THE CASE FOR PUBLIC SUPPORT FOR SCIENCE AND INNOVATION

FROM

THE VICTORIAN INNOVATION ECONOMY ADVISORY BOARD (IEAB)

It is clear that currently the Australian economy is performing relatively well. Still, if Australia is to remain internationally competitive and if we are to preserve our standard of living, we cannot be complacent.

Whilst the exploitation of our raw materials has held the Australian economy in good stead in recent years, our future competitiveness will be based on the exploitation of innovation and knowledge. Primary industries generate a disproportionate share of our export income, whilst we import a large share of knowledge-intensive goods. The speed and manner at which economies manage transitions from one set of economic drivers to the next determines global winners and losers.

We are facing increasing competition from countries in our region with currently lower labour costs and large well-educated workforces – such as China, India and Thailand. In addition, the skill levels of their workforces are rapidly increasing.

Countries that fail to innovate and exploit knowledge will increasingly find themselves in direct competition with such rapidly growing developing countries, who themselves are increasingly focussing on the exploitation of innovation and knowledge.

It is a truism that Australia must focus on producing higher level of value added goods and services. We need to invest the legacy of our natural assets in skills, science and innovation if we are to develop new areas of competitiveness and sustain and enhance our living standards.

It is also a truism that Australia is not managing the transition to an innovation economy as quickly or comprehensively as it needs to. We therefore welcome the Productivity Commission's study on science and innovation as an important opportunity to focus attention on this important issue. Without a systematic and significant scale of response, there is a danger that our innovation initiatives will remain at the margin and fail to deliver the required benefit.

Importance of Innovation

It has been empirically demonstrated that capturing the benefits of knowledge through innovation results in increased living standards. The Organisation for Economic Co-Operation and Development (OECD) has estimated that innovation accounted for 50% of long term economic growth in advanced industrial countries.

It is widely recognised that the major driver of sustainable increased living standards is productivity growth and innovation is a key determinant of productivity in an economy. For example, almost one third of labour productivity in the late 1990s was derived from Australia's uptake of information and communication technologies (ICT).

Given the strong link between innovation and increased productivity, the IEAB advocates the importance of encouraging innovation by all levels of Government because it leads to increased productivity in business, resulting in jobs growth and wealth creation. But that is not the only rationale for business to invest in innovation. We are already seeing that successful businesses invest in innovation and research and development (R&D) not just to generate intellectual capital, but also to gain the knowledge and skills to absorb and exploit new technologies and therefore develop their competitive advantage. It is this combination that is necessary – simply investing in R&D is unlikely to provide benefits on its own.

Importance of Government Support for Innovation

For the purposes of this paper, innovation is defined as:

"creating new or significantly improved goods or services and/or implementing new or significantly improved processes."

Innovation comprises inherent risks and uncertainty, long term investment and non-excludable benefits. As such, there is often under-investment by business in innovation, including R&D at a sub-optimal level for the economy. The benefits to the economy as a whole, however, are significant, as discussed. Thus there is a role for Government to encourage innovation, especially by business, through incentive and risk-management policies.

This market failure has seen Governments of developed countries putting in place public policies that aim to minimise the market failure and provide incentives for private sector investment in innovation, and Australia is no different. The debate however is whether these policies have been effective in creating an Australian innovation economy. An essential element in ensuring effectiveness is to achieve some scale of innovation activity. Whilst economies such as the U.S have a track record in rapidly and effectively managing large scale economic transitions, to demonstrably positive effect, this has not been the case for Australia.

Four Pre-conditions for an Australian Innovation Economy

The IEAB considers that Government policies to encourage innovation and adoption of new technology should focus on the following critical pre-conditions for developing Australia as an innovation economy:

1. a relevant and effective education system;
2. internationally competitive incentives for business innovation, including R&D;
3. increased risk capital formation; and
4. collaboration, especially international collaboration.

If we are serious about developing Australia's innovative capacity for future economic growth, then we cannot accept the argument that Australia's current industry structure is the reason for low business R&D and innovation investment, and that there is nothing that can be done about this. The IEAB suggests the better policy approach would be to

focus on the core competencies for the future of the Australian economy, and ensure that they are well developed and comparable with international competitors. The IEAB's four pre-conditions seek to create the environment for those core competencies for Australia's future.

1 A Relevant and Effective Education System

Many studies have found a positive correlation between education and economic growth, which are well documented in Dorwick's (2002) paper. He found that an 'increase of one year of schooling in the average educational attainment in the workforce, for example, can be expected to increase the level of output by around eight percent in a typical OECD country.'

Education has always been important for a developed economy. This is even more so for innovation economies – as they require a well-educated workforce, and ideally a workforce with science, mathematics and technology skills and with opportunities for continual learning, as well as environments that can effectively tap that learning. The IEAB sees education as a key factor in an innovation economy, not just as a building block for accumulating knowledge but because it creates a workforce that is flexible, able to take advantage of opportunities and adapt to emerging technologies. These skills can contribute to incremental increases in productivity in the workforce, and therefore economic growth.

The IEAB considers education is primarily a public sector responsibility as Dorwick (2002) suggests Government investment in education has a strong positive impact. Businesses do not capture sufficient direct benefits to make them invest in ongoing education.

In comparing Australia's education performance internationally, Dorwick concludes that Australia "Started well, but slackened off. Substantial room for improvement." This quote reflects the IEAB's view on Australia's education system.

The IEAB considers there are three areas in education that have "room for improvement". Firstly, the shortage and quality of teachers. Experience tells us that a student's ability to learn is largely determinant on access to quality teachers. In the context of developing innovation economy skills, this holds truer for the fields of science and mathematics. In IEAB's experience, the shortage in teachers has meant for example, teachers expert in social studies having to teach science.

