Funding concentration

This analysis summarises key information on the concentration of ESRC research proposals and funding across Research Organisations (ROs).

We are sharing it externally to invite comment, discussion and further analysis. Our aim is to use its conclusions to help us to work effectively with Research Organisations on future demand management and research strategy.

If you have any questions or comments about this analysis please contact the head of ESRC's Insights team, alex.hulkes@esrc.ac.uk, or telephone 01793 413039.

Key findings

ESRC peer review processes do not concentrate funding to a degree greater than that apparent in the proposals that request the funding.

ROs which apply infrequently appear to have lower success rates than do those which are more active applicants.

Does peer review concentrate funding?

Gini coefficients are an indicator of how evenly funding requests and awards are distributed across ROs. Figure 1 shows the Gini coefficients for ESRC funding requested and awarded over the financial years 2011-12 to 2016-17[1]:

Distributions of funding requests and awards by RO are reasonably stable across the years
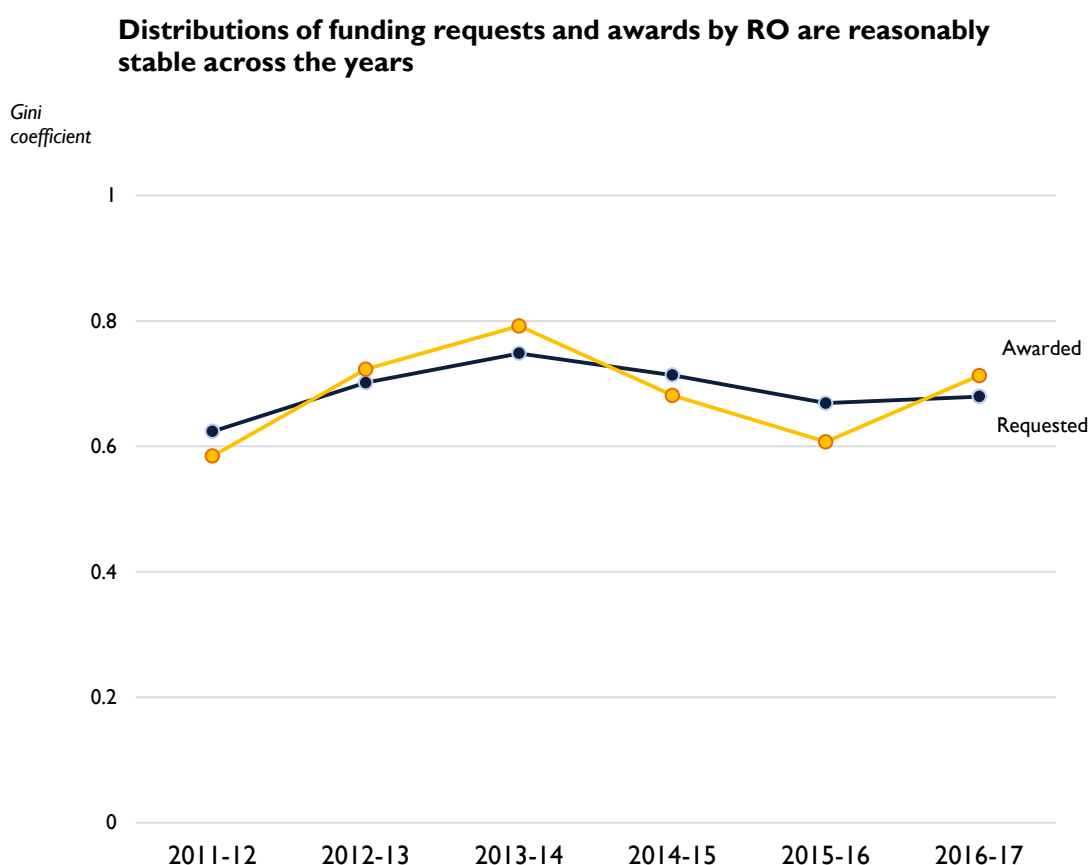

Figure 1: Gini coefficients for funding requested and awarded by RO, 2011-12 to 2016-17.

