Productive R&D Assistance

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Innovation is a critical driver of long term productivity and income growth. But the innovation performance of an economy attracts less interest in the financial pages than short-term macroeconomic indicators. That appears to have changed in the last year. When the Australian dollar plunged to new lows, a popular explanation was that foreign markets perceived Australia as a low technology economy, and that our commitment to business R&D was too low.

There is no doubt that, compared to its rapid growth of a few years ago, business R&D has recently slumped. Rod Maddock's insightful paper — applying methodology used by the Commission — diagnoses the cut in the concessional rate in Australia's tax concession for R&D as a major cause of this decline (Maddock, 2000). He argues that this would be best addressed by raising the concessional rate.

In reflecting on Rod's paper, I want to discuss three themes around business innovation.

- First, while the coincidence of the cut in the tax concession and Australia's flagging R&D performance is suggestive, the extent to which it brought about a decline in genuine R&D is a more complex story. That story has some lessons for the future design of any concession.
- Second, I want to look at government's role in stimulating business R&D, and particularly at some of the less glamorous, but critical, aspects of the design of an R&D tax concession.
- Third, I want to put business R&D into perspective, for it is only one aspect of innovation. Looked at more broadly, Australia is clearly an innovative country — as the Olympics demonstrated. That raises questions about the drivers of innovation and productivity growth in an Australian context.

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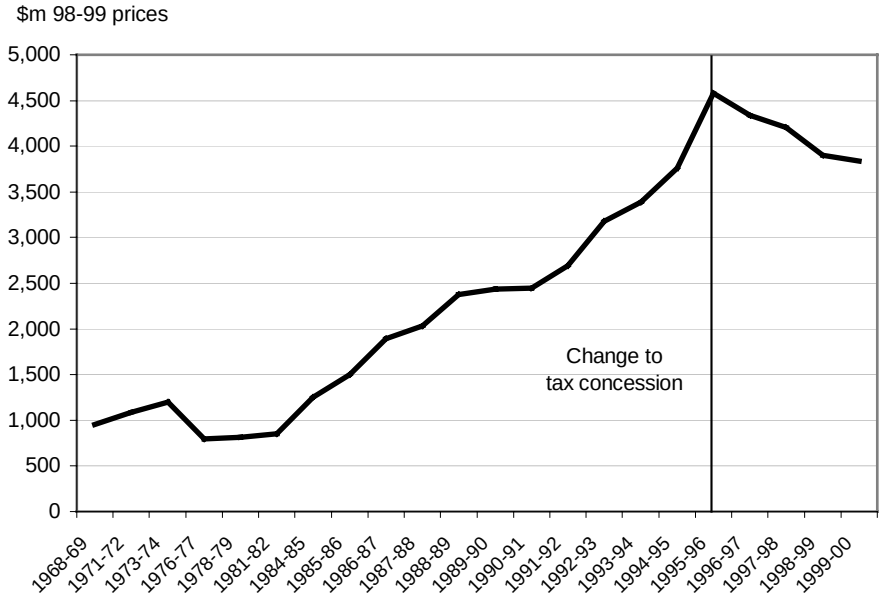
Looking for culprits for declining BERD

Let's first review the facts. Every year, the ABS surveys Australian businesses about their spending on R&D. The evidence is that estimated Australian business expenditure on R&D (BERD) has fallen significantly since the tax concession was amended. The Commission estimates that BERD has declined by 16 per cent in real terms from 1995-96 to 1999-00 (figure 1).