The Australian Council of Deans of Science 2005 report argued that the supply of science teachers was being impacted by a lack of qualified applicants to fill vacancies. Science graduates were choosing jobs in industry over a teaching career because they were higher paid, better resourced and had a 'higher status' in the wider community.

Given declining or stagnating enrolments in the fields of science and mathematics, the IEAB considers this a critical issue for Australia's future and suggests that a campaign to recruit teachers is required.

With respect to the quality of teachers, in the IEAB's experience, quality and inspirational teachers are few and far between. This is exacerbated by the lack of on-the-job training opportunities for teachers that are confronted with changing technologies and changing curriculum needs. Government needs to consider strategies for improving the quality of teaching at the primary and secondary levels, and any recruitment take into consideration adequate training of teachers in science and mathematics.

The Deans' report found that the quality of science teaching was being impacted by a lack of discipline-specific qualifications of senior school science teachers, particularly in the fields of physics, chemistry and geology. The report called for the development of meaningful accreditation mechanisms for science teachers, involving minimum qualification levels in science and teaching. The IEAB supports a system of accreditation.

The IEAB also supports the concluding recommendation of the Dean's report with respect to the supply and quality of teachers. That is, training and incentives to pursue teaching careers in secondary schools are needed to increase the number of tertiary science students and then have them teaching.

Whilst Australia may have some initiatives already in place to address the issues raised in the Deans' report, the IEAB cannot help noticing the U.S' aggressive strategy to boost the quality of science and maths education in its schools. Its new *Ten Thousand Teachers, Ten Million Minds* initiative has a number of ambitious aims such as 10,000 more scientists, students, post doctoral fellows and technicians given opportunities to contribute to the innovation exercise; 100,000 more highly qualified maths and science teachers by 2015; and 800,000 more workers skilled for the jobs for the 21st century. This is the sort of focus that is needed in Australia. Our current efforts could more accurately be described as well-intentioned tinkering.

This brings us to our second point. The IEAB is concerned that Australia, on a global scale, is largely mono-lingual. The languages taught most often in schools are largely of European origin, indicating that the education system is not well aligned to equipping the future workforce with the skills for dealing with emerging non-European business and trading partners. For example, more than 200 million students in China are studying English. By comparison, only about 70,000 students across primary and secondary schools are studying Chinese in Australia[1].

The United Kingdom (UK) Government has a similar problem, noting that it was lagging behind other European countries in the level of its language skills. The UK Department

[1] Source: Review of the Australian Government Languages Other Than English (LOTE) in Schools Programme 2002

for Education and Skills noted that the number of employees with the necessary language skills to fully engage in international business was very low. They found that 20% of companies in the UK believed they were losing business because of the lack of language and cultural skills. In light of this, they released a National Languages Strategy.

The U.S recently announced its US$57 million National Security Language Initiative to increase the number of Americans with foreign language skills, noting that this was needed for the U.S to remain competitive.

The IEAB notes that the Australian Government has a *Languages Other Than English* (LOTE) program and agrees with the conclusion in its review in 2002, that there needs to be a 'commitment to a national policy position on languages education … as the cornerstone of our national identity.' '[This identity] must also recognise that the global economy is a reality that we can either participate in as an equal, or become relegated to the sidelines.'[2]

In a world economy that is multi-cultural and multi-lingual, Australia will struggle to compete if the education system does not reflect the need to learn languages and about other cultures. These skills will be crucial requirements for doing business in a global innovation economy.

Finally, the ability of industry to adopt new technology is closely linked to the level of workforce skills and the availability of training.

However, Australia is facing the basic economic dilemma of scarce resources versus increasing wants – that is, the skills required for the development and uptake of new technologies are scarce and the capacity of the education and training system to deliver these is wanting. Australia is experiencing skill shortages in areas such as nanotechnology, biotechnology and ICT. In fact, the recent Science, Engineering and Technology Skills Audit report forecasts that Australia's supply in key science and technology areas through the education system will not be enough to meet future demand. For example, projected supply for science skills in 2012-13 will fall short approximately 35 per cent.

It is argued that this is because the education and training system does not always respond in a timely or appropriate fashion to the training needs of business or to skill requirements associated with emerging technologies. Some of the reasons identified for this include lack of flexibility in training packages and the high cost of customised training.

The OECD recommended in its *Going for Growth Report* (2006) that Australia has to "improve overall workforce skills by reducing the number of early school leavers by strengthening the vocational education and training system."

[2] Review of the Australian Government Languages Other Than English (LOTE) in Schools Programme 2002

The IEAB considers that Australia needs to go further than this and that, at a coordinated national level, appropriate programs need to be developed and implemented to address the skills gaps and secure the future of Australia's innovative industries. Immediate areas of action include:

- increasing Government funding for university places in science, technology, engineering, medicine and mathematics with incentives to pursue careers in these fields — thereby increasing the level of human capital stock in these fields;
- strengthening the links between education/training organisations and industry — assisting in developing appropriate training courses for innovation-related skills and potentially increasing the understanding of science and technology career pathways. For example, Government could promote the need for schools and universities to be more involved with industry, with linkages that pave the way for students and new graduates to gain work experience in industry of particular benefit; and
- increasing public awareness, appreciation and understanding of science and technology. Such programs can increase public awareness of current developments in the fields of science and technology and its future potential, which is vital for community support for investment in emerging technologies and for encouraging students studying or entering into innovation-related disciplines. We note the rise in innovation-related programs on television and radio. The IEAB itself auspiced a series of innovation lectures in 2005, the Alfred Deakin Innovation Lectures, aimed at increasing awareness of innovation. These sorts of initiatives should be strongly encouraged.

