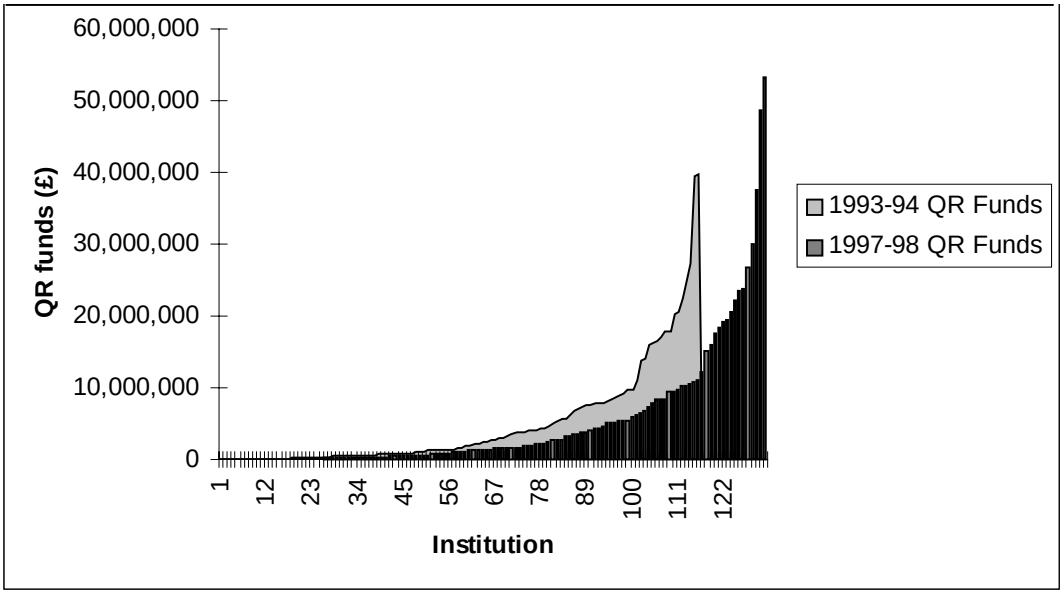
Annex E

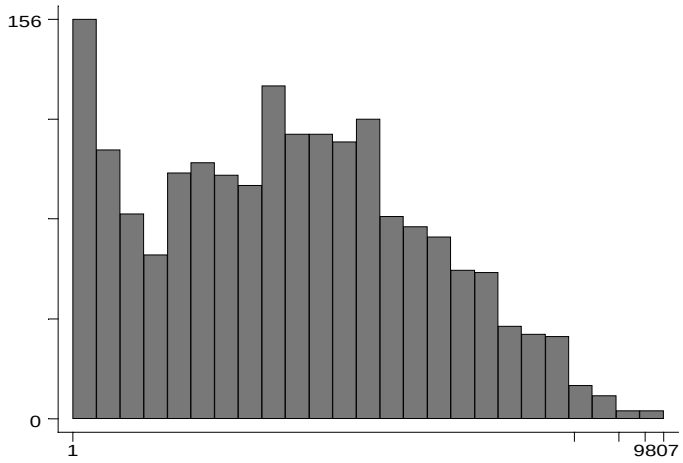
Concentration and critical mass

Figure E1 **Distribution of quality-related (QR) research funding between institutions following the 1992 and 1996 RAEs**