Figure 1 **BERD's progress**
Australia

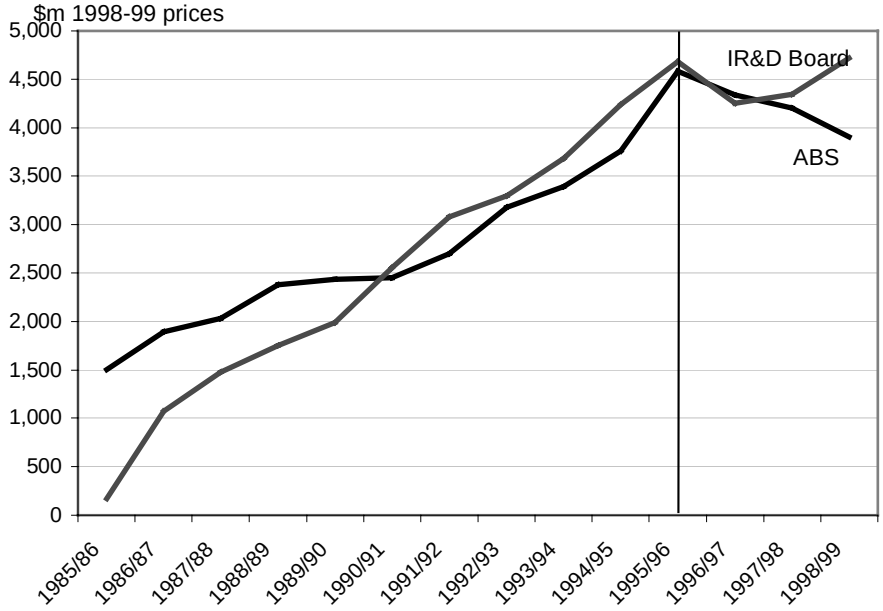


[a]The last year is based on ABS expectations data. These have been adjusted upwards by 7.3 per cent (the gap between actual and expected data for the previous year). It was assumed that the R&D deflator increased by 2.3 per cent over the year from 1998-99 to 1999-00 — in line with the previous year.

Data source: Commission estimates and ABS Cat. No. 8104.0.

Curiously, the IR&D Board's database of registrants, which in theory should provide the best testimony to the impact of changes to the tax concession, shows that real R&D among *registrants* actually increased by about 1 per cent from 1995-96 to 1998-99. However, that database is affected by large one-off claims that may not subsequently be allowable by the ATO — and these affect the last year of the data particularly. (Adjusting for this, using data provided by DISR, yields an estimated decline of around 20 per cent from 1995-96 to 1998-99).

Figure 2 **ABS and (unadjusted) IR&D database BERD**
Australia 1985-86 to 1998-99



[a]The IR&D database relates to the claims made by registrants for the tax concession. It may not match the final claims that are successfully lodged with the ATO.

Data source: ABS Cat. 8104.0 and data provided by DISR.

The fact that the two data sets can differ so much is testimony to the subjectivity in defining R&D. Definitions of R&D are fuzzy and likely to be applied differently by tax accountants, business managers, statisticians, government officials and economists. Tax accountants, in particular, have incentives to push eligibility as wide as they can. And tax officials naturally respond by tightening and clarifying the boundaries of eligibility. Those opposing forces may have played a significant part in the story of the decline in R&D over the late 1990s.

Prior to July 1996, R&D tax claims were burgeoning — and apparent R&D rising rapidly. But at that time there were a number of concerns about elements of the tax concession:

- Some expenses were being claimed that many would consider dubious as R&D. These included interest payments on debt to finance R&D, sizeable expenditure on feedstock in pilot plants, and a range of 'other' expenditures.
- The syndicated R&D program (a part of the tax concession that effectively allowed tax loss trading quarantined for R&D purposes) was still large, despite changes to its design. The most important element of the structured finance deals underlying syndicated R&D was the stock of 'core technology', which was notoriously difficult to value.

At the time the concession was lowered to 125 per cent, the syndicated R&D program and the tax treatment of feedstock, interest and core technology were also amended. The tightened eligibility criteria would have had a large impact on claims — but a much weaker impact on *productive* R&D investment. The numbers are revealing:

- In 1995-96, claims for expenditure on 'other' R&D expenses (which included feedstock, interest payments, core technology, pilot plant and other expenses) amounted to $2.5 billion in 1998-99 prices (about half of the total claims). By 1998-99, such claims were down by about 40 per cent, to $1.5 billion. Core technology claims had fallen by a remarkable 85 per cent.
- It is particularly revealing that total R&D salaries, contracts and plant deductions — all of which were relatively immune to the changes in eligibility rules — actually rose (slightly) in real terms from 1995-96 to 1996-97 (the year of the transition), whereas expenditure on the other items fell by 17 per cent.

It follows from this that a substantial part of the decline in R&D may be illusory, in the sense that some of what was formerly described as R&D may have been 'phantom' R&D.

That said, Rod Maddock is no doubt right to attribute some of the decline to the reduced incentive effect of the concession. However, his estimate of this effect may be overstated. In particular, he uses an 'inducement' rate (the extent to which a concession stimulates additional R&D) that is significantly higher than that estimated by the former Bureau of Industry Economics from survey evidence. Even the latter study may have exaggerated the responsiveness of R&D to the tax concessions, since it was based on judgements by the businesses themselves — whose interests presumably would not have lay in *understating* the benefits. The international literature on the responsiveness of business R&D to subsidies also suggests that Rod's estimates may be on the high side.