A greater focus on achieving a more relevant and effective education system is summed up in Joshua Gans' comment that 'had Australia maintained its historic share of expenditure on education, its innovation index in 2000 would have been over 16 per cent higher while achieving its peak university-based R&D performance would have added a further 2 per cent. This would have put Australia soundly in the second tier of world innovators rather than at the clear bottom of that group.'[3]

2 Internationally Competitive Incentives for Business Innovation, including R&D

Government has a leadership responsibility for creating the right environment across Australia for the growth of innovative industries, whether they are existing or new. This environment should provide internationally competitive incentives for business to undertake R&D and to innovate, and those incentives should be simple to understand and use, consistent and predictably available over time. This is important because the administrative costs of accessing incentives can quickly reduce their real value. In addition, the nature of research and development in many industries is long-term so businesses need to have confidence in the policy settings before they will invest.

[3] Joshua Gans' submission to the Productivity Submission' Science and Innovation Study 2006

Australia should at minimum have incentives for business R&D that bring us into line with other leading world economies. The end goal should be to develop a world scale private sector R&D base that will produce economic benefits from its own R&D and that of the public sector. More focus is needed on ensuring that the benefits of that R&D are effectively exploited at the level of the business.

Many of the issues in this area are addressed in the IEAB's position paper (attached) on incentives for business innovation presented to the Federal Treasurer in the context of the Study on International Comparison of the Australian Tax System undertaken by the Australian Government in early 2006.

The paper's key conclusion is that declining R&D investment trends, limited growth of technology companies and lack of access to venture capital for technology companies will only result in Australia falling further down the international competitiveness ladder. Despite the clear evidence supporting this proposition, the IEAB's position paper appears to have fallen on deaf ears. We therefore regard the Productivity Commission's current study as critical.

3 Increasing Risk Capital Formation

Risk capital formation is a key influence on Australia's capacity to generate income in the future. Risk capital formation, as defined in this paper, refers to capital that is made available to the knowledge intensive business sector in order to 'cross the valley of death' from an early-stage company to a sustainable company. That is, enabling the increased proportion of venture capital (VC) in the general investment capital pool to be available for later stage development. The Australian Venture Capital Association Limited (AVCAL)'s 2005 Yearbook reports that in 2005, of the 20 funds that raised $3.1 billion of private equity, only one fund was for later stage development, with only $47.4 million.

The IEAB's view is that there is a need to accelerate the establishment of more VC funds to invest in the later stage development of new innovation-based businesses.

We note in this context that the Victorian Government, in 2003, was the first State government to make significant reforms to limited partnership law to remove barriers to investment and to facilitate growth in the venture capital sector. Victoria has seen positive benefits from the changes. Starfish Ventures used the reforms to raise their $138 million fund for investment into a range of technology companies.

The IEAB notes that the Australian Government announced in its 2006-07 Budget that it will introduce an early stage venture capital limited partnership investment vehicle providing investors with a complete tax exemption on capital and revenue gains. We are also aware of the *Venture Capital Act 2002* and the *Taxation Laws Amendment (Venture Capital) Act 2002*, which amended the tax treatment of venture capital limited partnerships (VCLP) and Australian venture capital funds of funds in order to grow the VC industry.

However, Australia still has a low percentage of VC versus the rest of the investment flow compared with other developed economies[4], particularly if the private equity class is removed as it is used primarily for buyouts of going concern businesses for later resale.[5]

Clearly the current risk incentives and governance settings are insufficient to increase the flow of funds into VC. The IEAB notes that whilst our taxation system now does not discriminate against or seek to penalise venture capital investment, neither does it provide any real benefits that act as an incentive to invest. From the IEAB's perspective, the most obvious way to increase the flow of funds into VC is a further fine-tuning of the capital gains tax on VC investments and founder shareholdings.

The IEAB has also previously expressed the view[6] that superannuation funds could be opened up in relation to venture capital. We recognise the judiciary requirements of these funds but consider the objectives of the funds could be set to meet these requirements whilst taking into account access for venture capital. We would reiterate that whilst there are many issues that would need to be addressed in opening up superannuation funds for these purposes, we suggest it be considered in light of the points raised in the OECD *Going for Growth Report*[7] to ensure there are no unintentional impediments in the Australian tax system.

Finland's recent experience is instructive in this area. Prior to the mid 1980s, Finland's venture capital market was very weak. However, following the liberalisation of the financial market, the amount of venture capital investments increased more than tenfold between 1995 and 2000. It is estimated that about one-third of private equity investment in Finland went to ICT during this period, driving the huge growth of the sector that Finland is now so well known for. This example demonstrates the importance of strengthening the sources of capital and facilitating venture capital investments to create the conditions for business innovation. Despite such compelling examples, Australian policy makers and political leaders seem reluctant to take the step from conclusive research to action at a scale sufficient to achieve substantial economic impact.

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[4] The Australian Innovation Scorecard 2004 shows that Australia is ranked seventh, and was equal to the OECD average on its finance indicator which examines the investment in early stages and expansion venture capital as a percentage of GDP. It does not include management buyouts.

[5] The AVCAL Yearbook 2005 reports that in 2005, buyout funds dominated with 69% of the capital and 40% of the equity funds raised.

[6] In the IEAB's position paper on incentives for business innovation that was presented to the Federal Treasurer in response to the Study on International Comparison of the Australian Tax System.

