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## The Role of the Capital Markets in the Fight Against Cancer

### ONPAGE QUICKLINKS

- Introduction
- The Capital Markets
- Funding Types
- Government's Role
- Capital Market's Role
- Conclusion

### Introduction

In researching this talk on the Internet I came across an interesting item concerning the coming together of your field and mine. I quote:

"The National Health and Medical Research Council announced that they were going to allow the use of economists instead of rats in medical research experiments. Naturally, the Economic Society of Australia was outraged and filed suit but the NHMRC presented some compelling reasons for the switch:

1. NHMRC lab assistants become very attached to their rats. The emotional involvement was interfering with their research. No such attachment could form for an economist.
2. Economists breed faster.
3. Economists are much cheaper to care for and the RSPCA won't object regardless of the experiment.
4. There are some things even rats won't do.

However, the problem with using economists is that it is more difficult to extrapolate test results to humans." End of quote.

Fortunately, you can't believe everything that you read on the Internet and also, fortunately I am not an economist, being originally a physicist by training. I do, however have to talk about some economics to address the topic of this talk.

### Capital Markets - The Theory

Since you all know a lot more about the fight against cancer than do I, let me start by talking about the capital markets. First of all, what are they?

The capital markets are markets for money. Fundamentally, they exist to allow people with money that is, capital, in excess of their present consumption requirements to sell that money to people whose consumption needs now exceeds the amount of money they have to pay for that consumption. The payoff is an expected investment return.

Economic theory assumes that individuals invest their capital so as to maximise their so-called utility. It is further generally assumed that utility is a function of lifetime consumption that is in turn a function of wealth. Thus economic theory has individuals seeking to invest to maximise their wealth and to do this, they need to maximise the return on their investment of wealth.

Now in a world of uncertainty it is not possible to know ahead of time which investment is going to satisfy this objective of maximising return. We need to deal with this uncertainty, or risk. So economic theory has individuals seeking to maximise their return subject to a tolerance for risk.

Before we proceed to the next stage with this conventional approach, you might already have spotted a potential problem in its application to the fight against cancer. I think you would agree that in any sensible definition of utility, having a cure of cancer would score very highly, especially if you or a loved one is afflicted by it. However, right now, no amount of consumption expenditure or transfer of wealth is going to guarantee that you are cured.

Looked at another way, for an individual, wealth and health may be correlated because wealth can be traded for superior health care but when it comes to at least some forms of cancer, they are largely independent variables.



### Types of Research Funding

At this point in my talk, if there are any real economists in the audience, they are either very polite or they are on the verge of leaping up and abusing me as being another physicist who has only learnt enough economics to be dangerous. In fact, economic theory can accommodate

this apparent difficulty but I wish to highlight it as it has very practical implications for the funding of cancer research and, in particular funding at Peter Mac.

You would all be very aware that Peter Mac's funding comes predominantly from private charitable donations and from the government. How does this observation fit into the economic theory just outlined?

Starting with the charitable donations, there are many reasons why individuals will decide to make these and I will not even attempt to enumerate them all. Rather, let me give some instances that demonstrate important points of principle.

First, they may make a donation because they believe that additional funding for cancer research has a reasonable chance of finding in their lifetime a cure for a cancer that they may contract. This case can easily be covered by the theory as already outlined. One way of thinking about it is that the donor is consuming research services because this will be of benefit to them. In this regard it is little different to paying for a flu vaccination. I will note this under the heading of consumption of research services.

Another way of thinking of such a donation is that the donor is making an investment with the aim of maximising their wealth and consumption by living longer, thus earning more and consuming more. I'll call this an investment in longevity.

A second group might make a donation because it makes them feel good to be doing something that might help others even though they think that there is little chance of it helping themselves. Economists simply consider this another form of consumption of a service to make the donor feel good - perhaps a somewhat vulgar way to depict genuine selfless philanthropy, but remember we are talking about economists' world view here!

Finally, related to any of these is a potential second order utility benefit that comes from the fact that in making a charitable donation one gets a tax deduction. This can be thought of as consumption of the provision of a service to make the government spend money at the donor's direction. Given that the money is being directed to something that may already have a high utility, this is a compelling motivation. I'll call it the directed government funding service.

Before continuing with the main line of argument, it is worth noting that this provides a useful categorisation for anyone charged with raising charitable donations for Peter Mac. The message that needs to be designed for each of the groups above is quite different. For example, a campaign based on the first item would highlight the scientific progress that is being made in fighting some particular form of cancer and it would be targeted at an appropriate group - eg, progress on prostate cancer research targeted at middle-aged senior business executives. (I'm afraid I didn't bring my chequebook today but I suppose I can now expect to receive some mail from your fundraising department!)



