Building Australian Higher Education Research

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1. Introduction

With the announcement of the Excellence in Research for Australia (ERA) as the replacement for the Research Quality Framework (RQF) and other government initiatives such as "hub and spoke" research infrastructure and funding compacts, a unique opportunity exists to develop a research funding system for Australia's universities which delivers real impact for the nation. All too often, however, discussions of research funding are derailed by special interests. It is only natural that institutions will try to maximize returns in any such debate. I am no purer in my behaviour than any other Vice-Chancellor. If, however, Australian universities are to demonstrate the quality of the research they conduct and the impact such research will have on the future of Australia, an optimal assessment and funding system is required. Such a system will be to the benefit of both institutions and the nation.

This paper outlines some thoughts on the future shape of the ERA, including the degree of concentration of research funding within particular institutions and research focus. No debate about research funding can consider only quantum. The impact which the research will have will depend on just how thinly that quantum is spread across research groups. Therefore, the debate must also consider what will be Australia's research focus (a small nation cannot do everything) and how we build nodes of concentration where critical mass can allow real excellence to develop.

2. The RQF – pros and cons

The "shelving" of the RQF provides an opportunity to reflect on the pros and cons of the proposed system and to use these thoughts to guide the development of the ERA. Below, a number of the key elements of the system are discussed:

Administrative overhead

The RQF would have been an extraordinarily expensive and time consuming system to administer. I don't think anyone really believes that the panels were actually going to be able to read four publications from every researcher in the country and be sufficiently expert in the field to then be able to assess the quality of these works. Add to this the context and impact statements for groups and the other supporting material and the monumental nature of the task becomes obvious. Ultimately, one can only assume that other, more efficient, measures would have had to be found.

Time lag

The administrative overheads outlined above meant that it would have been too expensive to carry out the assessment process frequently. In the case of the RQF, data was to be assessed over a 5 year period, this data then being used to drive funding over a following 5 year period. Allowing one year to carry out the assessment, this means that funding in the final year would have been influenced by research performance 10 years earlier. Rather than funding today's excellent research groups, such a system would have funded performance of up to a decade earlier. In a fast moving research environment, many research paradigms do not even last a decade. A system with such a time lag cannot reasonably claim relevance to the present research environment.

Peer review
University research relies heavily on peer review. In many cases this is the only way to assess the quality of material. For instance, I can think of no other system to determine whether material is of an appropriate quality for publication or whether research proposals are worthy of funding. However, we should not believe such systems are without bias or inaccuracy. Anyone who has seen the broad spread of reviewers' comments for a journal publication or an ARC application knows, that peer review is far from perfect. In a research assessment exercise where there cannot be anonymity, either of the researcher's identity or affiliation, a range of biases will exist. Thus, a system which relies heavily on such assessment will, by its nature, favour established norms.

Quality vs quantity
The existing research "block grant" funding system of Research Training Scheme (RTS) and Institutional Grant Scheme (IGS) is a metrics-driven system with elements representing research grant income, research students and publications. Research grant income is a quality measure, as such grants invariably are assessed on their merits. Research student numbers (or completions) and undifferentiated publications reward quantity rather than quality. In this regard, the RQF focus on quality is a significant improvement over the status quo. Alternate metrics could however also give the desired quality outcomes.

Research management and critical mass
Australia's existing RTS/IGS does not encourage institutions to manage research in a strategic manner. There is no direct incentive to build critical mass or to focus resources so as to build quality. The experience of the Research Assessment Exercise (RAE) in the UK has been that this is a significant advantage of such a system. Institutions have a direct incentive to build high quality research groups rather than simply allowing research groupings to evolve. The RQF was clearly designed to produce the same positive behaviour in Australia.

