher education and government/private non-profit data do not include an ANZSIC breakdown.

share. South Australia had a high intensity of effort in this area, spending 0.74 cents per dollar of agriculture, forestry and fishing income compared to just 0.56 cents per dollar for Australia as a whole.

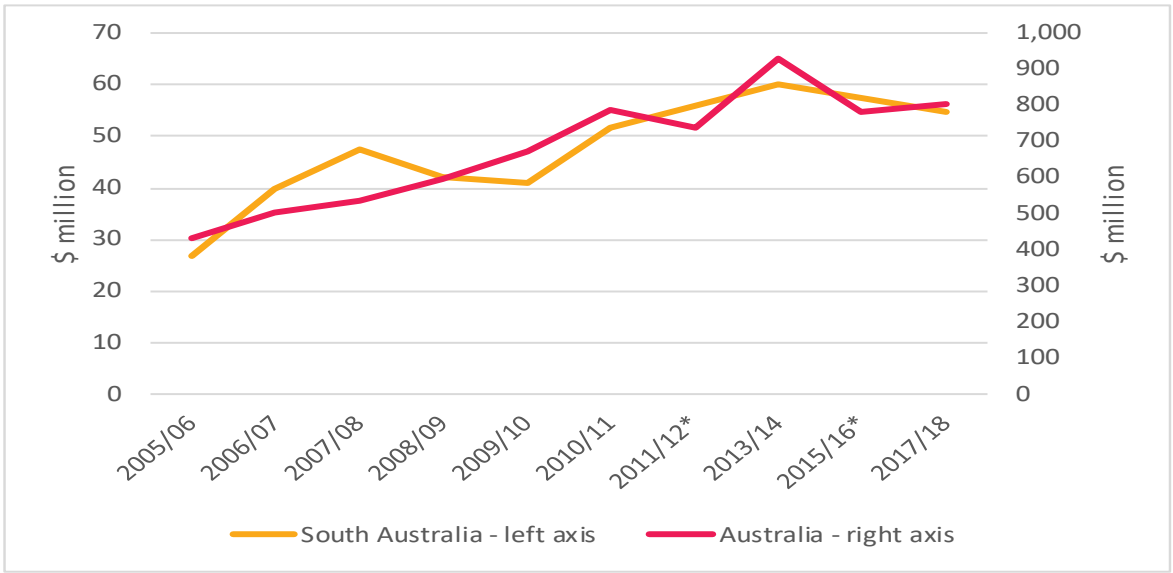
Table 4: R&D spending 2017-18, South Australia and Australia, value, shares and intensity

	SA	Australia	SA share of Australia	SA intensity	Australia intensity
	$m	$m	per cent	Cents per $	Cents per $
Business R & D:					
Agriculture, forestry and fishing	24.4	313.6	7.8	0.25	0.34
Food product manufacturing	26.1	443.8	5.9	0.59	0.50
Beverage and tobacco product manufacturing	4.4	46.6	9.4	0.16	0.28
Total above industries	54.8	804.0	6.8	0.33	0.41
Field of research basis (Plant Production and Plant Primary Products, Animal Production and Animal Primary Products):					
Higher education R & D	71.6	511.2	14.0	0.74	0.56

Source: ABS 8104.0, 8111.0, author calculations

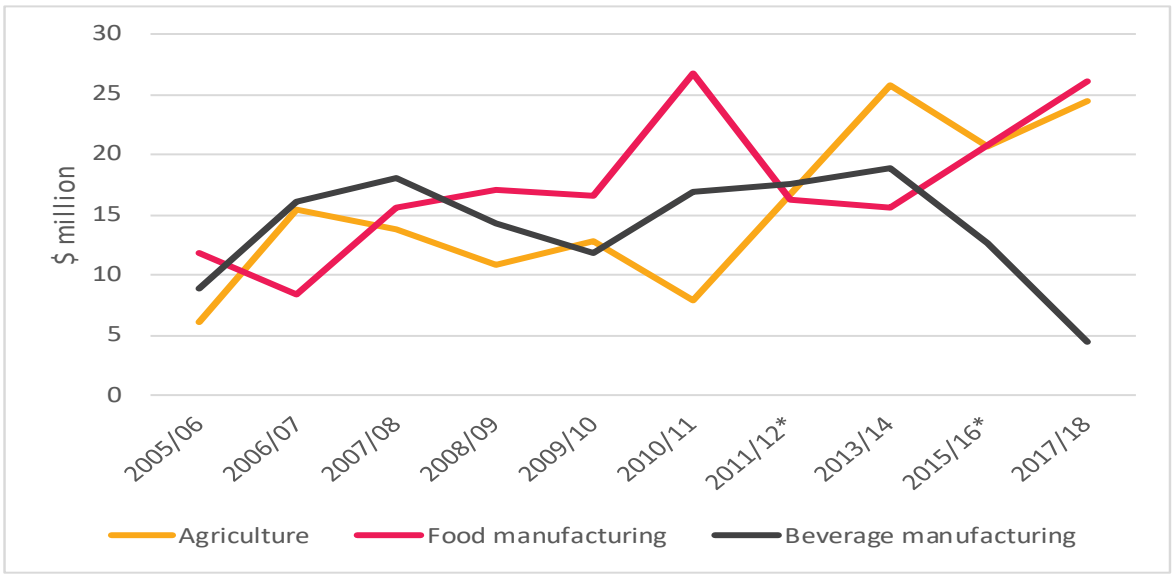
The R&D spending of South Australia's FWA businesses has shown subdued trends recently, (see Figure 3) and thus has grown only weakly over the last decade. This is also true for Australia as a whole. In recent years R&D spending has been especially weak for beverage manufacturing. Weak growth in R&D spending is consistent with generally weak investment trends around the world—especially outside the mining sector—over the last ten years. It is of concern because it may be associated with lower innovation and thus lower gains in the efficiency of the sector—both recent and prospective.

Figure 3: R&D spending by businesses in the food, wine and agribusiness sector, South Australia and Australia, ($ million at current prices), 2005-06 to 2017-18



Source: ABS 8104.0
Note: Figures use are interpolated for South Australia and exclude sawmill products, wood products and paper products

Figure 4: Business R&D spending in South Australia by FWA sub-sector, ($ million at current prices), 2005-06 to 2017-18



Source: ABS 8104.0
Notes: Figures use are interpolated for South Australia and exclude sawmill products, wood products and paper products

At the national level, small businesses in the agriculture, forestry and fishing sector tend to be less innovative than for the economy overall. In 2017-18, 30 per cent of agriculture, forestry and fishing businesses with 0 to 4 persons employed reported some innovation activity. Across all industries, 42 per cent of these small businesses reported innovation activity. The most commonly cited barriers to innovation by the agriculture, forestry and fishing businesses were costs of adoption, lack of funding, government regulation and compliance, and lack of skilled persons.

Other factors impinging on competitiveness

Surveys show that foreign investors in the agriculture, food and wine sectors very often cite growth prospects in the domestic market and proximity to markets and customers as critical factors in their investment decisions. Numerous other factors are also mentioned, such as the regulatory environment, transport infrastructure, the availability of skilled labour and natural resources. Also mentioned, although less frequently, were factors such as lower costs, government support, quality of life and various aspects of the innovation environment.

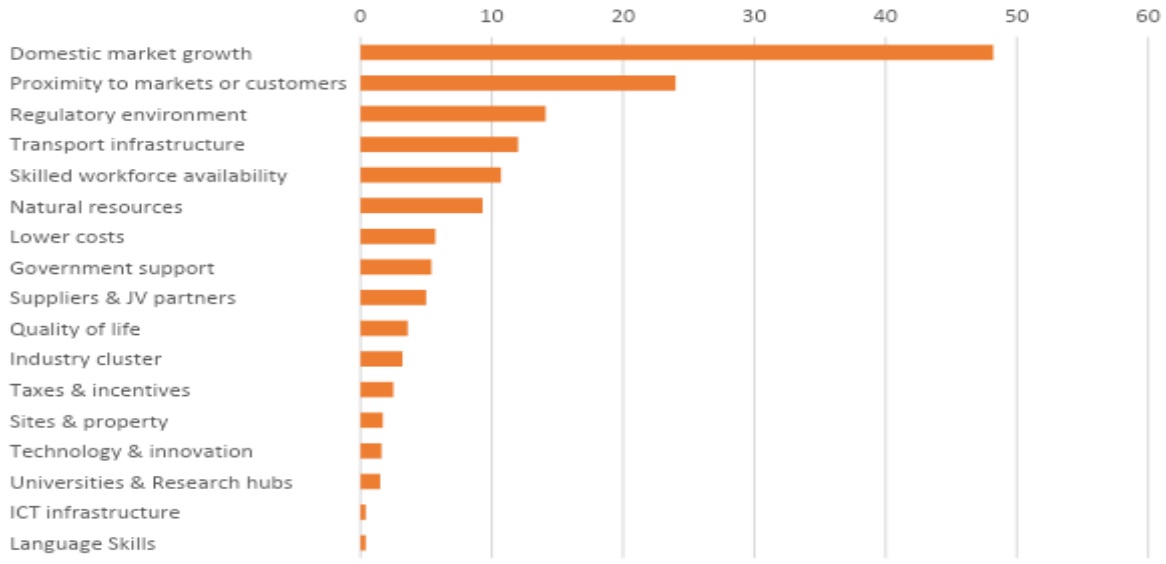
The sector has some specific challenges securing labour. Firstly, while the locally born may have strong attachment to regional communities it can be difficult to attract new workers to regions, which is particularly a challenge for recruiting skilled labour. Secondly, the sector has a prevalence of occupations which do not have high levels of formal education but which rely on workers with skills and aptitudes that are not always easy to find—knowledge of the land, willingness to work in uncomfortable conditions, etc. Thirdly, there are parts of the sector whose viability is dependent on a supply of cheap seasonal labour.

Figure 5 shows the frequency with which various factors were mentioned as important to investment decisions in a recent FDI Markets publication (which reported on investor responses over the period 2003 to 2019). While it is of interest to see which factors are more and less frequently cited, probably not too much weight should be put on these frequencies.

It is possible that sample instruments favour certain responses over others and respondents may tend to choose 'broad' responses. Moreover, there are potentially unstated assumptions lying behind respondents' answers. For example, an investor considering (say) a paper mill may be considering locations where costs are similar and therefore choose not to indicate costs as a key issue, even though costs may be highly relevant in determining the alternatives that the investor considers.

The factors identified here present a useful checklist of what governments should think about when seeking to improve the competitive environment. Some of these factors will be beyond a government's control but others clearly are within its influence, e.g. regulation, infrastructure and workforce skill levels.

Figure 5: Foreign direct investment (FDI) motives of announced FDI projects in the agriculture, food and wine industry, Jan 2003-October 2019, (%) (sample size: 1,055 projects, all countries)



Source: FDI Markets, https://www.fdimarkets.com/
Note: total exceeds 100 per cent due to observing multiple motives for some projects.

Industry assistance

The primary production component of the FWA sector receives above average industry assistance from Australian Governments although the degree of assistance has declined very substantially over the decades.

The Australian Productivity Commission estimates that in 2018-19 the sector received 21 per cent of industry assistance provided by Australian Governments despite accounting for only 2 per cent of value added.[10]

In 2018-19 primary production had an effective rate of assistance (ERA) of 3.0 per cent nationwide.[11] In contrast, ERA was 0.2 per cent for mining and 1.4 per cent for

[10] Productivity Commission, *Trade and Assistance Review 2018-19,* Annual Report Series, (Canberra, 2020).
[11] The effective rate of assistance is calculated as the sum of net tariff assistance (output price gains minus input price penalties from tariffs) plus budgetary outlays to support the industry plus tax concessions targeted at the industry. It is an incomplete measure in that it omits spending and tax decisions that are not specific to the sector

manufacturing as a whole.[12] The highest rate of protection was for sheep, beef cattle and grain farming—4.7 per cent.

The ERA for primary production tends to vary from year to year in response to seasonal fluctuations, e.g. drought assistance, but it has fallen over time. In the 1980s and the first half of the 1990s it averaged around 10 per cent and was even higher than that in the 1970s.

3.2 Minerals and Energy

Comparative advantage

In this section we consider two indicators of revealed comparative advantage, (as discussed in section 3.1) both of which rely on trade patterns.

One indicator of revealed advantage is the ratio of net exports to gross product. Net exports are calculated as exports minus imports and inclusive of both overseas and interstate trade. Net exports are calculated by sector and presented as a fraction of all-sectors GSP which indicates the relative importance of the sector to South Australia's net exports. The data source is the VURM database input-output table which provides synthetic estimates of exports and imports by industry.[13]

South Australia's net exports of minerals and energy commodities amounted to 1.9 per cent of GSP in 2015-16. Thus, South Australia had a revealed advantage in this sector overall. However, South Australia does not have revealed advantage in all the industries in the sector.

The minerals sector is a particular strength for South Australia. It had net exports equal to 1.9 per cent of GSP in 2015-16. Within the minerals sector, the non-ferrous metals sector is South Australia's main strength. It had net exports amounting to 2.5 per cent of GSP, (see Figure 6). However, it had a deficit on non-ferrous ores equal to 1.0 per cent of GSP—which is related to its strength in non-ferrous metals the production of which requires non-ferrous ores. South Australia also has a revealed advantage in iron ore and iron and steel which together had net exports amounting to 1.3 per cent of GSP.

South Australia does not have revealed advantage in the energy sector. It had a deficit on net exports equal to 0.4 per cent of GSP in 2015-16. The state has revealed advantage in oil and gas, which had a surplus equal to 1.6 per cent of gross product. Its main area of revealed disadvantage is refined petroleum products—the state is entirely reliant on imports—and the deficit in this sector amounted to 1.9 per cent of gross product. South Australia was near balance on electricity generation although there are some substantial gross flows into and out of the state. The electricity and gas transmission, distribution and retailing sectors were in balance.

The second indicator of revealed comparative advantage considered here is South Australia's share of Australia's gross exports—overseas and interstate.

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but impinge on it. In addition, a variety of regulatory measures may be used to advantage or disadvantage an industry—preferential visa treatment for people providing seasonal agricultural labour being a case in point. There are myriad complexities in estimating the full extent of protections and penalties imposed on industries.

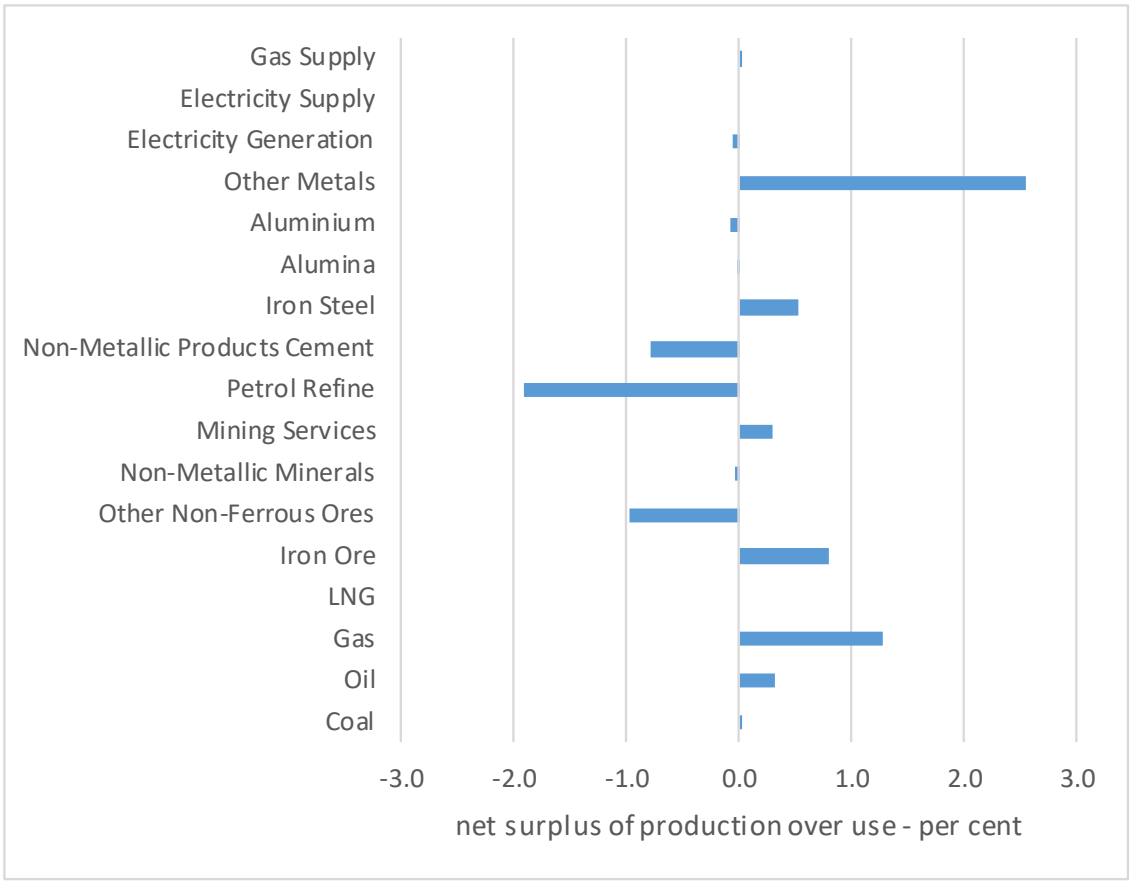
[12] The Commission does not calculate ERAs for the services sector.

[13] They are "synthetic" in the sense that they are model-generated rather than being generated from administrative and survey returns which identify the profile of activity within an industry. The data do not exist to compile State input-output tables directly.

South Australia had a 9.1 per cent share of Australia's electricity supply sector exports, compared with a GSP share of 7.9 per cent. However, as the previous indicator showed, South Australia has approximate balance on its net electricity production and use, meaning that imports are about as large as exports. The high exports share is perhaps more a reflection that South Australia is closely integrated into the National Electricity Market than an indication of comparative advantage in electricity production.

South Australia also had a relatively large share of exports from the gas supply and metals sectors. Its share of mining, non-metallic mineral products, and petroleum and coal products were considerably smaller than its GSP share. South Australia's small share of mining is the flipside to the huge scale of mining in Western Australia and, to a lesser extent, Queensland. The allocation of mining activities across the states is mainly attributable to natural resource endowments.

Figure 6: Net exports by industry sector, South Australia and Australia, (%), 2015-16

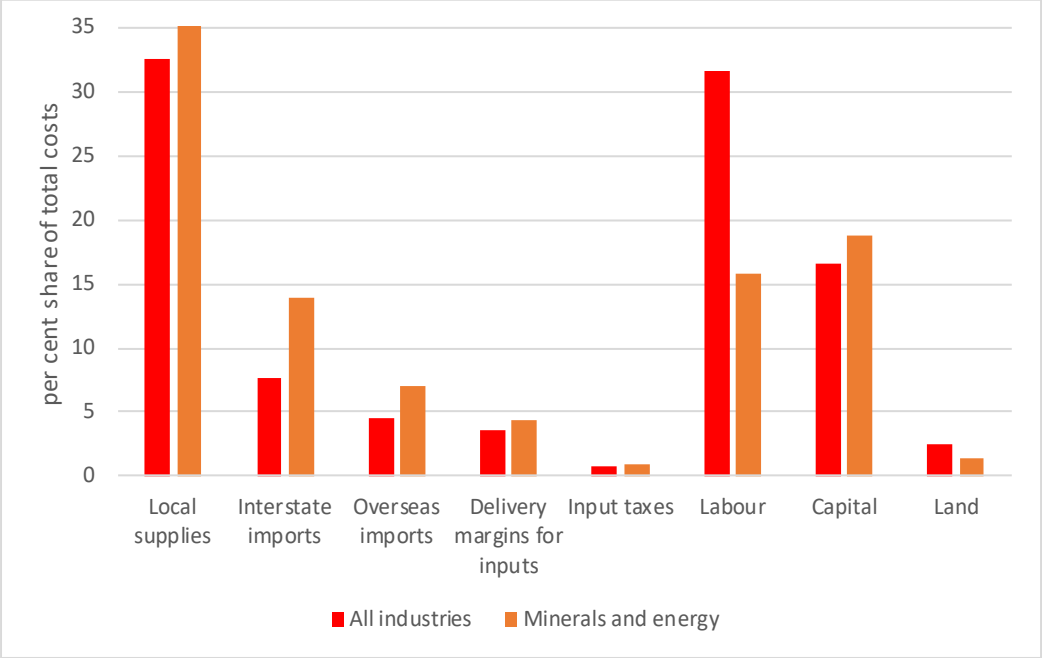


Source: SACES calculations from VURM data.

Cost structure

The minerals and energy sector direct cost structure is intensive in intermediate inputs. Intermediate inputs account for 66 per cent of its costs compared with a share of just 49 per cent across all sectors, (see Figure 7). Primary inputs (labour, capital and land) account for the remaining 34 per cent which is well below the all-sectors share of 51 per cent. The difference is attributable to a very low labour intensity in minerals and energy—labour accounts for just 16 per cent of its costs compared with 32 per cent across all sectors.

Figure 7: Direct cost structures, minerals and energy, compared with, all sectors, per cent shares of total



Source: SACES analysis of VURM database.

Productivity

Productivity indexes can be used to identify changes in the efficiency with which firms combine inputs to produce output, and these changes generally result from innovations and improvements in the operating environment of some sort. This approach can work reasonably well for comparisons through time but spatial differences in productivity reflect location-specific differences that make it hard to identify any differences in innovation culture.

The ABS produces indexes of multifactor productivity at the broad industry level for Australia as a whole, but not for the individual states. These indexes are substantially impacted by seasonal conditions and there is therefore little point in seeking to identify short-term movements in underlying productivity. But over the last three decades multifactor productivity in mining has been essentially flat. There has been substantial capital deepening over this period and while labour productivity has risen capital productivity has fallen.

Innovation

Innovation is important for industry competitiveness across a number of fronts. By finding and adopting new technologies to produce their products, firms increase their efficiency and cost competitiveness. By innovating the products that they offer, to better meet customer needs, firms improve their competitive position in product markets.

Research and development (R&D) spending data provide information about the extent of investment in new knowledge. Much innovation happens through other channels—e.g. the purchase of new capital equipment, the adoption of new production and marketing methods, the purchase of new IT and so on—but R&D spending does give an indication of firms' own efforts to discover new ways to produce and to redesign products. In addition, the link between R&D spending and local innovation and competitiveness is imprecise: if the

knowledge that comes from R&D is disseminated outside the state as well as within it then any beneficial impacts on the state's competitive position may be diminished.

In 2017-18 South Australian higher education institutions spent $41 million on R&D in minerals and energy fields, (see Table 5). Spending on energy R&D has grown particularly strongly over the decade to 2017-18, (see Figure 8).

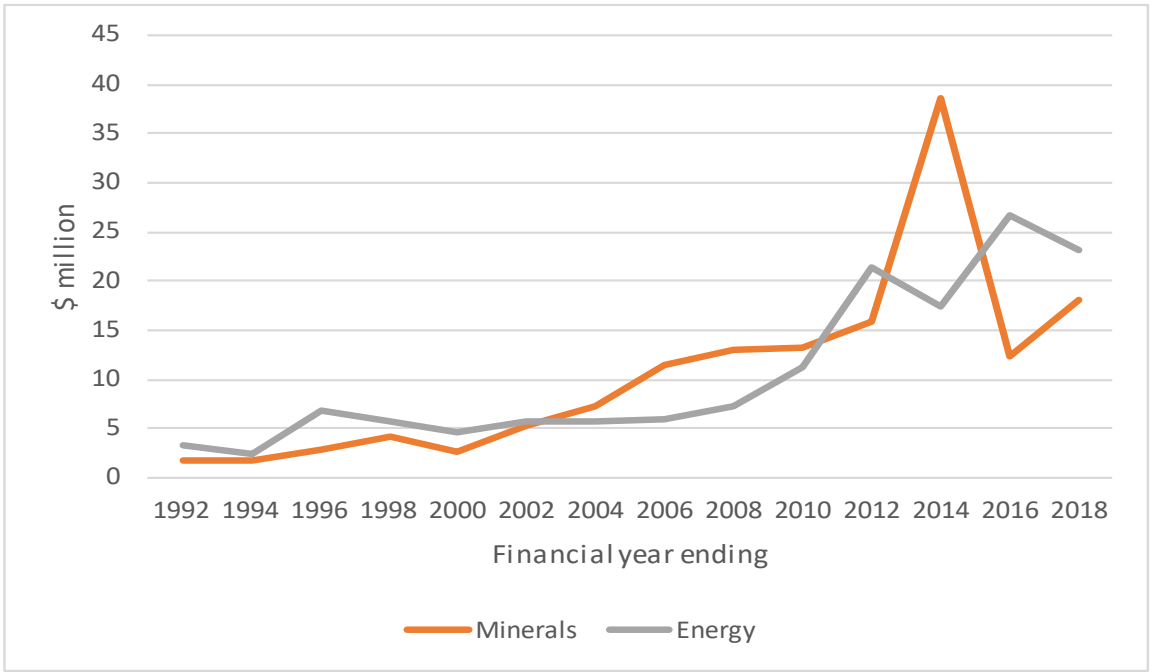
South Australia's minerals and energy R&D accounted for 7.9 per cent of the national spend which is around the average seen over the last two decades, (see Figure 9). South Australia accounted for 12.4 per cent of higher education institutions' minerals R&D, which was well above its share of economic activity in the sector. The state had a 6.1 per cent share of Australian higher education energy R&D.

