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Max Planck Institute for Innovation and Competition

25 January 2012

Online at <https://mpra.ub.uni-muenchen.de/61807/>

MPRA Paper No. 61807, posted 05 Feb 2015 15:59 UTC

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25 January 2012³

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³ Revised version published as: Mueller-Langer, Frank and Marc Scheufen (2013). Academic Publishing and Open Access. In: Handke, Christian and Ruth Towse (eds.), Handbook on the Digital Creative Economy, Edward Elgar, Cheltenham, 365-377.

Introduction

With the digital era and the spread of the internet, the academic publishing market is currently facing just another revolution after the invention of the Xerox copier in 1959. While copyright was broadened throughout a series of significant reforms after the Xerox copier had been introduced, new business models, especially Open Access (OA), seem to have recently put copyright and its role in academia into debate.

Two developments motivate this ‘OA debate’. First, subscription prices for academic journals have increased, which has forced (university) libraries to significantly cut their journal portfolios. Second, copyright as an incentive mechanism seems negligible in academia as researchers are motivated by reputation gains and CV effects rather than direct financial returns from publishing their works. Consequently, the OA publishing model may be seen as a superior alternative for the conventional closed access (CA) publishing model.

This paper critically reviews the OA debate by discussing theoretical and empirical arguments on the role of copyright in academic publishing. A brief historical examination introduces the altering conditions for scholarly publishing and highlights the new trade-off in the digital age. By locating the debate within a broader stream of current research, we provide alleys for further research and a glimpse of possible future scenarios. It is shown that copyright may be both, a blessing and a curse in establishing an effective framework for scientific progress.

Copyright in Academic Publishing

From an economics perspective, copyright is a simple means to correct the ‘free-rider’ environment that surrounds information goods. It does so by granting excludability and hence by providing monetary incentives for creative endeavour (Arrow, 1962). Stated differently,

copyright enforces a temporary monopoly creating both benefits (incentives for creative works) and costs (dead-weight loss) from a social welfare perspective.⁴

In the academic publishing market, copyright did not play a pivotal role until the mid-20th century. In fact, the relationship of copyright and scientific journals was ‘merely occasional; because many of the earliest journal publishers were learned societies and then academic institutions, copyright was licensed explicitly or implicitly to them, though it did not have a central role in the business’ (Ramello, 2010, p. 13). In contrast, the presence of pirated copies may have even laid the foundation for the popularity and reputation of particular journal articles and journal titles.

This changed dramatically once commercial publishers started to enter the journal publishing market by launching new or acquiring existing titles in the second half of the 20th century. After the introduction of the Xerox 914 copier in 1959, academic publishers induced significant revisions in copyright law. As a result, a series of court cases tackling the practice of copying journal articles en masse from library collections induced an era that somewhat revolutionized copyright law. Photocopying changed the trade-off for balancing the interests in copyright law in two respects. First, the Xerox technology dramatically eased the process of copying printed material. Second, copying en masse from library collections significantly dropped article unit costs and hence changed the attractiveness of journal subscription (Liebowitz, 1985).

The advent of the internet and the development of technologies to digitize information goods, had at least three far reaching implications for copyright legislation: (1) digitization supersedes the need for any physical media such as paper or CDs; (2) a digital copy is a perfect substitute for the original work; (3) digitization has reduced the marginal cost of copying to virtually zero. Several legislative steps have been trying to adapt copyright to the new conditions. Arguably, the most significant change is the introduction of technological

⁴ See Towse et al. (2008) on the economics of copyright and copying.

measures to control the access and use of electronic content (so-called Digital Rights Management (DRM) Technologies).⁵ The implications of the steps taken are far reaching and go beyond the question of who should own intellectual assets. Public protest against recent proposals for a reform of copyright, like the Stop Online Piracy Act (SOPA), shows the intensity in this debate. Besides, there has recently been a movement in the academic publishing market that questioned whether the traditional copyright model solves the trade-off between creating incentives for scientists to create high quality research output on the one hand and allowing the public fast access to those works on the other (Eger and Scheufen, 2012a, pp. 49 ff.). In fact, the Internet fostered the emergence of an alternative business model for publishing academic works – not only by scientific associations, but also by scientists themselves. The OA model seeks free online access of academic works ‘permitting any user to read, download, copy, distribute, print, search or link to the full text of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself’ (Budapest Open Access Initiative, 2002). In this regard, OA to scholarly literature can be achieved by means of two complementary strategies: (1) self-archiving (‘the green road’); and (2) OA journals (‘the gold road’). The differentiation between the green and gold road towards OA was introduced by Harnad et al. (2004). While self-archiving provides with internet platforms to deposit un-/published papers, OA journals provide with the general services of journal publishing, i.e. peer-review to enable for a quality selection of the works, but also editing and typesetting tasks. However, Bergstrom (2001) and Mueller-Langer and Watt (2010) suggest that not only the supply of the principal ingredient to journals, namely academic articles, is provided by the scientific community, but typically so is the task of filtering (i.e. refereeing) the articles for quality, editorship tasks, and even (for some cases)

