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Success Factors of Academic Journals in the Digital Age

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Abstract

Digitalisation has opened up new opportunities for the dissemination of information. That is why many academic journals have started introducing online services since the early 1990s. Previous studies suggest that online availability and free access to articles are positively connected to the number of citations. However, little is known about the relative impact of the introduction of online services at the journal level and what provides a long-term competitive advantage in times of digital change. Based on panel data from SSCI-listed management journals from 1989 to 2016, we examine which journals have pioneered the digital field, to what extent first-mover advantages can be identified, and which journal characteristics are associated with citation-based performance indicators. Our results show that lower-ranked journals were the first to introduce digital services and were beneficiaries of the digital age. Furthermore, we find a significant connection between the international composition of author teams and performance indicators. Our analysis of the relationship between online availability as well as open access and performance contradicts previous studies as we find that significant correlations diminish when adequately controlling for journal-level effects.

JEL-Codes: I23, L82, L86, M21, O33

Erfolgsfaktoren wissenschaftlicher Zeitschriften im digitalen Zeitalter

Zusammenfassung

Die Digitalisierung hat neue Möglichkeiten für die Verbreitung von Informationen eröffnet. Deshalb haben viele wissenschaftliche Zeitschriften seit Anfang der 90er Jahre mit der Einführung von Online-Angeboten begonnen. Frühere Studien deuten darauf hin, dass die Online-Verfügbarkeit und der freie Zugang zu Artikeln positiv mit der Anzahl an Zitationen verbunden sind. Über die relativen Auswirkungen der Einführung von Online-Angeboten auf Zeitschriftenebene und die langfristigen Wettbewerbsvorteile in Zeiten des digitalen Wandels ist jedoch wenig bekannt. Basierend auf Paneldaten SSCI-gelisteter Management-Journals von 1989 bis 2016 untersuchen wir, welche Zeitschriften im digitalen Bereich Pionierarbeit geleistet haben, inwieweit First-Mover-Vorteile identifiziert werden können und welche Zeitschriftenmerkmale mit zitationsbasierten Leistungsindikatoren verbunden sind. Unsere Ergebnisse zeigen, dass Zeitschriften mit niedrigerem Rang relativ früh digitale Angebote eingeführt haben und besonders von der Digitalisierung profitieren. Darüber hinaus finden wir einen signifikanten Zusammenhang zwischen der internationalen Zusammensetzung von Autorenteams und Leistungsindikatoren. Unsere Analyse des Zusammenhangs zwischen Online-Verfügbarkeit sowie Open Access und Performance steht im Widerspruch zu früheren Studien, da wir feststellen, dass signifikante Korrelationen abnehmen, wenn wir die Effekte auf Zeitschriftenebene angemessen kontrollieren.

Im Internet unter:

http://www.wiwi.uni-muenster.de/io/forschen/downloads/DP-IO_06_2019

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Success Factors of Academic Journals in the Digital Age

1. Introduction

Since the 1990s and early 2000s, more and more academic journals have offered selected content or entire issues online. With the help of modern technologies, these contents can be accessed by a large number of people from any location (Lozano et al. 2012), making digitalisation a relevant aspect in the context of knowledge generation (Ding et al. 2010). Digitalisation also changes the user behaviour of readers, as they can search for specific topics or articles without having to search through entire journal issues (Lozano et al. 2012). As a result, readers obtain information from a variety of sources, including print journals, electronic journals, full-text databases, and e-print servers (Boyce et al. 2004), which increases availability but also complexity (Turner 2005).

This has implications for authors, as they cannot only create their contributions digitally but also make them available to readers via a variety of (digital) channels. However, academic journals are still the pivotal format for the dissemination of academic articles. When looking for an appropriate journal to submit new research, authors typically weigh various factors such as the journals' prestige and character (Borgman 2008). Publishing in prestigious journals is particularly important for young academics who want to establish themselves in the scientific community, while older academics often need publications in high-level journals to maintain their grants (Larivière et al. 2015) and reputation. Moreover, many academics seek to maximise the recognition of their research, for which the visibility and accessibility of a journal as well as the publication speed are crucial (Borgman 2008). Accordingly, authors want to publish and get cited, while at the same time acting as consumers of academic contributions (Klamer & van Dalen 2002). In an article by Wineburgh-Freed (2007), a vivid summary of the actors' arrangement is provided. Accordingly, authors want to increase the impact of their research, commercial publishers want to increase their profits, libraries hope for relief with lower capacity requirements and cost reductions, and readers want to find literature easily and quickly (Wineburgh-Freed 2007).

Recent studies have examined aspects such as the advantages and disadvantages of acquiring online versus print journals from the customers' perspective (Williams et al. 2006), the extent of online publications (Amin Mahdavi & Abedi 2014), and the user frequency of online and print journals (De Groote & Dorsch 2001, Vaughan 2003). Overall, the results point to the increasing relevance of online offerings, which – despite not necessarily lower access costs –

are being used more frequently. However, not much is known about the journal-level effects of introducing digital services and what factors are associated with an academic journal's (long-term) performance in the digital age. Based on a complete list of management journals in the Social Sciences Citation Index (SSCI), we bridge this gap using panel data analysis. Furthermore, we provide descriptive evidence on what kind of journals were first movers in providing digital services and identify what factors create a competitive advantage in times of digital change.

The remainder of this paper is structured as follows. Section 2 gives an overview of the literature, followed by our research questions in Section 3. A description of our data is presented in Section 4, followed by our method in Section 5. Section 6 presents our findings, which are discussed and critically reflected in Section 7. Section 8 shows the limitations of our study and suggestions for future research. We conclude in Section 9.

2. Literature Review

Historically, online publications represent a step on a longer-lasting path, as previously demonstrated by a shift from contextualised monographs to scholarly articles (Evans 2008). Davidson (2005) wrote that academic, technological, and medical journals would be the first to switch entirely from print to digital, with monographs also being increasingly available in the digital format. He further stated that in the near future, communication and publication of scientific information would become entirely electronic. In Section 1, the actors particularly affected by these developments were already named. The sequence used forms the basis for the systematisation of this section, first presenting aspects focused on readers, followed by content on authors, libraries, publishers, and open access offerings. Particular attention will be paid to academic journals as they are at the centre of this paper.

Readers of Academic Contributions

De Groote (2008) examined the effects of online journals on citation behaviour. As a data basis, she used a university in Chicago with an urban and a rural campus. Her results show no significant differences between online and print journals on the urban campus, while significantly fewer print journals were cited on the rural campus. A similar study was conducted by Vaughan (2003), who used data from a university library to investigate the short-term effects of online availability on the use of print journals. The results show that the use of print journals roughly halved during the observation period from 1999 to 2001 (Vaughan 2003). Wil-

liams et al. (2006) investigated the advantages and disadvantages of buying online vs. print journals and found that readers increasingly prefer access to online journals. The majority of online journal articles are now published in the two formats HTML and PDF, with the HTML format often containing hyperlinks from one article to another (Davidson 2005). These links increase the wealth of information for readers and allow them to immediately verify the accuracy of the content cited (Davidson 2005). A significant disadvantage of increasing the efficiency of online search with hyperlinking is that the results may be channelled through a filter of prevailing opinions (Evans 2008). This is supported by the results of his study based on 34 million articles and their citations, which shows that as the prevalence of online issues increases, more recent sources are cited from a smaller number of journals and articles (Evans 2008). Similar to internet platforms such as Facebook, an information bubble could emerge, in which opposing views are systematically excluded.

