Individual Submission to the Base Funding Review

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Although I hold an executive position at the ANU, this is an individual submission to the Base Funding Review. The work reported in the submission is the result of personal research effort, nor institutional research. The views are mine, and do not represent the position of the ANU on any of the matters discussed.

The submission comprises this page, a copy of the scholarly work entitled *"The Expenditure on Research and Education Outputs by Australian Universities 1996-2009"*, and some comments to the BFR questions. Although the scholarly work has not yet been subject to formal peer review it is submitted in DRAFT because the findings have relevance to the Base Funding Review. The draft provides evidence for observations made in the comments.

The following points summarize the main observations

- While the focus of the Base Funding Review (BFR) on education matters is acknowledged, it is not possible to understand the context of the BFR without attending also to research-related matters. The many advantages of the current executive orders separating Ministerial responsibilities for education and research in Australia's universities do not extend to forming high-level government policy without a "whole of university" & "whole of government" picture.
- The attached paper represents a novel analysis of the expenditure reports of Australian universities that attempts to understand what universities do when they spend the money. It is based on an econometric study which attributes all expenditure to either education or research outputs. It is found that 98.4% of the variation between universities over the 14 years 1996-2009 can be explained by the analysis.
- The model implies that since 1996, expenditure on research in Australia's universities has risen from $5.1B to $11.6B (all expenditure is expressed in 2009 prices using the ABS CPI as deflator). Expenditure on education has risen from $5.4B to $6.3B. The growth rate in research expenditure is 6.3% against a growth rate in research output of 8.4%. For education, the expenditure growth rate is 1.4% and the education output growth rate is 4.2%.
- Public policy settings have been effective in driving Australian universities to maximise expenditure on the generation of additional research outcomes. The result appears to be a healthy university system. Nevertheless, it may be timely and prudent for universities consider the ethics of continuing to ask students and the government to pay rising fees and charges purportedly for their education mission, while expending the revenue on the growth of research activity.

The Expenditure on Research and Education Outputs by Australian Universities 1996-2009

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ABSTRACT: *An econometric method is used to explore relationships between total expenditure, research outputs and education outputs for 36 Australian universities over the 14 years 1996-2009. Over 98.4% of the variance in the data is explained with an average expenditure (2009 prices) of* $\$26{,}638 \pm \$1{,}695$ *per completion and* $\$226{,}586 \pm \$7{,}955$ *per publication. A minimum difference hypothesis is applied to adjust these averages to partition precisely the expenditure between research and education outputs for each university in each year. It is found that expenditure on research output has grown at a compound rate of 6.3% pa while research output itself has compounded at 8.7% pa. Slower growth occurs in education expenditure (1.4% pa) and in education output (4.3% pa). The results provide insight into the increasing number of research intensive universities, expenditure on the formation of cultural and social capital by universities, the small differential expenditure between sciences and humanities, differences between unit expenditure rates in different universities, and the use of discretionary, education-sourced revenue to cross-subsidise research.*

Introduction

In 1970, Howard Bowen observed that the *basic principle of college finance is simple. Institutions raise as much money as they can get and they spend it all*. Hoenack & Collins (1990, p. 142) dubbed this the *revenue theory of costs*. Bowen's principle has remained valid over the intervening decades. Despite a trend to attach specific demand-side purposes to the expenditure of some university revenues (e.g. through research and education contracts) and accountabilities to much of the expenditure, universities remain eager to grow their revenue from any and all sources, and continue to exercise general autonomy in choosing the purposes of much of the expenditure of this revenue. Winston (1999) concluded that the acquisitiveness element of Bowen's principle (*as much as they can get*) is driven by the fact that that *wealth is quite fundamentally a good* thing in a positional market such as higher education (see also Garvin 1980, Chapter 2). University education and university research epitomize experience goods, explaining the urge of universities to signal their quality through their wealthiness (Nelson, 1970). We are here concerned with the distributional element (*spend it all*) of Bowen's aphorism.

Universities' activities mould and channel the allocation of a sizeable and increasing part of society's resources (King, 2007). As participation rates increase, more people

enjoy differentiated university education outcomes and are subject to university-level screening that shapes their civic and economic life (Weiss,1995), and often contributes to the achievement of their highest personal aspirations (Hoenack & Collins, 1990, p. 1). Similarly, the increasing rate of publication of findings made by universities supporting Mode 1 research production (Gibbons *et al*, 1994) provides growing and non-rivalrous raw material for the innovative practices of maturing post-industrial institutions.

It is of wide and growing importance to understand the choices made by universities when they *spend it all*, and above all to know how the expenditure is *partitioned* between the two major output categories, research and education. Although considerable academic attention has been directed separately towards the economics of university education and the economics of university research, it is a curiosity that there are few studies of the economics and management of the balance between these elements. Perhaps this reflects studies of the US higher education system, where baccalaureate level studies frequently occur in education-intensive institutions. In many other national university systems, including the Australian system that is the case study of this paper, baccalaureate education occurs predominantly in research-and-education institutions where the partitioning of expenditure is a critical consideration.

There are two distinct approaches to the investigation of university finances. The *accounting* approach traces a university's financial transaction records with regard to the purposes of expenditure. The *econometric* approach puts financial transactions themselves inside a black box, and uses statistical methods and models to interpret financial and other data that entrains information about university activities.

The accounting approach finds use when a university engages in activity-based costing to better understand its operations, and when governments require university financial returns that are assembled for national and international statistics such as reported gross expenditure on tertiary education or public R&D. A frequent and important application is in the determination of indirect costs and overhead costs for pricing purposes. Governments insist on costly and highly refined accounting procedures to determine indirect cost rates (say, for research) even though the precision of the outcome is modest.

The econometric approach is used in studies of university production functions, financial and management decision processes, and system-wide and comparative studies of efficiency and productivity. While it might be possible to use an accounting approach to explore these questions, econometric techniques such as frontier analysis and data envelopment methods (e.g. Salerno, 2003) yield adequate answers at lower cost and with less opportunity for deception (Winston, 1999, p. 23). The econometric approach can be used to study intangible products, and when multiple outputs are produced by a single funded activity, situations that are common in universities.

This paper presents an econometric method for determining the partitioning of university expenditure between education and research, and illustrates it using data for the Australian university system in the years 1996-2009. The first step is a regression analysis that removes over 98% of the variance in the data. The second step precisely partitions expenditure for each university in each year. The results provide insight into

annual changes in unit and total expenditure on research and education outputs, the intensification of research in smaller universities, differential expenditure in science and humanities, and on universities that have unusually low and unusually high unit expenditures. Expenditure on the research partition over part of this time interval has also been obtained by accounting methods and published in national R&D data sets. Results from the two approaches differ significantly, providing circumstantial evidence (Becker 1964, p. 3) that universities expended a large amount on intangibles such as human capital.

It is perhaps of interest to note that the Australian university system has been highly ranked (1/17) in a Lisbon Committee Policy Brief (Ederer *et al*, 2008) that adopts a basket of academic and social indicators that would find favour in universities and their communities. The ranking data were gathered towards the end of the period covered in this paper. Thus, this study may provide potentially valuable insights into public policy issues relating to high-quality national university systems.

Data resources and their properties

The analysis considers the reported calendar year total expenditure $T(t,i)$, education output $C(t,i)$ and research output $P(t,i)$ of $i=1...36$ public Australian universities over the 14 years $t=1996...2009$. Trewin (2003) presents an overview of the information collected by the Australian government about university finances and outputs.