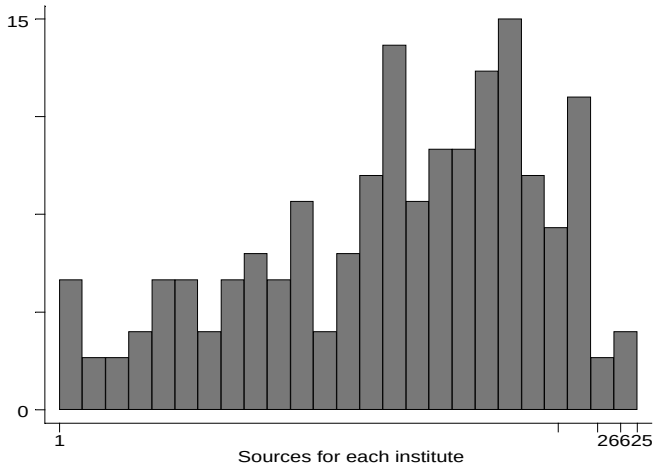
Each point on the X axis represents a separate institution, with its total HEFCE grant for research shown on the Y axis. It is clear from this graph that the vast majority of funds go to a small number of universities: 75 per cent of QR went to 28 of the 105 institutions which in 1997-98 received any significant element of QR funding (that is, more than £250,000). These 28 universities account for 68 per cent of research volume (that is, staff submitted to the RAE).

Figure E2 **Frequency distribution of the number of papers produced from institutions, at the Super UoA level**



This figure shows the number of super units of assessment (see Table G3) within HEIs recording a given level of published output. Output is described in terms of 25 equally sized 'bins'. Taking into account the very low output from specialist institutions, the pattern approximates to a normal distribution.

Figure E3 **Frequency distribution of the number of papers produced from institutions**



When the analysis giving rise to Figure E2 is repeated at the whole institution level, it is clear that the distribution is skewed: there are more institutions with high output levels than might be expected. This argues that high-output areas are co-located within certain institutions, the skew resulting from the additive effect of high-output areas in a relatively small number of institutions. However, the finding that institutions tend to have few high-output areas or many high-output areas, rather than a mix of high- and low-output areas, does not in itself demonstrate that 'critical mass' effects are at work.

Figure E4 **Relationship between ranked bibliometric impact (at the Super UoA level) against total output - UK**

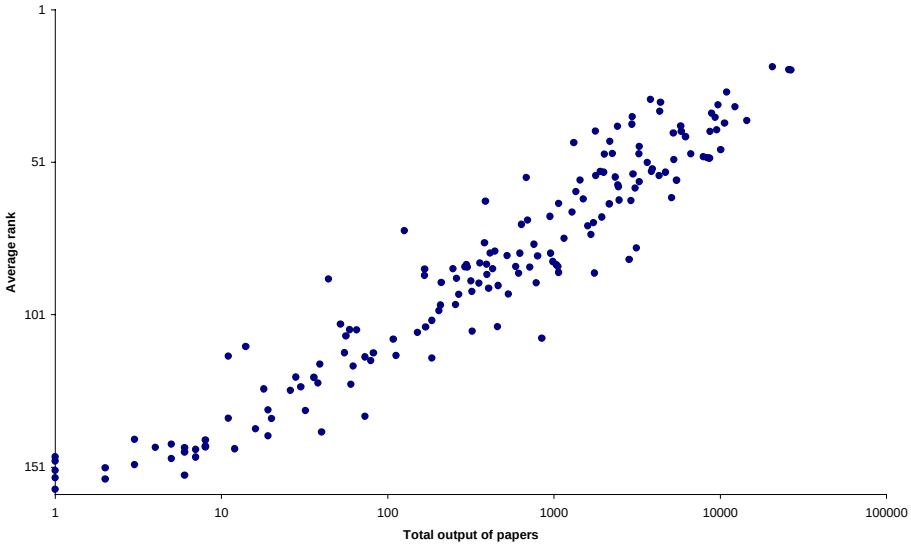
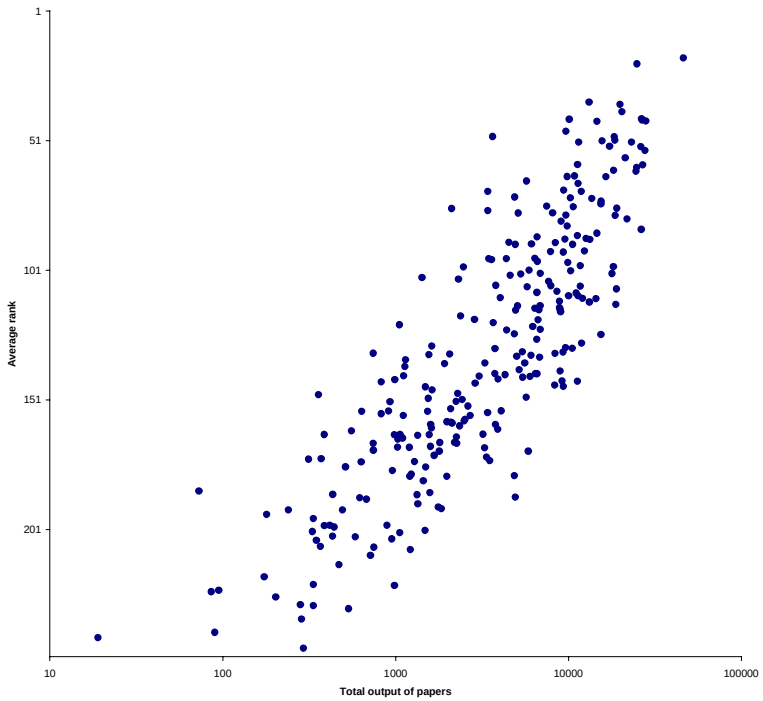


