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A Walk on the Wild Side: 'Predatory' Journals and Information Asymmetries in Scientific Evaluations

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Abstract

In recent years the academic world has witnessed the mushrooming of journals that falsely pretend to be legitimate academic outlets. We study this phenomenon using information from 46,000 researchers seeking promotion in Italian academia. About 5% of them have published in journals included in the blacklist of 'potential, possible, or probable predatory journals' elaborated by the scholarly librarian Jeffrey Beall. Data from a survey that we conducted among these researchers confirms that at least one third of these journals do not provide peer review or they engage in some other type of irregular editorial practice. We identify two factors that may have spurred publications in dubious journals. First, some of these journals have managed to be included in citation indexes such as Scopus that many institutions consider as a guarantee of quality. Second, we show that authors who publish in these journals are more likely to receive positive assessments when they are evaluated by (randomly selected) committee members who lack research expertise. Overall, our analysis suggests that the proliferation of 'predatory' journals reflects the existence of severe information asymmetries in scientific evaluations.

Keywords: Scientific misconduct, academic evaluations *JEL:* I23

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1. Introduction

The academic community has witnessed in recent years the emergence of a new industry of journals which engage in deceptive and dishonest practices, falsely claim to offer peer review and publish any article in

exchange for a fee (Butler, 2013; Clark and Smith, 2015; Kolata, 2013). This phenomenon has been documented by the scholarly librarian Jeffrey Beall, who maintained between 2010 and 2017 a list of 'potential, possible, or probable predatory' journals and publishers who allegedly engaged in fraudulent practices. In January 2017, Beall's list included 1,294 standalone journals and 1,155 publishers.[1]

The rise of 'predatory' publishers has been linked to the emergence of the open-access model (Beall, 2012). The newly available ICT technologies enabled the creation of a large number of new academic journals that are funded through publication fees and are free of all restrictions on access. [2] Some of these journals have gained scientific recognition for publishing highquality articles (e.g. PLOS One), but others have been accused of dubious behavior. The lack of standards of some of these journals was confirmed by a sting operation conducted by journalist John Bohannon. He submitted a fake medical paper with easily detectable flaws to 304 open-access journals, including a hundred which were included in Beall's list. Around half of these journals accepted the paper without questioning its content or providing meaningful feedbacks; among Beall's list journals the acceptance rate was above 80% (Bohannon, 2013).

While the revenues of traditional journals typically rely on the willingness of 'readers' - mainly academic libraries - to pay for a subscription, most open-access journals depend on authors' publication fees. The shift of the burden of payment from readers to authors, combined with the existence of relevant information asymmetries in the evaluation of scientific content, may have created a demand for journals with dubious standards. Readers are willing to pay for journals that they consider worth reading. Instead, authors of low-quality research may have an incentive to pay for publishing in 'predatory' journals if they are accountable to 'principals' (e.g. members of evaluation committees) who are unable to distinguish legitimate journals from 'predatory' ones. Furthermore, some inexperienced or naive researchers may be unaware of the fraudulent nature of some journals and they may fall prey of deceptive publishers.

In this paper, we study the extent of publications in 'predatory' journals using data from Italy and we identify two ways in which authors may benefit from these publications. First, we examine the role of 'whitelists', such as Scopus, that many institutions and evaluation agencies use to identify legitimate journals. We use survey information to verify whether the main

[1] Beall unexpectedly took down his list in January 2017. A cached copy is available at https://archive.fo/6EByy (accessed on March 14, 2018).

[2] For more information on the open access movement, see the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (https://openaccess.mpg.de/Berlin-Declaration) and the Bethesda Statement on Open Access Publishing (http://legacy.earlham.edu/~peters/fos/bethesda.htm, accessed on March 14, 2018). Harvie et al. (2014) provides additional information on the sources of discontent with traditional publishers.

whitelists used in Italy include any 'predatory' journals. Second, we hypothesize that 'principals' with a weak research background may lack the ability to assess accurately the quality of journals where applicants have published and, as a result, they may give credit to publications in dubious journals. We use data from a large-scale evaluation to test this hypothesis.

Our main database includes information on the CVs and the evaluations received by more than 46,000 researchers who participated in the 2012 edition of the Italian National Scientific Qualification. This qualification is required for promotion to associate or full professorship in Italy. The sample accounts for around 61% of assistant professors and 60% of associate professors in the country. Applications were evaluated by 184 evaluation committees, one per scientific field and, as we explain in more detail below, the members of these committees were selected by random draw out of a pool of eligible evaluators who had volunteered for the task. Each panel assessed around 300 CVs, which included an average of 46 publications each.

To detect publications in dubious journals, we use initially Beall's list. According to our findings, about 5% of applicants have published in journals that Beall has classified as 'potential, possible, or probable predatory'. Publications in these journals are more common in Southern Italy and, across the different fields, they are more prevalent in business and economics. Researchers who publish in dubious journals are usually younger, they are more prolific but have fewer publications in high-impact journals, and they tend to be based in departments with lower research quality.

The presence of these journals in Beall's list does not necessarily imply that they are bogus. Instead, it is possible that Beall's list is inaccurate and includes some legitimate journals. We investigate the reliability of these journals using two different sources. First, we collect information on the number of citations received by these journals from Google Scholar. Their academic impact tends to be very low, only 38% of these journals have published in the previous 5 years at least 5 articles that have received at least 5 citations (including self-citations). Furthermore, to learn more about their editorial practices, we surveyed a random sample of around 1,000 Italian researchers who published in these journals, with a response rate of 54%. According to our respondents, at least one-third of these journals did not provide referee reports during the revision process or had an editorial behavior that casts doubts on their integrity. Given the possibility of misreporting, we interpret this figure as a lower bound of the extent of fraud within this set of journals.

A number of survey respondents admit that their main motivation to publish in these journals was the possibility that these publications receive a positive evaluation in recruitment and promotion processes, due to their inclusion in whitelists that are relevant in the Italian context, such as Scopus or the list elaborated by the Italian academic authorities for journals in social sciences and humanities (in what follows, the *ANVUR list*).

We investigate the relevance of this claim. First, we study how common is the inclusion of 'predatory' journals in these whitelists. We find that 131

Beall's list journals are included in Scopus and 213 in the ANVUR list. These journals account for over 73% of the articles published by Italian researchers in Beall's list journals. Moreover, according to the survey, at least 40% of Scopus journals included in Beall's list are likely to be fraudulent and, in the case of the ANVUR list, the figure is above 49%.

Second, we examine the evaluations received by authors who have published in 'predatory' journals in the National Scientific Qualification. In these evaluations, committees had full autonomy to choose their evaluation criteria, but they were nudged by the Italian national evaluation agency to take into account the number of articles that applicants had published in journals included in the whitelist.[3] On average, the success rate of candidates with 'predatory' publications is 3.5 percentage points (about 9%) lower relative to other candidates with otherwise similar CVs. The available information does not allow us to disentangle whether this gap reflects the negative impact of predatory publications on the assessment of evaluators or whether it is due to other individual characteristics that are observable to evaluators but are not captured in our analysis of CVs (e.g. the content of candidates' articles).

