Open Access is an established mode in academic book publishing. Yet, publishing houses only dare to scale open access in small steps. Books, especially monographs, are still the preferred medium to communicate scholarship in many disciplines, foremost in the arts, humanities, and social sciences. The overall market of academic books is in recession. Large scale Open Access publishing may be a solution. This essay explores the current situation of Open Access book publishing by applying the prisoner’s dilemma to publishing houses. The results show theoretically that to adapt Open Access on a large enough scale required a systematic approach in which all publishing houses would have to act.

Keywords
Open Access, Book Publishing, Game Theory, Prisoner’s Dilemma
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All figures are created by Marcel Knöchelmann.
1 Introduction

Open access publishing can offer a solution for an important publication model and its recessive market: the academic book (Ferwerda et al., 2013). In the humanities and social sciences, the long form is the preferred publishing form (Frosio, 2014). Its market, though, is recessive (Simba, 2016), with print runs declining. This is a problem not only economically, but also for the research itself, as with fewer disseminated books the reach of the research decreases.

Open access\(^1\) book publishing (hereafter OABP) can be a solution as it increases the reach of research. However, the scaling of OABP has been rather slow, with many publishers still searching for sustainable business models. They seem to be in a Prisoner’s Dilemma (from here on PD), in which the best solution for all does not align with the dominant strategy in a competitive market, as will be described.

This essay describes the academic book publishing market in order to apply the PD, and the analysis of PD shall offer insights into the scalability of open access in academic book publishing.

2 Academic Book Publishing

This chapter focuses on describing the academic\(^2\) book publishing market. Section 2.1 pinpoints market characteristics and its inefficiency, whereas 2.2 focuses on OABP, considering the background of basic book publishing price and cost calculations.

2.1 Market Inefficiency

Academic books are “edited volumes, reference works, handbooks, conference proceedings, and academic monographs (original research) published in hardback and as ebooks at high prices and destined for the libraries”, as defined by Clark and Phillips (2014, loc. 2073/or 20%). These books are sold

\(^{1}\) When referring to open access in this essay, gold open access is meant. However, much of the analysis is also applicable to green open access.

\(^{2}\) Hereafter all descriptions of markets and subjects (publishers, books) refer to academic publishing.
worldwide, mostly to libraries. That makes it a market in terms of the range of product, since geographical boundaries barely exist. The actual market size of book publishing can hardly be assessed with reliable numbers (Esposito, 2015). An industry-wide survey of ALPSP (Association of Learned and Professional Society Publishers) in 2009 found that 24,213 titles are published per year with a total backlist of 349,183 titles (Cox, 2009, p.8). Most of those titles are monographs, with the humanities and social sciences leading in terms of subject areas (Frosio, 2014).

To assess this market theoretically in order to apply the PD, it is essential to differentiate between the behaviour of book and journal market: the price elasticity of demand. This will help us to determine the main characteristics of market behaviour – one of which, arguably, is inefficiency.

The price elasticity of demand is the “percentage change in quantity demanded of a good resulting from a 1% increase in its price” (Pyndick and Rubinfeld, 2013, p.33), or:

$$E_p = \frac{\Delta Q/Q}{\Delta P/P} = \frac{P}{Q} \frac{\Delta Q}{\Delta P}$$

Figure 1: Price elasticity of demand

If $E_p$ is less than 1, demand is inelastic. In other words, a change in price will leave the demand relatively unchanged, i.e. the demand is not price-contingent (Raa, 2013). This inelasticity is said to be due to missing substitutes on the demand side (Pyndick and Rubinfeld, 2013).

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3 As this essay looks specifically at book publishing, the definition of the market deviates from the actual market definition in which the product is information and not a physical product.

4 Geographical submarkets do exist and, in business strategy, do matter as they can offer a strategic advantage to sell internationally, rather than to a domestic submarket only. However, this essay looks at the academic book publishing market as a whole, which is why geographical submarkets are not of interest.

5 Surveyed were "400 academic and scholarly publishers covering a representative range of commercial, university press and non-profit publishers, of all sizes, worldwide" with viable responses from 171 distinct publishers (Cox, 2010, p.347).
Inelastic demand can be seen in the academic information market in general, however, more for journals and less for books. In the journal market, substitutes of articles are imperfect (McCabe, 2004). This led to a severe increase of prices in journal publishing. In comparison, the book publishing market behaves differently. Firstly, it has not had such a large increase in prices in recent years (SSIC, 2015; UCSB Library, 2014). Secondly, the reason for the increase in prices is altogether different from that of journal publishing. This becomes clearer when looking more closely at how the products are developed.

