

Developing and funding emerging manufacturing

- 5.1 The future of Australian manufacturing lies with innovative firms. While some firms will introduce new products or processes into longstanding industries, many will be developing products on the frontiers of science.
- 5.2 The first half of this chapter discusses the emergence of three of these areas; nanotechnology, biotechnology and 'green' technology. A characteristic shared by companies involved with all these technologies is that they often struggle to attract funding in their early stages and the second half discusses the role of venture capital in meeting these needs.

Nanotechnology

- 5.3 Nanotechnology is a developing area of science with wide applications. Dr Peter Binks, chief executive officer, Nanotechnology Victoria summarised:¹

It is essentially engineering. It is manipulating materials and processes but not at the macro level that we are used to with large physical objects. It is right down at the molecular level. There are some very different things that happen at the molecular level. There are fundamental changes in the properties of materials

1 The prefix 'nano' denotes a factor of 10^{-9} , or one-billionth. Nanotechnology operates at a scale in the order of a nanometre.

because quantum effects start to overlap with what we see as classical effects.²

- 5.4 An example demonstrated to the committee by Dr Binks was a nanostructured coating just a couple of molecules thick that changes the properties of surfaces. For example, it could mean:

A surgeon's gown can never hold blood ... bandages do not become sources of infection going forward ... [or] corrosion can be eliminated from certain kinds of structures or at least deferred for a period of time.³

- 5.5 While nanotechnology may not yet cure cancer, it may aid in its early detection. Dr Binks revealed:

You cannot detect cancer in the human body until there are more than a million cancerous cells in it. Otherwise, you cannot see it. We are trying to push that down, to about 10,000 cells and below, by having nanoparticles that can seek out cancerous cells and then fluoresce or be seen very differently under certain kinds of imaging.⁴

- 5.6 Nanotechnology is a focus of researchers globally and is seen as having great potential. Many universities are increasing the resources devoted to it. In Taiwan, even primary school students are learning about it.⁵
- 5.7 Manufacturing at the molecular level has huge implications. Some things previously only done in a laboratory environment may now be done in a manufacturing environment. The technology can potentially lead to developing new products in a wide range of manufacturing industries, such as scientific and mining equipment, micro-electronics, specialist materials, pharmaceuticals and biotechnology.

Government support for nanotechnology

- 5.8 The Victorian Government was an early supporter of nanotechnology. They set up Nanotechnology Victoria (NanoVic) five years ago to facilitate

2 Dr P Binks, Nanotechnology Victoria (NanoVic), *Transcript*, 15 March 2007, p. 1.

3 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 1.

4 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, pp. 7-8.

5 Mr P Laver, Australian Academy of Technological Sciences and Engineering (AATSE), *Transcript*, 28 August 2006, p. 43.

its commercialisation. NanoVic is jointly funded by the Victorian Government and three Victorian universities.⁶

- 5.9 The Australian government has supported nanotechnology through its funding of the CSIRO. The committee generally heard positive views about the CSIRO's research in this area. For example, a leading textile producer, Mr Brett Manwaring, said:

The CSIRO is actually one of the leading experts in nanotechnology, particularly with textile products.⁷

- 5.10 The universities, and other research institutes, also contribute to this research. Dr Binks, informed the committee that:

We spend about \$100 million a year across all activities on nanoscience and nanotechnology. More than half of that is spent on the research of nanotechnology. It is spent by almost all of our major universities, some of our CRCs, CSIRO, the Department of Primary Industries, ANSTO, DSTO and places like that. A smaller amount is spent by about 70 or so companies that are working in this field. They range from equipment manufacturers through to materials producers and biotechnology companies that focus on what materials can do within biological systems.⁸

- 5.11 In terms of government assistance, the CEO of Starpharma Ltd commented that they had received 'a lot of support from the Australian Government through R&D Start programmes, Commercial Ready and P3 [Pharmaceutical Partnerships Programme]'. However, they had 'far more support from the US government through the NIH [National Institutes of Health] programmes'.⁹

- 5.12 The Industry Statement 2007 singled out nanotechnology as having 'enormous potential'. It will be a focus for the CSIRO's new 'niche manufacturing' national research flagship at a cost of \$36.2 million over four years with accelerated allocations in the last two years. In addition, the Government will provide \$21.5 million for a 'National Nanotechnology Strategy'. Based on the overall spending figures quoted by Dr Binks, this is an evolutionary focus rather than a revolutionary focus.