Funding requests and awards have become more distributed since a peak of concentration in 2013-14, but the net change since 2011-12 is small. Funding awarded is as likely to be more concentrated than funding requested as it is to be less concentrated.

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[1] This analysis uses the data available at http://www.esrc.ac.uk/about-us/performance-information/application-and-award-data/

Gini coefficients for applications and awards tend to vary together (Figure 2), with almost all the variability in one measure being associated with variability in the other:
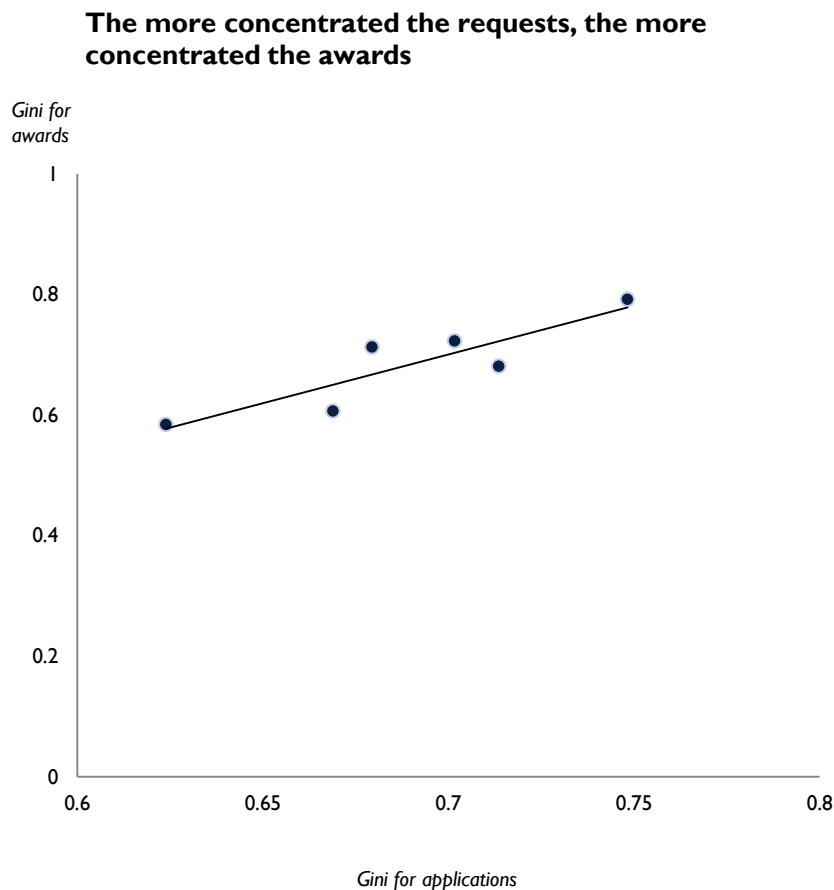
The more concentrated the requests, the more concentrated the awards

Gini for awards

Gini for applications

Figure 2:   Correlation between Gini coefficients for funding requested and awarded, 2011-12 to 2016-17 (note the truncated x-axis.) R^2 = .79

There is little room for factors other than the source and composition of the proposals submitted to influence the actual distribution of funding.

The ratio of the Gini coefficient for awards to that for applications can be expected to reflect the influence of ESRC decision processes on funding concentration across ROs. If this ratio is greater than 1, ESRC processes are concentrating funding to a greater degree than the pattern of applications might suggest. If the ratio is less than 1 we are distributing funding more widely. The value of the ratio gives an indication of the strength of the effect that ESRC decisions might be having.