3. Elements of a desirable ERA
Based on the above comments, desirable elements which should make up the ERA would include:

- *A system with a short time lag*. This should be possible with a metrics-based system. The present RTS/IGS system has a two-year lag and a similar outcome for the ERA would be desirable.
- *Low administrative overheads.* Again, a metrics-based system lends itself to such an approach.
- *Assessment of groups not individuals*. This will encourage institutions to manage research in a strategic manner.
- *Use peer assessment to moderate metrics*. Neither system of metrics or peer review is ideal on its own, and a blended approach appears to have merit.

The elements above would provide a responsive, low overhead approach which would recognize, and potentially fund, research excellence. This approach does not, however, provide a mechanism for government to preferentially fund particular areas of strategic importance to Australia or where Australia has a particular inherent research advantage. As a relatively small nation, it seems unlikely that Australia is going to be able to perform at a world class level across all fields of research.

Such, national level, strategic direction could potentially be achieved through the proposed mechanisms of compact funding and "hub-and spoke" research

infrastructure clusters. It would seem logical that government and universities could have strategic discussions on how to enhance activities recognized by the ERA as excellent, and defined as of national importance. At the simplest level, this discussion could be a requirement for institutions to develop research plans which addressed research concentration. The inclusion of additional strategic funding to foster and reward such developments would, however, be much more effective in driving positive behaviour.

4. Research Concentration

In many disciplines there is agreement that critical mass is a desirable feature. Building critical mass allows sharing of equipment, provides the intellectual interchange so critical for high quality research and creates a vibrant environment for the education and training of PhD students. Indeed the RQF and now the ERA should foster the creation of quality research groups, as outlined above.

The value of concentrating significant numbers of these groups into a small number of elite Universities is far less clear. For instance, is research productivity enhanced by having an outstanding quantum mechanics research group in the same university as an outstanding English literature group? The link seems tenuous and such discussions are obviously divisive as they potentially favour one institution over another. As universities rightly claim a link between teaching and research, the concentration of the bulk of the nation's research in a few universities, at the expense of others, may have few research benefits but significant negative impacts on the quality of the nation's teaching.

As recently pointed out by Peter Hoj[1] there appears to be little correlation between the number of universities a country has listed in the Shanghai Jiaotong (SHJT) rankings and standard measures of productivity or innovation. Hoj uses the analogy with Olympic Games performance. The fact that Australia performs well above its weight in the Olympics may make us feel proud as a nation, but says nothing about the physical fitness or health of the broader population. Similarly, the fact that a small number of elite institutions may exist in a nation does not mean that country has an outstanding higher education system. In fact, quite the opposite may be true.

Discussions around this point usually focus on the "outstanding" performance of the United States and the "poor" performance of Australia in the SHJT. Figures 1 and 2 show the number of institutions ranked in the top 100 and top 500 by the SHJT[2], respectively. The data is clear: the United States has 54 of the top 100 institutions and 197 of the top 500 institutions. In contrast, Australia has only 2 of the top 100 institutions and 17 of the top 500 institutions.

Before drawing conclusions from such comparisons it is, however, necessary to correct for the relative size of nations. Figures 3 and 4 show the same data but now normalized by population size[3]. Figures 3 and 4 show a very different situation to that of Figures 1 and 2. When considered relative to the size of the country, the US is not a stand-out performer, nor is Australia's performance substandard. In interpreting the results, some considerable care must be taken in drawing detailed conclusions from the top 100 data. For all but the largest of nations, there are very few institutions per country in the top 100. Therefore, the relative performance of a nation can change significantly depending on whether a single institution is ranked just within or just

[1] Hoj, P., 2008, "Interpreting the truth", Campus Review, Vol 18, No. 7.
[2] Shanghai Jiaotong Academic Ranking of World Universities - http://ed.sjtu.edu.cn/rank/2007/ranking2007.htm
[3] "OECD in Figures 2007", www.oecd.org/infigures, ISSN: 0029-7054

outside the top 100. In addition, some care must be taken in interpreting the data from small nations, such as New Zealand, where dividing by a small population base can be problematic.

