Using metrics to allocate research funds

A short evaluation of alternatives to the Research Assessment Exercise

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Introduction

1. The Government funds university research in two main ways, through the block grant provided by the Higher Education Funding Councils and for individual research projects through the Research Councils.

2. This arrangement, known as the dual support system, is essentially a compromise between two ways of funding public services:

- The Research Councils act as purchasers: universities have to bid against each other to sell research to them. This model has high transaction costs (because it costs universities money to bid for funding and it costs the Government money to assess those bids) but it has the advantage of forcing universities to be responsive to the Government's needs, and it enables the Research Councils to fund only research of the highest quality
- The funding councils, through the block grant they provide to universities, provide funding to those universities they trust to deliver good research with relatively few strings attached. This model is much cheaper but gives the Government less control over what is done with public money.

3. The Government is seeking to reform the way the funding councils allocate their money for research (known as QR). At present they run a Research Assessment Exercise (RAE) every few years to rate the quality of university departments in each subject, using the results to determine which universities to fund for research and how much to give each of them. The RAE enables the funding councils to concentrate their investment where there is research of the highest quality. However, because QR is part of their block grant, universities are not obliged to invest it in any particular area or to produce any previously stated output.

4. Included amongst the supporting material for the 2006 Budget statement was a document entitled 'Science and innovation investment framework: next steps (referred to here as 'Next Steps'). In it, the Government states its intention to abolish the RAE (although it leaves open the question of whether the RAE planned for 2008 should go ahead). It states that the Government's 'firm presumption' is that after the 2008 RAE QR allocations will be allocated on the basis of quantitative indicators or 'metrics'. The only indicators mentioned are those based upon income from research funders such as the UK Research Councils and UK industry. This report assumes that any metrics based allocation will depend very heavily upon such metrics[1].

5. Distributing QR in proportion to Research Council and other external research funding has very profound implications which have yet to be properly debated, but which will be the subject of a consultation in May, when the Government has said that it will present its proposals for using metrics to distribute QR. This report considers some of those implications. It goes on to discuss ways in which some of the deleterious effects of a metrics-

[1] In this report, unless otherwise stated, the term 'metrics' is used to signify a mechanism for distributing QR which discriminates between universities according to how much income they have achieved from external sources, such as Research Councils, Charities, Other Government Departments, the EU and Industry

based allocated could be mitigated and looks briefly at other potential replacements for the RAE.

6. This report focusses upon the merits or otherwise of metrics. It is not an evaluation of the RAE itself and, whilst it assumes that the RAE will have to be replaced this reflects the Government's public commitment to such a move rather than any view of the desirability of that.

7. The report is supported by five annexes:

- Annex A: Relative costs of the RAE and metrics as a basis for the allocation of QR
- Annex B: The use of metrics to determine QR funding allocations and its impact upon stability
- Annex C: The impact upon English universities of allocating HEFCE research funding on the basis of metrics: transitional effects
- Annex D: Is the RAE game worth playing for English universities?
- Annex E: The use of citations in a metrics-based allocation of QR funding

Impacts of a metrics based allocation

8. The fundamental feature of a funding system based on metrics is that it provides an incentive to pursue research grants in preference to all other research activities.

9. The principal advantage of this is that it is likely to encourage a greater concentration of research resources upon the highest quality and most relevant research. It is certainly arguable that this would have some beneficial effects. Research undertaken by Evidence Ltd shows that UK research is highly polarised between a minority of work which has very high impact (as measured by citations) and a long tail of work which has little or no measurable impact[2]. A system which puts greater pressure on institutions to focus on research of high quality and high salience to others might well mean that the UK produces fewer research outputs and that that those which are produced have higher average impact[3].

10. There are, however, a number of potential disadvantages, and this report discusses these. Of these the most important are that:

- The reforms will stimulate additional demand for grant funding which will in turn push up the transaction costs associated with that funding. Bearing in mind that over 70 per cent of Research Council grant applications are unsuccessful, the net effect will almost certainly be to increase the transaction costs associated with the funding of research, possibly by a very large amount

[2] How Good is The Research Base (Evidence Ltd published by HEPI, forthcoming).
[3] Some caution is necessary here. Very little is known about whether research and researchers who do not register as highly successful in terms of research grant income or citations are necessary to the productivity and success of others. A policy which promoted a focus on measurably successful researchers would be beneficial only if it were the case that the available measures of success capture all of the activity necessary to the creation of good research and to the maintenance of a high quality research base over time. If that is not so, such a policy will be counterproductive.

- Metrics based on grant income are inherently unstable because apparently modest changes in the weightings applied to different funding sources can have a very profound impact upon the distribution of funding. This sensitivity is likely to lead to intensive lobbying from institutions and funders to use weightings which favour them. Moreover, the relative amounts earned each year by universities also fluctuate greatly, making metrics an inherently unstable basis for allocating core university grant
- Academic researchers may become more hesitant about undertaking research in fields which are, perhaps temporarily, unfashionable, or whose conclusions are likely to be unwelcome to funders of research
- There will be no assessment of the quality of outputs, only of success in winning grants and contracts. This means that, where they are in conflict, activities aimed at securing new funding will take precedence over the production of high quality research. This is likely, for example, to deter researchers from undertaking cheap research utilising existing data because their QR funding will depend upon obtaining as much additional external funding as possible.

11. Other effects might be anticipated. By increasing the profitability of research funded by the Research Councils and others, the reforms would, in many institutions turn research into a standalone business rather than part of an integrated academic process. It makes little sense to entangle a high-risk high-return business (which is what research would become) with a low risk, low return one (teaching) because the management approaches demanded by each are so different. Therefore, we should expect an accelerating separation of research and teaching in universities, with research increasingly concentrated in institutes administratively separate from teaching departments. The losers would be those academics who at present enjoy time and resources to pursue their research whilst not working at the absolute forefront of their fields or having strong relationships with private sponsors of research. Such staff may struggle to find a role in the kind of university which the new approach would create.

Cost

12. The upper limit for the cost of the RAE is about £100 million over seven years, and in reality the cost is likely to be lower, as this figure includes expenditure that universities would incur anyway, independent of the RAE. This amounts to less than 1 per cent of the £10.5 billion allocated through QR by the four funding bodies in the seven years during which the 2001 RAE results will have been used to inform funding. The current cost of the Research Council grant allocation process is very much higher. On the basis of an analysis of the Research Councils' accounts, the total administrative cost of the funds provided by Research Councils to universities is unlikely to be less than 10 per cent of the funds awarded. The basis for these estimates is explained in Annex A. If it is assumed that the Research Councils are no more or less expensive than other grant funders, the total transaction cost of research grant and contract funding in the Science, Technology, Engineering and Medical (STEM) subjects will be at least £280 million per annum (10 per cent of the £2.8bn of research grant and contract funding received by HEIs in STEM subjects in 2004-05) – or £2 billion over the 7 years to 2007-08.

13. Even now, the success rate for grant applications is just 29 per cent – huge amounts of effort are wasted on unsuccessful grant applications. If QR funding is linked to research grant income, the effective value of grant funding will increase and universities will make more applications. This will have costs at both ends: universities will spend money on making extra applications and Research Councils will spend money on processing them. The same is equally true if income from funders other than the Research Councils is included in the funding formula: an increased proportion of the funding available for university research will be swallowed by the cost of grant applications.

14. Applications are only a part of the story. It is reasonable to expect the volume of funded research to increase, which will have a direct impact upon the costs of administering awards once they have been made (both institutions and the funding agency face costs). This is because, by effectively increasing the value of research grants, linking QR to metrics would make it possible for funders to pay an economic rate for a larger amount of research. Even if the Research Councils are prevented by the Government from increasing the volume of research they fund, it is unlikely that other funders would show similar restraint. This would sit uncomfortably alongside the Government's concern to improve the sustainability of the research base – indeed it would undermine it.

15. Once these factor are considered the costs of linking QR to grant income can look quite alarming. Very high cost estimates can arise – even on the basis of some apparently very reasonable assumptions. For example, it would be entirely plausible to assume that:

- Two thirds of the total direct and indirect costs of grant funding are associated with pre-award costs such as writing and reviewing proposals (application costs) and one third with administering awards once they have been made (award costs[4])[5]
- The overall amount of activity associated with applications for grant funding will go up by 50 per cent if QR funding is linked to it as institutions pursue the only strategy open to them to win funding
- The overall volume of research funded by grant funders will increase by 25 per cent to absorb the effective subsidy provided by QR

16. If those assumptions were borne out, linking QR to research grant income would cost over £700 million over seven years even once the savings from scrapping the RAE were taken into account. Even if very conservative estimates of growth in application activity and awards are made the costs are still far higher than those of the RAE as Table 1 shows.

[4] Award costs will also include some other costs which are dependent on the amount of research which is funded rather than the amount of applications made even though they are incurred before awards are made (such as the costs of developing calls for proposals)

[5] In practice, application costs will account for the great majority of the costs faced by institutions whereas award costs will account for a significant proportion of the direct costs faced by funders.

Table 1: Seven year cost of linking QR to research grant income *net of RAE cost* (assuming application costs twice as high as award costs; all figures in **£m**; STEM subjects only)

	Award costs increase (%)				
	5	*10*	*15*	*20*	*25*
Application costs increase (%)					
10	**63**	**96**	**129**	**161**	**194**
20	**194**	**227**	**259**	**292**	**325**
30	**325**	**358**	**390**	**423**	**455**
40	**456**	**489**	**521**	**554**	**586**
50	**587**	**620**	**652**	**685**	**717**

Source: Annex A

17. In the light of the cost considerations described in paragraphs 12-16 above, it is conceivable that HEFCE will consider attempting to reduce the costs associated with linking QR to external funding by penalising institutions with low success rates in external funding competitions.

18. This would be very likely to reduce the number of applications but at the cost of an increase in the amount spent on each application made. It is easy to imagine whole bureaucracies emerging within institutions devoted to screening applications before they are made, for example commissioning external peer review of proposals prior to submission. Under such a system, there is a danger that the research culture would become more conservative as risky proposals would never get past the drawing board.

19. It is also unlikely that dependable data on success rates could be sourced from funders other than the Research Councils. It would be against the interests of those funders to provide such data because that would discourage applications to their competitions. This could result in a situation in which unsuccessful applications to the Research Councils carried a penalty whilst unsuccessful applications to other funders did not. Under such circumstances, institutions would have an incentive to target funders outside the Research Council system, which in turn would shift the orientation of university research away from public interest activities and towards research that supports private interests.

20. There are additional costs associated with the 'Next Steps' proposals which are additional to the costs of a metric-based funding allocation, for example:

- The cost of running a separate process for the arts and humanities (and probably the social sciences). These subjects account for almost half the 'research active staff submitted to the RAE so it is not impossible that the costs of running an RAE-type process in these subjects would be around half the cost of the RAE or up to £50 million. Moreover, it would be a peculiar judgement that the RAE's processes had unacceptable consequences for STEM subjects, which were nevertheless acceptable for Arts, Humanities and Social Sciences

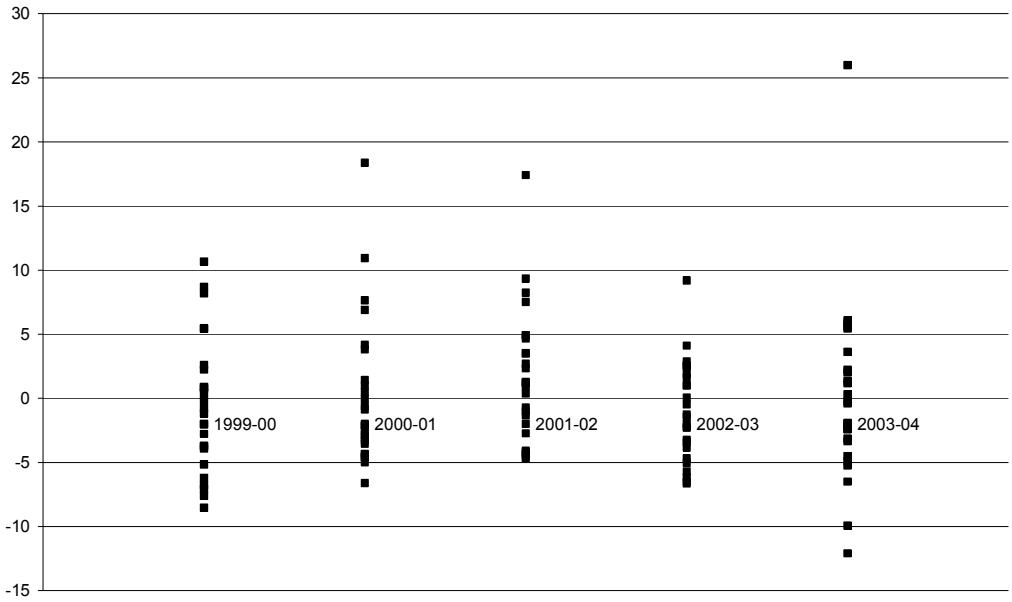
- The cost of operating expert panels to provide a check to validate results produced by metrics
- The cost of determining whether external funders' processes and policies justify the inclusion of their funding in the QR formula. The Government could not rely on third party decisions to distribute its own funding if there were doubts about the fairness of those decisions. This would not be an issue with the Research Councils, the EU or major research charities but if other funders were included it would oblige the Government to accept a new regulatory role.

21. If a QR allocation based upon grant data replaces the RAE there is a likelihood that bureaucratic costs will increase and a possibility that they will increase very dramatically. It would, nevertheless, be a defensible policy option if it could be shown to improve the contribution that university research makes to the public interest in ways unrelated to transaction costs, and if it avoided some of the apparent disadvantages of the present arrangements, without creating even greater problems.

Instability

22. A system which pegs QR funding to Research Council income may be inherently unstable. If QR had been allocated pro rata to research grants and contracts in each of the years from 1998-99 to 2003-04 the fluctuations in grant levels would be quite dramatic as Figure 2 shows. In 2003-04, for example, one institution (Nottingham) would have lost 12 per cent of its share in a single year, while another, (Warwick) would have increased its share by 26 per cent.

Figure 2: Year-on year changes in share of QR if QR allocated in direct proportion to research grants and contracts in a single year (STEM subjects only; top 25 recipients of QR in 2006-07 only)



Source: HESA finance record[6]

23. The analysis above assumes that no weightings would be applied to different types of research grant income in the QR formula. More probably, the weightings would be continually revised as policymakers struggled to keep institutions and politicians happy. Table 3 assumes that *unweighted* research grant income earned between 1998-99 and 2000-01 has been used to drive one set of allocations. It shows how those allocations would change if there were a move to *weighted* allocations when the 2001-02 to 2003-04 data were used.

[6] Published in successive annual HESA volumes entitled 'Resources of Higher Education Institutions' also known as 'blue books'.

24. The weightings[7] used are as follows:

- All external income included; no differential weightings (the 1:1:1 or 'unweighted' model)
- Only income from the Research Councils is counted (the 1:0:0 or 'Research Councils only' model)
- Income from the Research Councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:3:2 (the 5:3:2 model)
- Income from the Research Councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:4:1 (the 5:4:1 model)
- Income from a Research Council or charity is worth twice other income (the 4:4:2 model)

25. The combined effects of changes in performance from one period to the next and changes in funding methodology produce some stunning results – and what is stunning is just how much rests on the choice of weightings. Southampton gains 54 per cent in one scenario but only 8 per cent if the unweighted allocation is retained; Sussex gains 68 per cent if research council income alone is used and only 6 per cent if the unweighted allocation is retained; Kings College London, on the other hand, loses 41 per cent of its income if only research council income is used compared to 9 per cent if an unweighted allocation is retained.

[7] The current QR model contains an element (worth £135m in 2006-07) related to the amount of income obtained from charities. All of these models, with the exception of the 'research councils only' model, imply an increase in the amount of QR linked to funding from research charities.

Table 3: Percentage change in share of QR (unweighted 1998-2001 data vs. weighted 2001-04 data; STEM subjects only; various weightings of income sources)

	Weightings applied to 2001-2004 data				
	Un-weighted	Research Councils only	5:3:2 model	5:4:1 model	4:4:2 model
Bath	-3	29	4	2	-2
Birmingham	-5	6	-2	-1	-3
Bristol	1	16	6	10	5
Cambridge	8	28	16	21	15
Durham	9	36	12	4	4
UEA	12	54	22	21	15
Imperial	-1	-13	-3	0	0
Kings	-9	-41	-15	-11	-9
Leeds	-2	3	0	1	0
Leicester	-6	21	2	5	-1
Liverpool	7	7	7	5	6
Manchester (Victoria)	1	18	7	10	5
UMIST	8	101	31	30	16
Manchester (total)	3	38	12	15	8
Newcastle	-1	-23	-7	-10	-5
Nottingham	0	17	3	-1	-1
Oxford	-3	-5	0	8	5
QMW	4	2	7	16	12
Reading	-3	32	2	-4	-6
Sheffield	-1	16	2	-1	-2
Soton	8	54	18	16	10
Surrey	-2	11	-5	-18	-13
Sussex	6	68	22	25	14
UCL	-6	-12	-2	11	5
Warwick	1	14	1	-6	-5
York	1	12	3	1	0

Source: HESA finance record[8]

26. A fuller account of the analyses shown in Figure 2 and Table 3 can be found in Annex B. The use of rolling averages as an alternative to the approach modelled here is discussed in Annex F.

27. It will be almost impossible to calculate which institutions might benefit from particular weightings in a future period: that will depend upon variations in relative performance in

[8] As footnote 6.

different competitions (the institutions themselves may have some idea if they have, for example, recently instituted a policy of targeting one source of funding in preference to others). It is therefore entirely likely that a university which lobbies heavily for one set of weightings in one period will be equally concerned to see a different one introduced at the next revision. It is hard to see, therefore, how a stable system could be devised on the basis of a compromise between the interests of different institutions.

Effects upon the nature of the research carried out

28. Even if the new arrangements lead to improved research performance on some measures, the price of this might be in terms of the effect on intellectual freedom. Under any peer review system (including the RAE and metrics, both of which rest ultimately upon past peer review judgements) there is a danger that researchers will adapt their research to the preferences (imagined or real) of reviewers.

29. With metrics, however, there is an additional and much more serious danger: that research which is irrelevant - or hostile - to the interests of major research funders will become impossible to undertake (or to publish) as institutions seek to protect their relationships with funding organisations. This is the downside of one of the undoubted benefits of the proposals: their potential to focus the UK's research capacity upon work which is likely to generate applications of public interest and thereby make a contribution to the economy and society.

30. A related concern is that the breadth of UK research will suffer as academics focus upon the topics identified by funders and neglect the gaps in between. Even the persistence of response-mode competitions run by the Research Councils may do little to alter this state of affairs (except in cases where response mode accounts for a very high proportion of the total funding available from external funders, or unless the QR formula establishes a very high weighting specifically for response mode funding). With their careers largely dependent upon sustaining a track record in attracting funding, researchers will be under enormous pressure to focus upon areas which have been identified as strategic priorities by major funders because the sums available and the chances of being funded will be higher. To protect against these possible effects, it is essential that multiple sources of information should be taken into account in any metrics calculation, and even then this danger will remain very real – far higher than under the RAE, where a researcher has only to persuade a panel of peers of the quality of his or her research, every 7 years or so.

