

Industry Policies of the South Australian Government[†]

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1. Introduction

Australia is a country rich in minerals and land. According to the Department of Foreign Affairs and Trade (DFAT) (2010), Australia's major merchandise exports in 2010 were minerals (30.1%), fuels (28.8%), gold (6.2%), and processed and unprocessed food (10.6%; the figures in parentheses are shares in total export value). This trade structure is the reason Australia is often called a 'lucky state'. However, manufactured goods composed 14.7% of total merchandise export value, and elaborately transformed manufactures, such as pharmaceutical products, machinery for specialised industries, and road motor vehicles and parts, composed more than 60% of the total manufactured goods export value. Adelaide, the capital city of South Australia with population of 1.2 million, traditionally has a strong manufacturing sector. The 2006 Census showed that its employment rate in the manufacturing sector was the highest of all capital cities at 15%.

However, the reduction of tariffs on imported goods has exposed the manufacturing industries in Adelaide to severe international competition,¹⁾ and led to the reduction or discontinuation of production. Recently, the strong Australian dollar has further challenged manufacturing companies (hereafter, we denote the Australian dollar (or A\$) simply as the dollar (or \$) unless special mention is needed). According to the Australian Bureau of Statistics (ABS) (2011), 'South Australia's manufacturing industry showed negative growth in both employment and production between 2000–01 and 2009–10'. Moreover, the area may also suffer from low population growth. From 2004 to 2009, population growth in Adelaide was at 1.0%, far below the level in Perth, Western Australia (2.6%), and Brisbane, Queensland (2.3%). To make matters worse, young and talented people have a tendency to move to larger cities, especially Sydney, New South Wales, and Melbourne, Victoria, to pursue job opportunities at large companies (see Table 6 at the end of the article).

Confronting strong headwinds to economic growth, the South Australian government, under Premier Mike Rann, who was elected in 2002 and re-elected twice thereafter, has promulgated new

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1) The tariff on imported cars, for instance, has been decreased gradually from 37.5% in 1991 to 15% in 2000, to 10% in 2005, and to 5% in 2010.

and sometimes unique industry policies to strengthen and diversify industries in Adelaide. These policies put emphasis on improving the business environment for science, technology, and innovation, and are fundamentally different from former policies typically described as ‘corporate welfare’, though the government still maintains policies of this type to a lesser extent. This article reviews and tentatively evaluates the outcomes of these policies. In order to inject comparative rigour, it occasionally compares South Australia with other states in Australia or Silicon Valley in the U.S., which boasts the most concentrated industry clusters in the world (The South Australia government seems to take Silicon Valley as a model). If necessary, we use the data of South Australia for that of Adelaide; this is appropriate because Adelaide composes around 80% of the total population in South Australia.

2. Main Industries

This section gives a brief account of the traditional industries in Adelaide and the new industries which the South Australian government has tried to develop. Some references are made to a relationship between these industries. Agriculture and wine production are prosperous in the south-east region of South Australia, but they are not addressed in this article.

2. 1. Automotive Industry

GM Holden, a subsidiary of U.S.-based General Motors (GM), has a plant in Playford in northern Adelaide. Holden was founded in 1856 by James A. Holden as a saddlery manufacturer. Holden entered into automotive manufacturing in the early 20th century and was acquired by GM for which it had supplied car bodies. Though Holden now has its head office and an engine plant in Melbourne, it assembles automobiles at its Playford plant and a large number of parts manufacturers cluster around it. According to the South Australian government, ‘[i]n 2006, GM Holden built 125,000 cars, of which 46,000 were exported’ (southaustralia.biz website). However, automobile production in Australia has been decreasing since 2005 owing to the previously noted tariff reduction, a strong Australian dollar, and production increases in China and India. Mitsubishi Motors closed its Adelaide plant in 2008.

2. 2. Defence Industry

The automotive industry became a base for weapons production in Adelaide during World War II (Trainor undated). Now, Adelaide hosts army, naval, and air bases and the Defence Science and Technology Organization (DSTO), a research institute of the Department of Defence (DOD). Though facilities of the DSTO are placed in all states and the Northern Territory, the DSTO Edinburgh in northern Adelaide is the main hub employing about 1,270 scientists, engineers, and spe-

cialist personnel in the System Sciences Laboratory and the Information Sciences Laboratory (DOD 2005). The DSTO Edinburgh not only conducts independent research, but also outsources research to local universities and businesses. In 2003–04, the DSTO spent roughly \$176 million on R & D (South Australian Govt 2004). The whole army also outsources to local businesses. These organizations form the main infrastructure of the defence industry in Adelaide. Moreover, '[t]he DSTO is an enormous resource that has resulted in a large pool of people either creating their own defence spin-offs or branching out . . . with their own ideas' (David Suter; cited in Tekelek 2003). South Australia acquires around a quarter or \$1.2 billion of Australian defence procurement from domestic sources; the ratio is much higher than its population ratio (7.4%).