Authors as Consumers and Contributors

As mentioned in the introduction, authors act simultaneously as consumer and contributors. As consumers, they can access a variety of different (online) sources from any location. A problem already mentioned arises from the fact that frequently cited and highly published articles from a relatively small number of (high-ranked) journals are preferably used by authors (Evans 2008), which can lead to an information bubble. Considering much cited and highly published articles for the literature part of a research contribution is relevant to overcome the entry barriers of high-ranking journals so that a mechanism driven by inherent incentives comes into effect. Watson et al. (2012) have examined open access journals and find that many authors are increasingly interested in publishing quickly and being listed in large databases. In particular, lesser-known authors can use IT as a balancing force to increase their productivity and take advantage of an increased number of opportunities for collaboration (Ding et al. 2010). When selecting a suitable journal for the publication of academic articles, authors pay particular attention to the thematic consistency, quality, publication speed and an open access option of the journal, whereby journals with high impact factors tend to have higher application costs (Solomon & Björk 2012).

The Role of Reference Libraries

As the number of articles available online increases, the importance of reference libraries as a means of access decreases (Davidson 2005). Instead, more and more online libraries are being used that do not necessarily have to be linked to a reference library (Davidson 2005). When

most journals were only available in print, many libraries offered open browsing of their collections, which has become less common in the digital age (Davidson 2005). Instead, user-driven pay-per-view models for both e-journals and e-books are increasingly used as revenue sources to better meet individual customer needs (Schell et al. 2010). Other benefits used by platforms like EBSCO, Elsevier, Ebook Library (EBL), Infotrieve, and Ingenta include a variety of possible offerings, cost-saving potential, and the opportunity to generate accurate user statistics (Schell et al. 2010). Also, digitalisation enables new providers to enter the market, which intensifies the competitive situation. These new competitors include Serial Solutions, 360 Link, and Ex Libris' SFX, which offer "online linking to full text via third-party link-resolution services" (Stuart et al. 2015, p. 52). To remain competitive, traditional libraries must rethink their business model. In this context, it should be noted that a combined print and electronic environment appears to be the most costly option (Turner 2005). However, electronic collections are becoming more widely accepted and used (Montgomery & King 2002), so adequate adaption to an increasingly digitised environment is a critical success factor for libraries.

Publishers Associated with Academic Journals

The consolidation of the publishing industry has increased publishers' profits. Larivière et al. (2015) show that digitalisation has helped large publishers such as Reed-Elsevier, Wiley-Blackwell, and Springer to increase their share of published output. While it is widely accepted that journals appear online, it is up for discussion whether they should be cheaper than their printed equivalents (Odlyzko 1998). Some traditional publishers claim that switching from print to electronic can lead to cost savings of around 30 %, mainly through reduced printing and mailing costs (Odlyzko 1998). However, the market shows that there is little difference in the price between printed and electronic journals (Odlyzko 1998). Both formats have their cost base, with electronic journals requiring access and technology, while print journals need, among other things, extensive storage and shelving (Turner 2005). Study results from Montgomery and King (2002) suggest that electronic journals are more cost-effective on a per use basis than print journals when all costs considered.

Online Availability and Open Access

Most academic journals from various disciplines are available online (Borgman 2008), with the online version of the articles being published on average three months before the print version (Das & Das 2006). The amount of an academic journal's online content varies widely,

with younger journals more often being only available in the online format, while older journals sometimes put only a selection of older issues online (Borgman 2008). The fact that there are still print-only journals may be due to economic reasons. For example, third-party providers such as the subscription journal archiving services Muse can offer their members open access to online issues (Davidson 2005). If this user group belongs to the customer base of a journal, this can lead to the cancellation of subscriptions (Davidson 2005). The main issue here is that readers have no incentive to pay for an individual subscription if they can use full online access through institutional providers (Davidson 2005). Overall, the price of academic journals has risen remarkably since the mid-1980s (Haucap & Uhde 2007).

In addition to economic considerations, academic journals have an interest in obtaining a high number of citations to increase their visibility and citation-based success indicators like the impact factor or immediacy index. Anderson et al. (2001) show that online-only, peer-reviewed content is cited at an average rate, so a better synopsis of relevant citation drivers is of interest. In this context, a closer look at the topic of open access (OA) seems reasonable. OA can be seen as a global trend that influences the workflow in academic journals, their credibility, indexability, and quality (Gasparyan et al. 2013). OA can be offered by OA academic journals or by authors, who make a manuscript of their article freely accessible on the internet (Björk et al. 2010). Laakso et al. (2011) show a rapid increase in OA publications from 1993 to 2009, which can be divided into the pioneering years (1993-1999), innovation years (2000-2004), and consolidation years (2005-2009). According to Davidson (2005), we can speak of the development of an OA movement which is committed to making all articles freely available online six months after their publication. Björk et al. (2010) show that OA already has a significantly positive effect on the accessibility of scientific literature. In addition to accessibility, the influence of OA on the citation rates of scientific publications is of interest (Borgman 2008). Bernius and Hanauske (2009) suggests that if two authors publish articles of similar quality, OA leads to increased citations, as OA articles are on average read and downloaded more frequently than charged articles. However, as many readers of academic literature have institutional access to numerous journals, the question is whether the effect is caused by OA or, more generally, by online availability.

3. Research Questions

To measure the effect of an open access option and online availability, recent studies have focused on the article-level or single journal issues without measuring impact on the journal

level (McCabe & Snyder 2015). We contribute to the existing literature by conducting a comprehensive journal-level analysis with a focus on the effect of introducing online services on citation-based success indicators. We, therefore, formulate the following research question:

RQ1: *What effect does the introduction of online services have on the relative success of academic journals?*

We dig a little deeper at this point and investigate whether it was advantageous for journals to be a first mover in introducing digital services. This aspect is relevant, as more and more journals have introduced digital services over time, so this has not been a unique selling proposition in the long run. Accordingly, our second research question is:

RQ2: *Was it advantageous for academic journals to be early providers of digital services (in the long-run)?*

To gain insight into whether a particular type or group of academic journals followed the digital trend particularly early, we analyse several journal characteristics such as the journals' ranking, access modalities, and whether the respective publisher is commercial, non-commercial, or a university press. Our third research question is:

RQ3: *What type of academic journals were early providers of digital services?*

It could be that there was a positive effect of being a digital pioneer at the beginning, which diminished over time as more and more journals introduced online services and made the field more competitive. It could also be that being a digital pioneer was not an advantage, or only to a minimal extent, if it was unpopular to search for academic articles online in the early 1990s and only a small number of people had access to the internet. To gain insight into the factors that are associated with (long-term) competitive advantage in the digital age, we formulate our fourth research question:

RQ4: *What journal characteristics are associated with (long-term) competitive advantage in the digital age?*

In addition to a set of journal characteristics, we investigate whether the international composition of author teams is relevant to a journal's performance. Digital communication and collaboration tools such as Skype, Google Drive, and others enable locally dispersed authors to collaborate in real time. This allows researchers from renowned universities around the world to pool their knowledge in collaborative projects and improve the quality of their research.