31. In addition, with metrics-based funding the contribution of each individual to an institution's income can be calculated. This is bound to have an impact upon the kind of research which is carried out, with pressure to focus upon the next grant or contract, and to make more expensive bids in order to attract more funding.

Effects upon non-research activities

32. The current system is said, with some plausibility, to promote an excessive focus upon research at the expense of other activities (particularly teaching). However, this is a structural problem that arises from the highly selective allocation of research funding, and is unlikely to

be improved if the basis for selectivity changes from the RAE to metrics. So long as research funding is selectively allocated, and teaching funding is not, then this is likely to remain an issue.

33. Indeed, the Government's proposals may well increase the level of transparency in the system, making it much easier for managers to identify the academics whose research is profitable and those whose research is not. As noted in paragraph 11 above, this will make it increasingly tempting to limit research opportunities to high performers and to separate research from teaching departments entirely.

34. This would have negative effects upon teaching in subjects where research income is necessary to make teaching departments viable (in particular the physical sciences where student demand is weak and demand from research funders much stronger). The proposals would increase the temptation to convert science departments into non-teaching research institutes.

35. In other subjects, the effects upon teaching may be more mixed. In the longer term, metrics will encourage a management model for research in which top performers are well rewarded and others jettisoned. This model will probably not be viable for teaching and the two may therefore drift apart with research units and teaching departments increasingly separate from each other. If research and teaching are managed separately, it will become easier to develop reward structures for good teachers to parallel those which already exist for good researchers; and the advent of something resembling a market in full-time undergraduate education will mean that it is in the interests of universities to do so.

36. Institutions which simply redesignate less successful research staff to teaching roles will acquire a bad reputation for teaching unless they can motivate those staff to become good teachers. In some cases this will be difficult: the use of the PhD and postdoctoral research experience as the standard entry qualifications to the academic profession means that academics are selected on the basis for their aptitude for research rather than on the basis of their suitability for the full range of academic duties. The challenge of motivating staff who are allowed little or no opportunity to pursue research will, therefore, be very formidable indeed.

37. The possible impact on universities' recruitment policies is of considerable concern. One of the concerns about the RAE is that it might influence universities not to recruit young staff without a research track record. The RAE guidance to panels and institutions has at least been able explicitly to recognise this danger and mitigate it. In a situation where QR income depends on the value of research grants won, this danger will be even more present, and it will be extremely important to the health of our research to put in place measures to avoid this. However, it is difficult to see what such measures might be.

Danger of volume inflation

38. If teaching and research are not separated and continue to share the same budgets, there is a real danger that research activities will consume an ever-greater proportion of

resources intended for teaching. By linking QR funds to research grants, the Government's proposals make the latter more valuable and are therefore likely to stimulate an increase in research volumes (the amount of research funded in universities). They are also likely to lead to higher transaction costs (see paragraphs 12-16). Past experience has shown that universities have a tendency to prioritise research over teaching probably, as noted above, because of the highly competitive way in which it is assessed and funded and because of the way academics are selected from a pool of people who have devoted many years of their lives to research.

39. If this tendency were to continue (and there is nothing in the proposals to suggest it will not) it is likely that increases in research activity will come, to some extent, at the expense of university teaching, or else at the cost of creating unsustainable pressure on infrastructure as the renewal of existing facilities is deferred. Again, this would be unfortunate given the very substantial priority the Government has attached to placing university research on a financially sustainable basis over recent years.

Do metrics and the RAE produce the same results?

40. 'Next Steps' reports a correlation of 98 per cent between Research Council income and HEFCE recurrent research funding in each of the years 2000-to argue that the costs and distortions associated with the RAE are unjustified, implying that an allocation that reflects Research Council income would have similar outcomes to one based on the RAE. This is not the case.

41. The HE sector has a very large range in scale. Measured by total income the largest institutions are more than a hundred times larger than the smallest. Measures like the FTE of staff or students show an even greater size range. Measures which do not allow for this difference in scale will almost always be highly correlated. That is the reason for the 'very strong' correlation reported by 'Next Steps' between QR income based on the RAE and Research Council income.

42. A weak correlation would indeed indicate that it would be difficult or impossible for measures like Research Council income to replicate QR allocations, but the reverse does not hold. Table 4 is taken from Annex C**.** It shows the impact of a metrics-based funding system upon the 25 English institutions provisionally allocated the largest amounts of HEFCE QR funding in 2006-07, demonstrating the impacts of the five weightings described in paragraph 24 above:

Table 4: What Difference Does It Make? The impact of allocating QR in proportion to research grant income in Science Engineering Medicine and Technology

		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**
Imperial College	73,783,610	-26	-2	-8	-7	-4
University College London	70,817,913	-9	-7	-2	10	4
University of Cambridge	65,911,681	37	8	19	25	17
University of Oxford	61,144,801	18	13	18	27	22
University of Manchester	54,843,226	3	-11	-8	-10	-11
King's College London	37,743,690	-35	-1	-8	-5	-1
University of Southampton	34,276,573	29	-11	-2	-5	-10
University of Leeds	32,162,879	-13	-13	-13	-14	-13
University of Sheffield	28,991,796	30	2	7	4	1
University of Bristol	28,953,034	-1	-9	-7	-6	-8
University of Birmingham	27,139,191	3	-5	-2	0	-3
University of Nottingham	25,576,598	7	-11	-9	-15	-15
University of Newcastle	25,424,237	-35	-17	-22	-24	-20
University of Liverpool	23,640,597	-4	1	-2	-5	-3
University of Warwick	15,503,532	21	30	20	3	13
University of York	14,396,780	-5	-23	-18	-17	-20
University of Surrey	14,362,808	-35	-27	-35	-48	-40
Queen Mary, University of London	13,896,728	-24	20	15	26	27
University of Leicester	12,701,952	30	3	11	15	9
University of Reading	12,660,468	-5	-32	-28	-32	-34

Source: HEFCE and HESA finance record[9]

43. In 'Next Steps', the Government uses very high correlations between QR and Research Council income to imply that the impact upon institutions of linking QR to Research Council income or to overall external research income would be negligible. On this point, Table 4 is conclusive: the Government is wrong. That is not to say that there is anything wrong with change – there is nothing absolute or 'right' about the present distribution. But coincidence of outcomes between a QR distribution based on metrics and the present RAE-based distribution does not provide grounds for making the change proposed by the Government: there is no such coincidence

[9] Published in successive annual HESA volumes entitled 'Resources of Higher Education Institutions' also known as 'blue books'.

44. Notwithstanding the above, there is something to be said for the argument that the RAE has stimulated a level of anxiety (and therefore compliant activity) out of all proportion to the amount of funding it redistributes from one exercise to the next. As annex D shows, no institution owes more than 3.7 per cent of its income to improvements registered in the 2001 RAE and only one institution is down by more than 3.1 per cent as a result of a decline in performance in the same year. These figures suggest that, by publicly rating research, the RAE creates non-financial incentives which persuade institutions to invest a disproportionate amount of management effort in the process. This is a powerful argument not just against the RAE in its present form but, perhaps, against the notion that transparency is an unmixed blessing.

Limited application

45. If the intention of the Government is merely to liberate the sector from the burden of the RAE or to reduce the impact of funding processes upon behaviour, metrics are not the answer. They are likely to increase the pressures on academics and institutions and to produce a corresponding increase in the amount of compliant activity. This report has identified a number of issues that will arise if metrics are introduced as the basis for distributing QR, some of which could have a very serious impact on the science base.

46. The most promising means of mitigating the impact of metrics involves limiting their application to a small proportion of the funding allocated. If the link between metrics and QR income is made less direct, the negative impact upon the HE sector will become less severe and the useful life of the metrics will be extended. It is inevitable that any metrics used to allocate funding will decay as measures of quality as those assessed develop tactics which deliver apparent improvement without enhancing real quality. Approaches such as those described here may slow that process by reducing (though not eliminating) the incentives to develop such tactics

47. One way of reducing the instability caused by metrics would be for any funding formula to use several years', rather than one year's income[10]. As Table 2 shows, three years' data will not be sufficient to eliminate instability though a longer period might do so, providing the weightings employed did not change. However, the use of several years' data would do nothing to dampen compliant activity.

48. There are two, other ways, conceptually similar but quite different in effect, of dampening the effect of metrics. If the objective was to combine the maximum dynamism with the minimum incentive for compliant behaviour, one option would be to link the great majority of QR (probably >95 per cent[11]) on the basis of the previous year's baseline with the remainder constituting an 'improvement pot' to be distributed to those who had improved their performance in the previous year. This pot might be distributed in relation to the extent

[10] It makes little difference whether a rolling average or a periodic recalculation is used: the latter is slightly gentler because it gives institutions whose numbers begin to decline early in the funding period time to adjust whereas under a rolling average their grant will be revised every year.

[11] The actual proportions would have to be fixed in the light of detailed modelling.

to which institutions' share of weighted research grant income exceeded the previous year's performance. This would mean that each institution could budget on the basis that it could be sure of receiving at least 95 per cent of the previous year's allocation but that it would be quite normal for institutions to lose 5 per cent or to gain rather more, making the system potentially very dynamic. The amount of QR funding directly liked to external income would, however be relatively small, perhaps reducing behavioural effects.

49. If the objective were to create a more stable allocation of QR, a simpler system would involve pegging a high proportion of QR to the previous year's baseline and allocating the remainder in direct proportion to weighted research grant income regardless of whether any improvement had been achieved. This would involve a more direct trade-off between stability and dynamism.

50. Either approach would only work if there was a good baseline on which to build, such as will be established by the 2008 RAE. Subsequently, citations (or some other measure not used in the funding formula itself) could be used to check that, as metrics began to drive the system, funding continued to follow quality. This would guard against the dangers associated with the loss of retrospective assessment.

51. Attractive though such arrangements might seem, they would not be without their disadvantages. Their strengths are, in fact, a consequence of the fact that they do not offer the transparency promised by systems which provide for a more straightforward link between research grant income and QR. Perhaps the greatest reservation, though, is that they may not be sufficiently effective at dampening the more damaging effects of metrics-based funding. Institutions may take the view that in the longer term their grant will depend upon their ability to obtain external research income over an extended period. Obtaining grants and contracts would still be the only way of obtaining QR, and these approaches may not dampen compliant behaviours as much as might be hoped. Undoubtedly, though, some modification of a purely metrics-based funding system will be needed to offset some of the dangers discussed above.

Alternatives to metrics-based funding

Use of citations

52. In an ideal world grant funding would form part of a basket of indicators rather than being the sole source. However, whilst it might strengthen the case for metrics if there were a basket of viable metrics it is not evident at present what such a basket might contain. Citations are sometimes suggested as a possible measure.

53. Annex E of the full report discusses some of the difficulties with using citations in funding formulae. In brief, whilst citations are a very useful indicator at high levels of aggregation – for example at subject level, to assess the relative quality of UK research – they are increasingly unreliable at lower levels of analysis, such as the individual researcher, research group or department. Moreover, they measure only academic quality, and are not influenced by utility, so they would not meet one of the Government's main apparent

objections to the RAE. In addition they offer at present very poor coverage of research in the arts humanities and social science and do not give proper credit to research aimed at non-academic audiences.

54. Annex E also outlines some of the behavioural effects which are to be expected if citations were to have a direct influence upon funding. These include:

- The solicitation of citations from fellow researchers
- The neglect of valuable activity which is unlikely to yield citations such as the reporting of negative results
- The *de facto* replacement of RAE assessment panels with the editorial boards of high-profile journals who would have neither the administrative support nor the accountability necessary to take decisions with implications for the distribution of public funds.

A scaled-down RAE

55. In the introduction to this report, it was noted that funding council research grant is, by design, the more 'free and easy' of the two funding streams in the dual support system with the OST Research Councils employing processes which are both more forensic and more onerous.

56. The RAE is a competition between universities, or rather it is 68 different competitions – each subject has its own competition. It far from clear, however, that competition between *institutions* as opposed to researchers is necessary. Academic research is by its nature, an exceptionally open and competitive profession. The work which individuals use to justify their professional status is in the public domain and the people who make recruitment and promotion decisions are usually well equipped to judge its quality. It follows that, even were institutions' grants fixed, research would still be intensely competitive as researchers competed for reputations and, of course, for jobs offering access to the best facilities and the best salaries. Arguably, the useful aspects of competition (its ability to make people more productive) are created by the very open nature of the academic profession; in which case, government attempts to foster competition between institutions serve only to impose transaction costs as academic time is consumed by management activity prompted by both the RAE and other funding processes.

57. If the RAE is regarded as excessively bureaucratic, the obvious solution might be not to link QR to the still more intensive grant funding system of the Research Councils, but rather to scale down the RAE so that it is more appropriate to its task: that of applying a proportionate quality check in a system characterised fundamentally by trust in the ability of the academic profession to maintain its own standards.

58. It may be that a residual RAE would be needed to retain a modest level of competition *between institutions* (particularly because competition between individuals is dampened by very low levels of mobility amongst senior staff). In paragraphs 45-51 above, consideration is

given to basing only a small proportion of QR each year on metrics. The same principle could, of course, be applied to a peer-review based system. If only a proportion of the funding was driven by the RAE it would be possible to run a much less intense process.

59. The RAE, in its current form has two features which would have to change if the costs and burdens associated with it are to be substantially reduced:

- It leaves it to universities to decide which researchers and which pieces of work to submit for assessment. That decision-making process within universities costs far more time, money and consternation than the assessments themselves.

- It is over-engineered. An exercise whose purpose is to summarise the performance of around 160 universities and colleges is conducted as if it was supposed to appraise 50,000 individual researchers and their work. The last RAE, in 2001 considered 180,000 pieces of research: far too many.

60. In the past the HE sector has, when consulted, placed a higher priority upon the robustness of the assessment than the avoidance of burdens and distortions. This may well be because the sector is familiar with – and tends to trust – systems based on individualised peer review. If so there may be difficulties in winning consent for a slimmed-down RAE although in principle it is perfectly feasible. If major changes are to be made, however, it would be appropriate to give the sector a choice between a slimmed down peer review process and a metrics-based allocation, as well as a continuation of the RAE on something like the present basis.

Reducing the role of the Research Councils

61. As noted above, the Research Council system is undoubtedly more expensive than the funding council system of funding research. Even assuming only relatively marginal increases in the costs associated with grant funding, linking QR to external research income costs far more than it saves. If the costs and burdens of the present arrangements are of concern, there is a much more effective option to hand: downscaling the Research Council system.

62. In theory, both the Research Councils and the funding councils perform complementary roles, the former funding on the basis both of quality and strategic importance, the latter on the basis of quality alone. In practice, there is one clear exception to this division of labour: the Research Councils' response mode funding.

63. Response mode funding exists to enable researchers to bid for funds to undertake research on subjects of their own choosing. Funding does not depend upon the strategic importance of the research to the UK but solely on the quality of the research proposal. The funding councils, however, already have a much cheaper system for funding on the basis of quality alone: QR based upon the RAE. There is a very strong argument for transferring to the funding councils the proportion of Research Council funding currently deployed in

response mode funding. The funding councils would allocate this to universities as part of their block grant, for universities to spend as they see fit, in accordance with their own judgements and priorities.

64. The same observation can be made about other areas of Research Council funding including:

- Their support for research degree programmes
- Long-term funding for research centres in universities where that funding is not linked to strategic imperatives
- Their support of their own research institutes which could be transferred into the HE sector along with the grant which supports them.

65. The core role for the Research Councils is to provide grant funding and in some cases programme funding in those areas where there is an *exceptional* need to build up the UK's capacity to undertake high quality research. They are necessary to stimulate research in cases where it is demonstrable that vital areas will be neglected if universities are left to determine their own research priorities. This function could be exercised by a single grant-giving Research Council (a separate large facilities council might still be necessary) with a much reduced budget.

66. Our estimates, set out in Annex A suggest that for every £100 million of funding transferred from the Research Councils to the funding councils, roughly £9m would be saved in administrative costs.

Other issues

Postgraduate students

67. At present HEFCE has an element in its QR funding model linked to numbers of students on research degree programmes (RDPs) in eligible departments. In 2006-07 the RDP element will be worth £188m[12]. This element would have to be preserved (or some alternative mechanism used) if there were not to be a massive disinvestment in postgraduate training. This is simple to do: the proposed QR reforms could simply exclude the RDP element. Both metrics and the 2008 RAE results would provide an abundance of data from which eligibility for RDP support could be established. Unlike most of the points raised in this report, this is an eminently surmountable problem: difficulties would arise if the RDP element of QR were simply abolished or reduced but it will be straightforward to ensure that this does not happen.

If English QR is linked to Research Council income, should science policy be devolved to Scotland, Wales and Northern Ireland?

68. Education policy (including QR funding which is the education departments' funding stream for university research) is the responsibility of the devolved authorities in Scotland,

[12] Provisional allocations: data supplied by HEFCE

Wales and Northern Ireland. Separate funding councils allocate QR funding in Scotland and Wales. In Northern Ireland, the task is performed by the NI Department for Employment and Learning with practical support from HEFCE.

69. Science policy (including Research Council funding) is the responsibility of the UK Government. The UK Research Councils fund throughout the United Kingdom. No constraints are placed upon the proportion of their funding which they spend in each UK territory.

70. This means that the UK Government has no jurisdiction over the way QR is allocated in Scotland, Wales and Northern Ireland. If, however, QR in England were tied (exclusively or in part) to Research Council income, it would make sense for English institutions to increase the amount of money spent on applying for Research Council grants because they would be able to count on income from QR if they were successful. Scottish, Welsh and Northern Irish institutions would be at a disadvantage if they were not able to count on QR income following Research Council grants in the same way (it is also unclear that they could run an exercise as elaborate as the RAE without the support of the Higher Education Funding Council for England). The proposals, therefore have serious implications for the education policy in the devolved administrations.

71. If the devolved authorities were not content to move to a metrics-based allocation but considered themselves disadvantaged by the decision to do so in England, they could seek to have science policy transferred to Edinburgh, Cardiff and Belfast. This would not preclude them, if they wished, from using the Research Councils as their agents in distributing funds for scientific research in their countries but it would, almost certainly mean that their institutions were no longer in direct competition for funding with English institutions.

72. A transfer of Research Council funds to the higher education funding councils (as discussed in paragraphs 61-66) would also represent a *de facto* transfer of powers from the UK Government to the devolved authorities.

Subsidy: a potential legal problem

73. It is possible that a university which was in competition with a commercial research or consultancy organisation for a commercial contract would be deemed to be in receipt of an illegal subsidy if it could rely upon receiving QR in proportion to the value of the contract. If that QR enabled the university to undercut a competitor, that competitor may have a case against the UK government[13].

74. Even if the issue does not end up in court, businesses likely to find themselves in direct competition for services with institutions (such as the major consultancy firms) may make representations to the Department of Trade and Industry about the Government's proposals, in an attempt to protect their interests.

[13] This is an observation about potential legal risks on which policymakers may need to take legal advice. It is not a legal opinion and the author is not qualified to give such an opinion.

Conclusions

75. In 'Next Steps' the Government has given as reasons for abolishing the RAE

- The substantial administrative cost.
- The behavioural impacts on publishing and staff recruitment
- The failure to capture fully the value of interdisciplinary research; and
- The failure to reward excellent user-focused research.