The educational output $C(t,i)$ is the total number of *completions* (i.e. awards of formal qualifications) reported by the universities across all levels of higher education accredited awards and all student classifications, as published by the Department of Education, Employment and Workplace Relations (DEEWR, 2011a). All universities in the sample offer coursework (taught) awards at undergraduate and postgraduate levels, and research awards (masters and doctorates) at postgraduate level. All awards are situated within the Australian Qualification Framework (AQF, 2011). Completions reports of universities are closely scrutinised for audit and funding purposes. Universities also provide non-award education that consumes some reported expenditure for education purposes not captured in reported completions. The scale is small compared with award education (1.2% of education load in 2008 was non-award activity) and non-award education output is ignored in this study.

The research output $P(t,i)$ is the *HERDC weighted publication points* (hereinafter *points*) as aggregated and published by Universities Australia (2011). Points enter into Australian government funding arrangements for research block grants. As a result, the academic valuing of points has been carefully negotiated between scholarly communities and the government, and annual returns are audited to ensure accuracy and homogeneity. One point corresponds to the publication of a single-author refereed journal article in the year in question. Weights are applied to adjust for monographs, book chapters, refereed conference papers and multiple authorships. Unfortunately there are categories of research output not counted towards points, including publications not subject to peer review, commissioned works and reports, artistic and other creative works, and patents. If the proportion of such outputs were both large

and variable among universities, the counting shortfall could influence the conclusions of this study.

The total expenditure $T(t,i)$ is the reported component *Total Expenses for Continuing Operations* published by annually by DEEWR (2011a). The expenditures reported in this paper have all been expressed in 2009 prices through application of the Australian Consumer Price Index (CPI) series published by the Australian Bureau of Statistics (ABS, 2011). It is acknowledged that the appropriate measure for indexation of university finances can always be debated.

Several technical adjustments have been applied. Some Australian universities (rising from 4 in 1996 to 7 in 2009) encompass both higher education and post-secondary further education. For these, only the higher education component of expenditure and higher education completions are included. Where it is not already included, data for the Australian Defence Force Academy (ADFA) has been added to the corresponding data for the University of New South Wales which operates ADFA under contract. Before 2001, publication points for the Institute of Advanced Studies at the Australian National University were reported to government but not included in the Universities Australia summary since the university was not eligible for points-linked block grants. These points have been added to the values used here. The Australian Maritime College (AMC) is now reported with the University of Tasmania (UTas) and historical reports of expenditure and completions have been aggregated. Publication points for AMC were 3.8% of the UTas number in 2007, but they are difficult to locate and the contribution of AMC points to UTas has been ignored. Although the University of the Sunshine Coast was founded in 1994, some data for in 1996-98 has not been published presumably reflecting start-up times. The university is omitted from the study,

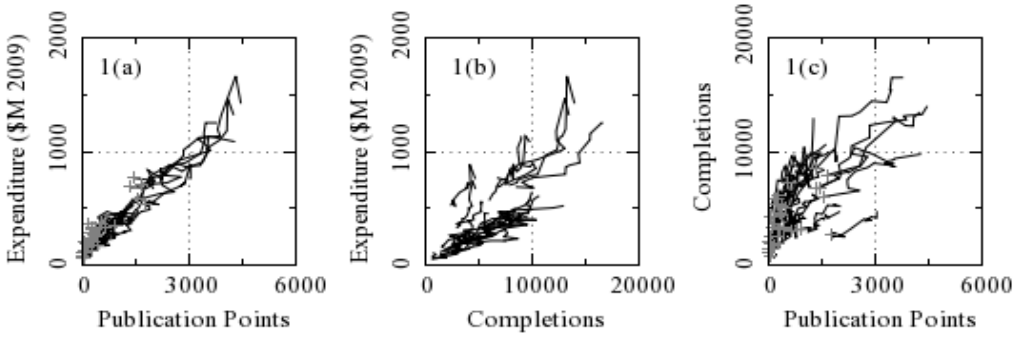

Figure 1. Expenditure and outputs of education (completions) and research (points) for 36 Australian universities over the years 1996-2009. Each university is shown as a continuous line joining 14 points. A cross denotes the starting point for each line.

Figure 1 exhibits the empirical data in graphical form. Note both the wide variation between different universities, and the inexorable year-on-year increase in all quantities. Panel 1(a) shows the remarkably tight correlation between expenditure and research output (publication points). There are hints that some universities increase points with little increase in expenditure (horizontal segments). Panel 1(b) exhibits the correlation between expenditure and education output (completions). Note how several universities increase expenditure with little increase in completions (vertical

segments). Panel 1(c) shows that the Australian university system encompasses institutions with a wide range of education-to-research output ratios.

Partitioning Expenditure on Education and Research

Universities have many functions and many outputs. This analysis explores a simplified picture that partitions all expenditure between just two outputs, education and research. Specifically, we aim to find for each institution and in each year the amounts of education expenditure $E(t,i)$ and research expenditure $R(t,i)$ satisfying

$$T(t,i) = E(t,i) + R(t,i)\,. \qquad (1)$$

If we choose to measure education outputs through completions $C(t,i)$ and research outputs through points $P(t,i)$, Equation (1) can always be expressed in the form

$$T(t,i) = A_E(t,i).C(t,i) + A_R(t,i).P(t,i)\,. \qquad (2)$$

The coefficients $A_E(t,i)$ and $A_R(t,i)$ may be called, respectively, the unit expenditure on education output (a completion) and on research output (a point) by university i in year t.

Before presenting the method it is useful to consider what can be learned - and not learned - from Equations (1) and (2) applied to a particular university in a particular year. Suppose for the sake of argument that the university expends $500M and produces 10000 completions and 2000 points. Were all expenditure devoted to completions, each completion would cost $50,000 and each point nothing. Were all expenditure devoted to points, each point would cost $250,000 and each completion nothing. Were expenditure devoted equally to completions and points, the unit expenditure on a completion would be $25,000 and each point $125,000. Although the partition between research and education cannot be determined from the information for one university at one time, once the expenditure, completions and points are specified the allowed values of $A_E(t,i)$ and $A_R(t,i)$ correspond precisely to a defined *trade-off* between the unit cost of education and the unit cost of research.

Our data amount to 504 *observations* of expenditure, completions and points. If we hypothesise that the unit expenditure rates $A_E(t,i)$ and $A_R(t,i)$ are *not* dependent on year or university, we can apply regression analysis to test the linear model

$$T(t,i) = \overline{A}_E.C(t,i) + \overline{A}_R.P(t,i) + \Delta(t,i)\,. \qquad (3)$$

The regression will minimise the sum of squares of the deviation $\Delta(t,i)$. The constant coefficients $\overline{A}_E$ and $\overline{A}_R$ may be called, respectively, the unit expenditure on education output and research output over the whole sample. This aspect of the analysis closely parallels the investigation of departmental expenditure on undergraduate and postgraduate teaching, and research reported by Verry and Layard (1975).

Standard regression analysis has been conducted using the Microsoft Excel package. The two-component regression model accounts for $R^2 = 98.4\%$ of the variance, with coefficients $\overline{A}_E = \$26{,}638 \pm \$1{,}695$ and $\overline{A}_R = \$226{,}586 \pm \$7{,}955$ (the errors represent 95% confidence intervals). The standard error in the regression is approximately \$59.2M.

