Committee Secretariat
Inquiry into Funding Australia's Research
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June 29th 2018

Dear Committee Secretariat,

The submission that follows is designed to provide an overview of research work led by our Chief Academic Strategist, Emeritus Professor Keith Houghton, over the past three years. The work focusses on the efficiency of expenditure on research (in the context of also providing education) within Australia's public universities. As the Committee will understand, the great majority of this research funding comes from government sources (principally Federal Government) and is, therefore in our minds, relevant to your Inquiry.

Given the depth and detail of our work, this submission can only provide an overview. We would be able to provide a more comprehensive briefing to the Committee if this would be useful.

This submission is structured with particular focus on the fourth of the terms of reference: 'Opportunities to maximise the impact of funding by ensuring optimal simplicity and efficiency for researchers and research institutions while prioritising delivery of national priorities and public benefit'. The submission does however touch on some of the other terms of reference to the extent they deal with matters of efficiency of research expenditure.

(1) Definition of Efficiency in the Context of Research in Australian Universities

Within the context of the research and analysis described here, an increase in efficiency, otherwise referred to as growth in productivity is either (a) the delivery of a given level of output with less input, or (b) an increased level of output for a given level of input - all other things being equal. The concept of efficiency in research or indeed any product, service or any outcome in unarguable. However, the issue is how this efficiency is observed and measured. Additionally, it introduces the issue of what is an acceptable and unacceptable level of efficiency. This research does not provide a theoretical answer to this question but instead turns to real-world data and finds estimates of best-practice and uses real-world best-practice as the measurable and achievable level of efficiency.

(2) The Need to Understand the Context of Expenditure on Research in Australian Universities.

We argue, based on the observed realities of the operation of Australian universities, that one cannot validly measure the efficient funding of research and the use of that funding without also recognizing that universities have two outputs: research and education. The consumption of research within universities is directed at one or other of these two activities. If one accepts that these are the two principal activities of universities, and one also

recognizes that the production of these two outputs – education and research – involves naturally occurring joint and common costs – then one must also accept that no estimate of the efficiency of research expenditure cannot be validly estimated without also estimating the same measures for education.

To use a simple example: if lecturer A comes to campus and is assigned 10 hours per week of teaching duties, then that leaves the total amount of hours per week less ten to spend on research or other duties [We note that there are other activities such as administration and service – which we find in our empirical work are highly correlated with either education or research activities]. If the number of hours devoted to education was doubled from ten to twenty – then the number of hours available for research declines. Put simply the input (academic staff time) can be devoted to research, or education or some combination of the two. It is assumed to be a zero sum game. The same is true of expenditure as it is with academic time.

While some attempt to use surveys or other rudimentary techniques to estimate the partitioning of such joint costs – in the end these are no more than arbitrary cost allocation decisions. While common as an accounting technique, the absence of validated cost drivers makes these allocation decisions largely arbitrary and therefore questionable in terms of validity. We use real world empirical system-wide data to estimate this partitioning of full costs (and not just marginal cots) between education and research and therefore the relative efficiencies of both.

The essential point here is that one cannot estimate the efficiency of research expenditure without making this estimate in the context of an 'eco-system' that includes both education and research.

(3) Measuring Efficiency and Productivity Growth in Australian Universities: Empirical Evidence in the Period 2011 to 2016

The graphical representations that follow show the development of an efficiency 'frontier' where we recognize the existence of both education and research. This means that one cannot find an efficiency point (or optimal point of efficiency) but an efficiency 'frontier' across a range or mix of education and research outcomes.

The horizontal axis on the graphs that follow shows the cost of research in the 37 Australian public universities we track. The vertical axis show the cost of research produced. The data is for 2016 – the most recent year Federal Government data has been made available.

The measure of research is number of unique authored publications per million dollars (note a publication with two authors is equal to 0.5 unique authored publication). Education is calibrated as number of Equivalent Full Time Students (EFTS) taught per million dollars.

Graph 1 shows the efficiency frontier for 2016 and one can observe that the frontier is defined by reference to four universities. The identities can be made available on request. These universities each have a different place on the frontier reflecting a differing research / education intensity mix. Also noticeable is that there are 33 universities not on the frontier. Some of these universities are more research focussed; others are more education focussed and a large number somewhere in between. The proximity to the frontier differs from on a high of around 97% of the frontier to a low of little more than 64%. The colours reflect the different university groupings (Group of Eight, ATN and the like). The legend for this is below the graph.

