Exploring the impacts of enhanced access to publicly funded research

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Project goals and audience

- Project aims were to explore and where possible measure: the costs associated with research communication, and the potential benefits of enhanced access to research results; and to compare the costs and benefits of alternative access systems.
- The project was funded by the Australian Department of Education, Science and Training, as an input to government policy on Open Access (e.g. The Research Quality and Accessibility Frameworks).
- It was also aimed at funding agencies and universities, as an input to their access policies and as a guide to the budgetary implications of various alternatives.

Systems perspective on costs

Research
- Reading & Research
- Preparation & Writing
- Submission & Revision
- Editorial Activities
- & Peer Review

Publishing
- Acquisition of content
- Editing & Production
- Abstracting & Indexing
- Marketing & Sales
- Distribution & Access

Research Funding
- Research Funding
- Grant Assessment
- Research Management
- Research Evaluation

Research Infrastructure
- Equipment & Facilities
- Library & Information Access
- Archives / Repositories
- ICT Network / Grid
Cost model and matrix approach

- The bulk of the costs associated with research communication relate to people’s time.
- To convert time to dollars we used a model for full cost recovery that included salary, on-costs and overhead costs typical in universities.
- Scholarly communication is multi-dimensional, so we adopted a “matrix” approach to costing: activities, actors, objects, functions and applications.
- With the aim of being able to break down and re-assemble the scholarly communication value chain along any of these dimensions.
- We produced upper and lower bound “range” estimates, and the ranges were often large.
Mean activity cost estimates for Higher Education, 2005 (AUD)

- Reading: academic staff ≈$5.8 billion, published staff ≈$3 billion pa.
- Writing (HERDC publications only) ≈ $636 million pa.
- Peer review (scaled to HERDC) ≈ $132 million pa.
- Editorial activities (scaled to published staff) ≈ $36 million pa.
- Editorial board activities (scaled to published staff) ≈ $3.8 million pa.
- Preparing grant applications (ARC & NHMRC) ≈ $110 million pa.
- Reviewing grant applications (ARC & NHMRC) ≈ $26 million pa.
- Publisher costs (scaled to HERDC) ≈ $164 million pa.
- Library acquisition costs (CAUL) ≈ $199 million pa.
- Library non-acquisition costs (CAUL) ≈ $321 million pa.
- Cost per download (sample of CAUL subscriptions) $3.51 (mean).
- ICT infrastructure (estimated total expenditure) ≈ $1 billion pa.
- Sum of core activities ≈ $4 billion (≈ 30% of HE expenditure).
Our matrix approach supported costing for **objects** (*e.g.* production of journal articles cost an average $21,000), and **actors** (*e.g.* writing HERDC publications cost ANU $50 million).

We estimated that attributable *publisher* costs relating ANU’s output of HERDC publications amounted to $14 million, while its library acquisitions expenditure was $7.3 million.

Whereas, nationally, higher education *publisher* costs amounted to $165 million, while CAUL library acquisitions expenditure was $199 million (a margin approximating the operating margin of commercial scientific publishers).
An Impacts Framework

RESEARCH
Access for all, research participation based on merit, not means.

Potential benefits:

SOCIETY
Access as needed, informed consumers (e.g. health and education).

Potential benefits: Contribution to the 'informed citizen' and 'informed consumer', with implications for better use of health and education services, better consumption choices, etc. leading to greater welfare benefits.

SUBSCRIPTION PUBLISHING
Current reach

CONSUMERS/SOCIETY
Few served

RESEARCH
Most/Many served, but not all

OPEN ACCESS
Potentially serves all

INDUSTRY/GOVERNMENT
Part served, but not all

INDUSTRY/GOVT
(1) Access as needed, more innovative producers & informed policy.
(2) New businesses add value to content (e.g. Weather Derivatives).

Potential benefits: Accelerate and widen opportunities for collaboration, commercialisation & adoption. The potential for much wider access for GPs/nurses, teachers/students, and small firms in consulting, engineering, ICT, nanotechnology, biotechnology, etc. The potential for the emergence of new industries based upon the open access content.

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One approach to measuring impacts: A modified Solow-Swan model

- There is a vast literature on returns to R&D, which while varied shows that social returns to R&D are high – typically 30% to 60% a year.
- The standard approach assumes that all R&D generates useful knowledge (efficiency) and all knowledge is equally accessible (accessibility), which is unrealistic.
- We introduced “accessibility” and “efficiency” into a standard model as negative, friction variables, and looked at the impact of reducing the friction by increasing access and efficiency.
Impact estimation assumptions

- We calculated the annual gain in returns to R&D for a given level of research expenditure, across a range of rates of return, for given percentage changes in both “access” and “efficiency”.

- We looked at rates of return of 25% to 75%, and increases in access and efficiency of 1% to 10% (and used 25% and 5% as examples).

- To keep it simple we assumed:
  - The increase in both access and efficiency is the same;
  - That a move to OA has no net impact on the rates of accumulation and obsolescence of the stock of knowledge; and
  - That the information to which access is provided is discoverable.
**Impact estimation ranges**

**Example of estimation tables (HERD, AUDm)**

<table>
<thead>
<tr>
<th>Higher Education</th>
<th>Rate of return to R&amp;D</th>
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<tbody>
<tr>
<td>4,283</td>
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<tr>
<th></th>
<th>25%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>75%</th>
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<tbody>
<tr>
<td>Per cent change in</td>
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<td>accessibility and</td>
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<td>efficiency</td>
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| Recurring annual  | 1%  | 2%  | 5%  | 10% |
| gain from move to |     |     |     |     |
| open access (AUD  |     |     |     |     |
| million)           |     |     |     |     |
| 4,283              | 22  | 43  | 110 | 225 |
| 25%                | 34  | 69  | 176 | 360 |
| 40%                | 43  | 87  | 220 | 450 |
| 50%                | 52  | 104 | 263 | 540 |
| 60%                | 65  | 130 | 329 | 675 |
Estimating potential impacts of OA

- With government R&D funding at $6.5 billion a year and a 25% return, a 5% increase in access and efficiency would be worth $166 million pa.
- With higher education R&D expenditure at $4.3 billion and a 25% return, a 5% increase in access and efficiency would be worth $110 million pa.
- With RC competitive grants funding to HE at $830 million and a 25% return, a 5% increase in access and efficiency would be worth $21 million pa.
- These are recurring annual gains from one year’s R&D expenditure.
Comparing cost and benefits

- We compare the estimated incremental cost of institutional repositories in HE with the potential incremental benefits from enhanced access to HE research (ceteris paribus).

- Over 20 years, a national system of institutional repositories costing $10 million a year would cost around $130 million (NPV), whereas:
  - Enhanced access to HE research, with impacts at $110 million a year, would realise benefits of around $4.8 billion (a benefit/cost ratio of 37).
  - Enhanced access to RC competitive grants funded HE research, with impacts at $21 million a year, would realise benefits of around $925 million (a benefit/cost ratio of 7).
Assessment, use and lessons

- Many weaknesses and limitations, but strength in simplicity.
- Should be supplemented by detailed studies of impacts in specific cases (See the Easi-OA Research Agenda at http://www.cfses.com/projects/Easi-OA.htm).
- Impact estimates likely to be conservative, as critiques focus on dimensions not included in the traditional approach.
- Applies to any outputs of research (publications, data, etc.).
- Has potential for development and refinement, and may be more widely applicable to PSI.
- Has been influential in access policy in Australia, and current work includes extending the analysis in Europe.
Background and references