In Figure 1(b), a group of universities with relatively high expenditure per completion can be seen lying above the main population. These are the Group of Eight (Go8) research intensive Australian universities. If the regression is repeated *excluding* these universities (leaving 392 data points), the regression accounts for 97.7% of the variance, and the coefficients are $\overline{A}_E = \$34{,}227$ and $\overline{A}_R = \$154{,}458$. These results are significantly different from the unit expenditure for the whole population. As will be discussed below, the higher average unit expenditure on education for the less research intensive universities is consistent with the findings obtained for the full data set. It would be possible to repeat the analysis reported below for the separate populations of Go8 and non-Go8 universities (other sub-groups could also be investigated). The qualitative conclusions would not change. The quantitative results would change as a consequence of higher unit expenditure on education for *all* universities and a somewhat slower drive towards research intensification in the non-Go8 population.

The values of $\overline{A}_E$ and $\overline{A}_R$ do not partition the expenditure according to Equation (1) because the deviation $\Delta(t,i)$ in Equation (3) is not zero. This deviation is not an "error term" because it is not uncertain but rather a reflection of the fact that the actual partitioning of each university in each year is not precisely that implied by the regression coefficients. We can partition expenditure exhaustively and exactly between research outputs and education outputs by determining the coefficients $A_E(t,i)$ and $A_R(t,i)$ that satisfy Equation (2) while also taking account of the known values of $\overline{A}_E$ and $\overline{A}_R$. Appendix A presents a method for effecting this, based on a minimum difference hypothesis.

R**esults**

Figure 2 shows how the total expenditure over all universities is partitioned and grows over the period 1996-2009. Expressed in 2009 prices, total expenditure displays a real growth rate of approximately 4.2% pa. The total education partition grows more slowly, at an average real growth rate around 1.4% with fall-backs and still-stands. The real growth rate of the total research partition is higher, approximately 6.3% pa.

Figure 2 also shows the time dependence of per-unit expenditure on education and research, defined as the total partition expenditure divided by the total output (points or completions) in the year in question. The unit expenditures on education and on research vary in concert, with cycles reflecting the general prosperity of universities alongside a general downward trend. The trends imply that the growth in the total research expenditure is due to a large increase in the number of research outputs (points), not an increase in unit expenditure. The smaller growth in the education partition reflects the combination of reducing unit expenditure and a relative growth in completions that is much smaller than the growth in points. Over the period, total

annual completions rise from 144,857 to 241,714 (growth rate 4.3% pa) while total annual points rise from 17,453 to 52,161 (growth rate 8.7% pa).

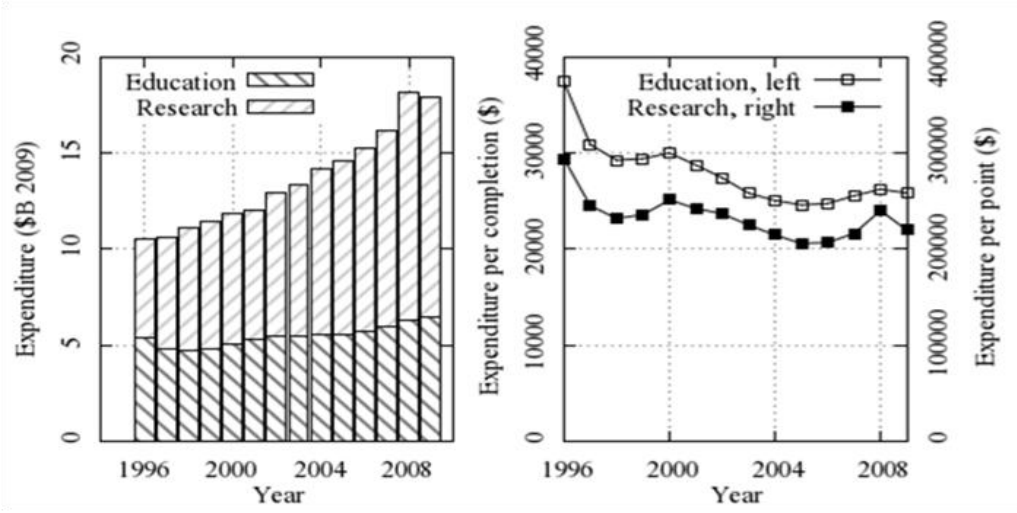

Figure 2. Partitioning of total annual university expenditure between research and education outputs, 1996-2009 (left). System-wide unit expenditure on education and research outputs over 14 years (right)

If we define *research intensity* to be the ratio of research expenditure to total expenditure, the results shown in Figure 2 correspond to a system-wide intensification of research, from just below 50% in 1996 to above 64% in 2009. However, because Australian universities display large differences in size, the trends shown in Figure 2 are dominated by those universities with large expenditure and large education and research output. Surprisingly, as exhibited in Figure 3, many of the smaller-scale universities have followed an even stronger trend towards research intensification.

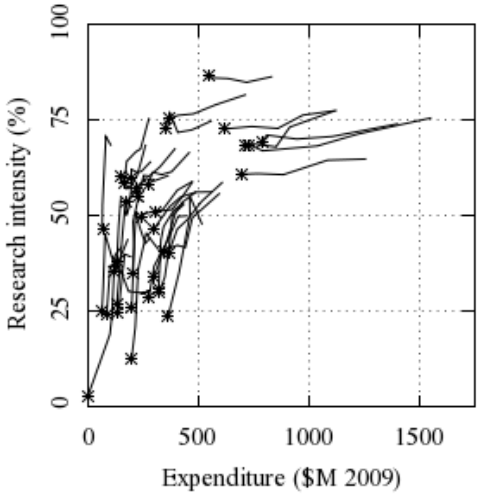

Figure 3. Research intensity *versus* expenditure. For clarity, 3-year running averages are shown (2-year average for 2008-09).

In 1996, the research intensity of 13 universities was below 30% and of 24 was below 50%. By 2009, only 1 was below 30%, and only 8 below 50%. Figure 3 shows how most universities with small scale and low research intensity increased their research intensity, often without a corresponding large increase in expenditure. Large universities on the other hand display relatively constant research intensity alongside

substantial growth in expenditure. According to the definition of a doctoral/research university adopted by the US-based Carnegie Foundation for the Advancement of Teaching (more than 20 PhDs awarded pa - see Carnegie Foundation, 2010) almost all Australian universities would be classified as *doctoral/research universities* and many would be classified as having high research activity.

Triangulation with Higher Education R&D expenditure

Australian universities provide bi-annual reports of Higher Education Research and Development (HERD) expenditures to the Australian Government, derived by accounting methods specified by the Australian Bureau of Statistics (ABS, 2008). It is of interest to compare the values of the research partition obtained by our econometric model with the HERD returns. HERD data were published for each institution in 1998, 2000 and 2002 by the Department of Education (DEEWR, 2011b), while data for 2004 and 2006 have been collated and published by Barlow (2009). The relationship between HERD expenditure (in 2009 prices) and the corresponding research expenditure partition of the econometric model is shown in Figure 4.

There is a systematic and significant discrepancy, in the sense that the derived research partition expenditure is almost always larger than the corresponding HERD value. The gap between the two different ways of deriving operating expenditure is somewhat larger than shown, because HERD includes both current and some capital (but not depreciation) components, while our econometric results use only current expenditure. How can the differences be reconciled?

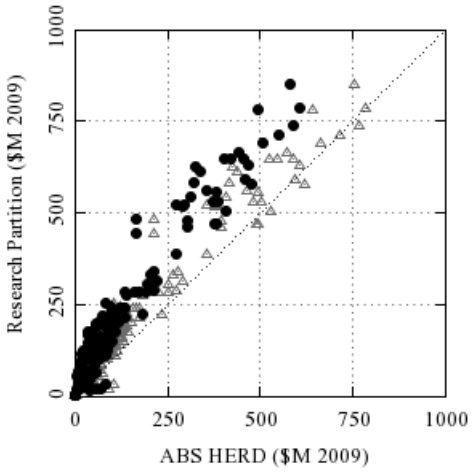

Figure 4. Solid dots exhibit HERD *versus* the inferred research partition expenditure. HERD data for each university is available bi-annually between 1998 and 2006; all points are displayed. Open triangles correspond to a universal 25% increase in the HERD value (see text). The oblique line represents equality between the two measures.