[7] The recent OECD Going for Growth report (Pg 65, 2006) suggests two key policy determinants that influence the supply of and demand for venture capital:

- relatively high taxation of capital income and capital gains that reduces both the willingness of individuals to commit money to venture funds (supply) and the incentive for companies to invest in high-risk activity (demand). Capital gains taxes for individuals and companies are relatively high in countries like Japan, but some of these countries provide special tax incentives for venture capital to offset the adverse impact; and
- portfolio restrictions that bar or limit institutional investors from holding non-listed companies or high-risk companies, even at levels consistent with prudential standards.
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4 The Importance of Collaboration, including International Collaboration

It is the IEAB's view that successful innovation requires strong collaboration between the publicly funded research sector and the business sector, as well as between businesses themselves, particularly those with an export focus. The Government's role in this context would be to promote interaction and transfer of information and knowledge across these sectors, through such programs like the Cooperative Research Centres (CRCs) as well as through private sector only programs.

In fact this is also the OECD's *Going for Growth Report* (2006) recommended that Australia "needs to strengthen industry-science linkages and increase the leverage effect of public R&D expenditure on private R&D investment through sustained emphasis on public/private partnerships for research and innovation."

In this context, the IEAB recognises that the Australian Government has introduced the National Collaborative Research Infrastructure Strategy (NCRIS), which aims to maximise the potential that can be achieved in linking the research and business sectors by providing access to the infrastructure and networks necessary to undertake world-class research and looks forward to what this program might deliver.

NCRIS aside, the IEAB is concerned about the Australian grant systems for investing in R&D development. We recommend they be reviewed as they constrain opportunities for research collaboration, and the ability to leverage foreign capital. That is, part of the grant conditions usually are that funds can only be expended on Australian-based projects, thereby limiting the opportunity to collaborate on international research that would have spillover benefits back to Australia, and also limiting the opportunity for knowledge transfer and access to much needed venture capital funds.

More still needs to be done in this area. In Australia, as in the UK, there are barriers to better collaboration efforts such as business not being aware of the potential benefits from collaboration with universities, "cultural clashes" between the mindsets of business and universities, and issues in the pricing and management of intellectual property (IP).

Lambert (2003) correctly expressed the view that Government needs to support universities which are doing work that industry values and that industry development agencies could play a greater role in developing links between business and universities.

The IEAB considers that the Australian Government, in close collaboration with State and Territory Governments, needs to take a lead in building international partnerships and linkages in order to improve knowledge transfer, technology diffusion, and collaboration on projects in innovation.

A good example of this happening in Victoria is the recent agreement between the Australian Stem Cell Centre, based at Monash University, and the University of California San Diego (UCSD). The Memorandum of Understanding (MOU) will allow Victorian stem cell researchers to work alongside their Californian counterparts,

resulting in two of the world's leading centres working together on future projects and discoveries. Under the agreement both centres will have access to research facilities and staff as well as undertake a regular exchange program to fast-track research and knowledge transfer.

We need to see more of this activity facilitated by Government for Australia to remain competitive internationally.

The IEAB recognises that the Australian Government program, the International Science Linkages (ISL), supports the engagement of Australian researchers in leading international scientific research and technology by enabling researchers to leverage access to international research funds (including EU Research Framework funds) and to develop strategic alliances with international researchers and industry. In the 2006-07 Budget, it received $9.2m, as part of a package of $92.7 million over nine years.

The Australian Government also recently announced $15 million funding for six new initiatives[8] to support greater collaboration between researchers, both domestically and internationally. This is a good start but not of the scale required.

As the Science & Innovation Mapping Taskforce's National and International Linkages Background Paper (2003) noted, "there is a need for a greater strategic approach to international science and technology (S&T) collaboration in Australia". The paper confirmed the IEAB's view that international collaboration plays a critical part in the collaborative behaviour of Australian researchers, research bodies and companies. It also found that it is an important mechanism for maintaining the visibility of Australian research and researchers. However, the paper does point out that there is a degree of lack of visibility of Australian science to the rest of the world, despite current Government support arrangements.

It further noted that Australia lacks a strategic approach to coordination of support for international collaboration in S&T. Funding mechanisms also appear to be insufficient and lacking in flexibility for Australia to be able to take advantage of the available opportunities.

In other countries, international S&T collaboration has received a priority status at a whole-of-government level, and since 2000, countries such as the U.S, Canada, New Zealand (NZ) and Sweden have either announced new initiatives or are in the process of refocussing their international S&T policies and strategies.

For example, the Canadian Government's efforts to encourage international research linkages and shared infrastructure arrangements with overseas institutions present one way of addressing limitations of scale in promising research areas. For example, they have set up two international funds, each with a CA$100m (A$105m) budget over three years. The International Joint Ventures Fund supports high-profile research infrastructure projects in Canada that enable researchers to take advantage of

[8] Announced 31 July 2006 under the *Systemic Infrastructure Initiative*.

opportunities with leading overseas research facilities. The International Access Fund enables Canadian institutions and researchers to access major international collaborative programs and facilities in other countries.

The NZ initiative *Bringing world-leading researchers to New Zealand* is similar to the *Victorian Endowment for Science, Knowledge, and Innovation (VESKI),* which has the primary aim of stimulating the sharing of knowledge by bringing successful expatriates and leading researchers to Victoria.

Arguably, as Australia is geographically isolated from the centres of world science – U.S, Europe, and North Asia – we need to invest more than countries like Canada, which have this at their door step.

The IEAB notes that given there is a very significant amount of research activity internationally, then it is important that the innovation policies developed by Governments consider mechanisms which link our research base to international research and support technology diffusion to industry. One such mechanism for building linkages internationally is for Australia to have world-class research infrastructure that will attract international collaborations that delivers national and international benefit.