**GRAPH 1: Australia University Sector 2016 – Efficiency Frontier**
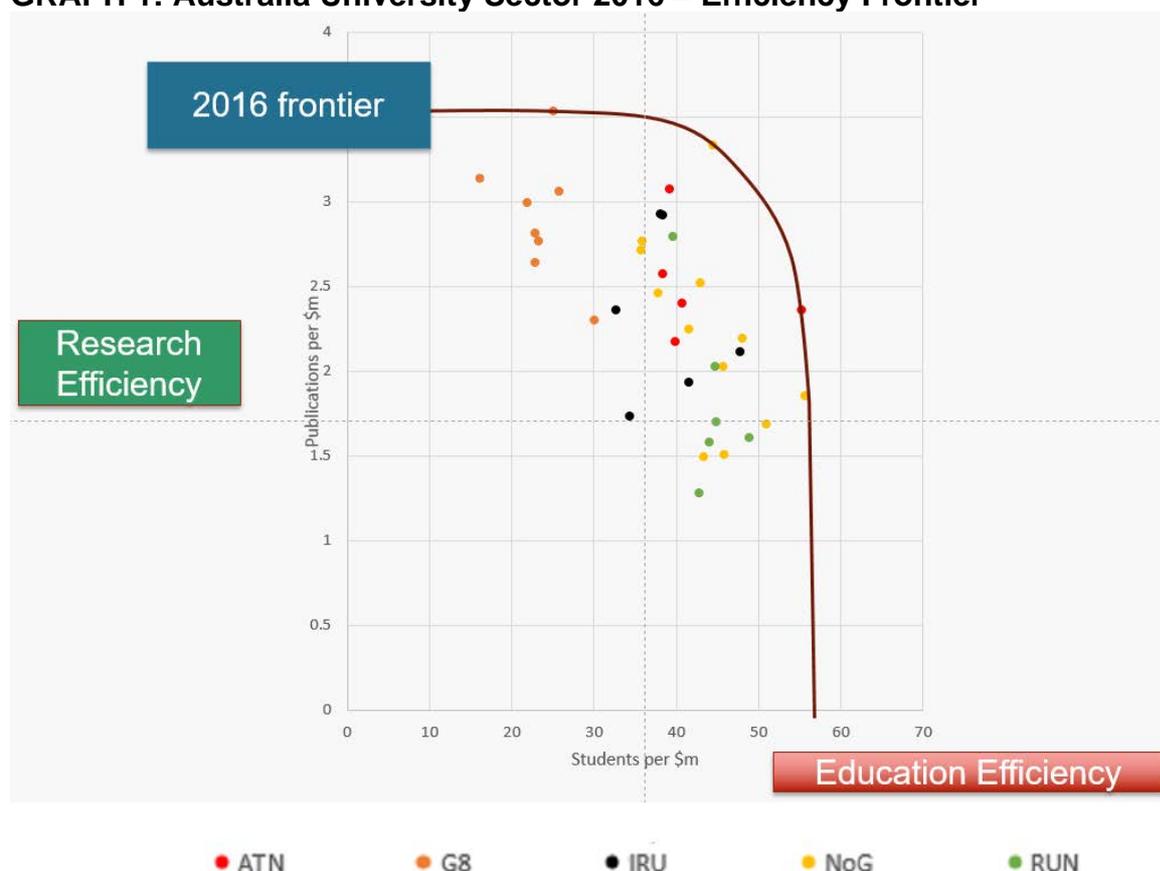
Graph 2 below shows the same data as Graph 1 but includes the frontier in 2011 using the same measures (with dollars deflated by reference to the ABS Index for inflation in education – not simply the CPI).

From an analysis of Graph 2, one can draw several conclusions. The most obvious is that the level of efficiency in the sector over the six-year period from 2011 to 2016 (inclusive) has increased almost entirely in respect of research. This is a significant

finding. The expenditure on research from all sources (but principally from the Federal Government) in Australian universities has shown very significant improvement in effieciency. This is not an opinion but is evidence-based with empirical data. Some will link this impressive result to a series of Federal Government incentives offered over the period to enhance research outcomes.

