

# Journal spend, use and research outcomes: a UK perspective on value for money

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# Study aims and objectives

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## RESEARCH QUESTIONS

***How have researchers responded to the unprecedented levels and convenience of access to scholarly journals?***

***Has enhanced access to the literature led to greater productivity, research quality and other outcomes?***

## RESEARCH OBJECTIVES

- ★ investigate researchers' information-seeking behaviour;
- ★ ascertain whether researchers' behaviours vary by subjects and disciplines, or in relation to the institutions in which they work;
- ★ consider any evidence of relationships between researchers' behaviours and usage, and institutional expenditure on e-journals;
- ★ consider any evidence of relationships between researchers' behaviours on the one hand and research productivity.

# Research design

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**top down**



database of UK university indicators

**bottom up**



deep log analysis of UK university departments

## **Case study institutions**

University of Aberdeen

Bangor University

University of Cambridge

Centre for Ecology & Hydrology (CEH)

University of Edinburgh

University of Manchester

Rothamsted Research

University of Strathclyde

University of Wales Swansea

University College London

## **Case study subjects**

Chemistry and chemical engineering

Earth and environmental sciences

Economics and econometrics

History

Life sciences and agriculture

Physics

## **The study in context**

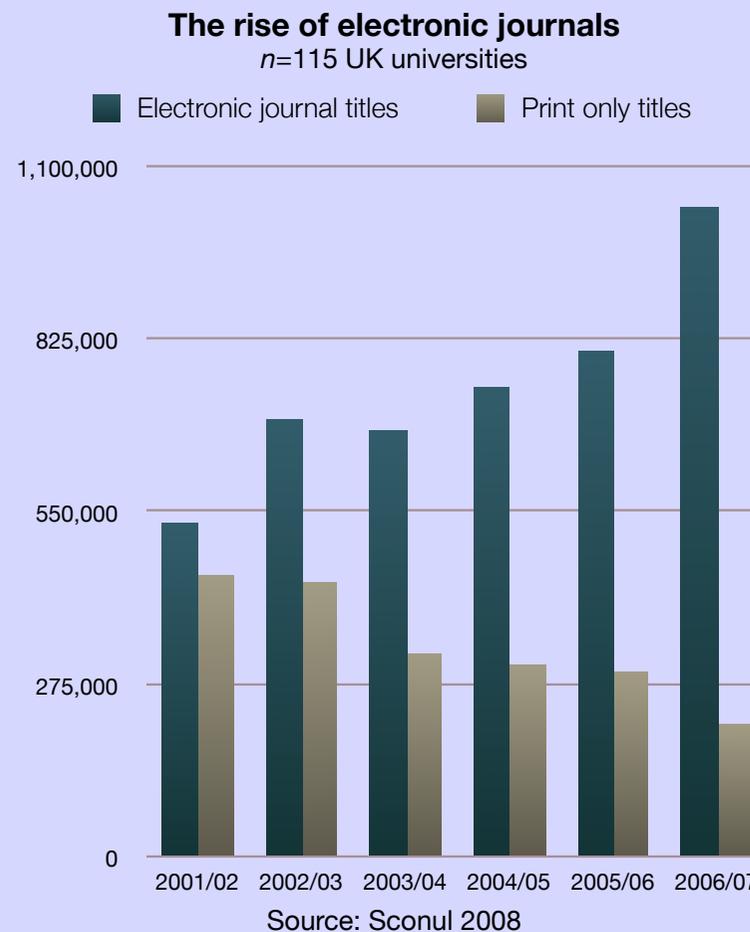
## The rise of e-journal provision

It is now estimated that 96.1 per cent of journal titles in science, technology and medicine, and 86.5 per cent of titles in the arts, humanities and social sciences are now available online<sup>1</sup>.

The scale of the e-journals enterprise is now enormous:

- ★ UK universities and colleges spent nearly £80 million licensing electronic journals in 2006/07;
- ★ we estimate that university researchers and students downloaded almost 102 million articles during that period;
- ★ downloads cost, on average, 80 pence.

<sup>1</sup>John Cox Associates for ALPSP, *Scholarly Publishing Practice Survey 2008*).



## Rapid consumer take-up

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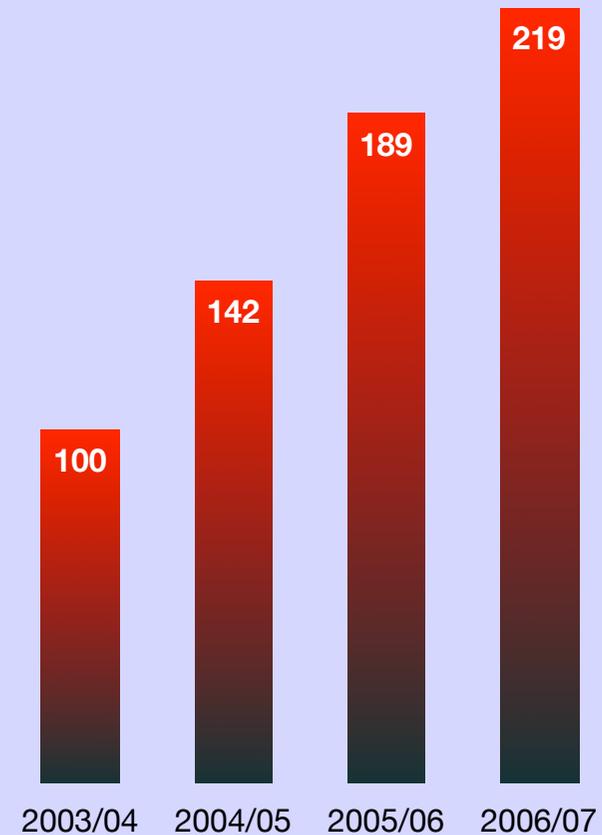
UK universities have taken full advantage of the enhanced provision of e-journals over the past five years.