2. 3. Mining Industry

In South Australia, mining was already a leading industry in the middle of the 19th century. Large-scale operations are currently at mines and deposits such as Olympic Dam (copper, gold, uranium), Challenger (gold), Prominent Hill (copper, gold), Cairn Hill (iron, copper, gold), and others. In 2008–09, mineral was the largest export item, composing 29% (\$9.5 billion) of the total exports (sa.gov.au website). The 2006 Census stated that the mining industry employed 11,175 people in the state.

2. 4. Information and Communications (ICT) Industry

The ICT industry has developed in Adelaide in order to support the defence industry and the mining industry. Though the distinction with the defence industry is unclear, the South Australian government states that '[it] employs about 20,000 people and contributes about \$6 billion to the State economy annually' (sa.gov.au website). The DSTO and three local universities also have many researchers in this sector. ILA (2002) estimates the total number of researchers in universities to exceed one hundred. ICT also contributes to the mining industry 'through the automation of large mines, automation of risky extraction, [and] mine design and green fields exploration' (Ovum 2003, p.26).

2. 5. Biosciences Industry

The Faculty of Health Sciences at the University of Adelaide (hereafter Adelaide University) and its affiliated hospitals are located near the North Terrace region. This, combined with the intention of the state government to diversify its industries in Adelaide, gave birth to the biosciences industry in Thebarton, just west of North Terrace. Flinders University in southern Adelaide also has the same faculty and an affiliated hospital. Bio Innovation SA (hereafter BioSA) estimates that '[a]pproximately 100 bioscience companies currently operate in South Australia, employing more than 1,700 people and generating about \$282 million in revenue' (website).

3. Universities

Universities employ scholars who research in science and technology and educate students who will be involved in R & D and innovation activities after graduation. Then, universities could play an important role in promoting local industries based on science, technology, and innovation. Many researchers on Silicon Valley take local universities, especially Stanford University, as main constituents of the region's economic system (Castilla *et al.* 2000, Cohen and Fields 1999, Gibbons 2000).

Adelaide has three public universities: Adelaide University (est. 1874, students: around 20,000), Flinders University (1966, 16,000), and University of South Australia (UniSA; 1991,² 36,000). Not only Adelaide University, a member of the 'Group of Eight' but also Flinders University and UniSA are highly evaluated inside and outside Australia. In 2010, Quacquarelli Symonds (QS) ranked them 8th, 11th, and 16th in Australia (among 39 universities) and 103rd, 251st, and 281st in the world, respectively (see Table 1).³ As QS used academic reputation, employer reputation, and citation per faculty among others as bases for evaluation, its rankings are thought to indicate the quality of researchers and students at each university.

However, Adelaide is not superior to other Australian capital cities in respect to the university rankings and the following points may attract more interest in regard to the contribution of Adelaide universities to local industries.

The first point is that universities, in cooperation with the South Australian government and local businesses, undertake human resource development and R & D for local businesses. Regard-

Table 1 World University Rankings 2010

	Total	Arts/ Humanities	Life Scis./ Medecine	Natural Scis.	Social Scis./ Management	Engineering/ Technology
Adelaide Univ.	103 (8)	151(tie)	85	158	133(tie)	131
Flinders Univ.	251(11)	***	160(tie)	***	***	***
UniSA	281(16)	***	***	***	199(tie)	278(tie)
Carnegie Mellon	34	108	166(tie)	123(tie)	70(tie)	12
UCL	4	12	15	50(tie)	25	51

Note) The figures within parentheses are the rankings in Australia; ***: no ranking

Source) <http://www.topuniversities.com/university-rankings/world-university-rankings/2010/results>.

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- 2) The merger of the South Australian Institute of Technology (SAIT; est. 1960) and the South Australian College of Advanced Education (est. 1982) created UniSA. The SAIT has its origin in the South Australian School of Mines and Industries (est. 1889).
- 3) In the same year, the Melbourne Institute ranked them 7th, 24th (tie), and 17th (tie) respectively in Australia (among 41 universities), and it should be noted that Adelaide University was ranked 2nd in biological and biotechnological sciences and UniSA was ranked 1st in physical, chemical and earth sciences.

ing R & D, universities have research institutes and centres; UniSA and Flinders University have 22 and 19 university institutes and centres, respectively, and Adelaide University has a total of 20 centres under 5 university institutes (websites).⁴⁾ They also implement joint research programs with other institutes and businesses, sometimes leveraging the Cooperative Research Centres (CRC) Program of the federal government. The CRC Program was commenced in 1990 to ‘link researchers with industry to focus R & D efforts on progress towards utilisation and commercialisation’ (DIISR 2010). The federal government provides \$20–40 million funding to each successful applicants and the South Australian government also provides funding for some selected CRCs which have tight relationship with state industries. In 2010, the South Australian government provided \$1.2 million in total for 12 CRCs. More recently, UniSA inaugurated the Master of Military System Integration program in the Defence and Systems Institute with partners BAE Systems Australia, Saab Technologies Australia, and ASC in 2006. The university converted it to an online program in 2009 to ‘increase participation especially by industry, Defence civilians and ADF [(Australian Defence Force)] members’ (Combet and Rann 2008). In 2008, Adelaide University and UniSA co-founded the Defence Systems Innovation Centre ‘to provide leading-edge advanced engineering and research expertise, advice, and services of direct relevance to the defence community’ (UniSA 2008). Both projects were accomplished with financial support from the South Australian government. These instances are never comprehensive (see also ILA 2002, South Australian Govt 2004).