6 Other states have also been supportive. The Queensland Government appropriately gave the world's smallest cheque, only 1.1 mm by 1.8 mm, to an institute working at the molecular level; *Australian Financial Review*, 4 May 2007.

7 Mr B Manwaring, Bruck Textiles, *Transcript*, 8 February 2007, p. 16.

8 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 2.

9 Dr J Raff, Starpharma Ltd, *Transcript*, 15 March 2007, p. 9.

Impediments to commercialising nanotechnology

- 5.13 Some concerns were expressed about the commercialisation of nanotechnology in Australia. Mr Manwaring, thought CSIRO were too close to foreign companies:

The only problem is that most of the companies they [CSIRO] are dealing with are overseas.¹⁰

- 5.14 Some companies thought that the research work lacked a commercial focus. Dr John Raff, deputy chairman, Starpharma Ltd commented:

There is far too much emphasis on research push in Australia with very little understanding of the processes involved in development, manufacturing, marketing and product positioning.¹¹

- 5.15 There was also some disappointment that larger companies are not actively involved. Dr Binks of NanoVic commented:

Companies like BlueScope Steel, Amcor, BHP Billiton and Rio Tinto are all looking at nanotechnology activities, not necessarily investing right now but keeping a watching brief.... the biggest challenge that we face between the nanotechnology field and the Australian manufacturing industry is the translation of the outcomes into the manufacturing environment.¹²

- 5.16 While nanotechnology offers scope for improved products, producers may not be aware of the potential:

Gear manufacturers will want harder and harder surfaces so that they wear less. They will want better lubricants and corrosion resistance. They are often looking for lighter, tougher materials. Nanotechnology can help provide all of that... [but] there is a real challenge finding the information to get that product improvement.¹³

- 5.17 The CEO of NanoVic agreed with a suggestion that universities get additional funding to employ industry liaison officers to investigate commercialisation, but warned universities should not feel reliant on

10 Mr B Manwaring, Bruck Textiles, *Transcript*, 8 February 2007, p. 16.

11 Dr J Raff, Starpharma Ltd, *Transcript*, 15 March 2007, p. 10.

12 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 2.

13 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 4.

commercialisation to fund their research. This was leading to them driving too hard a bargain and protracting negotiations.¹⁴

- 5.18 A challenge for some companies bringing new products to market was competition for space on supermarket shelves. Dr Raff commented:

Supermarkets [are] sourcing home brands from overseas. All the second-tier brands are being removed from the Australian market. That is making the introduction of innovative products very difficult. The amount of money required to effectively market a product in Australia ... as a top-tier brand is prohibitive.¹⁵

- 5.19 Nanotechnology also leads to specific occupational health and safety issues associated with the risks of handling, packaging and containing very small particles, which were raised by NanoVic. A nanoparticle has:

A much higher surface area compared to its volume, and that makes it in essence more reactive than a bulk material would be. We have already seen this in a number of other materials—for example, the sand blasting issues around silicosis. The same kinds of issues can occur with very small particles. It means that you need to have different handling equipment, different assessments of what exposure there is and essentially modifications to the regulatory environment. The process of developing those is under way.¹⁶

- 5.20 The Australian Government has identified the importance of health, safety and environmental aspects of nanotechnology research as a key area to be considered by CSIRO in the new Niche Manufacturing Flagship.

Australian Synchrotron and Lucas Heights neutron reactor

- 5.21 Research into innovative technologies such as nanotechnology often requires use of equipment too expensive for any single firm to construct.
- 5.22 An example of a large expensive research tool is a synchrotron, which is essentially a high-intensity light source; a 'super torch'. It produces light across a wide range of frequencies; infrared light, visible light, ultraviolet light and x-rays. It can be used for analysing materials in sub-microscopic detail and for the manufacture of small, precise materials. It has many applications, as outlined by Mr Max Roger from the Australian Synchrotron:

14 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 4.

15 Dr J Raff, Starpharma, *Transcript*, 15 March 2007, p. 10.

16 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 3.