76. None of these charges against the RAE is supported by evidence, and the cost and the impact on behaviours would be much more severe in a metrics-based allocation system, as favoured by the Government.

77. A metrics-based system would be likely to

- Cost very much more
- Lead to a distribution very different to the present;
- Be highly volatile, leading to considerable instability in funding
- Drive academics to put increasing effort into seeking research grants and contracts, driving down success rates even further
- Profoundly affect the nature of the research undertaken, and undermine the freedom of academics to pursue their own research agenda
- Penalise institutions that recruit young researchers not yet sufficiently established to win grants and contracts
- Move from a system which balances the scrutiny of the quality of research undertaken in the past on the one hand and responsiveness to research proposals on the other, with one where all research funding is provided in response to success in winning new grants and contracts
- Lead to an increasing separation of teaching and research, putting at risk teaching in departments where student demand is weak.

78. Some of these effects may be mitigated, but in the case of others it is difficult to see how the negative impacts can be avoided. Moreover, the RAE is not just a mechanism for funding research. It also provides a check on the quality of research output, feedback to university managers and an internationally recognised benchmark of the quality of research at subject level. 'Next Steps' says nothing about the possible loss of these, and how they would be replaced.

79. None of this in itself provides a reason for not changing the basis for the allocation of QR, and certainly none provides a reason for continuing with the RAE. However, in 'Next Steps' the Government acknowledges that this country has developed a 'world-class' science base. It would be stretching the evidence to suggest that the RAE has been responsible for this, but it certainly does not appear to have inhibited it.

80. If the Government is proposing to move away from the present arrangements it needs to demonstrate - in a way that has not been demonstrated yet - that the peer-review based system of the RAE has indeed had the negative effects claimed. It also needs to demonstrate how its replacement by metrics, as proposed by the Government, will avoid the likely deleterious effects discussed here. Without that, its proposed action would be irresponsible, and would represent an intolerable risk with what has developed into a world class research base. But if a change is decided, there are alternatives that might be preferable and would certainly avoid some of the negative effects of a metrics-based system.

Annex A

Relative costs of the RAE and metrics as a basis for the allocation of QR

Introduction

1. The government has proposed to abolish the Research Assessment Exercise (RAE) which is currently used to determine allocations of research funding by the Higher Education Funding Council for England (HEFCE). It has further suggested that in future HEFCE research funding could be based on 'metrics': quantitative indicators based wholly or primarily upon the amount of income universities win from other funders such as the UK research councils.

2. This annex compares the costs of the UK research councils with the costs of the Research Assessment Exercise. It concludes that the former are much greater than the latter. It further concludes that linking HEFCE research funding to other forms of research funding could, on the basis of some extremely plausible assumptions, increase administrative costs by more than £700 million over a seven year period because of the increased demand for grant funding of the type provided by the research councils which is inherently more expensive to provide than RAE-based funding.

Section 1: The direct costs of the research councils

3. The costs of any funding process can be broken down into two parts:

- the **direct cost** incurred by the funding body in performing its functions
- the **indirect costs** faced by those applying for funding.

4. This section is concerned with the direct administrative costs of the UK research councils.

What is being measured?

5. The analyses presented in this section are an attempt estimate *the amount spent by each research council on the administration of research grants to universities*[14] *as a percentage of the funding each council provides to universities*. This is referred to throughout the paper as the **administrative percentage**.

6. Information has been taken from the annual accounts of six of the seven grant-giving research councils (the seventh, the Particle Physics and Astronomy Research Council, is to lose its grant giving responsibilities if the Government's proposals are implemented). Different councils break down income and expenditure in different ways; some have their own research institutes whilst others fund solely in universities and colleges. As a result, it

[14] including where possible associated support such as IT support for administrators

has not been possible to take a uniform approach to estimating the administrative percentage of each council and comparisons between different research councils may be misleading.

7. Where possible, a comparison has been made between the amount spent upon research grants for which universities are eligible and postgraduate training on one side of the equation and the administrative costs associated with those categories of expenditure on the other[15]. In practice the breakdowns do not allow this to be measured precisely and the figures represent our best estimates of what they might be. HEPI understands that the research councils have agreed between them, on a definition of administration which specifically excludes all costs associated with grant processing - including the time of staff in those departments and will be re-presenting the costs from prior years, based on this definition. This change has presumably been made to ensure that research councils which because of the nature of the work they fund tend to award smaller grants do not appear less efficient than those which make larger awards. It is therefore worth repeating that it would be misleading to use these figures to make comparisons between the councils.

8. In several cases both the administrative costs of allocating monies to institutes and the running costs of those institutes have been included (on opposite sides of the calculation, naturally). The implicit assumptions being that the process cost of deciding how much funding to provide for institutes will be the same as the process cost of providing grant funding for universities. This is unlikely to be the case but it is consistent with the aim of ensuring that all estimates err on the low side.

9. The analysis provide sufficient grounds for concluding that 4 per cent is a reasonable lower estimate for the administrative percentage across the six grant-giving research councils (PPARC is excluded from the analysis). That figure forms part of the reasoning underpinning the general conclusion that using metrics to allocate HEFCE research funding is likely to increase transaction costs rather than to reduce them because of the impact of additional applications and awards upon the costs associated with funding from the research councils and other funders. No claim is made that the analysis can be used to draw more detailed conclusions about the funding processes of individual research councils.

10. Those referencing the figures in this annex are, therefore, urged to have regard for the purpose for which they have been produced: to produce the highest possible figure for the 'administrative percentage' of the research councils funding in universities which can confidently be said to be an underestimate.

11. The analysis has employed a level of scrutiny appropriate to that high-level task. It is not, however, a reliable guide to the *relative* efficiency of the grant-giving research councils for three reasons:

[15] This is in keeping with the intention to enable a comparison between the costs of research council funding in universities and funding provided by the Higher Education Funding Council for England whose research funding, in addition to supporting research *per se,* includes an element, (worth £188m in 2006-07) linked directly to numbers of students on Research Degree Programmes

- No allowance has been made for the hosting of joint services. Therefore, if one council bears a disproportionate burden of the Research Councils' shared costs it will appear more expensive than its fellows
- The aim has been to produce a **minimum cost figure** by including only those items which are unambiguously administrative or managerial in character. In some councils' accounts these items are harder to disaggregate than others. These councils will appear cheaper simply because they have broken their expenditure down in ways which make it harder to identify administrative costs
- For two research councils operating institutes (MRC and NERC), it has not been possible to disaggregate the costs of administering in-house research from the cost of administering programme funding. Therefore, the estimates for their transaction costs compare identifiable administrative costs with total expenditure. This assumes that the administrative percentage associated with in-house research is the same as the administrative percentage associated with grant funding. In reality, it are likely to be less which will make these councils appear cheaper than their fellows.

Arts and Humanities Research Board/Council

12. The figures in Table 1 below cover the two years immediately before the then Arts and Humanities Research Board joined the OST research councils system and became the Arts and Humanities Research Council.

13. AHRB/C does not have research institutes and it is therefore safe to assume that the great majority of its expenditure goes either on the funding of research and postgraduate study or on grants administration. The estimate for its administrative percentage has been produced by dividing its operating costs (staff and other identifiable administrative headings) by its total expenditure.

14. AHRC identifies its peer review costs separately. These are included because they are a consequence of funding research in the way that AHRC does but it should be noted that they are unlikely to be included in estimates for all of the other councils. It is worth noting also that institutions bear part of the costs of peer review because, where they are compensated for reviewers' time, it is at a level below cost rate.

Table 1: Total administration costs (including direct support and indirect administration) of the Arts and Humanities Research Board 2003-2005 (£000)

	2005	2004	Both years
Total expenditure	76354	69909	146263
Staff costs	2558	2153	4711
Peer review costs	362	300	662
Support costs	1430	1067	2497
Management and administration	69	57	126
Total admin	4419	3577	7996
Admin percentage	5.8	5.1	5.5

Source AHRC Annual Report and Accounts 2004-05

Biology and Biotechnology Research Council (BBSRC)

15. BBSRC costs are expressed as a percentage of the total disbursed in research grants rather than total expenditure (ideally this measure would have been used for all the councils). That total is equal to 94 per cent of total *income* which is sufficient to demonstrate that there are no major categories of research funding excluded from the analysis.

16. It has not been possible to disaggregate administrative costs relating to the funding and support of BBSRC's institutes from costs relating to funding in the HE sector. Therefore the identifiable administrative costs are expressed as a percentage of total research and capital grants rather than just those awarded to universities. It may be that much of the administrative costs of BBSRC institutes are covered by the £89m in grants paid to them by BBSRC rather than by the administrative services whose itemised in the BBSRC annual accounts. If this is so, the estimated administrative cost given in the table will be underestimates.

17. In order to arrive at a conservative figure, administrative costs relating to Biosciences IT services are excluded in their entirety to reflect the likelihood that some BITS activities are unrelated to the process of grant administration. BBSRC identifies staff costs related to research councils' joint services as a separate category. These have been *included* because the purpose of this exercise is to provide an indication of the costs of the research councils system as a whole rather than to identify the relative costs of the councils. The cost estimates are given in Table 2, below.

Table 2: Direct administrative costs (including direct support and indirect administration) of the Biology and Biotechnology Research Council 2003-2005 (£000)

	2004-05	2003-04	Both years
Research and capital grants			
in universities	168112	163477	331589
research institutes	89481	83442	172923
other	10166	12325	22491
Total research and capital grants	267759	259244	527003
Staff costs			
Administrative and Biosciences IT services (BITS)	6891	6062	12953
Research councils joint services	1670	1570	3240
Staff costs	8561	7632	16193
Other operating costs	6235	6335	12570
Total admin costs	14796	13967	28763
BITS			
BITS staff as percentage of total staff	0.14	0.15	0.15
Presumed BITS staff cost	1207	1151	2361
Central purchasing by BITS	1984	2628	4612
Total BITS	3191	3779	6973
Staff and operating costs net of BITS	11605	10188	21790
Admin percentage	4.3	3.9	4.1

Source BBSRC Annual Report and Accounts 2004-05

Engineering and Physical Sciences Research Council (EPSRC)

18. EPSRC does not have institutes. The estimate for its administrative percentage given in Table 3 has been produced by dividing its operating costs (staff and other) by its total expenditure.

Table 3: Direct administrative costs (including direct support and indirect administration) of the Engineering and Physical Sciences Research Council 2003-2005 (£000)

	2005	2004	Both years
Total expenditure	510423	470650	981073
Staff costs	12138	11538	23676
Other operating costs	8540	8355	16895
Total admin	20678	19893	40571
Admin percentage	4.1	4.2	4.1

Source EPSRC Annual Report and Accounts 2004-05

Economic and Social Research Council (ESRC)

19. Like EPSRC, ESRC does not have institutes. The estimate for its administrative percentage has been produced by dividing its operating costs (staff and other) by its total expenditure on research and postgraduate training.

Table 4: Direct administrative costs (including direct support and indirect administration) of the Economic and Social Research Council 2003-2005 (£000)

	2004-05	2003-04	Both years
Research	76994	67482	144476
Postgraduate training	31696	25620	57316
Total funding	108690	93102	201792
Staff costs	3337	3108	6445
Other operating costs	4016	3819	7835
Total admin cost	7353	6927	14280
Admin percentage	6.8	7.4	7.1

Source: ESRC Annual Report and Accounts 2004-05

Medical Research Council (MRC)

20. The costs of the MRC are extremely difficult to estimate. As a result, a conservative estimate designed to avoid the risk of exaggerating administrative cost is likely to be a substantial underestimate.

21. To produce such a conservative estimate, the following assumptions have been made:

- Other than management consultancy and professional fees, and those staff engaged in management policy or administration none of the operating costs of MRC relate to funding in universities
- These items contribute equally to the work of institutes as to the administration of funding in universities They cannot therefore be costed solely to the latter.
- Managers, policymakers and administrators in MRC cost only half as much per head as other staff (a crude way of allowing for the high clinical salaries enjoyed by some MRC staff)

22. For these reasons, it is important to stress that the administrative percentages given for MRC are not a 'best guess'; they are the lowest figure that could reasonably be defended.

Table 5: Direct administrative costs (including direct support and indirect administration) of the Medical Research Council
2003-2005 (£000)

	2004-05	**2003-04**	**Both years**
Total expenditure	471322	469255	940577
Staff costs	151872	139573	291445
Proportion of staff listed as working on 'management administration and policy'	0.13	0.13	0.13
Presumed admin staff cost	19426	17786	37212
Admin staff cost if managers administrators and policymakers cost half as much per head as other staff	9713	8893	18604
Management consultancy and other professional fees	10337	7828	18165
Minimum admin cost	20050	16721	36769
Minimum admin percentage	4.3	3.6	3.9

Source: MRC Annual Report and Accounts 2004-05

Natural Environment Research Council (NERC)

23. The figures for NERC are based on income rather than expenditure figures. NERC's operating income from sources other than the Department for Trade and Industry are very high at almost £50 million.

24. As with other councils, these figures are based on the assumption that the proportion of NERC's research funding spent in universities and the proportion of NERC's administrative resource spent on allocating that funding are the same. On this basis, by dividing the estimated cost of administrative staff by total resources it is possible to arrive at an estimate of the proportion of the funds spent on funding in universities which are spent on administration.

25. NERC's reported operating costs are very high over (£100 million pa) because they include institute costs. As we were not able to disaggregate these we used EPSRC as a model for NERC's funding in universities. In EPSRC, non-staff operating costs are equal to 71 per cent of staff costs. It was assumed that the same applies to NERC's funding in universities.

26. The administrative percentage has been calculated by dividing a conservative estimate of administrative costs by total income.

Table 6: Direct administrative costs (including direct support and indirect administration) of the Natural Environment Research Council 2003-2005 (£000)

	2004-05	**2003-04**	**Both years**
Total grant-in-aid	280669	258714	539383
Other operating income	49469	46866	96335
Total income	330138	305580	635718
Staff costs	91752	87095	178847
Proportion of staff listed as administrative	0.23	0.24	0.23
Presumed admin staff cost	20791	20586	41377
Operating costs associated with administration if on same ratio to admin staff costs as EPSRC	14628	14907	29535
Minimum admin cost	35419	35493	70912
Minimum admin percentage	10.7	11.6	11.2

Comparison with the Research Assessment Exercise

27. The cheapest research councils appear to have an administrative percentage of around 4 per cent. HEFCE spent £5.6m running the 2001 RAE. The results of that exercise will be used to distribute approximately £10.5bn across the UK. This makes the administrative percentage of the RAE 0.05 per cent, eighty times lower than the research councils.

Section 2: Total costs (including Indirect costs)

HEFCE/RAE

28. It is no straightforward task to estimate the cost of the RAE. It is, in practice, impossible to separate the costs of compliance with the RAE from the costs of running a university because so much unavoidable management activity is bound up with institutions' response to the RAE process. Much of that activity would continue to be necessary if the RAE were replaced.

29. 'Next Steps' referred to the total cost of the RAE as being £45, including both the direct costs of administration and the cost of compliance by institutions. Other figures have been produced, and in 2003, the HEFCE Audit Service (HEFCE AS), compared the costs (direct and indirect) of running the 2008 RAE on the same basis as the 2001 RAE with the cost of implementing all the reforms suggested by Sir Gareth Roberts' Review of Research Assessment[16].

30. Unlike previous HEFCE exercises which produced lower estimates of the cost of the RAE, the HEFCE AS study adopted a maximalist approach, including the very high costs faced by smaller teaching led institutions even though these institutions do not generally expect a high return on their investment in the RAE process and have expressed a very clear preference for participation in the RAE when offered the alternative of receiving funding without strings in return for waiving the right to participate in the RAE[17]. It is arguable that in respect of such institutions, RAE compliance costs amount to discretionary expenditure rather than bureaucratic imposition.

31. Unlike some higher estimates of the RAE costs however, it excluded costs sometimes attributed to the RAE which clearly pertain to the cost of doing research itself (for example, higher salaries and laboratory costs for 'star' researchers). This is a sensible approach: it stretches credulity to suggest that universities would cease to pay a premium for top researchers were the RAE abolished, and it is highly debatable that such premiums are a wasteful 'compliance cost' of the RAE.

32. The HEFCE AS study, therefore, provides a realistic *upper* figure for the costs imposed upon the system by the RAE process without making unrealistic assumptions about the kind of low-cost environment which the removal of the RAE would create.

33. It found that both the 2001 RAE model and the Roberts RAE model would cost very close to £100 million in 2008 of which around £90 million would be indirect costs. The similarity of the two figures was caused by the fact that the Roberts proposals did not affect the need for institutions to select staff and pieces of research for assessment – the feature which drives most of the RAE's costs. The costing was based upon fieldwork in a sample of UK universities selected to be representative of the sector as a whole.

34. Ultimately, the funding bodies opted to adopt some but not all of the Roberts reforms. The elements which could conceivably have added to institutions' costs (for example the proposed assessment of research competences at the midpoint of the assessment cycle) were not implemented. There is no reason to doubt, therefore, that the £100 million figure is higher than the maximum applicable to the RAE as proposed for 2008. That figure equates to just under 1 per cent of the £10bn which will be distributed on the basis of RAE2001.

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[16] In response to an informal request submitted by HEPI, HEFCE has confirmed both the existence of this costing and the accuracy of our understanding of its headline findings. Owing to staff absence, HEFCE has not been able to supply the documentation in time for us to review it in detail.

[17] This reflects the general desire to resist anything which represents or appears to represent a formal distinction between researching and non-researching universities and departments. See *Summary of responses to the RA-Review consultation* available at http://www.ra-review.ac.uk/reports/

Research councils

35. As noted above, conservative estimates of the direct administrative costs of the research councils range from around 4 per cent to 11 per cent. We can therefore take the lower figure (4 per cent) as the benchmark for the administration cost of a large well-run research council with reasonable economies of scale.

36. If a well-run research council spends a sum equal to 4 per cent of the funding it provides to universities in administration it is inconceivable that institutions do not spend more again in applying for grants, supplying reviewers at below cost rates and managing projects once awarded. It takes more effort to prepare a proposal than to read one. It might be objected that once awards have been made, the funder faces more costs than the university but with success rates of between a quarter and a third universities have to write three or four proposals to have one funded. No proper study of institutions' costs has ever been made but if the more efficient research councils cost 4 per cent the total cost will certainly not be less than 10 per cent.

Implication of cost differentials between the RAE and the research councils

Relative costs of the funding councils and the research councils

37. If the research councils process costs a sum equal to 10 per cent of the funds they award in administrative costs (see previous section) and the funding councils cost 1 per cent. It follows that for every £100 million of funding transferred from the funding councils to the research councils an additional £9m would have to be spent on administration. Conversely for every £100 million of funding transferred from the research councils to the funding councils, £9m would be saved in administration.

Section 3: Conclusion

38. The UK government has proposed allocating funding council quality-related research funding (QR) in England on the basis of quantitative indicators. It has also suggested that indicators based on the amount of research grant funding universities receive (including funding from research councils) would be an appropriate way of driving such an allocation.

39. The discussion that follows assumes that any change would only affect Science, Engineering, Technology and Medicine (STEM) disciplines.

