



Performance based research funding – an overly simplistic technological intervention

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Working paper

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Technological interventions attempt to improve a situation. As the main report¹ has argued, central intervention that governments can make is the funding of early-stage research and development. The question then arises as to how should this be best done. That is, what specific mechanisms lead to the best outcomes? Defining the outcome as the commercial exploitation of the research and development, an attractive idea is to fund institutions according to incentives, attempting to influence the R&D conducted to be commercially more valuable. This seems such a manifestly sensible idea it is often taken for granted and it is not challenged whether it actually works. This brief paper examines the evidence (and finds it does not work, at least as well as proponents might think) and suggests reasons for this, and offers some alternative interventions that could be made.

Enthusiasm for performance based funding remains high, and is a centrepiece of the Australian Government's paper on boosting the commercial returns to research². However, as is explained in the OECD report on performance based funding in tertiary institutions³ the government quotes, there is

no compelling empirical evidence that performance based incentives make any positive difference in research and there is evidence they induce harm.

Thus the claim 'To improve the commercial outcomes from publicly funded research, the underlying incentives must shift'⁴ is not based on evidence. This is not to say that incentives will not work; merely that this particular approach is not demonstrated.

Linda Butler states on page 128 of the report, *Performance Based Funding for Public Research in Tertiary Institutions*

Assessing the impact of performance-based research funding systems is a fraught exercise, which perhaps explains the paucity of broad authoritative texts on the subject. The literature is full of words like 'likely', 'potential', and 'possible' but contains relatively few concrete examples that examine the impact of PRFS in detail, either through investigative data analyses or well-structured survey/qualitative investigations.

Later (page 130) Butler says 'It is clear that the bulk of the evidence is based on the United Kingdom's RAE.'

Her conclusions are clear: there is no compelling evidence about the efficacy; such schemes are readily gamed; and there are many deleterious unintended consequences. Experienced research leaders know from experience that simple funding incentives are a poor way to motivate researchers. But this does not matter because there are some great ways that demonstrably work, as will be illustrated below.

A compelling evidence for this claim comes from Silicon Valley and Stanford. Stanford University is credited as the source of Silicon Valley. Stanford continues to generate vast wealth

¹ Robert C Williamson, Michelle Nic Raghnaill, Kirsty Douglas and Dana Sanchez, Technology and Australia's future: New technologies and their role in Australia's security, cultural, democratic, social and economic systems, Australian Council of Learned Academies, July 2015.

² Australian Government, Department of Education and Department of Industry, *Boosting the Commercial Returns from Research*, 2014, <https://submissions.education.gov.au/Forms/higher-education-research/Documents/Boosting%20Commercial%20Returns%20from%20Research%20%20-%2024102014.pdf>

³ OECD, *Performance-based Funding for Public Research in Tertiary Education Institutions*, Workshop Proceedings, OECD Publishing, 01 Dec 2010, http://www.keepeek.com/Digital-Asset-Management/oecd/education/performance-based-funding-for-public-research-in-tertiary-education-institutions_9789264094611-en#page1

⁴ Australian Government, *op. cit.* page 23

for the US through the entrepreneurial activity arising from Stanford's research. There are no 'incentives' at Stanford to encourage this, apart from Stanford's willingness to offer leaves of absence to its professors. The promotion criteria⁵ do not mention 'commercialization', 'industry engagement' or 'entrepreneurial activities' at all. Academic promotion at Stanford is entirely based on excellence in research and teaching.

Hence, what is arguably the world's best place for achieving commercial returns on research does not try to directly incentivize researchers for these activities. The recurrent appeal of performance based funding can be explained by James C. Scott's book *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*⁶ - states value *legibility* (being able to measure something in a manner that gives the impression of understanding it) over *outcomes* - it is considered important to be able to accurately account for things than to achieve a good outcome; it is more important to appear to have control over a process than have the process lead to good outcomes. Exerting control (by using KPIs) over complex and creative activities does not appeal to those who do the work and furthermore does not appear to be effective.

The government's report⁷ also claims 'Australia's research output (in terms of publications and citations) ranks highly in the OECD on indicators of research quality.' Comparison with alternate analyses⁸ of OECD statistics suggests this is generous. A different interpretation is supported by the analysis of Giovanni Dosi⁹ and coauthors. They have analyzed¹⁰ the 'European Paradox' which refers to the conjecture that EU countries play a leading global role in terms of top-level scientific output, but lag behind in the ability to convert this strength into wealth-generating innovations.