Accordingly, we highlight the role of locally distributed author teams for the performance of academic journals and formulate our fifth and final research question:

RQ5: *Is there a significant link between the international composition of author teams and the performance of academic journals?*

However, the right interpretation of the corresponding correlation is not intuitive, since it could be that higher-ranked journals attract international teams (self-selection) or that increasing internationality of teams increases the performance at the journal level. To investigate this relationship, we work with time lags and apply journal-level and time fixed effects (see Section 5 for the methodology).

4. Data

Our research is based on 194 SSCI-listed management journals. We focus our investigation on the management discipline because it provides a fertile field for measuring digitalisation effects (McCabe & Snyder 2015) and is in line with our research focus. “Harder” scientific disciplines may be less interesting for studying digitalisation effects, as they are often funded with large grants, and the access costs are comparatively low (McCabe & Snyder 2015). Scientific indicators have been documented for many years, for example, in the Science Citation Index (SCI, back to 1900), the SSCI (back to 1956), and the Arts and Humanities Citation Index (back to 1975, Borgman 2008), now available over the Web of Science by Thompson Reuters. The Scimago Journal & Country Rank database is used, for example, by Watson et al. (2012) and a SCImago Journal Rank (SJR) indicator is recommended by González-Pereira et al. (2010) for measuring the scientific prestige of a journal. However, these data can only be traced back to 1999. Since the shift from print to electronic took place mainly in the 1990s, an adequate panel analysis requires data from earlier years.

To establish a mostly complete panel record for the period from 1989 to 2016, we supplemented the data from Thomson Reuters and Scimago with hand-collected data from Journal Citation Reports for social science journals stored in German university archives. To obtain data on the shift from print to digital, we investigated the journals’ archives. The changeover from print to online was identified by examining up to which year scanned articles were uploaded instead of digital formats. Table A1 (see Appendix) shows a list of the variables collected, including their definitions, and Table 1 shows the respective summary statistics. Data on submission fees was obtained from the journals’ websites, where this information is typi-

cally included in the authors' guidelines. To determine whether a journal provides open access to all or selected content, access modalities were collected for each year of the observation period. For a robustness check, we created two additional dependent variables, one representing the relative deviations of a journal's immediacy index from the average immediacy index of the respective year, and the other representing the relative deviations of a journal's impact factor from the average impact factor of the respective year.

	Mean	SD (Overall)	SD (Between)	SD (Within)	Number of Journals	Number of Observations
Dependent Variables						
Immediacy Index	0.25	0.31	0.21	0.31	192	2,523
Immediacy Index Deviation	1	1.25	0.78	0.99	192	2,523
Impact Factor	1.38	1.13	0.97	0.80	192	2,523
Impact Factor Deviation	1	0.83	0.66	0.42	192	2,523
Explanatory Variables						
Access Category	1.75	0.62	0.60	0.09	176	4,356
Digital Services	0.70	0.46	0.21	0.42	171	3,976
First Year Online	1999.14	3.81	4.64	0.00	169	2,797
International Collaboration	22.14	13.95	8.66	11.45	188	2,915
Journal Category	2.27	0.49	0.31	0.42	171	3,976
Publisher Category	1.200	0.547	0.546	0.040	169	4,708
Submission Fees	1.69	0.70	0.73	0.07	163	3,930

Table 1: Summary Statistics

5. Method

In evaluating academic journals, citation analysis has become increasingly established (Magri & Solari 1996). In this context, citations are used to measure the recognition of both individual publications and journals (Borgman 2008). Widely used citation-based measures are the impact factor and the immediacy index (Borokhovich et al. 1999, Thelwall 2012). We follow Borokhovich et al. (1999) and use both the impact factor and the immediacy index as our main dependent variables. A particular focus will be on the impact factor, as it is a relative measure taking into account the number of citable items. It should be noted that the total number of citations shows fluctuations, as journals are added to and removed from the journal list over time. This also influences the citation-based impact factor and the immediacy index, whereby the article-based calculation mitigates the effect. In case of the impact factor, the effect is additionally mitigated by the two-year reference base. The newly generated dependent variables representing the deviation of a journal's impact factor and immediacy index from the average of the respective year are used for robustness checks presented in Table A3 and Table A5 in the Appendix.

Magri and Solari (1996) have shown a substantial heterogeneity in citations between journals over time, which was revealed by a considerable asymmetry of the frequency distributions. This confirms the relevance of controlling adequately for this phenomenon. According to McCabe and Snyder (2015), many previous studies have suggested too high an effect of online or open access on citations because they did not control for the journal quality using journal-level fixed effects. To measure the effects of introducing digital services (RQ 1) and the international composition of author teams (RQ 5) on the journals' performance, we run two separate regressions with time- and journal-level fixed effects, one with the impact factor and another with the immediacy index as the dependent variable. For this stage of the analysis, we consider only time-varying explanatory variables, since the fixed effects would capture the effect of time-invariant explanatory variables. As the main explanatory variables, we use a dummy variable equal to one if the journal offers online services and equal to zero if the content is only available in print format, and a variable representing the ratio of the journals' documents signed by researchers from more than one country. Furthermore, we include a sequence of integers from 1 to 28, representing the citation years from 1989 to 2016. This allows us to control for a general increase in the dependent variable over time (Evans 2008).

The baseline equation is

$$(1) \text{Success}_{it} = \alpha + \text{Digital Services}_{it}\beta_1 + \text{International Collaboration}_{it}\beta_2 + \text{Integer}_t\beta_3 + \text{Year}_t + c_i + \mu_{it},$$

where Success_{it} is the dependent variable representing either the *impact factor* of journal i in year t or its *immediacy index* in year t . $\text{Digital Services}_{it}$ and $\text{International Collaboration}_{it}$ are the main explanatory variables, Integer_t captures a possible time trend, and Year_t represents a year dummy. Lastly, c_i shows journal-level effects and μ_{it} is the error term (Schmidheiny 2018).

To examine research questions two, three, and four, we focus our analysis on descriptive statistics as the variables of interest are mostly time-invariant. For this purpose, we use illustrations in which we show the variables of interest over time and, depending on the question, their relationship to the journals' mean impact factor. However, we back up our analysis using a random-effects GLS regression with time fixed effects and journal-level clustered standard errors. For this, we follow Watson et al. (2012) and include further explanatory variables such as a variable indicating whether the journal provides open access to all or selected articles, the first year of publication, information about the publisher, and a variable indicating whether

the journal charges submission fees (see Table A1 in the Appendix for the variable descriptions).

The baseline equation is

$$(1) \text{Success}_{it} = \alpha + \text{Digital Services}_{it}\beta_1 + \text{International Collaboration}_{it}\beta_2 + \text{Integer}_t\beta_3 + x_i'\gamma + \text{Year}_t + c_i + \mu_{it},$$

where x_i' is a M -dimensional row vector of the time-invariant journal characteristics excluding the constant, and γ represents a M -dimensional column vector of parameters (Schmideiny 2018).