The government role in supporting business R&D

Even if there are some quibbles about the genuine impact of the tax concession, the Commission has generally supported the appropriate use of such programs because of the likelihood that markets will tend to under-invest in R&D (IC 1995). This reflects the standard argument that firms face weakened incentives to undertake as much R&D as might be socially desirable when they cannot appropriate the full returns. The econometric evidence — while complicated by difficult measurement, interpretation and specification issues — does suggest that private and social rates of return on business R&D are high compared to other investments (OECD 2000).

The fact that there is an in-principle case for government to support R&D, however, does not mean that any support will do. It is important to have new policy ideas — and the recent report by the Chief Scientist, for example, has a variety of them — but it is even more important to expose policy proposals to some hard tests before deciding whether to implement them (see Box 1).

Box 1 **Policy design and implementation principles**

Design principles

What is the primary problem being addressed by the particular intervention?

Is the intervention well targeted at the specified objectives and resolve problems in a timely way?

Does the intervention have the right scale and duration?

Have its impacts been measured for all relevant stakeholders?

Is the intervention consistent with related policies?

Does the intervention yield a net welfare benefit for Australians?

Are there superior alternative interventions or instruments that could be used?

Are there unintended consequences of the policy?

The implementation of policies

What are the costs of administration and compliance costs?

What are the risks of 'government failure'?

Are administrative processes timely, transparent and accountable?

Are review or appeal mechanisms appropriate, transparent, timely and cost-effective?

Is the policy being used 'strategically' by players in the industry, and if so, how should this be handled?

How could the implementation of the policy be changed to improve its operation and effectiveness?

Seen through the lens of good policy design, the R&D tax concession has some attractive features.

- In particular, it has the virtue of being a centralised general 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.

That said, the current arrangements also have a number of limitations:

- *Low additionality or inducement*. The concession provides subsidies for all eligible R&D expenditure undertaken by a firm. However, as noted, most of the R&D would have gone ahead anyway. That represents a transfer to shareholders, rather than a boon to R&D. While such transfers do not in themselves involve resource costs, the distortions that arise in financing them do.
- *Transfers to foreigners.* Much eligible R&D in Australia is undertaken by foreign multinational businesses. In this case, the transfers to shareholders do represent an economic loss to Australia.
- *Biased against high tech start-ups.* The tax concession is not worth very much to firms with tax losses, which is the typical position of high tech start-up companies. The concession is also not attractive to firms that issue unfranked or partly franked dividends — often the smaller start-up firms that wish to plough retained earnings into future investment — because the imputation system claws back some of the subsidy.
- *No limits on aggregate claims.* The budgetary impact of the concession is not knowable in advance, as there is no upper limit on aggregate claims. This means that if R&D demand increased unexpectedly, or a loophole were discovered that increased the scope for claims (as occurred in the mid-1990s), then the government may face unanticipated claims on its budget. (On the other hand, an R&D program is designed to stimulate socially beneficial R&D — not simply to save tax dollars!)

Other R&D incentive programs such as *Start* grants may be a partial response to these limitations. But they have their own weaknesses. As the Commission found in its 1995 review of Australia's innovation system, there are significant risks posed by the discretionary selective disbursement of grants, especially given imperfect information about the competing claimants. Grants also tend to involve higher administration and compliance costs.

The limitations and uncertainties associated with all R&D instruments, combined with the complex character of innovation, mean that a robust policy for R&D must involve a combination of approaches. Based on some detailed analysis, the Commission recommended the retention of the R&D Tax Concession in its 1995 report, including maintenance of the concessional rate at 150 per cent. But we did so with some misgivings about the extent of the net benefit.

In our 1997-98 inquiry into telecommunications equipment, we revisited the R&D Tax Concession and floated possible changes to deal with its main shortcomings, including:

- the adoption of a non-taxable grant instead of a tax concession (already raised in the earlier report); and
- limiting the subsidy to incremental R&D.

Australia is one of the few industrialised countries that has a tax concession that applies to the *level* of R&D expenditure, rather than being applied to additional or *incremental* R&D. The US, Canada, France, Japan, Sweden, and Taiwan all have incremental schemes. They work by allowing concessional tax treatment only for R&D expenditures above some base level — usually expressed as the ratio of R&D to sales.