While the average committee penalizes applicants with publications in 'predatory' journals, these candidates tend to be significantly more successful when committee members have a weak research profile. To identify causal effects, we exploit the random assignment of evaluators to committees.[4] Authors with dubious publications are significantly more likely to receive a positive evaluation when they are (randomly) assigned to evaluators with fewer publications in high-impact journals. The magnitude of the effect is substantial: one standard deviation decrease in evaluators' research quality increases the success rate of applicants with publications in dubious journals by about 7 percentage points (20%). This effect is strongest in business and economics which, as mentioned earlier, are also the fields where predatory publications are most common.

Our work contributes to the literature in several ways. We provide the first estimation of the extent of predatory publications at the country level. While previous studies have shown that authors publishing in predatory journals tend to be predominantly based in countries with weak research backgrounds (Xia et al., 2015; Shen and Bjo¨rk, 2015), our results indicate

[3] In science, technology, engineering, and mathematics, the Italian national evaluation agency collected and provided information to committees on the number of articles published in journals covered by Scopus, the number of citations received, and their h-index. In social sciences and humanities the agency used the ANVUR list, which includes around 20,000 journals, and a subset of these journals were considered A-journals.

[4] A similar empirical strategy has been used to study the impact of evaluators' gender (Bagues et al., 2017) and the existence of connections between evaluators and candidates (Zinovyeva and Bagues, 2015; Bagues et al., 2016).

that predatory publications are also a relevant problem in Italy, one of the world's biggest producers of academic research.[5,6]

We also provide novel evidence on the causes of this phenomenon. Our findings suggest that the proliferation of predatory publications may reflect the existence of severe information asymmetries in the evaluation of science. Some evaluators with a weak research profile give credit to publications in 'predatory' journals, perhaps because they lack the ability to assess the quality of scientific outputs. Moreover, our analysis also casts doubts on the mechanical use of journal lists. Some dubious journals have managed to be included in indexes, such as Scopus, which are used by many institutions as *de facto* whitelists. Academic evaluations that automatically give credit to these lists may distort publication incentives, giving unfair credit to unqualified (and unethical) authors. Overall, our analysis supports the need to complement journal lists with assessments conducted by knowledgeable evaluators.

2. Background information

2.1. The National Scientific Qualification

Since 2010, promotions in Italian universities are decided within a twostage evaluation system.[7,8] In the first stage, candidates to associate and full professorships are required to qualify in a national-level evaluation known as the National Scientific Qualification (NSQ) (*Abilitazione Scientifica Nazionale*). Assessments are conducted separately by 184 committees, one for each scientific field defined by the Ministry of Education. Qualified candidates can participate in the second stage, which is managed locally by each university.

The first edition of the NSQ took place between 2012 and 2014. Candidates' submission package included the CV and a selection of publications. Researchers were able to apply to multiple fields and positions. Once the list of eligible evaluators was settled and the application deadline for candidates was closed, committee members were selected by random

[5] According to the Scimago Country Ranking, Italy is the country with the 7th largest hindex (see http://www.scimagojr.com/countryrank.php?order=h&ord=desc, accessed on March 14, 2018). Similarly, King (2004) argues that Italy belongs to the scientific 'premier league'.

[6] Our results are consistent with the findings of a recent paper Moer et al. (2017), who show that the hazard of predatory publishing is not restricted to the developing world.

[7] Law number 240/2010, also known as "Gelmini reform" after the name of the minister of Education. A detailed description of the system can be also found in Bagues et al. (2017).

[8] Another recent change in the evaluation of research production in Italy concerns university funding. Since 2011, universities are periodically evaluated on the quality of their research output, and the outcome of this assessment has an impact on their funding. This evaluation combines peer-review of journal articles with the use of bibliometric indicators (Rebora and Turri, 2013).

draw out of the pool of eligible evaluators. These lotteries took place between late November 2012 and February 2013.

2.1.1. Selection of committees

The pool of eligible evaluators includes full professors in the corresponding field who have volunteered for the task and satisfy some minimum quality requirements. In sciences, technical and engineering fields, mathematics and medicine (STEM&Med), the requirement is to be more productive than the median full professor in the field in at least two of the following three dimensions: (i) the number of articles published in scientific journals covered by the Web of Science, (ii) the number of citations, (iii) and the H-index. In social sciences and humanities (SSH), eligible evaluators are required to have a research production above the median in at least one of the following three dimensions: (i) the number of articles published in high-quality scientific journals (in what follows, A-journals), [9] (ii) the overall number of articles published in any scientific journals and book chapters, and (iii) the number of published books.

Eligible evaluators may be based in Italy (hereafter 'Italian') and may also be affiliated with a university from an OECD country ('international'). International and Italian eligible evaluators have to satisfy the same research requirements. Evaluation committees include five members, four of them from the pool of eligible Italian evaluators and one from the international pool. Committee members are randomly drawn from the corresponding pool of eligible evaluators under the constraint that no university can have more than one evaluator within the committee.

Randomization is conducted in a way that leaves little room for manipulation. Eligible evaluators in each field are ordered alphabetically and are assigned a number according to their position. A sequence of numbers is then randomly selected. The same sequence is applied to select committee members in different fields. If an evaluator resigns, a substitute reviewer is selected randomly from the corresponding group of eligible evaluators. Approximately 8% of evaluators resigned after being selected in the initial random draw.

2.1.2. The evaluation

The evaluations are based on candidates' CVs and publications. Committee members meet several times to discuss their assessments and cast their votes. A positive assessment requires a qualified majority of four favorable votes (out of five committee members).

Committees have full autonomy on the exact criteria to be used in the evaluation. Nonetheless, at the beginning of the process an independent agency appointed by the Ministry (ANVUR) collected information on the scientific production of all candidates and provided it to the evaluation

[9] An evaluation agency and several scientific committees determined the set of highquality journals in each field.

committees. In the STEM&Med fields, this information is based on the number of articles published in journals indexed by Scopus or the Web of Science. In SSHs, it relies, among other sources, on a list of journals compiled by local experts (ANVUR list). Committees were suggested to take this information into account.

2.2. Beall's list

The academic librarian Jeffrey Beall launched in 2012 a blacklist of publishers and standalone journals who, according to his judgement, did not comply with some basic criteria (Butler, 2013). These journals did not conduct peer-review, they publicized fake impact factors and editorial boards, or they falsely claimed a non-existent association with an academic institution or geographic location. The 2012 edition of the list included 143 standalone journals and about 269 publishers; two years later, it included 468 standalone journals and 667 publishers, and by January 2017 there were 1294 standalone journals and 1155 publishers.

Several papers have studied the characteristics of authors who publish in Beall's list journals. Xia et al. (2015) analyze the profiles of around 1000 researchers who published in 7 selected journals of Beall's list in Pharmaceutical sciences. Most of these authors were based in developing countries (69% from India and 8% from Nigeria). In a more comprehensive study, Shen and Bjo¨rk (2015) consider 47 predatory journals and 262 authors. Similarly to Xia et al. (2015), they find that the regional distribution of authors is highly skewed to Asia and Africa (35% from India and 8% from Nigeria), even if a notable 6% are based in the US. Shen and Bj¨ork (2015) also estimate that the number of articles published in doubtful journals has grown exponentially in recent years, from around 53,000 articles in 2010 to 420,000 in 2014.