Table 5: Higher education institutions' minerals and energy R&D spending 2017-18, South Australia and Australia, values and shares

	SA $m	Australia $m	SA share of Australia %
Minerals	18.0	144.8	12.4
Energy	23.2	378.3	6.1
Total minerals and energy	41.2	523.1	7.9

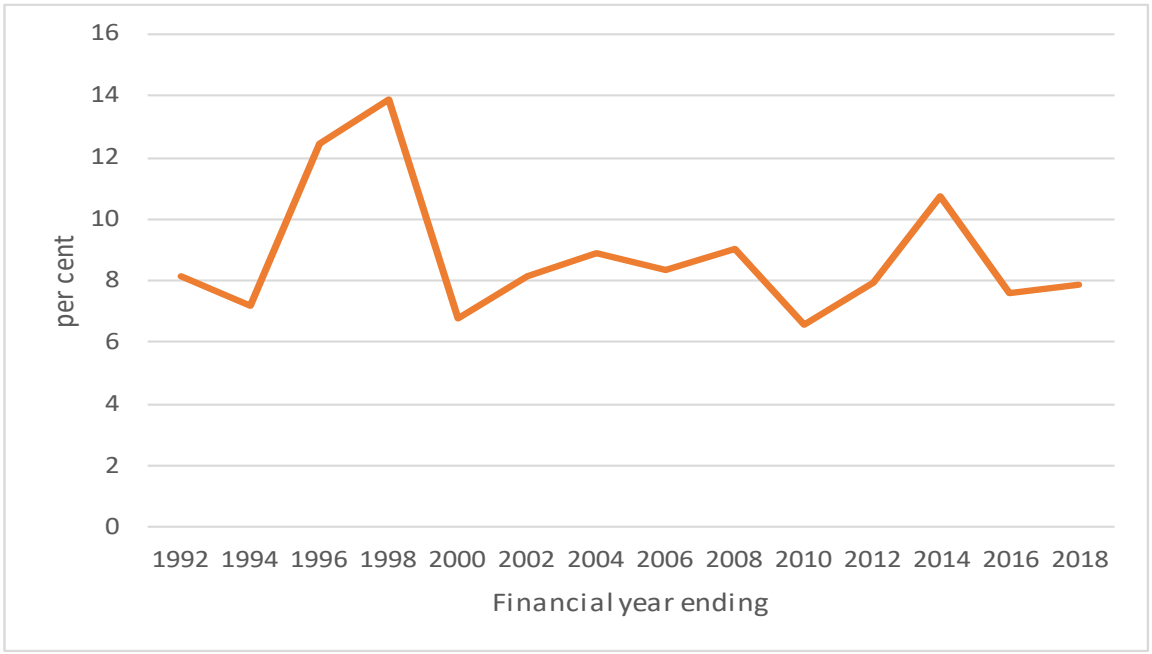
Source: ABS 8111.0, author calculations.

Figure 8: Higher education expenditure on R&D in minerals and energy South Australia, $ million at current prices, 1992 to 2018



Source: ABS 8111.0.

Figure 9: Higher education expenditure on R&D in minerals and energy, South Australia's share of Australia, (%), $ million at current prices, 1992 to 2018



Source: ABS 8111.0.

At the national level, small businesses in the mining sector have a below average engagement in innovation.[14] There are no data relating directly to the energy sector but small businesses in the utilities sector have about the same innovation frequency as for the economy overall. In 2017-18, 29 per cent of small businesses in the mining sector and 41 per cent of small businesses in electricity, gas, water and waste services reported having some innovation activity. This compares with a 42 per cent innovation rate for small businesses across the economy.

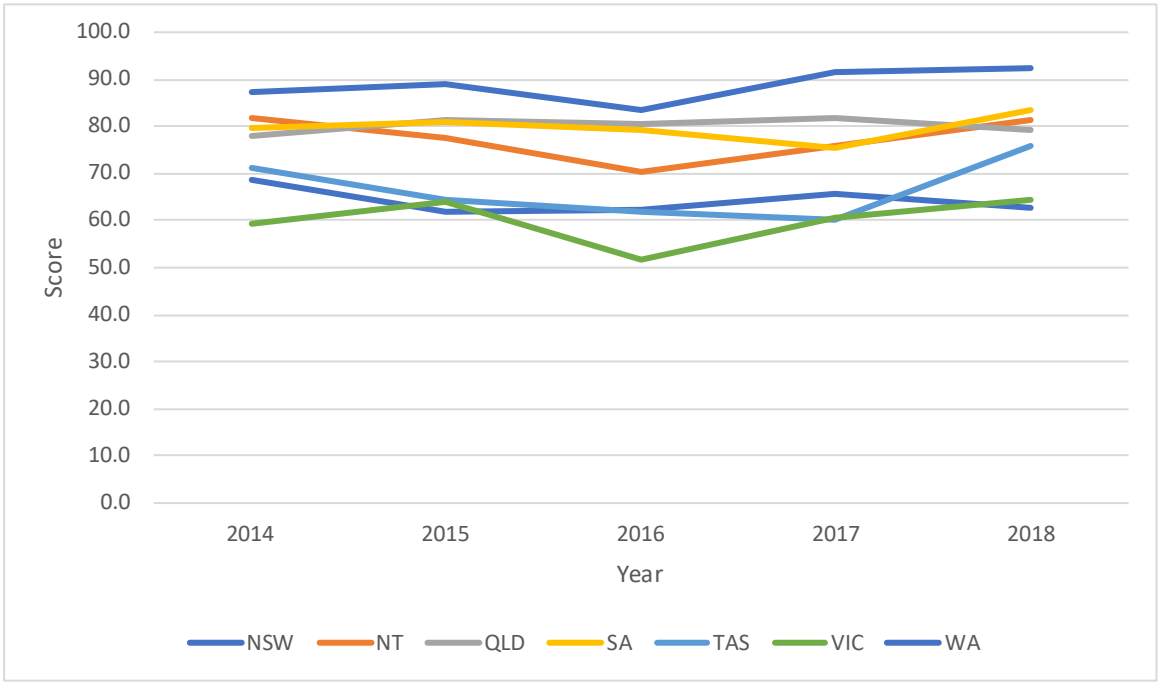
The most commonly cited barriers to innovation cited by small businesses in the mining sector were lack of funding and costs of adoption. Only 4 per cent cited government regulations and compliance as a barrier.

Other factors impinging on competitiveness

Differences in the scale of the mining industry from state to state reflect both geological factors and the policy environment. The Fraser Institute found that in 2019 South Australia ranked sixth out of 76 jurisdictions around the world for overall investment attractiveness in mining. South Australia was second in Australia behind Western Australia (which was ranked number 1 in the world) and a little ahead of the Northern Territory and Queensland. South Australia has generally been one of the leading Australian states on this ranking, (see Figure 10).

[14] ABS, Business Characteristics Survey 2017-18; data from ABS.Stat. State level data are not published.

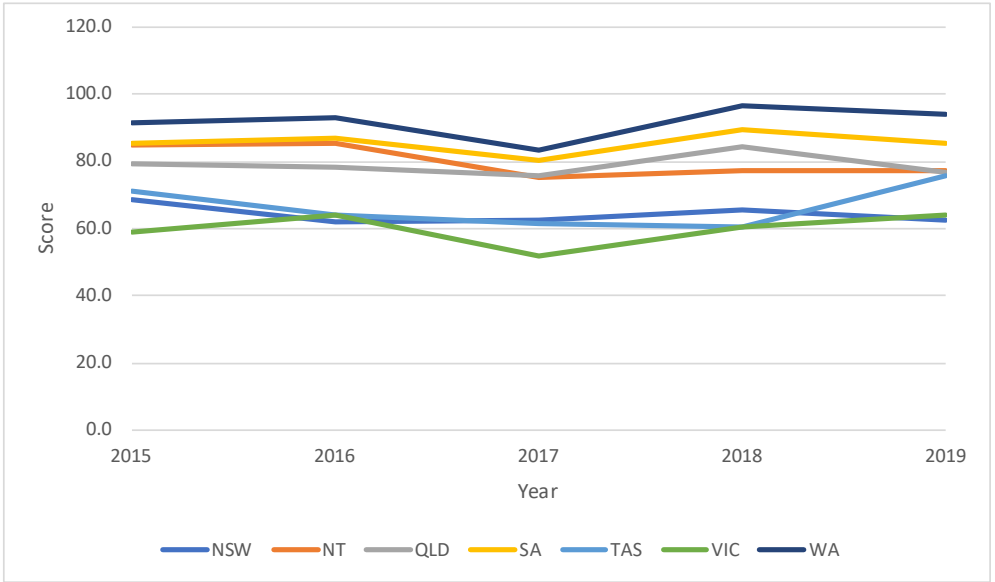
Figure 10: Investment Attractiveness Index, Australian states, 2014 to 2018



Source: Fraser Institute Mining Survey.

South Australia was ranked 19th in the world on the Fraser Institute's Policy Perception Index. The Policy Perception Index indicates mining industry participants' views of the degree to which the local policy environment supports exploration. Among the Australian states, South Australia ranked second in Australia behind Western Australia. South Australia has typically been one of the better-performing Australian states on this measure, (see Figure 11).

Figure 11: Policy Perception Index, Australian states, 2015 to 2019

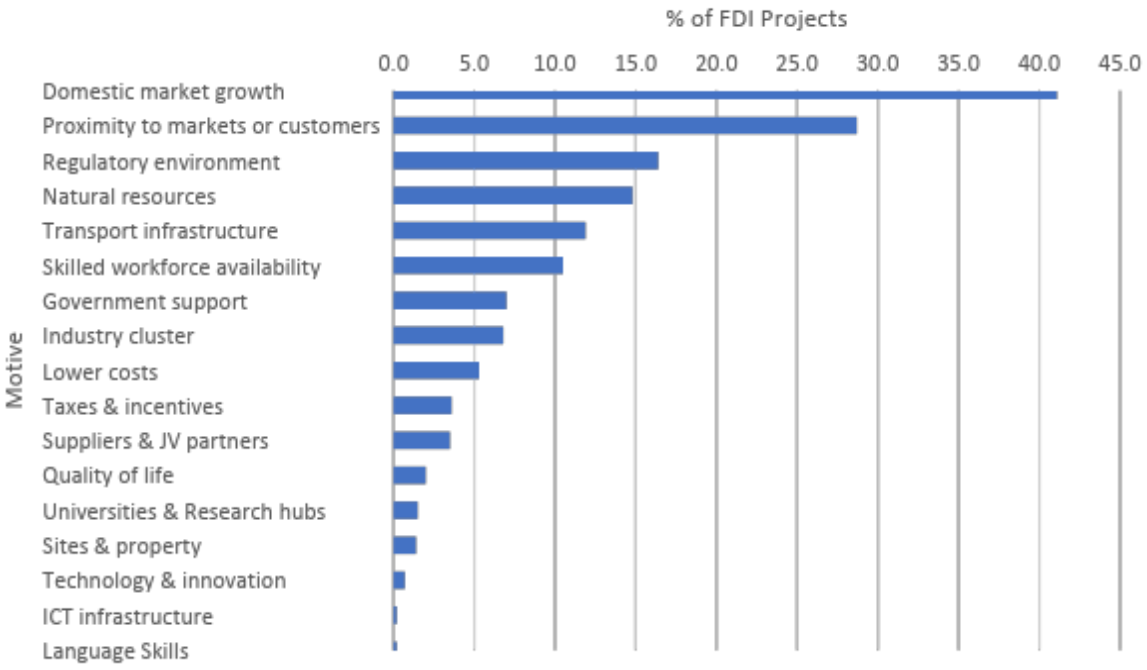


Source: Fraser Institute Mining Survey.

Survey data from FDI Markets provide insight into the motives of foreign direct investors and their location choices in minerals and energy projects globally.[15] Across 1,819 minerals and energy projects worldwide between 2003 and 2019, the most commonly cited factor was opportunities for growth, (see Figure 12). Other frequently cited factors were proximity to market, regulatory environment, natural resources, transport infrastructure and skilled workforce availability. Also mentioned, although less frequently, were factors such as lower costs, government support, quality of life and various aspects of the innovation environment.

Governments cannot control all of the factors identified in these surveys. But they do have a significant influence on regulation, infrastructure, workforce skill levels and quality of life. They also have an influence on the local cost structure and the innovation environment.

Figure 12: Foreign Direct Investment (FDI) motives of announced FDI projects into minerals and energy, Jan 2003 - October 2019, (% of all motives cited) (sample size: 1,819 projects, all countries)

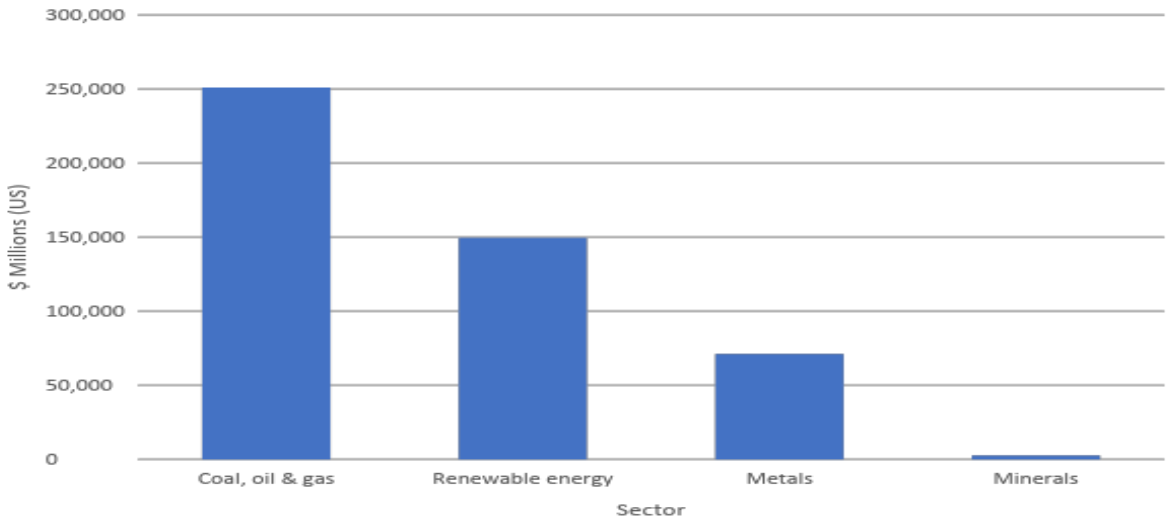


Note: total exceeds 100 per cent due to multiple motives reported for some projects.
Source: FDI Markets, https://www.fdimarkets.com/

According to FDI Markets' capital investment data, global investment in the last two years has occurred predominantly in coal, oil and gas, (see Figure 13). There is also substantial investment in renewable energy projects. Investment in metals is smaller and investment in minerals is only a small component of the sector.

[15] See https://www.fdimarkets.com/. Insights are attributed on the basis of investor statements regarding factors affecting their investment decisions. While it is of interest to see which factors are more and less frequently cited, probably not too much weight should be put on these frequencies. It is possible that sample instruments favour certain responses over others and respondents may tend to choose broad responses. Moreover, there are potentially unstated assumptions lying behind respondents' answers. For example, an investor considering (say) a copper mine may be considering locations which all have a copper deposit and might therefore not indicate that natural resources are critical to their decision, even though they are an essential prerequisite.

Figure 13: Foreign Direct Investment (FDI) capital investment into the minerals and energy sector previous 24 months, (all countries, $million)



Source: FDI Markets.

Industry assistance

The mining sector traditionally has received low levels of support through the government budget and that remains the case. Support may also be delivered indirectly by non-fiscal mechanisms—e.g. regulatory decisions—but it is difficult to quantify the direction let alone the magnitude of any such support.

The Australian Productivity Commission produces estimates of the extent of assistance provided to industry through import tariffs, subsidies and tax concessions. It reports that in 2018-19 the Australian mining sector had an effective rate of assistance (ERA) of 0.2 per cent, well below the average 3.0 per cent ERA across primary production and the average 1.4 per cent ERA across manufacturing.

These estimates of fiscal impact do not include royalty payments by mining. Royalty payments are appropriately seen as something akin to a fee paid for an input—that input being the natural resource owned by the state.[16]

Governments also make important decisions affecting minerals and energy that do not operate through the budget, for instance the setting of environmental standards and laws and regulations governing access to land.

Environmental conditions surrounding mining activity—and indeed mineral processing—have been tightened over time in Australian jurisdictions. For example, conditions around the treatment of waste and access to natural resources such as water are now much tighter than they once were. This can be interpreted as the removal of an implicit concession to mineral and energy production whereby these sectors were permitted to impose adverse impacts on other sectors and communities. There are still areas of contention, such as the energy sector's burning of fossil fuels and consequent carbon emissions, the gas industry's use of

[16] There remains a question as to whether the structure of royalties is as efficient as it could be. It is generally accepted that a scheme of royalties levied on resource rents rather than mining output can produce more efficient investment and production decisions by miners.

fracking with attendant risks to groundwater and agricultural lands, and the introduction of oil and gas extraction in offshore provinces.

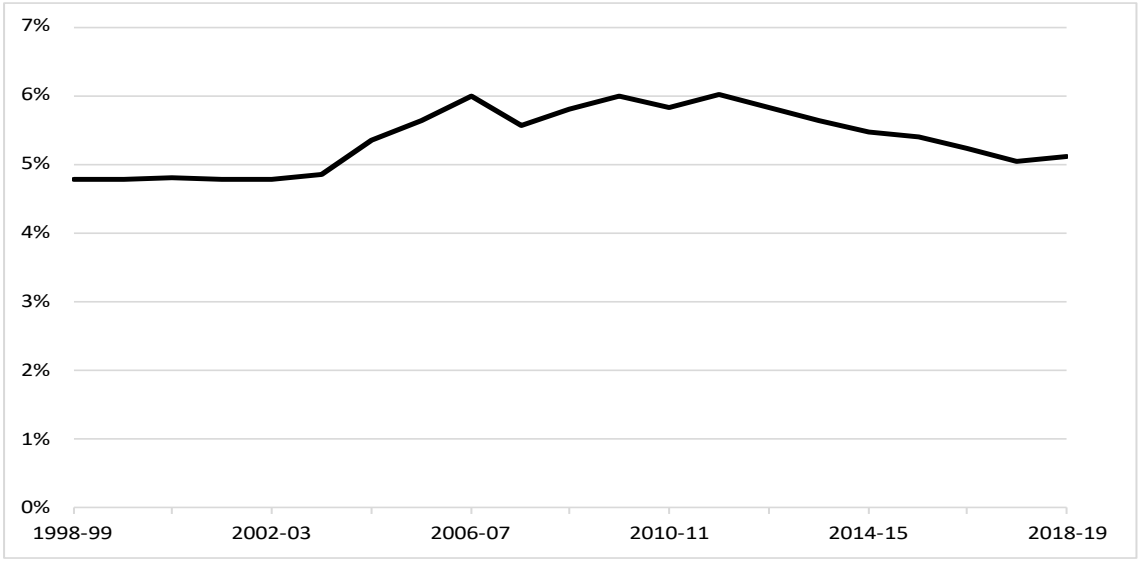
3.3 International Education

Comparative advantage

Here we consider several indicators of revealed comparative advantage, (as discussed in section 3.1) noting the complexity and lack of up to date data for the international education sector.

The first indicator that we consider is the state's share of national overseas exports of education-related personal travel services. Figure 14 shows the evolution in South Australia's share of national exports of education-related personal travel services over the past two decades. South Australia was able to increase its share of national exports of education services up until around the time of the Global Financial Crisis when it reached about 6 per cent. This was still smaller than the state's share of Gross Domestic Product and population. The state's share of national education exports has fallen since 2011-12 in spite of solid growth in the number of overseas students in recent years.

Figure 14: South Australian share of the value of international exports of education-related personal travel services, 1998-98 to 2018-19 (%)



Source: ABS, International Trade: Supplementary Information, Financial Year, 2018-19

The second indicator of revealed comparative advantage that we consider is South Australia's share of international student enrolments. In 2019 South Australia accounted for 4.6 per cent of international student enrolments. South Australia's share of international student enrolments is low compared to both the state's share of the national economy (6.6 per cent) and population (6.9 per cent).

Table 6 shows that South Australia had 5.4 per cent of Australia's higher education enrolments, well below gross product and population shares. It had just 3.3 per cent of Australia's VET enrolments. South Australian schools performed strongly as a destination for international students although the numbers are a relatively small component of the overseas student market. South Australia's share of ELICOS was relatively small.

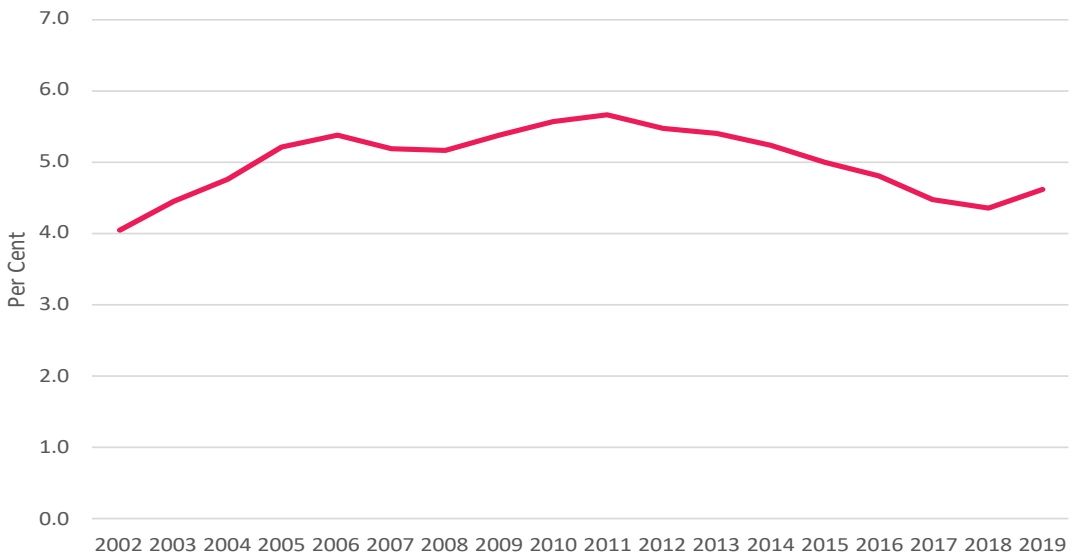
Table 6: South Australia and Australia's international student enrolments, 2019

	South Australia	Australia	SA's share of Aus. %
Higher Education	23,949	442,219	5.4
VET	9,367	283,893	3.3
Schools	2,855	25,564	11.2
ELICOS	5,022	156,880	3.2
Non-award	2,926	48,217	6.1
TOTAL	44,119	956,773	4.6

Source: Commonwealth Provider Registration and International Student Management System (PRISMS)

South Australian's share of Australian international student enrolments has declined steadily since peaking at 5.6 per cent in 2011, notwithstanding a small improvement in 2019, (see Figure 15). South Australia was able to increase its share of international student enrolments during the 2000s. However, the state's share of enrolments has fallen back with the result that in 2019 (4.6 per cent) it was only 0.6 percentage points higher than it was in 2002 (4.0 per cent).

Figure 15: South Australian share of international student enrolments, 2002 to 2019 (%)

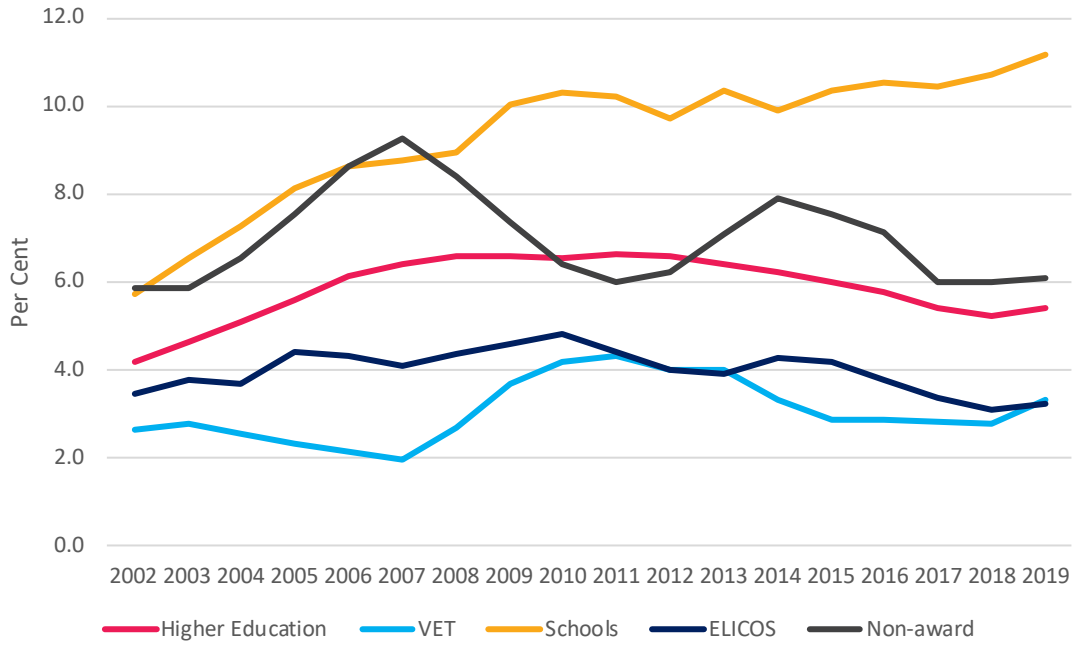


Source: Commonwealth Provider Registration and International Student Management System (PRISMS)

It is worth looking more closely at South Australia's performance in higher education and VET which are the two most popular destinations for international students. South Australia's share of the total number of higher education international student enrolments in Australia has been declining since peaking at 6.6 per cent in 2011, (see Figure 16).

A similar pattern is evident for VET international student enrolments, with the state's share falling steadily after peaking at 4.3 per cent in 2011.

Figure 16: South Australian share of international student enrolments in Australia by sector (%), 2002 to 2019



Source: Commonwealth Provider Registration and International Student Management System (PRISMS)

Teaching quality

One indication of teaching quality, a factor expected to influence competitiveness, is students' stated views about their course experiences. The Student Experience Survey (SES) is funded by the Australian Government Department of Education and has been administered by the Social Research Centre since 2015.[17] The SES surveys students' perceptions on six areas of their education experience, of which teaching quality is one of the surveyed items. Both undergraduate and postgraduate coursework students from Australian universities and non-university higher education institutions are surveyed yearly. It incorporates the responses of both domestic and international students.

South Australia's universities are around the middle of the ranking of Australian universities (see Tables 7 and 8). The three South Australian universities had almost identical performance in undergraduate teaching quality, but the University of South Australia was ranked higher in postgraduate.[18]

[17] At the start of the year, all higher education institutions are invited to participate, and students of these institutions are then invited to complete the SES. The survey is not compulsory and therefore responses are only representative of a sample.

[18] Several of the universities at the top of the ranking have unusual features—e.g. specific fields of teaching, high prevalence of mature students—and are perhaps not good comparators but the overall impression is that the South Australian universities are around the middle of the pack comprised of the Australian public universities. It can be seen that quite small changes in the teaching quality indicator—well within confidence bounds—can produce quite large changes in ranking. For example, the University of South Australia is ranked 21st for undergraduate, but it would rank 15th at the top of its 90 per cent confidence interval and 29th at the bottom of it.