The second is the invitation of famous foreign universities such as Carnegie Mellon (Heinz College) and University College London (UCL) under the ‘University City Project’ of the state.⁵⁾ Carnegie Mellon opened its Adelaide campus in 2006, and Heinz College now offers two Master of Science programs, one in information technology and the other in public management. The U.S. News & World Report ranked the College in the U.S. 1st and 10th (tie) in computer science and public affairs, respectively, and QS ranked Carnegie Mellon 34th overall, 12th in Engineering & Technology (hereafter, we use only QS rankings). UCL, a distinguished university ranked 4th overall, inaugurated the School of Energy and Resources in 2010 in partnership with Santos, a local resources company. The government’s invitation standard is whether the university will contribute to the local economy, especially to its main industries. For instance, Premier Mike Rann expected UCL to ‘complement this State’s development of its immense resources in uranium, geothermal hot rocks, copper and other minerals’ (Rann 2008). The South Australian government provided \$20 million of financial support for Carnegie Mellon’s Adelaide campuses and spent \$4 million for the

4) Universities also host some ARC Centres of Excellence and ARC Special Research Centres, which are funded by the Australian Research Council (ARC), an agency of the federal government.

5) The Royal Institution of Great Britain (est. 1799), though not a university but a charitable education and research institute, also opened a sister school, the Royal Institution of Australia in Adelaide in 2009 with financial support from the South Australian government (\$12.7 million) and the federal government (\$15 million).

renovation of a building which UCL now occupies. No other state governments have invited foreign universities.

The third is a large increase of overseas students accepted by universities and other education institutes in Adelaide. The number of overseas students surged from 11,000 in 2002 to 28,000 in 2008. Education is now an important industry and education institutes supply educated overseas students to local industries. In this respect, it is well known that overseas students (mainly from China and India) in Silicon Valley, after graduation, work as engineers and/or entrepreneurs and contribute to industry development in that region.

4. Liveability

The formation of advanced technology industries requires the gathering of talented people. As discussed in the previous section, Adelaide has three universities, and they produce a lot of graduates. However, labour has mobility, and therefore, the liveability of a city becomes critical for attracting and retaining talented people (Florida 2008). Adelaide has been highly ranked in *The Most Liveable Cities in the World*, an annual survey by the Economist Intelligence Unit (EIU) (see Table 2).⁶⁾ Other Australian cities like Melbourne, Perth, and Sydney have also been highly ranked, but Adelaide has attractions of its own in addition to elements shared with those cities. Some of the advantages are products of efforts by the South Australian government, and it publicizes the survey results on its website on businesses and industries in the state (southaustralia.biz, Why Choose SA?; Then, a policy to improve the level of liveability could be taken as an industrial policy in a broad sense).

The first advantage of Adelaide is the city itself. The city of Adelaide is laid out in a grid pat-

Table 2 The Most Liveable Cities in the World

	2010		2011	
1	Vancouver	Canada	Melbourne	Australia
2	Vienna	Austria	Vienna	Austria
3	Melbourne	Australia	Vancouver	Canada
4	Toronto	Canada	Toronto	Canada
5	Calgary	Canada	Calgary	Canada
6	Helsinki	Finland	Sydney	Australia
7	Sydney	Australia	Helsinki	Finland
8	{ Perth	Australia	Perth	Australia
9		Adelaide	Adelaide	Australia
10	Auckland	New Zealand	Auckland	New Zealand

Source) *The Economist*, 'Liveability Rankings,' 2010/8/30, 2011/2/11.

6) A national survey by the Property Council of Australia (*My City: The People's Verdict*) ranked Adelaide as the most liveable city among Australian capital cities in 2011. However, liveability is the collection of subjective indicators and different surveys have different rankings.

tern and is surrounded by green belts which cover 7.6 km². The Adelaide Park Lands and City Layout is registered as a National Heritage. To the east of the city rises Mount Lofty. Barossa Valley, a famous wine producing district, is located at the foot. To the west of the city lies Gulf St. Vincent and beautiful beaches stretch in a row. Kangaroo Island, a treasure land full of wild animals, is also close to the city.