The graph opposite shows the number of full text article downloads (from all publishers). Downloads are indexed to 100 for the academic year 2003/04 for ease of comparison.

In just three years:

- ★ total use more than doubled
- ★ ... at a staggering compound annual growth rate (CAGR) of 21.7 per cent per annum.

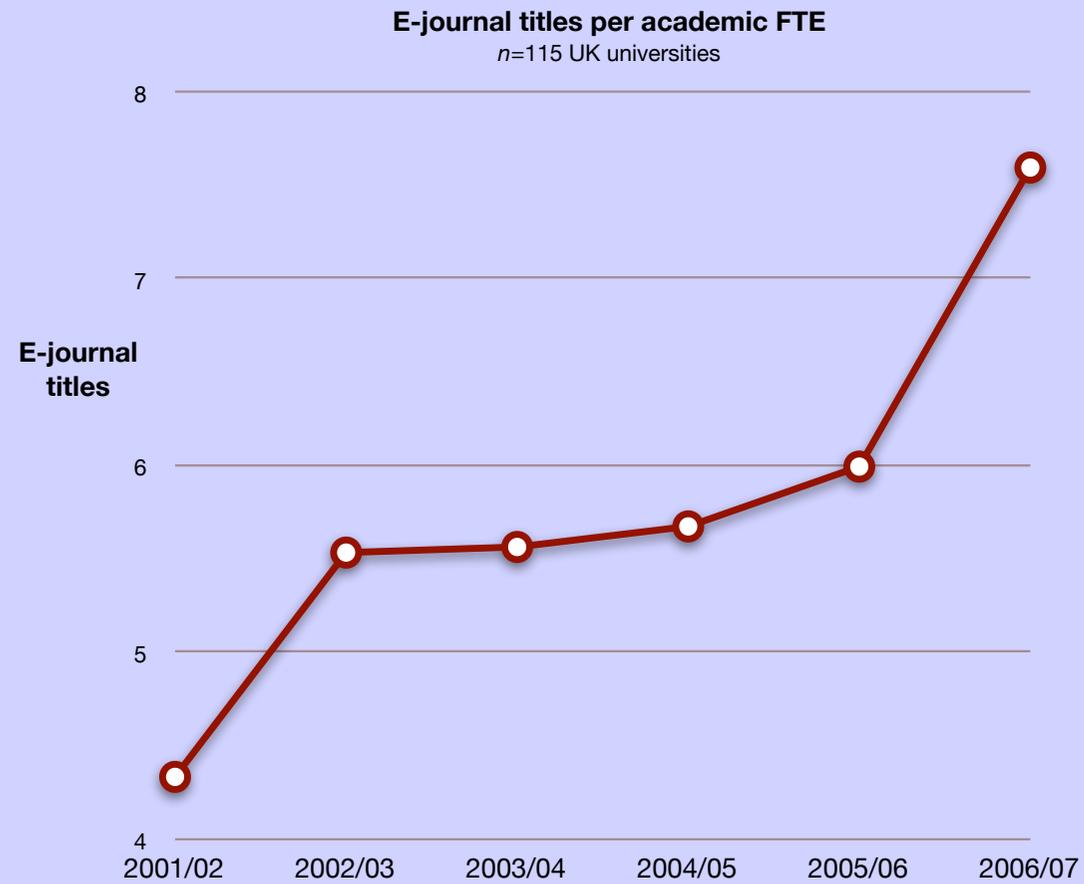
**The growth in article downloads**  
*n=67 UK universities*



Source: Sconul / COUNTER 2008

## Massive expansion of choice

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Source: Sconul / COUNTER 2008