Table 7: 2018 ranking of Australian university teaching quality as perceived by undergraduate students (% positive rating, with 90% confidence intervals)

	University	Teaching Quality
1	University of Divinity	94.5 (91.3, 95.9)
2	The University of Notre Dame Australia	90.4 (89.4, 91.3)
3	Bond University	89.2 (87.9, 90.3)
4	Edith Cowan University	85.8 (85.1, 86.4)
5	University of New England	85.7 (84.7, 86.6)
6	Federation University Australia	84.3 (83.4, 85.2)
7	Curtin University	83.7 (83.1, 84.3)
8	The University of Queensland	83.5 (83.0, 83.9)
9	University of Wollongong	83.5 (82.7, 84.2)
10	Murdoch University	83.5 (82.5, 84.5)
11	Deakin University	83.4 (82.9, 83.9)
12	Queensland University of Technology	83.3 (82.7, 83.9)
13	The Australian National University	83.3 (82.3, 84.1)
14	The University of Melbourne	82.4 (81.6, 83.2)
15	Griffith University	82.3 (81.7, 82.8)
16	Torrens University	82.0 (80.6, 83.3)
17	Swinburne University of Technology	81.9 (81.3, 82.4)
18	University of Tasmania	81.8 (81.2, 82.4)
19	University of the Sunshine Coast	81.8 (81.0, 82.6)
20	Central Queensland University	81.8 (80.9, 82.7)
21	**The University of South Australia**	**81.6 (80.9, 82.3)**
22	Charles Sturt University	81.5 (80.8, 82.2)
23	**Flinders University**	**81.5 (80.7, 82.3)**
24	The University of Western Australia	81.5 (80.3, 82.7)
25	Monash University	81.4 (81.0, 81.8)
26	**The University of Adelaide**	**81.4 (80.7, 82.1)**
27	University of Newcastle	81.4 (80.7, 82.1)
28	All Universities	81.3 (81.1, 81.4)
29	James Cook University	81.3 (80.3, 82.2)
30	Australian Catholic University	80.7 (80.1, 81.3)
31	Southern Cross University	80.4 (78.9, 81.8)
32	RMIT University	79.9 (79.4, 80.5)
33	University of Canberra	79.8 (78.8, 80.7)
34	La Trobe University	79.6 (79.0, 80.2)
35	University of Technology Sydney	79.6 (78.7, 80.4)
36	Western Sydney University	79.5 (78.9, 80.2)
37	Macquarie University	78.3 (77.8, 78.8)
38	The University of Sydney	77.7 (77.1, 78.4)
39	University of New South Wales	77.5 (77.0, 78.1)
40	University of Southern Queensland	77.5 (76.5, 78.4)
41	Charles Darwin University	76.7 (75.3, 78.0)
42	Victoria University	74.9 (73.9, 75.8)

Source: Quality Indicators for Learning and Teaching, 2018

Table 8: 2018 ranking of Australian university teaching quality as perceived by postgraduate students (% positive rating, with 90% confidence intervals)

2018	University	Teaching Quality
1	University of Divinity	92.0 (89.9, 93.3)
2	Federation University Australia	87.8 (85.7, 89.4)
3	Queensland University of Technology	85.1 (83.9, 86.3)
4	Griffith University	84.9 (83.8, 85.9)
5	University of New England	84.9 (83.5, 86.0)
6	University of Southern Queensland	84.7 (83.2, 86.0)
7	Murdoch University	84.3 (82.4, 85.8)
8	The University of Notre Dame Australia	84.0 (80.9, 86.5)
9	Bond University	83.7 (82.0, 85.1)
10	Deakin University	83.4 (82.7, 84.1)
11	Southern Cross University	83.4 (80.6, 85.7)
12	The University of Melbourne	83.3 (82.8, 83.7)
13	Swinburne University of Technology	83.3 (82.1, 84.3)
14	RMIT University	82.6 (81.9, 83.3)
15	University of Newcastle	82.4 (80.9, 83.7)
16	Charles Sturt University	81.8 (81.0, 82.5)
17	Curtin University	81.8 (80.6, 83.0)
18	Edith Cowan University	81.5 (80.4, 82.6)
19	University of Wollongong	81.5 (80.0, 82.8)
20	University of Canberra	81.5 (79.7, 83.1)
21	**The University of South Australia**	**81.3 (79.7, 82.7)**
22	Macquarie University	81.2 (80.2, 82.1)
23	The Australian National University	81.2 (80.0, 82.4)
24	All Universities	80.9 (80.7, 81.0)
25	The University of Queensland	80.8 (79.9, 81.6)
26	University of Technology Sydney	80.7 (79.6, 81.6)
27	Central Queensland University	80.2 (79.0, 81.3)
28	La Trobe University	80.0 (78.9, 81.0)
29	Torrens University	80.0 (78.2, 81.5)
30	Monash University	79.8 (79.2, 80.3)
31	University of New South Wales	79.7 (78.9, 80.4)
32	**The University of Adelaide**	**79.0 (77.7, 80.1)**
33	The University of Sydney	78.0 (77.2, 78.7)
34	**Flinders University**	**78.0 (76.8, 79.1)**
35	University of Tasmania	77.6 (76.1, 79.0)
36	University of the Sunshine Coast	77.0 (75.1, 78.7)
37	Australian Catholic University	76.6 (75.3, 77.8)
38	James Cook University	76.5 (74.2, 78.6)
39	The University of Western Australia	74.9 (73.4, 76.3)
40	Charles Darwin University	74.9 (72.3, 77.3)
41	Victoria University	74.6 (72.4, 76.6)
42	Western Sydney University	74.2 (72.8, 75.5)

Source: Quality Indicators for Learning and Teaching, 2018

Table 9: 2017-18 aggregated rankings of selected Australian non-university institutions teaching quality as perceived by undergraduate students (% positive rating, with 90% confidence intervals)

2017-2018	Institution	Teaching Quality
1	Campion College Australia	98.3 (96.1, 98.4)
2	Jazz Music Institute	97.7 (90.5, 99.2)
3	Perth Bible College	96.8 (92.1, 97.5)
4	Moore Theological College	96.7 (95.2, 97.4)
5	**Adelaide Central School of Art**	**96.7 (94.9, 97.4)**
6	**Tabor College of Higher Education**	**95.9 (94.4, 96.7)**
7	**Australian College of Theology Limited**	**95.4 (94.6, 96.0)**
8	Eastern College Australia	95.2 (91.7, 96.4)
9	Christian Heritage College	94.1 (92.4, 95.2)
10	Australian Academy of Music and Performing Arts	93.3 (87.4, 95.6)
29	**Alphacrucis College**	**85.0 (83.4, 86.4)**
49	**Kaplan Higher Education Pty Ltd**	**76.0 (62.5, 84.4)**
50	**TAFE South Australia**	**75.8 (71.4, 79.1)**

Source: Quality Indicators for Learning and Teaching, 2017 and 2018
n/a = result not available, fewer than 25 survey responses

The survey of students at Australian non-university institutions covers six South Australian organisations (highlighted in the table above). South Australia has three of the top ten best performing non-university institutions with respect to teaching quality, but one of the poorest performing TAFEs (see Table 9). Of the 59 institutions for which data are available, TAFE South Australia ranks 50th in terms of teaching quality. In comparison, North Metropolitan TAFE was ranked 11th, TAFE NSW 40th, and TAFE Queensland 41st.

Safe environment

South Australia enjoys a relatively crime free environment. As discussed in the Commission's second research discussion paper, South Australia has a low rate of crime among the Australian states and indeed internationally.

Given the safety of Australia in general, it is unlikely that a prospective student will decide against studying in Australia on the grounds of safety, and they are arguably less likely to hinge their decision to study in Adelaide instead of another Australian location based on safety. Australia and South Australia have low prevalence of crime and are in that sense safe places to study.

However, it is important to note the effect the perception of safety can have on international student enrolments. Following a series of violent crimes against Indian students in Melbourne in 2009, international student enrolments decreased as a result of negative media coverage. The Australian Government responded by commissioning the Australian Institute of Criminology to investigate crimes against international students between 2005 and 2009. The findings of the report showed that international students were no more likely to be the victim of a crime than an Australian citizen; yet despite this reality, the perception was sufficient to damage international student enrolment numbers.

Cost of living

The cost of living abroad is an important consideration for any prospective international student. Research discussion paper 2 describes the EIU and Mercer indexes of cost of living measurements in more detail. These surveys generally show that the cost of living in Adelaide is less than in the eastern capitals, but more expensive than in Perth. However, these performance indicators have the limitation of being general measures of the cost of living rather than specifically tailored to international students.

University ranking

The Times Higher Education World University Rankings are a widely followed assessment of the relative performance of universities around the world. Rankings for Australian universities are presented in Table 10.[19] The University of Adelaide (120th in the world) was 7th in Australia and had the highest ranking of the three South Australian tertiary institutions in 2020, placing it within the top 1 per cent of universities worldwide. The University of South Australia and Flinders University are jointly ranked 16th in Australia and are in the top 300 worldwide. Australia's best performing universities are in the eastern states.

Table 10: Times Higher Education World University Rankings, 2020

Australian ranking	University	World ranking
1	The University of Melbourne	32
2	The Australian National University	50
3	The University of Sydney	60
4	The University of Queensland	66
5	University of New South Wales	71
6	Monash University	75
7	**The University of Adelaide**	**120**
8	The University of Western Australia	131
9	Queensland University of Technology	179
10	University of Canberra	193
16	**The University of South Australia**	**251-300**
16	**Flinders University**	**251-300**

**2016 – 2020*
Source: Times Higher Education World University Rankings 2020

The Student Experience Survey (SES) also provides an overall ranking of a student's educational experience at university. Table 11 presents data summarising the overall quality of educational experience for undergraduate students. On this measure, the University of South Australia ranks highest in South Australia with an 81.5 per cent positive rating, whilst Flinders University and the University of Adelaide are about two percentage points lower and in the middle of the league table for Australian universities.

[19] A study by Safon (2019) showed that there is no discernible difference between the quality of the Times Higher Education World University Rankings and the Academic Ranking of World Universities—the two most popular world university rankings. Safon (2019) also found that neither ranking system is favoured by prospective international students.

Table 11: 2018 ranking of Australian university overall education experience as perceived by undergraduate students (% positive rating, with 90% confidence intervals)

	University	Overall quality rating
1	University of Divinity	91.5 (87.9, 93.3)
2	The University of Notre Dame Australia	89.3 (88.3, 90.2)
3	Bond University	88.6 (87.3, 89.7)
4	University of New England	84.1 (83.1, 84.9)
5	Edith Cowan University	83.8 (83.0, 84.4)
6	Deakin University	83.2 (82.7, 83.6)
7	Queensland University of Technology	82.7 (82.2, 83.3)
8	Federation University Australia	82.3 (81.3, 83.2)
9	Curtin University	81.6 (81.0, 82.3)
10	University of Wollongong	81.6 (80.8, 82.3)
11	Murdoch University	81.6 (80.6, 82.6)
12	**The University of South Australia**	**81.5 (80.8, 82.1)**
13	The University of Queensland	81.1 (80.6, 81.6)
14	Griffith University	80.6 (80.1, 81.2)
15	University of the Sunshine Coast	80.5 (79.7, 81.3)
16	Swinburne University of Technology	80.4 (79.9, 81.0)
17	RMIT University	79.6 (79.1, 80.2)
18	**Flinders University**	**79.5 (78.7, 80.3)**
19	Australian Catholic University	79.4 (78.8, 80.0)
20	**The University of Adelaide**	**79.4 (78.7, 80.1)**
21	The University of Western Australia	79.4 (78.1, 80.6)
22	All Universities	79.2 (79.1, 79.4)
23	Central Queensland University	79.1 (78.1, 80.1)
24	The Australian National University	79.1 (78.1, 80.1)
25	University of Newcastle	79.0 (78.3, 79.7)
26	Monash University	78.6 (78.1, 79.0)
27	University of Tasmania	78.2 (77.5, 78.8)
28	Charles Sturt University	78.2 (77.4, 78.9)
29	University of Technology Sydney	78.1 (77.2, 78.9)
30	La Trobe University	78.0 (77.5, 78.6)
31	The University of Melbourne	77.9 (77.0, 78.7)
32	James Cook University	77.9 (76.9, 78.9)
33	Western Sydney University	77.6 (77.0, 78.3)
34	Torrens University	77.6 (76.2, 79.0)
35	University of Canberra	77.4 (76.4, 78.3)
36	Southern Cross University	77.3 (75.7, 78.8)
37	Macquarie University	76.8 (76.3, 77.4)
38	University of Southern Queensland	76.7 (75.8, 77.6)
39	University of New South Wales	74.4 (73.9, 75.0)
40	The University of Sydney	74.3 (73.6, 75.0)
41	Charles Darwin University	73.9 (72.5, 75.3)
42	Victoria University	72.0 (71.0, 72.9)

Source: Quality Indicators for Learning and Teaching, 2017 and 2018

3.4 Tourism

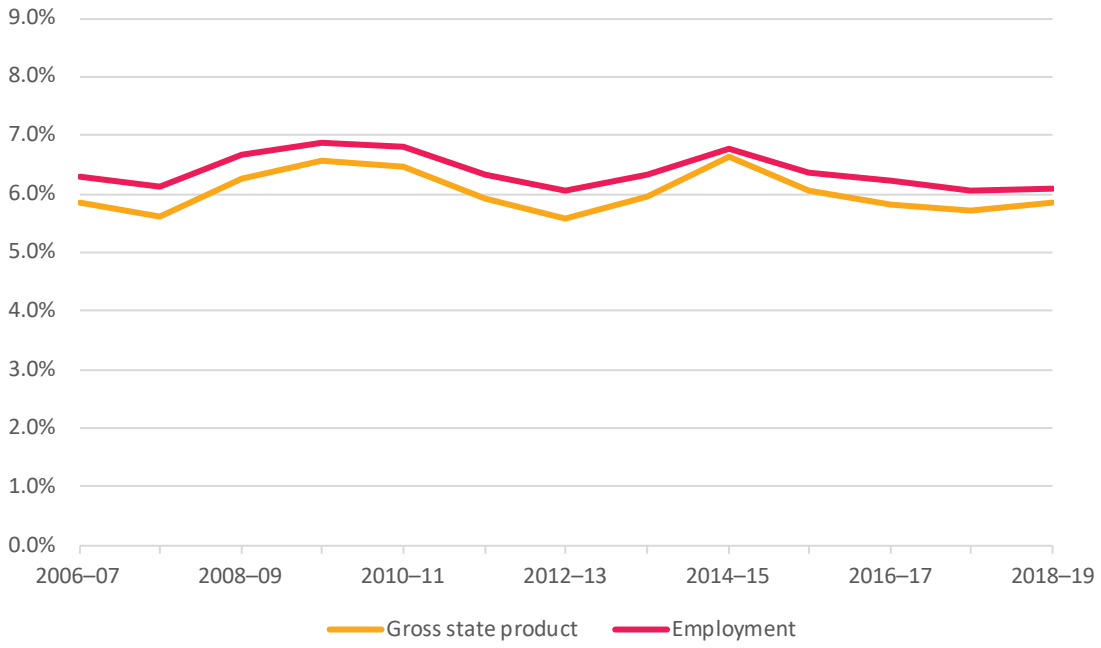
Comparative advantage

We consider several indicators of revealed comparative advantage (as discussed in section 3.1) in the tourism sector.

The first indicator that we consider is the state's share of national tourism gross state/domestic product. The data source is the State Tourism Satellite Account published by Tourism Research Australia.

South Australia's share of national tourism gross state product has fluctuated between 5.6 per cent and 6.6 per cent over the past decade (see Figure 17). (The state's share in 2018-19—5.9 per cent—was below the average of the last decade). South Australia's share of national tourism employment has been in the range of 6.1 to 6.9 per cent, and its 2018-19 share of 6.1 per cent was also below the average for the decade.

Figure 17: South Australian share of national tourism gross state product and employment, 2006-07 to 2018-19 (%)

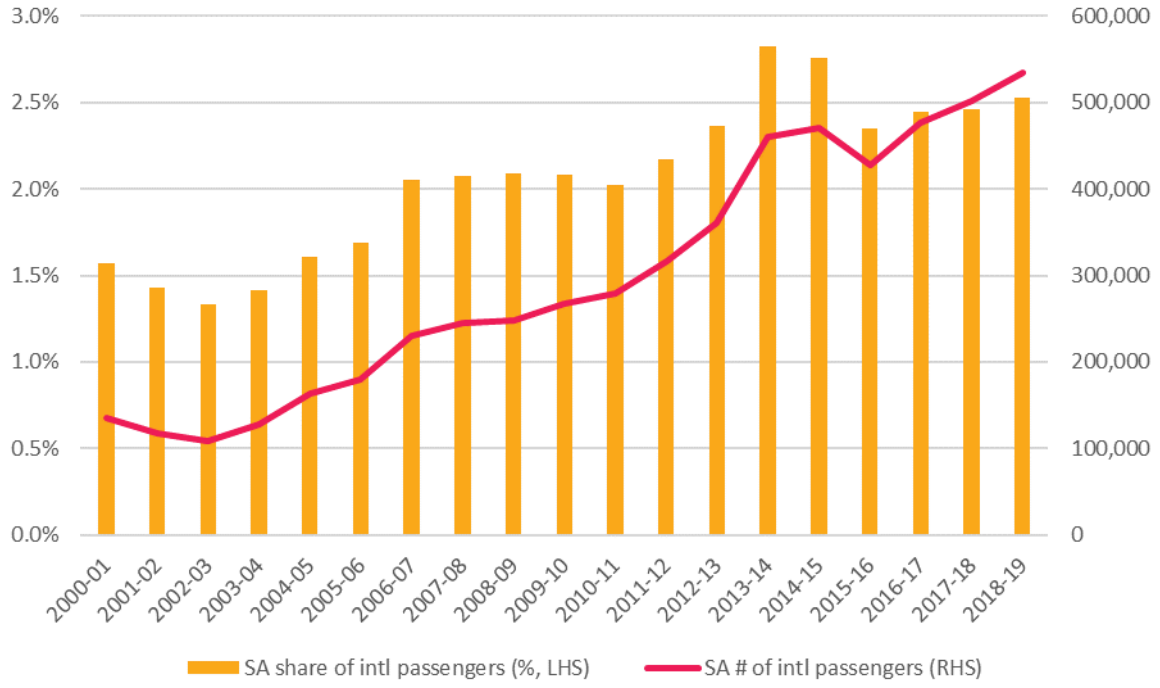


Source: Tourism Research Australia, State Tourism Satellite Accounts, 2018-19.

The second indicator of revealed comparative advantage that we consider is South Australia's share of inbound international passengers and direct international flights. All international inbound passenger flights to South Australia land at Adelaide Airport.

South Australia's share of inbound arrivals has historically been low, with many of its international visitors entering Australia at airports in other states, but this share has grown. Airport traffic data from the Bureau of Infrastructure, Transport and Regional Economics (BITRE) show that the number of inbound international airline passengers to South Australia has been rising in recent years, quadrupling from 135,000 in 2000-01 to approximately 535,000 in 2018-19. As a result, South Australia's share of inbound international passengers has risen from 1.6 per cent in 2000-01 to 2.5 per cent in 2018-19 (see Figure 18).

Figure 18: South Australia (Adelaide Airport) share of national inbound international airline passengers, (%), and numbers of passengers, 2000-01 to 2018-19



Source: BITRE

Direct international flights are an obvious enabler for increased tourism throughput into South Australia. While many tourists visit multiple states, other things being equal, arriving in or departing from a particular state is likely to boost the tourism activity in that state.

A decade ago, in September 2009, Adelaide had direct international flight routes with six cities through seven services:

- Auckland, New Zealand (operated by Air New Zealand);
- Denpasar, Indonesia (operated by Virgin Australia);
- Hong Kong (operated by Cathay Pacific);
- Kuala Lumpur, Malaysia (operated by Malaysia Airlines);
- Nadi, Fiji (operated by Virgin Australia); and
- Singapore (operated by Qantas and Singapore Airlines).

In September 2019 Adelaide had direct international flight routes with eight cities through nine services:

- Auckland, New Zealand (operated by Air New Zealand);
- Denpasar, Indonesia (operated by Virgin Australia and Malindo Air);
- Doha, Qatar (operated by Qatar Airways);
- Dubai, United Arab Emirates (operated by Emirates);

- Guangzhou, China (operated by China Southern Airlines);
- Hong Kong (operated by Cathay Pacific);
- Kuala Lumpur, Malaysia (operated by Malaysia Airlines); and
- Singapore (operated by Singapore Airlines).

Over this period Melbourne added a further 20 cities, Sydney a further 16, Brisbane a further 5 and Perth 3 (see Table 12).

Table 12: Inbound direct international flights and seat capacity by Australian destination, September 2009 vs September 2019

	Overseas cities (no.)		Flights during the month (no.)			Maximum seats (no.)		
City	**Sep. 2009**	**Sep. 2019**	**Sep. 2009**	**Sep. 2019**	**Change (%)**	**Sep. 2009**	**Sep. 2019**	**Change (%)**
Sydney	36	52	2,181	3,043	40	588,110	849,769	44
Melbourne	21	41	1,052	2,065	96	269,521	574,547	113
Brisbane	26	31	997	1,471	48	220,831	352,169	59
Perth	12	15	685	844	23	162,085	214,097	32
Adelaide	6	8	131	235	79	31,765	61,359	93
Gold Coast	6	7	167	191	14	39,605	45,064	14
Cairns	5	7	155	190	23	23,054	36,019	56
Darwin	3	3	103	90	-13	20,126	15,014	-25
Sunshine Coast	0	1	0	18	N/A	0	2,911	N/A
Port Hedland	0	1	0	4	N/A	0	704	N/A
Norfolk Island	1	1	4	4	0	600	148	-75
All cities	**42**	**63**	**5,475**	**8,155**	**49**	**1,355,697**	**2,151,801**	**59**

Source: BITRE

Despite the relatively small increase in the number of direct flight routes to Adelaide, the frequency of flights and seating capacity (i.e. the number of flights and maximum seats) from these cities have nearly doubled, growing second fastest in the country behind only Melbourne.[20]

The third indicator that provides insight into tourism performance or revealed comparative advantage is tourism accommodation occupancy rates, which measure capacity use at accommodation providers. Accommodation providers typically have high fixed costs and achieving high occupancy is therefore important for maximising revenue per room.

[20] Note that these have been heavily disrupted during the Covid19 pandemic.

Data from the Australian Accommodation Monitor show that South Australia's occupancy was in line with the national figure of 74 per cent for 2018-19 (see Table 13).[21]

South Australia's high occupancy rate of 83 per cent for luxury and upper upscale class accommodation—the same figure as in 2017-18—has triggered further investment in this space with the intention of opening additional 5-star hotels throughout the Adelaide CBD in the short-term (e.g. Adelaide Casino and Sofitel Hotel).

Table 13: Tourism accommodation occupancy rates 2018-19 (%), for South Australia and Australia

Accommodation	Occupancy: SA (%)	Occupancy: Australia (%)
Accommodation Type		
Hotels & Resorts	76.3	75.9
Motels/Private Hotels/Guest Houses	64.0	65.8
Serviced Apartments	78.6	73.6
Holiday Parks	54.5	53.9
Accommodation Class		
Luxury & Upper Upscale Classes	83.1	79.2
Upscale & Upper Mid Classes	74.3	73.6
Midscale & Economy Classes	66.2	67.1
Total	**73.6**	**74.0**

Source: Australian Accommodation Monitor

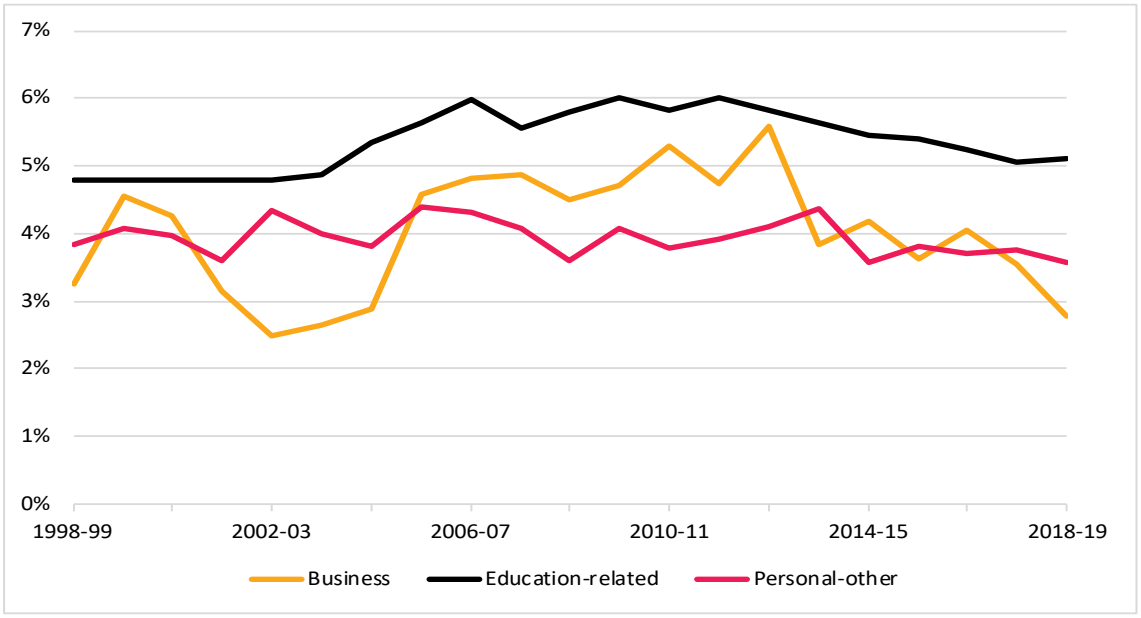
The fourth indicator of revealed comparative advantage that we consider is South Australia's share of overseas exports of travel services. A drawback of this measure is that it contains no information about interstate trade. Estimates of interstate visitor expenditure were examined elsewhere in this paper.

The ABS publishes estimates of international travel services by category—including education related travel—which provide insight into the state's comparative performance across various segments of the international visitor market. Figure 19 shows developments through time in South Australia's share of national exports of business, education-related and other personal travel services over the past two decades.

South Australia's share of national overseas exports of education, business and other personal travel services have been consistently below the state's share of gross domestic product and population. The share has been particularly low for business and other personal travel services which reflects among other things the tendency to locate head offices of major firms in Sydney and Melbourne. South Australia was able to maintain or even increase its share of national travel exports across all three categories until around 2012-13. Thereafter, the state's share has steadily declined for all three travel categories, but particularly for business travel.