The Australian Synchrotron is a very good demonstration of forging strong international links to promote Australian success in R&D. It has signed several Memoranda of Understanding (MOUs) with international research facilities including Spring-8 in Japan, the Chicago Advanced Light Source, the European Synchrotron Radiation Facility, the Photon Factory in Japan, the Swiss Light Source; British Diamond Light Source, the Canadian Light Source; and the Beijing Synchrotron Radiation Facility. These MOUs allow for scientific exchange in a world where co-operation and collaboration are increasingly important for success in frontline R&D.

The IEAB's view is that programs that attract leading researchers and enable domestic researchers to participate in international projects are essential. The capacity to attract research leaders is however heavily influenced by the available research infrastructure and supporting research expertise.

Conclusion

The IEAB would like to reiterate the importance of innovation for Australia to remain a dynamic, competitive economy with high living standards.

We strongly support the call by the Victorian Minister for Innovation for a national innovation agenda (NIA) which is focussed on investment in innovation infrastructure; increased private R&D spending; supportive regulatory environment; education and skills; and collaboration domestically and internationally.

The IEAB's four pre-conditions for an innovation economy are strongly aligned with the five key points of the NIA as outline by the Victorian Minister for Innovation. We note that the NIA includes a focus on publicly funded infrastructure for innovation and whilst this submission does not focus on this, we support its inclusion.

In translating our pre-conditions into the NIA, we seek to:

- develop human capital through education and training;
- enhance the innovative capacity of businesses by improving their ability to innovate through incentives and access to expansion capital; and
- focus on improving networking capacity within the innovation economy by stressing the role of joint research collaboration between business and public sector institutions, and internationalising these collaborations.

In doing so, an NIA will focus on the nation's advantages to create self-sustaining innovation capabilities in its firms and lead to a more innovative economy.

The IEAB would also suggest that Australia look to countries such as Finland and Sweden[9] where their economic success has been driven by a coordinated national innovation system which provides for access to capital and skilled labour, networking between business and science research sectors, and internationalised research. These case studies reinforce the IEAB's four pre-conditions necessary for an Australian innovation economy.

In closing, the IEAB would like to see improvements in the governance of innovation policy through the strengthening of cooperation between various levels of Government. This would see a more effective and cohesive allocation of resources with consistent priorities, providing certainty for the knowledge-intensive business sector, where consistency and certainty are critical for investment in an innovation economy.

In the IEAB's view, increased public support for science and innovation activity plays a critical role in maximising Australia's economic growth opportunities and outcomes. The growth in knowledge and innovation outputs across all OECD countries in recent years indicates that this type of investment is now a pre-requisite for higher living standards and growth.

We need to ensure that we are well equipped and active in the pursuit of our innovation economy. Given there are lags between science, innovation and skills investments and their full returns, estimated to be about nine years[10], the investment Governments make in science and innovation today will generate returns to Australia's economy and society in 2015 and beyond. Australia is going through period of prosperity and thus needs to act now to invest this legacy to secure our future. We need to be asking ourselves what the economy, environment society will need and what investments do we need to make today to achieve the needs for the future. It will be dangerous folly to allow the current but almost necessarily temporary boon of the resources boom to fool us into complacency.

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[9] Roos, Fernström & Gupta, *National Innovation Systems: Finland, Sweden & Australia Compared: Learnings for Australia* 2005

[10] Allen Consulting Group, *The Economic Impact of Cooperative Research Centres in Australia*, 2005

REFERENCES

Australian Council of Deans of Science, *Who's teaching Science? Meeting the demand for qualified science teachers in Australian secondary schools Report, 2005*

Australian Venture Capital Association Limited, *Yearbook 2005*

Committee for Melbourne, 2005, *Expansion Capital for Innovation Project*

Department of Education, Science and Training, 2006, *Science, Engineering and Technology Skills Audit*

Department of Education, Science and Training, *Australian Innovation Scorecard 2004*

Department of Education, Science and Training, 2003, *National and International Linkages Background Paper*

Department of Education, Science and Training, 2002, *Review of the Australian Government Languages Other than English Programme (LOTE) - Report*

Department of Industry, Tourism and Resources, 2003, *Business Innovation Working Paper*

Dorwick, S., 2002, *Investing in the Knowledge Economy: implications for the Australian economic growth*

Gruen, D., 2001, *Australia's Strong Productivity Growth: Will it be Sustained?*, Reserve Bank of Australia Bulletin

Lambert, R., 2003, *Lambert Review of Business-University Collaboration Final Report*

OECD, 2006, *Economic Policy Reforms: Going for Growth*

Rand Europe, 2004, *International Collaboration in R&D*

Roos, G., Fernström, L., & Gupta, O., 2005, *National Innovation Systems: Finland, Sweden & Australia Compared: Learnings for Australia*

The Brookings Institution, 2006, *The Hamilton Project*

http://www.ed.gov, United States Teaching Language for National Security and American Competitiveness

http://www.dfes.gov.uk/languages/DSP_nationallanguages.cfm, Department of Education and Skills, United Kingdom

http://www.innovation.ca/media/print_content.cfm?websiteid=227, *Canadian Foundation for Innovation*

http://www.hrc.govt.nz/root/pages_policy/International_Investment_Opportunities_Fund.html, *Health Research Council of New Zealand*

