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Two Cheers for Research

My title is an adaptation of a passage from an essay by E.M. Forster:

Two cheers for democracy: one because it admits variety and two because it permits criticism. Two cheers are quite enough: there is no occasion to give three. Only Love the beloved Republic deserves that. (Forster, 1965, p.78)

His general point is that 'there lies at the bottom of every creed something terrible and hard for which the worshipper may one day be required to suffer' (ibid., p.76), and, in particular, that democracy, as an ideal, is not something we should place upon a pedestal and worship uncritically. I think that is also true of research, and of its role in a university. I will argue that, while research is a distinguishing characteristic of higher education, it should not be seen as an absolute good. If

narrowly conceived, or over-emphasised, research can limit what universities aspire to, and are able to provide.

Is research really commonly represented as an unalloyed good, especially in relation to universities? I think so. For example, we find this on the web site of the University of Sydney:

At the heart of the University's mission is a fundamental moral commitment to intellectual discovery and development. Our students benefit through research-led teaching. Our creativity and discovery deliver cultural, social, economic and political benefits to the community.

The University's reputation is directly linked to the quality of our research. As our reputation as a research-intensive university grows, so too does our ability to attract and retain high-performing staff and outstanding research students. Research is at the core of everything we do.²

The University of Western Australia goes even further on its web site, saying:

'An emphasis on research and research training is a defining characteristic of UWA.'³

Victoria University of Wellington holds a similar regard for research. Its research policy states, *inter alia*:

All academic staff have the right *and are required* to conduct research and engage in scholarship and to publish their findings. ... [emphasis added]

The requirement to undertake research is a career expectation ...⁴

This is consistent with the first statement of the National-led government's view. A recently released Ministry of Education *Draft Tertiary Education Strategy* states:

Universities have three core roles:

- to undertake research that adds to the store of knowledge
- to provide a wide range of research-led degree and post-graduate education that is of an international standard
- to act as sources of critical thinking and intellectual talent.

The document goes on to say:

The Government expects universities to:

- enable a wide range of students to successfully complete degree and post-graduate qualifications
- undertake internationally recognised original research

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- create and share new knowledge that contributes to New Zealand's economic and social development, and environmental management.

This emphasis on research in universities is comparatively recent, essentially a post-World War II phenomenon. Writing in 1852, in the preface to *The Idea of a University*, John Henry Newman said:

The view taken of a University in these Discourses is the following: – That it is a place of teaching universal knowledge. This implies that its object is, on the one hand, intellectual, not moral; and, on the other, that it is the diffusion and extension of knowledge rather than the advancement. If its object were scientific and philosophical discovery, I do not see why a University should have students; if religious training, I do not see how it can be the seat of literature and science. (Newman, 1907)

Cardinal Newman (1801–1890), a prominent Anglican convert to Catholicism, developed these views as rector of the then newly-established Catholic University of Ireland (now University College, Dublin). His book is seminal in the study of higher education, although I suspect it is now more cited than actually read, by non-Catholics at least. At the time, however, Newman was articulating a view held by others: for example, Benjamin Jowett (1817–1893). Jowett was regius professor of Greek, the great translator of Plato's works (in which capacity I personally first encountered him), master of Balliol College and vice-chancellor of Oxford University. Logan Pearsall Smith records Jowett as saying: 'Research! Research! A mere excuse for idleness; it has never achieved, and will never achieve any results of the slightest value' (Smith, 1938, p.169).

Jowett's vehemence derives from the threat he saw posed to the tutorial system he championed by the developing enthusiasm for research, modelled on the German universities. Jowett's 'ideal was to have undergraduates read out essays to tutors, particularly on ancient philosophy and history, and to discuss

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them with those tutors. He did not wish to train researchers but to develop powers of mind and of clear, cogent expression which would equip undergraduates to take their place in public life' (Mayr-Harting, 2007).

So how did the teaching-focused conception of the university espoused by Newman and Jowett transmogrify into the research-dominated one we now have? My thinking on this issue has been strongly influenced by an address given at Leeds Polytechnic in 1990 by the foundation chair of the Australian Research Council, Don Aitkin. Professor Aitkin, for whom I then worked, is a distinguished political scientist who went on to become the vice-chancellor of the University of Canberra. He proposed 'a three-period model of the development of the modern university':

Period I: from the first degree-granting universities in Europe, beginning with the University of Bologna in 1088, to World War II

Period II: post-World War II to the 1980s

Period III: from the 1980s to now.