40. In 2004-05 English universities received a total of £2.8bn[18] in research income from sources other than the Higher Education Funding Council for England (HEFCE) in STEM disciplines. In 2006-07 they are scheduled to receive £828m[19] in HEFCE grant in the same subjects.

41. If the administrative costs associated with research council funding are at least 10 per cent, it is unlikely that other grant funders, which face less pressure to minimise burdens on

[18] HESA finance record 2004-05
[19] HEFCE provisional allocations ('March allocations')

universities, are cheaper. It is reasonable to assume therefore that the £2.8bn in external research income received by English universities in STEM subjects equates to at least £280 million in administrative costs.

42. There are two ways in which those costs could increase if HEFCE QR were tied to external research income:

- An increase in application activity[20] stimulated by the increased incentive (because the effective value of the grants would increase by £828m - the value of QR funding)
- An increase in the volume of research funded leading to greater post-award administration costs.

43. If it is assumed that the work associated with writing and reviewing applications is equal to two thirds of the total administrative cost associated with grant funding and the administration associated with awards once made accounts for the remaining third, then applications currently cost £187m per year. A 1 per cent increase in application activity would therefore cost £1.87m per year.

44. Table 7 shows what linking QR to research grant income would cost in twenty five different scenarios – each reflecting a different assumption concerning the increase in application activity and awards stimulated by the linkage of QR to research grant income.

Table 7: Annual cost of linking HEFCE QR in STEM subjects to research grant income (**£m**)

	Award increase (per cent)				
	5	*10*	*15*	*20*	*25*
Application increase (per cent)					
10	**23**	**28**	**33**	**37**	**42**
20	**42**	**47**	**51**	**56**	**61**
30	**61**	**65**	**70**	**75**	**79**
40	**79**	**84**	**89**	**93**	**98**
50	**98**	**103**	**107**	**112**	**117**

Source: HESA Finance Record 2004-05

45. If the costs shown in Table 7 (above) are multiplied by seven (to represent the current seven year RAE funding cycle) and £100 million is subtracted (to represent the money saved if the RAE was discontinued), this yields estimates for the additional costs of moving from a system of QR driven by the RAE to one in which QR in STEM subjects is driven by research grant income. These costs would be incurred over a seven year period.

[20] The term 'application activity' is used rather than 'applications' to signify that putting an increased amount of effort into a similar number of applications would increase costs as surely as would an increase in the number of applications themselves. This is the reason why measures designed to deter applications likely to be unsuccessful will fail to cut costs: universities will simply put more effort into trying to ensure that each application is successful and in doing so will incur increased costs.

Table 8: Seven year cost of linking QR to research grant income net of RAE cost (**£m**)

	Award increase (per cent)				
	5	*10*	*15*	*20*	*25*
Application increase (per cent)					
10	**63**	**96**	**129**	**161**	**194**
20	**194**	**227**	**259**	**292**	**325**
30	**325**	**358**	**390**	**423**	**455**
40	**456**	**489**	**521**	**554**	**586**
50	**587**	**620**	**652**	**685**	**717**

Source: Table 7

46. None of the assumptions shown in Table 8 are unrealistic. It is entirely reasonable, for example, to assume that the volume of funded research could increase by 25 per cent (even if the research councils are prevented from increasing the volume of research they fund, other funders will do so). It is equally realistic to assume that the amount of application activity may increase by 50 per cent if researchers know that their research will be seen as a drain on their institutions if they fail to bring in grants. If both these things happen, the cost of allocating QR would be £817 over 7 years, compared to £100 million under the present arrangements and a reform designed to remove a layer of administrative costs would therefore have a net cost of £717m in additional administrative costs. Under no realistic scenario will the costs of the new arrangement be less than the present.

Annex B

The use of metrics to determine QR funding allocations and its impact upon stability

1. This annex investigates the implications of allocating QR funding in proportion to external research income. It concludes that metrics based upon income earned in the most recent year for which data is available (single year metrics) would be extremely volatile, creating fluctuations in income which universities – which traditionally do not run large surpluses in normal years – would struggle to manage. It further concludes that the use of data from a three year period provides a more stable allocation than using single year data. It is equally clear however, that there would still be considerable volatility.

2. The analysis addresses the inherent stability of a *mature* metrics-based QR funding allocation. It complements, but does not replace, analyses of the effects of a *transition* from RAE-based QR to metrics based QR.

3. The intention was to study the impact of metrics upon the 24 English universities scheduled to receive the most HEFCE QR income in 2006-07 on the basis of HEFCE's provisional allocations[21].

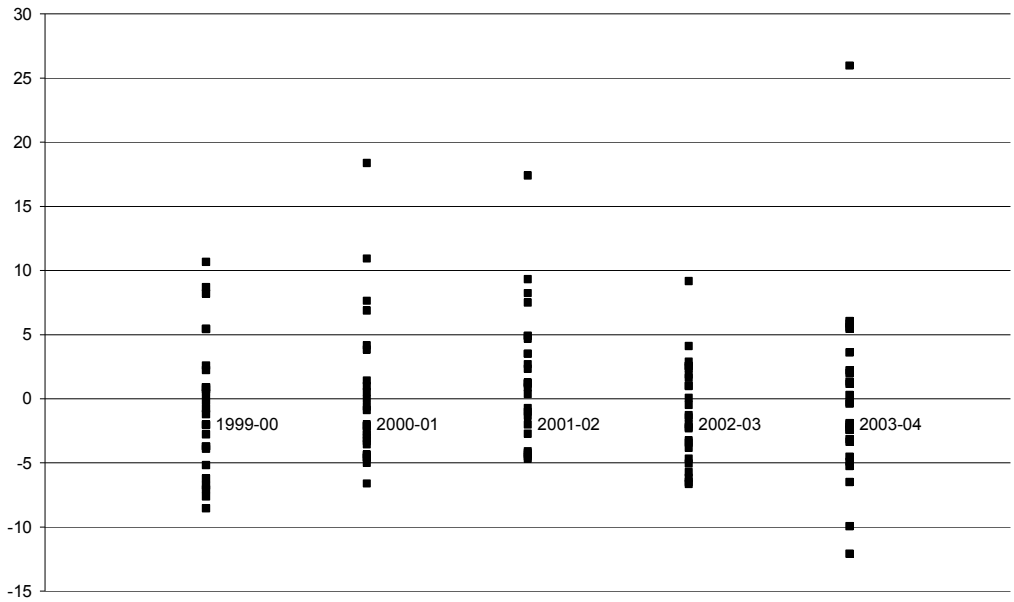
4. Each institution's share of the English HE sector's income from research grants and contracts was calculated for the years 1998-99 to 2003-04 inclusive. These were used to calculate the year on year percentage change in the share of income for the years 1999-2000 to 2003-04. The two predecessor institutions of the University of Manchester were included separately in the analysis giving a total of 25 data points.

5. If QR were allocated pro rata to research grants and contracts in each of these years the effects upon grant levels would be quite dramatic as Figure 1 shows. In 2003-04, for example, one institution (Nottingham) loses 12 per cent of its share. Another, (Warwick) increases its share by 26 per cent.

6. In general the gains are bigger than the losses because the share of the sector's total research income going to these 25 elite institutions is increasing. That process, however, can only go so far. In 2003-04 the top 25 institutions already accounted for 84.4 per cent[22] of total research grant and contract income. The scope for them to increase their share at the expense of institutions outside the group is therefore limited. It is therefore reasonable to expect that in subsequent years there will be more losers and fewer winners amongst elite institutions.

[21] One institution – not a university – from the top 25 is excluded. The Institute for Cancer Research (ICR) has not been a part of the HE statistics collection for long enough to be included in this analysis.
[22] Figure includes ICR and both Manchester and UMIST. It therefore equates to 26 2003-04 institutions but only 25 current institutions (because of the Manchester merger).

Figure 1: Year-on year changes in share of QR income if QR allocated in direct proportion to research grants and contracts in a single year



Source: HESA data volumes

7. There is no reason, of course, why metrics need give the same weighting to different classes of research income. To recognise this, the analysis was repeated using four variant assumptions[23]:

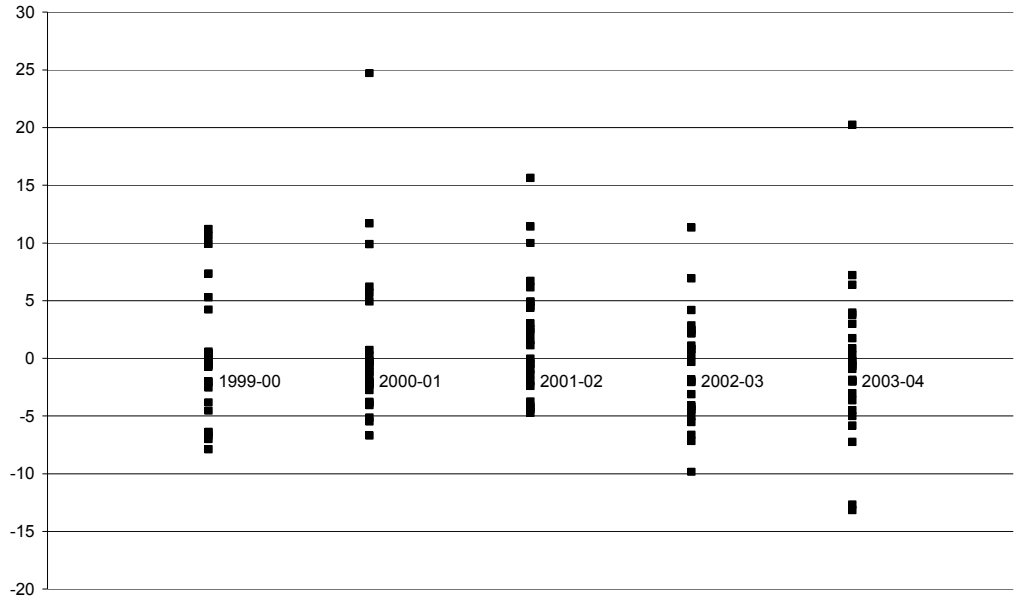
- income from the research councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:3:2 (the 5:3:2 model)
- income from the research councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:4:1 (the 5:4:1 model)
- income from a research council or charity is worth twice other income (the 4:4:2 model)
- Only income from the research councils is counted (the 1:0:0 or research councils only model)

8. The effects associated with these weighted models are shown in figures 2-5 below. Each data point[24] represents one of the 25 top recipients of QR in 2006-07. All models show essentially similar results with high levels of volatility.

[23] The current QR model contains an element (worth £135m in 2006-07) related to the amount of income obtained from charities. All of these models, with the exception of the 'research councils only' model, imply an increase in the amount of QR linked to funding from research charities as does the 'unweighted' model.

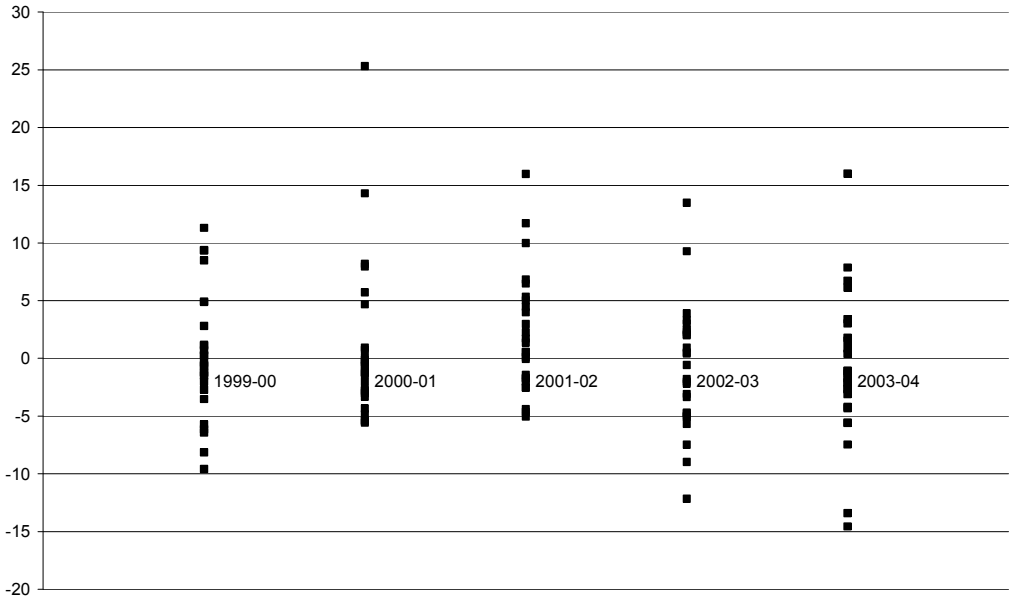
[24] One additional data point has been inserted for each year to enable the years to be clearly labelled on the charts. That data point has been given a value of -0.5 per cent. Care has been taken to ensure that the addition of this point does not affect the visual impression of the data provided by the chart.

Figure 2: Year-on year changes in share of weighted QR income (5:3:2 model)



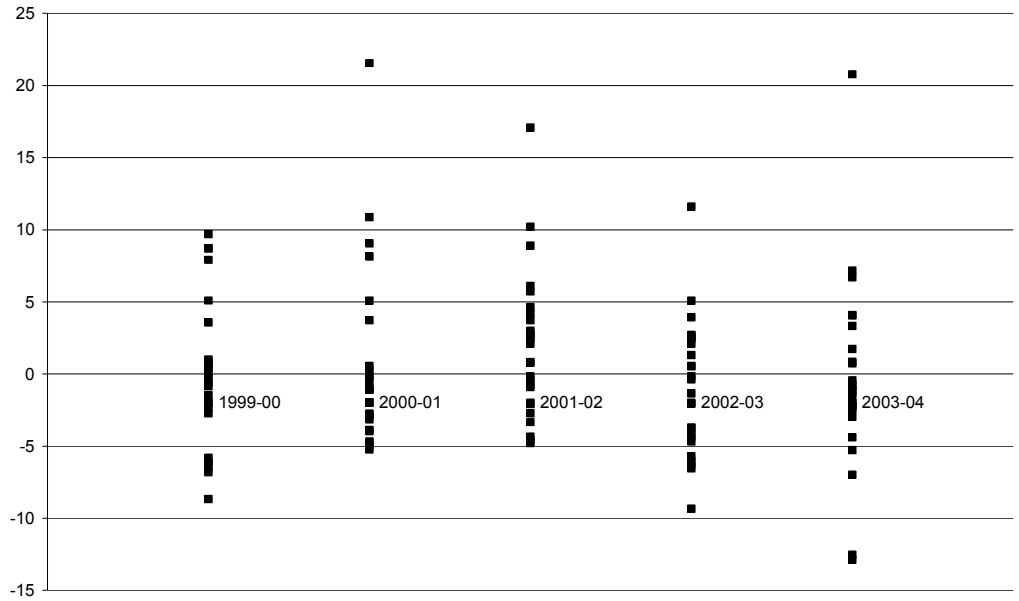
Source: HESA

Figure 3: Year-on year changes in share of weighted QR income (5:4:1 model)



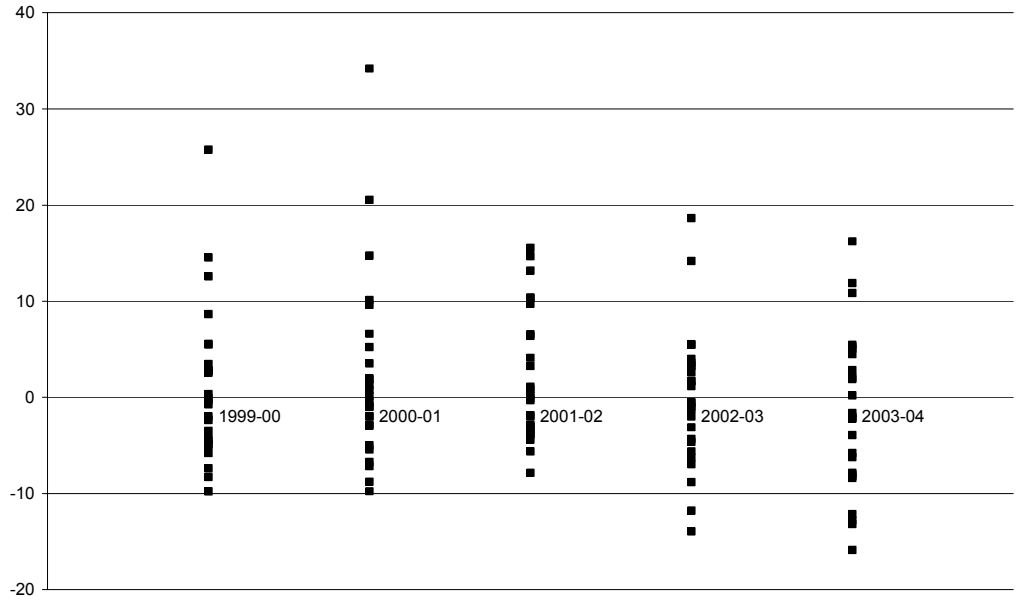
Source: HESA

Figure 4: Year-on year changes in share of weighted QR income (4:4:2 model)



Source: HESA

Figure 5: Year-on year changes in share of weighted QR income (Research councils only model)



Source: HESA

Use of multiple years

9. It would be possible to use data from more than one year to drive a funding allocation either by periodically recalculating the allocation or using a system of rolling averages.

10. Table 6, below, shows how each university's share of weighted grant and contract income changed between two adjacent three year periods: 1998-99 to 2000-01 and 2001-02 to 2003-04. Under the unweighted system (which is most effective at spreading risk between different categories of income) most changes in share are in single figures. At the other extreme, the 'research councils only' model causes for much more volatility.

Table 6: Percentage change in share of QR based on research grants and contracts 2001-2004 vs. 1998-2001 (various weightings of income sources)

	Weightings of research income sources				
	Unweighted	Research councils only	5:3:2 model	5:4:1 model	4:4:2 model
Bath	-3	7	0	1	-1
Birmingham	-5	-9	-6	-6	-5
Bristol	1	0	0	-1	-1
Cambridge	8	2	6	4	6
Durham	9	9	9	9	9
UEA	12	35	19	21	16
Imperial	-1	-5	-2	-1	-1
Kings	-9	1	-8	-7	-8
Leeds	-2	-2	-2	-1	-2
Leicester	-6	-12	-9	-10	-8
Liverpool	7	17	9	7	7
Manchester (Victoria)	1	2	1	1	1
UMIST	8	9	9	10	9
Manchester (total)	3	4	3	3	3
Newcastle	-1	8	1	1	0
Nottingham	0	17	5	6	3
Oxford	-3	-12	-4	-4	-3
QMW	4	5	4	4	4
Reading	-3	0	-1	1	-1
Sheffield	-1	3	-1	-2	-2
Soton	8	19	12	13	11
Surrey	-2	-16	-8	-13	-7
Sussex	6	8	8	11	9
UCL	-6	-9	-6	-5	-5
Warwick	1	-9	-2	-2	0

York	1	9	5	8	5

11. A rolling average, is actually a more volatile mechanism than a periodic recalculation of the type shown in Table 6 above. This is because in a rolling allocation. institutions face annual revisions to their grant rather than receiving what is effectively two years' grace if their numbers begin to decline. This will make it harder, rather than easier, for them to adjust.