ATTACHMENT

ISSUES CONCERNING TAXATION AND INCENTIVES FOR BUSINESS INNOVATION, INCLUDING R&D

FROM

THE VICTORIAN INNOVATION ECONOMY ADVISORY BOARD

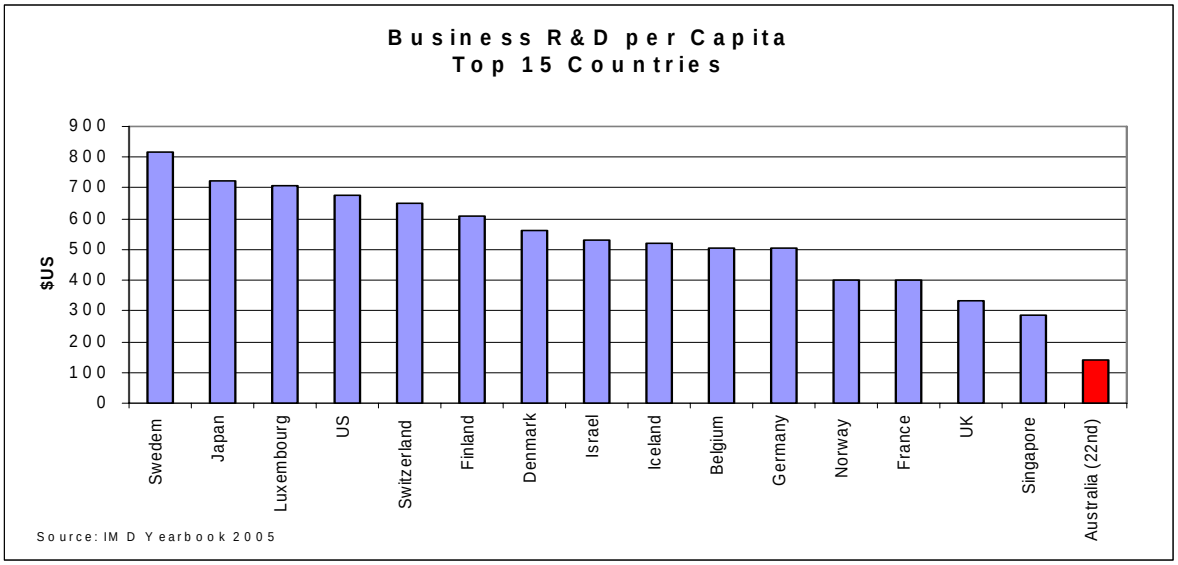
It is widely acknowledged that the Australian economy is performing relatively well, however, if Australia is to remain internationally competitive and preserve our standard of living, we cannot be complacent. We are facing increasing competition from countries in our region with low labour costs and large workforces – such as China, India and Thailand. In addition, the skill levels of their workforces are rapidly increasing. In the face of this we need to be concentrating increasingly on more value added goods and services.

Innovation is fundamental to our ability to produce high value goods and services. We believe that there needs to be urgent action to address this and that establishing a suite of effective incentives for business innovation, including R&D, is essential. The taxation system will play a significant part in this and the current review provides a welcome opportunity to establish what our competitors are doing and consider what needs to be done here.

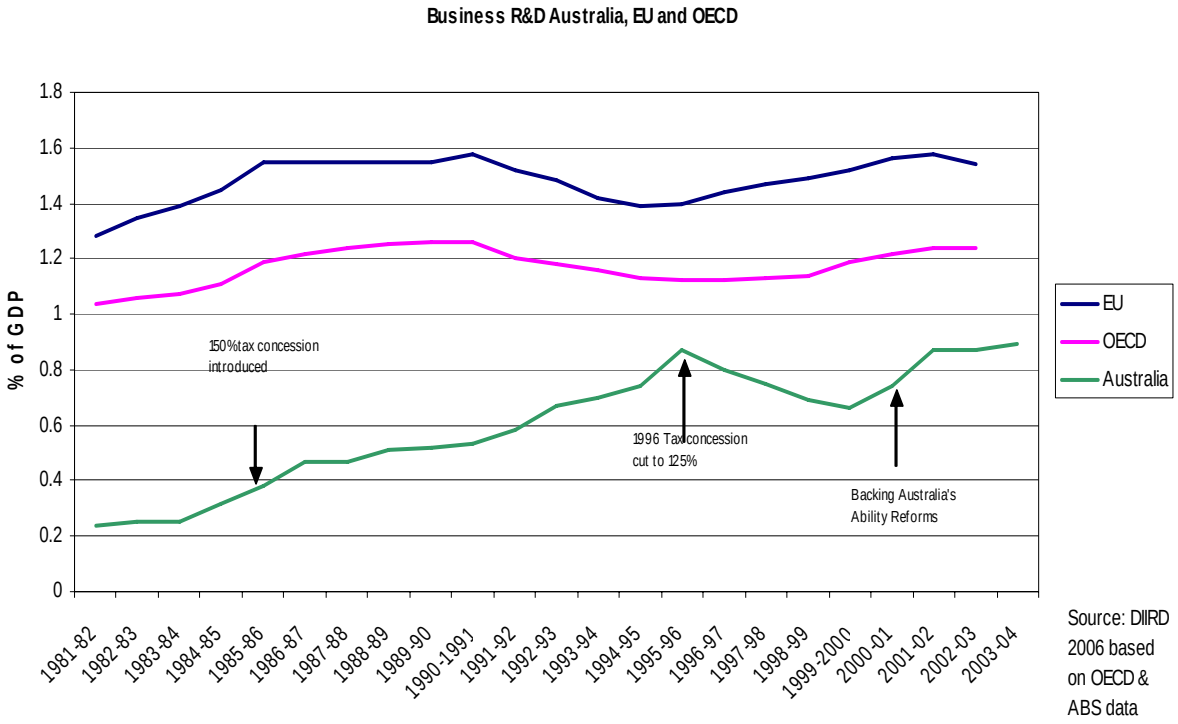
R&D Performance

Around the world, it is now generally accepted that innovation is becoming the main driving force behind successful modern economies. This is reflected in the United States and other leading OECD economies, by the very large investments in R&D capacity and skills that they are making. President Bush's recent US$137 billion *American Competitiveness Initiative* is a case in point.