Figure 3 shows this ratio for each of the last six years:

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Gini coefficients for funding awarded and requested differ very little
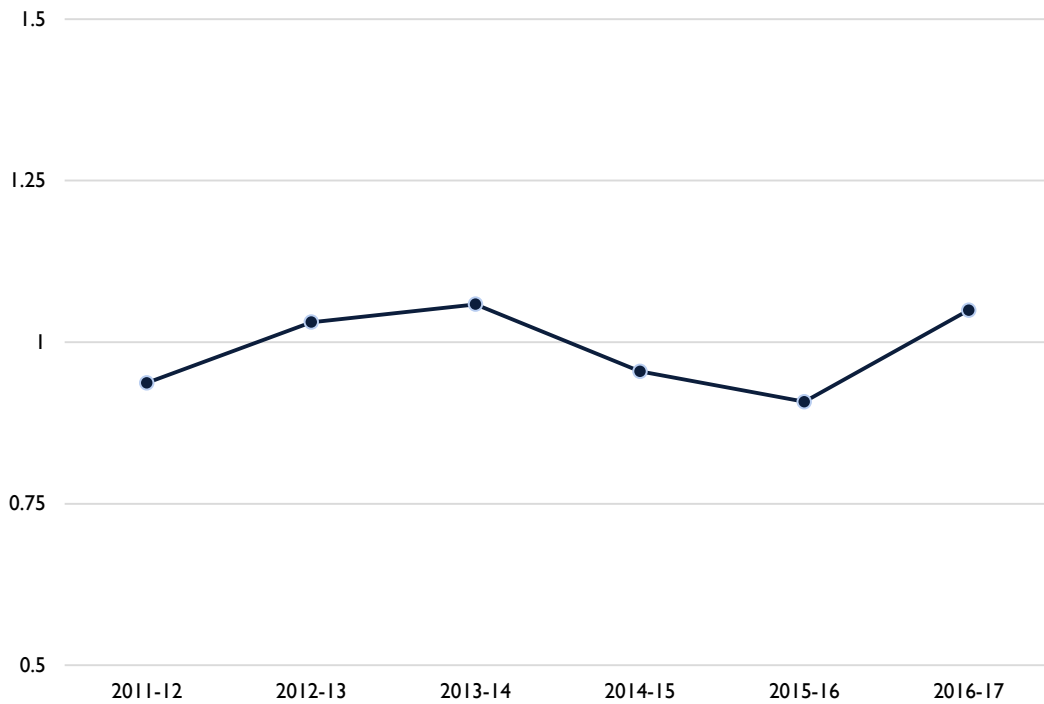

Figure 3:   ratio of Gini coefficients by RO, funded to requested, 2011-12 to 2016-17.

The ratio ranges between 0.90 and 1.05 and there is no discernible trend. It does not appear that ESRC review processes act systematically either to concentrate or redistribute funding across ROs. The overall distribution of funding actually awarded is very similar to that of the requests for funding that are received.

The fates of less-frequent applicant ROs

Across the 428 ROs who applied at least once in the period of the data, there were 1065 application years (in other words years in which an RO actually made an application[2].) Of these 1065 application years, 577 (54%) ended without the award of an ESRC grant. These range from years in which just one proposal was submitted and none was received, all the way up to a year in which an RO submitted 20 proposals but received no awards[3] (Figure 4):