The second advantage is education quality. According to the 2007 TIMSS survey on mathematics and science achievement of fourth- and eighth-grade students, 12 countries (out of 37) in mathematics and 8 countries in science had a significantly higher score than Australia at grade four (the significance level is 5%). However, at grade eight, only 9 countries (out of 50) significantly surpassed Australia in mathematics and 10 in science.⁷⁾ Inside Australia, though the score of South Australian students was significantly lower than those of New South Wales and Victorian students in both subjects at grade four, the scores of South Australia and other states did not have significant differences at grade eight (Thomson *et al.* undated).

The third advantage is public safety. The *International Crime Victims Survey* in 2004–05 (van Dijk *et al.* 2007) ranked Australia 16th among 29 surveyed countries (mainly developed countries) in the crime rate. The ABS (2005) demonstrates that South Australia's crime rate is not relatively low in the country. However, according to a recent survey by IDP Education, overseas students rate Adelaide the safest city in Australia (Kemp 2009). The author also heard from some Australians that the risk of children becoming alcohol or drug abusers is lower in Adelaide than in other eastern coastal cities.

The fourth advantage is cultural facilities or activities. The South Australian government manages a museum, an art gallery, a theatre, and a botanic garden in Adelaide, all of which are proud of their rich history and/or large collections. It also supports many festivals: South Australia is known as the 'Festival State.' The Adelaide Fringe, for instance, is qualified as 'the largest fringe festival in the Southern Hemisphere'. Adelaide also has sports facilities, and some professional sports clubs are based in the area.

The following advantages are related to the small size of Adelaide among capital cities in Australia. The fifth advantage is prices. According to the EIU's *Worldwide Cost of Living*, the prices in Adelaide are the lowest in five capital cities. The median house price in Adelaide is \$410,000 or 66% of that in Sydney and 73% of that in Melbourne (the house price in Australia has been generally increasing for the past ten years; QBE LMI 2010). While the average annual wage in Adelaide is also the lowest among capital cities, the wage in Adelaide is 81% of that in Sydney and 90% of that in Melbourne (ABS undated); the differences are comparatively small.

7) It should be noted that Australia emphasizes developing the ability of each student, not cramming knowledge into his/her head like some Asian countries which occupied the top rankings in each subject at each grade level.

Lack of traffic is the sixth advantage. Fleetcare (2007) shows that the degree of drivers stress is lower in South Australia than in other states. This may be due partially to the proximity between an individual's residence and office as Adelaide is called the 'twenty-minute city'. Moreover, Adelaide has a convenient public transport system.

The seventh advantage is the social climate. The social climate of Adelaide is expressed by the words such as 'friendly', 'welcoming', 'tolerant', and 'relaxed'. Dunn *et al.* (2010) demonstrates that the degree of racism in South Australia is lower than that in New South Wales and Queensland.

All of these advantages of living in Adelaide enable various people to enjoy their lifestyles and consider Adelaide liveable. Adelaide is also tapped as 'a great place to bring up kids' (Plane 2003)-a substantial attraction for families with children.

5. Industry Policies of South Australia

The South Australian government also adopts policies which directly impact businesses and industries. This section discusses the government's policies on its own agencies, industrial parks, venture capital, and grants.

5. 1. Government Agencies

In South Australia, the Department of Trade and Economic Development (DTED) is the government agency responsible for implementing economic policy, including industry development. The DTED also assists Innovate SA (est. 2009), a business consultant, to achieve that purpose. Innovate SA instructs small business managers how to take grants and venture capital investments. Moreover, Defence SA (est. 2007), which is 'Australia's only dedicated state agency for all defence-related matters' (Defence SA undated) and BioSA (est. 2000), a subordinate agency of the Department of Further Education, Employment, Science and Technology, are tasked with developing particular industries by committing themselves to policies mentioned below. The Department of Premier and Cabinet takes the initiative of the 'University City Project' as noted in section 3.

5. 2. Industrial (or Research) Parks

Adelaide has some industrial parks: Edinburgh Parks (est. 2003) in Salisbury, Technology Park Adelaide (est. 1982) in Mawson Lakes, and Techport Australia in Osborne (partially under construction), mainly for defence and ICT companies.⁸⁾ The Defence Precinct at Edinburgh Parks

8) The DTED is redeveloping the former Mitsubishi site at Tonsley Park mainly for sustainable technology (aka environmental, clean, or green technology) companies. The Sustainable Industry Education Centre is to be built on the site at a cost of \$125 million. It will train around 8,000 people in sustainable technologies.

accommodates an air base and the DSTO, and the Automotive Precinct hosts companies which deliver automotive parts to Holden. Technology Park is adjacent to UniSA's Mawson Lakes campus, home to the Division of Information Technology, Engineering and the Environment and related research institutes and centres, and hosted 87 companies in early 2011. Bioscience companies cluster in the Thebarton Bioscience Precinct. These industrial parks have been developed and managed by the South Australian government (precisely, the first three by Land Management Corporation, the last one by BioSA). Edinburgh Parks cost \$1,900 million, and more than 300 million has been invested in facilities at Techport. To develop the Thebarton Bioscience Precinct, the South Australian government bought up an old tannery and cleaned up contaminated soil in the area (Dean 2010). In 2009, BioSA built the \$12.9 million BioSA Incubator building to 'lease new [bioscience] companies modular office and laboratory space at subsidised rental rates' (O'Neill 2004).