[21] The occupancy rates that are achievable vary considerably across accommodation of different types. Venues with consistent year-round patronage such as CBD hotels can expect higher average occupancy rates than venues with seasonal custom such as beachside holiday houses.

Figure 19: South Australian share of the value of international exports of travel services by category, 1998-99 to 2018-19 (%)



Source: ABS, International Trade: Supplementary Information, Financial Year, 2018-19

Ability of a destination to deliver quality and competitive business services

Two indicators of South Australia's ability to deliver competitive and quality tourism services are considered in this section: labour productivity and international awareness.

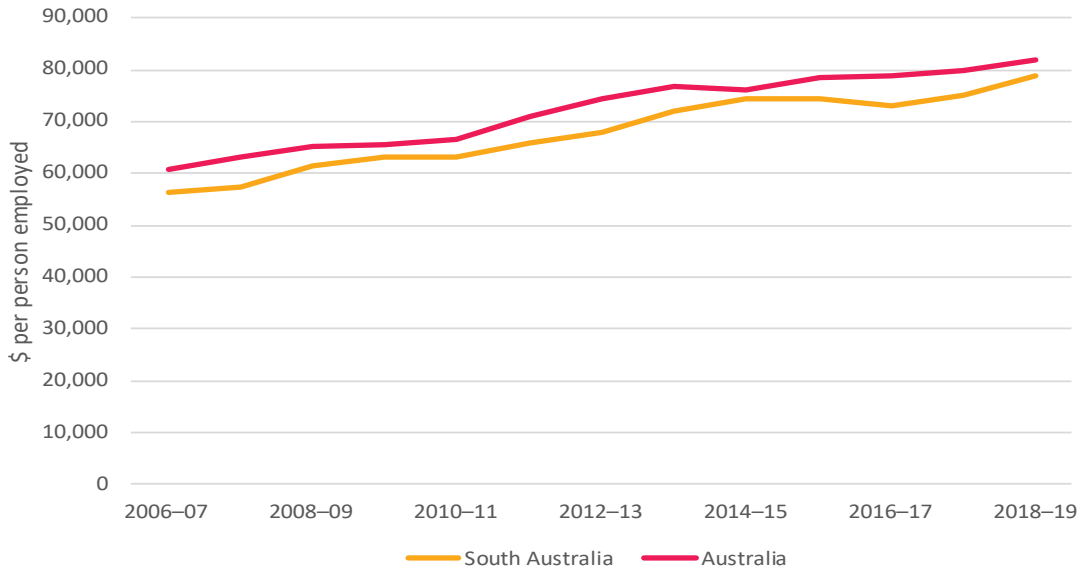
Productivity indexes can be used to identify changes in the efficiency with which firms combine inputs to produce output, and these changes generally result from innovations and improvements in the operating environment of some sort. This approach can work reasonably well for comparisons through time but spatial differences in productivity reflect location-specific differences that make it hard to identify any differences in innovation culture.

The ABS produces indexes of multifactor productivity at the broad industry level for Australia as a whole, but not for the individual states, nor for the tourism sector. The state Tourism Satellite Accounts produced by Tourism Research Australia include estimates of tourism sector gross state product in addition to direct tourism employment. The ratio of gross state product (i.e. the aggregate of all the direct impacts between a visitor and a producer of goods and services in the state's economy) to direct tourism employment can be calculated as a proxy measure for labour productivity. One major limitation with this approach is that employment is based on headcount rather than hours worked, meaning that hours worked per direct tourism employee are assumed equal across states and across years in order to make a comparison of labour productivity changes. The indicator shows that:

- South Australia's domestic tourism output of $78,942 per head in 2018-19 was quite similar—3.5 per cent below—to the national figure of $81,804, (see Figure 20). This gap is smaller than the 7.3 per cent gap in 2006-07. The state is ranked sixth on this measure among the eight states and territories.
- South Australia's international tourism output of $90,855 per head in 2018-19 was also very close—1.4 per cent above—the national figure of $89,634, (see Figure 21).

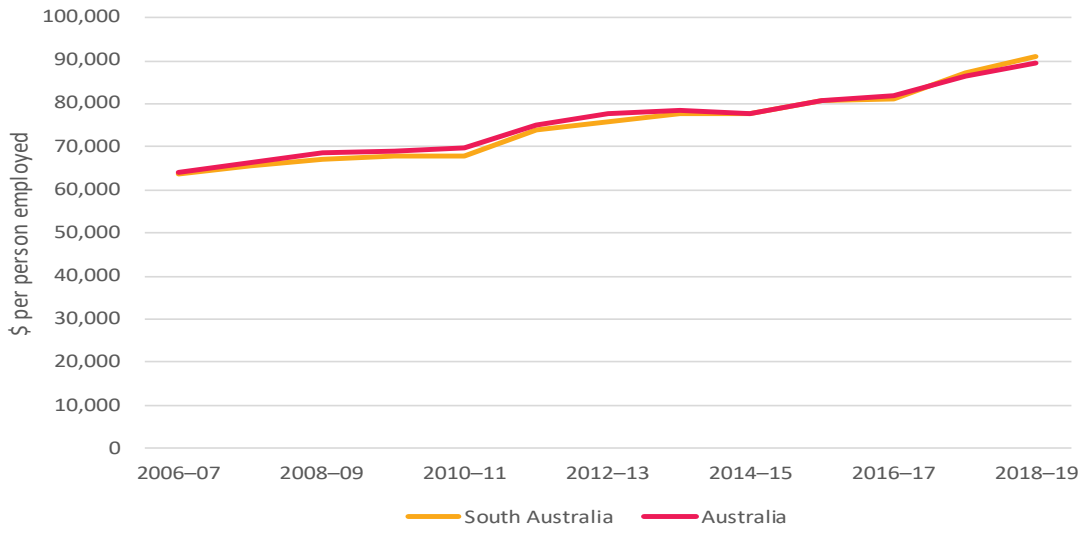
This gap represents a reversal from the 0.8 per cent deficit in 2006-07. The state is ranked fifth on this measure among the eight states and territories.

Figure 20: Ratio of domestic tourism gross state product to direct tourism employment ($ per person), South Australia and Australia, 2006-07 to 2018-19



Source: Tourism Research Australia

Figure 21: Ratio of international gross state product to direct tourism employment ($ per person), South Australia and Australia, 2006-07 to 2018-19



Source: Tourism Research Australia

The global tourism market has a myriad of options for the traveller. One factor that therefore affects destination choices is potential tourists' awareness of the location. Awareness is not only a consequence of inherent comparative advantages such as natural and cultural resources which are attractive to visitors; it is also influenced by strategic policy initiatives such as promotion and branding campaigns and the hosting of major events which reach televised audiences overseas. Soft marketing, such as use of the location in movies and television programs and, at the most basic level, inclusion in services such as televised global weather reports all can contribute to this.

There are limited available data to measure this at a state level; however, some selected publications provide insight.

Attractiveness of a destination

Rising international and interstate tourism has boosted demand for nature reserves and conservation parks in recent years. The rising popularity of ecotourism has prompted state governments to renew their investment in national park facilities and to enact marketing campaigns to promote Australia as an ecotourism destination.

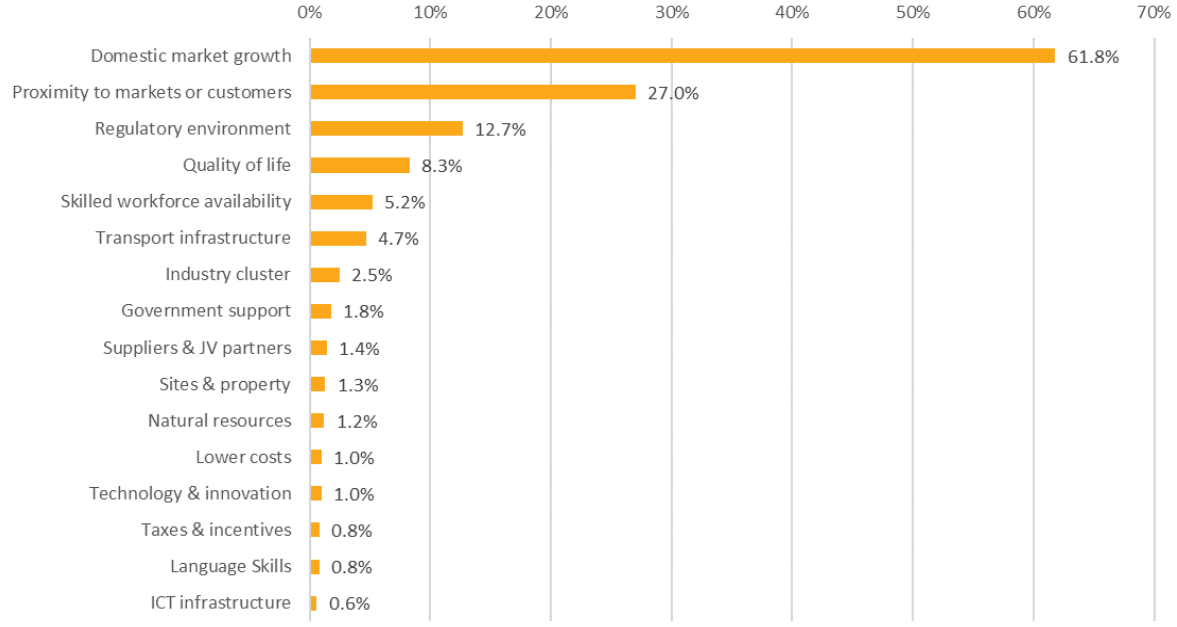
There are limited data sources available which provide direct insight into South Australia's economic competitiveness as it relates to eco-tourism development.

South Australia has a substantial number of protected reserve areas and indeed on one measure it is second only to Victoria in the number of reserves and third to Western Australia and the Northern Territory in the areas under protection.[22] But the tourism draw depends on more than the presence of reserves. Other important issues include the quality of the assets, their natural beauty, the appeal of the flora and fauna that they contain, their facilities (such as camping facilities, hiking trails and bird watching) and their accessibility, all have an impact on their appeal to tourists.

Other factors impinging on competitiveness

Surveys show that tourism investors are most likely to invest in tourism projects when overall market growth opportunities exist and there is sufficient proximity to customers, (see Figure 22). Numerous other factors were also mentioned, although less frequently, such as regulatory environment, quality of life, transport infrastructure, industry cluster, government support, and presence of supplier and joint venture partners.

Figure 22: FDI motives of announced FDI projects into the tourism sector January 2003 - September 2019 (sample size: 744 projects, all countries)



Source: FDI Markets. Note: Total exceeds 100% due to observing multiple motives for some projects.

[22] Based on data from the Collaborative Australian Protected Area Database.

3.5 Defence and Space

Comparative advantage

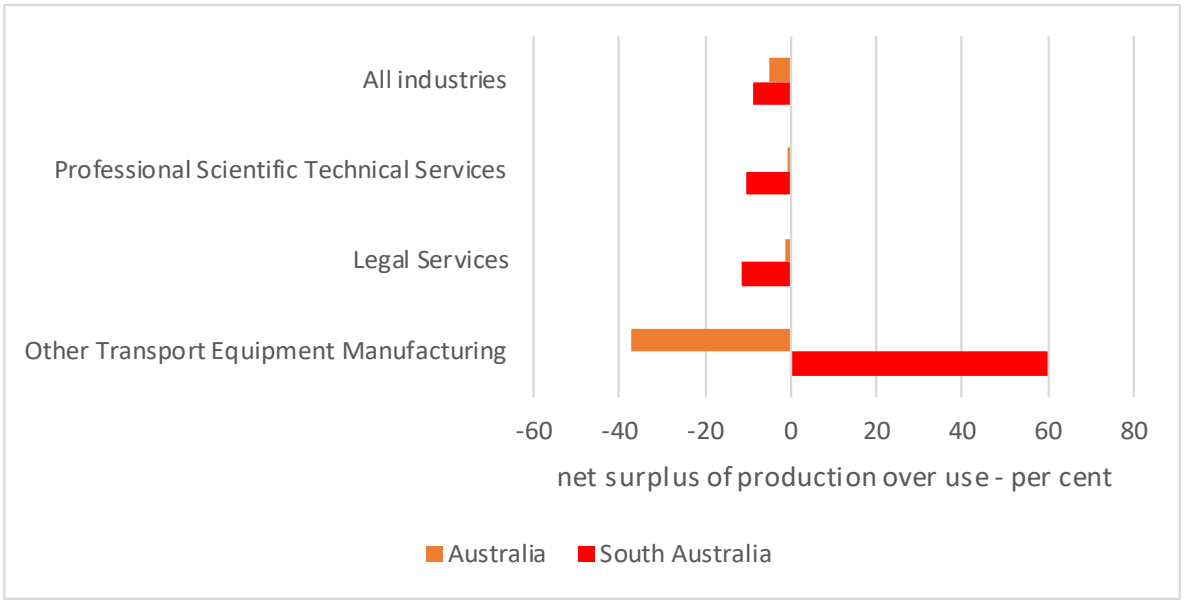
In this section, we consider two indicators of revealed comparative advantage (as discussed in section 3.1) in the defence and space industries, both of which rely on trade patterns.

The first indicator that we consider is the ratio of net exports to production. Net exports are calculated as exports minus imports and inclusive of both overseas and interstate trade. The data source is the VURM database input-output table which provides synthetic estimates of exports and imports by industry.[23]

The VURM data indicate that across all industries South Australia's production fell short of consumption by 9 per cent. This reflects inter alia South Australia's relatively old age structure and below average incomes—meaning a relatively high proportion of capital incomes flowing into the state for retirees and net transfers into the state as a result of the redistributive effects of the Commonwealth Budget.

This data is only available at a relatively aggregated level, and so it is not possible to be certain that, for example, the data on Other transport equipment manufacturing relate to those parts of the industry included in defence and space, or other activities such as rail stock manufacturing or civilian boats. Not withstanding this limitation, the available data does suggest a sector that is very outward facing, with a substantial surplus of production over domestic (South Australian) use (see Figure 23). The pattern for the services industries which are partially included in defence and space is very different, with South Australia showing a deficit of use over local output for both Professional, scientific and technical services, and for Legal and accounting services.

Figure 23: Net surplus of production over use of products by industry sector relevant to defence and space, South Australia and Australia 2015-16 (%)



Source: SACES analysis of VURM data

[23] They are 'synthetic' in the sense that they are model-generated rather than being generated from administrative and survey returns, which identify the profile of activity within an industry. The data do not exist to compile state input-output tables directly.

An alternative approach to considering potential comparative advantage is to compare the share of Australian exports that originate from South Australia for goods categories relevant to defence and space. This paints a somewhat different picture. Across all of the merchandised goods types identified as relevant to the defence and space sector, South Australia accounts for 0.9 per cent of the value of exports, well below the state's share of total economic activity. The only goods where South Australia's share of exports is substantially higher than its overall share of economic activity is 'War munitions' (see Table 14).

Table 14: South Australia's share of national exports in merchandised goods categories related to defence and space, 2018-19

Commodity (SITC 5-digit)	SA exports ($'000)	Australian exports ($'000)	SA share of Australian exports (%)
Helicopters of an unladen weight not exceeding 2,000 kg	236	26,550	0.9
Helicopters of an unladen weight exceeding 2,000 kg	0	320,734	0.0
Aeroplanes and other aircraft, mechanically propelled (excl. helicopters) of an unladen weight not exceeding 2,000 kg	0	21,259	0.0
Aeroplanes and other aircraft, mechanically propelled (excl. helicopters) of an unladen weight exceeding 2,000 kg but not exceeding 15,000 kg	0	77,387	0.0
Aeroplanes and other aircraft, mechanically propelled (excl. helicopters) of an unladen weight exceeding 15,000 kg	0	56,704	0.0
Spacecraft (incl. satellites) and spacecraft launch vehicles	0	694	0.0
Aircraft launching gear, deck arrestor or similar gear, ground flying trainers and parts of the foregoing	283	13,138	2.2
Propellers, rotors and parts thereof, of aircraft of group 792	4	48,473	0.0
Undercarriages and parts thereof, of aircraft, spacecraft and spacecraft launch vehicles of group 792	35	34,519	0.1
Parts (excl. tyres, engines, electrical components, propellers, rotors, undercarriages and parts thereof) of aeroplanes or helicopters, nes (not elsewhere specified)	19,003	1,918,878	1.0
Parts of aircraft and associated equipment, spacecraft (incl. satellites) and spacecraft launch vehicles (excl. tyres, engines, electrical components, propellers, rotors, undercarriages and parts of aeroplanes and helicopters) nes	0	31,496	0.0
Warships, lifeboats & other vessels, nes (excl. vessels for pleasure or sports, row boats, canoes, tankers, fishing, refrigerated & goods transport vessels, vessels for transporting people, tugs & pushers & special purpose & breaking up vessels)	0	0	N/A
Monocular telescopes, other optical telescopes (excl. binoculars); astronomical instruments (excl. radio-astronomical)	0	3,006	0.0

Commodity (SITC 5-digit)	SA exports ($'000)	Australian exports ($'000)	SA share of Australian exports (%)
Parts and accessories (incl. mountings) for binoculars, monocular telescopes, optical telescopes and astronomical instruments (excl. radio-astronomical)	247	3,966	6.2
Telescopic sights for fitting to arms; periscopes; telescopes designed to form parts of machines, appliances, instruments or apparatus of section 7, division 87, group 881 or 884 or subgroup 899.6	557	8,028	6.9
Tanks and other armoured fighting vehicles, motorised, whether or not fitted with weapons, and parts of such vehicles	0	61,394	0.0
Military weapons (excl. revolvers, pistols and swords, cutlasses, bayonets, lances and similar arms and parts thereof and scabbards and sheaths)	0	1,393	0.0
Swords, cutlasses, bayonets, lances and similar arms and parts thereof and scabbards and sheaths	0	3	0.0
Revolvers & pistols (excl. firearms nes, and similar devices which operate by the firing of an explosive charge (heading 891.31))	0	328	0.0
Cartridges for shotguns	0	7,868	0.0
Airgun pellets and parts of cartridges for shotguns	0	206	0.0
Cartridges (excl. shotgun) and parts thereof (incl. shot and cartridge wads)	0	8,182	0.0
War munitions (e.g. bombs, grenades, torpedoes, mines, missiles and the like) and parts thereof	9,854	12,847	76.7
Firearms & sim devices operated by the firing of an explosive charge (incl. sport shotguns & rifles, muzzle-loading firearms, Very pistols & signal flares; pistols & revolvers for firing blanks, captive-bolt humane killers, line throwing guns)	0	2,177	0.0
Parts and accessories of revolvers or pistols	0	362	0.0
Shotgun barrels of shotguns for firearms and similar devices which operate by the firing of an explosive charge	0	0	N/A
Parts of shotguns and rifles for firearms and similar devices which operate by the firing of an explosive charge	74	1,308	5.7
Parts and accessories, "nes", for bombs, grenades, torpedoes, mines, missiles & similar munitions of war; cartridges & other ammunition and projectiles (incl. shot and cartridge wads & non-military arms)	148	82,005	0.2

Source: ABS exports data customised for the Queensland Government Statistician's Office, https://www.qgso.qld.gov.au/statistics/theme/economy/international-trade/exports

Services export data are not available in sufficiently disaggregated form to allow the identification of defence and space specific exports. Although at a very early stage of development it is possible that the location of the Australian Space Agency in Adelaide may support the development of a local niche around space related services exports including

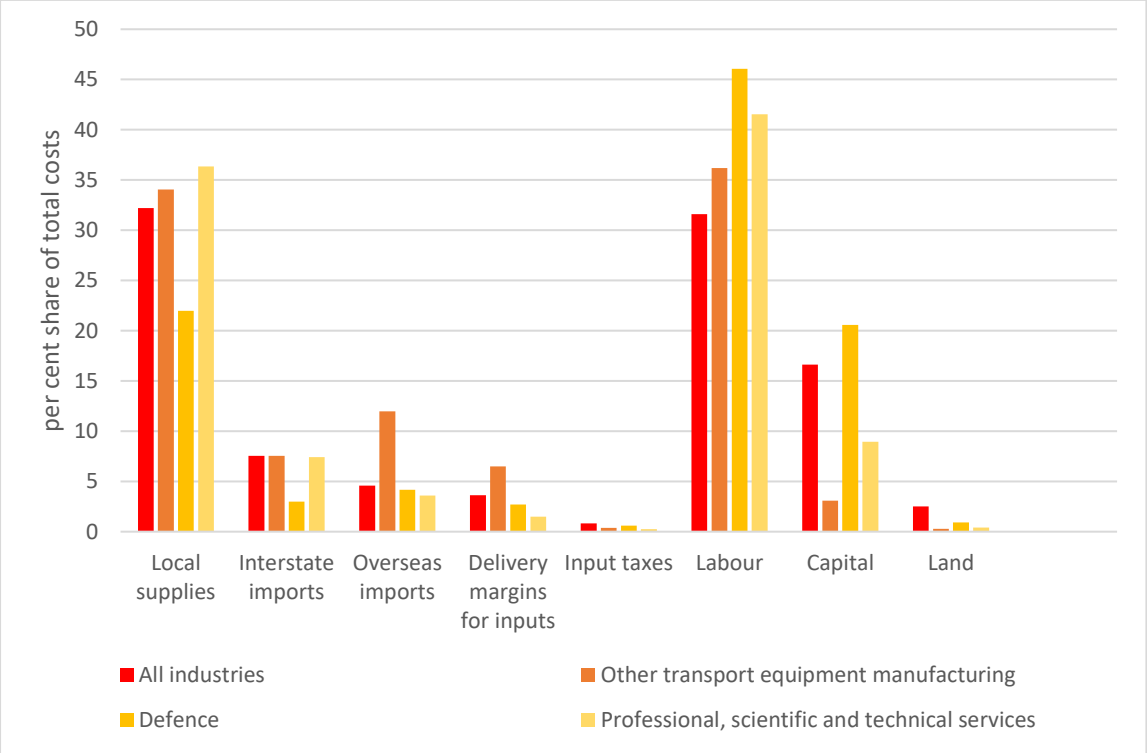
launch services and 'downstream' services such as the analysis of space sourced data, but any such niche is not yet apparent in the data.

It is not possible to identify from the available data which of the indicators of potential comparative advantage is more reflective of South Australia's relative position. In other words, whether the extent to which the defence and space industries meet a disproportionately high share of Australian Government defence procurement needs is reflective of the comparative advantages the state enjoys, (as these advantages are in sectors with low export propensity) or reflect other criteria unrelated to comparative advantage.

Cost structure

The Legal and accounting services sector and the Professional, scientific and technical services sector both have cost structures that are intensive in labour inputs, 41 per cent compared to the all industry average of 32 per cent. Both of the sectors have capital intensities that are well below the all industry average (see Figure 24).

Figure 24: Cost structures, Legal and accounting services and Professional, scientific and technical services compared to all sectors average – per cent shares of total, 2015-16



Source: VURM data, interpreted by SACES

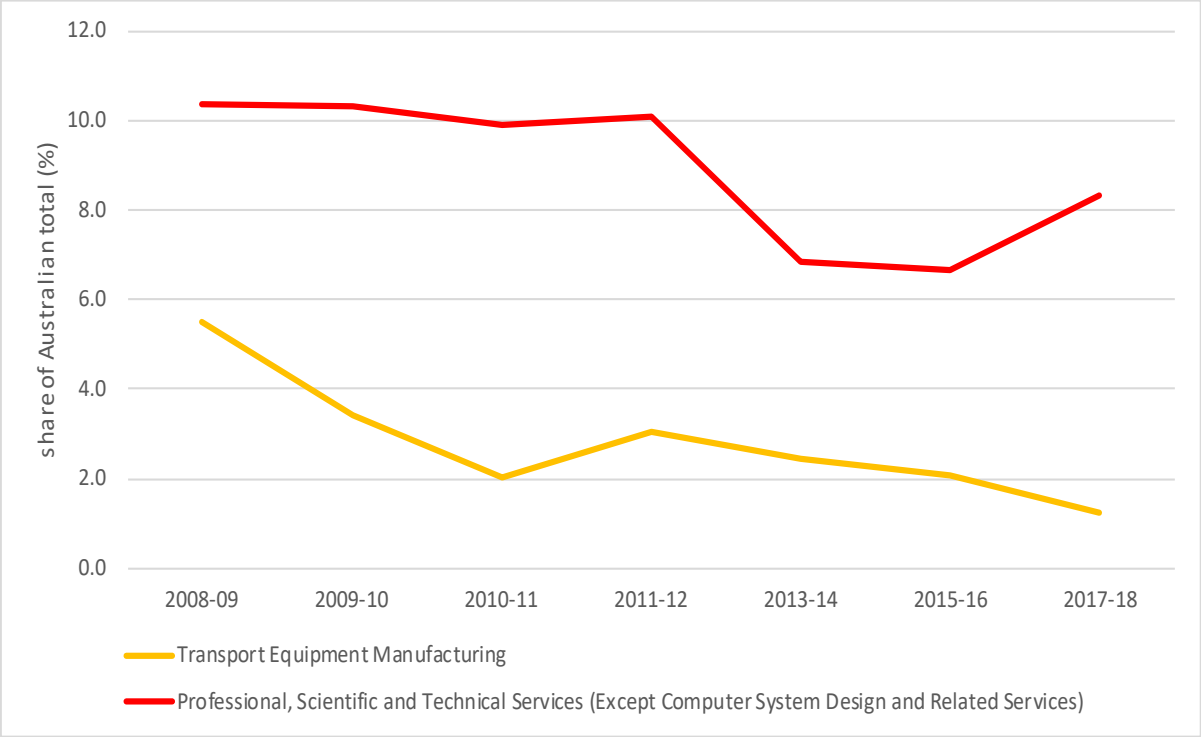
Innovation

Research and development is an important component of business innovation systems and as such can support the development or maintenance of competitive advantages. Unfortuntately given the level at which the data are available analysis can only be undertaken at the level of the service industry groups included in the High-Tech sector. No information is available on whether the intensity of R&D is higher, lower or the same in the proportions of these industry groups allocated to the High-Tech sector.

South Australia's share of national business research and development expenditure in 'Transport equipment manufacturing' has fallen sharply over the past decade amounting to only 1.8 per cent of the national total in 2017-18. Given that on average over 2017 and 2018 South Australia accounted for 10.6 per cent of national employment of this broader sector, this suggests a low innovation intensity of South Australian firms compared to the national average (see Figure 25).