Shen and Bj¨ork (2015) speculate that most authors are not unknowing victims, but are probably "well aware of the circumstances and take a calculated risk that experts who evaluate their publication lists will not bother to check the journal credentials in detail." Several other studies also suggest a link between the proliferation of predatory publications and the lack of quality of scientific evaluations. Omobowale et al. (2016) interviewed 30 academics from two Nigerian universities who argue that demand for predatory journals is often triggered by promotion committees that require 'international' publications but lack scholarly credibility. Seethapathy et al. (2016) ran a survey among 2000 researchers based in India that published in predatory journals, with a response rate of 24%. The respondents tend to argue that the major factors behind the popularity of predatory journals are publication pressure and the lack of proper evaluations. Finally, Djuric (2015) reports that hundreds of Serbian researchers published on a single predatory title that was listed in the Web of Science's Journal Citation Reports after their institution introduced publications in indexed journals as a requirement for obtaining PhDs, professorships and tenures.

Beall's list has been subject to some controversy. While in the experiment conducted by Bohannon (2013) a fake article was accepted by approximately 82% of the journals in Beall's list that were targeted, the remaining 18% did reject it, suggesting that maybe some of these journals do not qualify as predatory.[10] As Beall himself acknowledges, in some instances, publishers and journals may change their policies and, as a result, the status of each outlet may not always be up to date.[11] Sometimes it might also be difficult to distinguish between a poorly managed journal and an illegitimate one.

In January 2017 Beall stopped updating his list and removed it from his blog. He has publicly declared that this unexpected action was due to intense pressure from his employer, the University of Colorado Denver (Beall, 2017). Five months after Beall's list was shut down, a private firm named Cabell's International launched a new watchlist of untrustworthy journals (Silver, 2017).

2.3. Citation indexes

Citation indexes provide a number of bibliometric indicators that many institutions use to rank journals and evaluate research production. The standard ones are those provided by Scopus and the Web of Science. These lists include journals that allegedly satisfy some minimum requirements. For instance, Scopus, the most comprehensive of the two, claims to include only journals that (i) provide-peer review, (ii) publish issues on a regular basis, (iii) satisfy a minimum level of relevance and readability for an international audience, and (iv) have an ethics and malpractice statement (Rew, 2015).[12]Many universities and evaluation systems consider the inclusion in Scopus and the Web of Science as a mark of quality and use the set of indexed journals as a *de facto* whitelist.[13]

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[10] More recently, Sorokowski et al. (2017) submitted a fake application for an editor position to 360 journals drawn from the Web of Science's Journal Citation Reports, a list of open-access journals (DOAJ) and Beall's list. None of the titles indexed on Journal Citation Reports accepted the suspicious candidate, while 7% of titles in DOAJ and 33% in Beall's list did.

[11] For instance, publishers such as MDPI and Hindawi were removed from the list after a successful appeal.

[12] Scopus has a broader coverage of the scientific literature than the Web of Science. The selection criteria of the Web of Science and Scopus are explained in more detail respectively at http://wokinfo.com/essays/journal-selection-process/ and https://www.elsevier.com/solutions/scopus/content/content-policy-and-selection, accessed on March 14, 2018.

[13] For instance, Aalto University Guide for Researchers states that '(a)s some journals have questionable motives for their publishing activity, you should be very careful when choosing a journal. [...] Journals listed in Publication Forum [JUFO], Thomson Reuter's Web of Knowledge or Elsevier's Scopus are **guaranteed** to be established academic journals' (the bold is ours). Similarly, evaluation agencies in Italy (National Quality Assessment and National Scientific Qualification), the Russian Federation (The National Excellence Initiatives and the Russian Science Foundation) and Spain (Agencia Nacional de la Evaluaci´on de Calidad y la Acreditaci´on) rely on these indexes.

One potential advantage of using citation indexes is that they may be less prone to conflict of interests and they are less expensive than expert evaluations (R´egibeau and Rocke, 2016; Bertocchi et al., 2015). On the flip side, they may provide an inaccurate measure of quality and they may encourage agents to game the incentive system (Hicks, 2012).[14] If authors anticipate the metrics that will be used to evaluate them, a problem of goal displacement may arise whereas scoring high on performance measures becomes a goal in itself, rather than a means of measuring whether a desired performance level has been attained (Wouters et al., 2015). In line with this hypothesis, Butler (2003) finds that, in Australia, a greater reliance on journals indexed in ISI Web of Knowledge (today known as the Web of Science) was followed by an increase of the quantity but not the quality of research. Similarly, Moosa (2016) shows that the adoption of a bucket classification system encourages researchers to submit their research to the lowest-quality journal within each bucket. Moreover, some of the journals included in these indexes, particularly in Scopus, may have limited scientific value and, allegedly, they may not even be legitimate academic outlets (Sterligov and Savina, 2016).

More recently, some agencies are also using the information provided by Google Scholar (Bertocchi et al., 2015). In this database, citations are computed and updated automatically and reflect all documents accessible to Google search robots that are formatted in ways that make it possible for their indexing algorithms to identify their bibliographic data or references. Hence, compared to other citations databases, it is the most comprehensive (and the least selective) one.

3. Empirical analysis

The structure of our empirical analysis is as follows. First, we describe the composition of our main database, which includes information on all participants in the first wave of the NSQ.[15] Second, we quantify the number of publications that these researchers have published in Beall's list journals and we examine the characteristics of these authors. Third, we analyze the quality of Beall's list journals using bibliometric and survey information. Fourth, we study two possible ways in which authors may benefit from publications in Beall's list journals. On the one hand, we investigate whether 'predatory' journals are included in the most common whitelists used by institutions. On the other hand, we study the assessments that 'predatory'

[14] Moed (2005) and Vinkler (2010) offer systematic reviews of bibliometric indicators for research evaluation. More generally, Gibbons (1998) provides an overview of the economic literature on objective performance measures.

[15] We downloaded the CVs of all applicants in January 2014 from the official page of the *National Scientific Qualification* (http://abilitazione.miur.it/public/index. php?lang=eng).

authors received in the NSQ, and examine whether this assessment varies depending on the research quality of evaluators.

3.1. Publication record of Italian researchers

The dataset includes information on 46,244 researchers. This accounts for around 61% of assistant professors and 60% of associate professors in Italy.[16] Applicants' CVs provide a rich amount of demographic and academic information. As shown in Table 1, 40% of researchers are women and, on average, researchers have 16 years of experience measured as time elapsed since their first publication. Most candidates hold a permanent position in an Italian university, either as assistant professors (*ricercatori*) or as associate professors (*professori associati*). About a third of candidates have a fixedterm labor contract, or they are not affiliated with an Italian university. Approximately half of the researchers working in Italy are based in the North, one-quarter are based in central Italy, and another quarter are based in the South.[17]

The CVs also provide information on researchers' publications between 2002 and 2012 (see Table 1, middle panel). During this 10-year period, the average applicant published 45 items. Out of these 45 items, 24 (53%) are journal articles, 8 (18%) are conference proceedings, 8 (18%) are books and books chapters, and 5 (11%) correspond to other types of publications such as an abstract in a conference, a database, a translation or a comment on a court sentence. The type and number of publications varies significantly across different disciplines. In sciences and medical disciplines, journal articles are the main type of academic communication. In engineering, conference proceedings are the most popular output. In social sciences, humanities, business and economics, books or chapters of books are as common as journal articles. Economics, business, social sciences and humanities are the less prolific fields, with one journal article per year, compared to 3.5 yearly articles in Sciences and 3.8 in Medical Sciences.