# Intense activity across all subjects

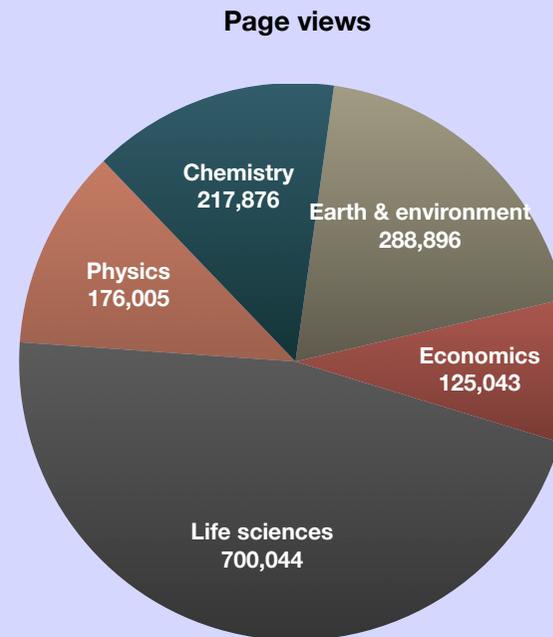
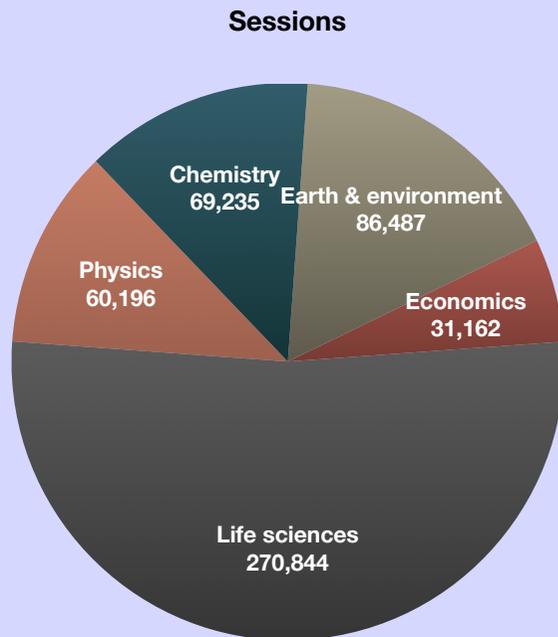
*Deep log analysis of ScienceDirect*

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Deep log analysis offers unique insights into user behaviour.

These pie charts convey something of the sheer scale and intensity of use made of e-journals.

The numbers are mind-boggling: and all this activity at just ten institutions over the first four months of 2008.



## **Information-seeking behaviour**

# Google is hugely popular and influential

*Deep log analysis of ScienceDirect and Oxford Journals*

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Once journal content is opened up to Google for indexing, Google is then used by large numbers of even the most proficient and informed information seekers.

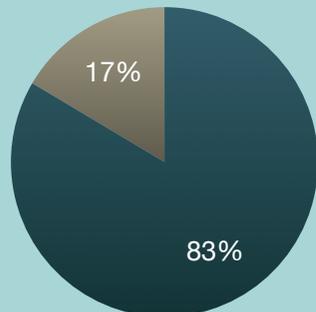
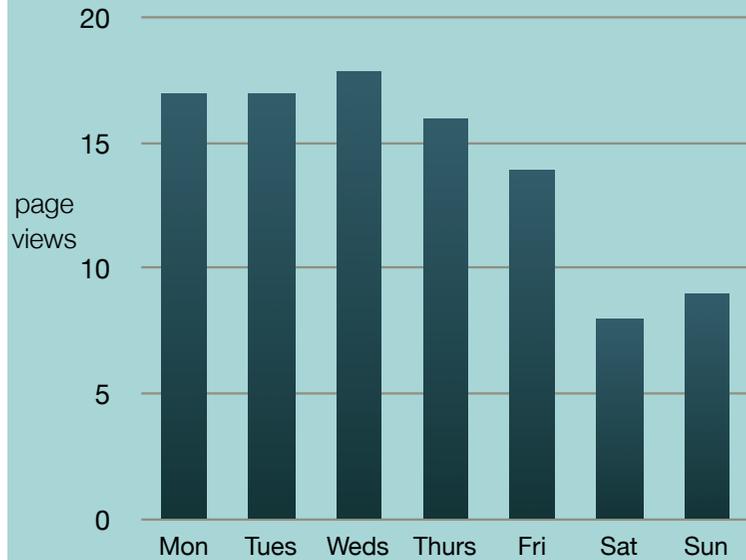
Just four months after ScienceDirect content in physics was opened up to Google, more than a third of all traffic arrived via this route. This is particularly notable in a field richly endowed with online information resources.

Google's popularity is also shown in the case of Oxford Journals where Google has had access for some years: over half of their traffic comes via Google, especially in the case of 'super-users'.

# UK readers burn the candle at both ends

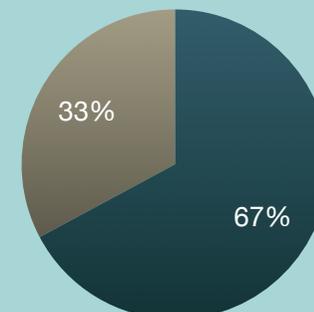
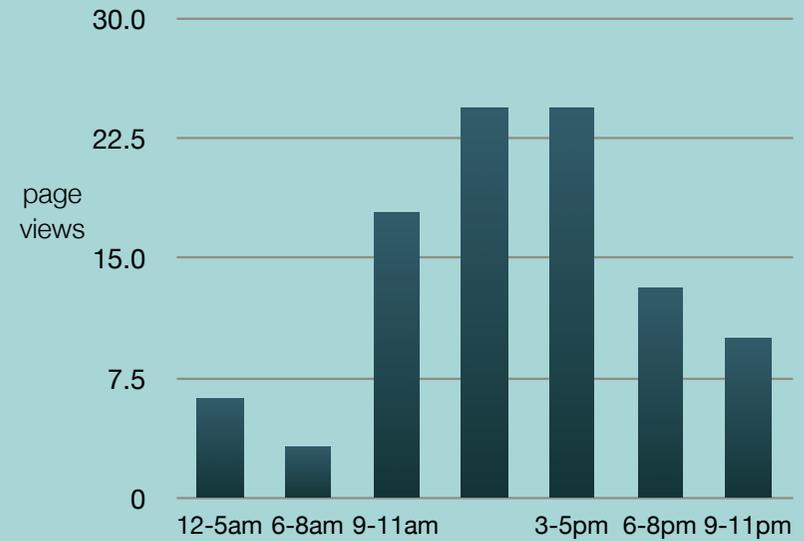
Deep log analysis of ScienceDirect