Of the first 850 years Aitkin says: 'Period I universities as a whole were places of teaching and scholarship, but not notably for research. And the research that was done was mostly of small scale, and relatively cheap' (Aitkin, 1991, p.236).

These were Newman's and Jowett's universities; though, as noted, the seeds

of Period II were sown in Germany by Wilhelm von Humboldt, who sought to have the universities demonstrate and promote the process of the discovery of knowledge. As the 20th century got under way, the Humboldtian idea took root across the Atlantic in the United States, and, not without debate, later in the United Kingdom, though not really in the Dominions. Thus we find the 1924 New Zealand royal commission on university education saying: 'The function of a university is not so much to conduct researches as to train students to that inquiring attitude of mind which inevitably makes them investigators' (cited in Malcolm and Tarling, 2007, p.91).

The history of New Zealand universities, and Australian universities, in the first half of the 20th century is that of teaching institutions in which some academics strove, largely unsuccessfully, to ignite interest in research. An example was 'A statement by a group of teachers in the University of New Zealand', which asserted: 'We do not accept the point of view that teaching is the main function of the University. ... The two activities of the University, teaching and research, should be co-ordinated and combined' (Allan et al., 1945). The signatories to this statement included Karl Popper, then at the University of Canterbury. Until after the war talented graduates went to Britain to do their research training, and, for the most part, their research. Popper, of course, left for Britain immediately after the war.

It was Vannevar Bush who ushered in Aitkin's Period II, with his report to United States president in 1945, *Science: the endless frontier*. The key argument of this was that:

Basic research leads to new knowledge. It provides scientific capital. It creates the fund from which the practical applications of knowledge must be drawn. New products and new processes do not appear full-grown. They are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science. (Bush, 1945)

Bush is asserting a linear model of innovation, very convenient for basic researchers but not much supported these days. Unexpected practical applications do emerge from basic research, but practical problems also succumb to a direct approach and such work is often inspired by 'market push'. However, that's a story for another time.

Vannevar Bush had a special place for universities in his vision:

Publicly and privately supported colleges and universities and the endowed research institutes must furnish both the new scientific knowledge and the trained research workers. These institutions are uniquely qualified by tradition and by their special characteristics to carry on basic research. They are charged with the responsibility of conserving the knowledge accumulated by the past, imparting that knowledge to students, and contributing new knowledge of all kinds.

His last sentence captures the traditional view of what universities do –

with which, by the way, I have no quarrel. To fund his vision Bush successfully argued for the creation of the National Science Foundation (NSF). Massive American government support for basic research in the universities through the NSF, and through national institutes of health, copied in Britain, Australia, New Zealand and many other countries, was the engine of universities in Period II. Among its principles, as articulated by Bush, was that:

Support of basic research in the public and private colleges, universities, and research institutes must leave the internal control of policy, personnel, and the method and scope of the research to the institutions themselves. This is of the utmost importance.

Even more important still was the way in which decisions were made about who would be funded and the results evaluated: peer review – namely the evaluation, by experts in the relevant field, of a research proposal for which a grant is sought, or of a paper proposed for publication. More colloquially we might say: Trust us, we

know which of us should get your money – and whether the results we got were worthwhile. Or, as a captain of industry once put it to me: 'Just slip the cheque under the door and bugger off quietly.'

Little wonder, then, that peer review should be popular among researchers as a way of deciding things in research. I shall be returning to peer review, and its limitations. But before that, my first cheer for research. As Don Aitkin says, after the explosion of research funding following World War II,

The result has been an astonishing advance in the knowledge that humanity has of the physical universe and of its own part in the universe, an advance that is perhaps without any precedent in human history. The flowering of research in the second half of the 20th century is arguably our century's most useful gift to the 21st century ... (Aitkin, 1991, p.238)

Motherhood and apple pie surely have nothing on research as a self-evident 'good thing'. Well, perhaps. There's always the Pandora's Box problem: there are some things that perhaps we shouldn't know – such as how to make weapons of mass destruction. We will be returning to that issue; but for the present, it would be churlish, indeed absurd, to deny the triumphs of research, in terms of either pure understanding or practical application.