12. Rolling averages do, however have one potential advantage. They make it easier to justify using data from a longer period which may well have the effect of dampening volatility. If it were decided to use ten years of funding data in the allocation, under a rolling average, the ten most recent available years would be used; under a periodic recalculation, this would not be the case making it difficult to justify using data from a very long time ago.

13. Given that these fluctuations are for a three year period in contrast to the annual fluctuations shown in figures 1-5 it is clear that using multiple years, under any set of weightings, provides a more stable allocation than using single year data. It is equally clear however, that there is still considerable volatility. A system with the power to create this sort of change in research funding levels will be a very powerful driver of behaviour, just as the RAE has been.

Conclusions

14. In the light of the volatility of the metrics examined in this annex, it would be naïve to assume that the additional effort that universities will put into grant applications will be any less than the effort they currently invest in the RAE process. Indeed, the fact that the grant funders' competitions are ongoing rather than occasional strongly suggests that compliant behaviour will increase rather than diminish.

15. Furthermore, it is immediately clear that the task of setting weightings would be extremely controversial were metrics to be introduced. Even on the more stable three-year metrics, the weightings used are critical for institutions. Nottingham gains 17 per cent if research council income alone is used. On an allocation based on unweighted income, however, its gain disappears completely. Oxford, by contrast loses 12 per cent under the 'research councils only model, far more than under any other system. It is very hard to imagine Oxford and Nottingham reviewing these data and agreeing about the best way to set the weightings[25]. A great deal of political will would be required to prevent the system being distorted by lobbying as institutions petitioned the Funding Council and the Government for a set of weightings best suited to their interest.

16. That, though, is only a part of the story. The analysis shown in Table 6 assumes that the weightings applied to the 1998-2001 data would be the same weightings applied to the 2001-2004 data. It seems unlikely that it would happen that way. Higher education funding is an intensely political process, with institutions often lobbying politicians and political advisers

[25] It is almost impossible to predict in advance which institutions will benefit from the use of particular weightings in subsequent years.

over the heads of the funding bodies if they are unhappy with funding decisions. For this reason, it would be extremely difficult for HEFCE to insist that the same weightings be used in perpetuity, even if it wished to do so.

17. Table 7 shows the results of a simulation in which it is assumed that

- *Unweighted* research grant and contract income in the years 1998-2001 has been used to calculate QR.
- The basis of the allocation is changed to reflect *weighted* income in the period 2001-2004 (five different sets of weightings are shown).

18. The combined effects of changes in performance from one period to the next and changes in funding methodology produce some stunning results. Southampton gains 54 per cent in one scenario but only 8 per cent if the unweighted allocation is retained; Sussex gains 68 per cent if research council income alone is used and only 6 per cent if the unweighted allocation is retained; Kings College London, on the other hand, loses 41 per cent of its income if only research council income is used compared to 9 per cent if an unweighted allocation is retained.

Table 7: Percentage change in share of QR if unweighted research grant income for 1998-2001 replaced by weighted grant income for 2001-2004 (various weightings shown)

	Weightings applied to 2001-2004 data				
	Un-weighted	Research Councils only	5:3:2 model	5:4:1 model	4:4:2 model
Bath	-3	29	4	2	-2
Birmingham	-5	6	-2	-1	-3
Bristol	1	16	6	10	5
Cambridge	8	28	16	21	15
Durham	9	36	12	4	4
UEA	12	54	22	21	15
Imperial	-1	-13	-3	0	0
Kings	-9	-41	-15	-11	-9
Leeds	-2	3	0	1	0
Leicester	-6	21	2	5	-1
Liverpool	7	7	7	5	6
Manchester (Victoria)	1	18	7	10	5
UMIST	8	101	31	30	16
Manchester (total)	3	38	12	15	8
Newcastle	-1	-23	-7	-10	-5
Nottingham	0	17	3	-1	-1
Oxford	-3	-5	0	8	5
QMW	4	2	7	16	12
Reading	-3	32	2	-4	-6
Sheffield	-1	16	2	-1	-2
Soton	8	54	18	16	10
Surrey	-2	11	-5	-18	-13
Sussex	6	68	22	25	14
UCL	-6	-12	-2	11	5
Warwick	1	14	1	-6	-5
York	1	12	3	1	0

Source: HESA

19. It will be almost impossible to calculate which institutions might benefit from particular weightings in a future period: that will depend upon variations in relative performance in different competitions (the institutions themselves may have some idea if they have, for example, recently instituted a policy of targeting one source of funding in preference to others). It is therefore entirely likely that a university which lobbies heavily for one set of weightings in one period will equally concerned to see a different one introduced at the next revision. It is hard to see, therefore how a stable system could be devised on the basis of a compromise between the interests of different institutions.

Annex C

The impact upon English universities of allocating HEFCE research funding on the basis of metrics: transitional effects

1. This annex investigates the transition from a system of allocating quality-related research grant (QR) from the Higher Education Funding Council for England (HEFCE) on the basis of the results of the Research Asssessment Exercise (RAE) and allocating it on the basis of external research income.

2. If there is a move towards allocating QR on the basis of success in attracting external funding, there is no reason why all types of research grant and contract income should be given the same weight in a QR funding formula. This report describes modelling of the outcome of five different weightings[26]:

- All external income included; no differential weightings (the 1:1:1 or 'unweighted' model)
- Only income from the research councils is counted (the 1:0:0 or 'research councils only' model)
- income from the research councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:3:2 (the 5:3:2 model)
- income from the research councils is worth more than the same amount of income from a research charity which in turn is worth more than other income on a ratio of 5:4:1 (the 5:4:1 model)
- income from a research council or charity is worth twice other income (the 4:4:2 model)

How selective are metrics based allocations?

3. The term 'selectivity' is used to refer to the extent to which funding is skewed towards the most successful Higher Education Institutions (HEIs). One means of measuring selectivity is by calculating the proportion of funding received by institutions in each quintile.

4. As Table 1 shows, an analysis based upon quintiles[27] reveals little difference between the overall level of selectivity produced by the provisional 2006-07 allocations and models based upon 2004-05 metrics. There is, however, some redistribution from the second quintile to the first in the metrics-based models probably owing to the impact of the very high levels of grant funding available in the biomedical sciences (institutions in the second quintile will typically be small research-led institutions without medical schools and therefore unable to compete for a large proportion of funding). Some metrics-based models also appear to

[26] The current QR model contains an element (worth £135m in 2006-07) related to the amount of income obtained from charities. All of these models, with the exception of the 'research councils only' model, imply an increase in the amount of QR linked to funding from research charities.

[27] Analysis excludes institutions not recorded as receiving external research income in 2004-05 or receiving QR in 2006-07. The total number of institutions included was 105, meaning that each quintile contains 21 institutions.

distribute funding slightly more generously to institutions in the lower quintiles. The analysis covers only Science, Technology, Engineering and Medicine (STEM) subjects and assumes that the share of total QR taken by STEM subjects remains constant.

Table 1: Proportion of QR in STEM subjects received by each quintile under current system and metrics (various weightings)

		Weighted income from research grants and contracts (2004-05 data)				
	2006-07 QR	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**
First quintile	82.9	84.2	82.2	82.6	84.2	83.5
Second quintile	14.6	13.0	13.1	13.4	12.5	12.5
Third quintile	2.5	2.4	3.8	3.3	2.7	3.3
Fourth Quintile	0.0	0.4	0.8	0.7	0.5	0.6
Fifth quintile	0.0	0.0	0.1	0.1	0.1	0.1

Source: HEFCE. Cols 3-7 based on data extracted by HEFCE from the HESA finance record.

5. As is often the case, the appearance of calm produced by a high-level view is somewhat misleading. As Table 2 shows, there are some very dramatic effects at institutional level. Of the twenty institutions receiving the most QR in 2006-07 ten would see their allocations change by over 20% if QR was determined by research council income. Six would see changes of 30% or more. Other models produce changes which, whilst slightly less dramatic are still very significant in a sector where few institutions expect to run large surpluses in a normal year.

6. A fuller version of Table 2, showing impacts on more institutions is reproduced later in this report as Table 4. A table showing complete simulated QR allocations under a metrics based allocation appears as Table 5.

Table 2: Percentage change in QR received if 2006-07 allocation based on income from research grants and contracts (2004-05 data). Institutions receiving £1m or more in QR in 2006-07 only. STEM subjects only.

		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**
Imperial College	73,783,610	-26	-2	-8	-7	-4
University College London	70,817,913	-9	-7	-2	10	4
University of Cambridge	65,911,681	37	8	19	25	17
University of Oxford	61,144,801	18	13	18	27	22
University of Manchester	54,843,226	3	-11	-8	-10	-11
King's College London	37,743,690	-35	-1	-8	-5	-1
University of Southampton	34,276,573	29	-11	-2	-5	-10
University of Leeds	32,162,879	-13	-13	-13	-14	-13
University of Sheffield	28,991,796	30	2	7	4	1
University of Bristol	28,953,034	-1	-9	-7	-6	-8
University of Birmingham	27,139,191	3	-5	-2	0	-3
University of Nottingham	25,576,598	7	-11	-9	-15	-15
University of Newcastle	25,424,237	-35	-17	-22	-24	-20
University of Liverpool	23,640,597	-4	1	-2	-5	-3
University of Warwick	15,503,532	21	30	20	3	13
University of York	14,396,780	-5	-23	-18	-17	-20
University of Surrey	14,362,808	-35	-27	-35	-48	-40
Queen Mary, University of London	13,896,728	-24	20	15	26	27
University of Leicester	12,701,952	30	3	11	15	9
University of Reading	12,660,468	-5	-32	-28	-32	-34

Source: Source: HEFCE. Cols 3-7 based on data extracted by HEFCE from the HESA finance record.

7. One of the reasons for the degree of instability shown here is that some subjects – especially medicine - have much more external income than others, and, particularly when external income other than RC income is taken into account, this leads to large gains by those institutions with large-scale activity in those subjects, and losses by those with little or no such activity. If the intention is to use external research income as a measure of quality a constraint could be added to the model to prevent money moving between subjects. If this is done, the results are very striking, redistributing large sums of money from the most prestigious institutions to others which have not traditionally been regarded as research-led institutions.

Table 3a: Top ten winners if RAE based QR for 2006-07 is replaced by QR based on unweighted income from research grants and contracts (2002-03, 2003-04 and 2004-05 data) with a constraint to prevent funds moving between subject cost centres

Institution name	Gain in £	Gain (per cent)
Cranfield University	14,586,917	262%
Sheffield Hallam University	6,865,011	192%
Loughborough University	5,124,480	34%
Northumbria University	5,006,624	456%
De Montfort University	4,224,469	113%
University of Greenwich	4,075,362	483%
University of Central England	4,026,451	585%
University of Westminster	3,944,045	232%
Manchester Metropolitan University	3,887,776	137%
University of Sunderland	3,721,409	529%

Table 3b: Top ten losers if RAE based QR for 2006-07 is replaced by QR based on unweighted income from research grants and contracts (2002-03, 2003-04 and 2004-05 data) with a constraint to prevent funds moving between subject cost centres

Institution name	Loss in £	Loss (per cent)
University of Manchester	-12,913,058	-18%
University College London	-12,294,283	-14%
Imperial College	-10,028,104	-13%
University of Bristol	-7,244,373	-18%
University of Southampton	-6,012,643	-14%
University of Oxford	-5,312,200	-6%
University of Bath	-5,194,756	-30%
University of Leeds	-4,983,900	-11%
University of Surrey	-4,928,039	-29%
Goldsmiths College	-4,068,639	-56%

8. This strongly suggests that the weightings applied to RAE data in the current HEFCE funding formula may overstate the real quality gap between the most successful institutions.

9. The fixed subject pots mode whose results are set out in tables 3a and 3b is not a viable alternative to the RAE or to other metrics based models. This is because it would lead to the payment of what was in effect a differential subsidy for funded research in different disciplines. That subsidy would vary to such an extent that massive distortions in behaviour are probable. For example, a £10,000 project in the History of Medicine would be worth £3

100 in QR if defined as medicine and £40,600 if defined as humanities; a project on avian flu would again be worth £31,000 as medicine and £59,000 as veterinary science; a project on the relationship of language skills to clinical effectiveness in nursing would be worth nineteen times as much if defined as a piece of research into modern languages as if defined as nursing research. It would not take long for universities and funding bodies to learn to manipulate these discrepancies, which would cause unpredictable effects on the research base.

10. This annex concludes with two long data tables (tables 4 and 5) which set out in full the information summarised in Table 1 and 2.

Table 4: Percentage change in QR received if 2006-07 allocation based on income from research grants and contracts (2004-05 data). Institutions receiving £1m or more in QR in 2006-07 only.

		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**
Imperial College	73,783,610	-26	-2	-8	-7	-4
University College London	70,817,913	-9	-7	-2	10	4
University of Cambridge	65,911,681	37	8	19	25	17
University of Oxford	61,144,801	18	13	18	27	22
University of Manchester	54,843,226	3	-11	-8	-10	-11
King's College London	37,743,690	-35	-1	-8	-5	-1
University of Southampton	34,276,573	29	-11	-2	-5	-10
University of Leeds	32,162,879	-13	-13	-13	-14	-13
University of Sheffield	28,991,796	30	2	7	4	1
University of Bristol	28,953,034	-1	-9	-7	-6	-8
University of Birmingham	27,139,191	3	-5	-2	0	-3
University of Nottingham	25,576,598	7	-11	-9	-15	-15
University of Newcastle	25,424,237	-35	-17	-22	-24	-20
University of Liverpool	23,640,597	-4	1	-2	-5	-3
University of Warwick	15,503,532	21	30	20	3	13
University of York	14,396,780	-5	-23	-18	-17	-20
University of Surrey	14,362,808	-35	-27	-35	-48	-40
Queen Mary, University of London	13,896,728	-24	20	15	26	27
University of Leicester	12,701,952	30	3	11	15	9
University of Reading	12,660,468	-5	-32	-28	-32	-34
Institute of Cancer Research	12,471,606	-76	26	13	39	41
University of Durham	11,886,643	21	-24	-15	-19	-24
University of Bath	11,521,880	-6	-31	-25	-26	-29
University of Sussex	11,163,468	-4	-44	-32	-28	-37
University of East Anglia	9,787,570	49	-7	7	7	-2
Loughborough University	7,600,909	65	18	24	11	10
London Sch. of Hygiene & Tropical Med.	7,207,984	-31	109	63	41	74
Lancaster University	7,163,976	24	-30	-18	-22	-29
Royal Holloway, University	5,398,954	-21	-45	-40	-42	-45

of London						
University of Exeter	5,272,040	-3	-17	-15	-20	-20
Cranfield University	5,024,852	85	211	149	85	137
Brunel University	4,814,271	-21	-39	-38	-45	-44
St George's Hospital Medical School	4,577,684	-78	67	35	45	63
Aston University	4,288,431	-46	-40	-45	-53	-48
		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**
University of Bradford	4,110,382	-62	-32	-42	-47	-39
Royal Veterinary College	3,727,594	-76	-47	-55	-57	-52
University of Essex	3,357,534	2	-34	-27	-31	-35
University of Portsmouth	3,002,390	-70	-59	-62	-62	-61
City University, London	2,888,739	-56	-9	-27	-39	-25
Open University	2,881,408	45	-13	2	3	-7
University of Kent	2,801,664	20	-20	-10	-10	-16
School of Pharmacy	2,755,561	-39	-26	-31	-32	-30
Birkbeck College	2,708,310	24	17	13	3	7
University of Plymouth	2,344,597	-15	10	-2	-13	-3
Keele University	1,927,372	25	45	35	25	33
University of Hertfordshire	1,812,861	-38	-18	-28	-41	-31
University of Hull	1,436,810	21	109	79	61	84
University of Brighton	1,173,504	10	33	17	-6	9
Liverpool John Moores University	1,150,528	37	102	68	31	60
University of Salford	1,051,602	96	108	90	59	77
Sheffield Hallam University	1,032,740	-32	15	-3	-15	-1

Table 5: Simulated 2006-07 QR allocations based upon income from research grants and contracts in 2004-05 (various weightings). All figures in £000s.

Page 1		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**
Imperial College	73,784	68,014	68,270	70,933	54,460	72,381
University College London	70,818	69,625	78,025	73,950	64,689	65,975
University of Cambridge	65,912	78,127	82,353	77,316	90,007	71,492
University of Oxford	61,145	72,440	77,485	74,448	72,308	69,301
University of Manchester	54,843	50,233	49,242	48,573	56,346	48,816
King's College London	37,744	34,764	35,913	37,379	24,360	37,516
University of Southampton	34,277	33,483	32,553	30,878	44,253	30,470
University of Leeds	32,163	27,984	27,784	27,905	27,984	28,110
University of Sheffield	28,992	31,026	30,073	29,286	37,595	29,432
University of Bristol	28,953	26,981	27,235	26,739	28,625	26,271
University of Birmingham	27,139	26,509	27,040	26,439	27,851	25,726
University of Nottingham	25,577	23,183	21,830	21,786	27,347	22,646
University of Newcastle	25,424	19,778	19,244	20,252	16,488	21,213
University of Liverpool	23,641	23,217	22,450	23,041	22,616	23,902
University of Warwick	15,504	18,566	15,980	17,518	18,723	20,145
University of York	14,397	11,775	11,910	11,446	13,608	11,077
University of Surrey	14,363	9,300	7,491	8,584	9,324	10,432
Queen Mary, University of London	13,897	15,946	17,543	17,697	10,543	16,744
University of Leicester	12,702	14,161	14,565	13,834	16,498	13,125
University of	12,660	9,178	8,560	8,339	12,047	8,610

Reading						
Institute of Cancer Research	12,472	14,043	17,345	17,646	2,953	15,666
University of Durham	11,887	10,109	9,589	9,009	14,415	8,998
University of Bath	11,522	8,644	8,520	8,149	10,787	8,006
University of Sussex	11,163	7,562	7,994	7,072	10,735	6,229

Page 2		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	2006-07 HEFCE QR funds (£s)	5:3:2 model	5:4:1 model	4:4:2 model	Research Councils only (1:0:0 model)	Unweighted (1:1:1 model)
University of East Anglia	9,788	10,445	10,447	9,586	14,581	9,063
Loughborough University	7,601	9,417	8,413	8,367	12,572	8,996
London Sch. of Hygiene & Tropical Med.	7,208	11,780	10,175	12,565	4,972	15,067
Lancaster University	7,164	5,844	5,564	5,104	8,873	5,008
Royal Holloway, University of London	5,399	3,249	3,143	2,991	4,291	2,967
University of Exeter	5,272	4,461	4,213	4,224	5,130	4,394
Cranfield University	5,025	12,511	9,295	11,916	9,298	15,613
Brunel University	4,814	3,005	2,665	2,702	3,820	2,948
St George's Hospital Medical School	4,578	6,198	6,633	7,451	996	7,662
Aston University	4,288	2,342	1,995	2,213	2,306	2,573
University of Bradford	4,110	2,393	2,187	2,488	1,550	2,805
Royal Veterinary College	3,728	1,668	1,594	1,803	881	1,977
University of Essex	3,358	2,445	2,311	2,189	3,422	2,204
University of Portsmouth	3,002	1,135	1,129	1,183	894	1,219
City University, London	2,889	2,120	1,775	2,162	1,264	2,623
Open University	2,881	2,943	2,963	2,694	4,176	2,518
University of Kent	2,802	2,518	2,532	2,350	3,354	2,230
School of Pharmacy	2,756	1,913	1,860	1,943	1,670	2,027
Birkbeck College	2,708	3,074	2,782	2,899	3,365	3,160
University of Plymouth	2,345	2,305	2,049	2,269	1,993	2,570
Keele University	1,927	2,602	2,403	2,565	2,405	2,793