The number of book titles published has increased over recent years, whereby each title, especially with regard to monographs, has become more and more specialised, serving the requirements of niche audiences. However, more books do not necessarily mean more original research. Books are often re-packagings or new editions of older material (Adema, 2015). This leads to a higher output of specialised titles, each of which, it is assumed will be sold in lower quantities. Print runs have declined massively over recent years (Collins et al., 2011), with Caren Milloy stating that monograph print runs have declined from 2,000 to 200 per title in the last 30 years (2013). The rising prices of monographs alone do not compensate for declining sales, nor do they drive growth. And whereas journal publishing can still deliver high profit margins (Larivièrè et al., 2015), most published books barely break even (Lambert, 2015). The rise in prices for books is a matter of covering costs rather than making monopolies on information. Publishers broaden supply to compensate for declining revenue. In return, that does mean that each single title in book publishing is less imperfect as a substitute than a journal article is, which supports the argument of a more elastic demand in book publishing.6 This

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6 That means that in journal publishing, a 1% change in price barely affects demand, whereas in book publishing, a 1% change in price can lead to a change in demand of about, say, 0.5%–1%. Thus, the demand is still inelastic, but much less inelastic than in journal publishing.

7 In addition, a similar argument can be made when positioning the researcher as the customer who wants to buy a publication place in an open access environment, like Hanauske et al. do
detail will be important when applying the model of the PD to the market later on.

2.2 Open Access and Publishing Costs

The previously stated number of backlist (349,183) and front list titles (24,213) published annually incorporates a certain amount of open access (OA) titles. This is only a fraction when considering the complete title list on the Directory of Open Access Books: 4,438, made available by 150 publishers (DOAB, 2016).\footnote{These numbers are not for the same year, but nevertheless they illustrate how minute the percentage of open access titles within the whole market is.}

Compared with the journal market,\footnote{Open access journals have a share of 2.3\% of the overall journal market (Esposito, 2014).} this share of OA titles appears to be rather small. This might be due to different mechanisms – book publishing is much more complex. The costs and prices are higher, which leads to higher funding requirements for OABP.

Academic books, especially monographs, are priced at £50-£160 ($70-$220) (Milloy, 2013). The average revenue can hardly be pinpointed as sales vary. However, with a print run of about 200-300 titles and partly discounted prices, an average revenue of £14,000 ($20,000) per title can be assumed (Gasson, 2004). This income is not without high costs. A study\footnote{The study gathered data on 382 monograph titles, published in the fiscal year 2014 by 20 university presses of varying size (Maron et al., 2016).} among American university presses reveals that monograph publishing costs exceed most income solutions by far, ranging from $15,140 at the lowest to a high of $129,909 per title, with average costs of around $40,000 (Maron et al., 2016, p.17). Other studies found lower costs, for instance an average of €12,000 ($16,700) in the Netherlands (Ferwerda et al., 2013), or $25,000-$30,000 as stated by Jennifer Crewe (2004). Though book prices increased from 1980-
2010 by 400-1000% depending on the subject field (Barclay, 2015), this is not enough to compensate for declining sales. "When you are selling 300 books, you can’t cover costs" as Robert Darnton puts it for Harvard Magazine (Lambert, 2015).

This is a dilemma in itself as it leads to a downward cycle of higher prices and decreasing sales. It could be alleviated by open access, with various factors supporting this argument. For instance, open access as a publishing model scales better than paid access (Suber, 2015), and open access publications increase reach and discoverability of a title more than cannibalising\textsuperscript{11} printed versions (Ferwerda et al., 2013). In addition, open access in general becomes increasingly compulsory as funders and public bodies make it a requirement (Collins et al., 2015).

Such advantages do come at a cost. Whereas some publishers charge around $12,000-$17,500 for making a title open access (Bunz, 2013), others like Open Book Publishers charge £3,000-£5,000 ($4,200-$7,000) (Milloy, 2013). External market participants who deploy alternative activities to convert paid publications to open access are known to charge around $15,000 (Luminos, 2016) or $12,000 (Knowledge Unlatched, 2015). The viability of the different models cannot be assessed easily. Most certainly, there are arguments on the researcher side that the charges are too high (Terras, 2013; Bunz, 2013). These arguments, however, hardly consider the value of professional publishing, assuming instead that OA merely makes use of the World Wide Web: simply uploading a PDF to a server. That may be open, but that is not professional publishing. As Martin Weller writes, “the reason academics are going to publishers and not just sticking their own books up online is that they get a range of benefits from the publisher” (2012). This range varies, but it is mostly an extensive list of activities (O’Sullivan, 2013). All of these activities incur

\textsuperscript{11} Cannibalism is the effect that one product or version of a product diminishes sales of another product or version of a product, when both are offered by the same company. In this case, it refers to open access editions diminishing sales of printed editions to a certain extent.
product-based and overhead costs which barely decrease when publishing open access. In addition, intangible assets like brands add value to a product and, thus, create return for the researcher in the form of reputational capital (Eve, 2015).