6. Results

This chapter is divided into two sections, the first giving an overview of the results of our descriptive analysis and the second presenting the results of our regression analysis.

Descriptive Results

In the first step of our descriptive analysis, we examine the introduction of digital services into the field of academic journals. For this, we distinguish between print journals, journals with combined print and online services, and online journals. Figure 1 shows the number of journals offering services of the categories “online only”, “online and print”, and “print only” over time. It can be observed that the first journals began introducing online services in the early 1990s. There was a particularly sharp increase in the years after 1996, which levelled off slowly from the 2000s onwards. A contrary trend can be observed in “print only” services, which declined rapidly from 1996 onwards and almost disappeared in the course of the 2000s, which is in line with De Groote (2008) and Vaughan (2003). Journals that offer their content exclusively online form a small group in our sample.

Before conducting an in-depth analysis to determine the extent to which first-mover advantages can be identified, we examine which type of journals pioneered the introduction of digital services. As the differentiation criterion, we focus on the journal performance and defined three groups of journals based on the mean impact factor: lower class (≤ 25 percentile), middle class (26 to 74 percentile), and upper class (≥ 75 percentile). We have created the journal classes based on the average impact factor of the entire period to avoid multiple counting of journals with significant changes in the impact factor over time. Figure 2 shows how many journals of the three categories have introduced online services in each year of our observation period. It shows that most journals in all three categories have offered digital ser-

vices since 1998. The earliest date for online services in our sample was 1991 for a lower-class journal, followed by one middle-class journal and five upper-class journals in 1994. Accordingly, the Figure indicates that lower- and middle-class journals pioneered the introduction of digital services, whereas the number of upper-class journals offering online services began to rise somewhat later. However, as we have relatively few data points for this period, the robustness and generalisability are limited.

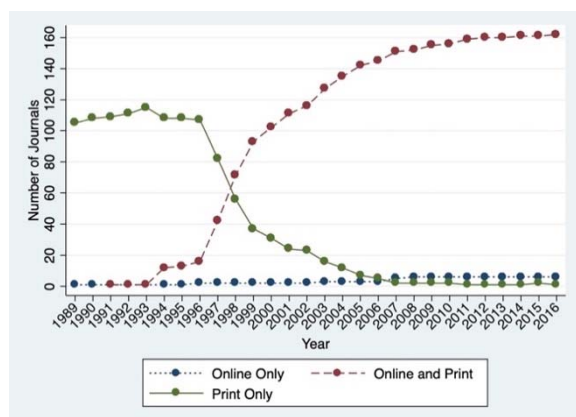


Figure 1: Publication Types of Journals over Time

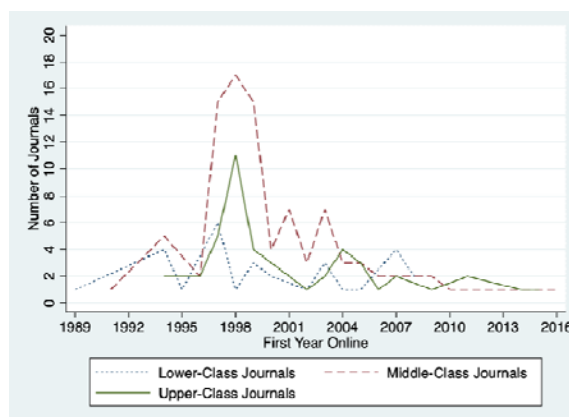


Figure 2: Number of Journals Introducing Digital Services by Journal Class

Interestingly, the development of the number of journals across the three classes shows a relatively constant trend until about 2009 (see Figure 3). Subsequently, the number of journals in all three categories raised considerably, with middle-class journals standing out and increasingly dominating the sample. While upper-class journals formed the midfield in the early 1990s, they accounted for the smallest share at the end of the observation period. In a way, the older journals are now relatively better while newer journals take time to build a reputation.

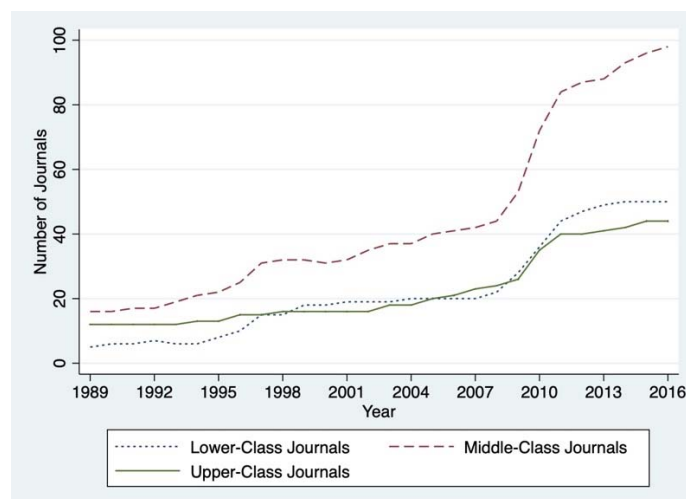
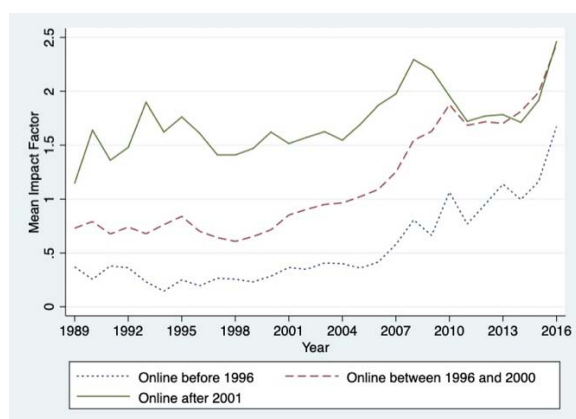


Figure 3: Number of Journals by Journal Class

To determine whether it was beneficial for journals to introduce digital services at an early stage, we created three journal categories: first movers (introduction of online services before 1996), followers (introduction of online services between 1996 and 2000), and late movers (introduction of online services from 2001, see Figure 4). An analysis of the mean impact factor over time shows no discernible differences in the time trend of first movers, followers and late movers. However, it can be seen that the group of early movers consists mainly of lower- and middle-class journals, while late movers seem to be the top performers. The group of followers forms the middle layer of the mean impact factor. This corresponds to Figure 2 but additionally shows that the initial top performers could not maintain their lead over time. Especially since the beginning of the 2000s, the first movers could almost catch up with the late movers, while the followers even overtook them. To examine to what extent Figure 4 could be distorted by a very different number of journals within the three categories, we add Table 2 with the corresponding frequencies. This reveals that the first-mover category comprises a total of 14 journals, of which only one is an upper-class journal. This has to be taken into account when interpreting the results.



