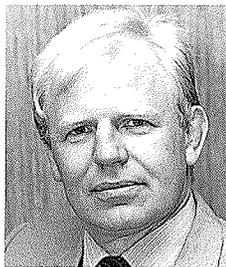


# R&D **D**ying of starvation

*Government policy is driving Australian savings into super-annuation funds, from where the Australian-equity allocation is invested in shares producing fully franked dividends and not*



*in research and development investments with potential high capital*

*gains. Tax policy and the dictates of the asset allocation mix have combined to ensure that whatever the funds do invest in R&D is being directed overseas, writes **Christopher Golis**. The result is that Australian innovations, particularly those generated in the public sector, are not being commercialised beyond a minimal extent.*

I became involved in the venture capital industry in May 1984 when I was given the task of raising the original \$10 million for BT Innovation Limited, one of the original seven management investment companies (MICs). Since then I have looked at more than 850 business plans and propositions. A handful have succeeded.

An examination of that short history leads to these questions: Is Australia's research and development being commercialised? If not, why not? And why is the position being made worse by government policies?

A large number of reports have crossed my desk that I consider directly or indirectly address these questions. A general conclusion made with increasing frequency in the reports is that Australian R&D is not being commercialised. This appears to be particularly true of public-sector R&D. One cannot help observing that if the same effort went into commercialising R&D as into writing about the lack of it, there might be several more success stories.

The latest report of the Joint Committee of Public Accounts (JCPA) provides the figures shown in Table 1. When one considers that the three organisations listed there represent a significant part of the Commonwealth allocation to R&D of \$2.6 billion, the returns in terms of licensing fees can only be described as woeful. The conclusion must be that Australia's R&D

is not being commercialised.

On the other hand, it must be said that the JPCA report contains some promising portents. Among the 300 pages of justifications, recommendations for establishing interdepartmental bodies to establish priorities, and arguments about the need to establish databases, it was pleasing to read that both ANSTO and the CSIRO had achieved the goal of 30 per cent external funding of their budgets.

The JCPA report lists six reasons for the lack of commercialisation: capital required, small size of the Australian private sector, high risk, lack of focus by the public-sector organisations, time taken and the recession.

I must note that the report lists, on its first page, three "horror stories" of non-commercialisation: the CSIRAC Mark I computer, the second-generation transistor and the black-box recorder. Nowhere did the report elaborate on the common reason for the rejections. In all three cases the inventions were rejected by public-sector departments or interdepartmental committees.

One key reason that Australian R&D is not commercialised is that the mix is wrong. In the excellent report *Innovation in Australia* the authors made the point that most successful innovation in terms of time and funding requires small research, medium development and large commercialisation.

Paul Trainor explained this rela-

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tionship in the context of the bionic ear. As a general rule, he said, for each dollar of research you need at least a dollar for production engineering and two dollars for marketing. In the case of the bionic ear, the numbers were \$3 million in research, \$4 million in production engineering (75 per cent of which came from the government) and \$6 million for marketing (of which \$3 million came from a venture capital consortium).

In Australia, the public-sector policy seems to be to spend \$2.6 billion on research and then hope someone else will come up with the \$10 billion or so needed for commercialisation. This is not clever policy.

While *Innovation in Australia* correctly noted that a major problem was the allocation mix in the innovation funding process, what it failed to say — and what *Bringing the Market to Bear on Research* said clearly — was that funding for innovation needed to be in the form of equity.

The servicing and repayment of debt consumes cashflow, and in Australia interest rates are notoriously variable. More important, however, is that a business committing major resources to innovation is in a position of business risk, and increasing the risk by increasing the level of debt substantially diminishes the later opportunity to raise equity.

I believe there are three major reasons why Australian R&D is not being commercialised:

- the cost of capital;
- the lack of entrepreneurs; and
- the lack of a pool of venture capitalists.

### Cost of capital

The cost of capital is the discounted cashflow rate which organisations should use to justify investment propositions. For a mature organisation, the cost of capital is typically the weighted average of the cost of debt and the cost of equity. The weighting depends on the proportions of debt and equity on the liabilities side of the balance sheet.