There are two reasons why the South Australian government develops industrial parks. The first reason is the formation of industry clusters which facilitate knowledge sharing through collaboration. The government reckons that knowledge sharing will lead to the creative use of the relevant knowledge and innovation (South Australian Govt. 2004).⁹⁾ Jurgen Michaelis, Bio Innovation SA CEO, states that '[the bioscience] industry relies heavily on tacit information – information that hasn't been written down but is shared between people' (Dean 2010). He also considers that constructing industrial parks is one of a few options for South Australia, an economy that is comparatively small and therefore cannot offer substantial grant programs (McDonald 2006; grant program is discussed in section 5.3).

The second reason is the provision of infrastructure. The website of Techport states that it provides infrastructure to 'support ASC to deliver the Royal Australian Navy's next generation...Air Warfare Destroyers' and to 'attract future naval shipbuilding and repair opportunities to the state'. Research institutes in industrial parks are linked together and with universities by an optical fibre telecommunications network (abbreviated as SABRENet), which facilitates closer and more diverse collaboration among them. At the launch, Premier Rann spoke proudly that 'It will make [South Australia] the only place in Australia to have a network connecting all key research and education sites with optical fibre' (Russell 2007).

The industrial park first appeared in South Australia and has spread to other states in Australia. However, the South Australian government thinks that being 'an established hub of defence companies' is an advantage of Technology Park Adelaide in attracting businesses. Industrial parks in South Australia have another advantage in low sale and lease prices (see Table 3).

9) Porter (1998) insists that both collaboration and competition among companies are essential for the working of an industry cluster and the development of a local economy. Regarding Adelaide's defence industry, BAE Systems Australia is the largest defence company in South Australia. A Dun & Bradstreet's database, Company 360, identifies two Adelaide companies-Saab Technologies Australia and Minelab Electronics- as its rivals (though the three companies are located at different industrial parks in Adelaide).

Table 3 Cost Competitiveness of Industrial Parks in Adelaide

	Distance from CBD	Price Per Sqm
Edinburgh Parks	25 km	\$65–95
Adelaide (Inner North West)	10–20 km	\$170–215
Melbourne (West)	15–25 km	\$160
Brisbane (Outer South)	20–30 km	\$300
Brisbane (Gateway South)	10–20 km	\$375
Sydney (Outer South West)	30–40 km	\$350
Sydney (Outer Central West)	20–30 km	\$350
Sydney (Outer North West)	30–40 km	\$325

Note) Technology Park and Techport are both located 10–20 km far from Adelaide CBD.
 Source) SA Government, *Edinburgh Parks, Adelaide: Central to Your Success*.

By the way, the industrial park has a worldwide origin in Stanford Industrial Park (now Stanford Research Park), which Stanford University developed in the immediate vicinity in 1951. It has been called ‘nucleus of Silicon Valley’, and now boasts around 150 companies. These companies are allowed to enforce joint research with faculty, to recruit graduates, to use the library systems among others (Stanford University website).

5. 3. Venture Capital and Grants

Start-ups generally earn no profit in the first years of operation; thus, initial financing is extremely important. Simultaneously, high risk and no assets restrict their ability to obtain funds. In Silicon Valley, there exist venture capitals (VCs) which specialise in investing in start-ups (Kenny and Florida 2000). VCs also offer valuable business management know-how to their portfolio companies. In Australia, taxation treatment of capital gains and stock options reflects ‘its own unique egalitarian style of society’ (Ferris 2001, p.48), and is deemed to have restricted the development of the VC business.¹⁰⁾ As a result, start-up founders must typically rely on their own capital or bank loans (Peacock 2004, ch.8) and are forced to exclude business models which require substantial initial costs. In 1997, the South Australian government founded a VC, Playford Capital, and used it as a base to invest in ‘high growth, technology-based [start-ups] in [IT], life sciences and clean technology’ (Playford Capital website; this could be another means to cope with its small pocket). On September 2010, Playford announced that it had placed a total of \$100 million of investments, and that ‘[its] investment had enabled 42 companies to gain a firm footing in their business sectors, while more than 800 businesses had received business advice and support’ in the state (Playford 2010). This type of state commitment to a VC is exceptional in Australia (Snelling

10) Relatively high interest rates may be another reason for inactivity of the VC business in Australia. Peacock (2004) calculates that a start-up may be required to earn a return of 40–50 % per annum based on the treasure bond yield of about 8%. Most early stage start-ups are not able to earn such a high return.

2010). BioSA created a \$35 million VC fund, the South Australian Life Science Advancement (SALSA) Fund, with a VC in Australia and has entrusted its management to a local private fund management company.