⁵ See Bechtold (2004) for a thorough analysis of DRM in the United States and Europe.

the typesetting task.⁶ Consequently, it may be questionable to what extent publishers actually add value to the production process and whether profit margins of 25 percent or more seem reasonable for incentivizing publishers to publish (Ramello, 2010).

The OA movement especially gained momentum throughout the last decade when several initiatives laid the foundations of OA publishing.⁷ In addition, scientific associations like the National Institutes of Health started to promote OA publishing by fostering the development of OA journals as well as self-archiving platforms. The Directory of Open Access Journals (DOAJ)⁸ currently lists more than 8,500 OA journals (December 2012), significantly ranging in number by discipline and country.⁹ Despite of this vast number of journals, OA still seems to play a minor role in academic publishing. OA journals often lack in reputation as compared to well-established CA journals. While OA journals have an average impact factor of 1.44, established commercial publishers like Elsevier (2.67) or Wiley-Blackwell (2.58) show significantly higher reputation measures and hence market power. Table 1 gives an overview on some market structure characteristics, comparing OA and CA journal publishers.

⁶ On the latter point see Hilty (2006).

⁷ In this respect, three initiatives laid the foundations of the OA principle: (1) the Budapest Open Access Initiative (2002), (2) the Bethesda Statement on Open Access Publishing and (3) the Berlin Declaration on OA to Knowledge in the Sciences and Humanities (2003).

⁸ The DOAJ lists all OA journals that follow the lines of the definition by the Budapest Open Access Initiative, i.e. only pure OA journals are being listed. Not subject are so-called hybrid OA models, i.e. business models that provide with delayed, partial, retrospective OA, or offer an additional Open Choice option to authors subject to the payment of an author fee. Bernius et al. (2009) provide an overview of academic publishing models.

⁹ Leading OA disciplines are the Health Sciences with more than 24 percent of all OA journals, besides social sciences (> 17 percent) and technological engineering (> 9 percent). The standardized GINI coefficient is 0.49. Most OA journals have been launched in the U.S. (1272), followed by Brazil (806), UK (575) and India (473). See DOAJ (2013).