For R&D commercialisations, the cost of capital should be the cost of equity. In my book *Enterprise and Venture Capital*, I describe a method of calculating the cost of equity for various stages of company development. I relate it to the risk-free rate and I recommend the 10-year Commonwealth bond rate as a surrogate. I sug-

**Table 1: Relation of annual budget to annual licensing income – \$m**

Organisation	1991/92 budget	1990/91 licensing fees	%
CSIRO	635	2.2	0.35
DSTO	212	1.9	0.90
ANSTO	65	6.4	9.85

**Table 2: Discount multiples of the 10-year bond rate to be used in investment valuations**

Type	Sales	Profits	Discount Multiple
Listed blue-chip	Yes	Yes	1.5
Listed green-chip	Yes	Yes	2
Private stage III	Yes	Yes	3
Private stage II	Yes	No	4
Private stage I	No	No	5

gest that for a listed blue-chip, such as Pacific Dunlop, the cost of equity is 1.5 times the bond rate. As can be seen in Table 2, the discount rate for a start-up is five times the bond rate. This is the rate an R&D commercialisation should use for justification.

For much of the past ten years the Australian long-term bond rate hovered around 13 per cent while the corresponding rate in Japan was 3 per cent. The corresponding discount rates would be 65 per cent and 15 per cent. It is not surprising that Japan had a better record of commercialisation than Australia during the 1980s.

The better performance was not due to culture, schooling or long-term planning but to realistic risk/reward analysis.

To quote from *The Global Challenge*: the present short-term focus by Australian managers is a rational response to the high cost of investment funds.

The recent drop in Australia's rate of inflation has led to a fall in the long-term bond rate to 8.5 per cent. The appropriate pre-tax discount rate for R&D commercialisation is now around 42.5 per cent. This is still too

high, but at last the Australian economy is moving in the right direction.

### The lack of entrepreneurs

It is unfortunate that in Australia the word entrepreneur has taken on a pejorative meaning: the word has become confused with promoter and wheeler-dealer. True entrepreneurs are catalysts and business-builders. They bring together labour, skills, ideas and money and create greater economic value.

In the eight years during which I read more than 150 business plans, I met only five real entrepreneurs.

In 1986 I visited Silicon Valley. There are two Silicon Valleys. One comprises the factories and the R&D laboratories. This is the valley the bureaucrats and politicians visit on their fact-finding missions. The other is the offices of the financial officers and venture capitalists. This is the real Silicon Valley.

I visited the financial officers of three companies. Each had sales of around \$50 million, each had started less than five years ago and each would be the dream of a public servant in the Department of Industry, Technology

**Table 3: Typical fund-raising history of a Silicon Valley company**

Date	Investors	Amount invested \$	Equity %	Valuation \$
1982	Founders	100,000	100	100,000
1983	Angels A,B	500,000	25	2,000,000
1984	Venture capital C,D	1,000,000	20	5,000,000
1985	Venture capital E,F,G	2,000,000	20	10,000,000
1988	List	7,500,000	15	50,000,000

and Commerce (DITAC).

What was fascinating was the similarity of their presentations. After the standard fare of business definition, mission statement, vision statement and management description, each financial officer put up a flip-chart looking like Table 3.

These people understand the entrepreneur/venture capital game, which has three rules:

1. Equity is raised in stages, stays in the company and is used to finance the growth of the business (line 1).
2. The founders' ownership is diluted — they maintain control by having a number of investors (line 2).
3. The raisings are done at increasing valuations and the value of the founders' shareholding increases dramatically (line 3).

It should be noted that fund-raising is usually made annually. Further, the first fund-raising generally comes from private individuals known as "angels".

This financing technique has not been the Australian way. Until recently, if an entrepreneur did manage to get a business going, he would follow a different course. He would go to the banks and borrow. He would use the operating cashflow of the business to pay as much interest and as little tax as possible. The income would be used to service more debt to buy appreciating assets, typically property. Then he would run the business on an even keel until he wanted to retire, fire the employees, sell the property and keep the tax-free capital gain. With the introduction of dividend imputation, capital gains tax and lower inflation, this technique no longer works, as many Australians have recently discovered, but the California model has not yet become widely used.

