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Peer assessment of research: how many publications per staff?

Jim Taylor and Ian Walker

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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Jim Taylor and Ian Walker

Department of Economics
Management School
Lancaster University
Lancaster LA1 4YW
Email: jim.taylor@lancaster.ac.uk

Abstract

The UK's higher education funding councils have proposed reducing the number of submitted outputs from four to three in the forthcoming Research Excellence Framework to reduce the burden on panel members. This reduction is considered to be sufficient for panels to form a robust view of the achievements of individuals and their departments. The key issue is whether the subject panels would have sufficient information to judge the quality of research *at departmental level* with details of only three outputs per staff. Two journal quality indicators are used in this note to test the assumption that three publications is likely to be as useful to the panels as four to measure research quality in three cognate units of assessment (business & management, economics & econometrics and accounting & finance). In fact, the results indicate that two publications would be sufficient, thereby providing more time for a careful assessment of submitted outputs.

Key words: RAE   Research quality   Journal quality index   University ranking   REF

Peer assessment of research: how many publications per staff?

"We have discussed with the EAGs [Expert Advisory Groups] *the wider question of how the burden on panels of reviewing large volumes of outputs could be reduced."* (HEFCE 2009, p. 16)

In reviewing the work undertaken by subject panels in the 2008 RAE, HEFCE concluded that the requirement to assess up to four research outputs per staff imposed a heavy burden on panel members. The burden varied substantially, however, between subject panels. For example, the 18 members of the Business & Management panel had over 12,600 submitted outputs to assess, or over 700 outputs per member. This compares to over 4,200 outputs for the 12 members of the Economics and Econometrics sub-panel, and approximately 2,000 outputs for 11 members of the Accounting & Finance sub-panel (including cross-referencing from Business & Management). Given the time constraints facing panel members, it is obvious that not all publications could be considered in detail, and certainly not by more than one panel member in the majority of cases.

In view of this heavy burden, especially in subject areas such as Business & Management, the UK's funding councils have jointly proposed to reduce the number of research outputs from four to three. It is argued that: "A reduction in the overall maximum from four to three could make a material contribution to reducing the burden on expert panels, especially in fields where citation indices are not well developed, and would in our view be justified if the assessment period were to be set at five years (the anticipated period between the 2008 RAE and a REF exercise in 2013)." Furthermore, the funding councils consider this reduction to three outputs "to be sufficient to enable panels to form a robust view as to the achievements of individuals and of submitted units while discouraging the submission of individual staff who do not have a sufficiently strong personal research record." (HEFCE 2009/38, p. 12)

HEFCE has consequently requested institutions and other interested parties to provide feedback on the proposal to reduce the number of submitted research outputs from four to three. The key issue is whether the subject panels would have sufficient information to judge the quality of research *at departmental level* with details of only three outputs per staff. Is HEFCE correct to assume that three research outputs rather than four would be sufficient to assess the quality of a department's research? Is there any way of testing the accuracy of this assumption?

A test

One possibility is to find a good predictor of the panel's judgement of the quality of the research output submitted by departments to the 2008 RAE, such as a journal quality index. This can then be used to estimate how the panel *would* have rated each department if only the 'best 3' outputs per staff had been submitted instead of the 'best 4'. It should then be possible to see how the ranking of

departments changes when only the 'best three' publications are included in calculating each department's research quality score (from the information provided by the journal quality index). The 'best 3' publications per staff are defined here as those published in the journals of the highest quality, as determined by information relating to a journal's citations impact factor. For comparative purposes, universities are also ranked according to their best 4, best 2 and best 1 publications per staff. This method is applied to three units of assessment in the present exercise: Business & Management, Economics & Econometrics and Accounting & Finance.

A fundamental criticism of using a journal quality index to assess the quality of a department's research output is that not all publications in high quality journals are themselves of high quality. Conversely, many publications in lower quality journals are of high quality. Both outcomes can result in serious measurement error when ranking departments according to a journal quality index, especially for small departments due to non-cancelling errors. There is serious concern, for example, about reliance on journal citation impact factors for assessing research quality in the REF (see Taylor 2009). Nevertheless, it should still be instructive to use a journal quality index to investigate the extent to which the *predicted* ranking of departments changes when only the 'best 3' publications are used to estimate the RAE research score.