Note: Before 1996 (early movers), between 1996 and 2000 (followers), and after 2001 (late movers)

Figure 4: Mean Impact Factor of Journals by Introduction of Online Services

	Online before 1996	Online between 1996 and 2000	Online after 2001
Upper Class Journals	1	23	19
Middle Class Journals	7	55	33
Lower Class Journals	6	12	13

Table 2: Matrix of Journal Classes and First Online Services

For the next step of our analysis, we examine whether there is a link between the performance of academic journals and their access modalities and submission fees. Figure 5 shows the mean impact factor of journals that charge submission fees, journals that charge fees for an open access option, and journals that do not charge submission fees. Our sample includes 25 journals without submission fees, five journals with submission fees, and 133 journals that charge fees for an open access option. Journals not charging submission fees have the highest mean impact factor over time. However, Figure 5 also shows that journals charging fees for

an open access option have developed very positively and, at the end of the observation period, are almost on par with journals not charging any fees. On average, journals levying submission fees show the lowest impact Factor. However, data for this category is retrievable only from 1997 onwards.

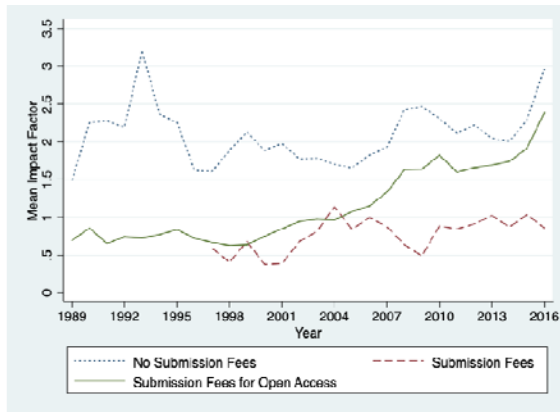


Figure 5: Mean Impact Factor by Submission Fees

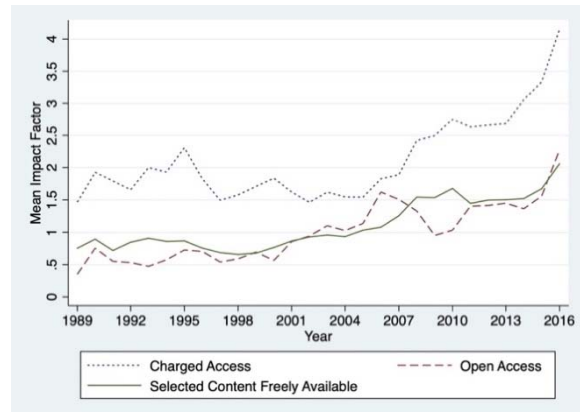


Figure 6: Mean Impact Factor by Access Category

The relationship between the journals' mean impact factor and their access modalities over time is shown in Figure 6. A total of 17 journals with paid access, eight with open access and 153 with open access for selected content are included. Here, too, the high number of journals offering open access for selected content must be taken into account when interpreting the results. Accordingly, it can be observed that journals with charged access stand out positively from around 2006 onwards. Based on Figure 6, however, no conclusions can be drawn about causality, partly because the variable is time-variant and journals can switch between categories. Of course, this can have a meaningful influence on the course of the mean impact factor of the different categories. For this reason, we excluded journals which have changed their access modalities at some point. However, there are not many changes, supporting the conclusion that journals with charged access modalities have developed best.

Figure 7 shows the mean impact factor of journals whose publishers are commercial, non-commercial, or university presses. In total, we have 149 journals associated with commercial publishers, nine with non-commercial publishers (excluding university presses), and 12 with university presses in our sample. When interpreting the results, the relatively strong differences must be taken into account. While journals associated with university presses were the top performers until around 1999, their mean impact factor decreased considerably in the following years and fell below the mean impact factor of journals associated with (other) non-commercial publishers in 2002. Interestingly, the journals linked to commercial publishers

have a relatively low mean impact factor, which, however, increased above the performance of journals related to university presses in around 2008.

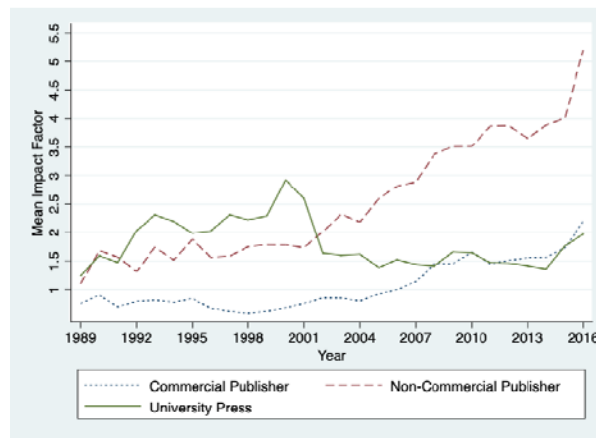


Figure 7: Mean Impact Factor by Publisher Category

Looking at possible connections between journals charging fees for accessing or submitting articles and the type of publisher (commercial, non-commercial, or university press), it appears that not only commercial but also non-commercial publishers and university presses are associated with journals that charge fees. Accordingly, a separate analysis of the relationship between the journals' performance and related publishers is necessary and cannot be derived from Figures 5 and 6.

Regression Results

In addition to our descriptive analysis, we use regression analyses to examine the impact of the introduction of digital services and the degree of the international composition of author teams on scientific success indicators. Since we are interested in the effects at the journal level, we only include time-variant variables in the model and use a fixed-effects approach. Table 3 shows the results of two regression models with *impact factor* and *immediacy index* as the dependent variables. Accordingly, there is no statistically significant impact of the introduction of digital services on these performance indicators. Significant coefficients for *digital services* can only be generated when not considering journal-level effects and using the journals' impact factor as the dependent variable (see Tables A3 in the Appendix). However, the results of model 1 show a significant positive coefficient for the explanatory variable *international collaboration*, suggesting that the degree of international collaboration among author teams might be a relevant factor in explaining the performance of academic journals.

	(1)	(2)
Dependent Variables	Impact Factor	Immediacy Index
Explanatory Variables		
Digital Services	0.245 (0.228)	0.019 (0.049)
International Collaboration	0.004* (0.113)	0.001 (0.001)
Integer	0.113*** (0.011)	0.021*** (0.003)
_cons	-0.824** (0.289)	-0.189*** (0.063)
Year Dummies	Yes	Yes
N (observations)	1,660	1,786
N (journals)	163	165
R-sq	0.080	0.077
Prob > F	0.000	0.000

Note: This table presents the results of fixed-effects OLS regressions with time-level and journal-level fixed effects. Robust standard errors are reported (in parentheses). * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In model (1), explanatory variables are lagged two years.

Table 3: Regression Results for the Time-Variant Explanatory Variables

However, this may be a case of reverse causality, as successful journals are likely to attract high-level contributors from around the world. To control for this, we have increased the time lag for *International Collaboration* to three, four, and five years. The effect persists in all cases. The coefficients become even more significant when using the relative deviation of a journal's impact factor and immediacy index from the average of the respective year (see Table A2 in the Appendix). Lastly, the significantly positive coefficients of *integer* indicate that both the *impact factor* and the *immediacy index* have a positive time trend.

To enable a detailed analysis of the time-invariant explanatory variables, we use stepwise random-effects OLS regressions with time-level and journal-level fixed effects (see Table 4).