Under-reporting of HERD

Part of the explanation is that HERD is likely to be under-reported, for the following reason. For all HERD collections 1998-2006, most universities have estimated the human resources devoted to R&D using a standard fraction of 30% for those academic staff with “teaching & research” (T&R) appointments. However, extensive

standardised time-use surveys were conducted in 2010 for transparent costing purposes, and it is now known that a value of 30% is too low. The median fraction of effort devoted to research was found to be 40%, and the median fraction for the largest universities was 55%. Because T&R appointments cover approximately 50% of academic staff, it is conceivable that HERD returns underestimate R&D expenditure by a factor approaching 25%. Figure 4 also compares research partition expenditure *versus* HERD once multiplied by a factor of 1.25. Even after this adjustment, a large systematic difference remains to be reconciled.

Expenditure without output

The other part of the explanation may be that in practice some university expenditure is allocated to research-related activity that does not produce points directly, and is thus not reported in HERD. In the same way, there may be expenditure on education-related activity that does not produce completions directly. Neither activity can produce direct tangible outputs because the regression established by Equation (3) removes over 98% of the variance. There is no scope for a third material component of (tangible) output that *varies* differently from points or completions over time and between universities.

That universities expend money on *intangibles* is well recognised. First, there are categories of intangible expenditure that universities incur like other firms – business information, innovative practice, branding and marketing, staff training, business-process know-how, consultants' reports and so forth (Barns & McClure, 2010). Universities also expend on industry-specific forms of intangibles. Expenditure on *scholarship* does not of itself produce tangible output. Similarly, expenditure on *third mission* and *engagement* activities generally produces intangible output. Jongblood (2008) summarises several sets of indicators of engagement between universities and their communities, few of which could be measured and valued and hence regarded as tangible (Peneder, 2002).

Expanding on the idea of expenditure on intangibles, consider as a specific case an academic employee who does not teach or publish in a particular year, instead devoting effort to studying for a higher research degree (PhD), renovating a curriculum, and serving as the treasurer of a national disciplinary body. According to the classification of Bourdieu (1986), the study forms embodied cultural capital, renovation forms institutionalised cultural capital, and service forms social capital. None of the expenditure on salary and the related indirect costs for this academic work produces tangible output, yet all the activities lie squarely within the mission of a university. Peneder (2002) has discussed the economic importance of intangible investment in the context of manufacturing industries. Our study provides circumstantial evidence that such considerations may be even more important in higher education.

A related explanation for the difference is found in those theories of not-for-profit organisations that suggest that they are managed to produce *budget maximisation* or *slack maximisation* (Niskanen, 1968; Wyckoff, 1990; Coates *et al* 2004). Garvin (1980, pp 26-39) addresses this possibility with some care. He concludes that prestige maximisation rather than budget maximisation is to be preferred as an explanation of

university behaviour, but the argument does not rule out some expenditure relating to organisational slackness.

If we assume that the fraction of expenditure on intangibles is $f(t,i)$ we might recast Equation 1 to a form that relates to tangible outputs

$$[1-f(t,i)].T(t,i) = E(t,i) + R(t,i). \qquad (4)$$

Because Equation 4 represents linear scaling of a linear equation, it appears to be impossible to estimate $f(t,i)$ from the data at hand. However, if we assume that $f(t,i) = \bar{f}$ is invariant among universities over time, then Equation (4) will lead to simple scaling of all calculated unit expenditures by the factor $(1-\bar{f})$. If the shortfall in HERD relative to the research partition is interpreted as a measure of the scaling due to expenditure on intangibles, we then infer $\bar{f} \approx 0.5$ if HERD is correct, or $\bar{f} \approx 0.35$ if HERD is under-reported by 25%. With the second estimate, the total expenditure on intangibles in 2009 was approximately $6.3B.

It is consistent for this study to partition *all* expenditure to either research or education, despite significant expenditure on intangibles. Intangible expenditure sustains the business of the university through intermediate products that used to produce final consumption products which this study shows are overwhelmingly research and education (Barnes & McClure, 2010, Appendix B). The approach to calculating the partitioning can be regarded as an attribution of intangible intermediate expenditure to tangible (i.e. measured and valued) consumption outputs. As Bourdieu (1986) concludes, we should not ignore the *brutal fact of universal reducibility to economics*.

HASS and STEM patterns

It is often claimed that the cost of research and education is higher in the STEM (Science, Technology, Engineering & Mathematics) disciplines that in the HASS (Humanities, Arts & Social Sciences) disciplines. If this is correct, we might expect to find traces of the cost differential in the unit costs across universities with different HASS-to-STEM activity profiles. We have devised the HASS-intensity index to measure this profile, as the ratio of HERD expenditure on HASS fields to total HERD, for the year 2006 (Barlow, 2009, Appendix B). Figure 5 exhibits the variation of the unit cost of education versus this HASS-intensity index.

There is wide scatter in HASS-intensity at any value of the unit expenditure on research, and little evidence of correlation. This might be explained if the purported "high cost of STEM research" is more about scale than unit cost, or if the purported "low cost of HASS research" ignores the reality of expenditure on the salary (and on-costs and indirect costs) of the HASS researcher. Figure 5 does reveal a correlation between HASS-intensity and research intensity, although there are evident outliers. This trend reflects the fact that many of the universities with higher HASS intensity are universities on a trajectory of increasing research intensity (i.e. the universities to the left in Figure 3).

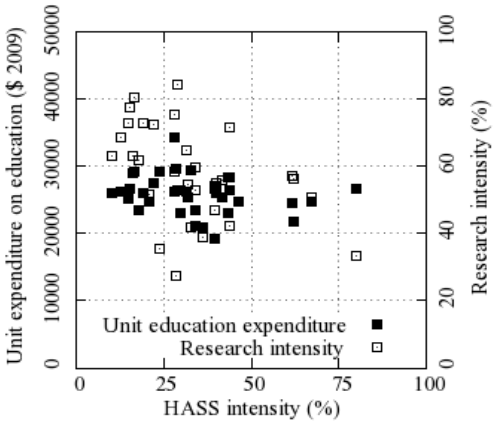

Figure 5. The relationship between the fraction of academic staff effort devoted to HASS activity, and the unit expenditure on research (left axis) and research intensity (right axis).

High-unit-output universities

Appendix A introduces the number $r_0(t,i)$ as the standardised difference between the average unit expenditure over the whole data set, and the unit expenditure for a given university at a given time. It is implausible that the education/research partition for a given university would change markedly from year to year, and thus it is not surprising that certain universities have systematically high or low unit expenditure over runs of several years. Over the 3 years 2007-09, for the University of Wollongong, Flinders University, Macquarie University and the University of South Australia the unit expenditure on research was approximately 75% of the average (i.e. approximately $170,000 per unit) and on education approximately 80% ($21,500). If all universities had operated with these unit expenditures in 2009, the total expenditure would have produced 30% more research outputs and 20% more completions.

More interestingly, suppose that the number of research outputs had been held fixed. Then the lower unit expenditure on research would have reduced the total research partition from $11.4B to $8.8B, allowing the total education partition to rise from $6.5B to $9.0B for the same total expenditure. This would have provided for 68% more completions across all universities. Over the same period, for Murdoch University and the Universities of Tasmania and Western Australia the unit expenditure on research was approximately 140% of the average ($300,000) and on education approximately 125% ($32,000).