## The Role of Government Funding

In the final characterisation of donors the government plays a role. We have already noted that the government is a major provider of funds for cancer research. Why do they have this role?

A significant function of government is the transfer of wealth, be it between sectors of the current generation of taxpayers or between different generations of taxpayers. It is this latter role, inter-generational transfers, that is crucial to the funding of cancer research.

For if we think as the government, rather than as an individual, the first category of utility maximisation on the slide is applicable. That is, the government is spending on research services, not necessarily for the benefit of the current generation of taxpayer electors but rather for future generations. The current generation allows this partially because of the bargain inherent in democratic systems that each generation will undertake spending now for the benefit of succeeding generations. In the same way, the current generation has benefited from the investment of preceding generations.

The government also has the opportunity to transfer the payment of current research funding over different generations of taxpayers using debt. This is where the capital markets come in for the first time. If there is a particularly large funding burden to be undertaken for something that will benefit several generations of taxpayers then rather than have the current generation completely pay for it with taxes, the government can borrow in the capital markets and have future generations repay the loan. Such borrowing is particularly appropriate for long-term infrastructure such as roads.

An interesting question, is whether because of breakthroughs in molecular biology the current potential for medical discovery is so disproportionately large compared with what is likely in the longer term future, that governments should be using debt aggressively to fund research rather than attempt to have the current generation of taxpayers disproportionately bear the cost of breakthroughs that will largely benefit future generations.

I will not attempt to answer this question as you are far better placed than I to do so. However, the very difficulty of answering the question leads us back to the element of the economic theory that we have not discussed, namely risk.

I am sure that I don't need to tell you that medical research in general and cancer research in particular is a very uncertain business. It is very difficult to know if a line of early stage research will lead to successful outcomes. What does that mean for the allocation of capital to medical research?

Let's consider first private donors of the types categorised on the slide. For categories 2 and 3 this risk isn't an issue. For category 2, it is a matter of the recipient of the donation being seen to do good things with the research money. For category 3, it is a matter of the Australian Taxation Office approving the organisation as a charity.

Donors in category 1 have to make a more fundamental assessment of the likelihood of success. This is obviously difficult but it may be that their tolerance to risk in this area is high because of their personal circumstances.

Turning again to government, risk is another reason for government involvement in medical research. Society as a whole is in a better position to tolerate economic risk associated with medical research than most individuals. There are two reasons for this. The first is that government looks at the risk of medical research inter-generationally. The risk of short-term failure is low compared with the benefits of long-term success.

The second reason is that governments are better placed to diversify their risk by spreading their research expenditure over a large number of independent projects than is a typical individual. Thus, of the hundreds of projects that the NHMRC funds, a large proportion will fail to produce any especially significant breakthroughs but the small number that do will make all of the expenditure worthwhile.

Notwithstanding this diversification argument, there is still an obligation on the government to allocate taxpayer funds in a way that maximises the benefit to society. In the case of the NHMRC and various other funding bodies around the world this is undertaken by a process of peer review in which experts make a judgement on the quality of the proposed science. In other words, persons appointed either directly or indirectly by the government are charged with allocating capital to maximise the payback to society.



## The Opportunity for Capital Markets

In many fields, in many parts of the world, taxpayer electors have concluded that governments are not very good at allocating capital. A case in point might be the allocation of taxpayer funds to investments in state banks. The alternative is to allow individuals to allocate capital using the capital markets.

In the capital markets, individuals or their agents can make an assessment of the likelihood of a desirable outcome from an investment and conclude whether the risk satisfies their personal risk tolerance. In so-called efficient markets, all of the knowable information about available investments is accessible to all investors, who then set a price for the allocation of funds for the investment. The price is set in a manner that compensates for risk, so that the riskier the investment the higher the expected return.

Where does medical research fit into such a diagram? Well to fit at all we need to be able to see a financial return resulting from an investment in research. In the past, such a financial return has typically appeared within pharmaceutical companies that provide the final outlet for research in the production of drugs.

Such pharmaceutical companies usually fall within the category of listed equities on the risk-return diagram. They are also typically large, global companies that sell their product in markets around the world.

The fact that an end result of medical research is a globally traded product raises a very interesting question. Why, as a country, does Australia undertake medical research? In particular, why don't we let other countries, particularly those where the big pharmaceutical companies are headquartered, find cures for cancer and then we can buy the results when available?