But before we get too carried away – an awful lot of dross was produced along with the bullion. The standard measure of whether basic research results are valuable is citation of the publication in which those results appear by later publications. Citations acknowledge intellectual debt. Other things being equal, the more often a work is cited, the more important and influential the results are taken to be. Various caveats are necessary: self-citations and negative citations, for example. But even negative citations can be impressive if there are enough of them and they go on for a long period of time. There is a whole research field – bibliometrics – devoted to this, and into which I cannot go very far here. I just want to point to one or two well established bibliometric findings with fundamental implications



for research policy. The first is that most research publications don't rate very well. In his classic paper, Derek de Solla Price observes:

It seems that, in any given year, about 35 percent of all the existing papers are not cited at all, and another 49 percent are cited only once Only 1 percent of the cited papers are cited as many as six or more times in a year . . . (Price, 1986, p.107)

So much for the problem of self-citation. In fact, more recently, Hamilton (1990) found that '55% of the papers published in journals . . . did not receive a single citation in the five years after they were published'. The figures vary by discipline and type of publication, and there are arguments in the literature about the exact level of uncitedness (Pendlebury, 1991). The point is simple, though: if one is to judge by citations, a great many journal articles are never read by anyone other than the author, the journal editor and the referees.

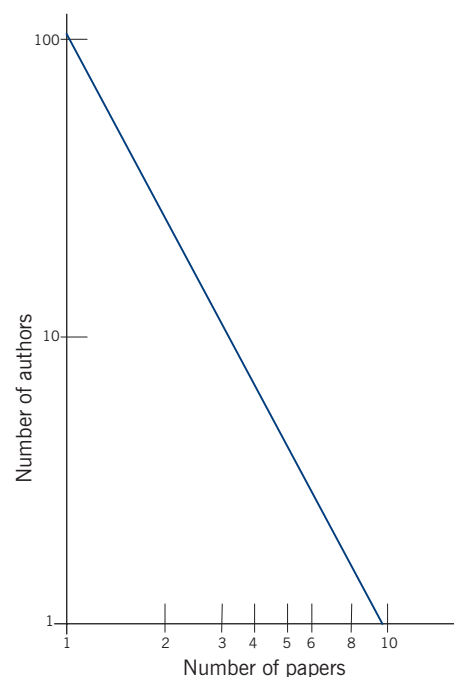
Moreover, citation frequency is logarithmically distributed. That is, of those papers that do get cited, as noted most receive only one or a few citations, and a tiny percentage have most of the impact. So, to take one example, high energy physics: in a database with 234,885 citeable papers, of the most highly cited papers, 10.66% had more than 50 citations, 5.79% had more than 100 citations, 1.29% had more than 250 citations, 0.38% 500 or more citations and 0.13% had more than 1,000.⁶

This is true of productivity as well as impact. Lotka's (1926) Law is an inverse-square law of productivity which states that the number of people producing n papers is proportional to $1/n^2$.

This means that for every 100 researchers who publish one paper, there are 25 who publish two; 20% of authors will publish five papers or more; 10% at least ten. Another way to put this is that 10% of authors produce more than 50% of all papers, and 2% produce a quarter of all papers (Price, 1986, p.41).

Many studies have been done to see whether Lotka's Law holds in various disciplines. In some fields it is confirmed: an example is finance (Chung and Cox,

Figure 1: Lotka's Law⁷



1990). In others an even higher exponent – 3 or 3.5 – has been proposed as best fitting the data. But the general point is well established: a few researchers are responsible for most of the publications.

Taking these two general findings together, we can say that *most researchers are unproductive, and their work has little or no impact*. Therefore, to optimise research outcomes and their impact, funding should be focused on a few, really a very few, talented researchers, and not the many talentless ones. In policy terms, where the quantity and quality of the research is the primary concern, an implication of this is to favour research-only organisations, such as the crown research institutes in New Zealand and the CSIRO in Australia.