Table 1: Comparing the CA Giants with OA Journals

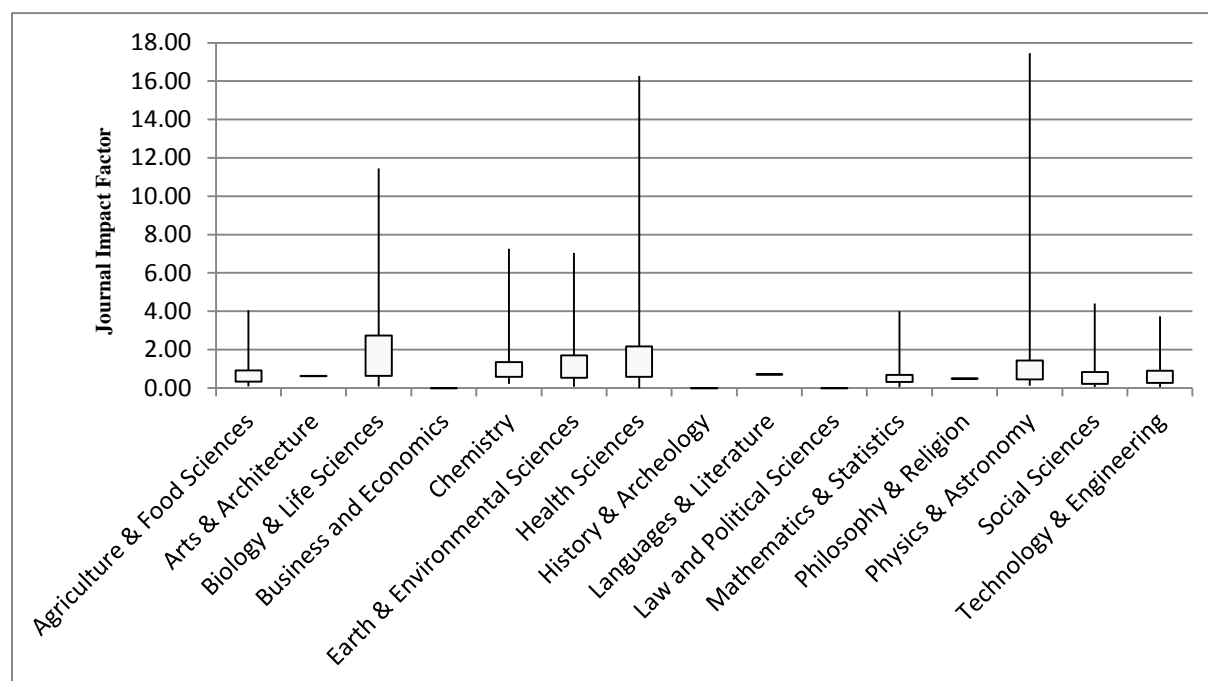
Publisher (numbers for 2011)	Elsevier	Wiley-Blackwell	Springer	All OA Journals
# Journals with Impact Factor ≥ 1	609	639	546	373
Market Share (IF ≥ 1)	0.122	0.128	0.110	0.0749
Average Impact Factor	2.668	2.575	1.637	1.437
Min Impact Factor	0.023	0.050	0.033	0
Max Impact Factor	38.278	23.462	11.526	17.462
Average Eigenfactor	0.015	0.013	0.006	0.005
Average Number of Articles*	206.240	171.208	109.252	127.709

* Sum of articles in journals by publisher x divided by the number of journals by publisher x .

Note: We generated the matching data via metadata harvesting.

Source: Elaborations from ISI Web of Science Data, Thomson Reuters Journal Citation Report (2011).

The difference becomes even more significant if we look at the role of OA journals by disciplines. OA journals may at most be considered as an alternative publishing outlet in Biology, Physics and Health Sciences, while in most disciplines OA journals are hardly ever listed by ISI Thomson's Web of Science. The boxplot in Figure 1 highlights these differences in the reputation of OA journals by discipline.

Figure 1: Boxplot – Impact Factor of OA Journals by Discipline

Note: A boxplot generally illustrates measures of central tendency and hence the distribution of a variable x . In particular, the vertical line illustrates the minimum and maximum. The height of the rectangle sets the limits for the first and third quartile of the distribution.

Source: Elaborations from ISI Web of Science Data, Thomson Reuters Journal Citation Reports (2011).

In addition to the emergence of alternative publishing models, digitization also provides new opportunities in the context of the traditional publishing model. Digitization offered new marketing strategies for commercial journal publishers, making bundling of different versions (electronic and print version) and journals (so-called ‘big deals’) predominant price discriminating strategies in the academic journal market (Edlin and Rubinfeld, 2004). As a consequence, serial expenditures¹⁰ increased by 273 percent between 1986 and 2004 (Ramello, 2010). Serial unit costs increased by 188 percent as compared to an increase in the consumer price index of 73 percent for the same time period. In some disciplines, for example physics and chemistry, journal prices even increased by more than 600 percent from 1984 to 2001 (Edlin and Rubinfeld, 2004). As a consequence of this vast increase in journal subscription prices together with budget cuts in several countries, libraries were forced to significantly change their subscription portfolios.¹¹ This serial crisis may be seen as the driving force behind the OA debate.

Moreover, the role of copyright – necessary for the possibility of exclusion and hence such pricing strategies – may be questioned, since the rationale of a primarily monetary reward as an incentive for an author’s creative endeavour seems negligible in scientific research. Other motivational factors, like cites and reputation (peer-recognition) or labor market signals, may be significantly more important. Furthermore, authors are hardly ever paid royalties for publishing an academic work in the first place. Thus, a removal of copyright is currently being discussed among Law and Economics scholars as a possible policy implication in shaping the future of academic publishing.

¹⁰ A serial is a published work that appears on a regular schedule, also referred to as journal. Thus, serial expenditures mirror the total amount paid by libraries for yearly subscription to a set of journals.