Cross-subsidies

The concept of *cross-subsidisation* is a significant element of discourse about university finances (e.g. Lewis & Pendlebury, 2002). It is used generically to describe political dimensions of university financial management, and specifically to describe expenditure for a purpose that differs from the ostensible purpose for which the revenue was paid. Depending on perspective, it can be regarded as good, bad or indifferent.

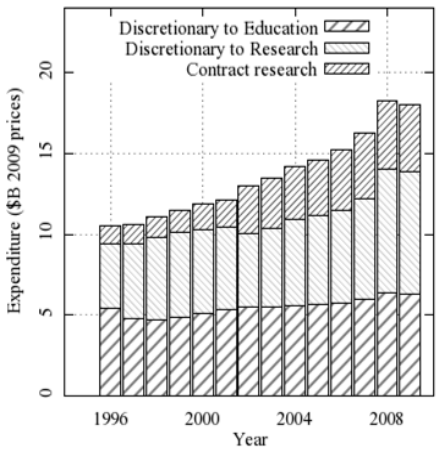

Figure 6. Illustrating the changing amounts and proportions of discretionary funds that are expended on research and education outputs by all Australian universities. Contract research funds are earmarked for research. We assume that the amount earmarked for education is negligible.

The current study provides some insight into the amount of cross-subsidisation of research in Australian universities. Over the period 1996-2009, an increasing amount of university revenue was specifically purposed (contracted) for research. Research grants for investigator-initiated projects, government and private-sector funding for large scale programs, and government performance-driven research block grants have all increased and are all specifically purposed for research. The amount is shown as the top component ("Contract research") of Figure 6. On the other hand, very little funding was paid for specific education purposes. If we assume that all university revenue other than specific-purpose research revenue is *discretionary*, the partitioning of the discretionary revenue between research and education outputs is as shown in Figure 6. This partitioning of discretionary revenue is frequently dubbed *cross-subsidisation of research* because the revenue is dominated by student fees and charges, alongside government payments of general purpose operating grants that are based on per-student rates.

Why are students and the government content for universities to expend such a large proportion of discretionary revenue on research output? One part of the answer relates to the fact that universities are carefully managed to satisfice educational requirements, through marginal funding schemes such as the Australian government's Learning and Teaching Performance Fund (DEEWR, 2011c) and attending to process audits by the Australian University Quality Agency (AUQA). Another part may be that students and perhaps potential employers value the vitality and buzz of a campus active in research. An asymmetry of knowledge between prospective students and universities about the amount of revenue received as fees and changes and expended on research compared with education may also be relevant.

Discussion

The econometric approach has succeeded in partitioning precisely the expenditure of Australian universities between research and education outcomes. Nevertheless the findings may be received with scepticism. Two lines of criticism emerge: (1) that there are other outputs that must be considered, and (2) that the method is over-

estimating expenditure on research outputs. Regarding (1), note the high explanatory power of the regression. There is little variance left in the data once the two main output components are fit, and thus little left to be explained. Of course no linear combination of points and completions can be distinguished from the two that have been selected, but the adopted components are clearly basic. Completions could be subdivided into baccalaureate, graduate and doctoral components and something more might be learned by this. However, such a breakdown would not change the findings reported here. Regarding (2), it has been suggested that the comparison between the model and HERD values provides circumstantial evidence that a large proportion of expenditure is on intangible, intermediate outputs. Only after attribution to outputs does expenditure fall to the education or research partition. Commentators who may be unaware of the nature or scale of university expenditure on human capital formation (Becker, 1964) will tend to ascribe this expenditure to intangibles such as *scholarship* or *service*.

Some colleagues have questioned the plausibility of the result that average unit expenditure on a completion can be as low as $26,600 pa. Their concern arises because university education expenditure supports the cost of instruction for all students (i.e. the effective full-time student load per annum, EFTS) in a particular year, not just students who are completing. In Australian universities, the ratio of total student load to total completions in any year is close to 3:1, so that the completions unit expenditure result translates to an expenditure of $8,750 pa per unit of student load. Is it plausible that Australian universities expend on average only $8,750 pa for education per EFTS? Appendix B presents a model for teaching costs that may render the finding more plausible.

There is an extensive literature applying econometric tools to the investigation of university "production." It is claimed that these methods provide the "best evidence" about the "efficiency of higher education institutions" (Salerno, 2003). Like the method presented here, these analyses explore the relationship between "inputs" and "outputs" treating the university as a black-box. Australian universities have been studied using these methods (e.g. Worthington & Lee, 2005; Horne & Hu, 2006) but it is hard to answer questions about expenditure outcomes and efficiency from the findings (Carrington, Coelli & Rao, 2004). The model presented here rests on simple concepts and robust empirical data, and it does appear to answer questions about the relative expenditure on research and education, and the efficiency with which this expenditure is applied.

While the econometric approach treats a university as a black-box, we may speculate about the reasons for the trends revealed by the model. It is not unreasonable to suppose that they reflect the outcomes of responsible and rational approaches to utility-maximisation by university managers, operating in the environment created by public policy settings and their consequential regulated markets. The results presented here suggest that high-level university decision-making may proceed along these lines:

1. Negotiate an agreed level of domestic student load with the Australian government, all the while striving to convince the government to increase the public component (and any cap on the private component) of per capita operating grant payments to universities.

2. Establish and deliver teaching and learning programs that minimise the revenue committed to these activities. In doing this, satisfy accountabilities for (a) load targets, (b) national governance protocols and similar contractual obligations, (c) process audits by the Australian University Quality Agency and academic standards audits by other accreditation bodies, and (d) maintenance of high levels of student and employer confidence in the education/screening functions.
3. Recruit a significant but not dominant number of international students and provide them with teaching and learning that is identical or slightly superior to that for domestic students. Every domestic and international student pays fees and/or attracts operating grants that are significantly more than the per-student expenditure on education.
4. Use revenue that is not expensed on education to stimulate intense, single-minded pursuit of research output. High research output directly generates additional revenue through the research block funds, and indirectly generates additional revenue through contract research. Success enhances the standing of the university and improves the utility function of the managers (Garvin, 1980; Coates *et al*, 2004). The strategy is *rational* because there is no advantage in expending any less revenue on research-related activities.

As a consequence of such responses to market and policy environments, expenditure on research outputs has grown relative to education output, rising from approximate equality in 1996 to now account for 64% of expenditure by Australian universities. If a research intensive university is defined as one that expends more than 50% of its revenue on activities that produce research output, there are now 28/36 research intensive universities in the sample studies in this work. There is little evidence to suggest that these outcomes of public policy settings are not close to optimal in an economic sense and in terms of the quality of the Australian university system (Ederer *et al*, 2008).

The method presented here provides information on the per-unit expenditure by different Australian universities. Universities with low unit expenditure should not necessarily be dubbed "efficient" but it is tempting to do so. What can be said (van Staveren, 2006) is that *efficiency is inherently ethical* and that the two ethical criteria of *no harm* and *no waste* applied interconnectedly can contribute to the attainment of threshold capabilities for all students. Whether the research intensification that has characterised the past 14 years of evolution of Australian universities is ethical by these criteria is, perhaps, a debatable proposition. On the one hand, students may benefit from some research intensification because it signals the prestige and quality of themselves and their *alma mater*. On the other hand, they may have chosen to pay lower fees if they were informed about the trade-off and given the option to do so.