The similarity of the European complaint with the Australian one under consideration is remarkable. Their analysis, as economists without a stake in the situation, is extremely pertinent. They distill a long history of detailed empirical economic analysis into seven 'stylized facts' (page 1452)¹¹:

1. Contrary to the claim that scientific and technological *knowledge* can be increasingly reduced to sheer 'information', the distinction between the two continues to be highly relevant. *A good deal of knowledge is, and is likely to continue to be, rather 'sticky', organization- and people-embodied, and often also spatially clustered.* Related to this is the persistence of widespread agglomeration phenomena driven by top-level research.
2. *Useful academic research is good academic research.* "Systematic evidence from the US shows that the academic research that corporate practitioners find most useful is publicly funded, performed in research universities, published in prestigious referred journals" and frequently cited by academics themselves.
3. Government funding of basic research is responsible, especially in the US, for most major scientific advances, including in the fields of information sciences and biosciences.
4. The proportion of university research that is business financed is very low everywhere (typically less than 10%) and lower in the US than in Europe.

⁵ <https://facultyaffairs-humsci.stanford.edu/chapter-4-promotion-full-tenure-line>

⁶ Yale University Press, 1999

⁷ Australian Government, *op. cit.*

⁸ <http://www.chiefscientist.gov.au/wp-content/uploads/OPS2-OECD-for-web-FINAL.pdf>

⁹ If citation statistics are to be believed (and the tenor of the Government's paper suggest they are at least not entirely discounted) then Giovanni Dosi http://en.wikipedia.org/wiki/Giovanni_Dosi is the most renowned scholar of the economics of innovation in the world: http://scholar.google.com/citations?view_op=search_authors&hl=en&mauthors=label:economics_of_innovation

¹⁰ Giovanni Dosi, Patrick Llerena, and Maoro Sylos Labini, "The relationships between science, technologies and their industrial exploitation: An illustration through the myths and realities of the so-called 'European Paradox'," *Research Policy* 35, 1450-1464, (2006).

¹¹ References for the stylized facts can be found in the paper

5. The expansion of US university patenting has resulted in a rapid decline of the patent quality and value.
6. *Increases in licensing income in leading US universities are concentrated in biotech and software, and have preceded the Bayh–Dole Act. Moreover, income flows from licensing are quite small as compared to the overall university budget; in most cases, they are unable to cover even the administrative costs of the ‘technology-transfer office’ in charge of them! At the same time, anecdotal evidence begins to hint at the ways the new appropriation regimes for public research tend to corrupt the ethos of researchers and to twist their research agendas, and in the US even “[s]ome of the nation’s largest and most technology- intensive firms are beginning to worry aloud that increased industrial support for research is disrupting, distorting, and damaging the underlying educational and research missions of the university, retarding advances in basic science that underlie these firms’ long-term future.”*
7. Interestingly, *only very rarely has a critique of the Open Science System and the public funding of basic research come from corporate users, except for peripheral countries and peripheral entrepreneurs (such as Italian ones, hoping to transform universities into some sort of free training subsidiaries). On the contrary, notably, “in the UK, where critical rhetoric is among the strongest, it comes mainly from government sources. . . In the US, companies like IBM have complained recently about the potentially harmful effects on future competitiveness of reduction in public support to academic research in the physical sciences.”*

The paper concludes with recommendations which are also worth quoting:

First, increase support for high quality basic science, through agile institutions much like the American National Science Foundation (NSF) and relying on world-class peer-review.

Second, fully acknowledge the differences within the higher education system between research-cum- graduate teaching universities and other forms of tertiary education discussed above. The well-placed emphasis on the role of the first type of institutions often comes under the heading of the ‘Humboldt model’ as pioneered by Germany more than a century ago....

Third, push back the boundaries between public or ‘open’ research and appropriable research. One often forgets that appropriability is socially justified only in so far it provides an incentive to innovation itself.

Fourth, develop large-scale, technologically daring missions justifiable in terms of their intrinsic social and political value and able to match in terms of size and ambition the US (often more military-oriented) programs. “Scandinavian countries and Switzerland are able to mobilize considerable resources for high quality basic research without the massive defence and health expenditures of the world’s only superpower.”

These conclusions are all directly translatable to Australia. This offers an alternative technological intervention motivated by the desire to obtain better commercial returns to research – rather than imposing the superficially appealing, but empirically doubtful ‘incentives’ on researchers, build research institutions with a culture that facilitates the conduct of research in a manner that boosts commercial returns. There are examples overseas, and Australia would do well to follow their lead.