South Australia's share of Business R&D in Professional scientific and technical services (of which the services components of defence and space form a small part) is much higher, over 8 per cent of the national total in 2017-18, suggesting that South Australian firms in this industry group are more innovative than the Australian average. It is not possible to identify if the high rates of R&D relate to firms which are in the defence and space sector, or if it relates to other activity such as the High-Tech sector, or clinical trials and other medical research.

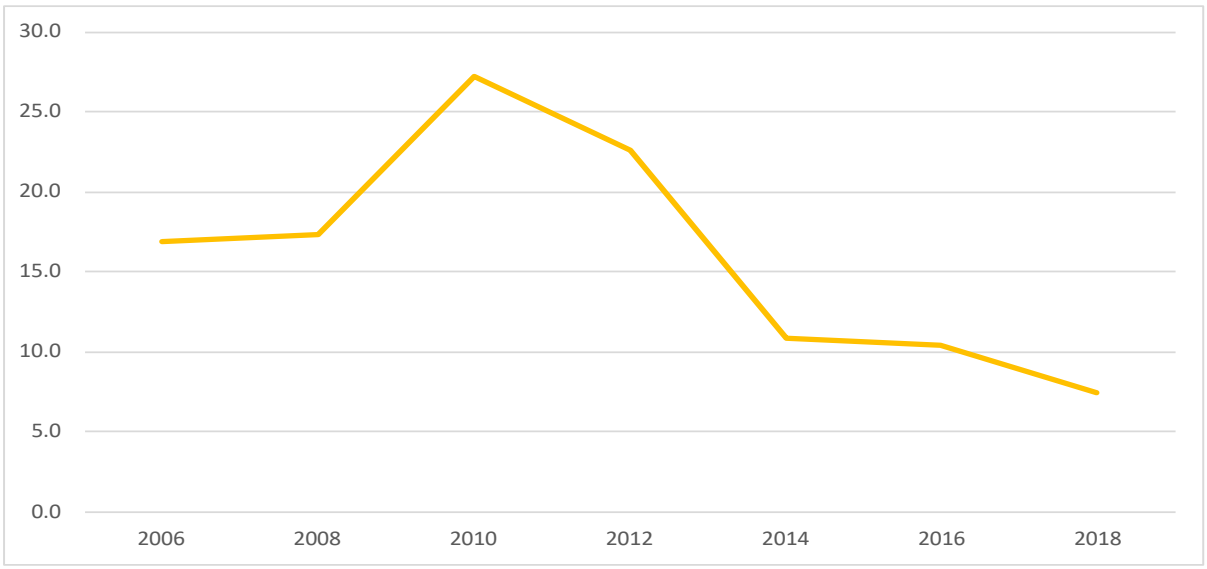
Figure 25: Business expenditure on R&D in fields of research related to the defence and space industries as share of national expenditure, South Australia (%), 2008-09 to 2017-18



Source: ABS 8104.0

South Australia's share of higher education spending on research and development in the socio-economic objective 'Defence' at 7.5 per cent of the national total is currently slightly above its population share. However, this represents a significant fall in South Australia's share of funding, which peaked at 27 per cent in 2010. This suggests the state's relative advantage is diminishing (see Figure 26).

Figure 26: Higher education expenditure on R&D for the socio-economic objective 'Defence' as share of national expenditure, South Australia (%), 2006 to 2018



Source: Department for Trade and Investment (DTI) estimations based on ABS data

Other factors impinging on competitiveness

South Australia has generally 'punched above its weight' in terms of foreign investment in the defence and space industries. South Australia performed particularly well in 2018-19 compared to the historical data (see Table 15).

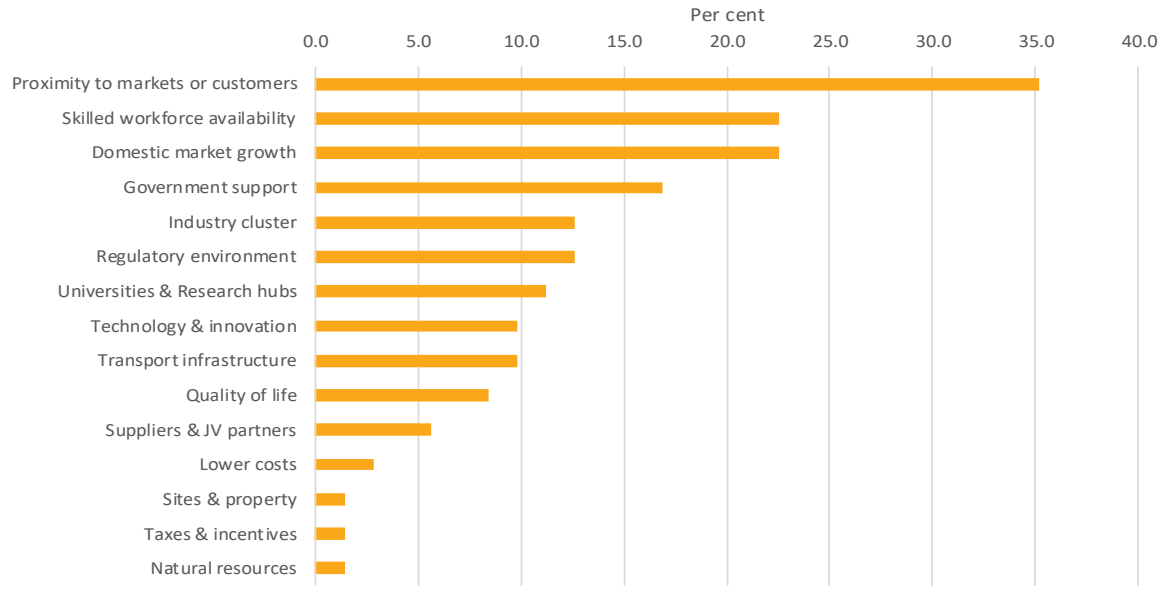
Table 15: Foreign investment in the South Australian defence and space industries

Total number recorded in South Australia (2003-19)	18
South Australian share of Australian total (2003-19)	13.5%
Total value of projects recorded for South Australia (2003-19)	$467.3 million
South Australian share of total Australian value (2003-19)	8.9%
South Australian number of projects 2018-19	3
South Australian share of total Australian projects 2018-19	60.0%
Total value of projects recorded for South Australia 2018-19	$74.3 million
South Australian share of Australian value 2018-19	85.0%

Source: FDI Markets, https://www.fdimarkets.com/

Figure 27 summarises motives behind FDI projects in the defence and space sector. The focus on proximity to markets and customers in explaining location decisions further emphasises the relatively inward facing nature of the sector.

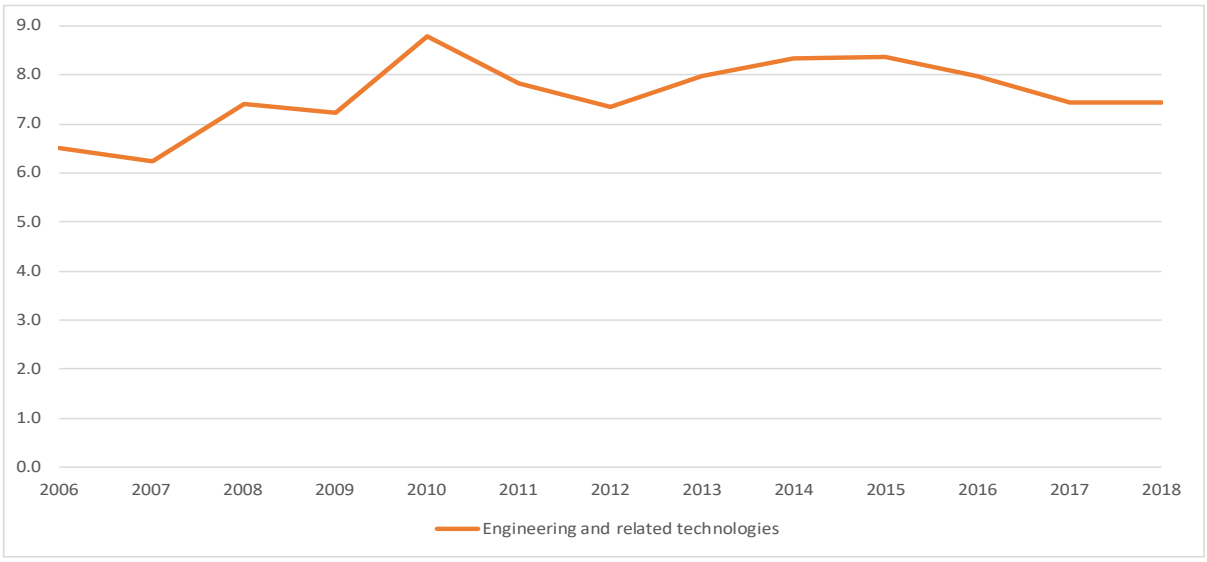
Figure 27: Motives of announced FDI projects in the defence and space sector (%), Jan 2003 – Nov 2019 (sample size: 71 projects, all countries)



Source: FDI Markets, https://www.fdimarkets.com/Note: Total exceeds 100 per cent due to multiple motives for some projects.

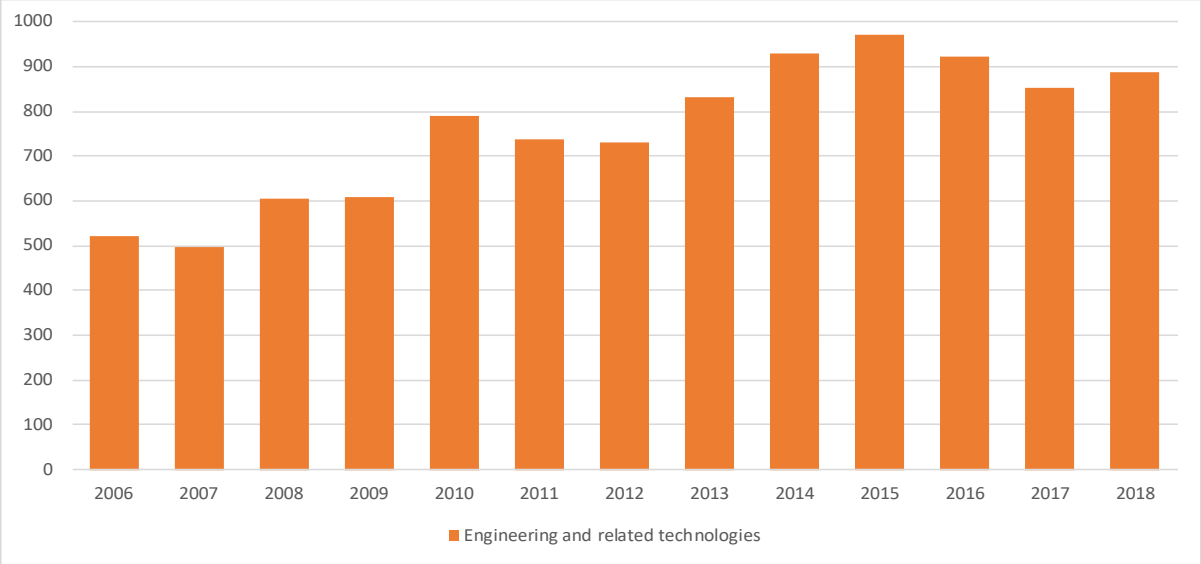
Access to skilled labour is an important element of competitiveness for firms in the defence and space sector. None of the broad field of study codes map particularly well to the defence and space sector; however, Engineering and related technologies covers most of the relevant skill needs, as well as much that does not link to the sector. South Australia's share of domestic higher education completions has been fairly consistent over the past decade, with completions for Engineering and related technologies at around 7.5 per cent of the national average, slightly above South Australia's employment share. This suggests there is reasonable access to graduate employees for the sector (see Figures 28 and 29).

Figure 28: South Australian share of domestic higher education completions in fields of study relevant to defence and space, 2006 to 2018 (%)



Source: Department for Trade and Investment (DTI) estimations based on ABS data

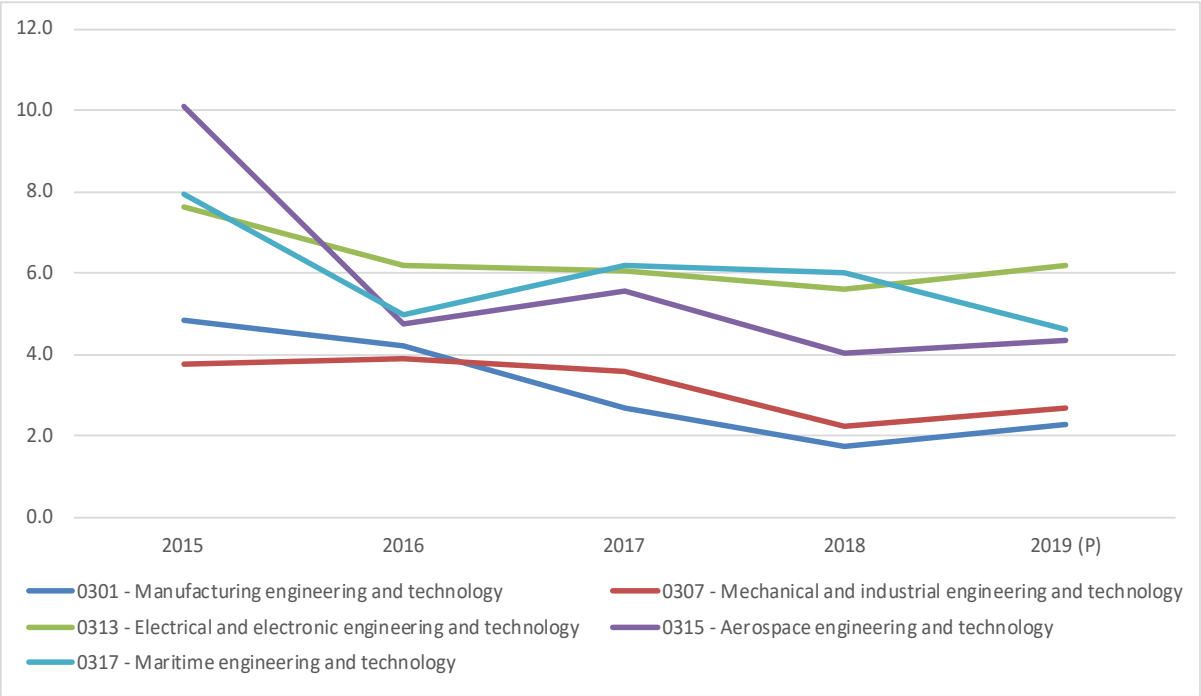
Figure 29: Number of domestic higher education completions in fields of study relevant to defence and space, South Australia, 2006 to 2018



Source: Department for Trade and Investment (DTI) estimations based on ABS data

Vocational educational skills are also extremely important for the defence and space industries. Figure 30 sets out South Australia's share of national vocational education and training (VET) completions for selected engineering fields of study potentially relevant to defence and space. Most of these currently sit at between 2 and 4 per cent of national completions, below the state's population share. South Australia's share has also been declining in each of the fields of study, with the most significant fall in Aerospace engineering.

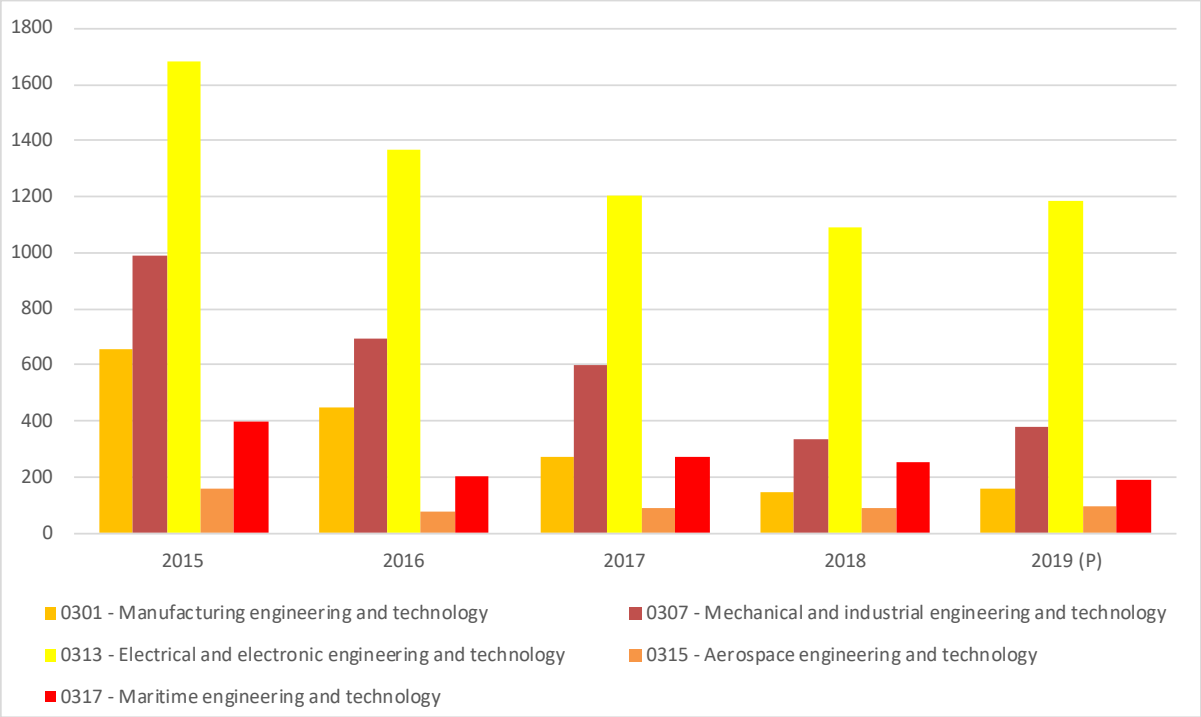
Figure 30: Selected South Australia Engineering VET completions as a share of national completions for that field of study (%), 2015 to 2019



Source: NCVER VOCSTATS database, accessed September 2020
Note: 2019 completions data is preliminary.

Numbers of VET completions are relatively low, with Manufacturing engineering and technology, Aerospace engineering and technology, and Maritime engineering and technology all seeing fewer than 200 completions in 2019 (see Figure 31).

Figure 31: Selected South Australia Engineering VET Completions (number of completions), 2015 to 2019



Source: NCVER VOCSTATS database, accessed September 2020
Note: 2019 completions data is preliminary.

3.6 Health and Medical Industries

Comparative advantage

Here we consider two indicators of revealed comparative advantage, (as discussed in section 3.1) both of which rely on trade patterns.

The first indicator is the ratio of exports to production in the sector, or its export intensity. The export intensity of the manufacturing sectors linked to the health and medical industries sector can be interpolated by calculating the level of domestic gross value added that would be expected to result from pharmaceutical and related products exports and comparing that to the overall scale of the sector. Using input–output analysis[24], the $80.4 milllion of pharmaceutical and related exports would be expected to result in a gross value added of $54.0 million. The Department for Trade and Investment estimates that pharmaceutical and related manufacturing attributed to the health and medical industries sector had a gross value added of $60.5 million in 2018-19. If all of the exports reported in Table 1 can be attributed to thehealth and medical industries sector, then its manufacturing components have a very high export intensity of just under 90 per cent. This is subtantially higher than

[24] Analysis undertaken using a modified version of the Regional Industry Structure and Employment (RISE) model developed for the SA Government by Econsearch.

the state average of 7.2 per cent, and would tend to suggest that comparative advantages do exist for the sector.

The alternative approach is to identify the share of Australian exports in the sector that originate from South Australia. Across the pharmaceutical, medicament and related goods types identified as relevant to the health and medical industries sector, South Australia accounts for 1.4 per cent of the total national export value, well below the state's share of total economic activity.

These two analyses suggest that South Australia has some strong niches in pharmaceutical and medicament exports, with local firms manufacturing in this sector being apparently very export-focussed; however, exports from the sector in South Australia are very small compared to national exports, suggesting that any comparative advantages are not widespread but rather are restricted to a few niches.

The small proportions of the relevant services sectors allocated to the health and medical industries sector means that it is not possible to assess export performance in further detail.

The partial exception to this is in the area of clinical trials, which in many cases are a services export funded by international firms. Unfortunately, the value of expenditure on trials is not available precluding a direct comparison of exports between states; nor is it possible to identify what proportion are internationally funded. However, South Australia performs strongly in terms of the number of clinical trials undertaken in the state, with 15.2 per cent of the national total in 2018, suggesting that undertaking clinical trials is a potential area of relative comparative advantage for the state.

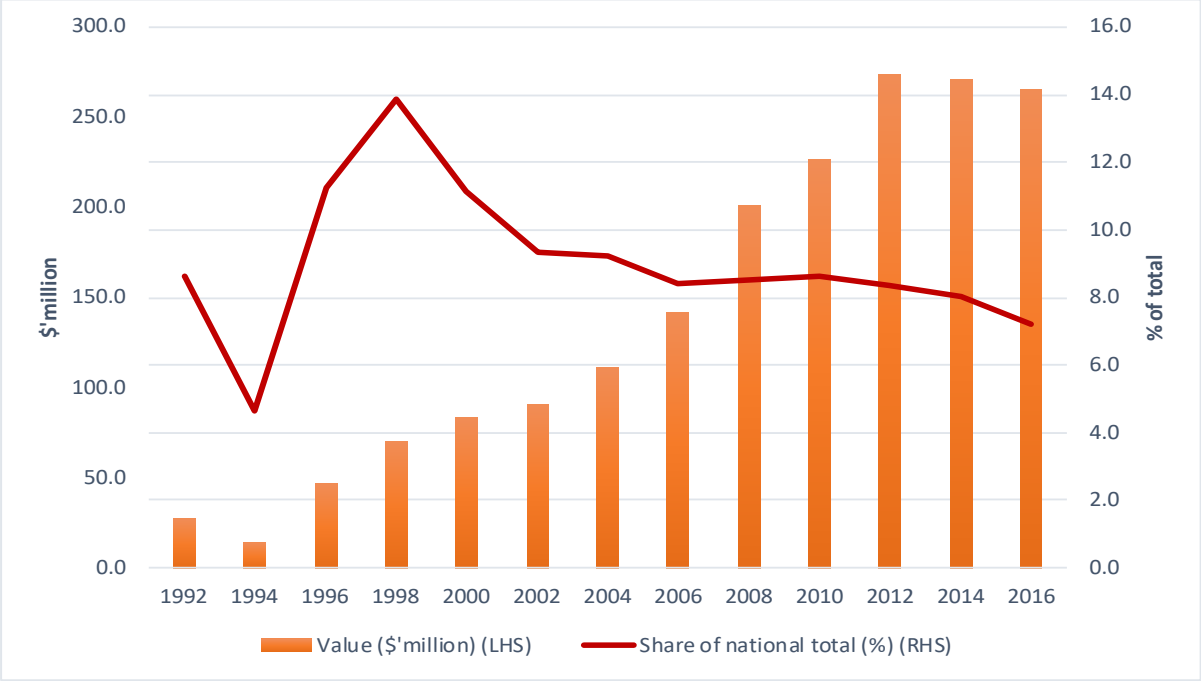
Research and development spending

Research and development (R&D) is an important activity in the health and medical industries, particularly with respect to pharmaceuticals and related goods. Unfortunately, the way in which data on business expenditure are aggregated means that is it not possible to assess expenditures related to the health and medical industries sector (pharmaceuticals are aggregated into the broader basic chemicals sector).

Data are available for higher education expenditure on R&D (HERD) as this data is coded by the socio-economic objective that the research is targeted at. Australia's total higher education R&D expenditure in medical and health sciences has doubled since 2006 and increased to six times its 1996 value.

Despite seeing expenditure grow strongly over most of the period since 1994, the South Australian share of Australian HERD in medical and health sciences has decreased since 1998. In 1998, South Australia accounted for 14 per cent of Australian expenditure, but in 2016 the state accounted for only 7.2 per cent, with the real value of expenditure also having declined since 2012 (see Figure 32).

Figure 32: Higher education expenditure on R&D for the socio-economic objective Health, South Australia, total value ($m) and share (%) of the national total



Source: ABS 8111.0

National Health and Medical Research Council research funding

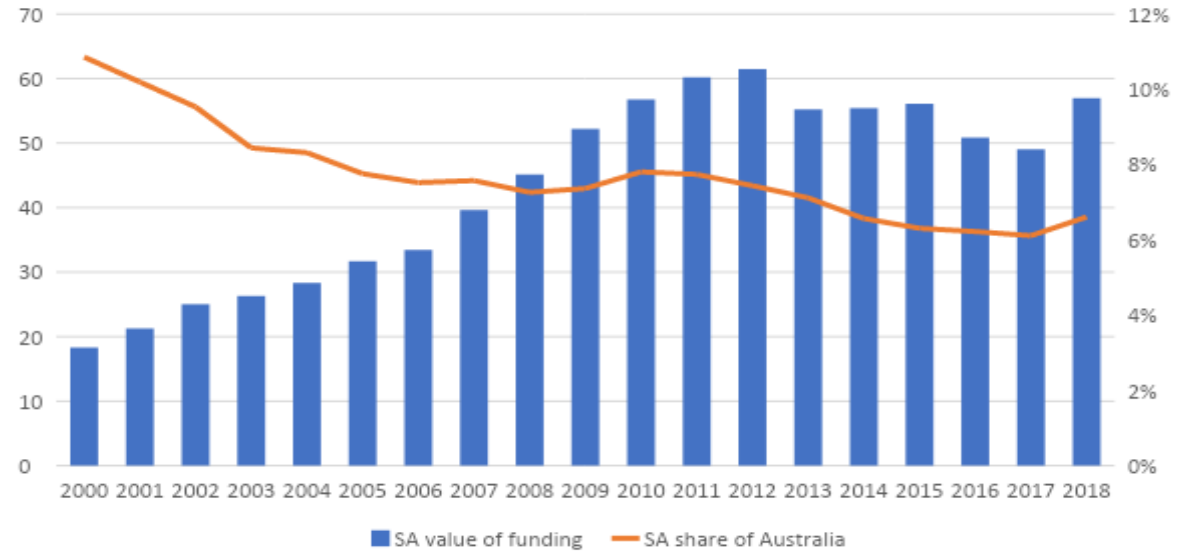
The National Health and Medical Research Council (NHMRC) is Australia's peak funding body for health and medical research. Since 2000, NHMRC has granted $11.3 billion in funding to Australian academics and researchers.

