



SPEECH

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Fostering innovation for the knowledge economy

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What are we talking about?

When speaking on a subject like innovation, it helps to know what we are talking about. A parliamentary committee released a report on innovation just last week helps us. It defines innovation as:

The path of conceiving, developing and implementing ideas through the generation of products, processes and services. It gives economic value to a nation's knowledge".¹

At the core of innovation are ideas and their accumulation as knowledge.

Having settled on an understanding of what constitutes innovation, I have to say that the level of understanding of what constitutes good innovation policy in Australia is pathetically low. I certainly don't pretend to be an expert, but I know the Australian political and policy debate is full of self-interested fallacies.

Why is knowledge important?

It has become clear that, in the 21st century, the generation and application of good new ideas by creative and skilled people is the paramount source of the wealth of nations.

Older growth theories, upon which economic policy was based up to the 1980s, make economic growth heavily dependent upon a nation's endowments of capital. Utilising these models, the main policy prescription for growth was for a country to save more and invest the savings in productive capital. In the neo-classical theories that followed the old

¹ Parliament of the Commonwealth of Australia (2006, p. 8).

growth theories,² both capital and labour were made factors of production. Both were assumed to be subject to diminishing returns – after a particular point is reached, the more either of them is used in production processes while the other is held constant, the less extra output is produced. This characteristic of diminishing returns imposes a limit on achievable growth as more doses of capital and labour are applied.

New growth theory, pioneered by Romer,³ specifically incorporates knowledge, and suggests that knowledge has special characteristics that ease the constraints of diminishing returns. New growth theory identifies two types of knowledge: embodied and disembodied knowledge. Embodied knowledge refers to the acquisition of skills, which are embodied in particular people and die with them. Disembodied knowledge is the creation and development of ideas, which can live forever.

Ideas have three properties that make them especially valuable. First, one person's use of ideas does not detract from another's use – called non-rivalry. By contrast, one person's use of physical capital (a piece of equipment) prevents another person from using it at the same time. The second attribute of ideas is that their creator cannot fully prevent others from using them – called non-excludability. It differs from physical capital, where the owner of a piece of equipment has property rights that can fully prevent another person from using it. The third and most powerful attribute of ideas is that they are not subject to the law of diminishing returns. There is no limit to the number of potentially productive ideas. In fact, as the total amount of public knowledge grows, researchers have an ever-broader field on which to come up with new ideas. This positive feedback on the level of knowledge from new ideas is what Isaac Newton was referring to when he said: 'If I have seen farther than others it is because I was standing on the shoulders of giants'.

Former US Federal Reserve Board Chairman, Alan Greenspan, has given modern expression to Newton's view:

*Over the past half century, the increase in the value of raw materials has accounted for only a fraction of the overall growth of US gross domestic product. The rest of that growth reflects the embodiment of ideas in products and services that consumers value. This shift of emphasis from physical material to ideas as the core of value creation appears to have accelerated in recent decades ... ideas are the centre of productivity growth.*⁴

The first and third attributes of ideas – non-rivalry and non-diminishing returns – give them the capacity to contribute to economic growth on an ongoing basis. Not only can investment in new ideas raise output once-and-for-all to a new level, it can keep growth going indefinitely. That is, investing in new ideas can have both a level effect and a growth effect.

In contrast, investment in skills has only a level effect. This is not to argue that investment in skills is less important than investing in ideas. Investing in skills favourably affects the rate at which new ideas are created and the ability of a country to absorb and adapt new technologies.

² The old growth theories, based on the Harrod-Domar growth model, were developed in the 1930s and 1940s. The neo-classical growth theories were pioneered by Robert Solow in the 1950s.

³ Romer (1990).

⁴ Greenspan (2004, pp. 2 & 4).

While embodied knowledge – skills – are essential to the creation of disembodied knowledge – ideas – and both are regarded as vital sources of economic growth, some go further, arguing that they are the only source of comparative advantage.⁵ The experience of the present global resources boom challenges this polar view. Australia's soaring terms of trade generated out of the phenomenal growth of China have added more than \$42 billion a year to national income in recent times.

The non-excludability of ideas causes private firms to under-invest in them, since they cannot capture all of the benefits of their investment. The positive spillover benefits of innovation for the wider community create a role for government in fostering innovative activity.

Australia as a free-rider?