University of Hertfordshire	1,813	1,297	1,076	1,246	1,124	1,493
University of Hull	1,437	2,569	2,314	2,643	1,734	3,009
University of Brighton	1,174	1,367	1,100	1,278	1,290	1,562
Liverpool John Moores University	1,151	1,934	1,507	1,840	1,578	2,323
University of Salford	1,052	2,001	1,671	1,859	2,060	2,190

Page 3		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	2006-07 HEFCE QR funds (£s)	5:3:2 model	5:4:1 model	4:4:2 model	Research Councils only (1:0:0 model)	Unweighted (1:1:1 model)
Sheffield Hallam University	1,033	1,007	882	1,021	701	1,188
De Montfort University	986	2,058	1,782	1,881	2,389	2,123
University of Greenwich	834	1,954	1,272	1,926	800	2,769
Nottingham Trent University	805	811	642	798	553	1,003
Manchester Metropolitan University	652	763	587	727	603	928
Goldsmiths College	467	354	359	348	392	338
London South Bank University	365	756	665	696	875	775
University of Central Lancashire	351	972	722	979	469	1,298
London Sch of Economics & Political Sci	334	367	322	343	399	385
University of Bolton	289	245	204	222	276	260
Northumbria University	244	1,439	1,012	1,488	396	2,057
University of Huddersfield	239	522	448	471	629	533
Coventry University	214	401	316	400	245	506
University of London	135	66	46	72	0	100
University of Westminster	133	333	254	328	207	424
University of West of England, Bristol	63	1,432	1,245	1,354	1,452	1,544
University of Teesside	16	322	188	328	38	502
University of Wolverhampton	16	504	424	474	495	557
Oxford Brookes University	12	1,076	906	1,014	1,052	1,191

Leeds Metropolitan University	6	102	78	101	62	131
London Metropolitan University	5	116	86	118	51	157
University of Chester	3	100	65	99	37	144
Kingston University	3	462	381	420	512	497
Page 4		**Percentage change in QR received if allocation based on income from research grants and contracts**				
Institution name	**2006-07 HEFCE QR funds (£s)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**
Middlesex University	2	376	212	387	15	601
Thames Valley University	2	93	60	91	37	132
St Martin's College	1	8	10	10	0	8
Bournemouth University	1	329	284	314	318	362
University of Sunderland	0	814	476	824	127	1,257
Staffordshire University	0	432	310	414	290	557
University of Luton	0	256	175	263	71	369
Anglia Ruskin University	0	246	219	223	304	243
University of Derby	0	218	152	207	145	285
University of East London	0	182	126	177	100	245
University of Central England	0	168	92	174	0	273
University of Lincoln	0	167	126	167	89	219
University of Northampton	0	148	96	151	38	218
Harper Adams University College	0	117	63	120	0	189
Buckinghamshire Chilterns University Col	0	114	66	119	2	182
RCN Institute	0	90	47	92	0	148

University of Worcester	0	80	42	82	0	132
Royal Agricultural College	0	60	64	61	63	57
Canterbury Christ Church University	0	54	28	55	0	88
Edge Hill College of Higher Education	0	40	49	52	0	48
University of Chichester	0	31	20	33	0	48
Southampton Solent University	0	25	14	26	0	41
Roehampton University	0	20	19	18	31	18
University of Gloucestershire	0	19	18	16	28	16

		Percentage change in QR received if allocation based on income from research grants and contracts				
Institution name	**2006-07 HEFCE QR funds (£s)**	**5:3:2 model**	**5:4:1 model**	**4:4:2 model**	**Research Councils only (1:0:0 model)**	**Unweighted (1:1:1 model)**
University of the Arts London	0	8	5	8	0	12
Newman College of Higher Education	0	8	4	8	0	13
Writtle College	0	4	2	4	0	6
Liverpool Hope University	0	2	1	2	0	2
Bath Spa University	0	1	1	1	1	1
Trinity & All Saints	0	0	0	0	0	0
University of Winchester	0	0	0	0	0	0
York St John University College	0	0	0	0	0	0

Annex D

Is the RAE game worth playing for English universities?

1. It is widely believed within the Higher Education sector that the rules of the Research Assessment Exercise as understood by university managers are a major determinant of behaviour.

2. If this is so (and this analysis does not attempt to establish whether or to what extent it is) it is worth asking whether HEIs are behaving rationally in devoting time and energy to playing the RAE game. This depends upon two things:

- Whether managerial interventions have a real impact upon the outcome
- The amount of money at stake in the process

Can managerial interventions have a real impact upon the outcome?

3. There are good reasons to doubt whether managerial interventions within HE institutions - above and beyond creating an environment conducive to good research – can have any real impact upon the outcome of the RAE. There is a paucity of information both about the way judgements are made by RAE panels and the way in which they will be translated into funding outcomes. This double opacity means that tactical approaches to the RAE are necessarily based upon speculation – albeit informed - which must affect their effectiveness.

4. The two types of opacity affecting, respectively, the RAE itself and its effect upon funding outcomes are described below.

Opacity of assessment criteria

5. The assessment criteria for the RAE itself are necessarily vague. In most cases, RAE panels are reluctant to specify in detail the characteristics of good research: to do so would be to dictate to researchers how research should be carried out which would in turn encourage a concentration upon technique rather than creativity[28]. This means that it is very difficult to plan an institution's research in such a way as to create a good fit with the criteria.

Opacity concerning the link between assessment outcomes and funding

6. The details of the funding formula – which determines the precise relationship between assessment outcomes and funding - are not disclosed in advance of the RAE. The formula depends upon 'volume' – a measure of capacity comprising principally of staff submitted for assessment – and 'quality' a multiplier which reflects scores achieved in the RAE. There is,

[28] RAE assessment criteria will not, for example, typically specify acceptable methodologies or the format in which results should be recorded or list flaws for which credit will be withheld - and few people argue that they should. This is because the RAE is not really a quality assurance process but rather an attempt to abstract subjective expert judgements into summary statistics. It is much harder to devise a strategy to succeed in the RAE than to devise a strategy to achieve top ratings in a more orthodox quality assurance process because so much less is known about what is necessary to be successful.

thus, a trade-off between maximising volume (by submitting all available staff) and maximising quality (by submitting only those likely to be rated highly). In the absence of prior notice of the details of the funding formula, this trade off is a matter of guesswork.

7. Furthermore the forthcoming RAE, which will be held in 2008, will use a completely different scoring system from its predecessors. Instead of producing a summary rating for each submission on a 7 point scale it will instead produce a profile indicating what proportion of the work submitted falls in each of five categories of excellence. This will give HEFCE and the other funding councils far more information from which to derive a quality multiplier (or multipliers) but HEIs have no information concerning the way the new scale will be used.

Lack of information

8. The information available to university managers about the way RAE decisions are made is vague and the information about the way those decision will translate into funding non-existent. Under these circumstances, it. is doubtful that management actions can influence research funding outcomes except where they improve the environment for researchers to do research. This is not because the RAE outcome is a perfect reflection of research quality but because it is almost impossible to anticipate its imperfections.

How much money is at stake in the RAE?

9. The remainder of this annex aims to establish how much difference the 2001 RAE outcome made to institutional incomes by

- Looking at shares of HEFCE research funding before and after the exercise,
- Establishing the monetary value of those changes in share
- Relating those monetary values to the institution's total income.

10. As Table 1 shows, for the large multi-faculty institutions, which receive the lion's share of HEFCE research funding, the system is very stable.

Table 1: Percentage share of HEFCE research funding 2000-01 and 2005-06 (English Russell Group institutions)

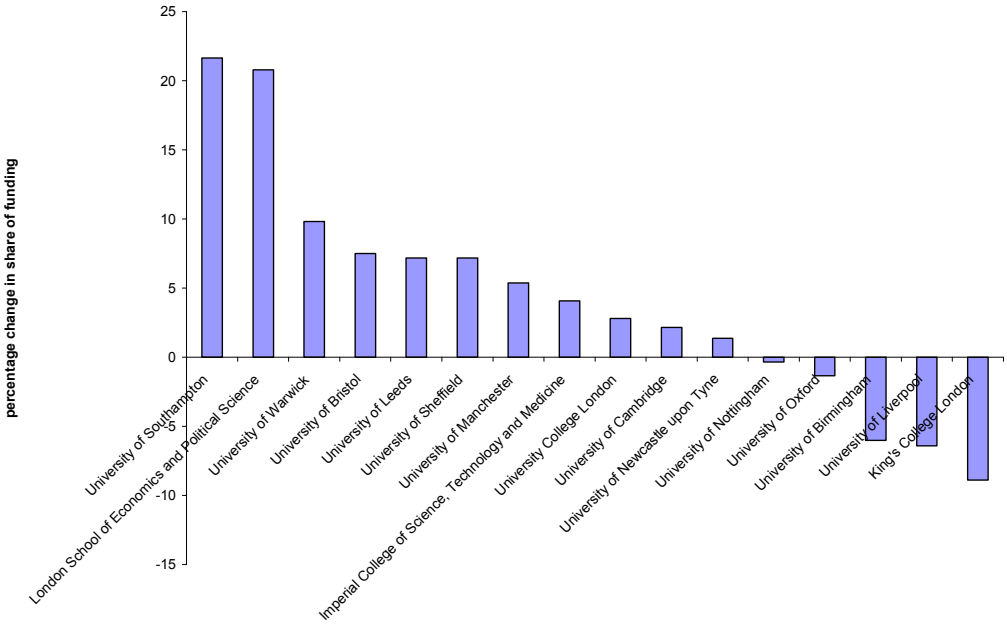
	Percentage share of total HEFCE research funding (2001-02) – before the 2001 RAE	Percentage share of total HEFCE research funding (2005-06) – after the 2001 RAE	Percentage change in share 2001-02 to 2005-06
Biggest increase (Southampton)	2.8	3.4	+21.7
Biggest decrease (Kings College London)	4.3	3.9	-8.9
Russell Group	63.3	65.1	+2.8

Source: HEFCE

11. Bearing in mind that the largest fall in share amongst Russell Group institutions was less than 9 per cent, it seems conservative to assume that three quarters of the research funding share of each Russell Group institution is 'secure' (meaning that it will not change hands in any conceivable RAE outcome). If this is the case, over half of the total HEFCE research funding pot can be said to be predestined for Russell Group institutions before the RAE has even begun.

12. A more detailed look at changes in the *share* of HEFCE research funding received by each Russell Group institution shows that only two institutions (Southampton and LSE) saw their share change by more than 10 per cent. It seems that large changes in funding share are relatively unusual amongst the multi-faculty research intensive institutions who are the recipients of the majority of HEFCE research funding.

Figure 2: Percentage change in share of HEFCE research funding 2000-01 and 2005-06[29] (English Russell Group institutions[30])



Source: HEFCE

Criticality of the RAE to institutions

13. The analysis above considers only the distribution of HEFCE research funding. The more pertinent question concerns the significance of observed changes in that distribution in terms of overall university finances. In other words, what effect do changes in research funding levels (which are partly caused by the RAE though also heavily influenced by other factors) have upon the overall income of universities and colleges.

14. It is possible to make a rough calculation of the impact of the last RAE upon institutions – and a rough calculation suffices to make the general point that the RAE does not move large amounts of money around the HE sector. We have produced our estimates by

[29] 2001-02 has been selected as the last year whose funding allocations were calculated based upon the results of the previous (1996) RAE. 2005-06 has been used because allocations in earlier years are more strongly influenced by transitional (moderation) funding which is difficult to separate out. Over the period, the effect of the transitional funding will be to further dampen the effect of RAE results upon funding. In the period since the 2001 RAE it is reasonable to assume that the more successful institutions will have expanded their research activity which will have a marginal impact upon funding. The use of 2005-06 as the reference year for the current funding cycle means that this analysis will tend to slightly *overstate* the degree to which funding depends upon the RAE.

[30] Analysis excluded Manchester for technical reasons. The merger between the Victoria University of Manchester (which was a Russell Group institution) and the University of Manchester Institute of Science and Technology (which was not) took place during the period in question. It is not possible to make reliable like for like comparisons between 2000-01 and 2005-06 for the merged University of Manchester using published data.

- Calculating the percentage change in each institution's share of HEFCE research funding between 2001-02 and 2005-06 (see footnote 14 for the reasons for choosing these years). For example, Loughborough University's share of HEFCE research funding fell from 1.18 per cent in 2001-02 to 1.14 per cent in 2005-06 – a **2.84 per cent** fall in *research funding share*

- Expressing the change in research funding share as a percentage of *post*-RAE income. In the case of Loughborough, a 2.84 per cent drop means that post-RAE (2005-06) HEFCE research income would be **2.92 per cent** higher had the university retained the same share of HEFCE research funding as it enjoyed in 2001-02

- Calculating the percentage of total revenue accounted for by HEFCE research income in the post RAE period. In 2003-04 (the most recent year for which figures are available) Loughborough's total income was £149.5m. It's 2003-04 HEFCE research income of £11.3m equates to **7.59 per cent** of this figure

- Expressing the change in research funding share as a percentage of total income. If Loughborough's HEFCE research income amounts to 7.59 per cent of its total income and if it would have been 2.92 per cent higher had the university retained its 2001-02 share of research income, it follows that Loughborough's total income would be **0.22 per cent** higher had it retained its pre-RAE share of HEFCE research funding.

15. The full results of this analysis are tabulated at Table 3 below. The remaining paragraphs refer to those results. The tables do not show all the steps of the calculation. These are shown on a separate spreadsheet available as Appendix 1 to Annex B on the HEPI website, **www.hepi.ac.uk.**

16. On the basis of the analysis, Wimbledon School of Art is an extreme outlier. Had its share of HEFCE research income remained unchanged from one RAE cycle to the next it's total income would be 12.9 per cent higher than it now is. In no other institution have changes in HEFCE research funding had a comparable impact. The next greatest change (and the greatest benefit) affects Royal Holloway and New Bedford College: 3.7 per cent of its current income is the result of an improved share of HEFCE research funding since the 2001 RAE.

17. A large proportion of the institutions for whom the RAE appears to be most critical are specialist creative arts and design institutions and specialist medical and health focussed institutions. This is unsurprising: one would expect that smaller institutions with a strong focus upon research would have the most to gain and lose in the RAE. Unlike the Russell Group institutions, they are not in the position to spread their risks by making a large number of submissions in different subject areas and unlike many newer universities, they are often heavily dependent upon research as a source of revenue.

18. The most striking finding, however, is that the funding outcome of the 2001 RAE does not seem to have had a dramatic effect upon the finances of most institutions. Only one institution saw its revenues affected by more than 3.7 per cent and the median impact was less than 0.6 per cent. Amongst Russell Group institutions the greatest impact was upon the university of Southampton which by 2003-04 owed an estimated 2.3 per cent of its income to changes in HEFCE funding after the RAE and the greatest loser amongst the Russell Group was Kings College London whose income would have been 1.1 per cent greater had it maintained its share of HEFCE research funding.

19. These figures do not suggest that the RAE should be the central preoccupation of English vice-chancellors. The RAE is not, of course, the only reason institutions prioritise investment in research and actions taken in response to the RAE may be justified by benefits which go beyond the results of the exercise. However, given the small scale of the prizes on offer and the lack of information about the rules of the game (which means that RAE tactics are mostly a matter of guesswork) institutions should be wary of devoting large amounts of resources and senior management attention to activities which would have no value if the RAE did not exist.

Table 3: Impact of changes to HEFCE research funding after RAE2001 on the total income of English Higher Education Institutions

		Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Value of change as percentage of total 2003-04 income
1	Wimbledon School of Art	-58.0	-12.94
2	Royal Holloway, University of London	35.4	3.68
3	University of the Arts London	182.8	3.53
4	Cranfield University	-49.6	-3.12
5	St George's Hospital Medical School	-35.7	-3.05
6	University of Greenwich	-70.8	-2.73
7	Dartington College of Arts	119.4	2.67
8	Royal Academy of Music	-57.2	-2.63
9	London School of Hygiene & Tropical Medicine	-19.5	-2.55
10	University of Bradford	-25.3	-2.28
11	University of Southampton	21.7	2.26
12	Royal College of Music	-56.3	-2.11
13	Falmouth College of Arts	-61.0	-2.05
14	University of Hull	-29.9	-2.01
15	Royal Northern College of Music	-59.2	-1.98
16	University of Durham	21.3	1.96
17	University of York	18.9	1.88
18	Birkbeck College	17.3	1.85
19	Royal College of Art	19.7	1.80
20	Cumbria Institute of the Arts	1421.3	1.77
21	London School of Economics and Political Science	20.8	1.76
22	Institute of Cancer Research	-8.3	-1.66
23	University of Exeter	19.2	1.42
24	City University, London	-24.6	-1.32
25	University College Winchester	349.4	1.29
26	Keele University	-16.5	-1.24
27	Institute of Education	11.8	1.22
28	Aston University	17.3	1.17
29	The Surrey Institute of Art & Design, University College	738.6	1.16
30	King's College London	-8.9	-1.14
31	London Business School	35.3	1.13
32	School of Oriental and African Studies	9.3	1.08
33	London South Bank University	-45.9	-1.07
34	University of Brighton	37.5	1.04
35	Manchester Metropolitan University	-34.9	-0.92
36	University of Bristol	7.5	0.89
37	University of Sunderland	-49.2	-0.87
38	University of Leicester	-9.8	-0.87
39	Queen Mary, University of London	-8.9	-0.82
40	University of Sheffield	7.2	0.81
41	University of Sussex	-5.7	-0.81
42	University College Worcester	-74.2	-0.80
43	School of Pharmacy	5.2	0.80
44	University of Warwick	9.8	0.79
45	Buckinghamshire Chilterns University College	-35.6	-0.73

		Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Change as percentage of total 2003-04 income
46	Coventry University	-47.3	-0.73
47	University of Westminster	-32.8	-0.71
48	Open University	-28.6	-0.70
49	University of Birmingham	-6.0	-0.68
50	University of Leeds	7.2	0.68
51	University of Liverpool	-6.4	-0.67
52	Staffordshire University	-46.0	-0.64
53	University of Kent	-9.9	-0.63
54	Imperial College of Science, Technology and Medicine	4.1	0.63
55	Kent Institute of Art & Design	91.2	0.60
56	Royal Veterinary College	7.7	0.59
57	Nottingham Trent University	-22.0	-0.59
58	University of Northumbria at Newcastle	-47.5	-0.58
59	University College Chester	2625.1	0.58
60	Canterbury Christ Church University College	-74.9	-0.57
61	University of Lincoln	-55.8	-0.56
62	University of Essex	5.8	0.54
63	Bournemouth University	160.5	0.51
64	University of Luton	183.6	0.50
65	Norwich School of Art & Design	-17.0	-0.49
66	University of Portsmouth	-12.7	-0.47
67	Southampton Institute	-66.8	-0.46
68	Roehampton University	-16.0	-0.46
69	Sheffield Hallam University	-18.1	-0.46
70	University College London	2.8	0.43
71	Goldsmiths College, University of London	3.5	0.43
72	University of East Anglia	4.0	0.41
73	University of Derby	-48.8	-0.41
74	Bath Spa University College	-25.3	-0.40
75	Middlesex University	-23.1	-0.39
76	University of Reading	3.2	0.39
77	University of Salford	9.1	0.37
78	Oxford Brookes University	-17.4	-0.36
79	University College Northampton	135.8	0.36
80	University of Central England in Birmingham	-39.1	-0.35
81	University of the West of England, Bristol	-21.0	-0.35
82	Leeds Metropolitan University	-31.2	-0.32
83	University of Hertfordshire	-18.0	-0.32
84	University of Plymouth	-12.4	-0.31
85	St Martin's College	870.1	0.26
86	University of Cambridge	2.2	0.25
87	Liverpool John Moores University	-10.4	-0.24
88	Loughborough University	-2.8	-0.22
89	University of Gloucestershire	-11.5	-0.22
90	University of Oxford	-1.3	-0.21
91	University of Central Lancashire	26.2	0.21
92	London Metropolitan University	-32.4	-0.21
93	University of Bath	1.8	0.19

94	University of East London	-10.7	-0.18
		Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Change as percentage of total 2003-04 income
95	University College Chichester	13.9	0.17
96	University of Huddersfield	10.0	0.16
97	Anglia Polytechnic University	31.2	0.15
98	Kingston University	-13.8	-0.14
99	University of Newcastle upon Tyne	1.4	0.14
100	Liverpool Hope University College	121.2	0.12
101	Thames Valley University	-47.1	-0.11
102	University of Wolverhampton	24.3	0.10
103	College of St Mark & St John	-50.0	-0.10
104	University of Teesside	20.8	0.09
105	Lancaster University	0.7	0.08
106	Trinity & All Saints	48.1	0.08
107	Brunel University	-1.2	-0.08
108	York St John College	54.9	0.08
109	St Mary's College	-15.1	-0.07
110	University of Surrey	0.7	0.07
111	University of Nottingham	-0.3	-0.03
112	De Montfort University	-0.6	-0.02
113	University of Bolton	-2.4	-0.02

Figures for London Metropolitan University are based upon the aggregation of 2001-02 HEFCE research funding received by its predecessor institutions. All other institutions which have changed names are assumed to have a single predecessor institution (for example, The London Institute is taken to be the predecessor institution of the University of the Arts, London). Institution names are given in the table as they appear on the provisional HEFCE research funding data for 2005-06 published on the HEFCE website and dated March 2005. No attempt has been made to allow for cases where transfers of research capacity mean that a comparison between an institution's funding in 2001-02, 2003-04 and 2005-06 may not be like for like. Kent Institute of Art and Design and Surrey Institute of Art and Design are shown as separate institutions because separate grants for AY2005-06 were calculated for each institution before their merger was concluded. The University of Manchester is excluded from this analysis because of difficulties in making like-for like comparisons between its predecessor institutions and the merged university. All other exclusions of institutions funded by HEFCE for research are the result of one of the following:

- The institution was not in receipt of any HEFCE research funding in 2001-02
- The institution was not in receipt of any HEFCE research funding in 2005-06
- The institution was not in receipt of any HEFCE research funding in 2003-04
- The institution was not recorded by published HESA figures for total institutional income in 2003-04

Annex D Appendix 1: Impact of RAE2001 on incomes (page 1)	Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Research funding as share of income (2003-04)	Change as proportion of current R income (losers)	Loss as percentage of 2003-4 total income	Current R income as proportion of income if share unchanged (gainers)	Gain as proportion of 2003-4 total R income	Gain as percentage of total income	Change as percentage of total income
Wimbledon School of Art	-58.0	9.38	1.3793694	12.94				12.94
Royal Holloway, University of London	35.4	14.07			1.3544867	0.2617129	3.68	3.68
University of the Arts London	182.8	5.46			2.8278254	0.6463714	3.53	3.53
Cranfield University	-49.6	3.17	0.9850401	3.12				3.12
St George's Hospital Medical School	-35.7	5.49	0.5562338	3.05				3.05
University of Greenwich	-70.8	1.13	2.4194314	2.73				2.73
Dartington College of Arts	119.4	4.9			2.1940999	0.5442322	2.67	2.67
Royal Academy of Music	-57.2	1.97	1.3353029	2.63				2.63
London School of Hygiene & Tropical Medicine	-19.5	10.52	0.2419557	2.55				2.55
University of Bradford	-25.3	6.73	0.3388472	2.28				2.28
University of Southampton	21.7	12.72			1.2165403	0.1779968	2.26	2.26
Royal College of Music	-56.3	1.64	1.2880121	2.11				2.11
Falmouth College of Arts	-61.0	1.31	1.5633471	2.05				2.05
University of Hull	-29.9	4.7	0.4273208	2.01				2.01
Royal Northern College of Music	-59.2	1.36	1.4522411	1.98				1.98
University of Durham	21.3	11.18			1.2128402	0.1754891	1.96	1.96
University of York	18.9	11.87			1.1886094	0.1586807	1.88	1.88
Birkbeck College	17.3	12.54			1.1733925	0.1477702	1.85	1.85
Royal College of Art	19.7	10.91			1.1969902	0.1645713	1.80	1.80
Cumbria Institute of the Arts	1421.3	1.89			15.213068	0.934267	1.77	1.77
London School of Economics and Political Science	20.8	10.2			1.207846	0.1720799	1.76	1.76
Institute of Cancer Research	-8.3	18.36	0.0906087	1.66				1.66
University of Exeter	19.2	8.83			1.1923481	0.1613187	1.42	1.42
City University, London	-24.6	4.05	0.3256997	1.32				1.32
University College Winchester	349.4	1.66			4.4942453	0.7774932	1.29	1.29
Keele University	-16.5	6.25	0.1977701	1.24				1.24
Institute of Education	11.8	11.49			1.1183552	0.1058297	1.22	1.22
Aston University	17.3	7.92			1.1734573	0.1478173	1.17	1.17
The Surrey Institute of Art & Design, University College	738.6	1.32			8.3864939	0.8807607	1.16	1.16
King's College London	-8.9	11.71	0.0975438	1.14				1.14

Annex D Appendix 1: Impact of RAE2001 on incomes (page 2)	Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Research funding as share of income (2003-04)	Change as proportion of current R income (losers)	Loss as percentage of 2003-4 total income	Current R income as proportion of income if share unchanged (gainers)	Gain as proportion of 2003-4 total R income	Gain as percentage of total income	Change as percentage of total income
London Business School	35.3	4.35			1.3527037	0.2607398	1.13	1.13
School of Oriental and African Studies	9.3	12.68			1.093119	0.0851865	1.08	1.08
London South Bank University	-45.9	1.26	0.8495995	1.07				1.07
University of Brighton	37.5	3.8			1.3747846	0.2726133	1.04	1.04
Manchester Metropolitan University	-34.9	1.72	0.5363623	0.92				0.92
University of Bristol	7.5	12.69			1.075042	0.0698038	0.89	0.89
University of Sunderland	-49.2	0.9	0.9703252	0.87				0.87
University of Leicester	-9.8	7.99	0.1082827	0.87				0.87
Queen Mary, University of London	-8.9	8.43	0.0978091	0.82				0.82
University of Sheffield	7.2	12.14			1.0718769	0.067057	0.81	0.81
University of Sussex	-5.7	13.31	0.0609267	0.81				0.81
University College Worcester	-74.2	0.28	2.8732796	0.80				0.80
School of Pharmacy	5.2	16.21			1.0517438	0.0491981	0.80	0.80
University of Warwick	9.8	8.89			1.0981486	0.0893764	0.79	0.79
Buckinghamshire Chilterns University College	-35.6	1.32	0.5529835	0.73				0.73
Coventry University	-47.3	0.81	0.8963915	0.73				0.73
University of Westminster	-32.8	1.45	0.4889066	0.71				0.71
Open University	-28.6	1.74	0.3999746	0.70				0.70
University of Birmingham	-6.0	10.64	0.0639562	0.68				0.68
University of Leeds	7.2	10.12			1.0718809	0.0670605	0.68	0.68
University of Liverpool	-6.4	9.85	0.0685142	0.67				0.67
Staffordshire University	-46.0	0.75	0.8522088	0.64				0.64
University of Kent	-9.9	5.74	0.1097018	0.63				0.63
Imperial College of Science, Technology and Medicine	4.1	16.04			1.0406772	0.0390872	0.63	0.63
Kent Institute of Art & Design	91.2	1.25			1.9115493	0.4768641	0.60	0.60
Royal Veterinary College	7.7	8.24			1.0772445	0.0717056	0.59	0.59
Nottingham Trent University	-22.0	2.09	0.2822225	0.59				0.59
University of Northumbria at Newcastle	-47.5	0.64	0.9063739	0.58				0.58
University College Chester	2625.1	0.6			27.251493	0.9633048	0.58	0.58
Canterbury Christ Church University College	-74.9	0.19	2.9834361	0.57				0.57

Annex D Appendix 1: Impact of RAE2001 on incomes (page 3)	Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Research funding as share of income (2003-04)	Change as proportion of current R income (losers)	Loss as percentage of 2003-4 total income	Current R income as proportion of income if share unchanged (gainers)	Gain as proportion of 2003-4 total R income	Gain as percentage of total income	Change as percentage of total income
University of Lincoln	-55.8	0.44	1.2618934	0.56				0.56
University of Essex	5.8	9.97			1.0576717	0.054527	0.54	0.54
Bournemouth University	160.5	0.82			2.6047534	0.6160865	0.51	0.51
University of Luton	183.6	0.77			2.8357047	0.647354	0.50	0.50
Norwich School of Art & Design	-17.0	2.39	0.2047324	0.49				0.49
University of Portsmouth	-12.7	3.25	0.1456456	0.47				0.47
Southampton Institute	-66.8	0.23	2.0116272	0.46				0.46
Roehampton University	-16.0	2.41	0.1901366	0.46				0.46
Sheffield Hallam University	-18.1	2.06	0.2212946	0.46				0.46
University College London	2.8	15.79			1.0280339	0.0272694	0.43	0.43
Goldsmiths College, University of London	3.5	12.69			1.0350481	0.0338613	0.43	0.43
University of East Anglia	4.0	10.77			1.039896	0.0383654	0.41	0.41
University of Derby	-48.8	0.43	0.9532778	0.41				0.41
Bath Spa University College	-25.3	1.18	0.3394024	0.40				0.40
Middlesex University	-23.1	1.3	0.3009712	0.39				0.39
University of Reading	3.2	12.51			1.0320147	0.0310215	0.39	0.39
University of Salford	9.1	4.5			1.0908873	0.083315	0.37	0.37
Oxford Brookes University	-17.4	1.72	0.2110059	0.36				0.36
University College Northampton	135.8	0.63			2.3576313	0.5758455	0.36	0.36
University of Central England in Birmingham	-39.1	0.55	0.6432789	0.35				0.35
University of the West of England, Bristol	-21.0	1.31	0.2654744	0.35				0.35
Leeds Metropolitan University	-31.2	0.71	0.4545182	0.32				0.32
University of Hertfordshire	-18.0	1.47	0.2189375	0.32				0.32
University of Plymouth	-12.4	2.18	0.1415007	0.31				0.31
St Martin's College	870.1	0.29			9.7011328	0.8969193	0.26	0.26
University of Cambridge	2.2	12.06			1.021502	0.0210494	0.25	0.25
Liverpool John Moores University	-10.4	2.09	0.1165169	0.24				0.24
Loughborough University	-2.8	7.59	0.0292385	0.22				0.22
University of Gloucestershire	-11.5	1.71	0.1295208	0.22				0.22
University of Oxford	-1.3	15.63	0.0136777	0.21				0.21

Annex D Appendix 1: Impact of RAE2001 on incomes (page 4)	Percentage change in share of HEFCE research funding 2001-02 to 2005-06	Research funding as share of income (2003-04)	Change as proportion of current R income (losers)	Loss as percentage of 2003-4 total income	Current R income as proportion of income if share unchanged (gainers)	Gain as proportion of 2003-4 total R income	Gain as percentage of total income	Change as percentage of total income
University of Central Lancashire	26.2	1.02			1.2616077	0.2073606	0.21	0.21
London Metropolitan University	-32.4	0.43	0.4791083	0.21				0.21
University of Bath	1.8	11.05			1.017553	0.0172502	0.19	0.19
University of East London	-10.7	1.53	0.1197237	0.18				0.18
University College Chichester	13.9	1.39			1.1391606	0.1221607	0.17	0.17
University of Huddersfield	10.0	1.72			1.0999148	0.0908387	0.16	0.16
Anglia Polytechnic University	31.2	0.65			1.3122438	0.2379465	0.15	0.15
Kingston University	-13.8	0.9	0.1595136	0.14				0.14
University of Newcastle upon Tyne	1.4	10.39			1.0137692	0.0135822	0.14	0.14
Liverpool Hope University College	121.2	0.21			2.211544	0.5478272	0.12	0.12
Thames Valley University	-47.1	0.12	0.8893434	0.11				0.11
University of Wolverhampton	24.3	0.53			1.2431779	0.1956099	0.10	0.10
College of St Mark & St John	-50.0	0.1	1.0016412	0.10				0.10
University of Teesside	20.8	0.55			1.2078851	0.1721067	0.09	0.09
Lancaster University	0.7	11.37			1.0074328	0.007378	0.08	0.08
Trinity & All Saints	48.1	0.25			1.4808771	0.3247245	0.08	0.08
Brunel University	-1.2	6.37	0.012348	0.08				0.08
York St John College	54.9	0.22			1.5492621	0.3545314	0.08	0.08
St Mary's College	-15.1	0.37	0.1782275	0.07				0.07
University of Surrey	0.7	9.3			1.0070889	0.007039	0.07	0.07
University of Nottingham	-0.3	9.6	0.0034614	0.03				0.03
De Montfort University	-0.6	3.22	0.0060384	0.02				0.02
University of Bolton	-2.4	0.67	0.0248872	0.02				0.02

Annex E

The use of citations in a metrics-based allocation of QR funding

1. The Government has proposed[31] to replace the Research Assessment Exercise (RAE) which is currently used to determine allocations of quality-related research funding (QR) by the Higher Education Funding Council for England (HEFCE) with quantitative indicators or 'metrics'.

2. At the time of writing (April 2006), the position is that a metrics-based funding allocation is the Government's 'preferred option'; the Government has, as yet, adopted no public position on the nature of the metrics[32] but its account of the reasoning behind its preference for metrics strongly suggest an expectation that they will be based in some way upon the research grant funding won by universities from credible sources such as the UK research councils.

3. If the Government's preferred option of a metrics-based allocation of QR is to go ahead, bibliometric data – and in particular, citations – offer the only alternative to metrics based on external funding.

4. At high levels of aggregation, citation counts offer a useful counterpoint to funding data – where funding data reflects relevance to funders as well as quality, citations reflect the salience of work to the research community itself. Like the RAE, they are retrospective and therefore complement the prospective assessments of grant funders by providing some measure of the quality of work once it has been done. There are, however, four main problems with citations counts:

5. There is currently no citation database capable of producing data of sufficient quality to inform funding

6. If citations informed funding, researchers would concentrate their research on fields which are of interest to large numbers of other researchers. This would create a clustering of the UK research base which may not reflect the national interest

7. Citation rates vary by discipline and sub-discipline. Some communities have a tendency to cite more heavily than others. It is very hard to control adequately for this effect because it is impossible to be sure that one has drawn the boundaries of a field in such a way that citation behaviour is the same throughout that field.

8. Citations are a lagging indicator because it takes several years for research papers to accumulate them. The RAE is also a lagging indicator. It however, has the advantage that the extent to which it lags is precisely known and readily controllable. Conversely, the speed at which papers accumulate their citations is likely to be dependent upon a number of variables of which subject matter may be only one. A

[31] Science and Innovation Framework 2004-2014: next steps

[32] The development of a system of metrics is currently the responsibility of a committee chaired by Sir Alan Wilson, Director-General of the Department for Education and Skills and Professor David Eastwood Chief Executive-designate of the Higher Education Funding Council for England. That committee is due to report in May 2006. Its finding will then be the subject of a public consultation.

better understanding of these variables will be necessary if greater weight is to be placed upon citation counts.

9. These considerations would apply whether citations were used as one component in a basket of measures or as the sole determinant of a metrics based allocation. There are two further issues would arise if citations were used as the sole basis of a metrics based allocation, but not necessarily if they were combined with other indicators with complementary strengths:

10. It has proved very difficult to develop citation indices with adequate coverage of the arts humanities and social sciences
11. Citations recognise the value of research to academic audiences only.

12. If it were decided to hold an RAE in 2008 and use the results to drive funding for a few years, that would leave sufficient time to develop a national citation database. Once developed it could play a vital role in validating the results of a metrics based (or any other) allocation and establishing the overall quality of UK or English research.

13. Citations, however, will never be suitable as an input into the funding formula itself. They are a more distant proxy for research quality than peer review decisions (whether RAE or external) and are therefore more liable to distort behaviour. Whilst they are a useful indicator at high levels of aggregation, were they to influence funding, it would not be sufficient that they provide an accurate picture of research quality at the level of the university. Universities would be able to tell which of their research activities are successful at attracting citations and will concentrate their investment on these: therefore any metrics impact directly upon research at the level of the researcher or group. It follows that, unless citations are reliable at the level of the individual researcher or research group, they are not suitable for inclusion in the QR funding formula.

14. Even at the level of the department (or RAE submission), citations are a highly unreliable indicator. Figure 1 shows the extent of the overlap between RAE ratings and performance as measured by citations in chemistry – a subject renowned for its relative suitability for citation based analyses. The range of citation averages is that between the extremes of each line whilst the boxes depict the second and third quartiles. The overlaps between RAE grade bands are very large and suggest that it would be impossible to defend funding allocations driven by citations (funding numbers have to be defensible *in every case*).