The biggest barrier to adoption of such an incremental scheme in Australia is the absence of a legal requirement for consolidated company accounting, providing scope for abuse through creative corporate structures. The Ralph Review of Business Taxation contained some proposals relating to the consistent tax treatment of entities that would go some way to addressing this problem. There may also be some administrative remedies. For example, statutory declarations by consolidated businesses might significantly reduce the risks. If means were found to address effectively any administrative and legal problems, an incremental scheme could involve a higher concessional tax rate without any additional burden on the public purse.

At the time, the Government did not accept the Commission's recommendations. It saw some difficulties in implementation and was concerned about exacerbating the uncertainty for business already created by large changes to R&D assistance in 1996 and 1997. However, some time has now passed and impetus for changes to the R&D Tax Concession has built up — including the recent support by the Chief Scientist for an incremental scheme for part of the subsidy.

Another issue of relevance to government intervention in innovation is at what stage it should use its scarce funding to obtain the best return. A repeated lament in Australia has been that our capacity for invention is trapped in the idea stage, and that our capacity for successful commercialisation is weak. The evidence for this often comes from case studies of particular inventions, such as the flight box recorder. But the generalisability of this apparent weakness is less clear-cut. Moreover, it is precisely at the commercialisation stage that the arguments for government business interventions start to falter, for it is here that firms are better able to appropriate their returns.

In this context, there may be grounds for exploring how regulation and tax may affect capital markets' financing of risky projects and for looking at arrangements used for commercialising results from universities and public research agencies. But extending general R&D tax concessions to the more commercial phases of getting products to market, would open up new vistas for innovative accounting — with the budgetary implications that entails — rather than genuine innovation.

Putting BERD in perspective

Finally, I'd like to come back to the bigger picture. Business R&D is clearly important, but it is not an end in itself. Its contribution to national income and living standards ultimately depends on the extent to which it raises productivity.

As you know, Australia's productivity performance over the past decade has been exceptional (see figures 3 and 4). Multifactor productivity in the market sector has grown by 1.5 per cent a year, double the growth rate in the preceding decade and a half. Data released a couple of weeks ago continues that trend.

This rapid growth in productivity has yet to show any effect of the decline in BERD. More significantly, disaggregating productivity growth by industry reveals that some of the best performers have not been those with high or rising R&D intensity.

One group is the public utilities, where increased competitive disciplines have driven out the slack accumulated under protected government ownership. Another notable performer has been the wholesale sector, which has boosted its productivity through industry rationalisation and outsourcing of non-core functions, as well as improved distribution methods and the widespread adoption of coding technologies. It is a good example, by the way, of how the use of new technology can have a significant pay-off, irrespective of where that technology is produced. From that perspective, Australia does have strong claims to being a technologically new economy.

But effective innovation goes well beyond the technological, to include *any* new way of doing the myriad of things that make up a business: from a better production line, to a new marketing plan, to an improved way of motivating and organising staff. This was the key message of an important earlier BCA study on innovation — based on detailed case studies of Australian enterprises (BCA, 1993). Many firms are innovative and competitive, but do little formal R&D. Competition and the pursuit of profit are key drivers of such innovation, which has many sources and is not amenable to ready targeting by a tax concession or other subsidy.

Microeconomic reform has had a central role to play in this new competitive environment. An important part of its early impact has come from better utilisation and allocation of resources — eliminating waste. This phase must inevitably come to an end. Its more lasting legacy on Australia's productivity performance will come from the continuing competitive pressure on firms to be innovative, and the reduction of regulatory and other constraints on such innovation. That remains the important broader policy context in which R&D assistance needs to be placed.