Less frequent applicants comprise the majority of those not receiving awards
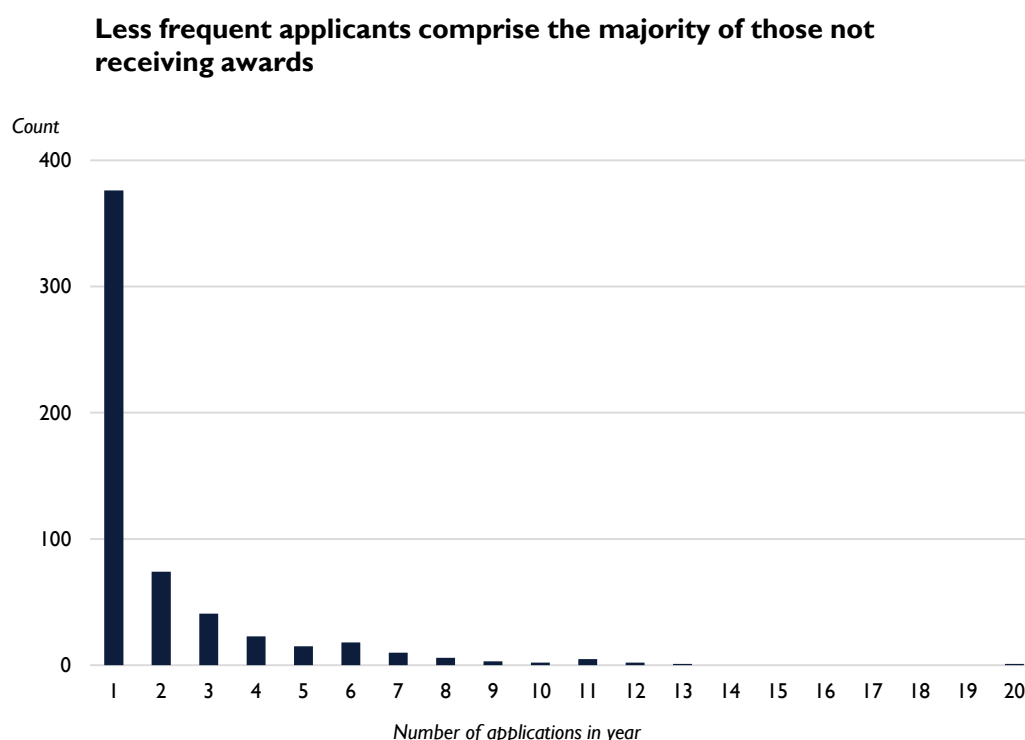

Figure 4:   application years without awards, 2011-12 to 2016-17. Total is 577.

Most commonly (nearly 80% of the time) years without an award are experienced by ROs applying just once or twice. As the number of proposals submitted by an RO in a year goes up it becomes increasingly unlikely that no award will be made.

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[2] In this terminology an application year of, for example, 6 is a year in which an RO submitted 6 applications.

[3] This seems like unusually bad luck, but in fact with an average success rate of 24%, the probability of an event this extreme happening by chance is about 3 in 1000. With seven application years featuring 20 applications, while unlikely, it's not inconceivable that we would see such an extreme result by chance.

Over the last six financial years the 428 ROs submitted a range of between 1 and 93 applications in each of their application years. The proportion of application years which resulted in the award of at least one grant is shown in Figure 5:

The most frequent applicants tend not to come away empty-handed

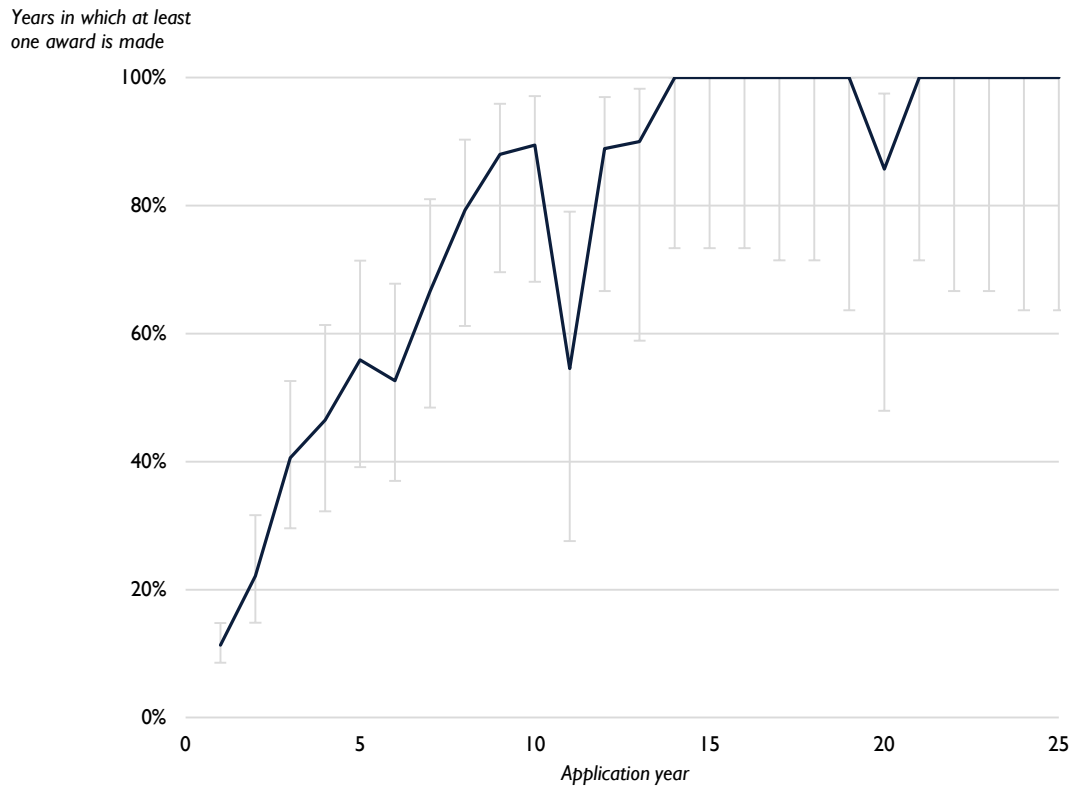*Years in which at least one award is made*