NHMRC annual expenditure has increased fivefold since 2000, from $168.8 million to $862.0 million in 2018 (see Figure 33).

South Australia's share of NHMRC expenditure has increased, from $18.3 million in 2000 to $57.0 million in 2018. Despite this absolute growth, South Australia's share of national NHMRC expenditure has declined. In 2000, South Australia accounted for 10.9 per cent of the total expenditure. This decreased to 6.6 per cent in 2018.

An inquiry undertaken by the SA Productivity Commission into performance of health and medical research in South Australia has explored issues that may have influenced these trends.

Figure 33: South Australian value of NHMRC expenditure ($m) and share of Australia (%), 2000-18



Source: NHMRC

South Australia had 56 NHMRC funded projects in 2019. The main field of research was Aboriginal and Torres Strait Islander health, with seven projects that accounted for almost a quarter (23.0 per cent) of South Australia's NHMRC funding and one third of national funding in this field (see Table 16). Five of South Australia's top 10 funded fields of research are also amongst Australia's top 10.

Table 16: NHMRC grant funding by top 10 fields of research, for South Australia ($m) and share of Australian funding (%), 2019

	Field of Research	Funding ($m)	Share of SA (%)	Field of Research	Funding ($m)	Share of Australia (%)
1	Aboriginal and Torres Strait Islander health	12.0	23.0	Aboriginal and Torres Strait Islander health	36.5	4.0
2	Gastroenterology and hepatology	3.4	6.5	Not applicable	35.7	3.9
3	Physiotherapy	2.5	4.7	Epidemiology	31.1	3.4
4	Medical bacteriology	2.4	4.6	Paediatrics	25.5	2.8
5	Dentistry not elsewhere classified	2.3	4.3	Preventive medicine	25.3	2.7
6	Medical devices	2.2	4.2	Neurology and neuromuscular diseases	23.4	2.5
7	Obstetrics and gynaecology	2.1	4.0	Medical bacteriology	21.3	2.3
8	paediatrics	2.1	4.0	Medical and health sciences not elsewhere classified	20.7	2.2
9	Cardiology (incl. cardiovascular diseases)	2.0	3.8	Cardiology (incl. cardiovascular diseases)	20.7	2.2
10	Epidemiology	1.6	3.1	Central nervous system	20.3	2.2

Source: The state's NHMRC grants are spread across a large number of fields, suggesting a lack of specialisation except in the case of Aboriginal and Torres Strait Islander which appears to be an area of competitive strength.

Clinical trials

The Australian New Zealand Clinical Trials Registry (ANZCTR) is an online public registry of clinical trials being undertaken predominantly in Australia and New Zealand.

The registration of clinical trials is not legally required in Australia and so all trials may not be included. Organisations may not register their clinical trials for competitiveness reasons, to prevent competing firms from discovering their ideas and research projects.

Registration is desirable in order to improve research transparency, facilitate trial participation, avoid duplication, identify potential research areas, promote research collaboration and improve trial quality. There are several initiatives in place to encourage the registration of clinical trials:

- The International Committee of Medical Journals Editors, which includes editors from many leading international medical journals, requires the prospective registration of clinical trials as a requirement for publication.[25]
- The Declaration of Helsinki, which outlines the ethical principles for medical research involving humans, states that 'every research study involving human subjects must be registered in a publicly accessible database before recruitment of the first subject'.[26]
- The World Health Organization asserts that 'the registration of all interventional trials is a scientific, ethical and moral responsibility'.[27]

The number of voluntary registered clinical trials recorded by the ANZCTR is taken as an approximation of activity in the clinical trials sector in Australia.

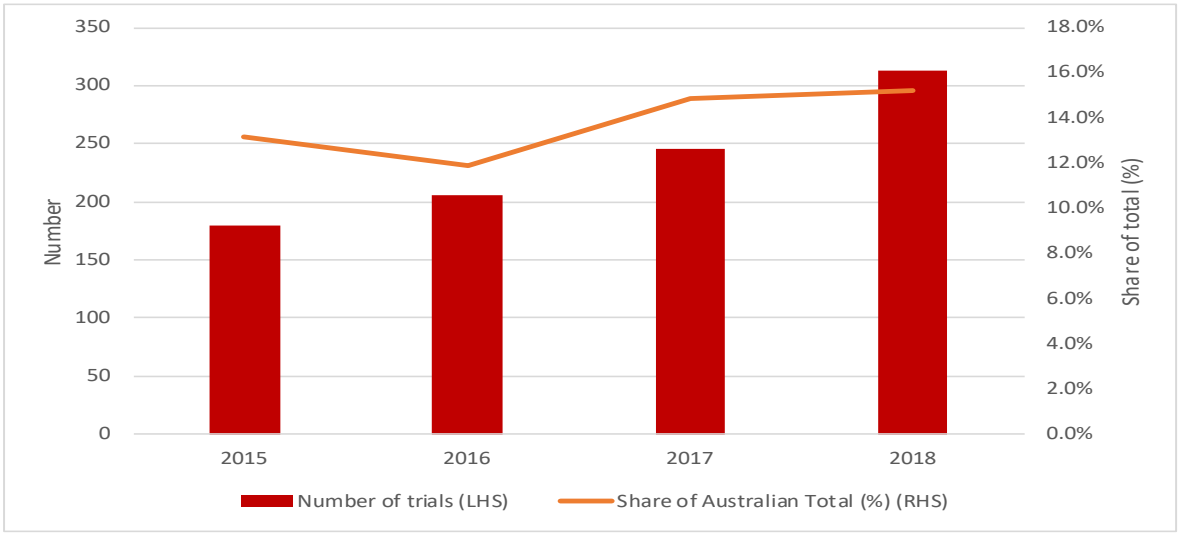
The Australian clinical trials sector has seen strong growth in the past decade. Since 2008, clinical trials have grown at an average annual rate of 12.4 per cent. The number of new clinical trials commencing in Australia has tripled from 641 in 2008 to 2,054 in 2018. New South Wales and Victoria are the leading states, with the greatest share of Australian clinical trials.

South Australia has also seen growth in clinical trials with the number registered increasing from 180 in 2015 to 313 in 2018.

Due to suspected under reporting, it is difficult to conclude what has happened to South Australia's share of Australian clinical trials. However, South Australia's share of the Australian voluntarily registered clinical trials has increased from 13.1 per cent in 2015 to 15.2 per cent in 2018 (see Figure 34).

[25] Catherine De Angelis et al, 'Clinical Trials Registration: A Statement from the International Committee of Medical Journal Editors (2004), 364(9) *The Lancet,* 911.
[26] World Medical Association, *Declaration of Helsinki* (2013).
[27] World Health Organization, *International Standards for Clinical Trial Registries* (2018).

Figure 34: Number of registered clinical trials undertaken and share of national trials (%), South Australia, 2015 to 2018



Source: ANZCTR

Note: The same clinical trial may be undertaken in several states; therefore the total count of Australian trials by state may be more than the total number of Australian trials registered.

Note: Prior to mid-2015, it was not mandatory to provide the state in which the study was occurring on the ANZCTR. Therefore, the count of clinical trials by state for the years prior to 2015 may not be accurate and has not been included in the analysis.

Other factors impinging on competitiveness

Foreign direct investment

FDI Markets is an online database of foreign direct investment (FDI), covering all countries and sectors worldwide.

The health and medical industries cluster in FDI Markets includes pharmaceuticals, medical devices, biotechnology and healthcare.

FDI Markets identified a total of 95 projects in the health and medical industries in Australia between 2003 and 2019. Seven of the projects were in South Australia. Due to the small sample size, no meaningful analysis of the data may be undertaken (see Table 17).

Table 17: FDI in the health and medical industries cluster in Australia, Jan 2003 – Dec 2019

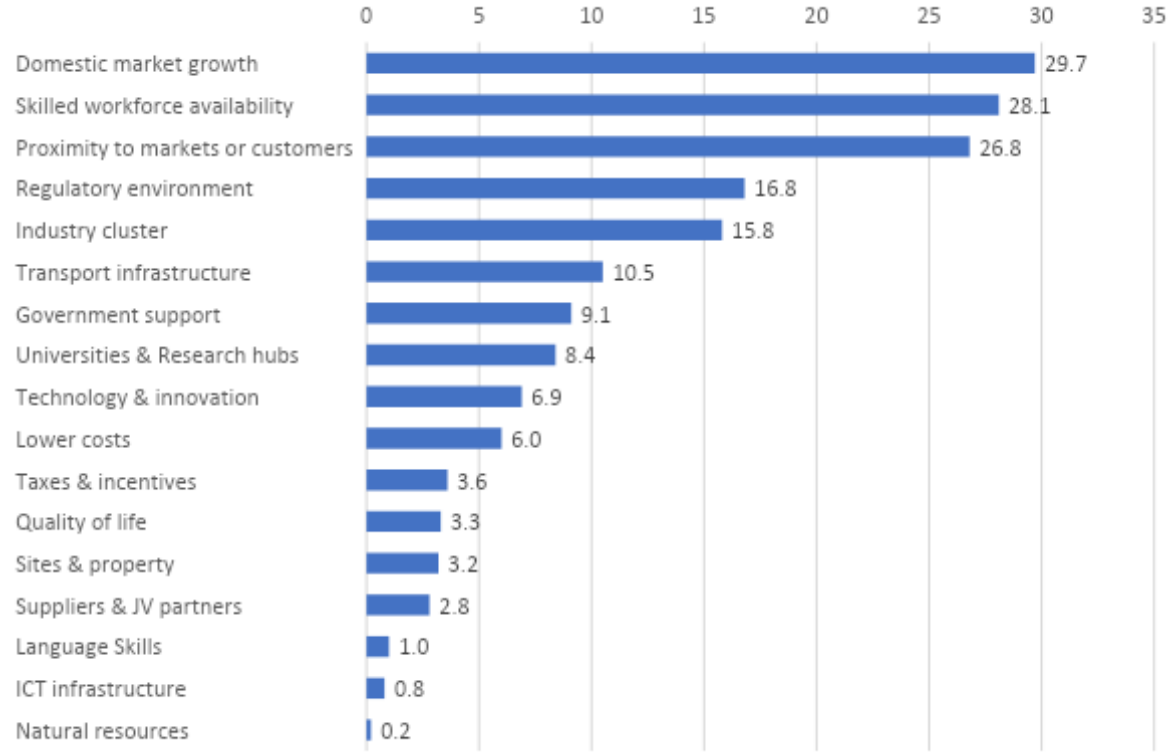
State	Projects (No.)	Total capital expenditure ($m)	Average capital expenditure ($m)	Jobs created (No.)	Average jobs (No.)	Companies (No.)
NSW	34	1,130	33.2	2,266	66	31
VIC	33	1,511	45.87	7,087	214	31
QLD	10	271	27.08	507	50	10
SA	7	126	17.91	262	37	7
Not Specified	11	211	19.22	796	72	11
Total	95	3,249	34.22	10,918	114	85

Source: FDI Markets

Data from FDI Markets also highlight key motives and determinants, cited in media announcements of health and medical industries projects globally. This data provides an indication as to the factors cited by companies, and their representatives, when announcing or opening a project.

Figure 35 provides information about investment motives for a sample of 1,491 projects globally where FDI Markets cited at least one investment motive. Companies investing in the health and medical industries are most likely to invest in a jurisdiction where there is a growing market close to its customers and a skilled workforce. Beyond these factors, the regulatory environment, industry cluster and transport infrastructure are also important (see Figure 35).

Figure 35: Motives of projects in the health and medical industries cluster, announced by FDI Markets, proportion of total motives (%), Jan 2003 to Dec 2019



Source: FDI Markets. Sample size 1,491 projects, all countries.

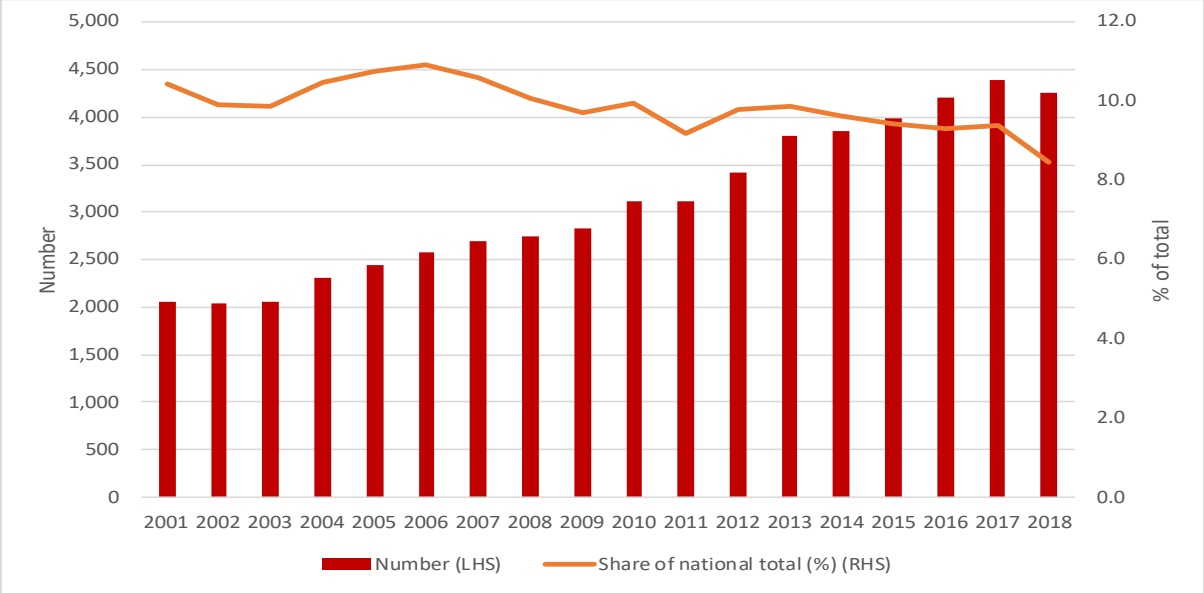
Note: Total exceeds 100 per cent due to multiple motives for some projects.

Higher education completions in health

Access to skilled labour is an important element of competitiveness for firms in sectors that are relatively skill intensive such as the health and medical industries. The total number of domestic student completions in the broad field of study Health at Australian universities has grown by more than 250 per cent since 2001, increasing from just under 20,000 to just over 50,000 by the end of 2018.

Over the same period South Australia has seen its completions increase from just over 2,000 to over 4,000, although its share of national completions has fallen from 10.9 per cent in 2006 to 8.5 per cent. Even at this reduced share the share of Health course completions is still above the state's share of total economic activity (see Figure 36).

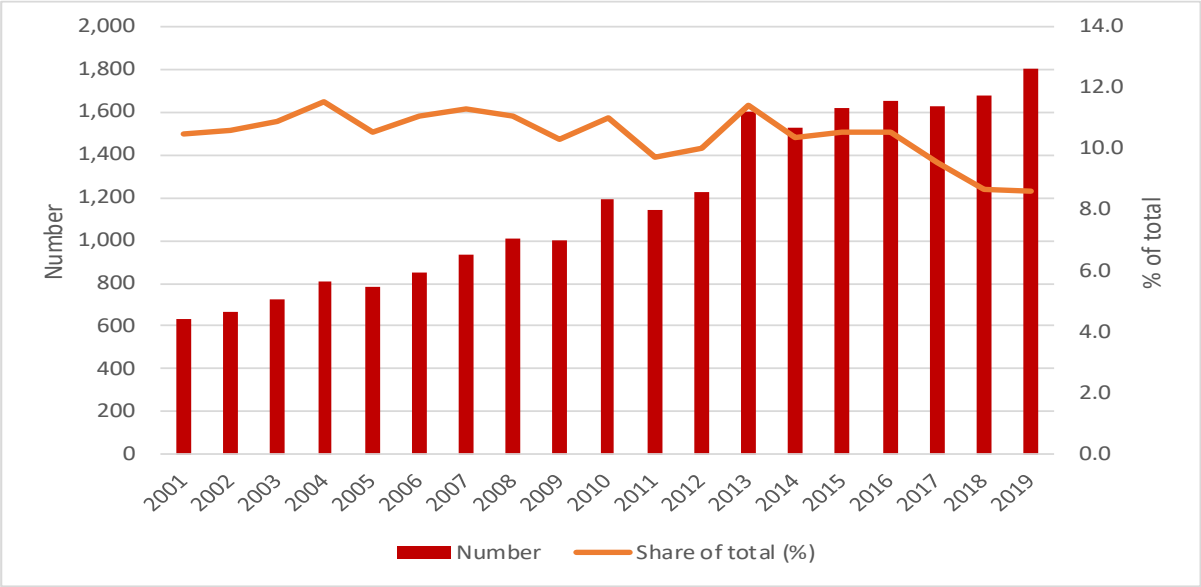
Figure 36: South Australian share of domestic higher education completions in the field of study Health, 2001 to 2018



Source: uCube

For the more externally focussed parts of the health and medical industries postgraduate completions are potentially a more meaningful measure of the available skilled workforce as higher degrees are often required for research. This data follows a similar pattern to the overall completion, except that the total number of completions has continued to increase up to 2019. Despite the continuous increase in completions, South Australia's share of the national total has declined steadily from 10 per cent to 8 per cent (see Figure 37).

Figure 37: South Australian share of domestic post-graduate higher education completions in the field of study Health, 2001 to 2018



Source: uCube

3.7 Hi Tech

Comparative advantage

For the hi-tech sector, we consider two indicators of revealed comparative advantage, (as discussed in section 3.1) both of which rely on trade patterns.

The first indicator is the ratio of exports to production in the sector, or its export intensity. The export intensity of the manufacturing sectors linked to Hi-tech can be interpolated by calculating the level of domestic gross value added that would be expected to result from the goods exports categories linked to the sector and comparing that to the overall scale of the sector. Using input-output analysis, the $153 million of exports linked to Hi-tech manufacturing would be expected to result in a gross value added of $107 million. If it is assumed that the exports were evenly distributed across the included industry groups (62.5 per cent of which are allocated to the Hi-tech sector) then this would represent an international export intensity of 42 per cent for Hi-tech manufacturing. This is substantially higher than the state average of 7.2 per cent. If all of the exports arise from those parts of the industry groups allocated to the Hi-tech sector, then the export intensity would be 67 per cent.

The alternative approach compares the share of Australian exports that originate from South Australia. Across all of the merchandised goods types identified as relevant to the Hi-tech sector, South Australia accounts for 4.9 per cent, somewhat below the state's share of total economic activity. The analysis does, however, identify some niches within which South Australia accounts for a significant share of exports (see Table 18).

The export intensity of the services sectors partially mapped to the Hi-tech sector is much lower. The gross value added attributable to exports is around $20 million, 2.5 per cent of total gross value added for those proportions of the service industry groups allocated to the Hi-tech sector. This indicates that the services component of the Hi-tech sector is largely orientated towards meeting domestic demand.

This suggests that the state has a comparative advantage in many of the areas where Hi-tech manufacturing remains in the state, but that there is no evidence of comparative advantage in the service industry groups within the Hi-tech sector.

It may well be that there are specific niches within these broader service industry groups that do have a much more outward orientation, but they would need to be identified qualitatively. It is also the case that, given the low outward orientation shown by the aggregate data for the service sector components of Hi-tech, these outwardly orientated niches would currently be small in scale. The Department of trade and investment website indicates that within Hi-tech services, machine learning, data analytics, artificial intelligence, virtual reality and cyber security are regarded as areas of relative strength for South Australia.

Table 18: Hi-tech exported commodities where South Australia accounts for more than 10% of national exports, ($ value and % share of national), 2018-19

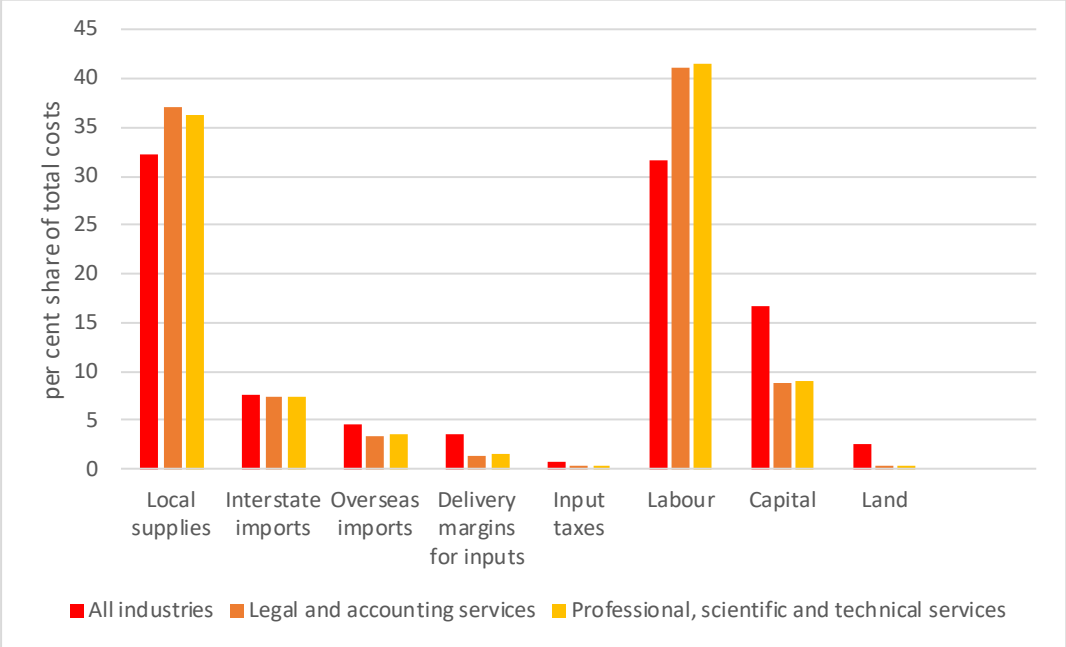
	SA Value ($'000)	Aust Value ($'000)	SA Share of Australia %
Electrical lighting or signalling equipment (excl. filament or discharge lamps and arc lamps of subgroup 778.2) windscreen wipers, defrosters and demisters, of a kind used for cycles or motor vehicles	50,154	70,309	71.3
Parts of diodes, transistors and similar semiconductor devices, photosensitive semiconductor devices and light emitting diodes of subgroup 776.3 and of the mounted piezoelectric crystals of heading 776.81	962	3,528	27.3
Hydrometers and similar floating instruments, thermometers, pyrometers, barometers, hygrometers, psychrometers, recording or not, and any combination of these instruments	1,332	6,655	20.0
Balances of a sensitivity of 5 cg or better, with or without weights	23	123	18.7
Parts of electrical lighting or signalling equipment (excl. filament or discharge lamps and arc lamps of subgroup 778.2) windscreen wipers, defrosters and demisters, of a kind used for cycles or motor vehicles	1,061	5,799	18.3
Parts and accessories for surveying (incl. photogrammetrical surveying) hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances (excl. compasses); rangefinders	11,898	72,203	16.5
Instruments and apparatus for physical or chemical analysis, nes	12,992	80,518	16.1
Printed circuits	2,361	14,871	15.9
Instruments and apparatus for measuring or detecting ionizing radiations	731	4,755	15.3
Electrical signalling, safety or traffic control equipment for railways, tramways, roads, inland waterways, parking facilities, port installations or airfields (excl. those of heading 791.91)	5,513	40,647	13.6
Parts of particle accelerators (heading 778.71) and of electrical machines and apparatus having individual functions not elsewhere specified (heading 778.78)	9,613	73,493	13.0
Machine tools, operated by electro-chemical, electron beam, ionic-beam or plasma-arc processes, for working of any material by removal of material	249	2,208	11.3

Source: Department for Trade and Investment (DTI) estimations based on ABS data.

Cost structure

The Legal and accounting services sector and the Professional, scientific and technical services sector both have cost structures that are intensive in labour inputs, 41 per cent compared to all industry average of 32 per cent. Both of the sectors have capital intensities that are well below the all-industry average (see Figure 38).

Figure 38: Cost structures for Legal and accounting services and Professional, scientific and technical services compared to all-industries (per cent shares of total costs),2015-16



Source: Department for Trade and Investment (DTI) estimations based on ABS data.

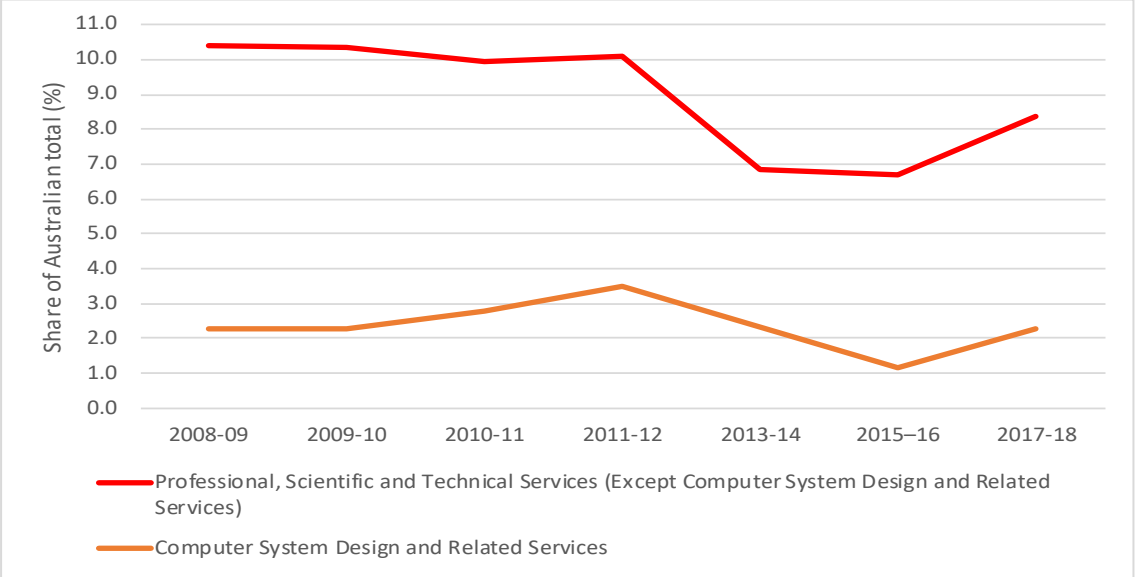
Innovation

Research and development is an important component of business innovation systems and as such can support the development or maintenance of competitive advantages. Unfortunately, given the level at which the data are available analysis can only be undertaken at the level of the service industry groups included in Hi-tech. No information is available on whether the intensity of R&D is higher, lower or the same in the proportions of these industry groups allocated to Hi-tech.