A journal quality index extensively used in Business & Management departments in preparation for the 2008 RAE is the Association of Business Schools' *Journal Quality Guide* (Kelly *et al*. 2009a, 2009b), which also covers most of the journals in economics and econometrics as well as in accounting and finance. Alternative journal quality indices are also available for economics and econometrics, such as the journal citations impact indices calculated by Kodrzycki and Yu (2006). It is therefore possible to test HEFCE's assumption that limiting the number of research outputs to three would be sufficient to assess research quality at departmental level.

One drawback of using journal-based indicators to estimate research quality is that not all research output is published in journals, though this is unlikely to be a serious issue in the present case since over 90% of research output submitted to the 2008 RAE was published in journals. A more serious issue is that an impact factor is not available for all journals. The findings reported below should therefore be interpreted with these limitations in mind.

Results

In the tables below, universities are ranked according to the research output scores derived from the 2008 RAE outcome tables for the following three units of assessment: Business & Management, Economics & Econometrics, and Accounting & Finance. The rank of each university is also provided for each department's score based on the 'best n' publications calculated using the ABS *Journal Quality Guide*. A further test is undertaken for Economics & Econometrics based in the journal citations impact index calculated by Kodrzycki and Yu (2006).

The main findings are as follows:

1. For all three units of assessment, the correlation between the RAE research output score and the ABS score is virtually the same for the 'best 3' publications as for the 'best 4' publications. The 'best 3' publications therefore perform as well as the 'best 4' publications as a predictor of the RAE research output score.

2. The correlation between the ABS score for the 'best 4' and 'best 3' publications is extremely high for all three units of assessment.

3. The 'best 2' publications perform as well as the 'best 4' publications as a predictor of the RAE research output score for Economics & Econometrics and for Accounting & Finance.

4. For Economics & Econometrics, the correlation with the RAE research output score is substantially higher for the journal citations impact index calculated by Kodrzycki and Yu (2006) than for the ABS score, indicating that the ABS score is less appropriate than the Kodrzycki and Yu index for economics and econometrics publications.

Finally, it should be noted that there are substantial differences in the rankings of universities between the RAE research output score and the ABS score, especially for Business & Management. In Business & Management, for example, Oxford, Cambridge, the LSE, Warwick, Lancaster, Leicester, Keele and Manchester all have an RAE rank which is substantially superior to their ABS rank. The opposite is the case for York, Bradford and (particularly) Swansea. The outliers are not so dominant in Economics & Econometrics, particularly when the Kodrzycki and Yu journal citations impact index is used.

Conclusion

These results support HEFCE's view that three outputs per staff would be sufficient (specifically for the three subject panels considered here) to judge the quality of research *at departmental level*. Indeed, the data provided in this note suggests that careful assessment of only two publications would be sufficient for judging the quality of a department's research output. This conclusion is dependent, however, on the assumption that reducing the number of publications to be assessed does not lead to a detrimental impact on research activity, such as a significant reduction in the 'quantity' of research output as departments pursue higher 'quality' publications. A counter-balancing policy would be to require departments to submit a quantitative indicator of their research output as supplementary evidence of research activity in addition to the 'best 3' (or 'best 2'?) publications from each member of staff.

BUSINESS & MANAGEMENT

Ranking of universities by RAE research output score and by the 'best n' publications using the ABS score per publication