Within the set of articles published in journals, the vast majority (75%) were published in outlets indexed by Scopus or the Web of Science. The proportion is significantly lower in social sciences and humanities, probably reflecting that in these areas only 10% of articles are written in English, compared to 60% in business and economics and around 90% in science, technology, engineering, math, and medicine (STEM&Med).[18]

To proxy for the quality of articles, we consider two different measures.

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[16] Source: Our own calculations using information from the Italian Ministry of Education on the identity of all assistant (*ricercatori*) and associate professors (*associati*) in Italy on December 31 2012.

[17] Southern regions refer to Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily and Sardinia; central regions include Lazio, Marche, Toscana and Umbria; and northern regions are Emilia Romagna, Piemonte, Lombardia, Valle d'Aosta, Veneto, TrentinoAlto Adige, Friuli-Venezia Giulia and Liguria.

[18] We identified the language of each article based on the language used in the title.

In the STEM&Med fields, we ranked journals in each field by their Article Influence Score (AIS).[19] About 45% of articles by Italian researchers in these areas were published in top quartile journals. In business and economics as well as in social sciences and humanities, we measure the quality of journals using the list of high-impact journals prepared by the Italian evaluation agency ANVUR (in what follows, 'A-journals'). About 20% of all articles in economics and 30% of articles in social sciences and humanities were published in A-journals.

3.2. Publications in Beall's list journals

According to our calculations, out of the 1.8M articles published by researchers in our sample, 5,798 were published in journals from Beall's list.[20] There are 2,225 researchers (about 5% of the entire population) in the sample with at least one article published in a journal of the Beall's list. 70% of these authors have published only once in a Beall's list journal.

For the average researcher, it represents 0.5% of the articles listed in her CV (see Table 1, lower panel). Since Beall monitored primarily Englishlanguage journals, we also calculate the proportion of English-language articles (79% of the total) that have been published in Beall's list journals. In this case, the share of predatory articles is slightly larger, around 0.9% of all articles published in English.

The propensity to publish in predatory journals differs substantially across fields. In sciences and in medicine, only 0.4% of articles in English were published in a predatory journal. The figure is larger in social sciences and humanities (0.7%) and in engineering (1.6%), and it is the highest in business and economics, where 4.1% of all articles in English were published in a journal classified by Beall as predatory.

Figure 1 also shows how the proportion of publications in predatory journals has evolved over time. Starting in 2010 we observe a sharp increase in the proportion of articles published in Beall's list journals, particularly in business and economics. In the last year of our sample, 2012, over 5% of all articles written in English in business and economics were published in journals included in Beall's list.

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in the Web of Science.

[20]We collected information on Beall's list journals in January 2015. In order to identify how many articles researchers have published in journals included in Beall's list of 'potential, possible, or probable predatory journals', we match the information provided by researchers on the name and the ISSN code of journals where they have published with the ISSN code of journals included in Beall's list.

[19] Article Influence Score is similar to the journal 5-year Impact Factor, but (i) it weights citations by the quality of the citing journal and by the inverse of the number of references in citing journal and (ii) it excludes self-citations. It is available only for journals indexed

3.3. Characteristics of authors who publish in Beall's list journals

To describe the profile of a typical candidate who publishes in Beall's list journals, we estimate the following equation:

[redacted], (1)

where $B_{i,e}$ is an indicator for candidates who have published in Beall's list journals, $\mathbf{X_{i,e}}$ is a set of individual characteristics, and μ_e are evaluation fixed effects (i.e. a set of discipline times promotion category dummies).

Authors with predatory publications tend to be more prolific, but they publish in journals with a lower rank (Table 2). They also tend to be less experienced, and they tend to be based in departments with relatively poorer research quality, as measured by the results of a national evaluation conducted by ANVUR.[20] There are also important geographical differences. Conditional on the research quality of the department, the probability of publishing in a predatory journal is 2.9 p.p. (around 60%) higher in departments located in the South of Italy. Predatory publications are less common among candidates who are based in foreign universities or candidates with non-academic jobs.

3.4. Quality of journals on Beall's list

More than 2,000 researchers in our sample (about 5%) have published at least one article in a journal included in Beall's list. Overall, they have published in 599 different journals, which represents slightly below 10% of the total number of journals included in Beall's list that have an ISSN code (see Table A1, columns 1 and 2).

Not all journals included in Beall's list are necessarily illegitimate. For instance, as previously mentioned, around 18% of journals from Beall's list that participated the experiment by Bohannon (2013) did not accept the fake paper sent by the researcher. The proportion of journals that, despite being part of Beall's list, actually follow a legitimate editorial process might potentially be even larger within the sample of journals where Italian researchers publish.

We investigate the quality of these journals using two sources of information. First, we use bibliometric information. We examine how cited are these journals according to Google Scholar. Second, we conducted an online survey among a random sample of 1,000 authors in our sample that

[20] We measure the research quality of Italian departments using the score obtained by each department in a national assessment of research quality that was conducted in 2011, based on publications by faculty members between 2004 and 2010. The assessment was organized by ANVUR and it was carried out by independent experts who reviewed a selected number of research products. The resulting score varies between zero (low quality) and one (high quality). According to this metrics, the average researcher is based in a department with score 0.6 (standard deviation is 0.2). More detailed information is available at http://www.anvur.org/rapporto/ (accessed on March 14, 2018).

had a publication in a Beall's list and we asked them about the editorial practices of these journals directly.

3.4.1. Bibliometric information

We use Google Scholar to gather information on the bibliometric impact of journals included in our sample.[21] Google scholar provides information on journals' h5 index, which indicates the largest number h such that h articles published in the previous five years have at least h citations each. According to Google Scholar, only 38% of journals in the sample satisfy the criterion for being indexed in Google Scholar: to have an h5-index of five or more and to comply with simple formatting rules. Among these journals, the median h5 index is equal to 10.

We also collect information about the number of citations received by each article as reported by Google Scholar. As shown in Figure 2, most of these articles have not attracted much attention. The median article has received only three citations and 23% of articles have not been ever cited.[22]If we exclude self-citations, the share of never-cited articles rises to one-third. At the same time, we also observe that there is a group of articles which have received a non-trivial number of citations. The 10% most cited articles in our sample have received at least 20 citations, including one article with 399 citations.