The South Australian government offers various grant programs, some of which also aim to assist new technology development or commercialization by start-ups and SMEs. Among these programs are the Bio Innovation SA Business Development Initiative (BDI), the Cleantech Partnering Program, the Small and Medium Enterprise Investment Development Program (SMEIDP), and the Tomorrow Start program. However, the grants issued by these programs are moderate. The BDI and the SMEIDP set the upper limit on their grants at \$250,000 and \$200,000, respectively (Innovate SA website). The state and local governments also provided financial support to universities to a total of almost \$60 million in 2009 (Audit Reports by the Australian Universities Quality Agency).

6. Evaluations

To what extent have the industry policies of the South Australian government, including those related to education and liveability, succeeded? This section begins by evaluating the outcomes of each policy, and then tentatively evaluates the outcomes of policies as a whole through the change of business activities in industries introduced in section 2, except the automotive and the mining industries (the latter is influenced largely by exogenous factors, especially the quality of mines or ores).

6. 1. Universities

High-ranking universities bring superior scholars and students to their cities. As we have seen in section 3, Adelaide universities have been highly ranked by QS and other institutes. However, it was only 2004 when QS (and Times Higher Education jointly) publicized the top 200 world university rankings. Therefore, university rankings are not available to assess the change of universities' innovation abilities. However, we should remember that Adelaide universities, sometimes in cooperation with the South Australian government, actively undertake R & D which is needed by local businesses. The performance of foreign universities in attracting students to the area is disappointing. Carnegie Mellon has failed to attract students, and *The Advertiser* on October 23, 2010 carried a story titled 'Carnegie Mellon Campus Faces Closure with Poor Enrolment' (Hood 2010). The South Australian government also invited Cranfield University, which engages in defence education and research in the U.K. However, the university's activity record is so poor that the Adelaide campus is described as a 'phantom campus' (Mathaba. Net 2010). Regarding overseas students, the government has succeeded in increasing their number, but it is not clear how many have

stayed or will stay in Adelaide because it depends heavily on the immigration policy of the federal government.¹¹⁾ Currently, acquiring permanent residence is not easy even for a university graduate.

6. 2. Liveability

We discussed the high level of liveability of Adelaide in section 2. Some companies claim that the city's liveability is the main factor in attracting skilled persons from around the globe and contributes to the low attrition rate in Adelaide; both these turn to advantages of a company located in Adelaide (South Australian Govt 1999). However, Sly (2004) indicates that the number of university graduates who take jobs outside South Australia has been increasing and recent data bolsters this claim. South Australia recorded a net outflow of population in 2008–09 and '[p]eople aged 20–39 years accounted for 47% of all interstate movers, while comprising 27% of the total South Australian population' (ABS 2010). This may indicate that the liveability of Adelaide does not appeal much to people in that age bracket, and the 'brain drain' problem has not been solved (though the characters of interstate movers in respect to school and business careers are not clear). In addition, it is feared that the strong Australian dollar will damage the international advantage of Adelaide vis-à-vis liveability.

6. 3. Industry Policies

6. 3. 1. Industrial Parks

A positive evaluation could be given to defence industrial parks which host a large number of diverse companies with different sizes such as subsidiaries of multi-national companies, local established companies, and start-ups. Regarding ICT, Parker (2001) evaluates Technology Park Adelaide as 'the most successful research park in Australia' (p.158). However, it is Macquarie Park Corridor in Sydney which is sometimes described as 'Australia's Silicon Valley'. Technology Park Bentley in Perth, and Gold Coast Technology Park are considered to have the potential to become similar successes. Regarding biosciences, AusBiotech, an Australian industrial association, has 54 members (mainly companies) in South Australia as of 10 May 2011 and 501, 259, 163, and 159 members in New South Wales, Victoria, Western Australia, and Queensland, respectively (website). South Australia compares unfavourably with other states in respect to levels of industrial accumulation in these industries. However, in terms of knowledge sharing among research institutes, SABRENet and the BioSA Incubator building are noteworthy. Moreover, we should take into account differences in population and economic size among cities or states in the assessment.

11) The South Australian government supports a graduate, especially a master's or doctor's degree recipient from an institute in the state to acquire the Skilled Sponsored Visa (Subclasses 886). Adelaide is the only large city where a person with the Regional Sponsored (Provisional) Visa (Subclasses 475, 487) is allowed to reside.

6. 3. 2. Venture Capital and Grants

Despite some policy responses of the federal government, such as the revision of the capital gain tax,¹²⁾ investment by Australian VCs is still tepid. The total amount was A\$1,624 million in 2010 fiscal year (AVCAL 2010); this amount is paltry in comparison with the US\$17,691 million investment by U.S. VCs in 2009 (NVCA 2010). The difference is even more remarkable in early-stage investment¹³⁾: A total of A\$168 million in Australia versus US\$6,286 million in the U.S. over the same time frame. Moreover, inside Australia, the South Australia's take of VC investment was only 2% while Queensland, Victoria, and New South Wales acquired 23%, 18%, and 16% of VC investment, respectively (see Table 4). Regarding the number of AVCAL members which included not only VCs but also business consultants, South Australia had 10 members as of July 27, 2011, while New South Wales, Victoria, and Queensland had 163, 45 and 17 members, respectively (website). Such figures may demonstrate that policies on venture capital are ineffective not only in supporting start-ups but also in promoting the VC business in Adelaide.