Institution number	University	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
135	London Business School	1	2	1	2	2
132	Imperial College London	2	1	3	4	9
156	University of Oxford	3	20	20	23	18
114	University of Cambridge	4	21	19	26	33
137	LSE	5	23	23	18	16
134	King's College London	6	17	15	19	20
179	Cardiff University	7	6	6	6	10
2	Cranfield University	8	9	10	12	13
109	University of Bath	9	10	14	16	21
124	University of Leeds	10	15	13	8	8
163	University of Warwick	11	27	29	32	35
119	University of Exeter	12	7	5	8	15
123	Lancaster University	13	24	22	14	12
173	University of St Andrews	14	5	8	24	27
141	Royal Holloway, London	15	18	7	5	6
169	University of Strathclyde	16	11	12	21	26
139	Queen Mary, London	17	3	2	1	1
116	University of Durham	18	3	4	3	4
152	Loughborough University	19	25	25	27	24
159	University of Sheffield	20	12	16	25	28
155	University of Nottingham	21	14	17	19	17
110	University of Birmingham	22	16	18	22	31
108	Aston University	23	22	24	28	29
125	University of Leicester	24	49	50	44	38
164	University of York	25	13	11	15	23
204	University of Manchester	26	40	37	37	32
115	City University, London	27	35	33	35	30
157	University of Reading	28	36	31	33	40
63	Kingston University	29	26	27	11	11
184	Queen's University Belfast	30	31	35	40	41
111	University of Bradford	31	19	21	17	14
126	University of Liverpool	32	30	32	34	34
161	University of Surrey	33	28	26	13	7
154	University of Newcastle upon Tyne	34	33	36	31	19
160	University of Southampton	35	34	34	43	51
122	University of Kent	36	46	48	46	46
170	University of Aberdeen	37	50	44	38	36
180	Swansea University	38	8	9	7	5
127	Birkbeck College	39	44	41	39	52
121	Keele University	40	69	71	70	68
117	University of East Anglia	41	37	38	30	45
167	University of Edinburgh	42	43	47	51	55
171	Heriot-Watt University	43	62	64	64	70
51	University of Brighton	44	57	61	62	63
60	University of Hertfordshire	44	56	59	63	69
1	Open University	46	68	66	66	64
68	De Montfort University	47	38	30	29	22

185	University of Ulster	47	41	43	41	37
168	University of Glasgow	49	42	40	42	49
66	Manchester Metropolitan University	50	51	51	49	47
146	SOAS	51	66	62	53	54
67	Middlesex University	52	58	53	48	43
112	University of Bristol	53	48	57	56	57
81	University of the West of England	54	60	58	55	58
71	Nottingham Trent University	55	39	42	50	53
104	Robert Gordon University	56	29	28	8	3
106	Glasgow Caledonian University	57	61	60	61	48
83	University of Westminster	58	45	39	45	44
72	Oxford Brookes University	59	47	49	36	25
73	University of Plymouth	60	64	65	69	75
113	Brunel University	60	65	68	67	65
174	University of Stirling	62	55	55	60	59
120	University of Hull	63	63	67	68	73
53	University of Central Lancashire	64	53	52	52	42
74	University of Portsmouth	65	77	76	76	78
177	Aberystwyth University	66	54	54	47	39
50	Bournemouth University	67	59	56	59	56
52	Birmingham City University	67	74	79	75	61
105	University of the West of Scotland	69	52	45	54	60
26	University of Bedfordshire	70	70	69	72	76
64	Leeds Metropolitan University	71	79	78	78	79
56	Coventry University	72	72	69	65	50
85	University of Wolverhampton	72	80	84	85	85
76	London South Bank University	74	67	63	56	61
79	University of Teesside	75	78	75	80	80
158	University of Salford	76	76	77	77	76
59	University of Greenwich	77	84	83	82	83
75	Sheffield Hallam University	78	87	87	87	86
69	University of Northumbria	79	71	73	74	71
107	Napier University	80	73	72	73	74
90	University of Glamorgan	81	86	86	86	87
202	London Metropolitan University	82	82	80	81	80
54	University of Gloucestershire	83	83	81	83	82
49	University of Bolton	84	88	88	88	89
27	University of Northampton	85	81	82	79	72
62	University of Lincoln	86	85	85	84	84
95	University of Abertay Dundee	87	75	74	71	66
89	University of Wales Institute	88	90	90	90	90
100	Queen Margaret, Edinburgh	89	89	89	89	88
9	Buckinghamshire New University	.	32	45	58	66

Notes:
1. RAE research output score = weighted score of proportion in each RAE research output category (weights: 4*=1, 3*=3, 2*=2, 1*=1). The proportion of staff in each research output category was obtained from the RAE 2008 website: http://www.rae.ac.uk/results/selectUOA.aspx.
2. ABS score = ABS score per publication (see Kelly, Morris and Harvey 2009b; and Taylor 2009).
3. The 'best n' publications are those submitted outputs with the highest ABS journal rating score.