Application year

Figure 5: % of application years with at least one award made, by number of applications, 2011-12 to 2016-17. Application years greater than 25 are not shown as all greater than 20 resulted in at least one award. Error bars are 95% confidence intervals based on the Wilson score approach.

As expected, it's rare for any RO to submit many proposals without receiving at least one award, but quite common for infrequent applicants to do so. This trend helps illuminate the fate of less-frequent applicants.

If the success rate does not vary with the number of applications, the expected proportion of application years that might result in at least one award being made is

$$1 - [(1 - success\ rate)^n]$$

Where *n* is the number of applications made (1,2,…93). This proportion is in effect 1 when *n* greater than about 20, for all realistic success rates.

Figure 6 shows, in addition to the data in Figure 5, the expected proportion of years in which funding is awarded (shown in red , based on the prevailing 24% success rate) and a third line (yellow) which indicates the 'experienced' success rate – the success rate which most closely matches the observed data for these lower rates of application:

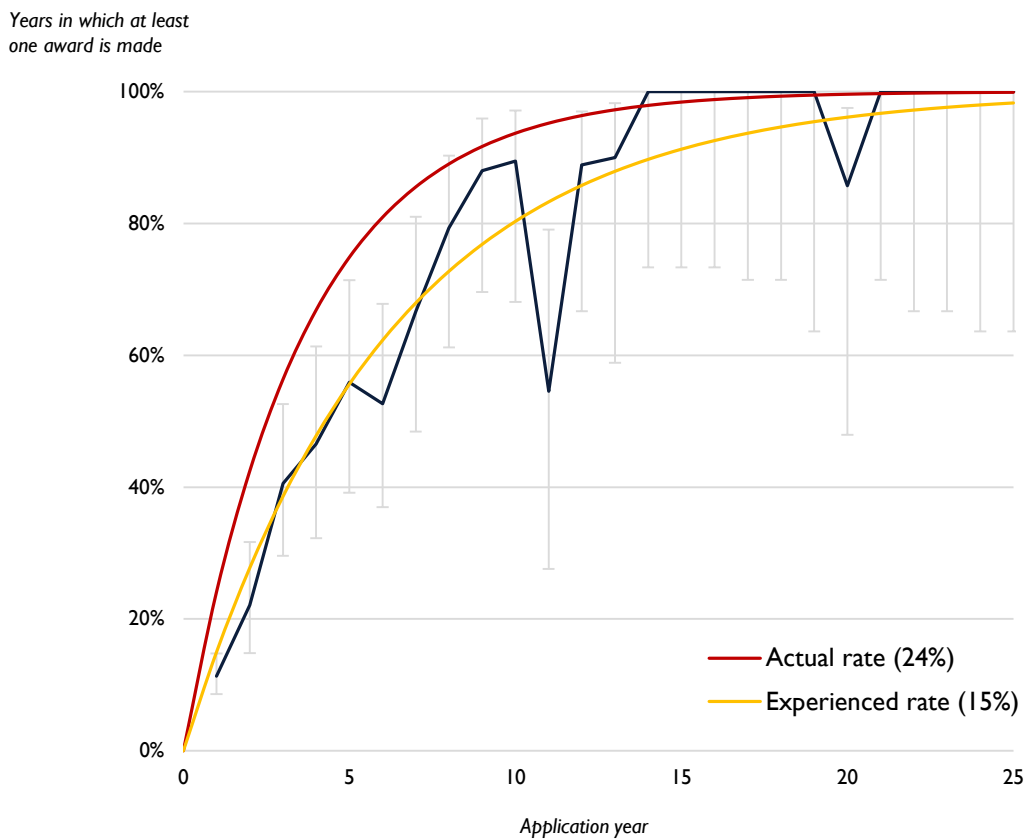**Less frequent applicants seem to experience lower success rates**