Figure E5 **Relationship between ranked bibliometric impact (at the Super UoA level) against total output - US**



To explore the role of critical mass, HEPU looked at the relationship between the level of output and bibliometric impact, at the Super UoA level. It is clear from the figures above that, both in the UK and the US, bibliometric impact - shown on the Y axis as ranked by HEPU - is correlated with level of output. However, there is considerable variance, indicating that the relationship is not predictive (see Figures E6 and E7). There is greater variance in the US: this may indicate the positive effect of the RAE in improving the quality of UK research, and at the same time increasing the level of strategic focus, thus reducing the tendency to proliferate papers with low impact.

Figure E6 **Size versus impact at the Super UoA level**

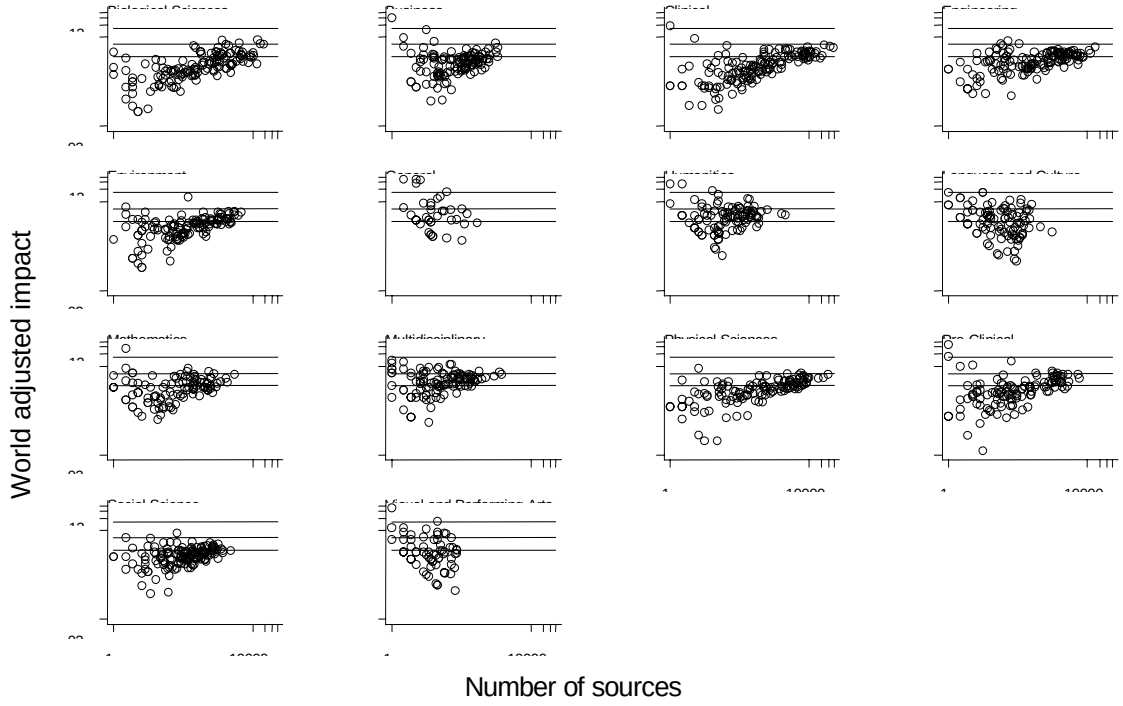


Figure E7 **Size versus impact for institutional Super UoAs performing at above the world average**

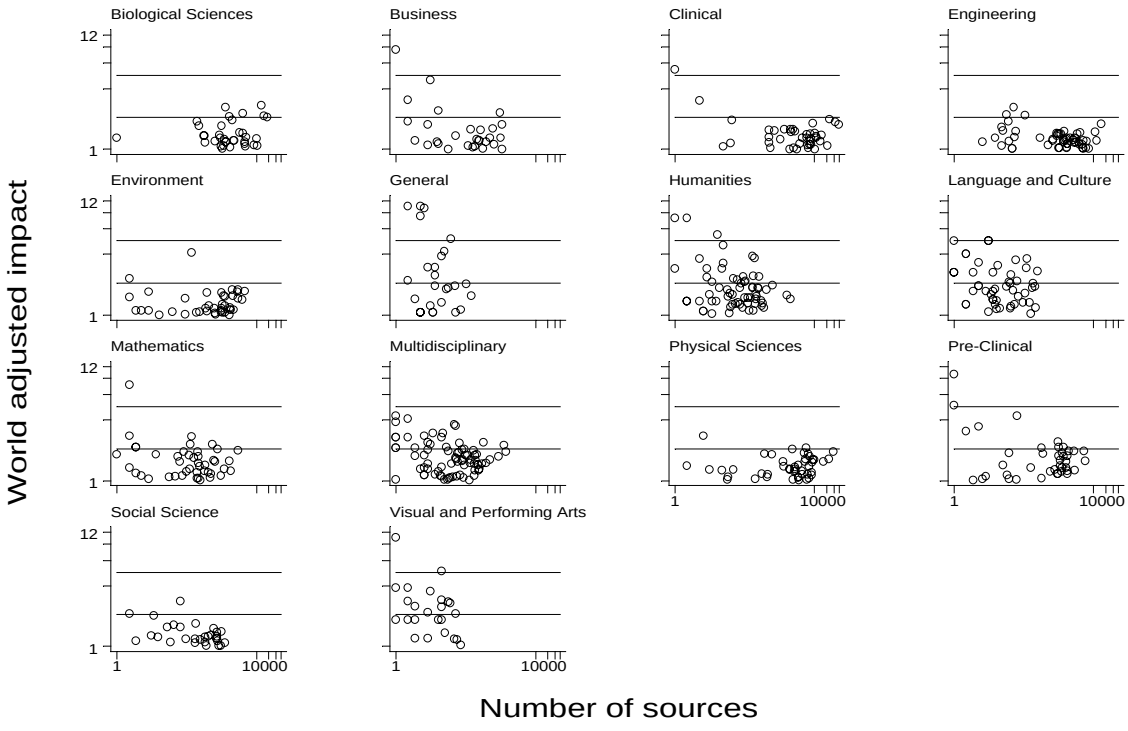


Figure E6 shows ‘size’ (number of sources, at the Super UoA level) on the X axis plotted against impact (against the world average) on the Y axis. Figure E7 shows the same information, with the same X axis scaling, but only for those institutions performing at above the world average (that is, the Y axis begins at 1). The data for those institutions above world average impact (Figure E7) does not show such a strong relationship between size and performance. This is evidence that in many subject areas there are small departments performing at the very highest levels.