As discussed in section 5.3, Playford Capital had invested aggressively in local start-ups, but only its investment may not be enough for the local industries. Moreover, Playford Capital might encounter some problem, as it has already stopped new investment and will be dissolved in 2012.¹⁴⁾ Jack Snelling, Science and Information Economy Minister of South Australia, stated that the South Australian government had better entrust VC activities to the private sector and limit government

Table 4 Australian VC Investment

	Amount (mil.)	% of Total		Amount (mil.)	% of Total
Australia	1,575.36	66%	U.S.	79.89	3%
QLD	554.41	23%	New Zealand	687.9	29%
VIC	436.16	18%	Other	26.92	1%
NSW	371.08	16%			
WA	88.17	4%			
SA	55.33	2%			
Other/Undisclosed	70.21	3%			

Note) QLD: Queensland, VIC: Victoria, NSW: New South Wales, WA: Western Australia, SA: South Australia Source) AVCAL (2010).

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- 12) In 1983, the federal government inaugurated the MIC (management and investment company) scheme to raise VCs who would invest into early-stage technology companies by granting tax concessions. It was replaced by the pooled development funds (PDF) scheme in 1992, and the Small Business Innovation Fund (now Innovation Investment Fund) scheme complemented the PDF scheme in 1998. For details, see Peacock (2004), ch.9.
- 13) VC investment is divided into early-stage and late-stage by the development stages of invested companies. Early-stage investment include seed investment, and late-stage investment is subdivided into expansion and acquisition/buyout investment.
- 14) The reason is not clear, but Lerner (2009) states that it is the custom of government officials to invest 'where private interest simply [do] not exist' (p.13). Playford Capital may have followed the custom.

Table 5 The 50 Fastest Growing Technology Companies in Australia

	2002	2003	2004	2005	2006	2007	2008	2009	2010
NSW	17	12	12	15	21	23	24	29	28
VIC	14	14	18	20	16	15	17	15	17
QLD	1	2	0	5	6	11	6	4	4
SA	8	8	12	6	2	1	2	2	0
WA	7	11	7	4	4	0	0	0	1
TAS	1	1	0	0	0	0	0	0	0
ACT	2	2	1	0	1	0	1	0	0

Note) See a note on Table 4.

Source) Deloitte Technology Fast 50 Australia, 2002–10.

support; he took the SALSA Fund as a preferable model of commitment (Snelling 2010). The government will also stop assistance to Innovate SA at the end of June 2012.

The South Australian government also has grant programs, but it relies more on other programs to cope with its small pocket. Then, we refrain from evaluating them.

6. 4. In Total

We mentioned the present situation of the defence industry in section 6.3.1. It should be added that '[a] range of major defence and security projects are currently underway' (Defence SA undated), and employment in the industry is expected to increase. Regarding the ICT and the biosciences industries, *Deloitte Technology Fast 50 Australia*, which ranks companies in both industries based on percentage revenue growth over the last three years, gives us useful information. 8 South Australian companies in 2002 and 2003 and 12 companies in 2004 were listed in the ranking, but the number of South Australian companies in the ranking decreased thereafter, and became 0 in 2010. New South Wales companies, in contrast, increased from 12 in 2004 to 28 in 2010 (see Table 5). Moreover, according to the research by the author, among the 25 companies which have ranked in the chart (except in 2004, because in that year, company locations were not entered), 12 companies were acquired by companies outside the state or moved to other states (one company was liquidated). On the other hand, Access Economics (now Deloitte Access Economics) reported in 2009 that South Australia surpassed Victoria and Queensland (not sure about New South Wales) in some key indicators, such as new company formations and patents, in the bioscience sector (Dean 2010). Then, the industry has mixed outcomes.

7. Conclusions

For the purpose of promoting new businesses and industries, the South Australian government,

under Premier Rann, has adopted new industry policies. Some policies, such as invitation of foreign universities and setting up a VC, cross the border of usual activities of Australian state governments. The South Australian government has also been very eager to promote research activities at local universities and to develop industrial parks, including the construction of super-fast broadband network. The reason it relies on these policies is that it has relatively weak financial strength, and cannot offer generous grants to local companies as New South Wales and Victoria do.