3.4.2. Survey information

The journals in our sample tend to have a low scientific impact. However, this does not necessarily imply that their editorial practices are fraudulent. To learn more about this dimension, we conducted a survey among a random sample of researchers in our database who have published in these journals. The sample was selected using a randomized design with stratification by university and field. The overall population includes 2,225 authors, who were based in 1558 different departments. We randomly assigned half of these departments to participate in the survey. The surveyed sample includes 1,088 researchers from 779 different departments. As expected, the characteristics of the survey sample are statistically similar to the characteristics of the targeted population (see Table A2, columns 1, 2 and 4).

We contacted authors by email between February 2016 and May 2016 and we asked them to complete a survey online. Our contact email and the questionnaire are reproduced in Appendix A. In the email we point out that one of the articles of the recipient has been published in a journal included in Beall's list, and we brief the recipient about the nature of this list.[23] We also

[21] We collected this information in Fall 2016.

[22] The titles of some of these articles provide some additional hints about their quality. In some cases, the grammar is not correct (e.g."Income Don't Influence Health"), or the paper deals with questions of presumably limited academic interest (e.g."Influence of Parmigiano Reggiano Diet on Male Sexual Behavior in Rats: Behavioral and Neurochemical Study").

[23] In the case of authors who had more than one publication in a predatory journal, we selected randomly one single publication for the purpose of our survey.

explain that Beall's list may have some shortcomings and, in order to shed some light on its reliability, we are collecting information from authors about the editorial functioning of these journals. To minimize the possibility that our message might be perceived as offensive, we also make it clear that it is not our intention to question the integrity or the scientific quality of the recipient. If a given author did not answer, we sent up to three reminders. Out of the 1,088 authors contacted, 584 completed the survey (response rate 54%). Due to co-authorships, some respondents provided information about the same article. Overall, respondents provide information on 549 different articles (around 59% of the initial set of articles) and 268 different journals (around 70% of the set of journals initially identified).

An important concern with this type of surveys is the potential existence of some kind of non-response bias, which might affect the interpretation of results in a non-trivial way. On the one hand, researchers who are aware of the fraudulent nature of the journal where they published their article may feel too embarrassed or guilty about their past behavior to participate in the survey. In this case, the sample that participated in the survey would be relatively better in terms of the quality of the journals relative to nonparticipants. On the other hand, researchers who have a higher opportunity cost of their time may be less likely to reply. If these researchers are less likely to publish in truly predatory journals, this might lead to a problem of 'negative' selection.

While we cannot exclude the presence of a non-response bias, the empirical evidence suggests that its relevance is likely to be limited. The set of authors who participated in the survey is statistically similar to the target population is practically every observable dimension (see Table A2, columns 2, 3, and 5). The sample of respondents only differs significantly from the target sample in terms of their probability of holding a permanent position in an Italian university (73% in the target sample vs. 77% in the sample of respondents), perhaps reflecting the higher reliability of the email addresses that we used to contact researchers with a permanent position.[24]

Respondents provided detailed information on the editorial practices of the journal where their article was published.[25] About 8% of respondents who recall the details of the process admit that they did not receive any referee reports and the share more than doubles (22%) when we also consider those who reveal having received only comments related to the editing (see Table 3, column 1). The figure rises to 26% when we also include respondents who point out that, during the revision process, they noticed something that made them distrust the integrity of the journal.

[24] We searched contact details based on the information provided in researchers' applications in 2012 for the NSQ evaluation. It is possible that researchers with a permanent position were more likely to use the same email address in 2016 than researchers with fixed-term positions.

[25] A more detailed summary can be found in Table A3.

There are several potential concerns with these estimates. There might be a recall bias. We ask researchers information about events that happened several years earlier. Some of them may fail to remember their experience accurately. There might also be a problem of cognitive dissonance: subjects may report opinions that legitimize their past behaviors and past opinions. In general, we expect these biases to lead to the underreporting of malpractices and, in this respect, our results should probably be interpreted as a lower bound of the actual degree of fraud.

Given that some respondents may underreport fraudulent practices but it is unlikely that someone mistakenly remembers an episode of academic fraud, we also construct a variable defined at the journal level that takes value one if at least one author has reported a case of malpractice in this journal. According to this metrics, at least 36% of journals behaved in a fraudulent way (Table 3, column 2).[26]

In the survey, we also asked authors how they chose the journal where the article was published. One-third of respondents replied that they learned about the journal from one of their colleagues, 27% reacted to an e-mail sent by the journal, and in 12% of the cases the submission was linked to the participation in a conference. Only 16% of respondents chose the journal because they had previously read some of the articles published there. We also asked researchers if they were familiar with Beall's list. Most of them were unaware of the existence of this 'black' list: only 10% had ever heard about it.

The survey also provides interesting qualitative evidence. Authors could include open comments and 40% of authors used this possibility to send us feedback about their experience. Some authors voice negative opinions about the journal where they published their work. Two authors put it quite bluntly:

> *I think that the journal should be shut down.*
>
> *The editor in chief is a crook.*

Some of the comments describe in detail the editorial practices of the suspicious journals. Sometimes the acceptance decision was done at an unusually fast pace: either automatic or in less than 48 hours from the submission. Of course, in none of these cases the authors received referee reports. In some cases, there were referee reports, but they were irrelevant. As one respondent points out:

> *I was invited to join the editorial board of the journal, and this is why I did not pay to get published. Subsequently, I was asked to serve as a referee, but I realized that my comments did not have any*

[26] Table A4 in the Appendix provides the list of journals for which at least one author has reported a case of malpractice.

impact: the papers were published without any improvement. This journal, like many others, does not have a real editor, but a graphical technician who deals with both referees and authors. I then wrote to the editor to resign but nobody even bothered to reply.

Another irregularity was related to pricing policies. Some authors were asked to pay additional fees to ensure publication after the official publication fee was paid. Others were requested ex-post to attend a conference and pay an extra cost. In some cases, journals published articles without the explicit consent of authors, for instance, following their participation in a conference. Some respondents also complain about the practice of *coercive citations*, when the editor requires the authors to include among the references some articles published in the same journal, irrespective of their actual content.[27]

Not all comments were negative. Around 10% (22 respondents) provided us with positive feedback either praising the quality of the revision process or highlighting the academic stand of the editor in charge.[28] This is consistent with the fact that some of these articles received a significant number of citations. For example, among the top cited articles of our sample, there is research cited in articles published in top-journals like Science, PNAS, Nature Reviews Cancer, and The Lancet. Some less cited articles were also peer reviewed for the Italian Research Quality Assessment (VQR) and received the highest mark (excellent), according to the feedback of our respondents.

3.5. Why would anybody want to publish in a 'predatory' journal?

Some respondents argue that they were misled by the information provided by the journal.[29] Other authors point out that, while they were aware of the fraudulent nature of the journal, they expected these publications to receive a positive assessment in some scientific evaluations.[30] For instance, one author says that:

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[27] This practice has also been widely documented among more 'standard' academic journals (Wilhite and Fong, 2012).