Various reports of the OECD and the IMF have identified Australia as one of the most successful countries at adopting and adapting information and communications technology developed overseas, primarily in the United States, having few regulatory restrictions in comparison with other OECD countries.⁶ The creation of the open, competitive economy has greatly assisted Australia in absorbing overseas technologies. It has been estimated that domestic R&D and the spillovers from foreign R&D absorbed into Australia are of roughly equal importance to Australian productivity growth.⁷

Yet, when visiting Melbourne for the World Economic Forum in 2000, Bill Gates criticised Australia for failing to develop major ICT production industries. Bill Gates is a very successful man, but that doesn't mean he is always right.

What reason do we have to believe Australia would have a comparative advantage in ICT production? During the 1990s the price of IT hardware in the United States declined by a staggering 21 per cent per annum, and in Australia it declined by 18 per cent.⁸ Australia received huge benefits from these price reductions without bearing the costs of investing in IT hardware.

The federal government has repeatedly pointed to the folly of Australia trying to establish its own computer hardware production industry, as if demolishing this argument also dispenses with the argument that Australia must do more to invest in research and development (R&D). The Prime Minister has sought to diminish the role of home-grown innovation in raising prosperity, suggesting the ongoing *use* of overseas technologies may be sufficient to transform Australia into a knowledge economy:

... the measurement of whether an economy is in the current language 'old' or 'new' is, in my view, overwhelmingly determined by the capacity of an economy to use the benefits of technology, particularly information technology."⁹

Australia should *not* be a total international free-rider when it comes to R&D.

⁵ Thurow (1996, p. 68).

⁶ See, for example, OECD (2003b).

⁷ Dowrick (2002, p. 23); Parham (2004, p. 253).

⁸ Parham, Roberts & Sun (2001, figure 2).

⁹ Prime Minister Howard, Hansard, p. 21046, 2000. See, also, Treasurer Costello, *Hansard*, 10 October 2000.

We should position ourselves to be able successfully and quickly to adopt and adapt overseas advances in ICT and other innovation. The international evidence clearly shows that a country's success in adopting foreign technology is enhanced by its own investment in education and R&D:

*Although the rest of the world provides a huge source of ideas and technologies, a country like Australia cannot rely on a strategy of passive absorption to maintain strong productivity performance. In order to benefit from the global public good of world knowledge, countries need to have well trained scientists, a technologically capable workforce and active engagement in cutting edge research.*¹⁰

Australia cannot simply be an international free-rider, utilising ICT developed overseas; but nor should we seek to invest heavily in replicating the ICT production effort of countries like the United States. We should identify our own comparative advantage in R&D, and invest in it, not merely to enhance our capacity to absorb foreign ICT, but because smart investment in R&D can yield large benefits for Australia.

Australia's research and development effort

National returns from extra investment in R&D are estimated at around 60 per cent.¹¹ At these high rates of return Australia would clearly benefit from more investment in R&D. How are we faring?

Australia's business spending on R&D as a share of GDP peaked in 1996. The gap between Australia and the OECD narrowed consistently from the mid-1980s through the early 1990s. But since 1997, the gap between Australia's business R&D spending and that of the OECD has widened. Australia's business spending on R&D as a proportion of GDP is below that of 15 other OECD countries.¹²

A broader measure of Australia's R&D effort – a measure of investment in knowledge – aggregates public and private spending on R&D, higher education and computer software. On this measure, Australia ranks a mediocre 14th out of 26 OECD countries surveyed.¹³

[Library: is there a comparable ranking in the latest OECD scorecard?] An Innovation Scorecard prepared by the federal government indicates that Australia fares well compared with other OECD countries in internet usage, the proportion of the workforce that is tertiary-educated and the number of science and engineering graduates in the workforce, but that we lag badly in business spending on R&D, patents and innovation more generally.¹⁴

¹⁰ Dowrick (2003, p. 17).

¹¹ Dowrick (2002, p. 23).

¹² ABS (2005).

¹³ OECD (2003c).

¹⁴ See Australian Government (2005, p. 6); Parliament of the Commonwealth of Australia (2006, pp. 21-23).

Overseas innovation policies

Most OECD countries provide enhanced tax deductions, tax credits or direct subsidies for business spending on R&D. Tax deductions of around 125 per cent and 150 per cent are common, as are tax credits for all R&D or for extra R&D above a firm's recent historical levels. Recognising that most private R&D is carried out by large companies – and probably would be undertaken regardless of tax concessions – OECD countries are increasingly favouring small businesses in the design of R&D incentives.