It can be used for anything. Really, the only limiting factor is our imagination and capabilities in those areas.... There is a company in Sydney called Fermiscan which is looking at commercialising a test for breast cancer based on the analysis of human hair. They are using the Chicago synchrotron.¹⁷

- 5.23 One of the better known products developed using a synchrotron is the Relenza anti-flu drug. Lesser known examples include self-cleaning tiles and glass which are environmentally friendly¹⁸ and 'metallic glass', a form of unbreakable glass based on a metal foundation. Synchrotron technology has also been used by IBM in the US and Japan to improve flat-screen technology to produce higher quality, larger and cheaper screens.¹⁹
- 5.24 The new Australian Synchrotron in Melbourne offers opportunities for many Australian researchers and businesses that previously required an overseas trip to (queue to) use a synchrotron in another country.²⁰ The initiative was taken by the Victorian Government, who met the bulk of the \$220 million construction cost. There were also contributions from other state governments, universities and the commonwealth government. Similar facilities around the world are also mainly funded by governments. Ironically for something examining microscopic objects, the synchrotron is the size of a football field.
- 5.25 An additional benefit from a facility with applications across a range of fields is that it brings together researchers from different locations, specialisations and perspectives.²¹ This will hopefully lead to future collaborations between industry and universities.
- 5.26 The Australian Synchrotron will cost around \$20 million a year to run and the long-term funding is not yet determined. Typically the overseas experience has been that commercial charges only cover 5-10 per cent of the operational cost, as it is mostly used for basic research.
- 5.27 A complementary facility is the new Lucas Heights Open Pool Australian Light-water reactor (OPAL). CSIRO commented that:

17 Mr M Roger, Australian Synchrotron, *Transcript*, 15 March 2007, pp. 45 and 49.

18 It was developed by an Australian researcher using synchrotron-based nanotechnology; Professor Robert Lamb, University of New South Wales.

19 Australian Synchrotron, 'Synchrotron science in manufacturing', *Exhibit no. 33*.

20 Further information can be found at <www.synchrotron.vic.gov.au>.

21 A diverse range of businesses access the Advanced Photon source in Chicago, ranging from the Dow Chemical Company to DaimlerChrysler AG.

We have at the moment an ongoing collaboration between the Division of Minerals and ANSTO [Australian Nuclear Science and Technology Organisation] in relation to finding ways of capturing the benefits of synergies that occur between the new synchrotron in Melbourne and the old and the new reactors at Lucas Heights.²²

- 5.28 The Government increased funding for ongoing costs to operate the OPAL reactor by \$22 million over four years in the 2007–08 Budget. The Australian Synchrotron received a one-off payment of \$50 million to contribute to the operating expenses of the first five years of operation, subject to matched funding from the Victorian Government.

Biotechnology

- 5.29 Biotechnology is an area where Australian scientists are well ahead of some of their overseas peers. For example, we have particular immunology expertise. However, the Australian Academy of Technological Sciences and Engineering expressed concern that this may change given the greater efforts some other economies put into teaching.²³

- 5.30 The Department of Industry, Tourism and Resources (DITR) summarised for the committee some of the specific Australian government programmes to support biotechnology.

The Government's \$150 million Pharmaceuticals Partnerships Program will support an additional \$500 million (over 2004–05 to 2009–10) of high quality R&D in Australia by originator, generic and biotechnology companies. By supporting the portfolio of R&D undertaken by a company and its related bodies corporate, the program supports company growth and adds to critical mass which can help anchor manufacturing activity in Australia. From the Program the Government will specifically provide \$10 million to establish a Small Scale Mammalian Cell Production Facility to bridge the infrastructure gap in the national biotechnology manufacturing chain.²⁴

- 5.31 An example of a successful biotechnology innovation in Australia is the Australian Proteome Analysis Facility (APAF). Proteomics, the study of

22 Dr R Hill, CSIRO, *Transcript*, 22 March 2007, p. 10.

23 Mr P Laver, AATSE, *Transcript*, 28 August 2006, p. 43.

24 Department of Industry, Tourism and Resources (DITR), *Submission no. 31*, p. 35.

proteins, is in a sense a successor to the study of the human genome. Science Industry Australia (SIA) commented:

APAF was established in 1995 under the Australian Government's Major National Research Facility Scheme The expression of particular proteins can be used as 'biomarkers' of health, disease and assist in finding protein quality traits in agricultural crops. APAF's four partner organisations - Macquarie University, University of New South Wales, University of Sydney and TGR Biosciences Pty Ltd (Adelaide) [provided] ... funding in the order of \$45 million.²⁵