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables	Impact Factor			Immediacy Index		
Explanatory Variables						
Digital Services	0.219 (0.214)	0.411 (0.245)		0.010 (0.043)	0.038 (0.056)	
International Collaboration	0.006* (0.002)	0.006* (0.003)	0.006* (0.003)	0.002** (0.001)	0.002** (0.001)	0.002** (0.001)
Access Category						
<i>Open Access</i>	-0.429 (0.478)	-0.201 (0.524)	-0.160 (0.488)	-0.117 (0.099)	-0.081 (0.097)	-0.079 (0.096)
<i>Open Access for Selected Content</i>	-0.722 (0.422)	-0.672 (0.505)	-0.653 (0.480)	-0.174* (0.082)	-0.195* (0.093)	-0.194* (0.084)
Submission Fees						
<i>Fees Demanded</i>		-0.657 (0.436)	-0.636 (0.444)		-0.202* (0.085)	-0.194* (0.084)
<i>Fees for Open Access</i>		0.515 (0.426)	0.520 (0.421)		0.102 (0.069)	0.107 (0.069)
Publisher Category						
<i>Non-Commercial</i>		1.624* (0.825)	1.725* (0.874)		0.269* (0.123)	0.290* (0.130)
<i>University Press</i>		0.072 (0.446)	-0.025 (0.424)		0.025 (0.059)	0.014 (0.056)
First Issue Online			0.024 (0.032)			0.001 (0.005)
Integer	0.111*** (0.011)	0.121*** (0.013)	0.119*** (0.013)	0.019*** (0.003)	0.018*** (0.003)	0.018*** (0.004)
_cons	-1.104 (0.450)	-2.084 (0.517)	-50.030 (63.498)	-0.129 (0.111)	-0.320** (0.105)	-1.862 (10.013)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N (observations)	1,587	1,380	1,335	1,709	1,486	1,443
N (journals)	153	133	133	155	135	135
R-sq	0.202	0.276	0.297	0.141	0.193	0.194
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000

Note: This table presents the results of random-effects GLS regressions. The dependent variable for both regressions is the *Impact Factor* (see Table 1 for the variable description). Standard errors are clustered by journals (in parentheses). Based on a Hausman specification test, random effects are used in case of both models. * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In models (1) to (3), all explanatory variables are lagged two years.

Table 4: Regression Results Including the Time-Invariant Variables

A Hausman test confirms that random effects are a consistent estimator in all models used. As with the short model (Table 3), the journals' *impact factor* and *immediacy index* are used as the dependent variables.

The results show no significant coefficients for the introduction of digital services, which, again, can only be generated when not considering journal-level effects (see Table A4 in the Appendix). Instead, we find significant positive coefficients for the degree of international collaboration in case of all models, which is consistent with Table 3 and our robustness check presented in Table A5 in the Appendix. The explanatory variable *access category* has

“charged access” as the base category. Only models 4, 5 and 6 show significantly negative coefficients for *open access for selected content*, indicating that the free provision of services might be negatively related to journal success. This is interesting, as previous studies suggested that free access to articles leads to an increase in citations. One explanation could be that many readers of academic literature have institutional access to journals anyway. However, this result is only significant if the *immediacy index* is used as the dependent variable. The situation is similar with the explanatory variable *submission fees*, for which we find significantly negative coefficients only when using the *immediacy index* as the dependent variable. Nevertheless, the result indicates that demanding submission fees is negatively associated with a high performance, which is in line with Figure 5.

Our results for the categorical explanatory variable *publisher category* show significantly positive coefficients for journals associated with non-commercial publishers in all regression models. This supports Figure 7 and shows that journals linked to non-commercial publishers perform significantly better than journals associated with commercial publishers or university presses. We use the explanatory variable *first issue online* to identify possible first-mover advantages, which, however, cannot be identified based on our data. Even a limitation of the period to the years 1998 to 2004 does not lead to any significant change. In accordance with Table 3, the coefficients of *integer* are significantly positive in all regressions, showing a significantly positive time trend for the dependent variables as there are more citations over time.

7. Discussion

This section is divided into two subsections, the first discussing our descriptive findings and the second detailing our results from the regression analyses.

Discussion of the Descriptive Results

Our descriptive analysis of the market launch and development of digital services in the field of academic journals reveals that the first journals in our sample began offering digital content in the mid-1990s. Interestingly, we have very few observations of online-only journals, the number of which has not increased significantly over time. This may be due to economic reasons, as most libraries and many institutional customers purchase online and print services. This is the most costly option (Turner 2005) but allows journals to earn twice with the same content or also to price discriminate. Furthermore, our data support the assumption of Davidson (2005) that scientific information is likely to become fully electronic, as not a single

journal in our sample has offered print-only services since about 2005. In view of the high costs for customers, an interesting question is to what extent combined print and online services are a long-term business model. In addition to the high costs, reference libraries are losing relevance as a medium for accessing literature (Davidson 2005), which gives reason to assume that the number of online-only services will increase in the future.

We find that the group of first movers consists mainly of lower and middle-class journals. The later entry of upper-class journals does not seem to have been an advantage in the long run, as first movers have been able to improve their performance especially since the early 2000s and, measured by their impact factor, have almost caught up with the former top performers or even overtook them. Whether one can speak of first-mover advantages based on this data is questionable but being a pioneer does at least not seem to have been detrimental.

According to Laakso et al. (2011), the number of open access publications has increased considerably between 1993 and 2009 and, according to Hanauske et al. (2007), OA-publications are read and downloaded more frequently than charged publications. Our descriptive analysis shows a somewhat different picture, since, based on our data, journals with charged access perform best over the entire observation period. Journals offering services without fees and those making only part of their contents freely available developed similarly, with pure open access journals making up only a relatively small subgroup of our sample. This raises the question of whether an increase in the number of citations is indeed caused by open access options or, for example, rather by the opportunity to access articles online. Doubts about the positive influence of open access on the impact factor can also be found in more recent studies such as Wang, Zhang, Chen, and Chai (2019).

Discussion of the Regression Results

Our empirical analysis provides no evidence that the introduction of *digital services* had a significant impact on the journals' *impact factor* or *immediacy index*. One reason for the lack of significance might be that our data density of the impact factor and immediacy index is relatively low for the early 1990s. Accordingly, the positive coefficients may at least indicate that the introduction of digital services is positively related to the journals' citation-based performance. However, significant coefficients can be generated when not controlling for journal-level effects (see Tables A3 and A4). This is in line with McCabe and Snyder (2015), according to whom past studies have overestimated the effect of online availability and open access. In this respect, we contribute to the existing literature by showing that there is no ap-

parent connection between online availability or open access and the performance of a given journal.

In both the long and short models, we find significantly positive coefficients for the degree of *international collaboration* of author teams. Although we cannot make a stable assumption about causality, the use of time lags suggests that increasing internationalisation of author teams is positively related to the performance of the journal in that the respective contribution is published. This finding contributes to the existing literature and indicates that it might be interesting to take a closer look at the composition of author teams in connection with the performance of academic journals.

