

Exploring the economic impacts of open access to publicly funded research

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Impacts of alternative access models (UK, Netherlands, Denmark, Germany, US and Australia)

- UK JISC study of the *Economic Implications of Alternative Scholarly Publishing Models*, in collaboration with Loughborough University.
- SURF Foundation and DEFF studies exploring the costs and benefits of alternative publishing models in the Netherlands and Denmark.
- DFG study, in collaboration with Goethe Universität in Frankfurt, bringing the German National Licensing Program (NLP) into the mix of alternative models.
- SPARC study of the potential impacts of the US *Federal Research Public Access Act* (FRPAA).
- FI-DEFF study of access to academic research by small high-tech firms in Denmark, its impact on innovation and value to them.
- ANDS study of access to public sector information, and UK ESRC study on the value of the Economic and Social Data Archive.

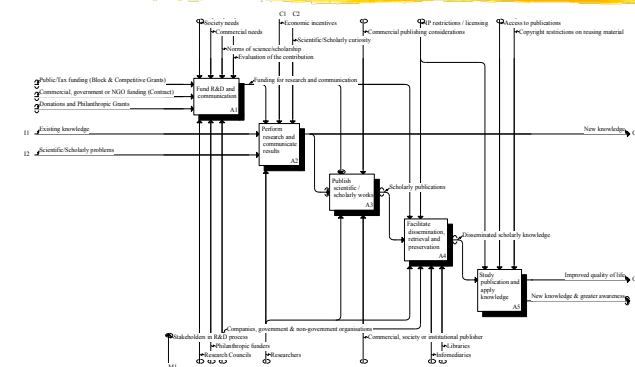
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Alternative publishing models (All include peer review, quality control & commercial margins)

- The studies focus on three alternative publishing models:
 - Subscription publishing – using individual or research library subscriptions;
 - Open access publishing – where access is free to reader, and the authors, their employing or funding organisations pay for publication; and
 - Self-archiving – where authors deposit their work in on-line repositories, making it freely available to anyone with internet access.
- To ensure that all models include peer review and quality control, we explore two self-archiving models:
 - Green OA self-archiving in parallel with subscription publishing; and
 - An overlay services model of self-archiving with overlay production and peer review services.

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The lifecycle process model (www.cfses.com/EI-ASPM/SCLCM-V7/)



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The activity cost model

(Activity costing based on the life-cycle process model)

- Created a series of spreadsheets containing each of the elements identified in the process model, then sought to populate the model with data.
- There are more than 2,300 activity and data items that are costed, and another 500 to 600 basic data items (e.g. the number of researchers and publications, R&D spending, etc).
- Costing relied primarily on existing sources, including the literature on publishing, national and sectoral data sources, although there was some targeted consultations with experts (e.g. e-book distribution and purchasing).

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The macro model (returns to R&D)

(A modified Solow-Swan model)

- There is a vast literature on returns to R&D, which while varied shows that returns to publicly funded R&D are high – typically 20% to 60% a year.
- The standard approach assumes that all R&D generates useful knowledge (*efficiency*) and all knowledge is equally accessible to anyone who could make productive use of it (*accessibility*), which is unrealistic.
- So we introduce *accessibility* and *efficiency* into the standard model as negative or friction variables, and look at the impact of reducing the friction by increasing accessibility and efficiency.

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A stepwise approach

(Four steps in the research process)

- Produced a detailed costing of all of the activities identified in the scholarly communication lifecycle model, focusing on areas where there were likely to be cost differences.
- Summed the costs of the publishing models through the main phases of the scholarly communication lifecycle, to explore potential system-wide cost differences.
- Used the modified Solow-Swan model to estimate the impact of changes in *accessibility* and *efficiency* on returns to R&D.
- Compared costs and benefits over a 20 year transitional period, using these three elements.