Figure 6:   Expected (red), observed (dark blue) and 'experienced' (yellow) % of application years with at least one award made, by number of applications, 2011-12 to 2016-17. Error bars are 95% Wilson score confidence intervals.

Visually, an experienced rate of about 15% is quite a good fit for the data, especially for ROs applying fewer than five times in a year. This is of course much lower than the rate for all proposals of 24%[4].

ROs which apply less frequently experience a reduced success rate. Whether they experience this rate because they apply less frequently, or they apply less frequently because they tend to experience a reduced rate, or whether some other factor influences both, requires further investigation.

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[4] It could be argued that, as the confidence intervals for the data often include the true overall rate, we cannot say that the experienced rate is in fact lower than the overall rate. But not all intervals include the overall rate, and in all cases the overall rate is greater than the experienced rate, suggesting that the difference is systematic and real. A closer look at this experienced success rate, and how it might vary with the number of applications, is in the annex.

Conclusions

The overall distribution of funding that is awarded by ESRC matches the distribution of funding requests that we receive. ESRC neither concentrates nor redistributes funding across ROs, at least not relative to the pattern we see in proposals.

We do not take from the poor and give to the rich, and we're not the Robin Hood of the Research Councils either. Taken together with what we know about the relative flatness of success rates it seems that suggestions of selection in favour of larger ROs in peer review are likely to have little substance. That's as it should be, as RO size on its own is not a sign of quality.

Across the social sciences we do of course concentrate funding. That is the job of the Research Councils. But we concentrate it in the hands of those who can use it to greatest effect – or at least we try to make sure that this is what happens. And it just so happens that we find more of those people in the larger ROs.

Where there is concentration, there will be those who lose out. It appears that those who lose out tend to be the ones who don't apply very frequently. If an RO applies only once or twice a year they can expect to have a lower success rate than their more active peers. This pattern persists up until an RO is applying about 20 times a year. At that point the success rate probably starts to become higher than average.

The direction of causation is important. A world in which a lower underlying success rate results in less frequent applications is different to one in which a less active application culture leads to a lower success rate. The former is better and also seems more likely.

Annex

For a success rate that is independent of the number of applications the expected proportion of application years that result in at least one award being made is

$$1 - [(1 - success\ rate)^n]$$

Taking (1- success rate) to be the 'failure rate' (FR) and treating the proportion as a probability, p, of getting at least one award from n applications:

$$p = 1 - FR^n$$

And

$$1 - p = FR^n$$

So the odds of receiving at least one award are:

$$odds = \frac{1 - FR^n}{FR^n}$$

$$odds = \frac{1}{FR^n} - 1$$

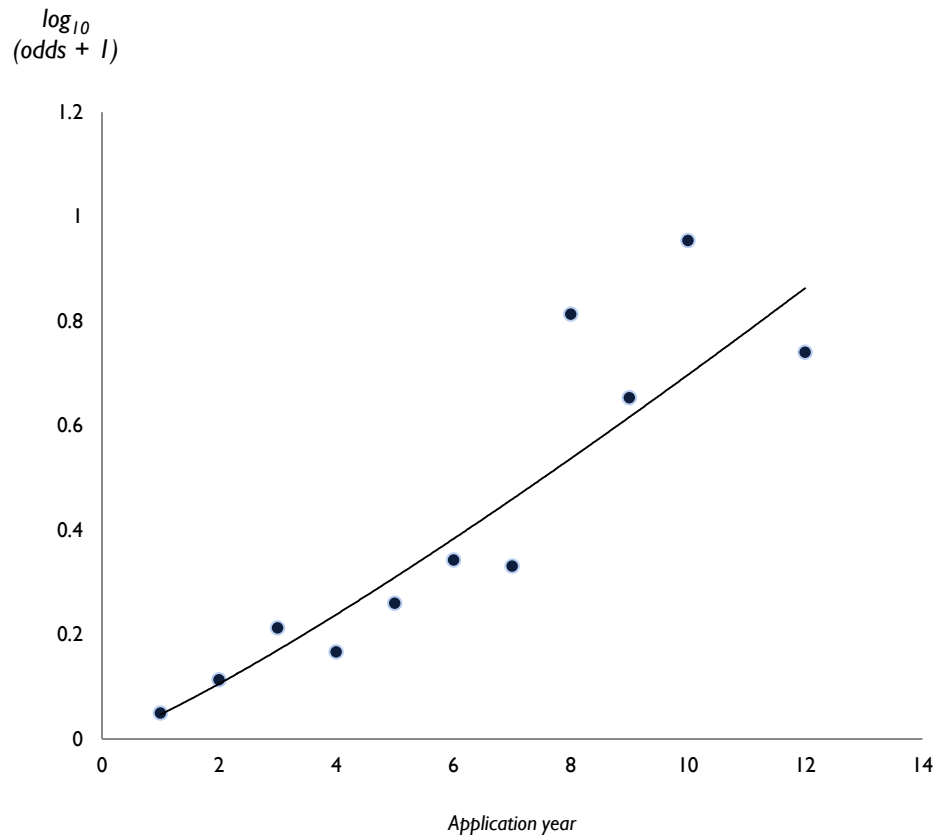$$odds + 1 = FR^{-n}$$

If the relationship between log(odds+1) and n were linear it would be described by:

$$\log(odds + 1) = -\log(FR) \times n$$

This gives estimated success rates for less frequent applicants of between 17% and 22%, which is qualitatively in agreement with Figure 6.

Plotting the observed odds for *n* up to 12 it is obvious that this relationship is in fact not linear[5]:

log_{10}(odds of at least one award being made +1) against number of applications made in year for applications in financial years 2014-15 to 2016-17. n = 11 is omitted as there is some doubt about the validity of the datapoint, though a similar result is obtained with it included. Regression line is for the power law given below, R^2 = .92.

Instead it is best modelled as a power law along the lines of:

$$log(odds + 1) = 0.047n^{1.17}$$

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[5] It can't be, as a lower than average success rate for infrequent applicants requires the rate for more frequent applicants to be higher than average. Data from ESRC and other Councils also suggest a relationship that is in general non-linear.

Using this relationship we can estimate the experienced success rate for each application year category[6]:

Applications	Estimated success rate (prevailing rate 24%)
1	10%
2	11%
3	12%
4	13%
5	13%
6	14%
7	14%
8	14%
9	15%
10	15%
11	15%
12	15%
13	15%
14	16%
15	16%
20	17%
25	17%
30	18%
35	18%
40	18%
45	19%
50	19%
55	19%
60	20%

ROs that apply more frequently have higher success rates, but in general ROs with similar numbers of applications have similar success rates.

If these implied rates are used to produce a funnel-type plot of RO success rates in financial years 2014-15 to 2016-17[7]:

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[6] Using the relationship: $implied\ rate = 1 - \frac{1}{10^{an^{b-1}}}$ where a and b are the coefficients in the equation.