### A working week in economics



Monday to Friday      Weekends

### A working day in economics



Office hours      Outside 9-5

**Users are making the fullest possible use of e-journals.**

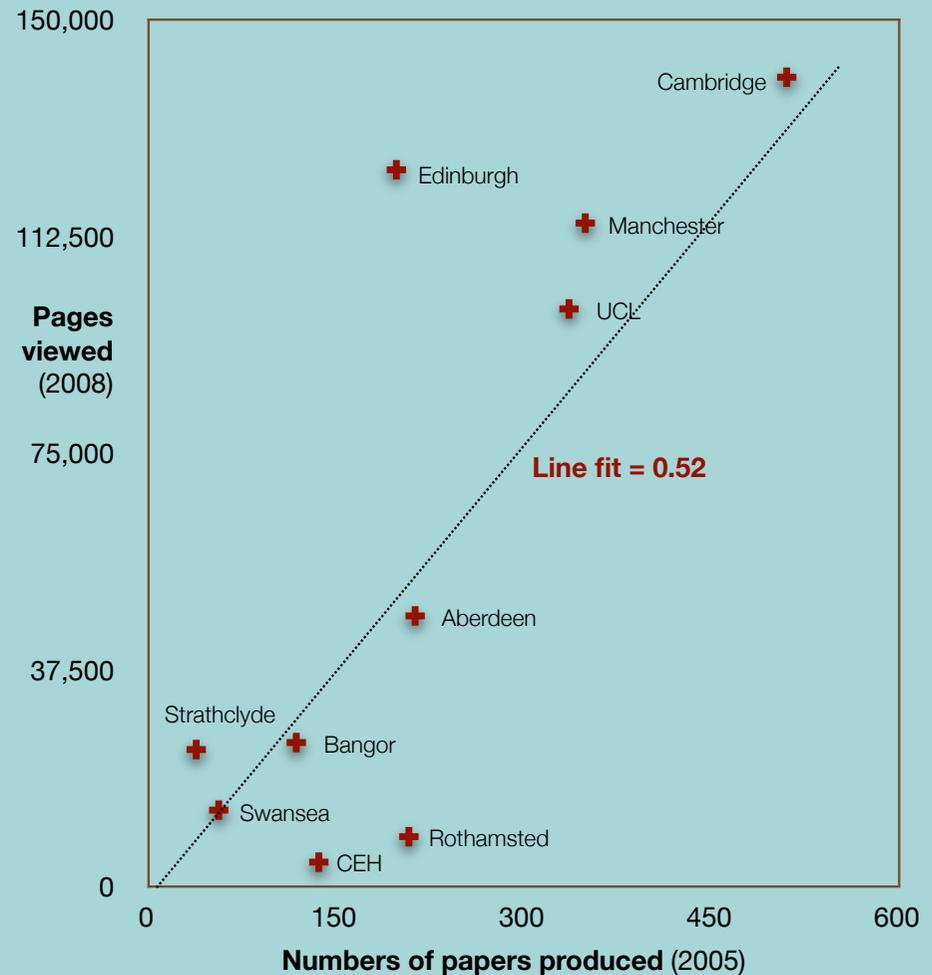
# Page views and publications: a link?

*Deep log analysis of ScienceDirect*

## Life sciences

This chart shows a strong correlation between page views and articles published at each institution.