¹¹ Ted Bergstrom provides an extensive overview and links for further reading on the serial crisis on his ‘journal pricing page’. See Bergstrom (2013).

The Open Access Debate in Science

The literature investigating the impact of digital technologies and the development of new business models and technologies for scholarly publishing falls into three categories: (1) comparative studies analyzing the effectiveness of the traditional copyright regime as compared to alternative publishing models, especially OA; (2) studies investigating the impact of online and free online access on readership and citations; (3) studies focusing on researchers' attitudes towards new business models in academic publishing. This paper focuses on the first literature stream, critically reviewing the literature on the impact of a removal of copyright for academic works.

Recently, most attention in the OA debate has been directed to a seminal paper by Steven Shavell (2010), which asked whether copyright for academic works should be abolished. In a nutshell, Shavell argues as follows: (1) scientists' driving motivation is the accumulation of reputation, which is increasing in readership; (2) OA will most likely increase readership and hence scholarly esteem; (3) most universities will have an incentive to cover the publishing costs when moving to an 'author pays'-principle.

However, McCabe and Snyder (2005) suggest that OA is more likely to be a feature of lower quality journals. They argue that under OA profit maximizing publishers may accept more articles than would be socially efficient to internalize author fees. Similarly, Jeon and Rochet (2010) find that OA forces publishers to set socially inefficient quality thresholds for paper acceptance. This may raise doubts on the allegedly positive reputation effect of OA on scientists as brought forward by Shavell (2010). In addition, Mueller-Langer and Watt (2010) are skeptical regarding Shavell's modeling assumption that scholarly esteem can be proxied by readership, i.e. the number of reads, alone. The authors argue that this only holds true if reputation as a function of readership would be strictly increasing for all values of readership. However, a journal's impact factor or reputation may be more important in the scientist's decision making than readership. Arguably, an author would more likely submit her paper to a

well-esteemed journal with only few readers than to a low-esteemed journal with a larger audience. Mueller-Langer and Watt (2010) raise the question whether copyright may be important for establishing a certain level of reputation for a journal in the first place. Hence, copyright may have important implications for the functioning of the market's inherent reward system for measuring a scientist's performance. In a follow-up paper, Mueller-Langer and Watt (2012) indirectly account for the importance of a journal's reputation in deciding where to publish by modeling both author's and reader's perspectives in a two-sided model. In this framework, journals are considered as intermediaries linking authors and readers. Mueller-Langer and Watt (2012) analyze the effects of a removal of copyright for academic works. The authors identify countervailing effects of abolishing copyright for academic works and find scenarios in which quality for journal articles may increase under OA. Mueller-Langer and Watt (2012) find that the overall welfare effects of a removal of copyright for academic works are ambiguous. In the light of this finding, we suggest that further empirical research on the academic publishing market may make an important contribution to the OA debate.

Several papers have investigated the influence of online or free online access on readership and citations. The literature provides a rather differentiated picture on a possible citation advantage of an OA regime, ranging from an OA citation advantage by a factor of three (Lawrence and Giles, 2001) to the conclusion that OA does not generate a significantly higher citation rate (Davis et al., 2008; McCabe and Snyder, 2011) or one that is declining by seven percent per year (Davis, 2009). Despite some doubt in the degree to which OA may induce higher citation rates, a broad literature stream gives confidence in believing that readership and citations may be at least weakly higher in an OA regime (Harnad, 2012). Accordingly, Eysenbach (2006) finds significantly higher citation rates for OA journal articles in the fields of biology, physics and social sciences. Similar findings are recorded by Norris et al. (2008) in ecology, applied mathematics, sociology and economics. Hajjem et al. (2005) find a

citation advantage ranging between 25 and 250 percent by discipline and year for ten different disciplines. Furthermore, Bernius and Hanauske (2009) suggest that a scientist may increase peer-recognition and hence scholarly esteem when switching to OA.

Feess and Scheufen (2011) consider possible distortion effects if not all universities cover the publication costs when moving towards an ‘author pays’-principle. Assuming that researchers differ in talent and that only the best universities will most likely cover the publication costs, Feess and Scheufen (2011) find that researchers’ rent-seeking motives may contradict some of the conclusions in Shavell (2010). While in Shavell’s model each author only causes positive externalities (i.e. private quality incentives can never be too high), their model shows that social welfare may not be strictly increasing in research activity due to rent-seeking motives. OA may hence create countervailing effects: OA is always superior if and only if we believe researcher’s private effort levels to be already too high as a larger readership and the asymmetry in publishing costs will correct some of the distortions in the traditional copyright model. In the other case, it will depend on the model’s parameters which of the two regimes may produce a better outcome.