The ethical debate about charging young students to pay for university research and graduate studies has been active in the USA for well over a decade. In a passionate and widely respected plea to redress excessive attention to research, the Boyer Commission (1998) said *the students paying the tuition get, in all too many cases, less than their money's worth*. Over the past decade, government policy settings have induced *all* Australian universities to go down the path followed by the US research-intensive universities. It may be time to ask whether this is good for students or for Australia; and if it is not, how public policy must change to redress the current situation.

Conclusion

A two-component linear regression model has been used to explain a 14-year time-series for 36 universities of operating expenditure (expressed in current prices), education completions and research publications. Over 98.4% of the variance in the data is explained with an expenditure (2009 prices) of $\$26{,}638 \pm \$1{,}695$ per completion and $\$226{,}586 \pm \$7{,}955$ per publication (point). A minimum difference hypothesis allows precise partitioning of expenditure to education or to research outputs. Using these results we find that expenditure on research output has grown at a compound rate of 6.3% pa while research output itself has grown at 8.7% pa, and that expenditure on education output has grown at 1.4% pa while education output has grown at 4.3% pa. In 2009, approximately 65% of all expenditure is on research output, and 28/36 universities expend more than 50% on research.

Comparison between bi-annual R&D expenditure returns to the Australian HERD data collection and the model provide circumstantial evidence that universities spend approximately 1/3 on intangibles including cultural and social capital that sustains education and research, and 2/3 on direct support for education and research. Further investigations of the ways that universities build and value intellectual and social capital might be a particularly important contribution to the vexed question of university finances.

The econometric method applied here could be modified to explore other national university systems. Research outputs could not be expressed readily in terms of Australian's unique system of publication points, but other measures of research output such as publication counts from an indexing service such as *Web of Science*, or publication counts in a search service such as *Google Scholar*, may well serve the same purpose. The method requires a certain level of inhomogeneity between universities to be effective, but on the other hand it may be difficult to interpret results if a national system contains very different kinds of universities.

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Appendix A: Exact partioning

We estimate the partitioning for a particular university in a given year by assuming that the actual unit costs differ *minimally* from the known average, in the following way. Equation (2) is a linear relationship between the unit expenditure per point $A_R(t,i)$ and the unit expenditure per completion $A_E(t,i)$. Define the standardized unit expenditure per point as $x(t,i) = A_R(t,i)/\overline{A}_R$ and the standardized unit expenditure per completion as $y(t,i) = A_E(t,i)/\overline{A}_E$. Equation (2) transforms to

$$x = [T(t,i)/P(t,i)]/\overline{A}_E - y[C(t,i)/P(t,i)].[\overline{A}_E/\overline{A}_R] \quad (2A)$$

For each university in each year, this equation describes a line in the standardized unit expenditure plane (x,y). Figure A exhibits two such lines, each obtained by selecting a real university and a particular year.

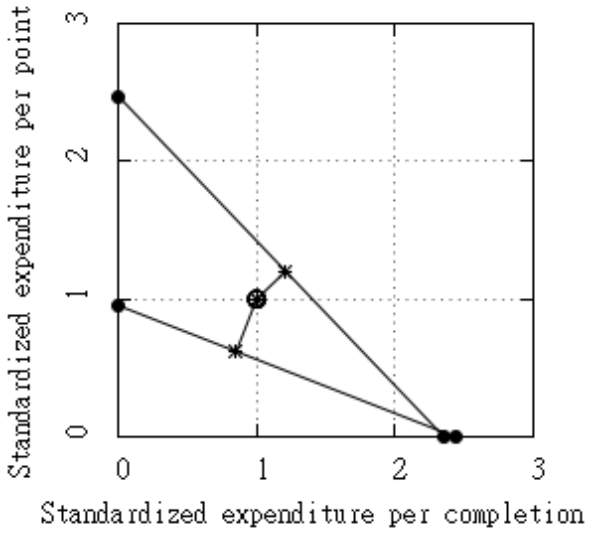

Figure A. The lines joining the solid dots represent the trade-off between all possible partitions between unit expenditure on research and education, for a given university in a given year (two cases). The point $(x,y) = (1,1)$ is the (standardized) average determined by the regression. An asterisk denotes the partition lying closest to the standardised average.

Note that this line defines the *trade-off* between actual standardised unit expenditure on completions and point. The actual partition of research and education expenditure for that university and that year must be represented by a point on the line. In the standardised unit expenditure plane, the point $(x,y) = (1,1)$ represents the sample average established by the regression that minimises the deviation $\Delta(t,i)$ in Equation (3). We conjecture that a useful estimate of the actual partition is the point on the line that lies *closest* to the point $(1,1)$ This point is (x_0, y_0) where

$$y_0 = \left\{ \frac{a^2 b + b^2 - ab}{a^2 + b^2} \right\}$$

$$x_0 = a - \frac{b}{a} y_0$$

and the constants are $a = (T(t,i)/P(t,i))/\overline{A}_R$; $b = (T(t,i)/C(t,i))/\overline{A}_E$.

These equations yield estimates of the values of unit expenditure on education and research for each university in each year, and hence partition the expenditure as described in Equation (1). Note also that the distance $r_0(t,i) = \sqrt{x_0^2 + y_0^2}$ represents a standardised increment (NE quadrant) or decrement (SW quadrant) of the unit expenditure relative to the average $(1,1)$.

We are assuming homogeneity of *unit* expenditure, not homogeneity of total expenditure. Figure 1(c) shows that in practice the relative amount of total education and research output does vary significantly among Australian universities, and total expenditure will do so as well. We offer two lines of argument to support the conjecture that the partition between *unit* expenditure on research and education will lie as close as possible to the standardised average, as follows.

First, Australian universities have operated in a *Unified National System* since the Dawkins reforms of 1988 with a single *Relative Funding Model* established in 1990 (see Base Funding Review, 2010; Baldwin, 1990) and a set of *Australian Qualification Standards* established in 1998 (AQF, 2010). Moreover, over many decades negotiations among universities, and between universities and the *National Tertiary Education Union*, have established formal and informal employment conditions that minimise differences in compensation and other working conditions, and facilitate staff movement between universities. While there are some factors that are not subject to homogenisation (e.g. higher unit education expenditure may arise in geographically remote Australian universities through both distance and demographic factors), Australian government and university policies, funding arrangements, custom and practice are all designed to drive unit education expenditure to similar values across universities.

Secondly, in addition to the specific circumstances of Australian universities, there are general and powerful drivers towards homogeneity and harmonisation in a field of organisations such as the Australian universities. *Institutional isomorphism* arises through mechanisms described by DiMaggio and Powell (1983) as efforts to deal rationally with uncertainty and constraint lead to homogeneity in structure, culture and output. One pertinent symptom of the process is characterised by Winston (1999) as institutional styling as *the Harvard of —*. As Winston (1999, p. 26) notes, Harvard itself cuts unit expenditure on what might otherwise be more expensive unit education costs, by relying on peer instruction by excellent students – and in this way drives towards isomorphism.

Appendix B: Teaching cost model

We present a model to test the plausibility of an education expenditure of $8,750 per EFTSL, by illustrating the sensitivity of teaching costs to changes in the size and contact time of a class, defined as a group of students who jointly experience a sequence of instruction known as a course. The sensitivity analysis reveals the scaling properties for variations away from a reference point.

Class size is modelled in two parts, lectures with 100 students per teacher (reference) and tutorials/laboratories with 25 students per teacher. There may be large variations in the class-time requirements corresponding to full-time load, particularly between HASS and STEM, and undergraduate and postgraduate, modes of instruction. For illustrative purposes, I adopt a load of 8 courses of 12 weeks duration, with each course involving 2 hours of lectures and 2 hours of tutorials/laboratories per week. This model corresponds to 192 class-hours of lectures and 192 class-hours of tutorials/laboratories for an EFTS.