Nevertheless, as we have seen the New Zealand universities are expected by government to undertake research as well as teaching. And since 2003 university research been assessed and rewarded through the Performance-Based Research Fund (PBRF). In my view, at least as implemented at Victoria University, the PBRF flies in the face of the bibliometrically-established realities about research just discussed. All academic staff who are employed for a minimum of one day a week on average, or 0.2 FTE, and whose employment functions include a substantial contribution to

research and/or teaching degree-level programmes are eligible. Although institutions may choose not to submit an Evidence Portfolio (EP) for some eligible staff, those staff are then automatically rated 'R' – research inactive.⁸ At Victoria University submission of an EP was compulsory in the recent internal round for those expected to be in position for the next, 2012 external round.

This contrasts with the British Research Assessment Exercise (RAE), on which the PBRF was generally modelled.⁹ Higher education institutions there selected research-active staff for inclusion from their eligible staff. In the last, 2008 RAE, 61% of eligible permanent academic staff were selected and 38% of all academic staff (Higher Education Funding Council for England, 2009, p.12). A key difference is in the reporting aspect: in the United Kingdom those who are not submitted do not appear in the denominator, whereas in New Zealand they do.¹⁰ Another is that in New Zealand, academics are individually scored and graded, whereas in the RAE it is 'units of assessment' – broadly speaking, equivalent to departments – that are rated.

Victoria University has a minimum expectation of a 'C' grade for those who are not new to research – defined as those having 'produced a reasonable quantity of quality-assured research outputs, acquired some peer recognition for their research, and made a contribution to the research environment within their institution'.¹¹ But this does not reflect the reality of research capacity among academics, here or anywhere else.¹²

The operation of the PBRF would be considerably improved if individual academics could choose whether to have their research evaluated. Even when they do, the time available to them, or elected by them, to do that research should be a factor as well; although implementing that may be easier said than done. Otherwise, it seems inevitable that many will do poorly in the PBRF. But it is also a case, I think, of the tail wagging the dog. The PBRF represents 20% of government funding to universities, and 10% of all university income. At Victoria University, research accounts

for about 10% of all revenue (Victoria University of Wellington, 2008, p.43). The preponderant majority of all income received by the university – whether from government or from students themselves – is for teaching. The notional split at Victoria University of Wellington between teaching and research duties for academics is 40:40 (with the remaining 20% covering administration, service to the university and service to the community). Even that, which underestimates the actual focus on research, is out of whack with funding purpose and reality (unless, perhaps, you decide to impute 40% of academic salaries to research).

Teaching is the primary responsibility of the university, the primary source of its income from government and of its income from the students themselves. Ross Guest, professor of economics at Griffith University in Australia, recently pointed out that ‘Given that research performance is measured and extrinsically rewarded more systematically than teaching performance, effort and performance is biased toward research’ (Guest, 2009). There is, of course, no national evaluation of teaching performance to compare with the PBRF. As a head of school, I cannot require that the teaching done by my staff be assessed and see the results in the way that PBRF scores are provided to me. Nobody tells me that I must manage the performance of poor teachers, in contrast with the requirement for detailed reporting on how I am managing those with poor PBRF scores. As Guest notes, there is

A well-established economic principle ... that when buyers cannot discern the quality of a product being offered for sale (in this case teaching quality) they tend to offer a price commensurate with average quality. This means that good teachers are paid less than they are worth and poor teachers are paid more. (ibid.)

Clearly we need to measure teaching performance at least as routinely as we do research if it is to be valued properly in the university environment. But we also need to reward good teaching at least as much as we do good research. Of course there are, now, teaching awards at Victoria

University, as well as national teaching awards. But if teaching excellence is truly to be co-valued with research there needs to be a tangible, dollar reward for it on at least the same scale as the PBRF: that is, somewhere around 20% of government funding to universities. And, while good researchers feel rewarded when they are asked to do more research, good teachers do not feel so rewarded when they are asked to do more teaching. This means that a substantial amount of any ‘performance-based teaching fund’ would need to find its way into academic salaries.