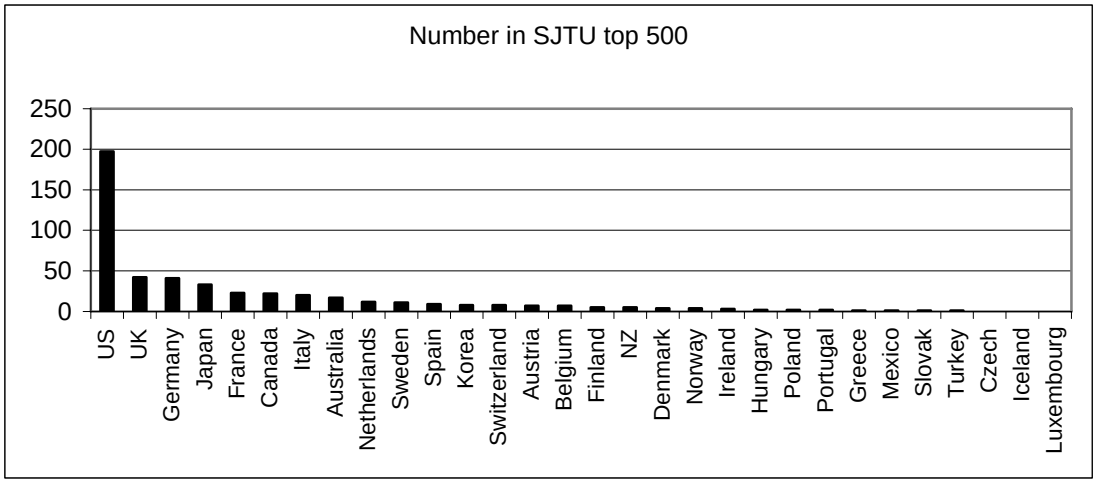

Figure 1: Number of institutions from OECD countries in the SHJT top 500. 2007 data is shown.

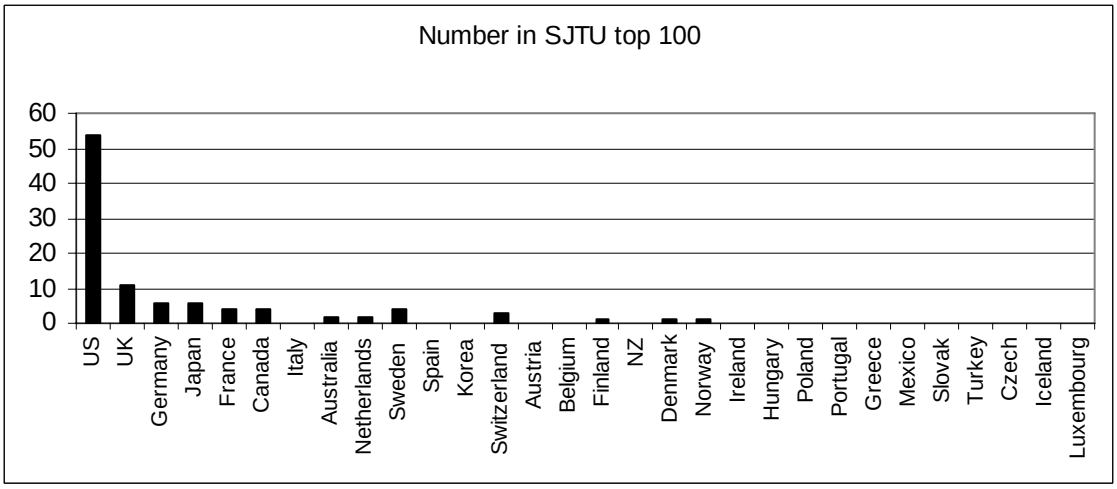

Figure 2: Number of institutions from OECD countries in the SHJT top 100. 2007 data is shown.