Mueller-Langer and Watt (2010) are interested in the possible effects when charging an author’s fee for submitted papers. They show that a universal OA regime may be particularly detrimental for research institutions exhibiting a relatively large publication output. Accordingly, the best institutions would have to bear relatively higher publication costs as compared to mediocre institutions with a lower publication output. As a result, they emphasize the need to assess the pricing scheme within an OA regime more carefully, especially considering possible distribution effects across institutions. Last but not least, an emerging literature has been investigating whether the market will enforce an OA regime anyway (assuming a universal OA regime to be superior) or whether some coordination failure may prevent from such an evolutionary process.

Several authors have been emphasizing that authors may in fact be locked-in due to a reputation advantage of established CA journals. Cavaleri et al. (2009) invoke the picture of a ‘chicken and egg’-problem, where newly launched OA journals will be restricted in accumulating a decent level of reputation and hence in creating demand. Accordingly, the dominant strategy of submitting to well-esteemed closed access journals leaves the authors locked-in to the weak Nash equilibrium and a ‘wait and see’ attitude regarding OA. Mann et al. (2008) provide evidence for this ‘wait and see’-attitude analyzing 481 scientists from different disciplines. A survey by Eger, Scheufen and Meierrieks (2013) among 2151 scientists in Germany finds that this attitude may, however, differ considerably between disciplines. Consequently, in disciplines where it has been more common to publish OA or where OA journals exhibit higher impact factor levels, authors tend to publish more of their papers in OA journals and deposit their works on self-archiving platforms.

Hybrid Open Access, Open Access to Data and Retro-Digitization

Publishers, such as Springer and Oxford University Press among others, have recently introduced the Hybrid Open Access (HOA) business model for academic publications in peer-reviewed journals (Davis, 2009; Björk, 2012). In contrast to the traditional subscription-based CA business model, the HOA publication format gives authors the option of paying a HOA publication fee (up to \$3000) to make their paper immediately and freely available online without any embargo period. Under HOA, the copyright remains with the authors. Mueller-Langer and Watt (2013) empirically analyze the effect of HOA at the paper level by comparing citation rates and quality factors for HOA papers to CA papers that appear in the same journal. This analysis finds that HOA papers generate significantly higher cites than CA papers. It suggests that commercial HOA publishers may use the HOA publication format as a second source for revenue on top of the revenue generated from subscription prices (double-dipping).

The technological revolution ushered in by the Internet and the increase of possibilities in the digital environment have not only changed the business model of commercial publishers but also facilitated and spurred the creation and use of data sets for scientific purposes. For instance, in Economics, as in many other disciplines, the number of articles for which researchers have collected their own data or used external data sets has significantly increased in recent years. The availability of data for scientific purposes is an essential feature for the scientific principle of self-correction, replication and further research (Dewald, Thursby and Anderson, 1986; Anderson et al., 2008; McCullough, 2009). Andreoli-Versbach and Mueller-Langer (2013) analyze the incentives of researchers to voluntarily make their data publicly available and thus to provide the scientific community with voluntary OA to data. The analysis suggests that a trade-off arises between the ex post benefits associated with OA to data and reduced incentives to create the data ex ante. It shows that forced OA to data may lead to welfare-reducing strategic delays of submission. Finally, Andreoli-Versbach and Mueller-Langer (2013) find that forced OA to data is welfare enhancing if and only if researchers have no incentives to postpone the date of submission and if the positive effect of data availability outweighs the negative effect associated with reduced efforts to create data.

A recent strand of literature studies the Google Book Search (GBS) Project (Lichtman, 2008; Grimmelmann, 2009; Bechtold, 2010; Samuelson, 2010a). GBS aims at maximizing the accessibility to books by making digitized books publicly available and searchable worldwide via an internet book search engine. Beginning in 2004 Google has pursued the retro-digitization of millions of books en masse from library collections with the vision to create a digital library that allows worldwide and free access to books. While the supporters of GBS conceive this as a first reasonable step towards the largest online body of human knowledge and as a means to promote the democratization of knowledge, its opponents fear negative effects due to an erosion of copyright law (Samuelson, 2010b and 2010c). Mueller-Langer and Scheufen (2011) provide a Law and Economics analysis of the GBS Project, focusing on