While overall innovation performance is difficult to measure, R&D expenditure is generally accepted as a reasonable indicator. The available data show clearly that Australia is lagging behind on business expenditure on R&D (BERD).



Of particular relevance to the current study into international taxation systems is the impact of changes to the taxation treatment of business R&D in Australia. The chart below tracks Australian BERD since the early 1980s against EU and OECD performance.



It clearly shows the strong and sustained positive impact that the introduction of the 150 per cent tax concession had, along with a range of associated measures. It also shows that since 1996, when the 150 per cent tax concession was reduced to 125 per cent (when combined with the 30 per cent company tax rate, the general 125 per cent tax concession represents support at the rate of around 8 cents for each dollar of business R&D expenditure), that this had an immediate and negative impact on business R&D.

This suggests that tax concessions for R&D have a strong impact on business behaviour and so should be an integral part of the Australian approach to encouraging more business expenditure on R&D.

Government has a leadership responsibility for creating the right environment across Australia for the growth of innovative industries, whether they are existing or new. This environment should provide real incentives for business to undertake research and development and to innovate, and those incentives should be both simple to understand and use and certain. This is important because the administrative costs of accessing incentives can quickly reduce their real value. In addition, the nature of research and development in many industries is long-term so businesses need to have confidence in the policy settings before they will invest.

Incentives for Business Innovation

Australia should at minimum have incentives for business R&D that bring us into line with other leading world economies. The end goal should be to develop a world scale private sector R&D base that will produce economic benefits from its own research and that of the public sector.

R&D Tax Incentives

We are of the view that the R&D tax concession mechanism is the most appropriate one to drive change and encourage economic behaviour that is in the long term interest of Australia.

As the Chairman of the Productivity Commission, Gary Banks, has pointed out the R&D tax concession has many aspects of good policy design - it is a "*centralised mechanism for stimulating private sector R&D, while allowing decentralised decision-making about what and where R&D should be undertaken. This avoids the obvious problems arising from a need for bureaucratic or political judgements about the likely payoffs from competing claims. And, because it only partly subsidises R&D, the tax concession also provides a firm with the incentive to choose carefully among its R&D investments – avoiding some of the moral hazard problems that afflicted R&D Syndication.*" (Banks 2000)

Companies must invest themselves before incentives are received and they must be successful to get a return on that investment. R&D tax concessions enable successful companies to do more and focus public funds towards those with positive track records.

A simple analysis, just looking at the tax concession and company tax rates, indicates that the level of incentive (as represented by the after tax benefit) provided by the tax concession has reduced significantly in the last 20 years.

Research and Development Tax Concessions

Financial Year(s)	Tax rate (%)	Incentive Rate (%)	After Tax Benefit
87/88	49	150 %	24.5
88/89 to 92/93	39	150 %	19.5
93/94 to 94/95	33	150 %	16.5
95/96 to Aug 96	36	150 %	18.0
96/97 to July 2001	36	125 %	9.0
Current	30	125 %	7.5
Possible Future	30	175%	22.5

Source: DIIRD

Whilst we strongly support the lowering of the company tax rate, we are concerned that a consequence has been the loss of any real incentive, once administrative costs are considered, for business to undertake R&D, rather than other less risky and less valuable overall investments. If we are to return to the levels of incentive for business R&D that we had in the late 1980s the tax concession rate would need to be raised to at least 175 per cent.

The Board recognises that in addition to the 125 per cent concession, a 175 per cent premium rate and offset provisions were added in 2001/02. Because of the incremental nature of the premium concession, complex calculations, and the different eligibility criteria, the equivalent level of after tax benefit is difficult to determine. We understand that the Department of Industry, Tourism & Resources (DITR) is currently evaluating the premium and offset and will soon to be in a position to comment on their effectiveness. We look forward to this information.

In summary, a major concern is that Australia's policy environment for business R&D has become less attractive compared to other countries with whom it directly competes to attract R&D activities. For example, in Ireland incentives provided through the tax system for business R&D can contribute up to 32.5 per cent of total R&D costs, while in Singapore the 200 per cent tax deductibility for business R&D provides an incentive of 22 cents in every R&D dollar expended by business.

It would also be useful to consider a differential tax concession on the basis of R&D intensity, eg as a proportion of sales revenue. The objective would be to encourage more Australian companies to increase their R&D activity to a scale comparable with leading international companies. If budget neutrality was required, it could be achieved through careful management of the various levels of the concession. Notwithstanding this, we would prefer to see an increase in the overall level of incentive being made available.

The other main consideration concerns what is deemed as eligible expenditure for the purposes of the tax concession. As the overall purpose of supporting business R&D is to encourage the development of higher value export products and services there is a good argument for considering allowing a broader range of innovation expenditure to be claimed under the tax concession. The Business Council of Australia recently released a report into business innovation, called *New Concepts in Innovation*, which argues strongly for a broadening of the understanding of what constitutes business innovation beyond tightly defined R&D and calls for this to be considered as part of ensuring international competitiveness.

We suggest therefore the current review should provide advice on the range, type and scale of incentives being provided through the tax system for business expenditure on R&D in competitor nations.

The R&D tax concession is, of course, not a universal solution. It does not, for example, provide an incentive for those companies that are R&D intensive but not paying tax, such as high technology start ups. We recognise that other measures (such as *Commercial Ready* and the *Tax Offset*) address some weaknesses. However, as effective incentives are simple to understand, calculate and apply there is an argument for simplification of the suite of incentives which would be usefully informed by international approaches.