The lack of entrepreneurs is a critical problem because it is typically they who commercialise an invention. Inventions may be commercialised in three ways: by a large corporation, a start-up or by adoption by a small, fast-growing corporation.

Large corporations are not by nature developers of inventions unless they are in a market which they consider they fully understand. They prefer to buy smaller, commercially successful businesses. Examples are Pacific Dunlop's acquisition of Nucleus and BTR's purchase of Borg-Warner.

Start-ups are very tough. The ma-

ajor difficulty is finding management with the skills to take a business to initial profit, given Australia's small market and high production costs. The tragedy is that what is often good technology is tainted with commercial failure and shunned by other parties.

The best method is adoption by a small, fast-growing company. Many technologies have insufficient potential to form a separate business but are adequate as an extra product line. The companies tend to be more innovative and receptive to technical development. Unfortunately, these companies in Australia have limited access to equity capital but overseas they are courted by the venture capitalists. Examples such as ERG are rare.

### Too few venture capitalists

The problem is not simply the lack of venture capital but the lack of a pool of venture capitalists. Even those who have it are not investing. The MIC program raised \$392 million and so far has invested \$225 million.

After the June 1984 fund-raising, an initial meeting of the MICs was held with the MIC Licensing Board. Before the meeting the MIC managers got together for lunch. Within five minutes the conversation shifted to how the incumbents could prevent any more licences being handed out. It was straight out of Adam Smith:

*People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in conspiracy against the public, or in some contrivance to raise prices.*

Recalling my formal training in economics, I disagreed and contended that we should lobby to have as many licences handed out as possible to replace those managers that would fail. I also predicted that more than half of the managers around the lunch table would not be there in five years. I was given the cold shoulder and never invited to lunch again.

The prediction turned out to be true, and unfortunately the MIC Li-

ensing Board became a victim of agency capture, like so many other government bodies. This lack of dynamic rivalry, as Porter's *The Competitive Advantage of Nations* clearly points out, generally leads to insularity and failure — and so it was with the MIC program.

However, it is not just for the economic viability of the industry that we need a pool of venture capitalists, but because it improves the capital-rationing process. Two key decisions face the venture capitalist when investing.

The first is whether the initial price is too high. The best comfort is to have another independent investor — or victim? — willing to pay the same price. The second is when there is a request for follow-on funding. The investor must ask himself whether he is throwing good money after bad. The best protection is to have another independent investor set the price, and if you cannot find another investor, turn down the request for more funds. The first loss is usually the best loss.

In Australia, because of the lack of players, these two processes of syndication and independent follow-on funding rarely occur. As many of the MIC annual reports now show, much good money has been thrown after bad.

### How the government makes it worse

Two major policy conflicts affect the innovation process. One is the conflict between the superannuation guarantee levy and dividend imputation. The other is the conflict between the 150 per cent R&D deduction and dividend imputation, particularly for large companies.

The latter is the easier to understand. Eighty-five per cent of the investment in the Australian stockmarket is controlled by Australian institutions and most of their shareholdings are in the large companies. The institutions want fully franked dividends. The 150 per cent R&D deduction reduces the

**Table 4: The operation of dividend imputation**

Marginal tax rate	47%	39%	15%
Dividend received	100	100	100
Franking credits	64	64	64
Taxable income	164	164	164
Tax due	77	64	25
Less franking credits	64	64	64
Actual tax paid	13	Nil	(39)

amount of corporate tax paid and thus the level of franking credits.

Another insidious consequence of the 150 per cent tax deduction, not widely recognised, is the aftermath of R&D syndication on small and medium-sized companies.

R&D syndicates are best thought of as old-style leases that suddenly finish with a 100 per cent residual of intellectual property on the balance sheet. The R&D syndicate initially removes R&D from the profit-and-loss account, increasing the company's profit, but later when the syndicate finishes and the intellectual property comes back on to the balance sheet it must be amortised. Not only is profit-and-loss adversely affected; the balance sheet also is seriously weakened because it is now loaded with an intangible asset.