[7] As found in the analysis at http://www.esrc.ac.uk/files/about-us/performance-information/application-and-success-rate-analysis/
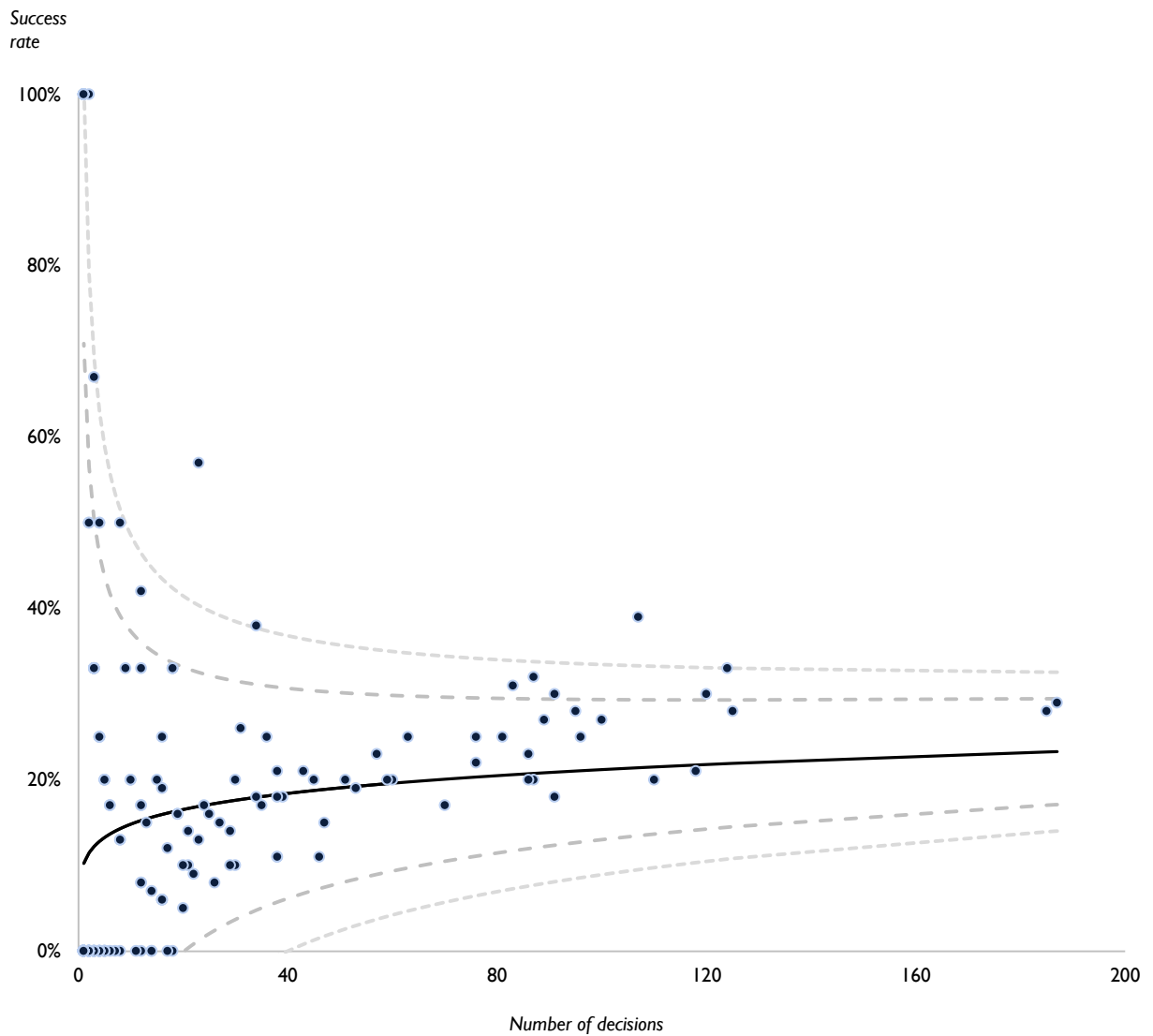
Figure 8:   funnel plot of RO success rates in financial years 2014/2015 to 2016/2017 using success rates based on log(odds of at least one award being made +1)=$0.047n^{1.17}$. Limits are approximately 95% (dashed line) and 99% (dotted line).

Qualitatively the fit is good, with the rising trend of success rates as *n* increases being tracked quite well. Just a very few ROs lie outside the 99% control limit (dotted line) and few are outside the 95% limit (dashed line.) It seems quite likely that these ROs are in fact behaving unusually, even allowing for the fact that they might not be expected to have the same underlying success rate.