The performance varies across policies and industries. The fruits of the government's efforts can be found in the defence industry, which is composed of many and various type of companies. The industry also benefits from DSTO Edinburgh in respect of jobs, technologies, and personnel. Some signs of growth are observable in the bioscience industry. However, start-ups are confronting difficulties in fund-raising. This is due to the inactive VC business in Adelaide. The author heard that start-ups which need capital to get on a high(er) growth path move to other larger cities in other states. The investigating results on the ICT and the biosciences industries would support this story. The South Australian government has also tried to improve the level of liveability, but brain drain is still a reality in Adelaide. Then, at this time, it cannot be said that the future of the manufacturing industries in Adelaide is generally promising. Adelaide is different from Silicon Valley, where new company formations, acquisitions, and spin-offs are carried out and technologies, information, and talents circulate in the region.

On the other hand, South Australia faces severe financial problems (South Australian Govt 2011, 'Budget summary') and has comparatively high taxes and high prices for some public services in Australia. If industry policies are not implemented effectively and efficiently, they could further worsen the financial situation and, in turn, increase the tax burden on citizens or injure liveability of Adelaide via poorer public services (South Australian Govt 2011, 'Savings and revenue'). A means to improve policy efficiency is usually sought in good collaboration with the private sector. The involvement of the South Australian government in a VC fund has just been revised in this manner. It's establishment and management of industrial parks should be revised likewise. Stanford University developed the Stanford Research Park by itself and the Park 'generates millions of dollars for the university each year' (Chu 2010). Macquarie University succeeded in obtaining over \$100 million from the private sector for the Macquarie University Research Park, a part of the Macquarie Park Corridor. The management of the Technology Park Bentley and the Brisbane Technology Park is entrusted to the same private management company. Regarding the invitation of foreign universities, an invited university could close its campus, like some invited companies that have closed or moved their plants in the past. This does not seem unlikely on account of the poor enrolments at these universities. Nevertheless, the South Australian government has entered into discussions with Laureate Education, the operator of Laureate International Universities, on the establishment of a campus in Adelaide.

Table 6 Australia's 40 Largest Companies

		Industry	Sales	H.O.			Industry	Sales	H.O.
1	BHP Billiton	Materials	39,498	MEL	21	Woodside Petro	Oil & Gas Ops	2,845	PER
2	Natl Aust. Bank	Banking	28,205	MEL	22	Insurance Aust. G	Insurance	6,562	SDY
3	Cwltb Bank	Banking	26,478	SDY	23	Foster's G	Food Drink	3,867	MEL
4	Rio Tinto	Materials	22,465	MEL	24	PBL	Media	1,623	SDY
5	ANZ Banking	Banking	19,024	MEL	25	Toll H	Transportation	5,880	MEL
6	Westpac Banking	Banking	16,081	SDY	26	GPT G	Diver. Fins	773	SDY
7	Telstra	Telecomms	20,113	MEL	27	Leighton H	Construction	7,865	MEL
8	Maquarie Bank	Diver. Fins	8,228	SDY	28	Origin Energy	Utilities	5,307	SDY
9	Woolworths	Food Markets	33,275	SDY	29	Lend Lease	Diver. Fins	12,134	SDY
10	AMP	Diver. Fins	11,031	SDY	30	Ancor	Materials	8,462	MEL
11	QBE Insurance G	Insurance	7,024	SDY	31	Blue Scope Steel	Materials	6,893	MEL
12	Suncorp-Metway	Diver. Fins	8,365	BNE	32	Zinifex	Materials	1,639	MEL
13	Westfield G	Diver. Fins	2,769	SDY	33	CSL	Drug & Biotech	2,695	MEL
14	St George Bank	Banking	5,763	SDY	34	Caltex	Oil & Gas Ops	14,532	SDY
15	Coles G	Food Markets	29,801	MEL	35	Adelaide Bank	Banking	1,685	ADL
16	Qantas Airways	Transportation	12,754	SDY	36	Challenger Fin.	Diver. Fins	2,273	SDY
17	Wesfarmers	Conglomerates	8,213	PER	37	Metcash	Food Markets	8,059	SDY
18	AXA Asia Pac. H	Insurance	3,963	MEL	38	Santos	Oil & Gas Ops	2,134	ADL
19	Brambles	Business Svcs	3,869	SDY	39	Bendigo Bank	Banking	1,055	†
20	Stockland	Diver. Fins	958	SDY	40	ASX	Diver. Fins	457	SDY

Note 1) G: Group, H: Holdings, Diver. Fins: Diversified Financials, Food Drink: Food Drink & Tobacco, H. O.: Head Office, MEL: Melbourne, SDY: Sydney, BNE: Brisbane, PER: Perth, ADL: Adelaide, †: Bendigo, Victoria

Note 2) The rankings are based on sales, profits, assets, and market value. Here we enter only sales (unit: \$ million).

Source: Laurent, L., B. Zajac, and S. DeCarlo (2007) Australia's 40 Largest Companies, (http://www.forbes.com/2007/12/03/australia-bhp-forbes-40-biz-cx_ll_1203_australia40.html). The head office locations are added by the author.

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