GRAPH 2: Australia University Sector 2016 with Overlay of 2011 Frontier
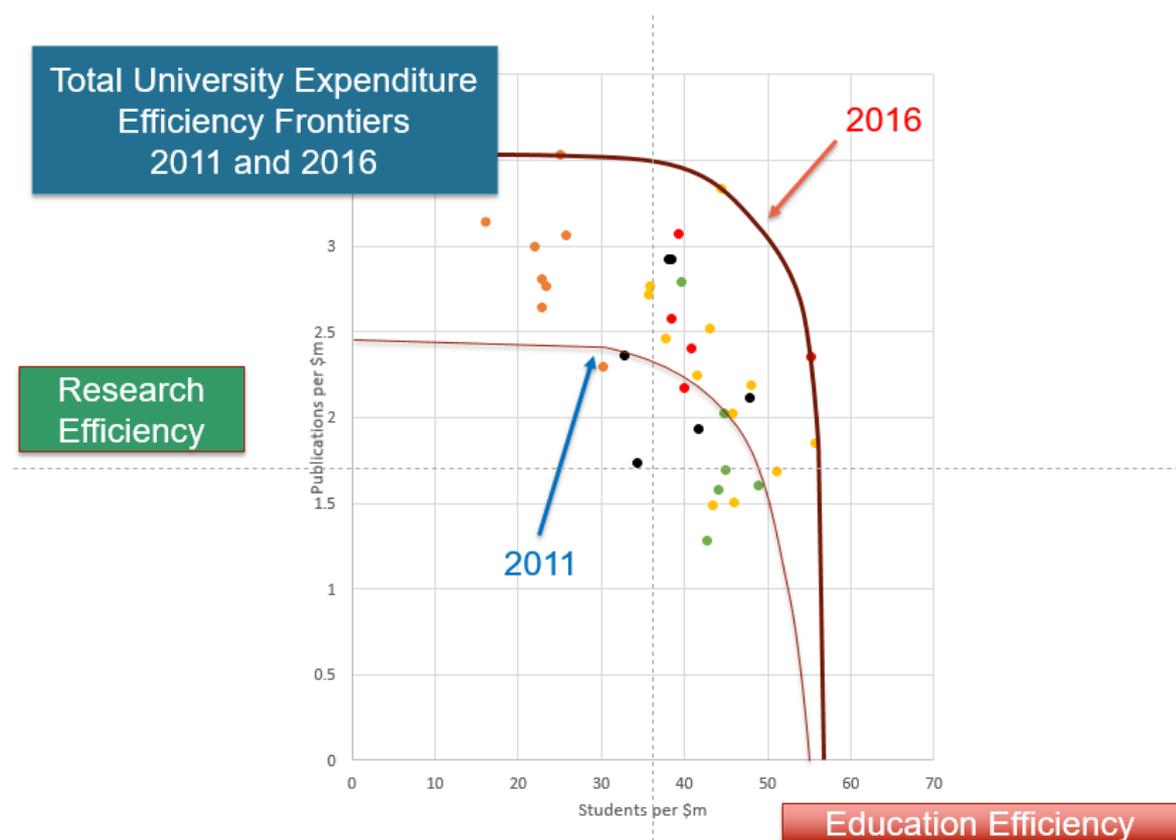
Notice in Graph 2 that there is little or no efficiency enhancement in respect of education. Also relevant is that the change in efficiency varies widely between individual universities. The overall growth in productivity differs from a high of an efficiency growth of over 30% in the six years from 2011 to 2016 (inclusive) to negative growth of between around 5 to10%. That is to say, some universities not only did not keep up with sector norms (that is the change in frontier), but actually went backwards in respect of efficiency compared with themselves over the same six year period. The base level funding arrangements for those that achieved excellent efficiency outcomes did not appear vary over the period. That is to say, there was no overt funding incentive to support this enhanced efficiency. Those that achieved negative growth also appear to have received no change in their funding

arrangements. The average across the whole system is around 3.25% per year compounding over the period.

(4) Analysis of Some Potential Policy Options

a. The 'Exchange Rate between the Cost of Education and the Cost of Research:

The analysis allows multiple ways of partitioning the relative costs of conducting research and education and finds that the average 'exchange rate' between education (per EFT student per year) and research (per unique authored publication) across the whole system in 2016 is approximately 14 to 1. Put another way and averaged across the whole system in 2016, an Australian university will spend the same amount to educate 14 students as it does do to fund the work to produce one research publication.

b. The Economics of Comparative Advantage:

Graph 3 shows a hypnotical division of the sector with those more research focused being in one zone (A) and those more education focused in another (B).