5.32 APAF is a leading global facility:

APAF ... continues to co-develop many of the laboratory 'tools' in use in proteomics research worldwide APAF engages a plethora of Australian and international science industry partners (around 350 in 2004) as a provider of proteomic R&D expertise, discovery partner, technology developer/licensor, technology educator, and market appraisal source. APAF has generated significant export dollars through royalties from products licensed to multinationals and overseas contracts.²⁶

Green technologies

5.33 The recognition of the economic and social damage being caused by climate change has focused attention on the need for the costs of carbon emissions to be borne by the emitters (rather than being subsidised by future generations). As the current underpricing of non-renewable energy sources is removed, there will be market incentives for households and firms to seek to reduce energy usage and obtain it from more environmentally sensitive sources. This opens up many areas for innovative Australian companies to develop products and processes which will become in strong demand around the world.

5.34 Some Australian companies realise this potential. For example, the Australian Electrical and Electronic Manufacturers' Association stated:

25 Science Industry Australia (SIA), *Submission no. 7*, p. 10.

26 SIA, *Submission no. 7*, p. 10.

There is another emerging 'growth engine' for manufacturing and that is 'minimal manufacturing', a trend to minimise the industry's environmental footprint.²⁷

- 5.35 It has also been recognised by governments. For example, the Victorian Government submitted that:

In Victoria, manufacturing is the main user of electricity and gas, which significantly contributes to the emission of greenhouse gases. Manufacturing companies are now incorporating cleaner production methods, adopting alternative energy sources, and developing new environmentally friendly technologies. As well as meeting local standards and regulations, it also provides opportunities for the design of innovative products and services.²⁸

- 5.36 Nanotechnology experts viewed nanotechnology as an area that could help with addressing climate change.

A lot of it is the real simple stuff. It is things like having energy efficient glass. Being able to stop the energy leakage from buildings is very important. ... having lighter materials that are stronger or that do not collect other gunk along the way. We also work with wind turbines. Being able to get better blades that are lighter and more efficient involves nanostructured materials.²⁹

Venture capital

What is venture capital?

- 5.37 Venture capital is the very early stage external equity funding that businesses, particularly in innovative industries, may need to start up. (By contrast, 'private equity' is a much broader concept, also covering funding of well-established unlisted operations.)
- 5.38 New innovative firms, sometimes called 'gazelles', require some form of equity because until they finish commercialising their product and start making profits they are not in a position to repay debt (and often have little in the way of hard assets to offer as collateral). It is probably only a minority of new firms that are funded by formal venture capital. Most

27 Australian Electrical and Electronic Manufacturers' Association, *Submission no. 19*, p. 1.

28 Victorian Government, *Submission no. 40*, p. 12.

29 Dr P Binks, NanoVic, *Transcript*, 15 March 2007, p. 5.

entrepreneurs initially rely on their own savings, or money provided by family and friends (also known as 'love capital'), employees ('servant capital') or individual private investors ('angel capital') or by borrowing from a bank using property as collateral. One innovator, Dr John Raff from Starpharma Ltd, suggested:

Ninety per cent of all financing of smaller innovation companies comes from private placement financing. It does not come from the organised venture capital industry.³⁰

- 5.39 Typically, the professionally managed venture capital fund is a 'patient' investor, committing funds for up to 5-10 years. It then sells up once the company is established and can borrow and/or list on a stock exchange.
- 5.40 Venture capital funding is, by its very nature, a risky investment. If the eventual product is successful the investor may earn extremely high returns, but if it is unsuccessful, as many (perhaps the majority) are likely to be, the venture capitalist may lose their entire investment. Venture capitalists tend to be more closely involved in the company's operations than a typical shareholder, sometimes acting as a mentor to the company's management or holding a seat on the board. Sometimes the provision of further capital is promised subject to meeting performance benchmarks. Venture capital fund managers typically specialise in certain industries, such as biotechnology or information technology.³¹
- 5.41 Some now large and well-known companies, such as Apple, Google, Intel, Microsoft and Starbucks, started life with support from venture capital. It was suggested that 'without that kind of investment, these enterprises might never have got off the ground'.³² Australian companies to have benefited from venture capital include Cochlear (makers of the bionic ear) and ResMed (medical technology).
- 5.42 The ABS conducts an annual survey of venture capital.³³ At June 2006, investors, almost half of which are domestic pension funds, had \$10.9 billion (just over double the amount in June 2001) committed to 229 venture capital funds. However, only \$6.8 billion had been drawn down,

30 Dr J Raff, Starpharma Ltd, *Transcript*, 15 March 2007, p. 18.

31 Further information about the operations of venture capital firms, particularly the legal aspects, are given in S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, Exhibit no. 35.