**Does this mean that information consumption and production are in some way related to each other?**



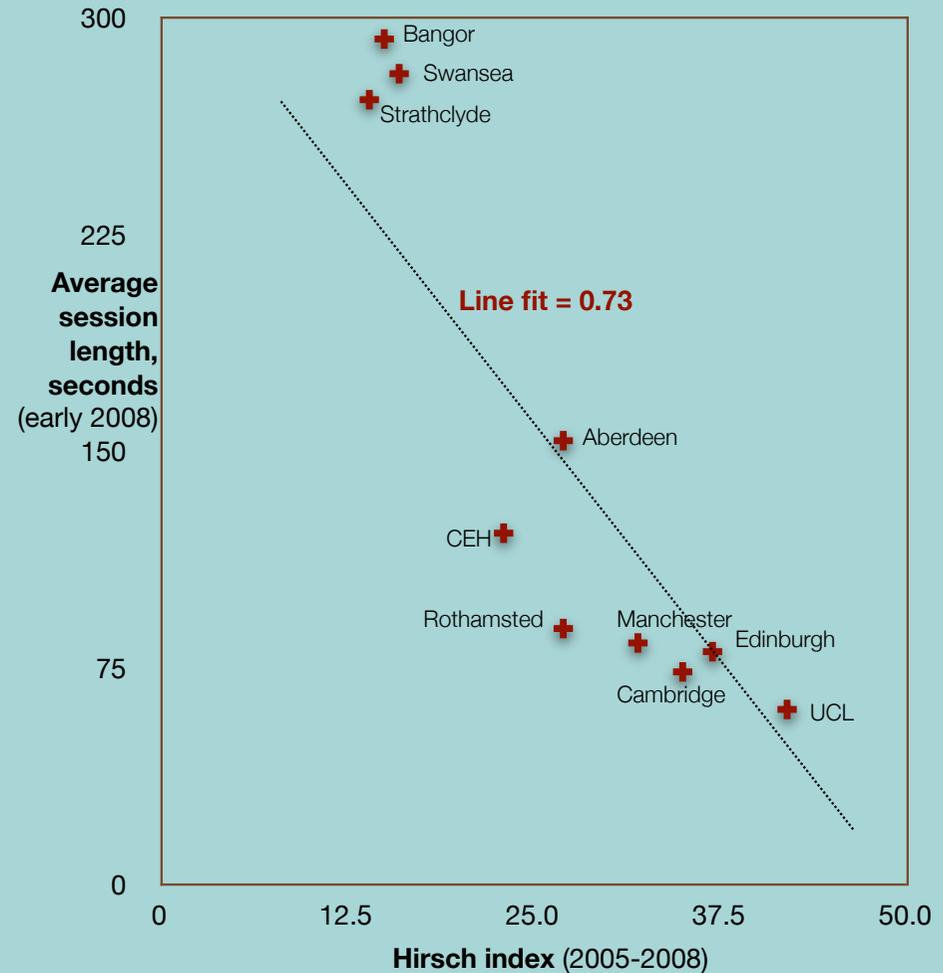
# Efficient search = successful research??

*Deep log analysis of ScienceDirect*

## Life sciences

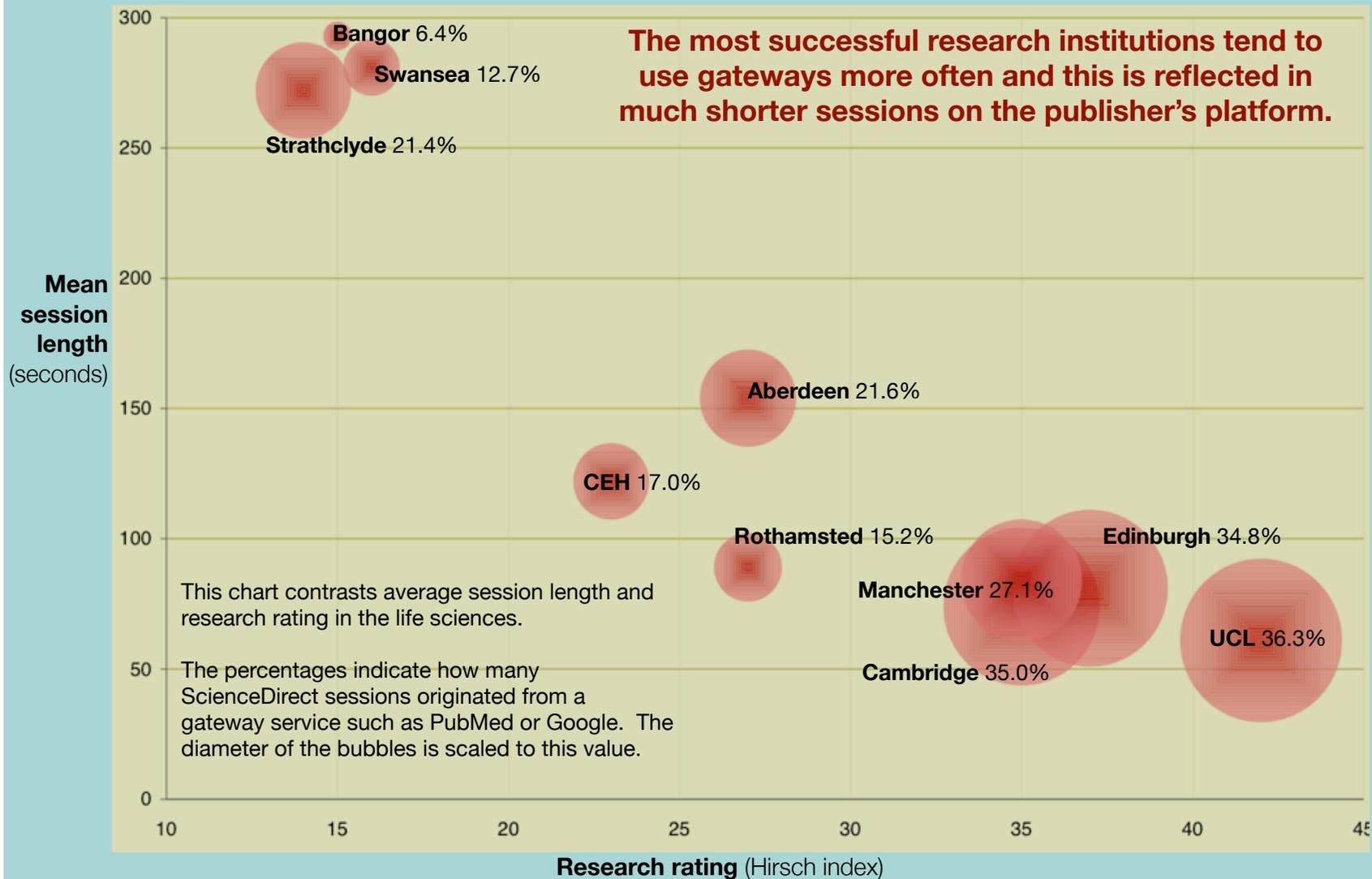
This chart shows a strong negative correlation between the research rating of life scientists in each institution, as measured by the Hirsch index, and the length of their sessions in ScienceDirect (measured in seconds).