Based on these comparisons, there seems little reason to believe that there is a fundamental problem with the quality of research in Australia's Universities, or that a dramatic change in the way that funding is allocated between institutions is required.

Noting the limitations in the data mentioned above, there are however, clear and significant differences in performance of nations in Figures 3 and 4. Why, for instance, do nations such as Sweden and Switzerland perform so strongly? Are there lessons in their approach to research funding which Australia could emulate?

It is reasonable to assume that there is a link between the investment in research and development in universities and performance. Figures 5 and 6 show the number

of institutions in the SHJT top 500 (or 100) per 10 million of population as a function of the national spend on R&D in Higher Education institutions per head of population[3]. There is a strong correlation between the investment in R&D in universities and the ranking of those universities. The success of Sweden and Switzerland can be largely accounted for by the level of funding available to these institutions. Countries such as Australia and the United States rank where one would expect for the level of funding available.

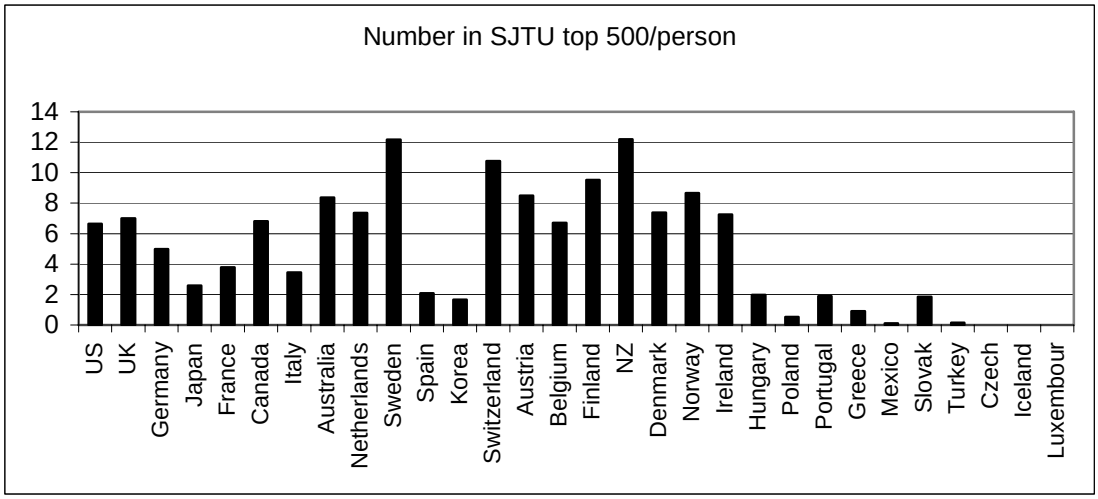

Figure 3: Number of OECD institutions in the SHJT top 500 per 10 million of population. SHJT figures are for 2007, population data is for 2005.