South Australia's share of national business expenditure in computer system design and related services peaked at 3.5 per cent in 2011-12. Since then it has declined slightly to be 2.2 per cent in 2017-18 (see Figures 39 and 40). This is concerning as South Australia's share of Australian businesses in the computer system design and related services industry in 2017-18 was 4.2 per cent. This could suggest that South Australian IT businesses may not be as innovative as other Australian businesses in the industry.

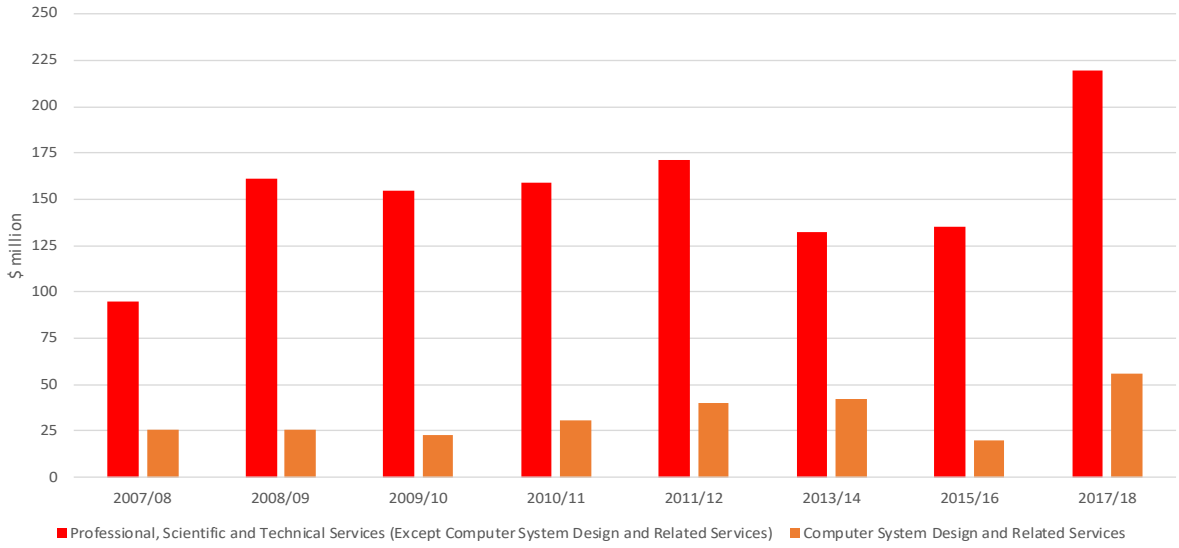
South Australia's share of business R&D in the rest of Professional scientific and technical services is much higher, over 8 per cent of the national total in 2017-18, suggesting that South Australian firms in this industry group are more innovative than the Australian average. It is not possible to identify if the high rates of R&D relate to firms which are in the Hi-tech sector, or if it relates to other activity in the sector such as defence, or clinical trials and other medical research.

Figure 39: Business expenditure on R&D in Hi-tech sector as share of national expenditure, South Australia (%), 2008-09 to 2017-18



Source: ABS 8104.0

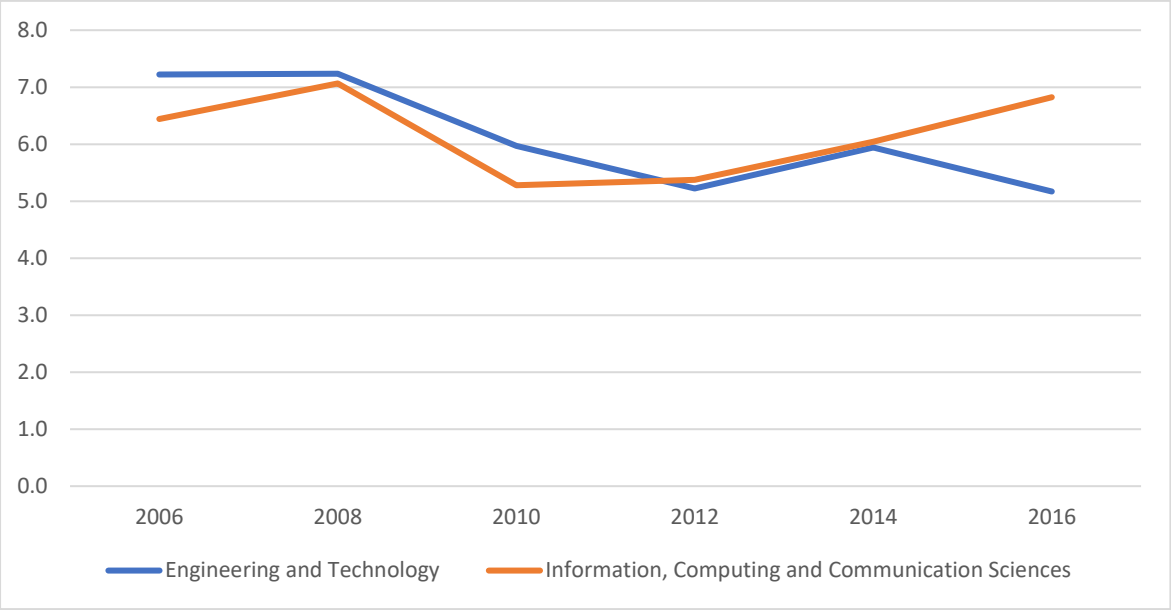
Figure 40: Business expenditure on R&D in Hi-tech sector, South Australia, ($m), 2007-08 to 2017-18



Source: ABS 8104.0
Note some numbers have large standard errors so should be used with caution.

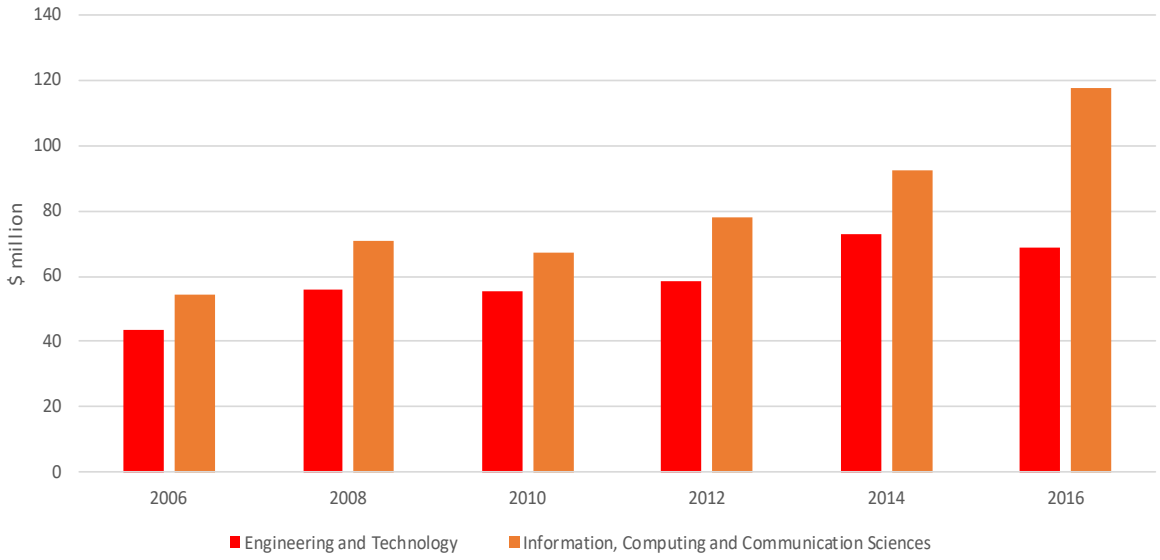
Not all R&D takes place within businesses, with research in the higher education sector also playing an important part in the innovation system. In contrast to business R&D, 'Information and Computing Sciences' R&D within South Australian higher education has had a higher share of national spending (6.8 per cent) than 'Engineering and technology'. In the 2000s both fields of research had a share of national spending in SA that was higher than the share of those industry sectors in GDP, but Engineering and technology has fallen and is now roughly in line with the size of the industry sector (see Figures 41 and 42).

Figure 41: Higher education expenditure on R&D in Hi-tech sector as share of national expenditure, South Australia (%), 2006 to 2016



Source: ABS 8111.0

Figure 42: Higher education expenditure on R&D in Information and computing sciences, Engineering and Technology, South Australia ($m), 2006 to 2016



Source: ABS 8111.0

Start-ups are another important part of the innovation ecosystem, although data on them is generally limited. There are an estimated 1,752 start-ups in Australia developing a large variety of technologies. This figure is based on an analysis conducted by Upwise, on behalf of the Australian Computer Society, in early 2019 on companies founded since 2014. Only 3 per cent of these start-ups were located in South Australia while almost half were located in NSW. No data were available on the number of start-ups in the other industry groups coded to Hi-tech (see Table 19).

Table 19: National share of tech start-up businesses by state, (%), 2014-2019

State	Share of national start-ups (%)
NSW	48
VIC	29
QLD	12
WA	6
SA	**3**
TAS	1

Source: Upwise, ACS (2019)

Published statistics on venture capital and private equity investment highlight that South Australian firms had a low share of national venture capital and private equity investment. This is not a barrier specific to Hi-tech, potentially affecting innovative firms in any sector. South Australian firms accounted for an average of just over 2 per cent of all recorded investment deals and 1 per cent of their total value (see Table 20).

Table 20: New and follow-on venture capital and later-stage private equity investment in investee companies (no. of deals and value in $m), by location of investee company head office, 2017-18 to 2018-19

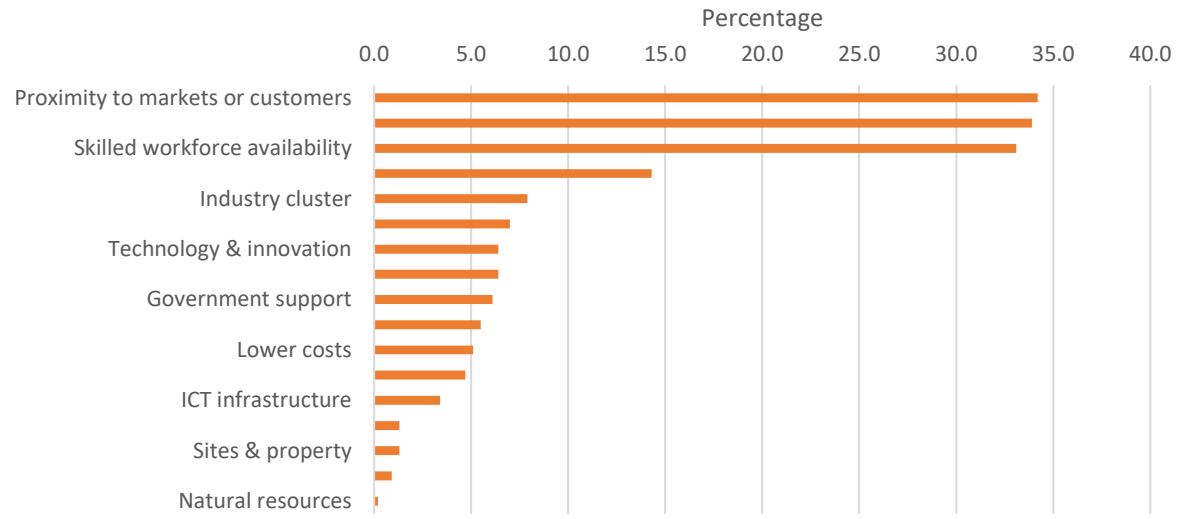
	2017-18		2018-19	
	Investment deals (no.)	Value ($m)	Investment deals (no.)	Value ($m)
New South Wales	208	1,199	215	508
Victoria	112	465	129	507
Queensland	39	267	58	188
South Australia	**10**	**28**	**12**	**16**
Western Australia	np	np	17	52
Tas., NT and ACT	np	np	16	21
Overseas	75	213	70	160
Total	479	2,603	517	1,452
SA share	**2.1%**	**1.1%**	**2.3%**	**1.1%**

Source: ABS 5678.0; np = not published

Other factors impinging on competitiveness

Data on the motivations for foreign direct investment (FDI) in the Hi-tech sector in South Australia suggest that many of these investors also see the sector as inward facing with 'Proximity to markets or customers' and 'Domestic market growth' the two most frequently mentioned motivations. Figure 43 show motives listed for FDI projects in the FDI Markets database (where the project has a motive listed) for projects in: custom computer programming services, electrical equipment, measuring and control instruments, other consumer electronics and other computer related services globally. The top three motives are market proximity, domestic market growth and skilled workforce availability.

Figure 43: Foreign direct Investment (FDI) motives of announced FDI projects in Hi-Tech sectors, by proportion of projects with that motive (%), Jan 2003 to Jan 2020



Source: FDI Markets
Note: sample size: 1,733 projects, all countries
Note: total will sum to more than 100 per cent as some projects have more than one motive listed.

Table 21 below present SA's share of national FDI over 2003-09. South Australia has underperformed, with an average of 4 per cent of national FDI. The most recent data, however, is more positive with South Australia receiving 7.9 per cent of national FDI in 2018-19.

Table 21: FDI projects in Australia 2003 to 2019, Hi-Tech sectors

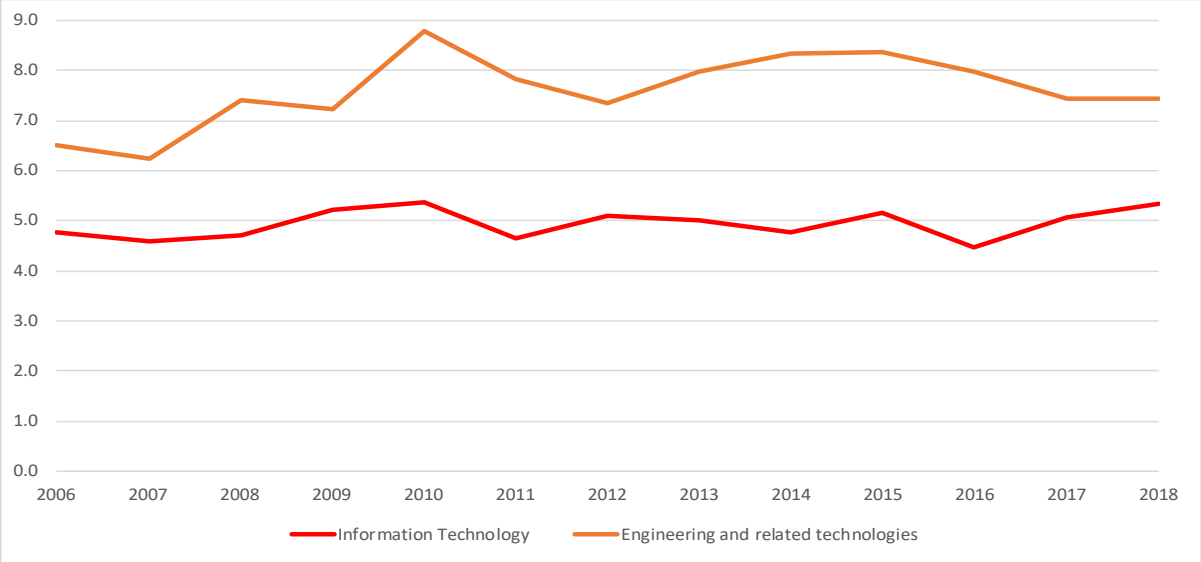
Total number recorded in South Australia (2003 - 2019)	12
South Australia share of Australian total (2003 - 2019)	4.7%
Total value recorded in South Australia (2003 - 2019)	$182.74 m
South Australian share of total Australian value (2003 - 2019)	4.0%
South Australian number of projects 2018-19	2
South Australian share of total Australian projects 2018-19	8.0%
South Australian value of projects 2018-19	$24.03 m
South Australian share of Australian value 2018-19	7.9%

Source: FDI Markets

Access to skilled labour is an important element of competitiveness for firms in sectors that are relatively skill intensive such as the High-Tech sector. South Australia's share of domestic higher education completions has been fairly consistent over the past decade, with completions in information technology fields typically at around 5 per cent of the national total (slightly below South Australia's population share), and completions for engineering and

related technologies at around 7.5 per cent of the national average, slightly above South Australia's employment share (see Figure 44).

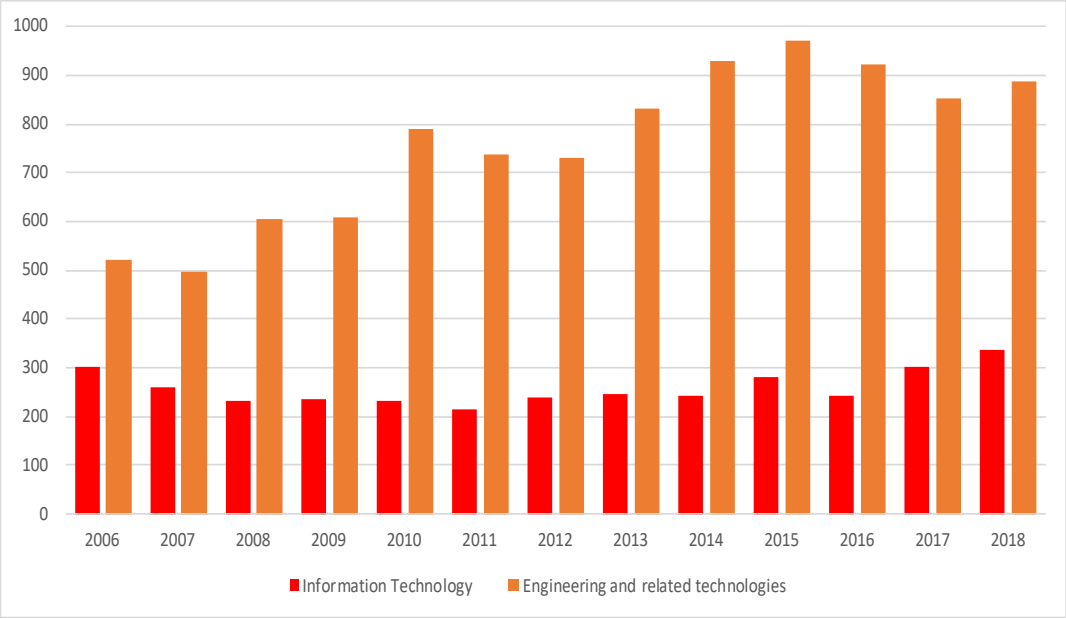
Figure 44: South Australian share of national domestic higher education completions in fields of study relevant to Hi-tech (%), 2006 - 2018



Source: uCube

Total completions have been effectively flat for information technology, at around 300. Engineering and related technology completion numbers increased up to 2015 but have fallen back slightly since then (see Figure45).

Figure 45: South Australian higher education completions in engineering and information technology (no.), 2006 - 2018.



Source: uCube

3.8 Creative Industries

Comparative advantage

Several indicators of revealed comparative advantage (as discussed in section 3.1) are presented here.

South Australia has a relatively low share of Australia's creative industries exports of goods (see Table 22). This suggests that the state does not currently have an underlying comparative advantage in creative industries, broadly speaking.

There are pockets of the creative industries where the State does have a comparative advantage. Table 22 shows those export commodities where South Australia has a revealed comparative advantage compared to the rest of Australia based on the commodities share of total goods exports.[28] In 2018-19 there were 10 creative industries goods exports which show a revealed comparative advantage for South Australia:

- Entertainment articles for festive, carnival or other entertainment, including conjuring tricks, novelty jokes, Christmas tree decorations and similar articles for Christmas festivities not elsewhere specified (89449);
- Loudspeakers, mounted in their enclosures (76422)
- Imitation jewellery of base metal, whether or not plated with precious metal (89721)
- Radio broadcast receivers, combined with sound recording or reproducing apparatus, capable of operating without an external source of power (76221)
- Loudspeakers, not mounted in their enclosures (76423)
- Discs, tapes, solid-state non-volatile storage devices, smart cards and other media for recording sound or of other phenomena, including matrices and masters for the production of discs (excl. photographic and cinematographic supplies) not elsewhere specified (89849)
- Articles for funfair, table and parlour games, not elsewhere specified (excl. video games of a kind used with a television receiver, articles & accessories for billiards, games, operated by coins, banknotes etc and playing-cards) (89439)
- Articles and accessories for billiards (89433)
- Trade advertising material, commercial catalogues and the like (89286)
- Original sculptures and statuary, in any material, executed entirely by hand (89630).

It should be noted that these exports are small in value, with a combined export value of $8.7 million, equivalent to 0.07 per cent of the state's total goods exports.

[28] A country (or state) is considered to have a revealed comparative advantage (RCA) in a product if the RCA is greater than one, where the RCA is the product's share of state exports relative to the product's share of national exports.

Table 22: Creative Industries goods exports where South Australia has RCA > 1, value ($) and shares of South Australian and Australian total exports (%), 2018-19

Product (SITC 5-digit code)	SA exports($) 2018-19	Australia exports ($) 2018-19	Share of total SA exports (%)	Share of total Aust. Exports (%)	Product RCA for SA
89449 Entertainment articles for festive, carnival or other entertainment articles, including conjuring tricks, novelty jokes, Christmas tree decorations and similar articles for Christmas festivities nes	1,451,673	9,162,210	0.012	0.003	5.043
76422 Loudspeakers, mounted in their enclosures	2,292,298	15,978,511	0.020	0.004	4.566
89721 Imitation jewellery of base metal, whether or not plated with precious metal	855,230	11,090,990	0.007	0.003	2.454
76221 Radio broadcast receivers, combined with sound recording or reproducing apparatus, capable of operating without an external source of power	53,858	731,468	0.001	0.000	2.344
76423 Loudspeakers, not mounted in their enclosures	221,002	4,548,503	0.002	0.001	1.546
89849 Discs, tapes, solid-state non-volatile storage devices, smart cards & other media for recording sound or of other phenomena, including matrices & masters for the production of discs (excl. photographic and cinematographic supplies) nes	655,588	15,281,629	0.006	0.004	1.365
89439 Articles for funfair, table and parlour games, nes (excl. video games of a kind used with a television receiver, articles & accessories for billiards, games, operated by coins, banknotes etc & playing-cards)	2,132,998	52,153,593	0.018	0.014	1.302
89433 Articles and accessories for billiards	140,372	3,834,979	0.001	0.001	1.165
89286 Trade advertising material, commercial catalogues and the like	190,709	5,363,488	0.002	0.001	1.132
89630 Original sculptures and statuary, in any material, executed entirely by hand	739,047	21,116,556	0.006	0.006	1.114

Source: ABS data customised for the Queensland Government Statistician's Office

Another indicator of revealed comparative advantage is South Australia's share of businesses and employment in the film, television and digital games development sectors. The most recent survey of the sector is somewhat dated, being conducted for 2015-16.

The results from that survey show that South Australia generally had a below-average share of businesses and employment in the film and video production, post-production, and digital games developers sectors (see Table 23). The most notable departure from this pattern was for commercial free-to-air broadcasters, where South Australia had a 36 per cent national share of businesses. However, the number of free-to-air broadcasters is quite small with many of them operating in multiple states, and South Australia's share of their employment was 5.3 per cent, which is below the state's share of national economic output. Looking at the other subsectors, in 2015-16 South Australia's shares of national activity were:

- film and video production - 4.5 per cent of businesses and 2.3 per cent of employment;
- film and video post-production - 2.9 of businesses and 5.6 of employment; and
- digital game developers - 6.3 per cent of businesses and 3.1 per cent of employment.

Table 23: Film, television and digital games in Australia, 2015-16

		NSW	VIC	QLD	SA	WA	Other	Australia	SA share %
Film and Video Production Businesses									
Businesses at end June	no.	1,381	798	303	126	173	76	2,819	4.5
Employment at end June	no.	8,200	4,245	1,272	336	357	229	14,638	2.3
Wages and salaries	$m	365.1	184.3	58.7	10.4	13.9	7.8	640.1	1.6
Total income	$m	1,351.6	653.7	168.3	30.9	73.8	24.2	2,302.5	1.3
Film and Video Post-Production Businesses									
Businesses at end June	no.	242	109	26	12	26	6	414	2.9
Employment at end June	no.	1,452	494	320	137	41	18	2,462	5.6
Wages and salaries	$m	106.8	34.4	18.4	np	np	np	174.2	np
Total income	$m	245.6	83.3	43.1	np	4.6	np	398.5	np
Commercial Free-to-Air Broadcasters									
Businesses at end June	no.	7	7	7	5	6	9	14	35.7
Employment at end June	no.	3,985	1,416	1,277	422	553	359	8,012	5.3
Wages and salaries	$m	527.9	92.0	77.9	33.8	45.8	25.8	803.2	4.2
Total income	$m	1,948.7	765.6	617.9	204.1	339.1	86.0	3,961.4	5.2
Digital Game Developers									
Businesses at end June	no.	13	42	12	5	7	7	80	6.3
Employment at end June	no.	146	381	148	23	17	19	734	3.1
Wages and salaries	$m	11.6	28.5	8.5	1.2	np	np	51.2	2.3
Total income	$m	21.9	63.2	np	2.5	np	3.1	111.1	2.3

Source: ABS 8679.0
Note: As businesses may have operated in more than one state or territory, the counts of businesses for each state do not sum to the total.
np = not published

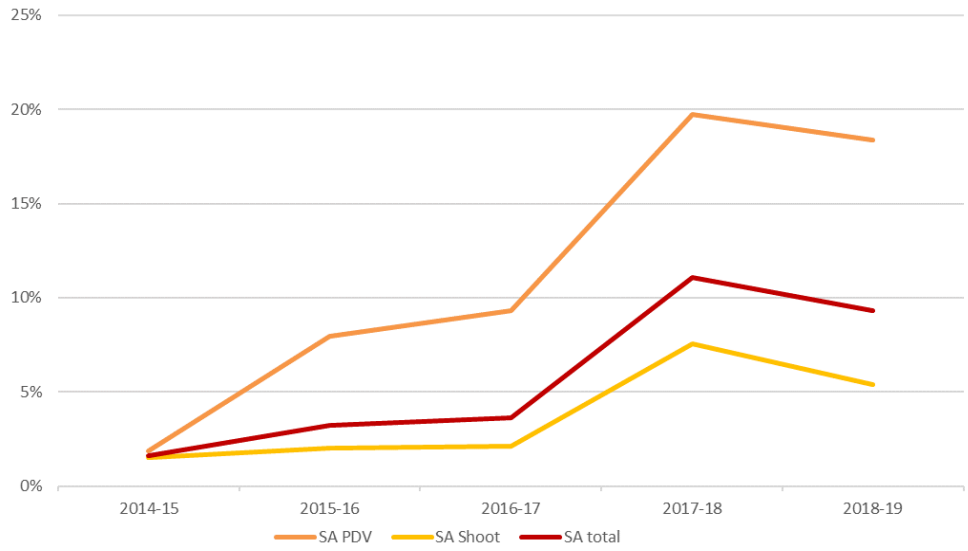
Some of these patterns may have changed over recent years. For example, the French post-production company Technicolor has since established its Mill Film post-production studio in Adelaide and it aims to employ up to 500 people within five years.