Several countries, including the United States, Japan, Britain, the Netherlands and New Zealand, have been examining new ways of enhancing the tax treatment of R&D, while that bold R&D experimenter, Ireland, discontinued its R&D tax allowance in 2001. In fact, Australia has bigger spending on R&D than Ireland.¹⁵ Other countries are considering phasing out their R&D tax concessions to increase the neutrality of their tax systems. A number of OECD countries target their incentives to R&D projects undertaken in collaboration with universities and other public research institutions.¹⁶

Australia's innovation policies

Between 1996 and 2001 the federal government's innovation policy landscape resembled the Gobi Desert. The only major initiative taken in that five-year period was the cutting of the R&D tax concession rate from 150 per cent to 125 per cent. The Coalition's indifference to innovation policy had followed a decade of innovative policy development.

In launching his government's 1990 election program, Prime Minister Bob Hawke coined the phrase 'the clever country'. His argument was that Australia could no longer rely on being a 'lucky country', depending for its wealth on farming and quarrying. The centrepiece of the lucky country election program was the establishment of co-operative research centres (CRCs).

The Hawke government had introduced a 150 per cent R&D tax concession in 1985. Business responded immediately, its spending on R&D surging through to 1997, when the Howard government cut the concession back to 125 per cent. Syndication, whereby two or more companies could jointly register for concessions for projects with R&D expenditure in excess of half a million dollars, was introduced in 1987, but was terminated in 1996 on the grounds of its high costs and the practice of using it to minimise tax by syndicate partners with little interest in R&D.

Labor, in opposition, set the agenda for a new wave of investment in knowledge, through the Knowledge Nation Taskforce established by Kim Beazley at the Party's 2000 National Conference. Tragically, the public reception of the Knowledge Nation Taskforce Report was derailed by one diagram, described as 'noodle nation' on no less than 40 occasions by Howard government ministers determined to diminish the political appeal of Australia investing in knowledge.

But the idea had struck a chord in the Australian community – and the scientific and business community in particular – such that the Howard government in early 2001

¹⁵ ABS (2005).

¹⁶ OECD (2002, p. 9).

committed \$3 billion over five years to a series of programs called Backing Australia's Ability. In May 2004, the government followed up with a second five-year program, this time amounting to \$5.3 billion.

The R&D tax concession, described on the official website as 'the principal Government initiative to increase the amount of R&D undertaken in Australia',¹⁷ costs around \$500 million a year. The introduction in 2001 of a 175 per cent premium rate concession on eligible incremental R&D spending does not appear to have resulted in any significant increase in spending. Official projections of the cost of this concession to 2009, at around the \$100 million mark, imply no significant increase on 2004 spending levels.¹⁸

Yet Australia appears to have relatively generous tax concessions for spending on R&D by large firms compared with other OECD countries,¹⁹ which raises the question of whether these tax concessions are a wise public investment. There is international concern that R&D tax concessions may be an afterthought in business decision-making; that businesses appear to decide on their R&D spending on other grounds, and claim a deduction at the end of the tax period for decisions that would have been taken anyway.²⁰

Reforming Australia's R&D incentives

Australia's system of encouraging R&D needs a total overhaul. The subsidy value of the 125 per cent R&D tax concession is just 7.5 cents in the dollar, less than half the 18 cents subsidy provided by the previous Labor government.

[Library: please check figures]. It appears that the subsidy value of the R&D tax concession is so low for businesses, and the base of eligible expenditures is so narrow, that the concession appears to be at best marginal to business R&D spending decisions.²¹

The government's R&D tax concessions appear to be a \$600 million annual gift to businesses that elicits little or no extra R&D investment. Even the Business Council of Australia assesses that the R&D tax concessions:

*... may have a marginal effect on the level of R&D activities being undertaken in Australia.*²²

¹⁷ <http://www.ausindustry.gov.au>

¹⁸ See Commonwealth of Australia (2005), which estimates foregone revenue at \$90 million in 2003–04, \$85 million in 2004–05, \$90 million in 2005–06, \$95 million in 2006–07, \$100 million in 2007–08 and \$110 million in 2008–09.

¹⁹ OECD (2002).

²⁰ This appears to be the evidence from the US. See OECD (2002, pp.14–15).

²¹ Business Council of Australia (2004, p. 27).

²² Business Council of Australia (2004, p. 31).

Moreover, the imputation system of company income tax means that concessions claimed by Australian companies, while reducing company tax, correspondingly increase the personal tax liabilities of most shareholders. That is, the government claws back a large part of the subsidy from Australian shareholders.