These variables can hardly be captured by a fixed publication charge. However, with the argument being that open access only partly cannibalises sales, OABP should be able to scale faster. The following analysis tries to model a possible dilemma that could be a reason for the slow rise of OABP.

3 The Prisoner’s Dilemma

The PD has been applied to open access publishing in various ways (Brown and Boulderstone, 2008; Murray-Rust, 2010; Eve, 2014), sometimes with librarians, researchers, or publishers as the prisoners. In the following, the theoretical framework of the PD will be described and then applied to OABP.

3.1 Theoretical Framework

The PD draws attention to details of cooperation and strategies of maximising outcome, and it does not require a particular domain. With its applicability to various situations, it offers a great range of thought experiments for phenomena in humanities, social sciences, and philosophy (Peterson, 2015).

As Shaw (2015) describes it, the standard model (figure 2) is that two subjects are imprisoned and accused of having committed a crime. There is no evidence so the police have to rely only on the interrogation of the prisoners. They’ll be interrogated simultaneously in different rooms and cannot talk to each other. The sentences will be as follows:

- If both subjects don’t talk, both will be sentenced with an obligatory 1-year imprisonment.
- If one defects the other while the other does not talk, the latter gets a 3-year charge while the defector will be released.
- If both defect each other, both will be sentenced for 2 years.
The PD has been applied to economics in various situations and is an important model of Game Theory. Game Theory is about theoretical frameworks which model "situations of conflict and cooperation between rational decision makers" (Tadelis, 2013, p.xi). In a PD, the subjects act in the way to gain the highest payoff for themselves. As they do not know whether the other player cooperates, they will avoid the risk of being punished (i.e. try to “cooperate alone” C,D or D,C). This leads to the unique Nash equilibrium\(^\text{12}\) in D, D as the dominant strategy (Vega-Redondo, 2003). A Nash equilibrium describes that each subject is doing “the best it can given what its competitors are doing” (Pyndick and Rubinfeld, 2013, p.458).

3.2 The Prisoner’s Dilemma Applied to Open Access Book Publishing

In the following, the PD will be applied to OABP in different forms in order to offer insights into dominant strategies. However, this model also shows that in

\(^\text{12}\) As named after the mathematician, who described this mix of strategies in 1951 (Pindyck & Rubinfeld, 2013).
order to scale OABP, the market as a whole has to be taken into account, as will be discussed in 3.3.

Let us assume that two publishers are going to publish a book in the same field. As has been argued in 2.1, libraries and researchers are not compelled to purchase both books, as they are likely to be substitutable. In addition, library budgets are under constraints and they only invest in books their respective universities actually need, unless they have a budget surplus. If one title would be open access and the other paid access \((OA, PA\) or \(PA, OA\)), more libraries could invest in the paid title as they would have a budget surplus due to receiving the open access title for free. In this case, only a fraction of libraries would purchase a printed edition of the open access title. If all titles were open access \((OA, OA)\), libraries would purchase the same amount of each book as they would not have any economic preference for one title. However, the amount of purchased print titles would be lower than in the all-paid situation \((PA, PA)\) as not all libraries require to have both digital and print editions. This model would lead to the PD in figure 3.

The situation\(^\text{13}\) shows that prices of both books are set at $75, with assumed sales of 200, leading to a revenue of $15,000. As mentioned above, one

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\(^{13}\) All numbers of this model are average numbers according to the research in section 2.2.
publisher would profit from publishing a paid title while the other publishes it as open access. The paid title would gain more sales, while the open access title would generate less, but with an additional publishing fee of $10,000. If all titles were open access, the payoff would be a revenue that is smaller than the original revenue, but – combined with the publishing fee – would lead to more income than the original situation in which none of the books was open access. The best strategy for all would be to publish open access. But as no publisher risks getting the smallest payoff ($OA, PA$ or $PA, OA$), the dominant strategy is the paid model ($PA, PA$).

This model works only in the particular situation described above, and if the restriction holds that open access editions only partly cannibalise printed editions. This surely varies with the purchasing power of libraries and the elasticity of the product. But even in the situation that publishers offer the printed edition for a lower price, a similar PD could be assumed, as in figure 4.

Here again, it would be more rewarding if all titles were published open access ($OA, OA$). However, this model is also true only under certain circumstances – which can vary: publishers may not know which titles competitors are
planning, and libraries may not purchase using this assumed rigorously rational behaviour.