Figure 1: Average citation counts by RAE rating in (chemistry)

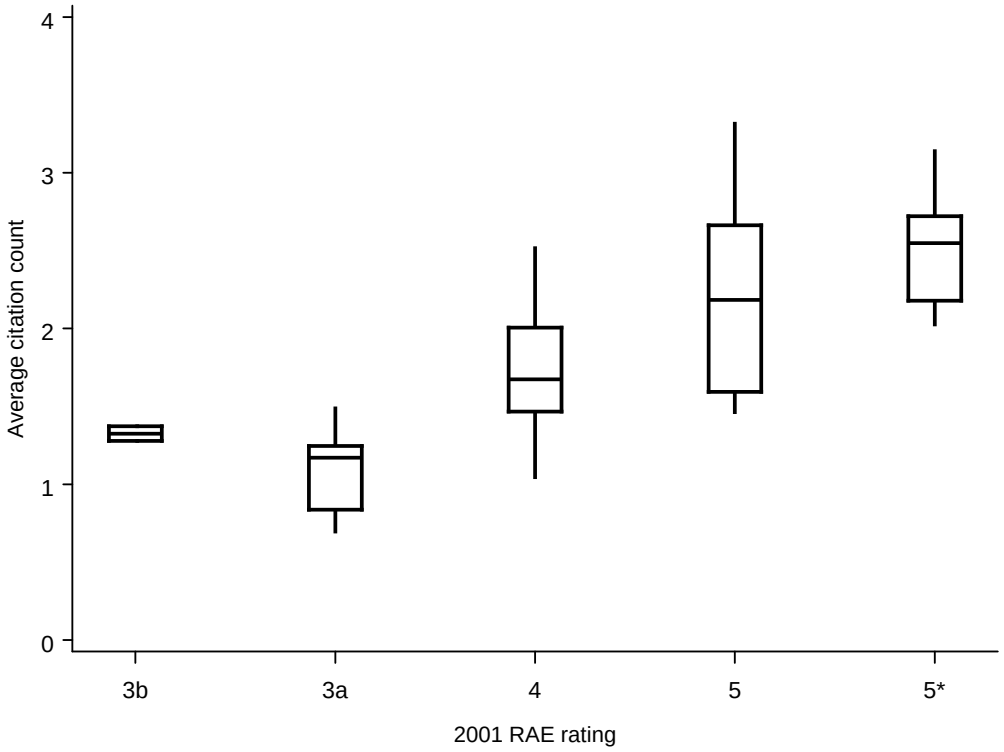


Chart supplied by HEFCE from forthcoming report. The data used to create this chart were originally supplied to HEFCE by Evidence UK

15. The linking of funding to citation based metrics would also create perverse incentives. It could be expected to create the following problems:

- A systematic bias against the reporting of uninteresting or negative results (because negative results are unlikely to be heavily cited and may not justify the time taken in writing them up). This would render meta-studies which included English research unreliable
- The formation of 'citation clubs' in which researchers collude to cite one another
- An excessive focus upon topics of salience to large numbers of researchers, distorting the pattern of research
- As the medium of publication will have a very major impact upon citation rates, citation based funding would result in the effective transfer of the role of assessment panels to the editorial boards of high-profile journals who would neither be supported to undertake the role nor accountable for the way in which it was carried out

16. It is very hard to see how these problems could be overcome, or even mitigated. By definition, a system based upon quantitative indicators is easier to manipulate than

one based upon the subjective judgement of experts (as, ultimately both the Research Assessment Exercise and research grant funding are).

17. In the light of the considerations set out above, it seems unlikely that it will be justifiable to include citations in the QR funding formula itself. Consequently, a metrics-based allocation will almost certainly depend for its dynamic element upon research grant funding, though citations may well have a substantial role in validating, at an appropriately high level, the allocations made, whatever the basis for allocation..

Annex F

Stability in metrics-based QR: are rolling averages the answer?

1. The Government has proposed allocating the quality-related research funding (QR) provided by the Higher Education Funding Council for England (HEFCE) on the basis of universities' succes in obtaining research funding from other sources. One objection to this is that this 'external research income' is subjects to fluctuations which make it too volatile to use as the determinant of QR.

2. The most obvious way of smoothing year-on-year fluctuations is to use several years' worth of research income data to determine each allocation of QR, thereby making it less likely that atypical years will distort QR levels.

3. This note considers different ways of using three years' data to drive the QR allocation in science, technology, engineering and medicine (STEM) subjects in the years 2002-03 to 2005-06 in two different scenarios:

- Scenario 1: Metrics based on unweighted research grant and contract income throughout the period
- Scenario 2: Metrics based on unweighted research grant and contract income in the first year and subsequently based on research council income only

4. It takes roughly two years for data on universities' external research income to become available. This means that, if three years worth of data are to be used, the most recent data available to inform 2002-03 QR allocation would come from the years 1998-99, 1999-2000 and 2000-01.

5. This paper considers three ways of using data from multiple years[33] and their impact upon QR allocations in the years 2002-03, 2003-04, 2004-05 and 2005-06. The three allocation methods are:

- A steady state allocation in which data from the 1998-99, 1999-2000 and 2000-01 is used in perpetuity to calculate the share of QR received by each institution
- A triennial recalculation in which data from 1998-99, 1999-2000 and 2000-01 is used to settle shares of QR which are fixed for three years from 2002-03. Those shares are replaced in 2005-06 by shares based on data from 2001-02, 2002-03 and 2003-04.
- A rolling average in which data is used from the three most recent years for which it is available in any given year[34]

[33] The analysis assumes that all the years included in the calculation are given equal weight, although it is, in theory, possible to give greater weight to research income earned in more recent years. The effect of such a move would be to increase the level of dynamism in the allocation and in doing so to make it more similar to an allocation based upon a single year's data.

[34] It is assumed here that no weighting is applied to the different years in the calculation

Table 1: Years of funding data influencing QR allocation in each scenario

QR in year	Steady state allocation	Triennial recalculation	Rolling allocation using three years' data
2002-03	1998-99, 1999-00, 2000-01	1998-99, 1999-00, 2000-01	1998-99, 1999-00, 2000-01
2003-04	1998-99, 1999-00, 2000-01	1998-99, 1999-00, 2000-01	1999-00, 2000-01, 2001-02
2004-05	1998-99, 1999-00, 2000-01	1998-99, 1999-00, 2000-01	2000-01, 2001-02, 2002-03
2005-06	1998-99, 1999-00, 2000-01	2001-02, 2002-03, 2003-04	2001-02, 2002-03, 2003-04

6. The purpose of the analysis is to compare the level of instability (or dynamism, if you prefer) created by the triennial recalculation model (whose effects have already been discussed in annex B and reflected in the conclusions drawn in the main report) and rolling averages model (which has been suggested as an alternative). If it were demonstrable that the rolling averages model offered greater stability than the trienniel recalculation model, this would have implications for the conclusions drawn about the inherent stability or instability of metrics based QR allocations.

7. The steady state allocation is included not because it is of interest in itself but because it provides a reference point against which the degree of instability introduced into the system by the other two models can be judged.

Scenario 1: Metrics based on unweighted research grant and contract income throughout the period

Year-on year percentage change in shares of income

8. We assume first that STEM QR is to be distributed between HE institutions on the basis of shares of unweighted external research income. An institution which received 5% of external research income in the relevant years would receive 5% of the QR pot.

9. Table 2 shows percentage changes in the shares of the QR received by each of 24[35] English universities under the rolling averages model

[35] The 24 are all amongst the top 25 recipients of QR in 2006-07. The Institute for Cancer Research, which is also in the top 25 has been excluded because it has not been providing data returns to HESA for long enough to enable the calculations to be made.

Table 2: Percentage changes in share under rolling averages model (scenario 1)

	2003-04 vs. 2002-03	2004-05 vs. 2003-04	2005-06 vs. 2004-05	2005-06 vs. 2002-03
Bath	-1.7	-0.5	-1.3	-3.4
Birmingham	-0.5	-1.5	-2.9	-4.9
Bristol	0.2	0.2	0.1	0.6
Cambridge	1.4	2.0	4.3	7.9
Durham	1.6	4.1	3.6	9.5
UEA	6.9	3.7	1.3	12.3
Imperial	-1.7	1.4	-1.2	-1.5
Kings	-3.8	-3.7	-2.2	-9.3
Leeds	1.7	-2.1	-1.5	-1.9
Leicester	-0.1	-2.8	-3.6	-6.4
Liverpool	3.2	3.1	1.0	7.4
Manchester (Victoria)	0.0	-1.1	1.9	0.8
UMIST	6.3	5.1	-3.2	8.2
Manchester (total)	1.5	0.4	0.6	2.5
Newcastle	-0.3	-1.1	0.2	-1.2
Nottingham	5.3	0.7	-5.4	0.3
Oxford	-1.4	-1.2	-0.1	-2.6
QMW	0.3	0.6	2.8	3.7
Reading	-2.5	0.2	-1.2	-3.4
Sheffield	1.8	-3.0	-0.2	-1.4
Soton	4.4	2.0	1.6	8.3
Surrey	-0.7	-1.9	0.9	-1.8
Sussex	2.7	1.6	1.3	5.7
UCL	-3.8	-0.4	-2.0	-6.1
Warwick	-5.5	-2.3	8.9	0.5
York	-2.2	1.8	1.7	1.2
24 HEIs	1.0	0.5	-1.8	-0.3

Source: HESA

10. Under the triennial recalculation model the shares received by each institution for 2002-03 and 2005-06 are the same but the shares for 2003-04 and 2004-05 are pegged at 2002-03 level. This creates the appearance of greater volatility because the year on year increase in 2005-06 is in some cases quite substantial as table 3 shows:

Table 3: Percentage changes in share under triennial recalculation model (scenario 2)

	2003-04 vs. 2002-03	2004-05 vs. 2003-04	2005-06 vs. 2004-05	2005-06 vs. 2002-03
Bath	0.0	0.0	-3.4	-3.4
Birmingham	0.0	0.0	-4.9	-4.9
Bristol	0.0	0.0	0.6	0.6
Cambridge	0.0	0.0	7.9	7.9
Durham	0.0	0.0	9.5	9.5
UEA	0.0	0.0	12.3	12.3
Imperial	0.0	0.0	-1.5	-1.5
Kings	0.0	0.0	-9.3	-9.3
Leeds	0.0	0.0	-1.9	-1.9
Leicester	0.0	0.0	-6.4	-6.4
Liverpool	0.0	0.0	7.4	7.4
Manchester (total)	0.0	0.0	2.5	2.5
Newcastle	0.0	0.0	-1.2	-1.2
Nottingham	0.0	0.0	0.3	0.3
Oxford	0.0	0.0	-2.6	-2.6
QMW	0.0	0.0	3.7	3.7
Reading	0.0	0.0	-3.4	-3.4
Sheffield	0.0	0.0	-1.4	-1.4
Soton	0.0	0.0	8.3	8.3
Surrey	0.0	0.0	-1.8	-1.8
Sussex	0.0	0.0	5.7	5.7
UCL	0.0	0.0	-6.1	-6.1
Warwick	0.0	0.0	0.5	0.5
York	0.0	0.0	1.2	1.2
25 HEIs	0.0	0.0	-0.3	-0.3

Source: HESA

11. The appearance of greater volatility in the triennial recalculation model is deceptive. It is important to remember that the real difference between the periodic calculation model and the rolling averages model is that in the former institutions get extra time to adjust to changes in their performance in the years 2001-02 and 2002-03 whereas in the rolling averages model this data influences allocations as soon as it is available.

12. If the triennial recalculation model and the rolling averages model are compared in terms of the extent to which they depart from the steady state model, a very different picture emerges.

13. For the purposes of this analysis, it is assumed that QR in STEM subjects was as shown in table 4:

Table 4: Assumed levels of QR in STEM subjects

2002-03	£650m
2003-04	£700m
2004-05	£750m
2005-06	£800m

14. These are hypothetical values which are used to illustrate the impact of the different allocations upon funding levels. **They are not real figures**.

15. Table 5 below compares the cumulative difference (positive or negative) in QR funding experienced by each institution between 2003-04 and 2005-06 under the rolling averages and triennial recalculation models compared with the steady state model. It shows that the rolling averages produces impacts upon funding levels which are roughly twice as large on average as those produced by the triennial recalculation model.

Table 5 Cumulative impact[36] (positive or negative) of 'Rolling average' and 'Triennial recalculation' models compared with steady state allocations 2003-04 to 2005-06 in GBP (Scenario 1)

	Rolling averages	Triennial recalculations
Bath	548077	272570
Birmingham	1992517	1353393
Bristol	277440	135082
Cambridge	7093746	4537968
Durham	1540779	904398
UEA	2240459	966929
Imperial	2033856	943622
Kings	7743275	3714685
Leeds	225660	534320
Leicester	1368905	946131
Liverpool	3240715	1483466
Manchester (total)	2280402	1018395
Newcastle	560454	240112
Nottingham	2535103	62278
Oxford	3979646	1673642
QMW	638981	496791
Reading	712552	317481
Sheffield	248037	355645
Soton	4662967	2107691
Surrey	435852	159920
Sussex	923641	431361
UCL	8482493	3866379
Warwick	1421103	67536
York	127993	145489
Total	55314653	26735282
Average of 24 HEIs	2304777	1113970

Source: HESA

Scenario 2: Metrics based on unweighted research grant and contract income in the first year and subsequently based on research council income only

16. If QR is driven by funding metrics, the biggest risk faced by institutions is a change in the weightings given to different funding sources. This has the power to have a greater impact upon funding levels than any change in like-for-like performance[37]. It is therefore relevant that the 'rolling averages' model, by instituting an annual recalculation of QR shares, means that this risk has to be faced every year.

[36] These figures are calculated using the sum of the differences between the allocations produced by the steady state model and the other two models in each of the years 2003-04 2004-05 and 2005-06. This means that, in the case of the rolling averages model, if the overall effect of the model was to increase allocations but in one of two years of the period allocations were lower than they would have been under the steady state model, those effects will offset each other. In consequence these figures, whilst sufficient to make the general point actually *understate* the extent to which the rolling averages model is more dynamic than the triennial recalculation model.

[37] It is the sensitivity of funding metrics to changes in weightings which has led HEPI to conclude elsewhere that funding models based upon them may be inherently unstable. This is because it will be very difficult for HEFCE to guarantee that the weightings would never be changed and equally difficult to change the weightings without having very serious impacts on some institutions.

17. To illustrate this, it is instructive to consider what would happen if a decision were taken in the 2003-04 funding round to move from a model using unweighted research income to one using only research council income. Under the 'rolling averages' model, percentage changes in share would be as shown in table 6:

Table 6: Percentage changes in share under rolling averages model (scenario 2)

	2003-04 vs. 2002-03	2004-05 vs. 2003-04	2005-06 vs. 2004-05	2005-06 vs. 2002-03
Bath	28	2	-1	29
Birmingham	15	-3	-5	6
Bristol	18	-1	-1	16
Cambridge	24	0	4	28
Durham	27	4	3	36
UEA	26	13	8	54
Imperial	-10	0	-3	-13
Kings	-40	-1	-1	-41
Leeds	7	-1	-3	3
Leicester	41	-7	-8	21
Liverpool	-3	7	4	7
Manchester (total)	37	3	-2	38
Newcastle	-28	3	4	-23
Nottingham	14	6	-3	17
Oxford	0	-3	-2	-5
QMW	1	4	-3	2
Reading	30	0	2	32
Sheffield	16	-2	2	16
Soton	38	4	8	54
Surrey	28	-5	-8	11
Sussex	59	4	2	68
UCL	-9	-3	-1	-12
Warwick	16	-4	3	14
York	2	6	3	12

Source: HESA

18. It is noticeable that the big changes are felt in 2003-04, the year of the decision, meaning that institutions would have no time to adjust to what are very large changes in the share of QR they receive (unless the decision were delayed, but that delay would, in practice make the 'rolling averages' model more similar to the 'triennial recalculation' model)

19. Under the triennial recalculation model the year on year changes in share would be as shown in table 7:

Table 7 Percentage changes in share under triennial recalculation model (scenario 2)

	2003-04 vs. 2002-03	2004-05 vs. 2003-04	2005-06 vs. 2004-05	2005-06 vs. 2002-03
Bath	0	0	29	29
Birmingham	0	0	6	6
Bristol	0	0	16	16
Cambridge	0	0	28	28
Durham	0	0	36	36
UEA	0	0	54	54
Imperial	0	0	-13	-13
Kings	0	0	-41	-41
Leeds	0	0	3	3
Leicester	0	0	21	21
Liverpool	0	0	7	7
Manchester (total)	0	0	38	38
Newcastle	0	0	-23	-23
Nottingham	0	0	17	17
Oxford	0	0	-5	-5
QMW	0	0	2	2
Reading	0	0	32	32
Sheffield	0	0	16	16
Soton	0	0	54	54
Surrey	0	0	11	11
Sussex	0	0	68	68
UCL	0	0	-12	-12
Warwick	0	0	14	14
York	0	0	12	12

Source: HESA

20. Here it is worth noting that institutions have two years to prepare for what are very profound impacts – at least insofar as they are able to predict the impact by modelling data from previous years.

21. As with the previous analysis, the year on year changes are not the best guide to the amount of dynamism created by the allocation method. That is best measured by looking at the extent to which the money received by each institution under each model differs from what they would have received under a ‘steady state’ model. This is shown in table 8. Figures are based on the assumptions for the value of QR in STEM subjects given in table 4, above.

Table 8 Cumulative impact[38] (positive or negative) of 'Rolling average' and 'Triennial recalculation' models compared with steady state allocations 2003-04 to 2005-06 in GBP (Scenario 2)

	rolling averages	triennial recalculations
Bath	6493073	2299153
Birmingham	8316221	1668003
Bristol	10701495	3563911
Cambridge	40500276	16195717
Durham	8514273	3441994
UEA	9221119	4250117
Imperial	19559558	7959338
Kings	45491748	16423546
Leeds	3831844	750981
Leicester	12775361	3103288
Liverpool	1612237	1479359
Manchester (total)	15403554	5666992
Newcastle	28246267	9611027
Nottingham	43649822	15278019
Oxford	14520478	4682010
QMW	11769432	4105465
Reading	4688882	3138416
Sheffield	922597	249026
Soton	7997100	2977627
Surrey	11090182	4187642
Sussex	32398143	13723199
UCL	5021788	1010286
Warwick	13634039	5139145
York	19529925	7771263
24 HEIs	4825753	1759381
Average	2464949	1365547

Source: HESA

22. It is clear that in scenario 2 as in scenario 1, by delaying the impact of changes in performance and policy, the triennial recalculation model provides a more stable allocation than the rolling averages model.

[38] These figures are calculated using the sum of the differences between the allocations produced by the steady state model and the other two models in each of the years 2003-04 2004-05 and 2005-06. This means that, in the case of the rolling averages model, if the overall effect of the model was to increase allocations but in one of two years of the period allocations were lower than they would have been under the steady state model, those effects will offset each other. In consequence these figures, whilst sufficient to make the general point actually *understate* the extent to which the rolling averages model is more dynamic than the triennial recalculation model.

Conclusion

23. Although the triennial recalculation model does, once every three years produce year on year changes which are, in most cases, greater than anything seen under the rolling averages model, over the three year cycle beginning in 2003-04 it moves less money around the HE sector as the rolling averages model. Furthermore, the shift in the year 2005-06 would not come as a surprise to the institutions affected as they would know the data for two of the years included in the calculation in advance and would have had time to adjust.

24. It would therefore be misleading to present rolling averages as a more effective means of dampening volatility than periodic recalculations. The opposite is the case: periodic recalculations, whilst a less sensitive way of reflecting changes in research performance are much more effective at dampening down the volatility associated with metrics based QR allocations.

25. On this evidence, there is little reason to suppose that the existence of rolling averages as an alternative to periodic recalculations gives any reasons to modify the conclusion reached in the annex B and reflected in the main report: that metrics based QR is likely to be highly unstable.

26. There is, however, one other point to make. Unlike periodic recalculations, rolling averages use the most recent available data. This means that, if it is decided that it is unacceptable to use data which is more than a given number of years old, it will be possible to use more years' data under a rolling average system than under a periodic recalculation. Rolling averages are less stable than periodic allocations if the number of years used is the same but it is possible that they could underpin more stable allocations by allowing a greater number of years' data to be used in the calculation.