The impact of the tax system on individuals should also be looked at from an international competitiveness perspective. People with the right skills are fundamental to all business innovation so it is critical that the impact of the taxation system, whether through the cost of education and training or personal taxation does not put Australian businesses at a competitive disadvantage.

Grow technology-based businesses

The review could also look at tax measures that seek to encourage growing technology businesses such as tax concessions, rebates, credits, accelerated depreciation provisions, and grants and other direct funding.

The Singapore Government, for example, has been successful in attracting the world's leading multinational companies to locate in Singapore to service regional and global markets. One of the key mechanisms used to achieve this is taxation incentives. In particular, Singapore has the Development and Expansion Incentive, which provides for a minimum company tax rate of 5 per cent for up to 10 years to encourage existing and new companies to expand, upgrade and invest in high value-added activity.

In a similar vein, Dr Peter Farrell of ResMed (Farrell 2005) has suggested that tax breaks or holidays should be given to newly formed businesses, with sunset clauses for a zero tax rate from when the companies start to make a profit, or tax free periods from when companies begin to actually earn revenue.

The Intellectual Property Research Institute of Australia (IPRIA 2006) highlights the need to examine the taxation treatment of high technology start up companies. For example, the report points out that the tax laws impose significant start-up tax costs on the establishment and operation of start-up companies and proposes that there should be a general 'tax rollover relief' for contribution of assets in exchange for equity in a start-up company, to prevent taxation of unrealised gains on formation of start-up companies.

Submissions to Government by the Committee for Melbourne, Ernst & Young and BioMelbourne Network (2002) and AusBiotech (2003) raise very clear issues regarding access to capital for (bio) technology companies which apply across the board to technology companies generally. The issues include direct taxation impediments of investment into the biotechnology industry for emerging and mature companies; uncertainties facing investors concerning taxation issues, requirements, and liabilities; and taxation incentives not being competitive with other countries, especially the US.

Both submissions suggest taxation and related responses that would greatly support the development of Australian technology companies, such as broadening the capital gains tax rollover relief provisions or expanding the eligibility of the R&D tax incentives.

We strongly suggest that the tax study include consideration of these sorts of provisions in order to ensure that the environment for growing technology-based companies in Australia is competitive and effective.

Venture capital

Venture capital is an essential component of the innovation system. Australia's venture capital industry is underdeveloped in comparison with leading developed economies. The sector in Australia is estimated to be equivalent to just 0.1 per cent of GDP, a third of the OECD average and only one quarter of the level of the leading nation, the United States.

Furthermore, our venture capital sector is more focused on the risk averse projects – such as mergers and takeovers – compared to providing finance for early stage technology companies. This is one reason why there are so many small biotechnology companies listing on the stock market, as they could not access capital from other sources, which either fail due to lack of capital-raising or are bought out.

The recent OECD *Going for Growth* report (Pg 65, 2006) suggests two key policy determinants that influence the supply of and demand for venture capital:

- relatively high taxation of capital income and capital gains that reduces both the willingness of individuals to commit money to venture funds (supply) and the incentive for companies to invest in high-risk activity (demand). Capital gains taxes for individuals and companies are relatively high in countries like Japan, but some of these countries provide special tax incentives for venture capital to offset the adverse impact; and
- portfolio restrictions that bar or limit institutional investors from holding non-listed companies or high-risk companies, even at levels consistent with prudential standards.

In Australia, superannuation funds are frequently mentioned as a major potential source of venture and expansion capital. In a recent Prime Minister's Science, Engineering and Innovation Council (PMSEIC) Working Group Report: *Growing Technology-based SMEs* (2005) it is suggested that one way to support greater access to superannuation funds for venture capital is to increase the availability of domestic, expansion capital for technology companies in the $5 million to $30 million range by creating a tax-advantaged, privately managed fund into which individuals can directly commit a portion of their superannuation contributions.

The Board recognises that there are certainly many issues that would need to be addressed in any serious consideration of opening up superannuation funds for these purposes but we suggest that the current study look at international experience in light of the points raised in the OECD report to ensure there are no unintentional impediments in the Australian tax system.

In closing, we would like to reiterate that Australia needs a much more innovation-friendly taxation system and this is the time to strike with a reform of a tax system that currently lags behind many innovative countries. Declining R&D investment trends, limited growth of technology companies and lack of access to venture capital for technology companies will only result in Australia falling further down the international competitiveness ladder.

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REFERENCES

AusBiotech Ltd, 2003, *Growing Australian Biotechnology through Improved Access to People and Capital*

Banks, G., 2000, *Productive R&D Assistance*

Business Council of Australia, 2006, *New Concepts in Innovation: The Keys to Growing Australia*

Centre for International Economics, 2003, *Review of the R&D Tax Concession Program*

Committee for Melbourne, 2005, *Expansion Capital for Innovation Project*

Ernst&Young, Committee for Melbourne and BioMelbourne Network, 2002, *Growing Our Knowledge Economy*

Farrell, P.C., 2005, *Australian Innovation and Entrepreneurship in the 21st Century*

Fox, J., 2000, *A Proposal to Reverse Australia's Decline in Business Expenditure on Research & Development (BERD)*

Industry Research & Development Board, 2004-2005, *Annual Report*

Intellectual Property Research Institute of Australia (IPRIA), 2006, *Taxation Problems in the Commercialisation of Intellectual Property*

OECD, 2006, *Economic Policy Reforms: Going for Growth*

Prime Minister's Science, Engineering and Innovation Council Working Group, 2005, *Final Report: Growing Technology-based SMEs*