**Is there a link between efficient search and successful research?  
We need to find out.**



# Session length and gateways

Deep log analysis of ScienceDirect



## **Journal spend, use, and research outcomes**

## Journal spend and journal use

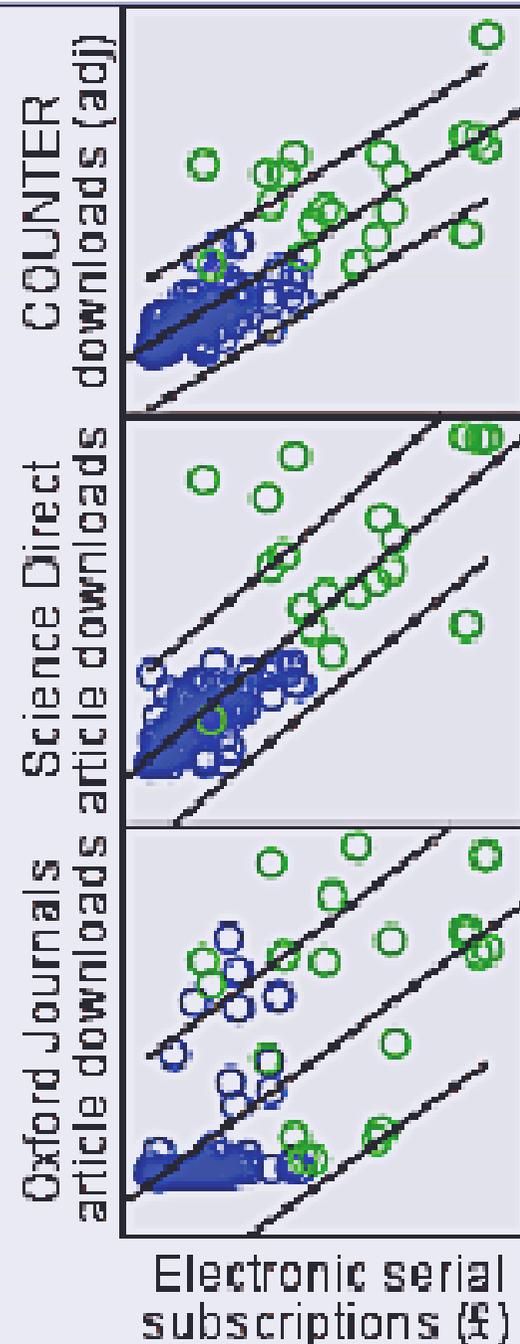
*CIBER institutional indicators*

Surprisingly, no one seems to have explored the relationship between UK spending on electronic journals and levels of actual use.

The chart opposite illustrates highly-credible correlations between electronic serials spend and downloads: whether for COUNTER-compliant sources (the vast majority of journals), or for Elsevier or Oxford Journals titles.

**This suggests that levels of usage are closely related to levels of expenditure, and that money is being spent efficiently at the UK level.**

Note: The green dots represent Russell Group universities.



## Are super-users also super-producers?

*CIBER institutional indicators*

We have identified three groups of universities in terms of downloading volume: moderate, high and super users. In the table below, we match these usage groups with research outcome measures:

	Moderate users (n=80)	High users (n=25)	Super users (n=10)
<b>Research papers per academic</b>	0.4	0.8	1.0
<b>Research grants and contracts per academic (£000s)</b>	12.7	29.0	39.7
<b>PhD awards per 100 academics</b>	9.1	17.5	17.4
<b>Cost per download</b>	£0.89	£0.74	£0.60

The evidence provided here suggests **a tentative link between e-journal consumption and research outcomes**. The differences between the three groups are statistically very significant with respect to research outcomes, but there is no such difference in terms of average cost per download.