32 Associate Professor S Barkoczy, *Transcript*, 15 March 2007, p. 35.

33 Cat. no. 5678.0. The survey is financially supported by the DITR. It is called *Venture Capital and Later Stage Private Equity*, as the data being reported has a broader scope. The survey covers both venture capital funds which directly invest in companies, and those which pool funds to invest in these vehicles (the latter are known as 'funds of funds').

and invested in 902 companies. The selection of these companies was an intensive process. The 157 venture capital managers reviewed over 6000 potential new investments during 2005-06 before selecting around 200 for investment. As well as providing funding, the managers spent a total of 186 000 hours advising and assisting the companies, or about three and a half days a month per company. Most funds only hold minority stakes in companies and most investments in individual companies are less than \$10 million.

- 5.43 These data would seem to indicate that if there is any problem in the venture capital market, it is not a lack of money coming in but either the poor quality of many of the companies seeking funding or excessive conservatism of the venture capital fund managers.
- 5.44 However, the ABS survey is capturing some funds that are more like private equity funds than venture capital and they only provide a limited amount of data. There has not been a lot of research done on the Australian venture capital market. Associate Professor Stephen Barkoczy, associate professor of law, Monash University – appearing before the committee in a private capacity, said:

There is no hard data. There is only anecdotal evidence.³⁴

Is venture capital undersupplied?

- 5.45 It does appear that the amount of Australian venture capital, particularly for manufacturing, is not 'high' by international standards. Two international surveys of businesses suggest that Australia's venture capital market is less developed than in countries such as Ireland and Finland, renowned for their healthy manufacturing sectors, but comparable to the average advanced economy; see Appendix F.
- 5.46 Some evidence is more critical. The Victorian Government commented:
- As a nation, across all industries, we are below leading practice abroad on the measure of venture capital/GDP. In Australia, manufacturing accounts for a small proportion of venture capital investments across all industries.³⁵
- 5.47 But venture capital may just be smaller relative to GDP because we have a smaller high-tech manufacturing sector relative to GDP. It does not prove that venture capital provision itself is *too low*, or that there is a market failure justifying government intervention.

34 Associate Professor S Barkoczy, private capacity, *Transcript*, 15 March 2007, p. 35.

35 Victorian Government, *Submission no. 40*, p. 13.

5.48 An academic study cautioned that:

Evidence supporting the contention that market failures exist is usually derived from isolated case studies and is principally anecdotal in nature ... what is lacking is a carefully grounded, authoritative and broad-based empirical study examining this issue in Australia.³⁶

5.49 An ABS survey in 2004 and 2005 found that only five per cent of innovating businesses reported 'excessive economic risk perceived by financiers' as a barrier to innovation, although a further 16 per cent referred to the cost or availability of finance as a barrier.³⁷

5.50 Venture capital provision may be low because of information problems. New innovative companies may not be aware of the relevant venture capital funds. There could be a role for government in helping fill these information gaps. The Australian Government recently announced the establishment of Australian Industry Productivity Centres (AIPCs). These could operate as 'one-stop-shops' for manufacturers seeking advice and could have a desk officer with information on venture capital funds and the areas in which they specialise. Links to this information could also be placed on the AIPC website; a 'one-click-shop'.³⁸

5.51 The Australian Government commissioned a 'Venture Capital Industry Review' in 2005.³⁹ However, their report and the submissions they received have not been made public.

5.52 Nonetheless, a common view seems to be that venture capital is underprovided. For example, the Australian Council of Trade Unions tied venture capital provision to innovation:

36 S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, *Exhibit no. 35*, pp. 23-4. Interestingly, this does not stop them concluding that 'Australian government support of such [venture capital] investment is appropriate' (p. 24).

37 ABS, *Innovation in Australian Business 2005*, Cat. no. 8158.0, p. 25. The largest barriers reported were lack of skilled staff and potential markets being dominated by established firms.