The fourth indicator that provides insight into the relative competitiveness of the state's creative industries is its share of national drama production expenditure. This includes expenditure related to the shooting of films, television and online drama productions, and post-production, digital and visual effects (PDV) work.

South Australia's share of national drama production expenditure has risen sharply over recent years, from 2 per cent in 2014-15 to 9 per cent in 2018-19 (see Figure 46). This improvement has been brought about by a large increase in expenditure on PDV work, with the state increasing its share of national PDV expenditure from 2 per cent to 18 per cent over this period. The state has also improved its performance in respect of shooting films, TV and online drama.

The recent improvement in the state's performance can be in part attributed to the introduction of state-specific production incentives for film and television production in South Australia. While incentives such as PDV rebates have improved the state's attractiveness as a destination for PDV businesses, similar schemes have recently been announced in Queensland and New South Wales, which will in turn increase their relative competitiveness. It is also important to acknowledge that successes such as this are in part due to luck in the form of the state having a few talented and entrepreneurial individuals who lead the development of a company or industry in a particular market niche.

Figure 46: South Australian share of national drama production expenditure (%), 2014-15 to 2018-19



Source: Screen Australia

The final indicator of relative comparative advantage considered here is the state's share of the video game development industry, which is a small but growing component of the creative industries sector.

The most recent industry snapshot prepared by the Interactive Games and Entertainment Association (IGEA) revealed that 9 per cent of Australia's video game development studios

and 9 per cent of its video game development full-time employees were located in Adelaide (see Table 24).

Table 24: National share of Australian video game develpment studios and employees (%), 2018-19

Studio location	Studio numbers as% share of national numbers	Full-time employees as % share of national employees
Melbourne	33	39
Brisbane	20	21
Sydney	17	23
Adelaide	**9**	**9**
Canberra	6	np
Perth	6	np
Hobart	2	np
Other	7	np

Source: IGEA; np = not published

Cultural venues and events

ABS data on attendance rates at cultural venues and events highlights that South Australia generally has a similar prevalence and pattern of attendance to the national average. South Australia is in line with the nation for museum attendance rates, slightly higher for libraries and archives, but slightly lower for art galleries (see Table 25).

Table 25: State attendance rate (per cent of state population aged 15 and over) at selected cultural venues and events, 2017-18

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
Cultural venues									
Art galleries	26.1	32.2	24.9	**24.4**	24.7	32.5	28.4	46.1	**27.7**
Museums	26.8	27.8	27.3	**27.4**	23.2	39.1	36.9	48.6	**27.5**
Libraries and archives	29.0	32.6	31.3	**32.4**	30.6	28.8	28.9	33.5	**30.9**
Performing arts:									
Live music concerts and performances	39.3	39.0	33.1	**40.0**	40.4	37.4	37.7	43.0	**38.2**
Theatre performances	16.6	18.7	12.9	**15.9**	16.3	18.1	14.3	23.6	**16.5**
Dance performances	11.4	10.0	9.0	**9.5**	11.4	10.3	11.5	12.7	**10.4**
Musicals and operas	16.2	19.1	13.5	**13.2**	13.8	13.1	9.5	17.7	**15.8**
Other performing arts	18.2	19.6	15.8	**30.9**	25.0	22.2	19.8	18.3	**19.8**
Total attending at least one performing arts event	54.1	55.7	47.5	**57.6**	55.6	53.5	49.0	61.3	**53.7**
Cinemas and drive-ins	66.3	69.0	66.0	**64.1**	67.2	59.1	56.4	80.0	**66.8**
Total attending at least one venue or event	81.1	84.3	81.0	**81.7**	83.4	80.3	76.2	92.5	**82.4**

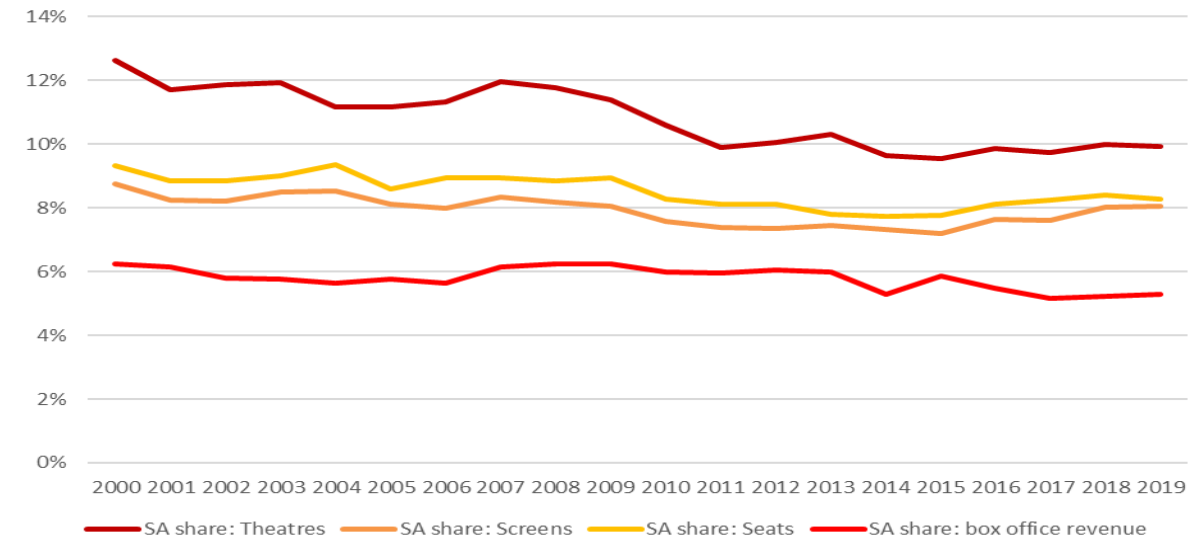
Source: ABS 4114.0

South Australia's attendance rates for other performing arts (31 per cent) are the highest in the nation, likely a result of the Adelaide Fringe Festival. Largely due to this difference, South Australia is second only to the ACT for residents attending at least one performing arts event throughout the year, with a 58 per cent attendance rate.

Screen Australia data highlights that the state has a higher proportional share of national cinema capacity in terms of theatres (10 per cent), screens (8 per cent) and seats (8 per cent).

As Figure 47 shows, the state's share of Australia's cultural attendances has trended downward over time along with the State's share of box office revenue, which can be partially attributed to the state's declining national share of the population.

Figure 47: South Australia's share of Australian cinema capacity and box office revenue (%), 2000 to 2019

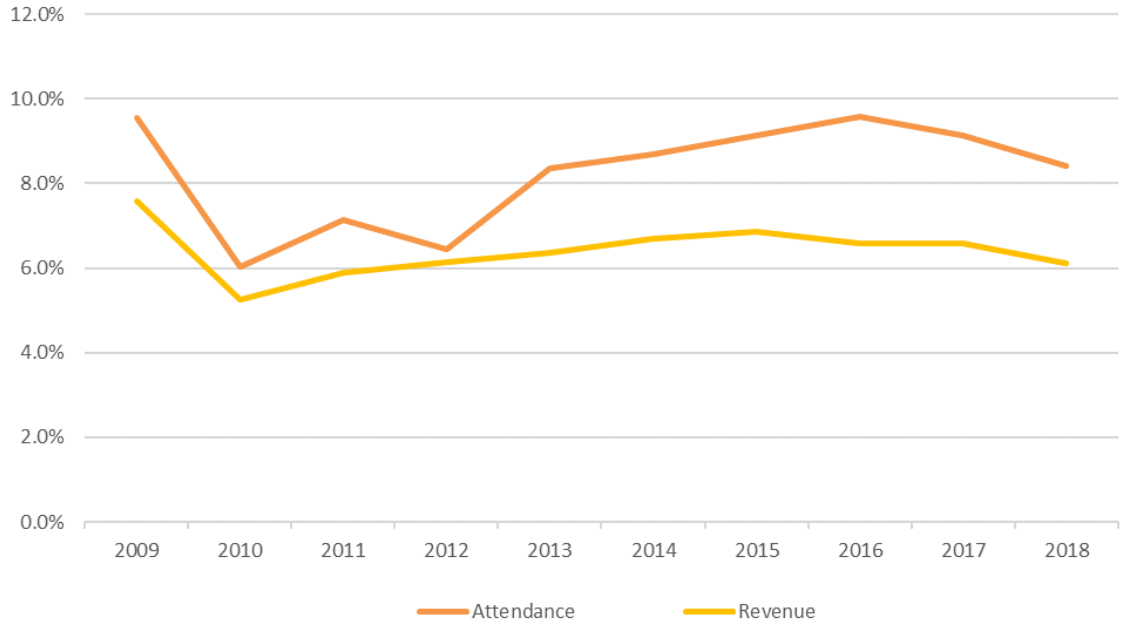


Source: Screen Australia

Ernst & Young was engaged by Live Performance Australia to undertake an annual compilation of ticket attendances and revenue for the live performance industry for the calendar year 2018 for its *2018 Ticket Attendance and Revenue Report*. The live performance industry encompasses performances, productions, previews and concerts that are performed in front of a live audience.

South Australia attracts a relatively high share of live performance attendance nationally at 8.4 per cent in 2018 which, as mentioned previously, can be partially attributed to flagship events such as the Adelaide Fringe, Adelaide Festival and WOMADelaide. However, in terms of revenue share the state is more in line with its share of the population at 6.1 per cent in 2018 (see Figure 48).

Figure 48: South Australia share of Australian live performance revenue and attendance, 2009 to 2018

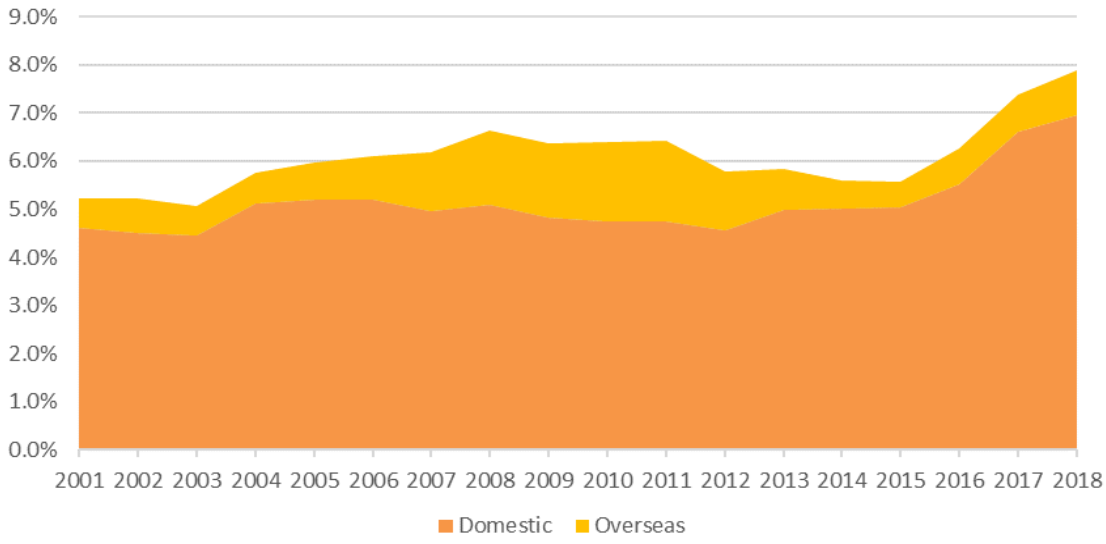


Source: Live Performance Australia

Education

South Australia's national share of higher education enrolments in the creative arts has risen strongly in the last few years, from 5.6 per cent in 2015 to 7.9 per cent in 2018. This is largely driven by a rise in enrolments of domestic students in both absolute and relative terms (see Figure 49).

Figure 49: South Australia share of higher education enrolments in creative arts (%), 2001 to 2018

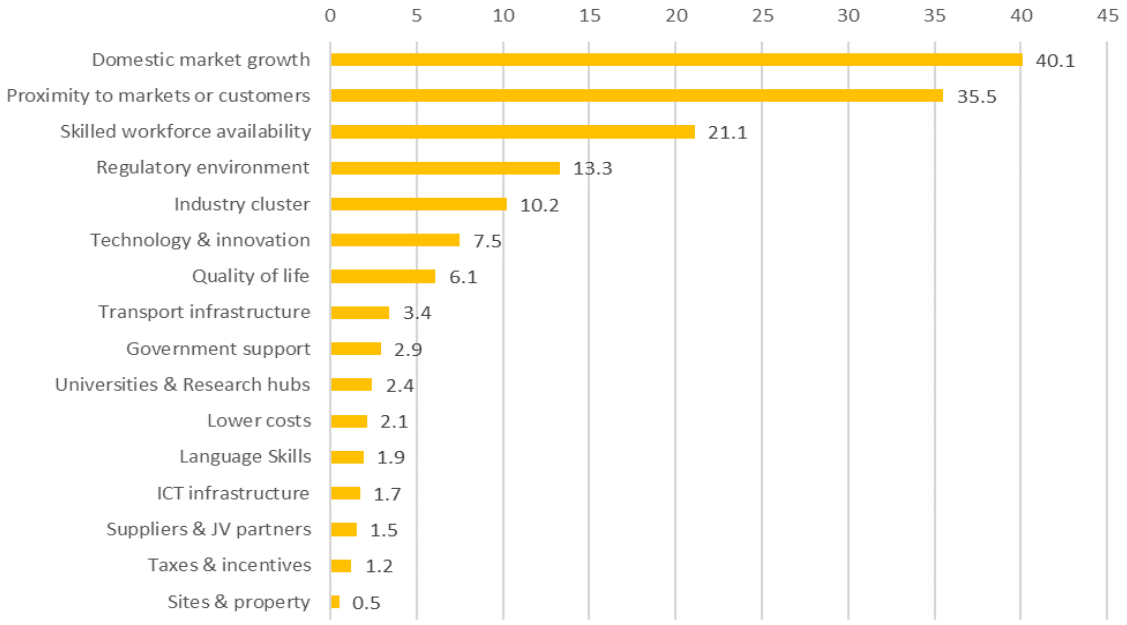


Source: Department of Education, Skills and Employment uCube

Other factors impinging on competitiveness

Surveys show that creative industries investors are most likely to invest in creative industries projects when overall market growth opportunities exist and there is sufficient proximity to customers (see Figure 50). Various other factors were also mentioned, although less frequently, such as the availability of a skilled workforce, the regulatory environment, having an existing industry cluster, technology and innovation, and quality of life.

Figure 50: Foreign direct investment (FDI) motives of announced FDI projects in the creative industries cluster, by proportion of projects with that motive (%) Jan 2003 to Nov 2019



Source: FDI Markets. Sample size: 2,279 projects for all available destination countries.
Note: Total exceeds 100 per cent due to observing multiple motives for some projects.

Table 26 shows that of the 505 foreign direct investment projects identified by FDI Markets in the creative industries cluster in Australia, South Australia accounted for:

- 3.8 per cent of projects;
- 3.1 per cent of inward investment; and
- 5.0 per cent of the jobs expected to be created from these projects.

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Table 26: Announced FDI projects in the creative industries cluster in Australia, Jan 2003 – Jan 2020

State / territory	Projects (no.)	Share of projects (%)	Capital expenditure($m)	Share of capital expenditure (%)	Estimated jobs created (no.)	Share of estimated jobs %
New South Wales	304	60.2	6746	61.0	7828	52.1
Victoria	111	22.0	2571	23.3	4392	29.3
Queensland	27	5.3	561	5.1	844	5.6
South Australia	**19**	**3.8**	**347**	**3.1**	**758**	**5.0**
Western Australia	8	1.6	180	1.6	422	2.8
Australian Capital Territory	5	1.0	94	0.8	156	1.0
Tasmania	1	0.2	10	0.1	41	0.3
Not Specified	30	5.9	547	4.9	574	3.8
Total	**505**	**100.0**	**11055**	**100.0**	**15,015**	**100.0**

Source: FDI Markets. Sample size: 505 FDI projects for companies investing in Australia in the creative industries cluster

4. What is probably important but missing from the data?

The statistical indicators that are presented here tell only part of the story regarding sector competitiveness. There are other things that it would be useful to know but for which there are no data. It is important that the reader be aware of this and not be led to think that the data presented cover all of the most important issues for each industry.

There are no broad spatial indexes of productivity such as might allow us to draw conclusions about the relative efficiency of industries in South Australia. Nor do we have broad indicators that show in an aggregate sense how favourable South Australia's operating environment is in terms of its regulation, culture and other controllable factors.

The policymaker who seeks to improve the competitiveness of South Australia cannot change every aspect of its competitive position. Among those things that the policymaker has influence over, which ones are important to the state's competitive position? And how can they be used to improve competitiveness? Often trade-offs will be involved and careful judgment is required.

The data in this study do not provide final answers to these questions, but they are a starting point. They indicate, among other things, comparative advantage, its cost structure, its significance in the national industry, trends over time and the factors that investors identify as important, and issues around innovation.

In addition, while it is interesting to identify the relative strengths and weaknesses of South Australia's growth industries, it is perhaps more important to understand what can be done to make them more competitive. After all, even if South Australia does perform better than other states in some respect, that does not mean that it should not seek further improvement.

4.1 Food, Wine and Agribusiness

South Australia has a comparative advantage in significant parts of the FWA sector although not all of it. It appears that much of this is related to the state's natural resource endowment and it is not possible to identify separately the impact of institutional and cultural influences on patterns of economic activity.

4.2 Minerals and Energy

The minerals and energy sector in South Australia has a comparative advantage in significant parts of the sector although not all of it. Similar to the FWA sector, much of this comparative advantage is related to the state's natural resource endowment.

4.3 International Education

Aggregate measures of international student activity suggest that South Australia has failed to grow the international education sector as quickly as the nation as a whole over the past decade. While there are general data sources available that provide insight into those key factors which international students take into account when selecting a study destination—e.g. cost of living and safe environment—these measures are generally not tailored for international students specifically. In some cases, there is also a lack of international comparative data, which is an important limitation given that international students will generally consider a range of countries.

Many overseas students are interested in settling in the country where they study after they complete. The prospects for securing residency are therefore likely to be quite influential in the study choice. The migration rules are broadly neutral across the Australian states, but it is possible that regional concessions favour education institutions in regional locations depending on their exact form. The stringency of the migration regime and the extent to which it favours regions is therefore a factor with an unmeasured impact on the competitiveness of the international education sector—in both the domestic and the international competitions for places.

There are no indexes of multifactor productivity such as might allow us to draw conclusions about the relative efficiency of the international education sector in South Australia. Measuring the output and therefore productivity of services activities such as education is challenging, while measuring the quality of these outcomes is even more difficult. Student perceptions and university rankings do provide insight into relative performance. But they do not always provide insight into more specific factors, such as the reputation of particular qualifications, which may be a particularly important factor for certain international students given their preferred field of study.

In some cases, important factors that affect South Australia's attractiveness to international students will be beyond the direct influence of South Australian policy makers. For instance, the ability to work while studying and the scope for post-graduate employment opportunities will depend heavily on Australian Government policy settings in respect of visa and work restrictions for international students.

4.4 Tourism

Aggregate measures of tourism performance suggest that South Australia is relatively disadvantaged in tourism outside niche areas such as food and wine catering to domestic visitors. Persistent low levels of international visitation across the business, education and leisure market segments undoubtedly reflect natural barriers and hard to move structural barriers that stand in the way of growing the tourism sector. These barriers include: the relatively small size of South Australia and its population-driven cultural and entertainment attractions relative to larger population centres on the eastern seaboard; the low share of international visitor flight arrivals; its climate and the range of natural attractions on offer; and the large distances to potential attractions once arrived in the state. There are no statistics that directly measure the extent of these strengths and weaknesses.

Some industry participants argue that lengthy approvals processes for tourism infrastructure pose a significant barrier to generating business activity within the sector. There are also questions about the requirements that must be met to secure approvals. These regulatory processes seek to balance the interests of those who benefit from tourism development and those who may be adversely affected by them, and striking the right regulatory balance is important.

South Australia has some inherent disadvantages in tourism, but it also has its strengths. The performance of the sector can be influenced by initiatives such as promotion and marketing strategies, the development of tourism events and attractions, and initiatives that promote access to destinations. Such initiatives can come from the private sector (e.g. the Tasmanian Museum of Old and New Art) or the public sector (e.g. Sydney Opera House and support for major events). Support initiatives need to be carefully considered and targeted, e.g. boosting tourism when activity is low rather than when the sector is at or near full capacity.

4.5 Defence and Space

As with the other growth state sectors reviewed in this report, regional data availability imposes constraints on the extent to which the relative competitiveness of the defence and space sector can be assessed. Then there are other potentially important factors for which statistical data does not answer the most policy relevant questions even where it is available. Readers should keep in mind that the assessments in this chapter are necessarily partial as a result.

Services export data also has important limitations. Whilst analysis of disaggregated goods export data has been able to accurately allocate exports to the defence and space sector, services data are only available in a much more aggregated form. This is particularly problematic for the emerging space sector as all of its services exports such as launch and telemetry services form small parts of much broader export categories. It was not possible to estimate defence and space services exports in this analysis.

As with many other sectors considered in this report, gaps in the availability of data on innovation meant that relative performance of the defence and space in this important driver of competitiveness could not be assessed. None of the ABS's data on innovation activities by firms are available at the state level, nor is industry level data on patents (a very important indicator of innovation output with potential commercial applications). Even business R&D spending data, which is available for many of the other growth state sectors, is not available for defence and space. The only innovation data available is R&D spending within higher education, as that is coded to socio-economic objectives, one of which is defence.

Finally, none of the available statistical data can identify the relative importance of the various indicators of competitiveness to the defence and space sector. This data cannot shed light on how amenable various aspects of competitiveness are to state government intervention, nor does it provide guidance on the relative effectiveness of potential interventions.

4.6 Health and Medical Industries

As with the other growth state sectors reviewed in this report, regional data availability imposes constraints on the extent to which the relative competitiveness of the health and medical industries sector can be assessed. Then there are other potentially important factors for which statistical data does not answer the most policy relevant questions even where it is available. Readers should keep in mind that the assessments in this chapter are necessarily partial as a result.

Services export data also has important limitations. Whilst analysis of disaggregated goods export data has been able to accurately allocate exports to the health and medical industries sector, services data is only available in a much more aggregated form. It was not possible to estimate Health and Medical Industries services exports in this report.

Gaps in the availability of data on innovation meant that relative performance of the health and medical industries sector could not be assessed. None of the ABS's data on innovation activities by firms are available at the state level, nor is industry level data on patents (a very important indicator of innovation output with potential commercial applications). Business R&D spending data, which is available for many of the other growth state sectors, is not available for the health and medical industries sector. Similar to the defence and space

sector, the only innovation data available is R&D spending within higher education, as that is coded to socio-economic objectives, one of which is health.

Finally, there are many important policy considerations related to competitiveness where this data cannot help. None of the available statistical data can identify the relative importance of the various indicators of competitiveness to the health and medical industries sector. This statistical data cannot shed light on how amenable various aspects of competitiveness are to state government intervention, nor does it provide guidance on the relative effectiveness of potential interventions

4.7 Hi Tech

As with the other growth state sectors reviewed in this report, regional data availability imposes constraints on the extent to which the relative competitiveness of the Hi-tech sector can be assessed. Then there are other potentially important factors for which even national level data does not exist. Readers should keep in mind that the assessments in this chapter are necessarily partial as a result.

One important issue regarding data availability is the way in which the Hi-tech sector has been defined for the purposes of growth state. The sector does not map readily to existing ABS classifications such as the industry sectors.

Services export data also has important limitations. Whilst analysis of disaggregated goods export data has been able to accurately allocate exports to the Hi-tech sector, services data is only available in a much more aggregated form. For example, it is likely that some of the services exports coded to 'Scientific research services' fit within the Hi-tech sector exports within this group could also sit within other growth state sectors such as health and medical industries, or defence and space, or be within industry sectors not included in growth state.

Innovation is very important for the Hi-tech sector, however at the state level data on innovation activities and outputs are very limited. For example, none of the ABS's data on innovation activities by firms are available at the state level. Similarly, whilst patents are a very important indicator of innovation output with potential commercial applications, data on the sector to which patents relate is only available at the national level. This means that only R&D spending can be used to shed a light on the relative innovation performance of South Australian Hi-tech firms.

None of the available statistical data can identify the relative importance of the various indicators of competitiveness to the Hi-tech sector.

4.8 Creative Industries

High-level measures of revealed comparative advantage suggest that South Australia is relatively disadvantaged in creative industries outside specific areas such as festivals, cinema and post-production. Below-average representation across other sectors of the creative industries is partly a consequence of strong agglomeration effects with creative industries clustering in New South Wales.

Obtaining a fuller picture of performance across the various sectors is ultimately hampered by a lack of timely indicators. These deficiencies include a lack of comprehensive measures on the total number of cultural venues and facilities, satisfaction with cultural facilities, patent applications in respect of the creative industries, and new jobs created in new creative enterprises.

Given the disparate nature of the creative industries there are no indexes of multifactor productivity such as might allow us to draw conclusions about the relative efficiency of the creative industries sector in South Australia. Nor do we have broad indicators that show in an aggregate sense how favourable South Australia's operating environment is in terms of its regulation, culture and other controllable factors.

Although the creative industries do not draw very much on natural resources, their location choices are likely to be affected by the availability of 'soft' resources such as the depth of industry-relevant networks. For example, decisions by television networks to locate functions in the large eastern state capitals likely relate to the depth of labour markets, frequency of relevant events, prominence on the international performance sector, etc. and it is difficult to overcome disadvantages like these. The achievements of some parts of South Australia's creative industries—such as its internationally-recognised events—in overcoming some of these barriers should not be underestimated.

Obtaining more precise measures of the relative performance of the sector is hampered by the small and diverse nature of the creative industries. In assessing the sector's performance, it is important to bear in mind its strong connection to other sectors, especially tourism.

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