# Journal use and research outcomes: PhD awards

*CIBER institutional indicators*

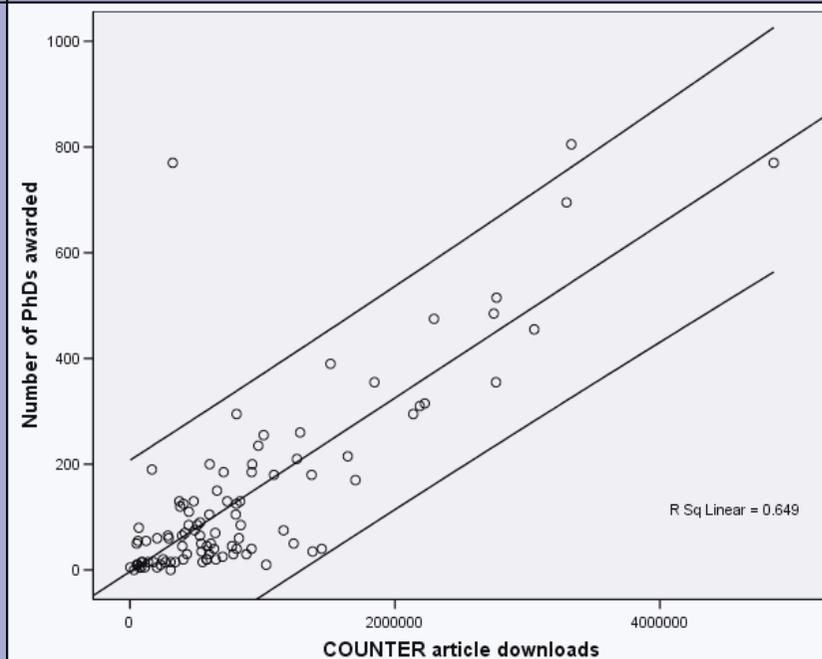
This is the first of three slides that demonstrate strong statistical associations between journal use and research outcomes.

The diagram plots numbers of article downloads (as recorded by institutions using the COUNTER standards) against PhD awards for 2006/07. The outer lines are 95 per cent confidence intervals.

**The model shows a good fit with few outliers.**

## PhD awards and article downloads, 2006/07

*n*=112 UK universities



# Journal use and research outcomes: RGC income

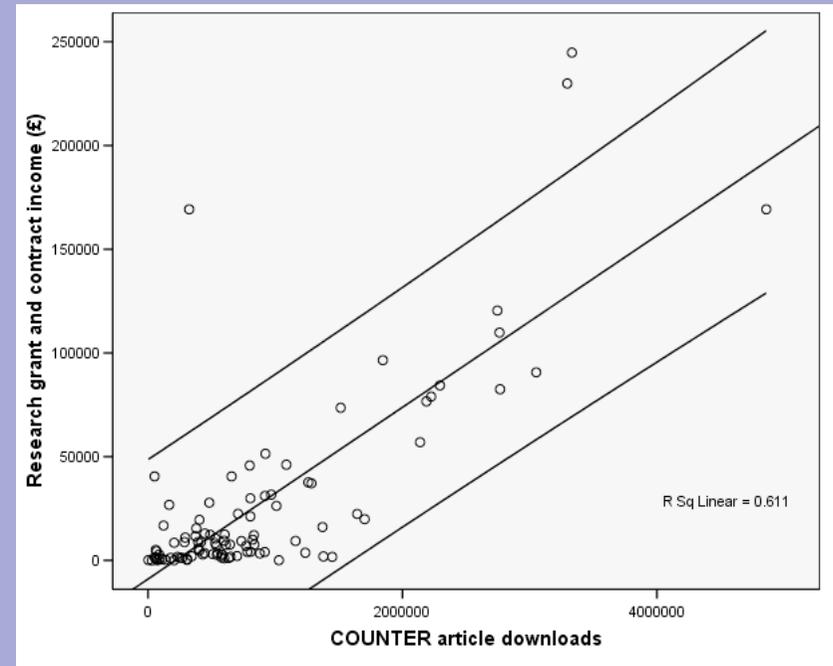
*CIBER institutional indicators*

This slide shows a similar association between numbers of article downloads and success in securing research grants and contracts (RGC) income.

**The model shows a good fit with few outliers.**

## RGC income and article downloads, 2006/07

$n=112$  UK universities



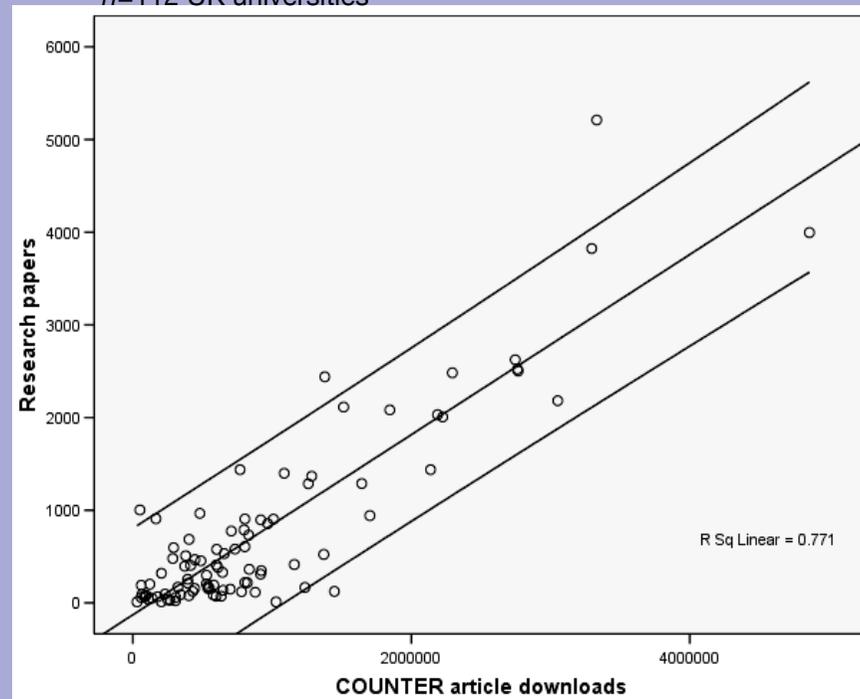
# Journal use and research outcomes: publications