38 The UK's Management Advisory Service has a link to a website <www.bvca.co.uk> where entrepreneurs can find potential venture capital investors by entering their location, amount of funding required and industry type. The MAS website also has advice on preparing an application for venture capital.

39 Minister for Industry, Tourism and Resources media release, 10 May 2005. The expert group conducting the inquiry comprised Brian Watson (Executive Chairman of Georgica Associates, an independent private equity investment management firm, and a board member of the Future Fund); David Miles (deputy chair of the Committee for Melbourne and chair of the Australian Government's Industry Research and Development Board) and Gary Potts (formerly with the Treasury, now a commissioner at the Productivity Commission and a trustee director of a major superannuation fund).

A more concerted focus by institutional investors on investing in venture capital can help accelerate the emergence of new technology intensive firms.⁴⁰

- 5.53 The Victorian Government suggested that in the absence of tax concessions manufacturers will not get sufficient access to venture capital due to sectoral image problems:

The venture capital industry is likely to grow significantly, largely because the Federal Government has introduced tax incentives, but there are still barriers for manufacturers in accessing venture capital, including a perception that manufacturing is a low skill, low technology, low return industry.⁴¹

- 5.54 Similarly, Ms Christine Hawkins, a director from the textile industry thought venture capitalists were prejudiced against innovation in the more traditional parts of manufacturing:

You cannot go out and find venture capitalists to support your business, especially in fashion and textiles. It is not the sexy end of the market for the Macquarie Banks and the venture capitalists.⁴²

- 5.55 Mr Nixon Apple, industry and investment policy advisor, ACTU, who had served as a fund trustee, suggested to the committee that Australian investors are unduly cautious:

I have spent the last 10 years banging my head against the wall as an industry fund trustee about how to get more investment in venture capital. It is very hard Nobody really wants to back the guys who are starting up because they do not have a track record.⁴³

- 5.56 Dr John Pulsford, from SIA, also felt the Australian funding market is 'not as aggressive and risk-taking' and attributed it in part to the small number of very wealthy individuals.⁴⁴

40 Australian Council of Trade Unions (ACTU), *Submission no. 27*, pp. 26-7. They expressed concern that 'Australia only has a handful of managers in venture capital who are established with a track record of any significance'; 'Strategic Directions to Boost Australian Manufacturing – a compendium to support a report by the National Manufacturing Forum,' *Exhibit no. 24*, p. 262.

41 Victorian Government, *Submission no. 40*, p. 12.

42 Ms C Hawkins, Cinnabar Designs, *Transcript*, 8 February 2007, p. 12.

43 Mr N Apple, ACTU, *Transcript*, 22 November 2006, p. 20.

44 Dr J Pulsford, SIA, *Transcript*, 2 March 2007, p. 9. Similar comments were made by Associate Professor S Barkoczy, private capacity, *Transcript*, 15 March 2007, p. 35; and Mr T Strasser, *Submission no. 13*, p. 2.

Government support for venture capital

- 5.57 At least implicitly, the Australian Government apparently thinks the market under provides venture capital, as it has a number of programmes to encourage it. DITR says the schemes aim 'to promote ... the development of a self-sustaining venture capital market.'⁴⁵ Taken at face value, this statement suggests the schemes should only be temporary. But no benchmark is given to indicate when they will no longer be needed.
- 5.58 There are a number of venture capital schemes. Some involve direct government funding and others involve tax concessions.
- 5.59 The Innovation Investment Fund (IIF) programme involves the provision of venture capital to early stage, small high-tech companies. A pool of capital provided mostly by the government (but a significant minority by the private sector) is divided between a number of licensed private sector funds managers (some of whom specialise in particular sectors) who take the investment decisions. Returns are shared by the government and private sector investors, but favouring the private sector investors. The programme is budgeted to cost \$55 million in 2007–08.
- 5.60 The Pre-Seed Fund (PSF) programme is similar but focused on companies controlled by a university or CSIRO or using intellectual property developed by them.
- 5.61 The IIF and PSF are similar to schemes in many other countries whereby the government directly invests in venture capital programmes. A recent comparative study concluded that many countries:
- Have established grant programs, low interest loan programs and loan repayment guarantee and insurance programs.⁴⁶
- 5.62 As well as providing funding, government grants may act as a 'seal of approval' making it easier for recipients to attract private sector funding.
- 5.63 A plethora of other grant programmes provide support for new companies in other ways. For example, the Small Business Entrepreneurship programme provides grants to assist setting up small business incubators and the Commercialising Emerging Technologies (COMET) programme helps companies less than five years old commercialise new processes and products. Much of the support for research and development also goes to new companies.
-