[28] For instance, one of the respondents declares: *"My experience with [journal title] was very positive. I had the impression of a very careful and rigorous revision process, comparable to other journals of the same scientific field. I remember we had two very competent reviewers who addressed pertinent issues in the paper and helped us to improve our article. To me, this is a 'trustable' Journal."* Similarly, another author argues: *"The referees did an excellent job. The paper has improved substantially after their comments and suggestions."* Two authors even sent us the copies of the referee reports they received as a way to demonstrate the quality of the editorial process.

[29] For instance, one respondent argues: *"On their website, they reported the impact factor of the journal. Unfortunately, I trusted them and did not check it out. Only after they charged me the publication fees, I realized that the journal was not indexed neither in ISI nor in Scopus."*

[30] Around 10% of feedbacks are related to the fact that the journal under scrutiny is indexed in Scopus or the Web of Science. Additionally, 13 feedbacks mention at least one

> *It is not a publication I am proud of. Indeed, I am a bit ashamed. Let me add that all the journals published by (...) are just trash. I cannot understand how they can be indexed by Scopus and, thus, count for the Research Quality Assessment.*

Similarly, another author explains that:

> *In 2011 I participated in a conference they organized. They run several journals and they offered me to publish on a fast track in one of them. (...) I needed a publication for the National Scientific Qualification and I accepted to publish in this journal. Today, I regret that decision.*

Below we study systematically these claims. First, we study whether any fraudulent journals are included in any of the whitelists that were considered for the National Scientific Qualification. Second, we investigate whether authors received credit for these publications and we analyze the potential role played by the lack of expertise of some evaluators.

3.5.1. Whitelists

Many institutions and authors use whitelists to identify journals that satisfy some minimum quality requirements. In the case of the Italian National Science Qualification, the evaluation agency considered several lists. In scientific disciplines, it relied on the citations indexes Scopus and the Web of Science. In social sciences and humanities, the Italian academic authorities prepared their own whitelist of journals (ANVUR list). First, we investigate whether these whitelists include journals that have been classified by Beall as predatory and, then, we use bibliometric and survey information to verify whether these journals are actually fraudulent.

Our analysis shows that, out of the approximately 7,000 journals included in Beall's list, 284 of them are also indexed by Scopus and 14 by the Web of Science (see Table A1).[32] If we restrict the sample to the 599 Beall's list journals where Italian researchers have published, we find 131 journals that

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of the two Italian national evaluations (VQR or NSQ). Interestingly, in 5 cases respondents acknowledge that the publication was useful for the evaluation.

[32]We consider the composition of these indexes in 2012 when the NSQ took place.

are also included in Scopus and 10 in the Web of Science. In social sciences and humanities, we examine the overlap between Beall's list and the ANVUR list. According to our analysis, this whitelist includes 273 journals from Beall's list and Italian researchers have published in 213 of these journals. ANVUR also elaborated a more selected list of A-journals. Only two of these journals are also included in Beall's list.

The analysis conducted in subsection 3.4 suggests that most journals in Beall's list are likely to be fraudulent. Here, we repeat the analysis restricting our sample to Beall's list journals that also belong to one of these whitelists. The survey that we conducted among author provides information on 74

Scopus journals and 102 journals from the ANVUR list. According to respondents, at least 40% of Scopus journals in Beall's list and 49% of ANVUR journals exhibit some editorial irregularity (see Table 3, columns 3-6).

The bibliometric information suggests that most of these journals tend to have a low impact. Only three of them are in the top quartile of most cited journals according to Scopus, and none of them is in the top quartile within the Web of Science.[31]

3.5.2. Expert evaluations

We study how publications in predatory journals affect evaluation outcomes and whether the expertise of evaluators plays any role. Evaluation committees in the National Scientific Qualification had access to CVs, and they were also provided information on the number of articles that applicants had published in journals from the corresponding whitelist. Nonetheless, they had full autonomy to choose their evaluation criteria.

First, we examine the average performance of authors with predatory publications. We estimate the following equation:

[redacted] (2)

where $Success_{i,e}$ is an indicator variable that takes value one if application i in evaluation panel e was successful and takes value zero otherwise; B_i is an indicator variable that takes value one if the candidate has published in a journal from Beall's list, and $\mathbf{X_{i,e}}$ is a vector that includes various measures of candidates' research productivity, as well as other individual characteristics that might be correlated with candidate quality, such as experience, the field of research, the type of position or the research quality of the applicant's department. Evaluation fixed effects (μ_e) capture any variation in the success rate of applicants who are evaluated by different evaluation panels.

On average, in each discipline and rank there are about 188 candidates aspiring promotion and about 37% of them obtain a positive assessment. As expected, individual productivity is strongly correlated with success (column 1, Table 4). The number of publications in high-impact journals is the strongest factor: applicants with one standard deviation more publications in top-quartile journals according to the average Article Influence Score (or journals in A-category in ANVUR list) are 12.5 percentage points (or 34%) more likely to qualify. A similar increase in the number of other publications in Scopus or the Web of Science is associated with a 2.9 percentage points (p.p.) increase in the probability of success. The number of chapters in collective volumes, conference proceedings and books are also positively associated with success but the magnitude of the coefficient is smaller. Publications in other outlets are, if anything, negatively correlated with success. Applicants also tend to be more successful if they are more

[31] In the case of the Web of Science we consider the ranking according to the Article Influence Score; for Scopus, we consider the Scimago Journal Rank (SJR).

experienced, they have a tenured position, they are specialized in the same field as the committee, or they are based in a research-intensive department. In columns 2-6, we perform a similar analysis separately for different disciplinary groups. Interestingly, publications in high-impact journals are the strongest predictor of success across all disciplinary groups, including the ones where the dominant form of science communication is not academic journals, but rather conference proceedings (i.e. engineering) or books (i.e. social sciences and humanities).

Candidates with publications in predatory journals are less likely to obtain a positive evaluation. Conditional on all the quantitative information available in the CV, their success rate is 3.5 p.p. lower. This gap may reflect either the causal impact of predatory publications on evaluations or it may capture the existence of some relevant differences that are observable to evaluators but not to the econometrician (e.g. differences in quality). The penalty associated with predatory publications is largest in engineering and sciences, and it is not significantly different from zero in medical sciences, business and economics, and social sciences and humanities.

We also examine whether the evaluations received by authors with predatory publications vary depending on the research quality of committee members. This analysis faces at least two challenges. First, it requires the measurement of evaluators' research quality. Second, given that evaluators' characteristics may be potentially related to applicants' characteristics, it calls for an empirical strategy that identifies exogenous variations in the composition of committees.

We measure evaluators' research quality by the number of publications in high-impact journals. In the STEM&Med fields we consider publications in top quartile journals according to the Web of Science and in other areas we use the list of A-journals elaborated by ANVUR. As shown in Table 4, this variable is the best predictor of academic excellence as assessed by evaluation panels across all disciplinary groups. To account for the varying propensity to publish in different fields, we normalize this measure among eligible evaluators in the same discipline.

To identify exogenous variations in evaluators' research expertise, we exploit the existence of a random draw that selects panelists from the pool of eligible evaluators. We compare the success rate of candidates who, due to the randomness of the draw, were eventually assessed by panels of different research quality. Given that, as pointed out in section 2.1, 8% of evaluators resigned after being assigned to committees and they were replaced by other randomly selected evaluators, we report two sets of results. First, we estimate the impact of the research quality of the initial set of members of the committee ('intent-to-treat' effect). Second, to deal with the lack of full compliance, we use the research quality of initially drawn committee members as an instrumental variable for the research quality of final committee members.