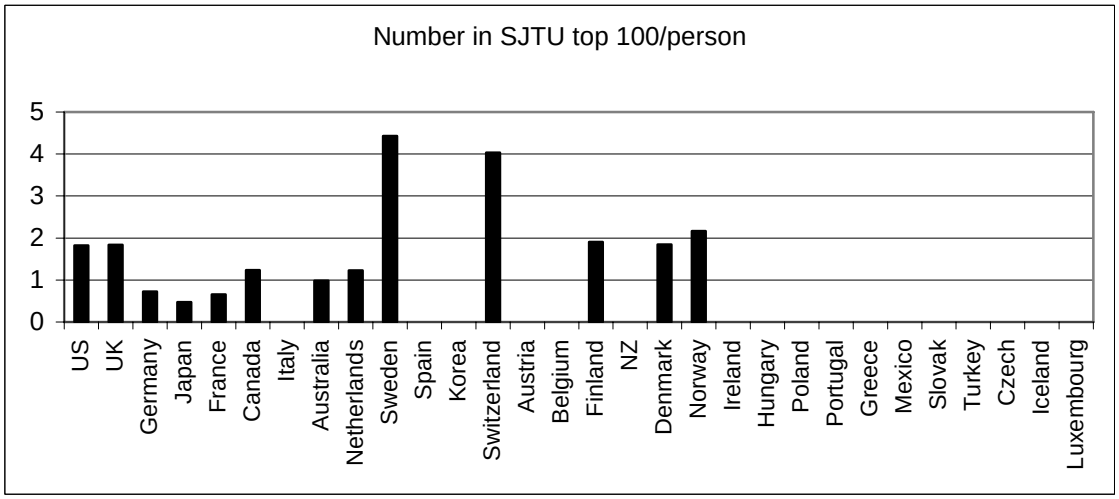

Figure 4: Number of OECD institutions in the SHJT top 100 per 10 million of population. SHJT figures are for 2007, population data is for 2005.

The relatively strong correlation noted above suggests that the main indicator of success is the total funding available, rather than the manner in which the funding is distributed between institutions. If the manner of distribution was critical, then there would be far greater scatter in Figures 5 and 6. The discrete nature of the data (i.e. integer values of institutions) means that the addition or deletion of a single institution can dramatically impact in the position in the figure. The fact that there is not more

scatter in the data is quite remarkable. Therefore, although funding systems should obviously encourage and reward quality (as presumably all do, to varying extent), the systems should not be distorted to attempt to build “super institutions”.

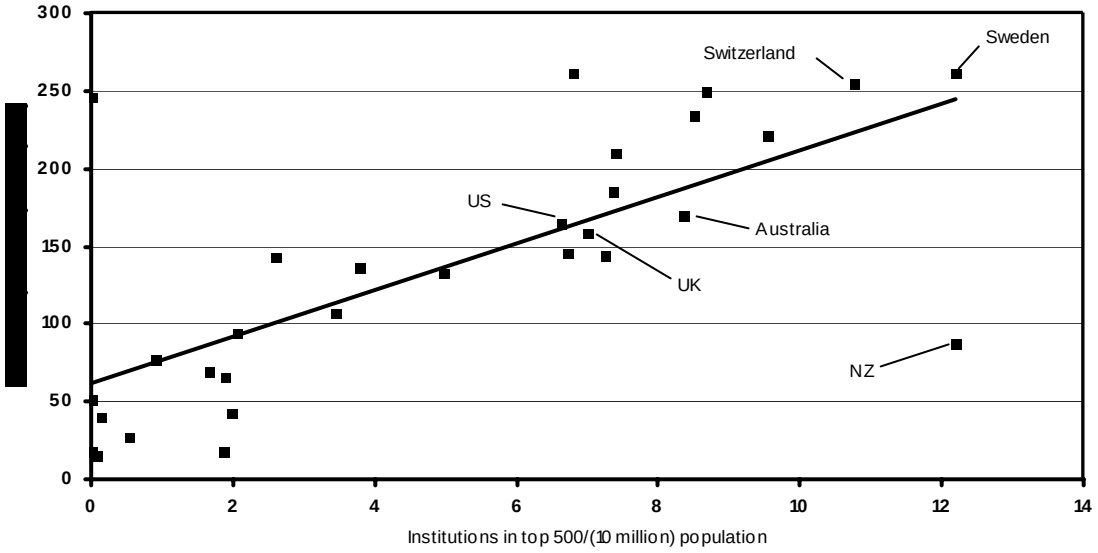

Figure 5: Number of OECD institutions in the SHJT top 500 per 10 million of population as a function of the national spend on R&D in Higher Education institutions per head of population. Higher Education expenditure figures for 2005.