Business & Management: correlation between RAE research outputs and the ABS score (n=89)

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.92	1.00			
Best3	0.91	0.99	1.00		
Best2	0.88	0.97	0.99	1.00	
Best1	0.82	0.93	0.95	0.98	1.00

Business & Management: rank correlations (n=89)

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.92	1.00			
Best3	0.91	0.99	1.00		
Best2	0.89	0.97	0.98	1.00	
Best1	0.84	0.93	0.94	0.98	1.00

ECONOMICS & ECONOMETRICS I

**Ranking of universities by RAE research output score and by the 'best n' publications using
the *ABS score* per publication**

Institution number	University	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
137	LSE	1	2	1	2	6
149	University College London	2	3	5	8	19
118	University of Essex	3	6	6	4	4
163	University of Warwick	4	5	7	7	8
156	University of Oxford	5	15	14	14	10
139	Queen Mary	6	7	3	1	2
160	University of Southampton	7	20	19	16	12
141	Royal Holloway	8	1	2	6	7
112	University of Bristol	9	4	4	5	3
155	University of Nottingham	10	9	12	13	16
168	University of Glasgow	11	14	9	3	1
114	University of Cambridge	12	17	18	20	20
204	University of Manchester	13	19	20	23	26
167	University of Edinburgh	14	23	22	21	18
119	University of Exeter	15	8	8	11	15
125	University of Leicester	16	13	10	9	5
127	Birkbeck College	17	26	27	30	30
122	University of Kent	18	18	16	12	11
170	University of Aberdeen	19	21	23	24	24
110	University of Birmingham	20	27	28	27	27
174	University of Stirling	21	21	24	25	23
159	University of Sheffield	22	10	17	18	21
161	University of Surrey	23	11	11	10	9
180	Swansea University	24	16	15	15	14
115	City University, London	25	30	30	29	28
117	University of East Anglia	26	12	13	17	22
162	University of Sussex	27	29	30	31	29
173	University of St Andrews	28	28	26	22	13
164	University of York	29	24	21	19	17
113	Brunel University	30	25	25	26	31
172	University of Dundee	31	33	32	32	32
152	Loughborough University	32	31	29	28	25
202	London Metropolitan	33	32	33	33	34
63	Kingston University	34	34	34	34	33
66	Manchester Metropolitan	35	35	35	35	35

Notes:

1. RAE research output score = weighted score of proportion in each RAE research output category (weights: 4*=1, 3*=3, 2*=2, 1*=1). The proportion of staff in each research output category was obtained from the RAE 2008 website: http://www.rae.ac.uk/results/selectUOA.aspx.

2. ABS score = ABS score per publication (see Kelly, Morris and Harvey 2009b; and Taylor 2009).

3. The 'best n' publications are those submitted outputs with the highest ABS journal rating score.

Economics & Econometrics: correlation between RAE research outputs and the ABS score (n=35)

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.89	1.00			
Best3	0.89	0.99	1.00		
Best2	0.88	0.95	0.98	1.00	
Best1	0.78	0.83	0.89	0.96	1.00

Economics & Econometrics: rank correlations (n=35)

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.81	1.00			
Best3	0.81	0.98	1.00		
Best2	0.80	0.92	0.98	1.00	
Best1	0.72	0.79	0.87	0.94	1.00

ECONOMICS & ECONOMETRICS II

Ranking of universities by RAE research output score and by the 'best n' publications using the *journal quality score* per publication