Total expenditure on academic employment benefits in 2009 is reported in the Higher Education Finance Data Set (HFEDC, DEEWR, 2011a) as $5.71B, and the full time equivalent (FTE) number of non-casual academic employees as 38,965. There are additionally a total of 15,544 FTE of casual employees, not allocated to academic and non-academic categories. I assume that casual staff contribute 10,000 FTE to education, for a total of 48,965 FTE academics. The average academic employment benefit is thus $116,620 per annum per FTE, or $83.30 per work-hour assuming 1400 paid work-hours per year. According to HEFDC, academic salaries represent approximately 1/3 of total expenditure (excluding depreciation); the implied total indirect cost on benefits is consistent with recent transparent costing exercises in Australian universities. Academic work does not comprise only in-class time and we allow 3 work-hours for each work-hour of actual lecture class time and 2 work-hours for each work-hour of actual tutorial/laboratory class time. This implies that the total expenditure for an hour of class time is $750 for a lecture and $500 for a tutorial.

The teaching cost model described above leads to an estimate of the expenditure on one ETFS as

$$Cost/EFTS = \$1{,}439\left(\frac{100}{N_L}\right)\left(\frac{L}{2}\right) + \$3{,}838\left(\frac{25}{N_T}\right)\left(\frac{T}{2}\right),$$

where N_L, N_T are the numbers of students per lecture class and per tutorial/laboratory class, and L, T are the number of lectures and number of tutorials/laboratories per week. The "reference" values yield a cost of approximately $5,277 per EFTS, well below the inferred value of $8,750.

The teaching cost model reveals that it may be plausible that Australian universities expend less than $8,750 per EFTS. Note also that some educational activities will reveal themselves as research output in the model adopted here. These include completions of research higher degrees, which are frequently related to the production of HERDC points, and research outputs that relate to education outputs (e.g. journal articles on pedagogical matters).

Responses to questions raised in the consultation paper

Q1.1 Government investment in higher education has been justified in terms of delivering benefits to the economy, benefits to society and equity of access for students from all socioeconomic backgrounds. Should these principles continue to be applied, and if so how should they be used to determine the appropriate level of government subsidy for the cost of universities' learning and teaching activities?

Universities' activities mould and channel the allocation of a sizeable and increasing part of society's resources. As participation rates increase, more people enjoy differentiated university education outcomes and are subject to university-level screening that shapes their civic and economic life, and often contributes to the achievement of their highest personal aspirations. Similarly, the increasing rate of publication of research findings made by universities provides growing and non-rivalrous raw material for the innovative practices of social and corporate institutions.

Ultimately the balance of the public & private components in university revenue is shaped by democratic political considerations. Central to consideration are the choices made by universities when they expend the base funding revenue by governments and students. In contemporary Australian universities, the most important choice is how to partition expenditure between research activity and education activity. Without an understanding of this choice, the issue of the amount of public payment that might be used for learning and teaching activities is impossible to disentangle.

Q1.2 What principles should determine the appropriate balance of resources contributed by:

- **Government;**
- **students; and**
- **other sources**

towards the cost of undergraduate and postgraduate education?

These principles are discussed in the 2010 book "Financing Higher Education Worldwide: Who pays? Who should pay?" by D Bruce Johnstone and Pamela N Marcucci (Baltimore: The Johns Hopkins University Press). See especially their Chapter 3 and Table 7.1.

Q1.3 What other principles, if any, should influence the level and distribution of government subsidies for tuition costs in higher education?

Lessons may be learned by considering the effects of many decades of balancing of the public/private share in the Australian secondary school system. When certain private schools have been provided with additional government funding, the effect has been further increases in costs to students combined with the vigorous pursuit of differentiation in the level of provision of education and ancillary resources (C. Ryan & L. Watson, 2004, *The Drift to Private Schools in Australia: Understanding its Features*, ANU Centre for

Economic Policy Research, Discussion Paper No. 479). The market forces shaping this behaviour are fairly well understood and apply to universities.

The application of *Ethical* principles might assist with some policy positions. As discussed by Irene Van Staveren (2006: The Ethics of Efficiency, *paper presented at the annual conference of the Human Development and Capability Association, Groningen, 29 Aug-1 Sept, pp30*.) an ethical principle applied to university finances might state that *efficiency is intrinsically ethical.* In this context, Efficiency entails the parallel pursuit of the two guiding principles of no waste and no harm

With the public-private balance currently in place, it is hard to see material harm being done to students and most other university stakeholders. One recognized exception is the over-reliance on sessional teaching in some universities. Whether material waste is occurring is less easily determined. It may be that the explosive growth of research output has produced much that will go unrecognized (Linda Butler, 2004,). ERA and related funding policy instruments have the potential to reign in any such deviations in due course. Exclusion of academically worthy candidate students on economic grounds is a waste and the Base Funding Review will address this matter.

Q2.1 What are the best international measures of course quality that would provide appropriate benchmarks to inform judgments about the appropriate level of base funding for Australian universities?

Adoption of minimum quality standards misunderstands the role that universities play in the development of people. Weiss (1995, Human capital vs. Signaling Explanations of Wages, *The Journal of Economic Perspectives*, 9(4), 133-154.) and others explain how the education function of universities involves two parts: (1) supporting students to achieve at their highest levels, and (2) testing and credentialing this performance. It is the *best work* of students that matters. Minimum standards sell both students and universities short.

Courses should be benchmarked for their capacity to support students to perform their best work, and by the rigor of credentialing. These are complex, subtle and qualitative evaluations and accordingly a range of benchmarks is appropriate. These may include peer evaluation of curriculum and learning environments, objective comparison of costs among comparable universities in different states and countries, visiting examiners, and standardized tests. Universities themselves could adopt an appropriate mix. The approach and the outcomes should be transparent to students and other stakeholders. Public funding could be made conditional on transparency, not on the specific benchmarking outcomes. This avoids the "improvement" versus "reward excellence" dialectic that arises if public funding is differentiated on the basis of benchmarking outcomes.

Q2.2*Q2*What are the best international measures of student engagement that would provide appropriate benchmarks to inform judgements about the appropriate level of base funding for Australian universities?

The "best" instruments are unknown, so that adopting a range of approaches is to be preferred. The connection between the intention to measure student satisfaction and how the level of base funding might be set is unclear.

Q2.3 Is there a system of higher education funding in another country that would be a useful benchmark model to inform Australia's review of base funding?

See Johnstone and Marcucci (cited above) for a thorough summary. Australia's approach to the allocation of CGS funding, and even the level of funding per student, is probably at or close to optimal compared with other countries.

Q2.4 What is the connection between the level of base funding and quality outcomes?

While examples of underfunded universities with associated poor outcomes do exist the evidence of a relationship between level of funding and quality of outcomes is hard to find for systems funded like the Australian system. The main technical reason for this is that the quality of outcomes is related to the academic proficiency of entering students. Studies designed to control for this dominant variable yield mixed results (J.F. Ryan, The Relationship Between Institutional Expenditures and Degree Attainment in Baccalaureate Colleges http://www.oairp.org/images/expenditure_degree_attain.pdf) presents a useful summary of previous work. J Robst (Cost efficiency in public higher education institutions, *The Journal of Higher Education*, 72(6), 2001) presents data showing that efficiency increased more when universities suffered smaller declines in the public component of funding, in the US funding context.

The issue is further clouded by the lose link between the drivers of university revenue and the purposes of expenditure. Universities exercise discretion in expending around 50% of their base funding on research-related activity (as the attached paper suggests). This makes it even more difficult to find evidence of a connection between base funding revenue and quality of education outcomes.