Australian business spending on R&D is much more strongly influenced by business profitability than by the tax concession. The Productivity Commission has floated the idea of converting the R&D tax concession into a non-taxable grant, and applying it only to incremental investment.²³

The tax concession should either be increased or cashed-out to create a pool of public funds for encouraging private sector R&D. At a 30 per cent company tax rate, the R&D tax concession would need to be lifted to 160 per cent to provide the same subsidy value as that provided by the previous Labor government. That would cost an extra \$640 million a year to subsidise R&D that would have occurred at the 125 per cent concession rate, and more if it were to be successful in eliciting any extra R&D spending.

Alternatively, both the standard and premium R&D tax concessions could be taxed out to create a large Australian innovation fund of \$2.5 billion over four years.²⁴ At least some of the funds could be made available as loans, with repayment contingent on the private innovator achieving specified minimum returns on investment. If the minimum returns were not achieved the loan would not be repaid; if they were, the loan would be repayable over time, with interest. Such a loans system, modelled on HECS for university fees, could ensure the replenishment of the fund while encouraging the commercialisation of Australian ideas and inventions.

Both Kim Beazley and Greg Combet²⁵ have floated the idea of a special development allowance for projects involving the use of high-risk new technologies. Building on that idea, a Leading Edge New Development Allowance (LENDa) could be offered at the rate of 20 per cent of eligible development costs. LENDa would apply to projects approved by the Commonwealth. Project proposals would be assessed for their national net benefits by an independent advisory body such as the Productivity Commission. At least part of LENDa funding would be offered on as an income-contingent loan modelled on HECS.

Half of the Australian innovation fund - \$1.25 billion over four years - could be devoted to LENDa. The other half could be allocated to collaborative research projects between business and universities. Some of this could be offered as HECS-style income-contingent loans.

Converting the R&D tax concession into an outlays program would improve the integrity of the income tax system. Limiting expenditure to selected projects would remove the open-endedness of the tax concession, subsidising only those projects or activities that are expected to offer net national benefits and which are judged, on the basis of an independent assessment, would not have proceeded in the absence of Commonwealth support.

²³ Banks (2000, p. 7).

²⁴ The value over the period 2005-06 to 2008-09 of the tax expenditures associated with the 125 per cent and 175 per cent R&D tax concessions as estimated in Commonwealth of Australia (2005, p. 96).

²⁵ Beazley (2005, p. 10); Combet (2005, p. 10).

In determining the merit of applications for Australian innovation funding, regard should be had for Australia's prospective competitive strengths. Projects that convert Australia's abundant fossil fuels into clean, greenhouse-friendly energy sources would be possible candidates for LENDA. Australia's biological diversity is unique, and the richest among all the continents. Biotechnology might therefore be an area of competitive strength. Indeed, it has been estimated that annual rates of return to Australian health R&D have historically been up to five dollars for every dollar expended, including eightfold returns to cardiovascular R&D, sixfold returns to respiratory R&D and fivefold returns to R&D involving research into the digestive system.²⁶

A common complaint about R&D tax incentive schemes is that governments change them too often, altering the eligibility criteria and the rates of concession. The argument is that a lack of certainty about future government support hinders private R&D investment. These criticisms have some validity. But if, as seems probable, the present tax concessions are eliciting little extra private R&D, the creation of a merit-based grant scheme would be a real improvement.

Putting innovation on the national reform agenda?

The BCA argues that building the skills base and implementing policies that elicit greater levels of R&D are preferable to modifying the R&D tax concession. While individual components of the present innovation policies like the CRC program might be effective in improving Australia's innovation performance, it is not obvious that the overall program is having the desired effect.

One of the problems might be the difficulty of Commonwealth departments administering grants schemes. State governments may be better equipped to administer such schemes. Queensland and Victoria appear to be successfully implementing their own innovation programs. Commonwealth departments are typically one step removed from businesses operating in these and other states. The principle of subsidiarity would have the states administering grant programs. Overall direction would be provided by the Commonwealth and pooled funding arrangements could be established through the Council of Australian Governments (COAG). Co-operative federalism has a lot to recommend it. The removal of duplication and overlap is always a worthy pursuit.

Victoria is setting a national COAG agenda of early childhood development, skills development and preventative health. Without wishing to overload it, adding a co-operative approach to innovation policy to the COAG agenda could be the tonic needed to foster Australian innovation.

²⁶ Access Economics (2003, p. 1).

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