a possible fair use argumentation against the claims of copyright infringement. This question arises as the GBS search engine offers its users a short excerpt of the book containing the search term, allowing users to browse sample pages in a limited preview. Copyrighted books are not generally excluded from the digitization and the preview as Google operates on the premise of passive consent and evades the right holders' explicit permission. The right holders may, however, exclude their books from GBS by choosing to opt out. Mueller-Langer and Scheufen (2011) suggest that GBS may provide a solution for the unsolved dilemma of orphan works under the condition that Google's pricing algorithm for orphan works replicates a competitive market outcome under third-party oversight.¹²

In fall 2005, the Authors Guild and five publishers initiated litigation over GBS, suing Google for copyright infringement. Google reverted to the fair-use argument to legitimate GBS. In particular, Google argued that the limited preview was a fair and thus non-infringing use of copyrighted book content and that GBS improved the accessibility to knowledge. In October 2008, the proceedings of the litigation resulted in a class action settlement. In November 2009, the parties filed an Amended Settlement Agreement. On March 22, 2011, judge Denny Chin rejected the proposed settlement (US District Court Southern District of New York, 2011). In particular, Chin suggested that many of the concerns from a copyright law perspective would be ameliorated if the settlement were converted from an 'opt-out' to an 'opt-in' settlement.¹³

Conclusions, caveats and questions for further research

Despite the recent flood of research investigating the impact of a shift towards OA in academic publishing, many questions remain unsolved. Two future scenarios seem possible: (1) a universal OA regime; (2) a coexistence of CA and OA business models. Imagining the first scenario, it may still be questionable whether a change in copyright or alternative

¹² See Picker (2009) for a divergent view.

¹³ See Mueller-Langer and Scheufen (2011) for a critical investigation of Chin's judgment.

legislative steps (e.g. an inalienable right of secondary publication) is reasonable and/or necessary for promoting OA or whether copyright may have important implications for academic publishing in the first place (e.g. journal reputation). In fact, a universal OA regime following a 'one-size-fits-all'-approach may be far from reaching a first best solution, especially when considering the immanent differences in the reward systems between disciplines and countries. In contrast, the coexistence of both regimes in a world with copyright may raise doubt on the competitiveness of OA journals as compared to well-established CA journals. Accordingly, the question arises of whether OA journals will be able to successfully increase reputation and hence their impact factor in the long run. A possible downside of this 'reputation advantage' of established CA publishers may be 'double dipping' strategies by using HOA models for discriminating prices and maximizing profits. Consequently, future studies should investigate which approaches, tools or strategies would provide institutions with a counter balance against the market power of well-known commercial publishers.

As for OA to data, the question arises which approaches, tools or strategies research institutions or external funders of research may choose to increase the (career) incentives of affiliated academics to share their data with the academic community. In addition, the analysis of recently established standards of data citations and the concept of data-co-authorship appears to be a promising path for further research (Altman and King, 2007). Besides, further research on the impact of GBS on scholarly communication is needed. One may argue that GBS fills a gap with respect to the accessibility of knowledge as it provides a retro-digitization in contrast to the Creative Commons and OA movements. Finally, the ongoing debate on the benefits and cost of GBS and its settlement may induce a substantial impulse for the future scientific discussion on the role of copyright law in the information age.

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Further Reading

For a more general review on how new technologies have affected the content industries, see Lemley (2011). On the history of copyright and its linkages with the invention of new technologies see Eger and Scheufen (2012a, b) and the herein mentioned literature.

McCabe and Snyder (2007) suggest that OA may most likely be adapted by low-quality/low-esteemed journal publishers, while publishers of high-quality journals will tend to choose CA. Bernius et al. (2009) analyze researchers' attitudes towards new business models in academic publishing. They also study the implications of OA for publishers, libraries and funding organizations. Readership and citations may be interrelated as a larger audience increases the probability of getting cited. Brody et al. (2006) analyze the physics e-print archive 'arXiv.org' and find that readership and citations are correlated. Gaulé and Maystreb (2011) suggest that there is a positive impact of OA on citation rates. Bosch (2009) summarizes the literature on the impact of OA on citation counts, the crisis in the world of scientific publishing and

potential changes in the scientific publishing system. Suber (2012) provides a thorough overview on OA, analyzes its benefits for authors and readers and discusses future scenarios.