Q3.1 Do the current funding relativities reflect the relative cost of delivering undergraduate courses in particular disciplines? What, if any, relative weightings should be afforded to various discipline groups and why?

Universities can be observed re-balancing much of the differential revenue they receive through the CGS-HECS funding clusters. The attached paper finds no evidence of higher or lower overall unit costs of education in STEM *versus* HASS settings. It may be that the main purpose of maintaining funding clusters is to manage the CGS/HECS balance in terms of student earnings opportunities (i.e. a revenue control measure) rather than supporting differences in delivery costs.

Q3.2 What are the costs to universities of improving the quality of teaching and the quality of the student learning experience at the undergraduate level and to what extent should they be reflected in the base funding model?

As mentioned above, the evidence for expenditure-related differences in the quality of outcomes is not overwhelming. On the other hand, there is no upper limit to what might be spent on improving the quality of teaching and the quality of learning experiences. As mentioned above, elite Australian private schools provide swimming pools, extensive playing fields, overseas travel experiences, specialist teachers and tutors, and so forth, and all undoubtedly adds to the broad quality of teaching and the quality of learning.

It is a political and ethical matter to decide the extent to which private wealth should be directed towards better teaching and learning experiences for those who can pay for it, versus the use of taxation to ensure that the economic privilege of one generation is re-calibrated in the next. Resolution of the dilemma through a combination of progressive taxation, a public/private mix of revenue, income contingent loans for fees and accommodation costs, and means-tested funding support for academically proficient people is probably the optimal ethical approach.

If the BFR recommends that caps come off fees (or certain fees), consideration might be given to applying a levy to fees in excess of a specified level, in order to re-balance revenue to those universities that cannot capture such high fees. This would represent an ethical nuance to the matter of university fees, informed by the behavior of elite secondary private schools.

Q3.3 What are the costs of engaging low SES students in undergraduate education? Should such costs be a factor in determining base funding? How might support for low SES students be maintained in the future?

By definition, it is the low level of personal and family wealth than classifies a person as low SES. Potential students from low SES settings can be greatly assisted by full public funding that is provided personally to them, to enable access to university on a level (financial) playing field. While untied grants would be preferable, including a living cost allowance for low SES students as an eligible part of HECS-HELP would be a valuable step towards this objective.

It is important to sharpen understanding of the difference between academically proficient low SES students, for whom personal enabling funding is the main requirement, and students of lower academic proficiency, who may come from any SES setting. Universities – not students – may be able to make a case for additional payments to support the education requirements of students with low academic proficiency.

Q3.5 What proportion of a higher education teacher's time should be spent on scholarly activity and how could the costs of scholarship be included in the base funding model?

The accompanying paper provides circumstantial evidence that Australian universities now expend on intangibles an amount of approximately $6.3B, or 35% of the total expenditure. This expenditure covers two kinds of activity: (1) intangibles that all institutions maintain, such as business-system know-how, institutional cultural and social capital, advertising and marketing, etc., and (2) university-specific intangibles such as scholarly work. Unfortunately there is scant evidence relating to this topic, and perhaps the best that can be done would be to maintain the current rate of 35%. To reduce the expenditure would almost certainly lead to the erosion of the human and intellectual capital base of Australian universities and this would be extremely expensive to repair. To pay more than 35% may risk (unethical) inefficiency.

Q3.6 Should any research activity continue to be supported by base funding?

Minister Peter Baldwin's 1990 report *Assessment of the Relative Funding Position of Australia's Higher Education Institutions* adopted approximately 6% of the operating grant at that time as being the "research-related component". It also reported that the size of this component was not a significant issue.

The attached paper suggests that approximately 50% of the discretionary funding available to universities is expended on research-related activity, and that many universities are in hot pursuit of greater research expenditure. The discretionary funds are primarily earned as revenue for delivery of education services.

Given it terms of reference, the BFR might choose to identify the non-educational activity supported by discretionary funding as "scholarship related to teaching and learning" even though the scholarship is actually research. There is nothing particularly awkward in this approach, apart from the ethical question of whether students should be advised about what they are paying for. Alternatively, the BFR might consider three alternative responses to the reality that universities spend around 50% of their education-sourced revenue on research:

1. Acknowledge the situation and recommend that it continues, consistently with the objective of intensifying research in all institutions using the title "universities" under the recommendations of the Bradley Review;
2. Carve out (or claw back) a portion of the research-related component (say around $1B pa) in order to direct it contractually and specifically for education-related activities; or
3. Accept the current reality, but inject education growth funding through policy instruments that encourage education quality and discourage channeling the growth funding into research.

Option 1 is preferred if the government proposes to fund the public payment for the proposed education growth at the current rate per student, since it is the recipe that has led to Australia having one of the world's best university systems. Option 2 would be preferred if the BFR finds that questions are

beginning to arise about the way that channelling education funding into research is lowering education quality, and an urgent response is indicated. Option 3 would be preferred if the BFR forms the view that there is a need for a competitive funding instrument for education on a scale that balances the effects of the competition for the approximately $1.7B of ARC, NH&MRC and research block funding that is available on the research side of the ledger.

Q5.2 In what circumstances should the level of students' contribution towards the cost of their courses be based on factors other than the cost of their tuition?

Earning capacity of graduates is accepted as a criterion in the current arrangements. It has little ethical risk provided that HECS-HELP is available to fully cover the fees and might well continue as a criterion.

Q5.3 Should the basis for determining the level of contribution by the student towards the cost of their tuition be different at the postgraduate level?

Yes, but on the same basis as the first award. A Masters Award might attract higher average earnings in some fields, and the private component of that fee might thus be larger.

Q6.1 To what extent does the base funding model provide incentives for institutions to invest in and deliver high quality teaching?

Currently, the incentives are to invest heavily in research growth, once the basic education accountabilities are satisfied. This may be optimal. However, the absence of a large competitive fund to support education innovation induces a gross asymmetry between decisions that drive expenditure on research or education. The education experience in Australia's universities would be enhanced almost immediately if approximately $1B pa were injected into the system as competitive grants directed towards improvement of learning and teaching.

Q6.2 Does the base funding model provide incentives for institutions to maintain strong academic standards?

Academic standards will emerge from the overall higher education marketplace, and particularly from those universities that decide to position themselves on the integrity and level of their academic standards. A university qualification appears to be recognized and rewarded for its duration and almost irrespective of the quality that it entrains (e.g. G. Becker, 1964 Human Capital, National Bureau of Economic Research). Thus, many public policy objectives of higher participation are likely to be achieved without attention to quality issues. Quality comes into play in relation to institutional positioning in the market. It is therefore important for the BFR to recommend policy instruments that promote diversity among institutions.

Q6.3 What features could be incorporated in the design of a new base funding model to make it more simple, transparent and responsive to higher education providers?

The attached analysis provides little evidence to dispute the viability of a simple base funding model along these lines:

- Universities would receive a single value public payment for every eligible undergraduate and postgraduate ETFSL irrespective of the kind of undergraduate course or first professional postgraduate course.
- Universities would be permitted to change HECS-HELP at any rate. A high levy rate would be applied to fee revenues above an agreed threshold that are paid for popular courses at popular universities. The levy would be fed back as equity scholarships for low SES students, paid to the eligible students at any university.

All government special-purpose programs providing education-related funding and much of the anticipated growth funding would be rolled into a competitive education improvement and innovation program. This would aim to grow to $1B pa over a few years. The public policy purpose of the fund would be to improve learning and teaching, and to counteract the excesses