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As well as over-emphasising research, the PBRF also emphasises one kind of research at the expense of another. The key problem is the way in which the research is assessed. Overwhelmingly it is other academics who make these judgements. The peer review panels for the 2006 PBRF quality evaluation consisted almost exclusively of academics.¹³ Even in an area like business and economics, the panel was composed entirely of academics: there were no business people; there were no Treasury officials; no *users* of research, nobody who might comment on whether any of this business and economics research improved business bottom lines or helped frame government economic policy.

The dominance of peer review – trust us, we know how good we are – is very evident, and it is hardly surprising that good ‘pure’ or ‘basic’ researchers would be

happy with this arrangement. But *applied* research, which seeks to solve problems, is ill-served by the PBRF because the people with the problems are not asked how good the proposed solutions were at addressing them. And it is applied research that is most important in places like the School of Government. Our primary stakeholders are the public sector agencies, not eminent academic researchers elsewhere in New Zealand and around the world.

Government is by no means the only field of university research where applied research is most important. To take one random further example, I would venture to suggest that educational research which had no impact on teaching or learning would be an entire waste of money, regardless of how well cited it might have been in academic research.

Of course, researchers who work on applied problems can also publish their work in academic journals, and many of those in my school do. But such journals are, by and large, not read by senior public officials, who prefer face-to-face communication or read the reports they have commissioned. There is a cost to this need to serve two masters – the time and effort taken to convert a report to a government department into an article published in an international journal is very considerable, and necessarily reduces productivity (everything has to be done twice). Moreover, to get something published in an international journal can mean stripping the New Zealand content out to meet off-shore demands. This has to be done because New Zealand-based journals – such as this one – are regarded as inferior publication vehicles.

There is, however, some glimmer of hope. I referred earlier to the Ministry of Education’s *Draft Tertiary Education Strategy 2010–2015*, released in September 2009. There we find the government arguing that:

New Zealand must have a strong contribution to research and innovation from the tertiary education sector. Research-driven innovation will be a major factor in helping New Zealand industries to become more productive.

And the strategy goes on to say:

The Performance-Based Research Fund has been successful in promoting quality improvements, and will continue to enhance research quality. We will look at whether the Performance-Based Research Fund is working well for all parts of the sector.

Perhaps this is a hint that it might be appreciated that it is not working well for applied research. The next PBRF round is in 2012. I earnestly hope that it leavens the peer review panels with research users from both the private and public sectors.

I have argued that widespread engagement in research by university academics is not the best policy for optimising research output and impact, pure or applied. Is there any other reason to want to have large numbers of academics doing research? There is one very commonly advanced argument: that teaching is improved by being done by active researchers. So, for example, it can be found in university mission statements such as that of the University of Sydney, cited earlier: 'Our students benefit through research-led teaching.' And we find it in the Ministry of Education's *Draft Tertiary Education Strategy*:

Research needs to inform teaching, both in academic and applied settings. This enables the development of human capital, as tertiary education institutions play a key role in spreading knowledge and in transferring technology through teaching.

As with many shibboleths, there is not a great deal of evidence for the teaching–research nexus. One recent study which looked at what there is found that:

the evidence ... suggests that research and quality teaching are not contradictory roles. However, we cannot conclude from the information at hand that the link is strongly positive. The evidence indicates the relationship may be modestly positive, though it is likely to be stronger at postgraduate than under-graduate levels. The overall quality of the statistical analyses on

which these conclusions are based is not high. (Zaman, 2004)

Another study notes:

At the level of the individual member of staff, the simple models of staff who are heavily productive in research outputs being the most effective teachers, or that high productivity in research results in effective teaching, are clearly suspect. (Jenkins, 2004, p.11)

On the other hand, it did find that 'In the UK, there is clear evidence that, while many mission statements ... state the importance of the link, few teaching or

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research strategies have clear mechanisms for delivering the teaching–research link' (ibid., p.31).

A teaching–research nexus is not very plausible in relation to beginning undergraduates: their teaching could hardly be informed by research they could not yet understand. A researcher who is a talented teacher might, however, communicate something of the excitement and importance of their research in a first-year lecture. So let's say the association is weak, rather than absent.