For the categorical variable *access category*, we find significantly negative coefficients in the case of *open access for selected content*, while *charged access* is the reference category. This result is consistent with Figure 6, which shows that the performance of journals with charged access has developed particularly well over time. In our sample, however, we have only 17 generally charging journals, which we compare with eight open access journals and 153 journals offering only part of their content free of charge. This could limit the reliability of the results but at least shows that the uncharged provision of selected journal content seems to be the preferred business model although it does not make a meaningful contribution to explaining the (long-term) academic performance.

Our explanatory variable *submission fees* has *no fees* as the reference category, against which journals requiring submission fees perform less well. We find negative coefficients in all regressions, which are, however, only significant in models 5 and 6. The fact that a large majority of 133 journals demand submission fees for an open access option limits the reliability of the regression results due to the small comparison groups but also shows that this seems to be the preferred option.

In line with Figure 7, our regression results show that journals associated with non-commercial publishers perform significantly better than those associated with commercial publishers and university presses. One might have assumed that open access journals and those offering at least selected content free of charge are particularly linked to non-commercial publishers. This, however, cannot be confirmed by our data, as the majority of the 134 journals in these categories are published by commercial publishers.

The significantly positive coefficients of *integer* indicate a positive time trend in the citation-based performance indicators. Accordingly, it is crucial to control for the rising time trend

when examining the impact of introducing digital services and other factors on the journals' performance. With the consideration of journal-level effects and a time trend in the dependent variables, we have two relevant components that were not sufficiently considered in previous studies. Interestingly, we cannot confirm central results of these previous studies as we do not find any evidence for a significant effect of introducing digital services (when controlling for the journals) or providing open access on the journals' performance.

8. Limitations and Implications for Future Research

The present study has some limitations, from which implications for future research can be derived. First, relatively few data are available for the first years of the observation period, which affects the robustness of our results. Accordingly, we recommend conducting studies based on a larger sample, for example by including further disciplines. This leads to a further limitation, as our results may contain discipline-specific effects. With data covering different disciplines, it would be possible to control for corresponding effects in future research projects. However, the literature does not indicate the existence of relevant discipline-specific differences in our research context, so that we assume generalisability but do not claim it.

Another limitation concerns the robustness of our descriptive analysis. Although the illustrations used are probably a good way of showing the evolution of variables over time and correlations in the data, it is challenging to take multidimensional influences into account. To consider more influencing factors, we have additionally applied regression analyses. However, their application possibilities are also limited in the case of our study, especially since many of our explanatory variables are time-invariant. For future studies, we recommend examining more explanatory variables that change over time, including aspects such as the average number of articles per issue and the average number of authors per article. In this context, it would be particularly interesting to examine the extent to which there are a positive time trends similar to those of the citation-based performance indicators.

Furthermore, a weakness can be seen in the measurement of the variable *journal category*, in which the introduction of digital services was identified based on the conversion of scanned articles to digital formats. There might be cases in which articles were retroactively transferred to digital formats and put online leading to inaccuracies. To keep distortions to a minimum, we have only included observations in which no such indications could be found.

9. Conclusion

This study examines factors that are related to the citation-based performance of academic journals in the digital age. One contribution is the consideration of journal-level and time effects, with which we address limitations of previous studies. Accordingly, our empirical analysis reveals a diminishing correlation between online availability as well as open access and citation-based performance indicators when controlling for journal-level and time effects. Based on our data we can show that print-only offers are gradually disappearing from the market, whereas combined print and online services seem to have become the standard. Although combined print and online services appear to be a lucrative business for journals and their publishers, the declining relevance of reference libraries as a means for accessing literature puts into question how long this model will work.

Our descriptive analysis throws light on the emergence and development of digital services in the domain of academic journals, with lower and middle-class journals pioneering the field. These have developed particularly well over time and, at the end of our observation period, almost caught up with the former top performers. In addition, the renunciation or partial renunciation of submission fees is positively associated with citation-based performance indicators. We find a significantly positive correlation between the international composition of author teams and the performance of journals, suggesting that future research should pick up on the role of authoring teams for explaining a journal's academic success. Overall, our study provides detailed insights into the digitalisation of academic journals and identifies relevant success factors for explaining success in an increasingly digitalised competitive environment.

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Appendix

Variable Name	Definition
Dependent Variables	
Immediacy Index	The immediacy index is the average number of times an article is cited in the year it is published.
Immediacy Index Deviation	Variable representing the relative deviation of a journal's immediacy index from the average immediacy index of the respective year.
Impact Factor	The impact factor is defined as all citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.
Impact Factor Deviation	Variable representing the relative deviation of a journal's impact factor from the average impact factor of the respective year.
Explanatory Variables	
Access Category	Categorical variable equal to 0 if no open access is being offered at all, equal to 1 if all issues and articles are freely available, and equal to 2 if open access is provided only for selected issues or articles.
Digital Services	Binary variable equal to one if the journal provides online offerings, and equal to zero otherwise.
First Year Online	Year in which the first issue of the journal was published online.
International Collaboration	The ratio of the journal's documents signed by researchers from more than one country; that is including more than one country address.
Journal Category	Categorical variable equal to 1 if it is an online journal, equal to 2 if the journal is available in both print and online, and equal to 3 if it is a print-only journal.
Publisher Category	Categorical variable equal to 1 if it is a commercial publisher, equal to 2 if it is a non-commercial publisher, and equal to 3 if the publisher is a university press.
Submission Fees	Categorical variable equal to 0 if the journal has no submission fees at all, equal to 1 if a publication fee is always required, and equal to 2 if submission fees have to be paid only if the author wants his or her article to be freely available on the internet.
Control variables	
Integer	Variable comprising a sequence of integers from 1 to 28, representing the citation years from 1989 to 2016.
Year	Observed year within the observation period from 1989 to 2016.

Table A1: List of Variables

	(1)	(2)
Dependent Variables	Deviation Impact Factor	Deviation Immediacy Index
Explanatory Variables		
Digital Services	0.059 (0.105)	-0.050 (0.200)
International Collaboration	0.005** (0.002)	0.007** (0.003)
_cons	0.881*** (0.100)	0.886*** (0.198)
N (observations)	1,660	1,786
N (journals)	163	165
R-sq	0.026	0.018
Prob > F	0.005	0.034

Note: This table presents the results of OLS regressions with journal-level fixed effects. The modified dependent variables represent the relative deviations from the average for the respective year. Robust standard errors are reported (in parentheses). * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In model (1), all explanatory variables are lagged two years.

Table A2: Robustness Check with Modified Dependent Variables – Short Models

	(1)	(2)
Dependent Variables	Impact Factor	Immediacy Index
Explanatory Variables		
Digital Services	0.224* (0.095)	0.010 (0.036)
International Collaboration	0.005** (0.002)	0.002** (0.001)
Integer	0.111*** (0.007)	0.019*** (0.002)
_cons	-0.955*** (0.175)	-0.183** (0.060)
Year Dummies	Yes	Yes
N (observations)	1,660	1,786
N (journals)	163	165
R-sq	0.026	0.083
Prob > F	0.000	0.000

Note: This table presents the results of OLS regressions without journal-level fixed effects. Standard errors are reported (in parentheses). * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In model (1), all explanatory variables are lagged two years.