*CIBER institutional indicators*

Finally, we see a powerful statistical association between numbers of article downloads and numbers of papers published in scholarly journals.

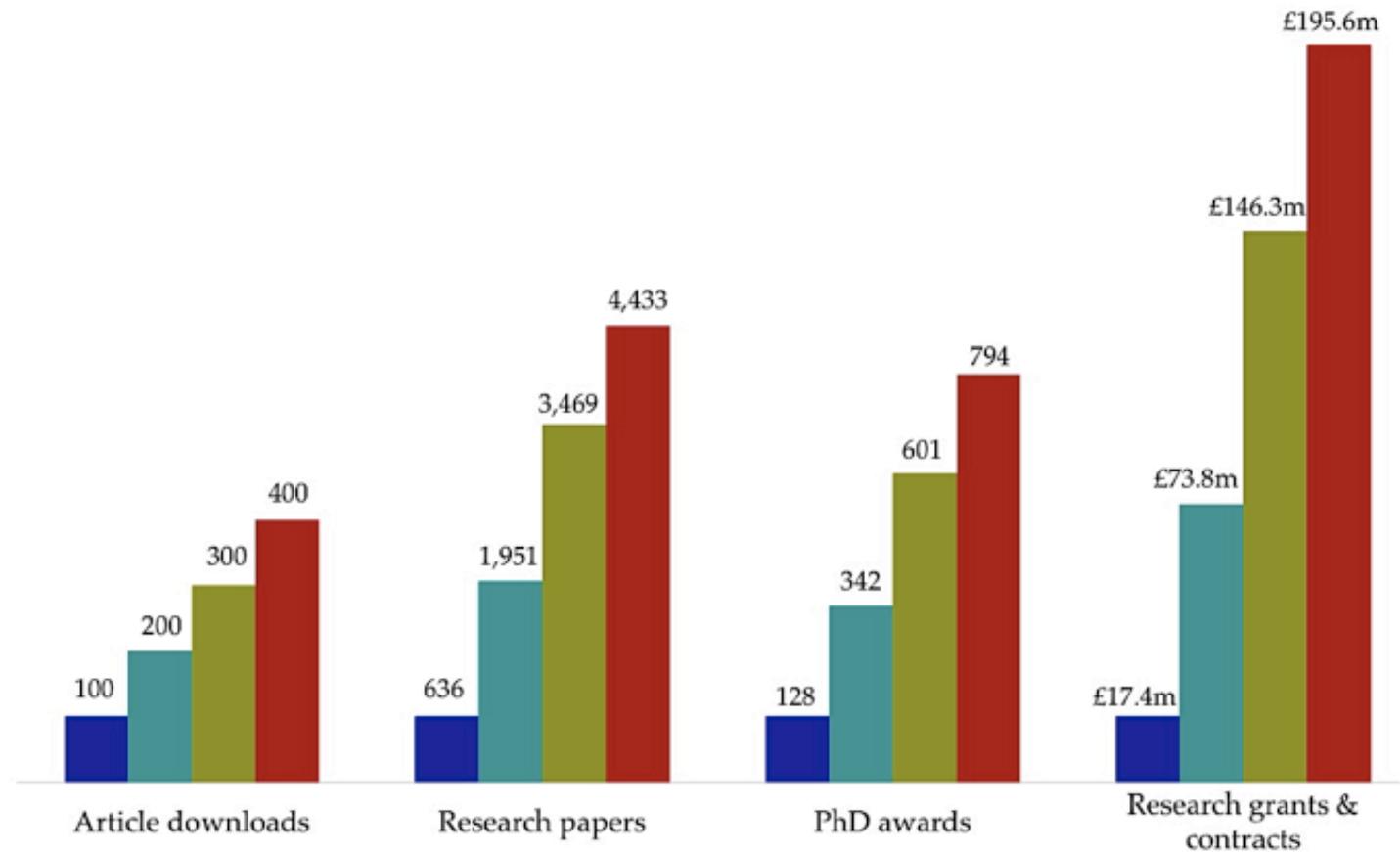
**The model shows a good fit with few outliers.**

**Papers published and article downloads, 2006/07**  
*n*=112 UK universities



# Journal use and research outcomes: a thought experiment

*CIBER institutional indicators*



- 1 million downloads
- 2 million downloads
- 3 million downloads
- 4 million downloads

100	100	100	100
200	307	268	424
300	545	471	841
400	697	622	1,124

Indices

**In conclusion**