On the other hand, students working for research-based masters degrees and doctorates can surely be satisfactorily supervised only by academics who themselves hold such degrees and are

active in research. It is important, too, to remember that the universities in New Zealand have a unique role as the only institutions awarding research qualifications. Here I think the nexus is strong. At some point in the more senior undergraduate courses, and certainly at honours level, students need to be introduced to research, in terms of both substantive content and method. Here, too, there is a need for good teaching to be informed by research. So the need for some teaching to be informed by research can justify many, if not most, academics being engaged in research – the extent of such an engagement depending upon the levels at which they teach.¹⁴

But I think there is bit more to be said in favour of research. Donald Rumsfeld, sometime US defense secretary, has been much mocked for saying:

There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we now know we don't know. But there are also unknown unknowns. These are things we do not know we don't know.¹⁵

Partly this mockery is because he missed out something rather critical: the things we think we know, but which we don't (because they aren't true); in this case that Iraq had weapons of mass destruction. Still, he has a point, albeit rather clumsily put. In universities we teach the things we know we know (or think we know) to our students. We try to resolve the known unknowns: that is, we do research. But most importantly we accept that this research will, from time to time, not merely add to our stock of knowledge, it will transform it entirely, as we discover unknown unknowns.

The scholasticism of the schoolmen in the medieval universities was fundamentally doctrinaire, and much the worse for it. What a commitment to research, the Humboldtian ideal, bequeaths to the contemporary university, and to its teaching, is, above all, a horror of dogma. And there's my second cheer for research: it is antithetical to dogmatism. (Mind you, it won't have been long since you last heard something like: 'The overwhelming consensus of scientific opinion is ...'. Often

it is said by a journalist or a politician but, sadly, rather too frequently it is said by a scientist.)

So we may say, two cheers for research: one because it has given us so much knowledge of the world and ourselves, and two because it fights dogmatism. But, as E.M. Forster said, 'Two cheers are quite enough: there is no occasion to give three. Only Love the beloved Republic deserves that.' I have suggested that there are some aspects of research in New Zealand universities, and at Victoria University of Wellington, which mean we need to withhold the final cheer. Most academics are not capable of truly outstanding research, and should not be compelled

to try. The balance between teaching and research is currently awry, with the latter excessively rewarded to the detriment of the former. And the kind of research rewarded is too narrow, rewarding basic research at the cost of applied research.

1. This is an edited version of an inaugural professorial lecture, delivered on Tuesday 17 November 2009.
2. http://www.usyd.edu.au/ro/rmp/importance_research.shtml.
3. <http://www.research.uwa.edu.au/>.
4. <http://policy.vuw.ac.nz/Amphora!~--policy.vuw.ac.nz~POLICY~00000000945.pdf>.
5. My thanks to my colleague Professor Bob Gregory, who used this cartoon in his own inaugural lecture earlier in 2009. Reproduced by permission.
6. <http://www.slac.stanford.edu/spires/play/citedist/>. Note that the data are not cumulative (i.e. a paper with 512 citations is only counted in the 500+ category, not in the 50+ and 100+ categories).
7. Drawn by Amanda Cunningham after Price (1986), p.39.
8. Tertiary Education Commission.
9. Likely to be metrics- rather than peer review-based, at

least for some fields, in future, and renamed the Research Excellence Framework.

10. Jonathan Boston, personal communication.
11. <https://intranet.victoria.ac.nz/research-office/policy-and-services/PBRF/grades.html#c>.
12. I do not have the space to do so here, but it is instructive to compare the spread of outcomes by level (excellent to poor) in peer-review driven exercises such as the PBRF and the RAE, with the distribution which bibliometric data shows: the latter offers a much harsher judgement. For example, compare Trends in measured research quality: an analysis of PBRF Quality Evaluation results (Ministry of Education, 2008) at http://www.educationcounts.govt.nz/_data/assets/pdf_file/0018/29403/PBRF_-_report.pdf, figure 4, p.17, which shows a distribution of research output scores with a distribution not far from normal.
13. Tertiary Education Commission.
14. In the light of the earlier discussion of the distribution of talent in research, however, it should be noted that much of the research undertaken by academics which is justified by their teaching responsibilities will be pretty low quality research.
15. Press conference at NATO Headquarters, Brussels, Belgium, 6 June 2002.

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