We estimate the 'intent-to-treat' effect using the following equation:

[redacted]

where R_e is the average research quality of initial committee members that were selected in the initial lottery and $E(R_e)$ is the expected research quality of the committee. The latter variable reflects the composition of the pool of eligible evaluators and it is computed using one million simulated draws taking into account the rules of the selection process. Coefficient β_1 measures the relative success rate of authors with a Beall's list publication and β_3 captures the causal effect of the research profile of the initial committee on the success rate of applicants with a Beall's list publication.

As shown in Table 5, column 1, committees that had initially a lower research quality tend to be more benevolent with authors with publications in Beall's list journals. A one standard deviation decrease in the research quality of the committee increases the success rate of these authors by 6.2 p.p. (17%), relative to other candidates.

In column 2 we report the results of the instrumental variables (IV) strategy, where we instrument the research quality of the actual committee using the research quality of the initial committee. As expected, the IV estimates are approximately 8% higher than the 'intent-to-treat' estimates. Authors with publications in Beall's list journals have 6.7 percentage points (or about 18%) higher success rate when evaluators' research quality is one standard deviation lower (Table Table 5, column 2). In columns 3-7 we report the analysis separately for different disciplinary areas. The impact of evaluators' research quality on the success of candidates with publications in Beall's list journals is highest in business and economics (29 p.p.).

4. Conclusion

We investigate the extent of publications in 'predatory' journals and try to shed light on the motivations of authors who publish in these journals. We use information from a large sample of researchers who applied for promotion in Italy in 2012 and were evaluated by scientific committees at the national level. To identify dubious journals, we use Beall's list of 'potential, possible, or probable predatory' journals. The number of publications in journals from this list is relatively small, but not negligible. In a sample of around 1.8 million publications, we identify approximately 6,000 publications in journals that have been included by Beall in his blacklist. The number of these publications has been growing in recent years and, among all fields, it is particularly relevant in business and economics. In the last year of our sample, 2012, approximately 5% of all articles by Italian economists and management scholars in English-language journals were published in one of these journals.

To assess whether these journals are truly fraudulent, we collected bibliometric information and we conducted a survey among a sample of around 1,100 authors who had published in these journals, with a response

rate of 54%. Most of these journals have a poor scientific impact. Only 38% have a Google Scholar h-index of five or more based on the articles published in the previous five years. Moreover, according to survey respondents, at least a third of journals in the sample incurred in some fraudulent editorial practice.

The survey also provides interesting qualitative information about the motivation of authors to publish in these journals. Some researchers argue that they were fooled by the misleading information provided by these journals. Others confess that they were aware of the dubious nature of these journals but, despite their lack of rigor, they expected to receive academic credit for these publications.

We study the validity of the latter claim empirically. Our analysis uncovers two ways in which authors may benefit from publications in 'predatory' journals. First, we find that many of these journals are included in lists of journals, such as Scopus, that many institutions use as whitelists. Second, we show that authors with publications in Beall's list tend to receive relatively better evaluations when evaluators' research background is poor.

Overall, our study casts doubts on the mechanical use of whitelists and blacklists in evaluation processes. In general, a more nuanced approach to evaluations may be needed, whereas lists are combined with evaluations by experts.[32] Moreover, the research quality of these experts is relevant. Evaluators with a poor research record may reward publications in dubious journals. In sum, the proliferation of predatory journals may be a worrying symptom of the lack of accuracy of many scientific evaluations. In this respect, predatory publications may be the 'tip of the iceberg' of a much deeper problem.

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[32] There may also be a trade-off between using very comprehensive lists, such as a Scopus, which may include predatory journals, or more selective ones, such as the Web of Science, which excludes many (less prestigious) legitimate journals.

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4541504460525839262131 26

.Q1-journalsarejournalsinthefirstquartileinthecorrespondingfieldintheWebofScienceintermsof

Observations46,24411,95310,7124,6073,25615,716

Experienceisdefinedasthenumberofyearssincethefirstpublication.Publicationdatarefertopublicationsbetween2002and2012listedinap

criptivestatistics–CandidatesinNSQ

)

ValutazionedellaQualit´adellaRicerca

Table1:

Q1-journalarticles(STEM&Med
A-journalarticles(SS&H

%ofBeall'slistarticlesinjournalarticles

Individualcharacteristics:

PublicationsinBeall'slist

assessmentbyANVUR(

Universitylocation:

Publications

Table 2: **Who publishes in Beall's list?**

	1	2	3
	All	**Disciplinary group:**	
		STEM&Med	**Econ&SSH**
Female	−0.001	−0.003	0.001
	(0.002)	(0.003)	(0.002)
Experience	−0.004***	−0.004***	−0.004***
	(0.001)	(0.002)	(0.001)
Position (benchmark - non-tenured university position):			
- Assistant Professor, tenured	0.003	0 002	0.002
	(0.003)	(0 005)	(0.003)
- Associate Professor, tenured	0.004	0 002	0.004
	(0 005)	[redacted]	(0.006)
		(0 008)	
- Abroad or non-university position	[redacted]		0.020***
	006)	(0 009)	(0.006)
University location:			
- Central Italy	0.006**	0.007	0.004
	(0.003)	(0.004)	(0.003)
- Southern Italy	0.029***	0.039***	0.014***
	(0.003)	(0.004)	(0.003)
University ranking	−0.036***	−0.040***	−0.042***
	(0.007)	(0.010)	(0.008)
Total number of publications	0.018***	0.022***	0.011***
	(0.001)	(0.001)	(0.001)
Proportion of Q1/A-journal articles	−0.011***	−0.014***	−0.005***
	(0.001)	(0.002)	(0.001)
Mean dependent variable	0.048	0.065	0.024
Evaluation panel FE	Yes	Yes	Yes
Adjusted R-Squared	0.062	0.044	0.099
Observations	46,244	27,272	18,972

Note: OLS estimates. The dependent variable is an indicator for authors who have publications in Beall's list journals. All productivity indicators in the prediction model exclude publications in Beall's list. Productivity indicators and experience are normalized to have zero mean and unit standard deviation for all applicants in a given field and category.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Table 3: **Survey responses on Beall's list journals**

	1	2	3	4	5	6
	All journals		Indexed in Scopus		Listed by ANVUR	
	% of answers	**% with at least one answer**	**% of answers**	**% with at least one answer**	**% of answers**	**% with at least one answer**
No referee report	8	12	9	19	11	22
No or superficial referee report	22	30	21	33	27	43
No or superficial referee report, or something odd	26	36	27	40	31	49

Notes: The table includes information on 242 journals for which at least one respondent could recall whether the publication involved a referee report.