GRAPH 3: Australia University Sector 2016 – Efficiency Zones
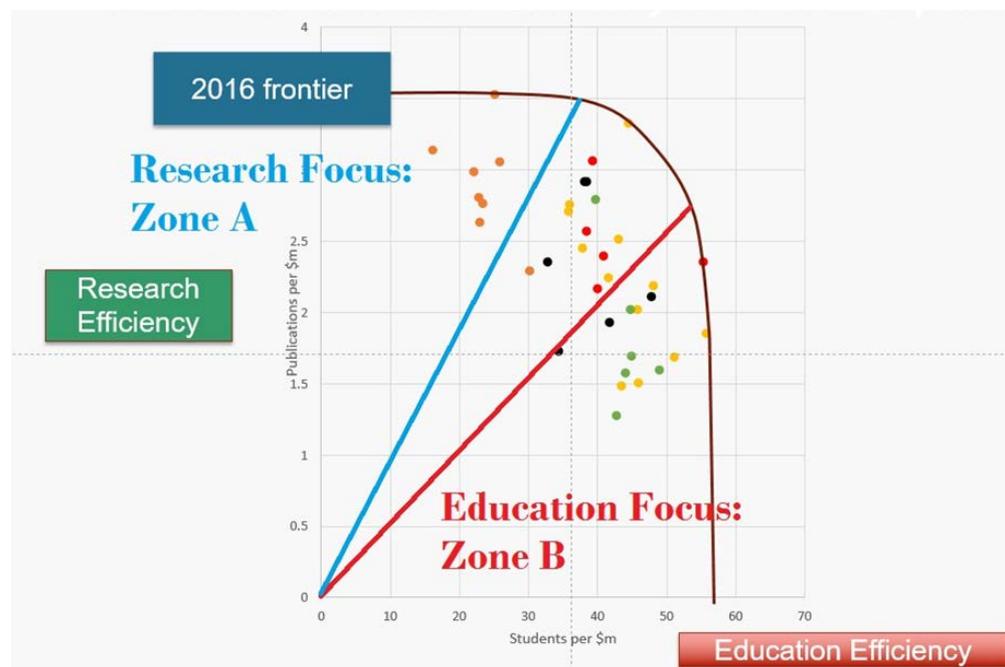
Re-estimating the average costs shows a significant difference in the exchange rate of education and research.

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The exchange rate in zone A is 8 EFTSL (students per year) to 1 publication. In zone B it is 20 to 1. Thus zone A institutions have a comparative advantage (i.e. undertake it more economically) in research and zone B have a comparative advantage in education. This shows evidence of a well understood phenomenon in economics – the economics of comparative advantage.

While there are some significant exceptions, a substantial portion of the current funding mechanism dates back to 1989 policy changes. This system might be referred to as having a "fixed" exchange rate. This rewards all universities – no matter what their comparative advantage is – in the same way and at the same rate. Thus, it engages activities in institutions where there is no comparative advantage.

To illustrate the point, take a hypothetical example: University X that is extremely successful in science research and now seeks to find $20million per year in research funding for a new Centre for Bio-Tech. Potentially the lowest risk, most effective pathway to obtain this funding is to recruit one thousand undergraduate students in accounting. This uses the revenues earned from one field of education to cross-subsidy the research expenditures in an entirely different filed. Some, perhaps many, will argue that this is neither efficient nor optimal and indeed may have dysfunctional long-term unintended negative consequences.

(5) Research Topics Currently Under Investigation or Under Consideration for Investigation

a. The economies and dis-economies of the scale of research and education establishments.
b. The efficiency consequences of multiple sourced research funding
c. The relationship between university efficiency and executive remuneration.
d. The efficiency of academic units (e.g. Faculties and Research Centres) within universities.
e. The relative efficiencies of academic activities and 'back office' operations.
f. The effect on efficiency of structural change in universities.
g. Comparative analysis of efficiency in the Australian, UK and US research and higher education systems.
h. Efficiency of university specialization.
i. Comparative Analysis of efficiency measures v cash flow management.

About Research Coaching Australia

Research Coaching Australia (RCA) is a Pty Ltd company headquartered in Melbourne with representation in most states and territories in Australia. RCA provides a range of services to the higher education sector. The organization is

comprised of largely retired university staff and operates as a social enterprise to: provide higher education research policy analysis and advice; researcher training and development; and, research coaching for researchers to support the next generation of researchers and research careers and to strengthen research wherever it is conducted.

RCA has been developing a diagnostic tool, the Research and Education Efficiency Frontier Index (REEF Index). Much of the analysis shown above is based on the REEF Index. It is a policy tool that is providing efficiency analysis to a range of stakeholders and is generating insights and interest within the sector.

For example, we are now regularly invited to publish commentary in various news outlets on the university sector. Also, we are to present at the AFR Higher Education Summit in August 2018 on the topic of efficiency; and in the past week, we took up the invitation to personally brief Minister Birmingham on the topic of university efficiency.

Concluding Remarks

This submission draws on the analysis that the REEF Index provides. While we are able to offer some observations about how current funding arrangements are working and how any issues of inefficiency could be addressed, we are perhaps most able to make some macro level observations about the Australian funding system. We can also provide some analysis on how the Australian system sits in comparison to the US and UK funding systems.

Thank you for the opportunity to provide this input to your important Inquiry. If the Committee would like more information about the matters in this submission, please contact Keith Houghton (for contact details see below).

Yours faithfully,

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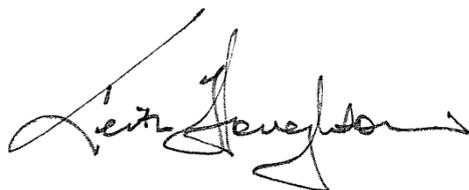
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