I have obviously asked this question to be controversial and to check if you are awake! However, it is important to have answers to these questions if you don't want the government to find a new home for money currently allocated to research.

There are a variety of reasons for undertaking medical research in Australia and I would like to mention two. The first is one that many of you live with daily. That is that the end result of the research process might be drugs but a vital by-product is expertise that is applicable in the clinical environment, thus increasing the utility of taxpayers now.

The second reason is far more qualified and is one on which much more work needs to be done to strengthen its validity.

It is true that Australia could choose not to contribute to world medical research and simply buy in the results of others' work as part of its international trade. But international trade is exactly that. One country exchanging something it has that another wants for something it doesn't have but wants, otherwise a trade imbalance results. This introduces the notion of international competitive advantage.

Australia has a strong competitive advantage in primary industries, mining and agriculture. In the 1800s this put us in a strong position to trade our primary produce for other goods that we did not produce. Over the 1900s the world has changed from one of primary produce to one of manufactured goods and then to one in which services and knowledge based industries dominate.

Relying on a competitive position in primary industries will not be sufficient for Australia to continue to enjoy its current standard of living without its balance of trade ballooning to an unsustainable level. Fortunately, Australia has a strong competitive position in medical research and it is a sensible strategy to look to exploit this position to pay, at least partially, for our medical health needs in the future.

However, for this argument to apply, we need to see our advantage in medical research converted to a financial return. In the past we have had limited success in this regard with much of the output resulting from Australia's research expenditure being made available cheaply or freely to anyone in the world who was prepared to exploit it. This has included the international pharmaceutical companies whose business is to add value to the research and sell it back to us as drugs.

In order to reverse this situation, the Australian medical research community needs to include consideration of commercial exploitation of its research output as an integral part of its planning. There should be a particularly strong moral obligation to do this when considering the output of research programs that are taxpayer funded

Fortunately, we are seeing some considerable progress in this regard with particular assistance coming from developments in the Australian capital markets. Early stage commercial development of medical research output is a particularly risky undertaking and falls a long way up the risk-return curve depicted earlier.

Funding of such development requires a high risk tolerance and a high degree of diversification. This is a domain of investment known as venture capital. Until recently, there was little venture capital available in Australia, and that which was available was typically earmarked for relatively low risk activities, such as further development of existing businesses.

As the Australian capital markets have become more sophisticated and having seen the enormous success of venture capital investments in the United States, the volume of venture capital funding in our market has increased dramatically. This has made possible the funding of a growing number of commercial spin-offs from Australian medical research activities.

It is important to stress that commercial development of medical research outputs does not simply benefit investors. There are also considerable benefits accruing to the medical research profession and ultimately to the community. For example, a share of the financial benefits of successful commercialisation will usually flow back to the research organization, strengthening

its financial position and reducing its dependency on taxpayer funding as its sole or primary revenue source. Further, the commercial employment opportunities for scientists offer new career paths that may keep high quality scientists in Australia, with careers often moving to and fro between commercial and pure research activities. There is some way to go, however, before these benefits are fully realised.

My company, County Investment Management, has for almost two years been working with the NHMRC towards facilitating the investment of superannuation funds into early stage medical research through a vehicle called the Medical Research Investment Fund. We entered this undertaking with considerable enthusiasm, seeing the opportunity to facilitate investment in an area of considerable global significance in which Australia has a demonstrated competitive advantage.

Unfortunately, we have [recently announced](#) that we have abandoned our initial attempt at developing the Fund as we have found that most Australian medical research organizations are not in a sufficiently strong position to commercialise their research to allow the prudent allocation of funds from outside investors. An exception is the Walter and Eliza Hall Institute with which we entered into a landmark heads of agreement last year. We believe that most medical research organizations can and should bring their commercialisation capability to as high a state as WEHI but have decided that it is not County's role to lead this transformation.

Nevertheless, through the extensive work we have done on the MRIF proposal, some very important progress has been made in identifying the kinds of policies and structures that institutions need to put in place to make the medical research sector 'investible'. We have drawn the attention of our partner, the NHMRC, to these issues, and understand that they and the Government will be pursuing some public policy measures along the lines we have suggested.



## Conclusion

In summary, given the enormous potential financial rewards that will accompany the humanitarian triumph of winning the fight against cancer, the capital markets should play a key supporting role in the battle. To gain this support, Australian research organizations need to better understand the capital markets and better prepare themselves to receive their support.

I hope that this talk has helped in furthering that understanding at Peter Mac and that you are not now too inclined to throw me in with the laboratory rats!

This is the text of a guest address to the Peter McCallum Cancer Institute, Melbourne, 22 May 2000

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