45 DITR, *Submission no. 31*, p. 32.

46 S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, *Exhibit no. 35*, p. 187.

- 5.64 The other Australian schemes provide tax concessions to investors in venture capital funds. Normally a venture capital fund would be subject to capital gains tax when it exits from its investment in a company.⁴⁷ The schemes provide relief from this tax.
- 5.65 The Venture Capital Limited Partnership (VCLP) framework is aimed at foreign investors (initially only from selected countries).⁴⁸ It interposes incorporated limited partnerships (rather than a corporate structure) between the foreign investors and start-up companies.⁴⁹ The limited partnerships have general partners (the venture capital managers) and limited partners (the investors). The scheme allows tax benefits to flow through this structure. The VCLP programme allows for investment in companies up to \$250 million.⁵⁰
- 5.66 The latest scheme is the Early Stage Venture Capital Limited Partnership (ESVCLP), announced in May 2006, which is gradually replacing the PDF programme.⁵¹ The ESVCLP is similar to VCLP but focused on the small end of the market. This limited partnership entity allows for investment in companies valued up to \$50 million. The ESVCLP must divest itself of any holdings once the total assets of the investee company exceed \$250 million. The fund managers have discretion about what companies in which to invest, other than excluding retailing and land development.⁵²

47 An alternative legal view is that a venture capital fund is not holding an equity stake to receive a dividend flow and therefore is 'trading' in the equity positions and so returns should be taxed as 'income' rather than 'capital gains'. See: S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, Exhibit no. 35 p. 42.

48 The ABS survey shows that only around five per cent of investors in venture capital are non-residents so there is substantial scope to increase their involvement. However, VCLP seems to be attracting more domestic than foreign interest; S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, Exhibit no. 3, p. 79.

49 The Venture Capital Limited Partnership (VCLP) supersedes the dormant Foreign Superannuation Fund (FSF) programme. There had been 21 venture capital entities registered under the FSF in 2001 but over time all their registrations have been revoked.

50 The PDF scheme was limited to \$50 million.

51 The Pooled Development Funds (PDF) programme involves private sector investment companies which raise capital from investors. Their investments in eligible Australian companies receive concessional tax treatment. In May 2006 the Government announced that the existing PDF programme would be closed to new registrations after 31 December 2006. DITR, *Submission no. 31*, p. 32. According to the ABS survey, about half the venture capital vehicles were participating in the scheme. The PDF scheme had itself replaced the Management and Investment Companies (MIC) programme.

52 VCLP and ESVCLP are examples of what are termed in the literature 'back-end incentives' (as opposed to measures, such as the former MIC programme, giving investors a tax deduction for placing funds in a venture capital fund, which are termed 'front-end incentives'). The 'front end incentives' may be more prone to abuse through tax shelter schemes; S Barkoczy et al,

5.67 ESVCLP provides flow through tax treatment and a complete tax exemption for income, both revenue and capital, received by its domestic and foreign partners in early stage investments. However, losses can not be offset against other taxable income. Advocates laud this feature as meaning the scheme only rewards success, and therefore those projects likely to generate future tax revenue. Critics argue it means investors get a tax benefit when they do not need help, and are penalised for supporting unsuccessful ventures. The scheme may therefore do little to encourage risk-taking. A recent study suggests:

One reform that could be considered is to allow investors ... to benefit from either full or partial deductions and/or capital losses on the disposal of unsuccessful investments. The obvious concern with implementing such a reform is its cost ... [and] there is simply no reliable data as to what extent the denial of [more generous tax treatment] of losses is an important concern to potential investors.⁵³

5.68 Countries such as the United States and Canada have schemes that provide tax concessions for both gains and losses.

5.69 The Australian schemes are also quite complex which may deter, or at least delay, investors. A recent report comments 'it will take some time for the VCLP program to be widely understood'.⁵⁴

5.70 Even an expert in the field concedes the number of schemes creates unnecessary confusion:

You should call these things by the right name and perhaps merge the programs into one program so that you do not have a million different programs operating, because people just do not understand different titles. ESVCLP does not roll off the tongue.⁵⁵

Venture capital and superannuation funds

5.71 Australians are investing heavily in superannuation. There do not appear to be any regulatory hurdles to superannuation funds investing in venture capital funds. As superannuation funds have long-term liabilities and very

'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, *Exhibit no. 35*, p. 33.

