

Internet and Access to Scholarly Publications

Jean-Philippe Rennard

Grenoble Graduate School of Business, France

INTRODUCTION

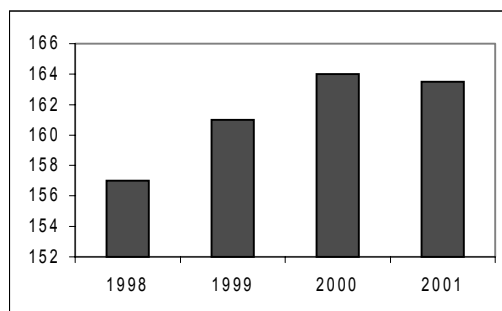
"If I have seen further it is by standing upon the shoulders of giants." The famous statement of Sir Isaac Newton demonstrates that the progress of science relies on the dissemination of discoveries and scientific knowledge. Even though scientific progress is not strictly cumulative (Kuhn, 1970), information sharing is the heart of this progress.

In the Gutenberg era, researchers had no alternative: Publishers were the only way to reach readers. The development of e-commerce and of digital networks led to the post-Gutenberg era, and offers a powerful alternative that can lead in the long term to a new organization of scientific publications (Harnad, 1999). As well as e-commerce is revolutionizing the distribution of cultural goods (particularly music), the distribution of scientific knowledge through the Internet should contribute to the emergence of a new economic model.

BACKGROUND

The growing complexity of modern science induces a growing need of knowledge-dissemination media. The number of academic journals is very difficult to estimate, but according to "Ulrich's International Periodicals Directory" (<http://www.ulrichsweb.com>), there were about 164,000 scientific periodicals in 2001 in all disciplines (see Figure 1).

Figure 1. Number of periodicals (thousands) published worldwide from 1998 to 2001 (Source: "Ulrich's International Periodicals Directory")



The largest publishers like Elsevier-Reed, Blackwell, or Wiley own most of these journals. Over the last 20 years, commercial firms—especially the largest ones—have raised prices at a rate that cannot be justified by cost or quality increase (McCabe, 2000). The evolution of the median cost of serials is summarized in Table 1; it is now 3 times higher than it was in the mid-'80s.

Former president of the University of California, Richard C. Atkinson, recently stated, "University librarians are now being forced to work with faculty members to choose more of the publications they can do *without*" (Atkinson, 2003, p. 1). As a consequence, in the USA, Figure 2 shows the following.

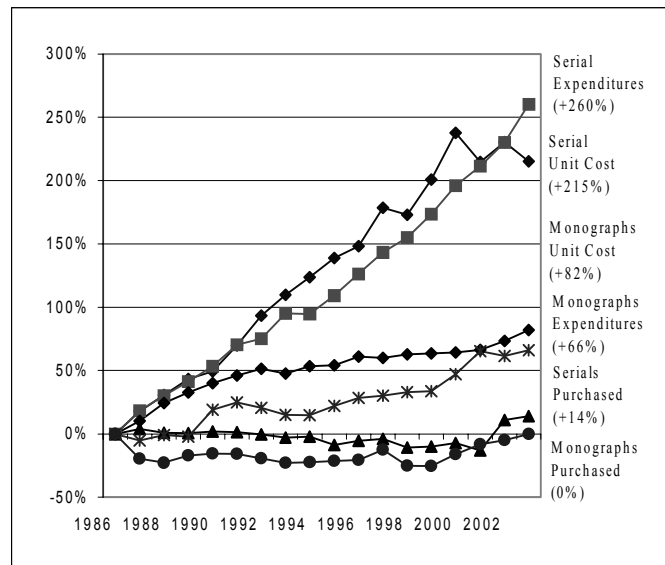
1. Acquisition expenditures have tremendously grown.
2. Part of the budgets had to be reallocated from monographs to journals.

The rise of journal prices has multiple origins, one of the most important being provisions to invest in electronic publications (Chartron & Salaun, 2000). The electronic publication, which should reduce costs, is now a source of cost increase. These provisions are nevertheless insufficient to explain the current prices. Elsevier-Reed's gross-profit margin is estimated at 32% (Wellen, 2004). Such Microsoft-like margins are very unusual and demonstrate the inefficiency of the scientific-publication market. There are four main reasons for this inefficiency.

Table 1. Evolution of the median value of serial unit cost from 1986 to 2003 (Source: Association of Research Libraries (ARL, 2004))

Year	Serial Unit Cost	Annual Percentage Changes	Cumulative Percentage Changes
1986	\$ 89.77	N/A	N/A
1988	\$ 117.25	10.94%	30.60%
1990	\$ 134.09	4.18%	49.36%
1992	\$ 173.67	13.93%	93.46%
1994	\$ 200.85	6.67%	123.72%
1996	\$ 222.89	3.95%	148.28%
1998	\$ 245.05	-1.97%	172.96%
2000	\$ 303.19	12.30%	237.73%
2001	\$ 282.54	-6.81%	214.72%
2002	\$ 296.50	4.94%	230.27%
2003	\$ 283.08	-4.53%	215.32%

Figure 2. Monograph and serial costs in ARL libraries from 1986 to 2003 (Source: ARL, 2004)



- Researchers publish to popularize their works and to improve peers' recognition (which has a great impact on their careers). They are "giveaway authors" (Harnad, 2001) and do not receive any royalties or fees. Furthermore, they do not have to pay to access to scientific information since all the expenses are paid by academic libraries. Authors are then not concerned with the prices of journals; they only consider the reputation and the citation impact of the journals they publish in.
- The demand is price inelastic (that is, prices have few impact on the volume of the demand) since prices are not important for researchers, and journals are not easily substitutable.
- Libraries evolve on a commercial market, but do not have any commercial approach. They buy up to their budget limit and not according to any price equilibrium.
- The multiplication of mergers among publishers has strongly contributed to the increase of prices (McCabe, 2000).

Moreover, commercial publishers now have a growing aggressive commercial attitude with, for example, journal bundling that obliges libraries to buy journals they do not need if they want to subscribe to prestigious must-have journals. The Big Deal (Frazier, 2001)—an online aggregation of journals—is so expensive and restrictive that prestigious universities like Stanford or Cornell created sensation in late 2003 by canceling their Big Deal subscriptions (Wellen, 2004).

Symptomatic of this evolution, the new CEO (chief executive officer) of Elsevier-Reed previously worked in

firms operating in highly competitive markets like Procter & Gamble and Guinness (Wellcome Trust, 2003).

In this context, public research institutions pay twice for scientific knowledge. They pay researchers who publish freely, and publishers to have access to journals (Anderson, 2004).

The growing conflict between researchers, who aim at disseminating their works as widely as possible, and libraries, which have a limited budget on the one hand, and publishers, who mainly have financial objectives on the other hand, gave rise to the accelerated development of the practice of open access to electronic publications. Governments concerned about research budgets are more and more interested in that movement and try to support it. At the end of January 2004, OECD ministers "recognized that fostering broader, open access to and wide use of research data will enhance the quality and productivity of science systems worldwide. They therefore adopted a Declaration on Access to Research Data from Public Funding" (OECD, 2004). One of the principles of this declaration is to promote openness, that is, open access to public-funding research.

THE OPEN-ACCESS MOVEMENT: TOWARD A NEW ECONOMIC MODEL OF SCIENTIFIC PUBLICATIONS

According to Harnad (1999), the new organization of scientific publications will be based on open access to electronic publications. Beginning with self-archiving

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