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Benefit/Cost comparisons for UK

(GBP millions over 20 years and benefit/cost ratio)

Transitional Model	Benefits / Cost			Benefit / Cost
	Costs	Savings	Increased returns	
Scenario (UK Unilateral OA)				
OA Publishing in HE	1,787	2,990	615	2.0
OA Repositories in HE (Green OA)	189	67	615	3.6
OA Repositories in HE (Overlay Services)	1,558	2,990	615	2.3
OA Publishing Nationally	2,079	3,479	850	2.1
OA Repositories Nationally (Green OA)	237	96	850	4.0
OA Repositories Nationally (Overlay Services)	1,831	3,479	850	2.4
Scenario (Worldwide OA)				
OA Publishing in HE	1,787	5,198	615	3.3
OA Repositories in HE (Green OA)	189	786	615	7.4
OA Repositories in HE (Overlay Services)	1,558	5,198	615	3.7
OA Publishing Nationally	2,079	6,054	850	3.3
OA Repositories Nationally (Green OA)	237	1,132	850	8.3
OA Repositories Nationally (Overlay Services)	1,831	6,054	850	3.8

Note: Compares Open Access alternatives against subscription publishing of national outputs, with costs, savings and increased returns expressed in Net Present Value over 20 years (GBP millions). Returns are to public sector and higher education R&D spending. HE = Higher Education.

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German National Licensing Program (DfG project in collaboration with Goethe Universität)

- Brings the German National Licensing Program (NLP) into the mix of alternative models.
- The NLP provides enhanced access for researchers in Germany through centralised purchasing and licensing.
- The JISC study compared the costs of publishing UK output under alternative models, but the German study compares the costs of operating within alternative models.
- In preliminary analysis, the German NLP returned the 2nd highest benefit/cost ratio during a transitional period.
- However, it is a long term commitment in a time of change and returns lower benefits than the Open Access alternatives.

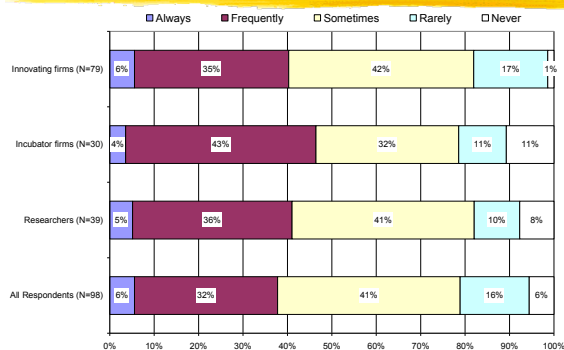
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Impacts of the US FRPAA (RoI impact of a US federal R&D archiving mandate)

- SPARC funded study measuring the impact of an Open Access archiving mandate on returns to investment in federally funded R&D in the United States.
- Shifts focus to modeling returns to R&D and further development of the modified Solow-Swan model.
- Requires sensitive operationalisation and data collection, particularly in relation to archiving costs.
- Preliminary modeling suggests that the *incremental* benefits from mandating Open Access to all US federally funded research might be around 5 times the costs.

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SME access to research in Denmark (Frequency of difficulty accessing research articles)



Source: Houghton, J.W., Swan, A. and Brown, S. (2011) Access to Research and Technical Information in Denmark, Report to The Danish Agency for Science, Technology and Innovation and The Danish Agency for Libraries and Media, Copenhagen.

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SME access to research in Denmark (Costs and benefits of accessing research articles)

- Research respondents spent an average of 63 minutes trying to access the last article they had difficulty accessing, and an average of 17 articles presented difficulties during last year.
- So, access difficulties could be costing DKK 540 million a year among specialist researchers in Denmark alone.
- An average of 27% of new products and 19% of new processes developed or introduced during the last three years would have been delayed or abandoned without access to academic research.
- So, pro-rata, the value of academic research to sales was equivalent to DKK 16 million per firm per year and to savings DKK 95 000 - equivalent to around 12% of sales revenue.

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Summary and conclusions

(Benefits of enhancing access to research)

- Looked at the benefits of Open Access to research findings, as well as the costs for producers and users, and found that the benefits outweigh the costs.
- Looked at the use of academic research by small firms, and found that they do use it and its worth a lot to them, but they face barriers accessing what they need.
- Despite the recent focus on collaborations and contract research, traditional channels (*e.g.* publications) remain important, and may be becoming more important.
- Making research more easily discoverable and openly available would increase its use, enhance its value and help to maximise returns on public investment in research.

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Link to studies and models

<http://www.cfses.com/projects/knowledge-access.htm>

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