Table A3: Regressions without Considering Journal-Level Effects – Short Models

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables	Impact Factor			Immediacy Index		
Explanatory Variables						
Digital Services	0.219* (0.094)	0.411*** (0.114)		-0.010 (0.037)	0.038 (0.043)	
International Collaboration	0.006*** (0.002)	0.006** (0.002)	0.006** (0.002)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)
Access Category						
<i>Open Access</i>	-0.429 (0.451)	-0.201 (0.480)	-0.160 (0.488)	-0.117 (0.089)	-0.081 (0.089)	-0.079 (0.091)
<i>Open Access for Selected Content</i>	-0.722** (0.227)	-0.672** (0.259)	-0.653* (0.259)	-0.174*** (0.053)	-0.195** (0.060)	-0.194** (0.062)
Submission Fees						
<i>Fees Demanded</i>		-0.657 (0.783)	-0.636 (0.799)		-0.202 (0.129)	-0.194 (0.133)
<i>Fees for Open Access</i>		0.515 (0.287)	0.520 (0.292)		0.102* (0.052)	0.107* (0.053)
Publisher Category						
<i>Non-Commercial</i>		1.624*** (0.447)	1.725*** (0.458)		0.269*** (0.073)	0.290*** (0.076)
<i>University Press</i>		0.072 (0.399)	-0.025 (0.412)		0.025 (0.064)	0.014 (0.066)
First Issue Online			0.024 (0.025)			0.001 (0.004)
Integer	0.111*** (0.007)	0.121*** (0.008)	0.119*** (0.008)	0.019*** (0.002)	0.018*** (0.003)	
_cons	-1.104* (0.468)	-2.084*** (0.534)	-50.030 (50.365)	1.100* (0.488)	-0.320** (0.113)	-1.862 (8.474)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N (observations)	1,587	1,380	1,335	1,709	1,486	1,443
N (journals)	153	133	133	155	135	135
R-sq	0.202	0.276	0.298	0.141	0.193	0.194
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000

Note: This table presents the results of random-effects GLS regressions. We control for country-level and time effects, but not for journal-level effects. Standard errors are reported (in parentheses). Based on a Hausman specification test, random effects are used in case of both models. * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In models (1) to (3), all explanatory variables are lagged two years.

Table A4: Regressions without Considering Journal-Level Effects – Long Models

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables	Impact Factor			Immediacy Index		
Explanatory Variables						
Digital Services	0.040 (0.102)	0.094 (0.127)		-0.114 (0.202)	0.038 (0.056)	
International Collaboration	0.005** (0.002)	0.007** (0.002)	0.007* (0.002)	0.009*** (0.003)	0.002** (0.001)	0.011*** (0.003)
Access Category						
<i>Open Access</i>	-0.224 (0.299)	-0.059 (0.325)	-0.033 (0.293)	-0.429 (0.357)	-0.081 (0.097)	-0.267 (0.326)
<i>Open Access for Selected Content</i>	-0.400 (0.268)	-0.327 (0.309)	-0.313 (0.281)	-0.634* (0.314)	-0.195* (0.093)	-0.633* (0.308)
Submission Fees						
<i>Fees Demanded</i>		-0.509 (0.267)	-0.474 (0.259)		-0.202* (0.085)	-0.738** (0.261)
<i>Fees for Open Access</i>		0.224 (0.259)	0.237 (0.248)		0.102 (0.069)	0.339 (0.225)
Publisher Category						
<i>Non-Commercial</i>		1.080* (0.549)	1.074* (0.547)		0.269* (0.123)	0.982* (0.465)
<i>University Press</i>		0.089 (0.271)	-0.006 (0.238)		0.025 (0.059)	0.091 (0.177)
First Issue Online			0.017 (0.018)			0.002 (0.016)
_cons	0.735** (0.274)	0.347 (0.292)	-34.205 (36.543)	1.100* (0.488)	-0.320** (0.105)	-4.356 (31.821)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N (observations)	1,587	1,380	1,335	1,709	1,486	1,443
N (journals)	153	133	133	155	135	135
R-sq	0.133	0.232	0.231	0.078	0.128	0.123
Prob > chi2	0.000	0.000	0.000	0.001	0.000	0.000

Note: This table presents the results of random-effects GLS regressions. The modified dependent variables represent the relative deviations from the average for the respective year. Standard errors are clustered by journals (in parentheses). Based on a Hausman specification test, random effects are used in case of both models. * denotes significance at the 5% level, ** at the 1% level, and *** at the 0.1% level. In models (1) to (3), all explanatory variables are lagged two years.

Table A5: Robustness Check with Modified Dependent Variables – Long Models

Diskussionspapiere des Instituts für Organisationsökonomik

Seit Institutsgründung im Oktober 2010 erscheint monatlich ein Diskussionspapier. Im Folgenden werden die letzten zwölf aufgeführt. Eine vollständige Liste mit Downloadmöglichkeit findet sich unter <http://www.wiwi.uni-muenster.de/io/de/forschen/diskussionspapiere>.

- DP-IO 6/2019** Success Factors of Academic Journals in the Digital Age
Alexander Dilger/Milan F. Klus
Juni 2019
- DP-IO 5/2019** The Influence of Political Characteristics on the Relationship between Family Control and Firm Performance
A Meta-Analytical Approach
Todor S. Lohwasser/Felix Hoch
Mai 2019
- DP-IO 4/2019** Zur Empfehlung von Abfindungsobergrenzen für Vorstandsmitglieder
Ute Schottmüller-Einwag/Alexander Dilger
April 2019
- DP-IO 3/2019** Ökonomik und Ethik wissenschaftsinterner Gutachten
Alexander Dilger
März 2019
- DP-IO 2/2019** Begutachtungsverfahren nach Zahl, Gewichtung und Fehlern der Gutachten
Alexander Dilger
Februar 2019
- DP-IO 1/2019** 100 Diskussionspapiere des Instituts für Organisationsökonomik
Eine deskriptive Übersicht
Alexander Dilger/Michael Hickfang/Milan Frederik Klus
Januar 2019
- DP-IO 12/2018** The Impact of Stock Options on Risk-Taking
Founder-CEOs and Innovation
Michael Hickfang/Ulrike Holder
Dezember 2018
- DP-IO 11/2018** Identifying Leadership Skills Required in the Digital Age
Milan Frederik Klus/Julia Müller
November 2018
- DP-IO 10/2018** 8. Jahresbericht des Instituts für Organisationsökonomik
Alexander Dilger/Milan Frederik Klus
Oktober 2018
- DP-IO 9/2018** Konzeption einer direktdemokratischen Plattformpartei
Alexander Dilger
September 2018
- DP-IO 8/2018** Erfahrungen aus der Programmkommission für die VHB-Pfingsttagung 2018
Alexander Dilger
August 2018
- DP-IO 7/2018** 20 Jahre Workshop Hochschulmanagement
Ein deskriptiver Überblick
Alexander Dilger/Joachim Prinz/Daniel Weimar
Juli 2018

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