Yet, the strength of the PD does not lie in predicting behaviour. Rather, it provides a theoretical framework to suggest how subjects choose strategies and this framework, if applicable, can be applied to various situations (Peterson, 2015). Therefore, and to discuss insights more generally in section 3.3, figure 5 shows the generalised payoff matrix. It states the requirements that must be true in order for the PD to be applied to OABP.14

![Generalised PD Matrix](image)

The matrix shows the different payoffs for certain strategies of publishers. Interestingly, it provides information about how a single publisher could assess whether open access would be more rewarding than paid access, with the implicit attribute that the payoff for all publishing open access (OA, OA) is more rewarding than the payoff for all publishing paid access (PA, PA), in case the publishing fee is greater than the reduced revenue. This can be represented in the formula in figure 6.

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14 These requirements are the same as in figures 3 and 4. Though, in these the generalised forms are filled with information of a particular case, i.e. sales data for a single title.
3.3 Discussion of the Applied Prisoner’s Dilemma

With many economists urging caution with economic modelling (Rodrik, 2015), the described situation in chapter 3.2 should be analysed carefully as it only provides information about a particular situation. Nonetheless, the inductive process of finding a generalised explanation for the situation provides hints that go beyond the situation itself. As Mäki identifies the use of a specific example to provide insights into more general circumstances, the "example is chosen to isolate a specific mechanism, and hence can make some arbitrary simplifications. In that sense it is not intended as a general model" (2003, p.209).

As the costing analysis indicates, open access cannot alleviate financial pressure on book publishing. However, the PD suggests that a more open market could create economic incentives for publishers to offer open access. Contrary to this is the assumption that publishers would rather not offer potential bestsellers as open access, as then the high revenue could not be absorbed due to the free digital version. This again shows how important it is to have accurate information on OA/print cannibalism effects. Statistics indicate that they might not be too severe, as readers prefer hard copies: about 90% of revenue stems from printed editions (Cox, 2010).

\[
P < R \\
\gamma p < f + \beta p \\
f > p(\gamma - \beta)
\]

Figure 6: Formalised representation of the open access payoff. The requirement of the PD is that the payoff of \(PA,PA\) (all paid access) is smaller than the payoff of \(OA,OA\) (all open access): \(P < R\). In the standardised PD, the payoffs are original (\(\gamma\)) sales * price for \(P\), and reduced (\(\beta\)) sales * price plus the publishing fee \(f\) for \(R\). This can be transformed to the equation that the publishing fee \(f\) must be bigger than the price * original sales less the reduced sales. In other words, the publishing fee must at least compensate for the cannibalism effect.
However, the requirement of the PD that $P<R$ (open access publishing as more rewarding) is only true if the cannibalism effect is not bigger than the compensation of the publishing fee: $f > p(\gamma - \beta)$. This could especially be a risk for new or smaller publishers, as, presumably libraries would rather go without the titles of unknown publishers than without those of well-known brands. Thus, economically, newer or smaller publishers have less incentive to scale open access. Some external initiatives such as Knowledge Unlatched or Luminos try to mitigate risks by dividing them amongst a community/crowd. The efficiency of this model is confronted with two probable limitations. Firstly, how do these initiatives make sure that the whole quality spectrum is offered and not only the predictable “low revenue titles”? Secondly, the budgeting source on the library side is unclear, especially when these models scale. This is in general a problem that underlies the whole transformation process to open access: in order for open access to offer economic incentives to publishers, $P<R$ (open access publishing as more rewarding) must hold true. Following that logic further, this means that the whole market becomes more valuable, which has to be borne by funders and libraries (Collins et al., 2015). Hence, the funding source is as crucial as (and goes alongside with) the strategic offering of publishers. As long as funding for OABP remains uncertain for individual researchers, open access cannot scale.¹⁵

4 Conclusion and Outlook

The analysis shows that the PD can indeed be applied to OABP, which offers – in a generalised form – insights into the scalability of open access. In addition, it can be concluded that open access would be economically better for individual publishers if the whole market shifted in its favour.

This, however, should not preclude an acknowledgement that open access offers even non-economically rewarding improvements for the whole market.

¹⁵ This could change if competition through more external activities (Open Library of the Humanities, Knowledge Unlatched, etc.) increases, as more competition would assumedly drive prices down.
(Murray-Rust, 2010), with open science as a systematic approach (Scheliga and Friesike, 2014). Arguably, the biggest threat in an increasingly open market is missing discoverability, and many publishers do not address this problem effectively even in the paid content market\(^\text{16}\) (Cox, 2009).

In the end, it is the researcher who has to opt for open access, with funding bodies and policy makers still struggling to find sufficient requirements for funding open access long form publishing (Showers, 2014). This – and here the PD helps to point us in the right direction – is accompanied by insufficient knowledge about cannibalism effects and availability of funding.

Future research could try to analyse these complex issues. In terms of the PD, it would be interesting to apply it to journal publishing or, as Hanauske et al. (2007) have attempted, the researcher as prisoner.

\(^{16}\) The ALPSP study (2009) found that only about 40% of ebook publishers provide sufficient MARC records alongside their publications.
Reference List