Second, by a combination of taxation inducement and coercion, the government is effectively making the 40 or so superannuation managers in this country the major repository of Australian equity. Unfortunately, very little of this equity is ever going to be invested in Australian innovation under the present fiscal regime.

To understand why, it is necessary first to understand how dividend imputation works. Effectively attached to every \$100 of dividends on which corporate tax has been fully paid are \$64 of franking credits. Taxpayers who receive these dividends add them to their taxable incomes, calculate the tax to be paid, and then deduct the franking credits to establish the actual tax owed. Table 4 shows the calculations for three classes of taxpayer. Note that superannuation funds have a tax credit of \$39 and can shield a further \$39/0.15, or \$260, of income from non-franked sources.

Dividend imputation was introduced to remove the bias in the taxation system towards debt and against equity. It has achieved this goal. Over-leveraged companies and businesses have been punished ruthlessly. On the other hand, investors seek returns from equity in two forms — either dividends or capital gain. The introduction of dividend imputation (along with capital gains tax) has dramatically shifted the balance towards dividends and against capital gain.

This phenomenon is further clarified by an explanation of how a superannuation fund works. Two quota-

**Table 5: Relative performance of various asset classes\***

Asset class	Average returns % pa	Standard deviation %	Risk-adjusted performance
Venture cap funds 3 yrs+	17.5	37.6	22.1
Venture cap funds 6 yrs+	24.4	51.2	29.7
S&P 500	15.9	12.3	54.5
Small stocks	20.4	18.9	59.3
Real estate	12.8	15.0(est)	24.0
Treasury bills	9.2	2.7	0.0
Long gov. bonds	10.5	16.2	8.0
Long corp. bonds	10.7	16.4	9.1

\* US data, 1978-87

tions may be helpful:

Adam Smith: *It is not from the benevolence of the butcher, the brewer or the baker that we expect our dinner, but from their regard of their own self-interest.*

P.J. Keating: *Always back self-interest — it is the one horse in the race that is always trying.*

Fund managers are directly rewarded according to the amount of funds they have under management. The flow of funds is mainly driven by their position in the quarterly performance tables. The higher up the table, the greater the flow of funds. The position in the table depends on the manager's investment selection processes.

All fund managers are aware of two laws of investment decision-making. The first law is that the best investment sector is second-ranking equities. They provide the best trade-off between risk and return. Table 5 is taken from the DITAC working party report *Strategy for the Australian Venture Capital Industry*, which is one document that cannot be accused of bias against the industry.

The working party report tried to justify investment in venture capital because it was the asset class that gave the highest returns. No professional fund manager would invest on that basis. What a fund manager tries to do is balance return against risk. If given two investments of equal historical mean return but different historical variations, an investor would naturally choose the investment with the smaller variation. The final column in Table 5 uses the measure of risk-adjusted returns known as the Sharpe Index. The higher the index, the more attractive the sector. As is shown, venture capital rates far lower than other forms of equity.

The reason that the fund managers

do not put all their funds in second-ranking equities is that they are aware that the returns from the various asset classes vary over time. They are also aware of the second law of investment decision-making, which is that 80 per cent of a fund's performance comes from the asset-allocation decision.

The fund managers operate as follows.

First, they spend considerable time deciding on their asset-allocation mix. One typical structure outlined in a BT Australia document was: cash 22 per cent, Australian bonds 11 per cent, international bonds 14 per cent, Australian shares 18 per cent, international shares 21 per cent and property 14 per cent.

The fund manager would then estimate the income likely to come from this portfolio over the following six months.

The next step would be to select sufficient high-dividend-paying Australian shares to generate enough tax credits to reduce the tax due on income to zero. This selection will probably take up nearly all the Australian share allocation.

Because so much of the Australian equity portfolio is now weighted towards dividends, the fund manager must look for capital gains from the international equity asset segment. One source of high capital gains is venture capital funds, so any venture capital investment is directed overseas. If that necessitates an overseas trip, so much the better.