Figure 3 **Australia's growth path 1964-65 to 1998-99**
1996-97=100

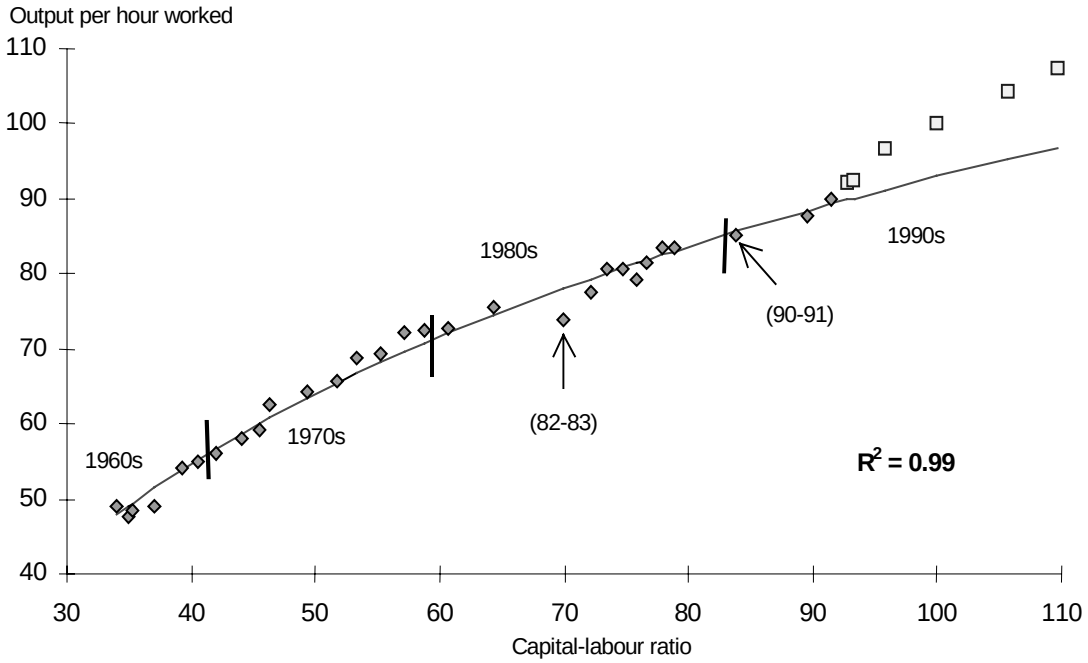
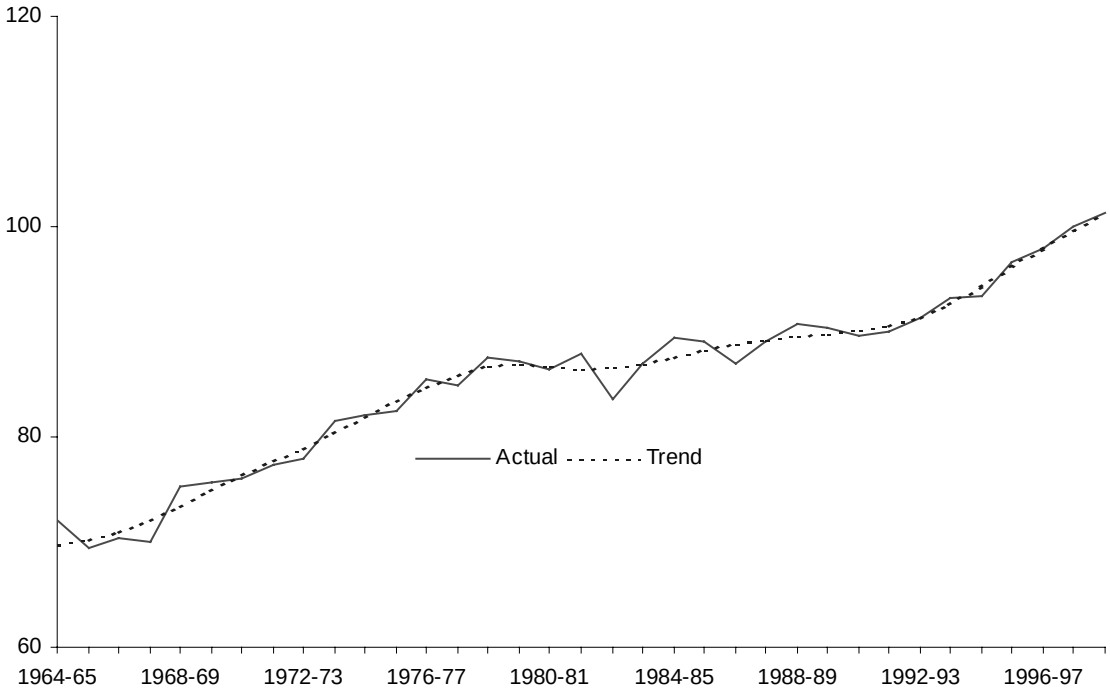


Figure 4 **Multifactor productivity growth**
Actual and trend



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