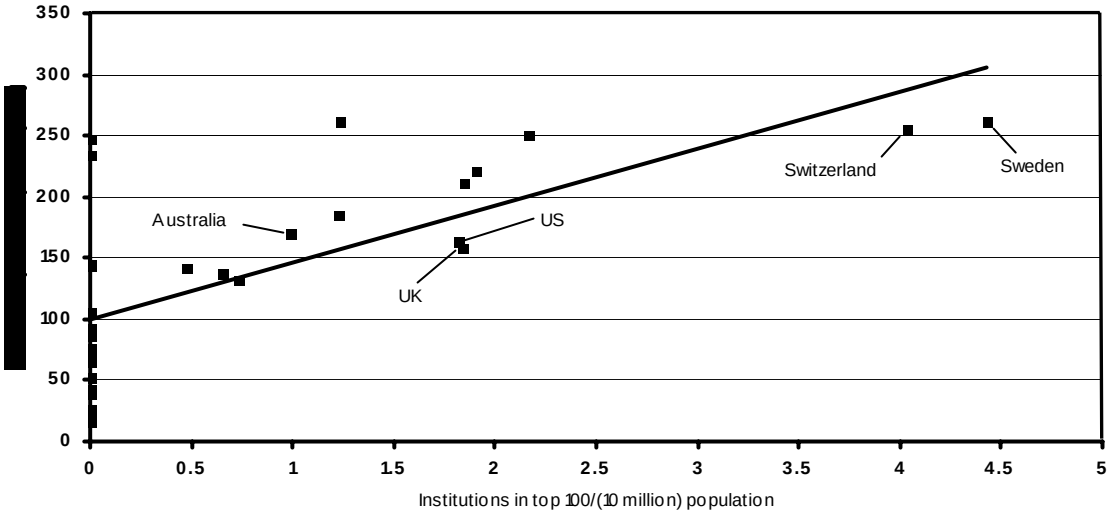

Figure 6: Number of OECD institutions in the SHJT top 100 per 10 million of population as a function of the national spend on R&D in Higher Education institutions per head of population. Higher Education expenditure figures for 2005.

As noted earlier, universities have a range of educational, research and social missions and all must be supported for the national good. It appears that OECD nations either implicitly or explicitly recognize this in their funding systems. Obviously, it would be possible to skew funding to build a small number of such “super

institutions". The benefits of artificially concentrating research funding in particular institutions are not clear and the negative impacts on the higher education system as a whole could be dramatic.

5. Conclusions

The ERA provides an ideal opportunity to develop a system for research evaluation and funding which encourages and rewards quality, is responsive and not excessively bureaucratic. It is suggested that the system should be predominately metrics-based and include the following desirable features:

- The system should have a low administrative overhead, thus reducing cost and allowing regular application of the assessment
- Have a relatively short time lag (eg. not more than 2 years). Therefore, the system should not aggregate data over long period and it should be applied regularly
- The system should evaluate groups not individuals. In this way, institutions are encouraged to build critical mass and actively manage research.
- Peer review should play a role, but only as a moderator of the metrics system. Too greater reliance on peer review will be both expensive and lacks transparency.
- The proposed system of "compact-funding" could be used by Government to work collaboratively with universities to strategically build research clusters of national importance. This could be done through an enhanced system of institutional research development plans or, more desirably, through additional targeted funding for such activities.

Despite the frequent claims that Australian institutions under-perform in international ranking systems, the data indicates that once population size is taken into account, Australia is not atypical compared to other OECD countries. Further, Australia's performance in the SHJT is consistent with funding levels of Australian institutions. There seems little justification for radical shifts in research funding allocation schemes, which would see individual institutions provided preferential funding. Rather than trying to build "super institutions", it seems more cost effective to encourage institutions to build critical research mass in areas of importance and fund this excellence wherever it exists.

Allocation methods clearly drive behaviour, but are second-order compared to the quantum of funding. Therefore, the allocation method should not become a major administrative burden to the system, as the benefits are marginal.

The data clearly indicates that if Australia wishes to perform at a higher level in terms of R&D outputs from universities, the major driver is the total funding available.