The most recent attempt by the government to create a venture capital industry is the announcement of pooled development funds. The jury is out on whether an Australian investment which allows a tax-free capital gain but no tax deduction for a capital loss and will pay 23 per cent

less franking credits will be attractive to superannuation funds. The previous logic suggests they should have limited appeal.

There is common consent that to raise funds from the institutional market you must focus on the superannuation funds. It is this segment which over the next ten years will become the largest repository of long-term equity capital and it is equity capital which must go into the pooled development funds. To attract the superannuation funds, it is necessary either to lower the tax rate of the venture capital intermediary to no more than 15 per cent or to increase the tax on superannuation funds to 39 per cent (one way of levelling the playing field never suggested by the fund managers), or to attach some form of franking credits to the subscription of equity to the venture capital intermediary.

Despite their protestations to the contrary, the Australian superannuation funds will not invest in venture capital under market pressures.

There is a market failure in this area, compounded by the taxation structure.

The government desperately needs to set up a seeding process similar to the small business investment corporation (SBIC) program in the US. Since 1958 more than 600 SBICs have been licensed and while 200 have failed and another 200 are among the "living dead", the remaining 200 have formed the basis of the venture capital industry in the US. ■

## R&D readings

Reports on research and development and venture capital in Australia issued over the past decade include:

*High and New Technology: Needs of Australian Industry*, 1983, Australian Science and Industry Association.

*Developing High Technology Enterprises for Australia*, 1983, Australian Academy of Technology and Science.

*MICLB Annual Reports*, 1984-91, MIC Licensing Board.

*Review of Venture Capital in Australia and the MIC Program*, 1987, Bureau of Industry Economics.

*Strategy for the Australian Venture Capital Industry: Facilitating the Innovation Process*, 1989, DITAC Working Party Report.

*Review of Product Innovation Infrastructure in NSW*, 1989, DITAC, Coopers & Lybrand.

*Manufacturing — Making Our Future*, 1990, Australian Chamber of Manufactures.

*The Global Challenge*, 1990, Australian Manufacturing Council.

*Innovation in Australia*, 1991, Industrial R&D Board.

*Small Business Finance*, 1991, Bureau of Industry Economics.

*Bringing the Market to Bear on Research*, 1991, Task Force on Commercialisation of Research.

*Wealth Creation in Australia*, 1991, Strategic Imperatives Committee.

*Economic Evaluation of CSIRO Industry Resources*, 1992, Bureau of Industry Economics.

*Public Sector R&D*, 1992, Joint Committee of Public Accounts.

*Developing Australian Ideas*, 1992, Ministry of Science and Technology.

## UNLISTED EQUITIES *From page 21*

that fees are negotiated down substantially. Unfortunately these issues sometimes arise when the fund is in its death-throes and long-term patient investors have little chance of recouping their money.

### Key factors in the success of unlisted equities

Several key features can contribute to successful long-term investment in unlisted equities:

- detailed research to identify strategically significant investment opportunities;
- financially strong and technically competent partners who work for the benefit of all shareholders;

■ the right to nominate a board member, receive management accounts and contribute to the management of the business;

■ an agreed exit strategy to enable the investor to achieve market valuation.

### The trend for the 1990s

The 1990s will undoubtedly be different from the previous decade, with the first years of the nineties spent in recession, record unemployment in Australia and the prospect of long-term low global interest rates. For AMP's unlisted portfolio, a relative premium over the market of 1.4 to 1.8 times the market should be achievable but the ability to achieve an absolute

portfolio performance of 20-25 per cent a year is clearly dependent on the market.

There will be opportunities which will yield 20-25 per cent IRRs. However, they will be scarcer than in the past, when inflation made life easy. A review of real returns may provide a clearer insight to performance that can be expected in a low-inflation environment.

It is likely that in the 1990s a portfolio performance of 1.4 to 1.8 times above the compound return of the All Ordinaries Accumulation Index will remain a reasonable target for investors in unlisted equities for an investment in the order of 10 years. ■