Institution number	University	RAE research output score	Journal quality score: best 4	Journal quality score: best 3	Journal quality score: best 2	Journal quality score: best 1
137	LSE	1	1	1	1	1
149	University College London	2	2	2	2	2
118	University of Essex	3	4	4	4	5
163	University of Warwick	4	6	7	7	8
156	University of Oxford	5	9	9	11	12
139	Queen Mary, London	6	7	6	5	4
160	University of Southampton	7	10	10	10	11
141	Royal Holloway, London	8	3	5	6	6
112	University of Bristol	9	5	3	3	3
155	University of Nottingham	10	12	12	14	13
168	University of Glasgow	11	11	11	8	7
114	University of Cambridge	12	13	14	15	15
204	University of Manchester	13	19	21	21	26
167	University of Edinburgh	14	14	13	12	10
119	University of Exeter	15	8	8	9	14
125	University of Leicester	16	15	15	13	9
127	Birkbeck College	17	17	17	20	23
122	University of Kent	18	25	20	18	17
170	University of Aberdeen	19	20	22	22	25
110	University of Birmingham	20	26	26	27	28
174	University of Stirling	21	29	29	29	29
159	University of Sheffield	22	16	16	17	20
161	University of Surrey	23	21	19	19	16
180	Swansea University	24	27	27	26	27
115	City University, London	25	22	23	25	22
117	University of East Anglia	26	18	18	16	19
162	University of Sussex	27	30	30	30	24
173	University of St Andrews	28	24	25	24	18
164	University of York	29	23	24	23	21
113	Brunel University	30	28	28	28	30
172	University of Dundee	31	31	31	31	31
152	Loughborough University	32	32	32	32	32
202	London Metropolitan	33	34	34	34	34
63	Kingston University	34	33	33	33	33
66	Manchester Metropolitan	35	35	35	35	35

Notes:
1. RAE research output score = weighted score of proportion in each RAE research output category (weights: 4*=1, 3*=3, 2*=2, 1*=1). See the RAE 2008 website: http://www.rae.ac.uk/results/selectUOA.aspx.
2. The journal quality score is calculated by weighting each publication by the journal citations impact index (per article) published in Kodrzycki and Yu (2006). This variable (available for 181 journal titles) is logged since journal rating per article is heavily skewed.
3. The 'best n' publications are those submitted outputs with the highest journal quality score.

Economics & Econometrics: correlation between RAE research outputs and the journal quality score (n=35)

	RAE research output score	Journal quality score: best 4	Journal quality score: best 3	Journal quality score: best 2	Journal quality score: best 1
RAE research output	1.00				
Best4	0.92	1.00			
Best3	0.93	0.99	1.00		
Best2	0.94	0.99	0.99	1.00	
Best1	0.92	0.95	0.98	0.98	1.00

Economics & Econometrics: rank correlations (n=35)

	RAE research output score	Journal quality score: best 4	Journal quality score: best 3	Journal quality score: best 2	Journal quality score: best 1
RAE research output	1.00				
Best4	0.93	1.00			
Best3	0.93	0.99	1.00		
Best2	0.92	0.98	0.99	1.00	
Best1	0.87	0.94	0.95	0.97	1.00

ACCOUNTING & FINANCE

Ranking of universities by RAE research output score and by the 'best n' publications using the ABS score per publication

Institution number	University	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
178	Bangor University	1	2	2	2	1
118	University of Essex	2	1	1	1	2
119	University of Exeter	3	5	5	3	5
112	University of Bristol	4	4	4	4	3
174	University of Stirling	5	8	9	8	11
81	University of the West of England	6	9	7	9	10
168	University of Glasgow	7	11	10	10	8
105	University of the West of Scotland	8	3	3	6	7
172	University of Dundee	9	7	6	5	4
106	Glasgow Caledonian University	10	9	11	11	12
104	Robert Gordon University	11	14	14	13	9
1	Open University	12	13	12	7	6
65	Liverpool John Moores University	13	12	13	14	13
61	University of Huddersfield	-	6	8	12	14

Notes:

1. RAE research output score = weighted score of proportion in each RAE research output category (weights: 4*=1, 3*=3, 2*=2, 1*=1). The proportion of staff in each research output category was obtained from the RAE 2008 website: http://www.rae.ac.uk/results/selectUOA.aspx.

2. ABS score = ABS score per publication (see Kelly, Morris and Harvey 2009b; and Taylor 2009).

3. The 'best n' publications are those submitted outputs with the highest ABS journal rating score.

Accounting & Finance: correlation between RAE research outputs and the ABS score

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.79	1.00			
Best3	0.84	0.96	1.00		
Best2	0.81	0.77	0.90	1.00	
Best1	0.70	0.65	0.76	0.92	1.00

Accounting & Finance: rank correlations

	RAE research output score	ABS score: best 4	ABS score: best 3	ABS score: best 2	ABS score: best 1
RAE research output	1.00				
Best4	0.81	1.00			
Best3	0.83	0.96	1.00		
Best2	0.80	0.79	0.86	1.00	
Best1	0.65	0.58	0.70	0.90	1.00

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