53 S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, *Exhibit no. 35*, pp. 189-90.

54 S Barkoczy et al, 'Venture Capital Tax Expenditure Programs: An International Comparative Analysis of Legal Structures and Benefits,' 2006, *Exhibit no. 35*, p. 78.

55 Associate Prof. S Barkoczy, *Transcript*, 15 March 2007, p. 41.

large portfolios, they would seem a good source of funding for venture capital funds. But while they provide about half of the venture capital funds, this is only a tiny proportion of superannuation fund assets.

- 5.72 The reason for the limited involvement of superannuation funds in venture capital is not clear. It may just be that the returns offered by venture capital are inadequate, or it may be that superannuation fund managers are being unduly 'conservative' in their investment practices.

Conclusions

- 5.73 Nanotechnology offers great scope for both improving traditional manufacturing processes and developing new manufacturing industries.
- 5.74 The Australian Synchrotron is an important facility for nanotechnology (and has broader uses). It will bring national benefits. It is noted that around the world, synchrotrons are substantially funded by governments, partly due to their high cost and use in basic research. It is important that the synchrotron be placed on a sound financial footing.

Recommendation 7

- 5.75 **The committee recommends that the Australian Government commits to annual direct funding of the Australian Synchrotron given its importance to manufacturing innovation through cutting-edge research.**
- 5.76 There may be other facilities like the synchrotron, too large for any individual company to fund but of great value to researchers and manufacturers. CSIRO should inform the government of any such projects which could be considered for funding support.
- 5.77 Biotechnology and green technologies are other important areas with potential for developing innovative manufacturing industries. They should continue to be supported by government.
- 5.78 The committee notes claims that innovative manufacturing is being held back by an underdeveloped venture capital market in Australia, meaning that viable projects are not being funded. However, on the information

currently publicly available, it is hard to assess this. More information is therefore required.

- 5.79 In addition, it notes claims that superannuation funds are unduly conservative towards investing in venture capital funds. However, the committee does not believe that superannuation funds should be directed where to invest.

Recommendation 8

- 5.80 **The committee recommends that the Australian Bureau of Statistics, in conjunction with the Australian Taxation Office and the Department of Industry, Tourism and Resources, improve the available data on venture capital, including by distinguishing better between venture capital and other forms of private equity, and compiling performance data.**

Recommendation 9

- 5.81 **The committee recommends that an inter-departmental working party, headed by the Department of the Prime Minister and Cabinet, report publicly on the issue of whether there are market failures hindering the development of the venture capital industry. The report of, and submissions received by, the Venture Capital Industry Review, should be made available to this working party and be allowed to be cited in their report.**
- 5.82 If, in the light of further study, it is concluded that the venture capital market is unduly limited in Australia, it would be worth examining the available tax concessions. These appear to 'reward' successful investors and 'punish' the unsuccessful, which may be reinforcing rather than offsetting any tendency towards investors being unduly risk averse.

Recommendation 10

- 5.83 **The committee recommends that the Department of Industry, Tourism and Resources and the Treasury prepare a paper outlining the implications, including cost, of allowing participants in the Venture Capital Limited Partnership and Early Stage Venture Capital Limited Partnership schemes to deduct losses in these schemes against other income.**
- 5.84 Regardless of whether substantial changes are deemed necessary to the venture capital tax concessions, the existing schemes are unduly complicated and lack criteria for judging their success.

Recommendation 11

- 5.85 **The committee recommends that the venture capital tax concession schemes—such as the Venture Capital Limited Partnership scheme and the Early Stage Venture Capital Limited Partnership scheme—be merged and simplified, and clear objectives set.**
- 5.86 Another possible impediment to new companies accessing venture capital is a lack of knowledge about how and where to obtain it. The nascent Australian Industry Productivity Centres could play a role here.

Recommendation 12

- 5.87 **The committee recommends that the Australian Industry Productivity Centres ensure they have adequate information about venture capital funds to assist new manufacturers in accessing this source of funding.**