Table 4: **Determinants of success**

	1	2	3	4	5	6
	All			Disciplinary area:		
		Sciences	Engineering	Medical Sc.	Econ&Bus	Soc.Sc.&Hum
Author with Beall's list articles	−0.035**	−0.059***	−0.054**	−0.024	[redacted]0	−0.011
	(0.014)	(0.021)	(0.024)	(0.021)	(0 048)	(0.041)
Productivity measures:						
Q1 or A-journal articles	0.125***	0.134***	0.081***	0.152***	0.161***	0.081***
	(0.007)	(0.018)	(0.013)	(0.011)	(0.022)	(0.006)
Other articles in the Web of Science or Scopus	0.029***	0.036***	0.060***	0.044***	0.009	0.005
	(0.004)	(0.009)	(0.009)	(0.014)	(0.013)	(0.004)
Other journal articles	−0.006**	−0.001	−0.009	0.005	−0.013	−0.011**
	(0.003)	(0.006)	(0.006)	(0.005)	(0.008)	(0.004)
Proceedings	0.012***	−0.005	0.077***	0.000	0.013	0.019***
	(0.004)	(0.010)	(0.009)	(0.005)	(0.012)	(0.005)
Books	0.009***	−0.004	0.007	−0.008*	0.001	0.034***
	(0.003)	(0.006)	(0.006)	(0.004)	(0.011)	(0.004)
Chapters	0.038***	0.030***	0.014**	0.028***	0.042***	0.056***
	(0.003)	(0.005)	(0.006)	(0.005)	(0.014)	(0.004)
Other publications	−0.009***	−0.014**	−0.007	−0.002	−0.017**	−0.006*
	(0.002)	(0.005)	(0.008)	(0.006)	(0.006)	(0.003)
Other individual characteristics:						
Experience	0.008**	0.006	−0.004	0.002	−0.015	0.022***
	(0.004)	(0.009)	(0.008)	(0.005)	(0.009)	(0.005)
Non-tenured university position	−0.096***	−0.112***	−0.126***	−0.164***	−0.014	−0.050***

	(0.018)	(0.032)	(0.042)	(0.032)	(0.038)	(0.017)
Fixed university position in the same field	0.255***	0.221***	0.318***	0.197***	0.303***	0.280***
	(0.011)	(0.024)	(0.018)	(0.023)	(0.033)	(0.014)
Fixed university position in other field	0.017	0.042**	−0.075**	−0.020	0.091**	0.025
	(0.012)	(0.018)	(0.032)	(0.029)	(0.036)	(0.017)
University score	0.160***	0.126***	0.207***	0.261***	0.027	0.153***
	(0.026)	(0.038)	(0.056)	(0.045)	(0.071)	(0.029)
University location:						
- Central Italy	−0.023***	−0.022**	−0.019	−0.015	−0.037*	−0.012
	(0.007)	(0.010)	(0.016)	(0.023)	(0.018)	(0.011)
- Southern Italy	−0.039***	−0.063***	−0.043**	−0.020	−0.064***	−0.018*
	(0.008)	(0.014)	(0.019)	(0.020)	(0.019)	(0.011)
Adj. R-Squared	0.239	0.233	0.294	0.265	0.227	0.260
Observations	69020	19164	6813	15418	6005	21620

Note: OLS estimates. All regressions include exam fixed effects. Standard errors are clustered at the field level. Dependent variable takes value one if the applicant is granted a qualification. Research productivity indicators and experience are normalized for researchers applying to the same position and field. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5: **Effect of committee research quality on the success of candidates with Beall's list publications**

	1	2	3	4	5	6	7
					Disciplinary area:		
			Sciences	Engineering	Medical Sc.	Econ&Bus	Soc.Sc.&Hum
Author with Beall's list articles	−0.032**	−0.032**	−0.062***	−0.062**	−0.029	0.044	0.005
	(0.014)	(0.014)	(0.020)	(0.024)	(0.021)	(0.038)	(0.050)
Author with Beall's list articles * Evaluators' research quality	−0.062**	−0.067**	−0.110***	−0.037	0.031	−0.292***	−0.026
	(0.031)	(0.033)	(0.031)	(0.049)	(0.049)	(0.093)	(0.124)
IV	No	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-Squared	0.240	0.240	0.233	0.295	0.265	0.232	0.260
Observations	69020	69020	19164	6813	15418	6005	21620

Note: Dependent variable takes value one if the applicant is granted a qualification. Evaluators' research quality is measured as the number of Q1 articles in STEM&Med fields and as the number of A-journal articles in business and economics, social sciences and humanities, and it is normalized for all eligible evaluators in a given field. Column 1 reports the estimate from an OLS regression. In columns 2-7, the research quality of actual evaluators is instrumented by the research quality of evaluators initially selected by the random draw. Standard errors are clustered at the field level. All regressions include exam fixed-effects, and an interaction between the proportion of articles in Beall's list and the expected evaluators' research quality, which is obtained based on one million simulated draws taking into account the composition of the pool of eligible evaluators and the selection rules.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Figure 1: **Beall's list articles (%)**

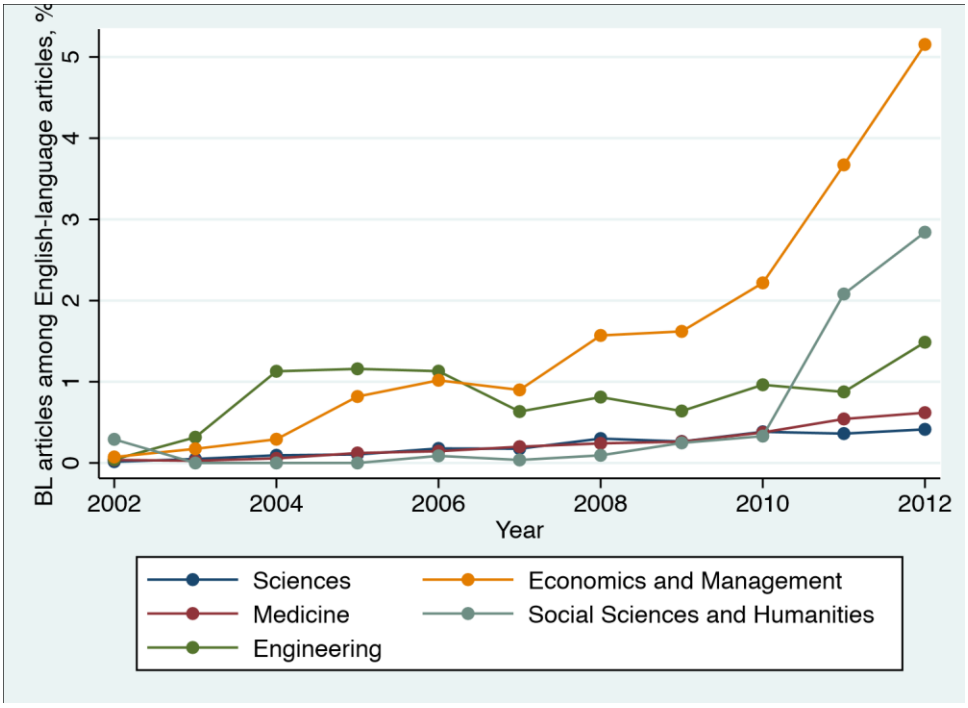
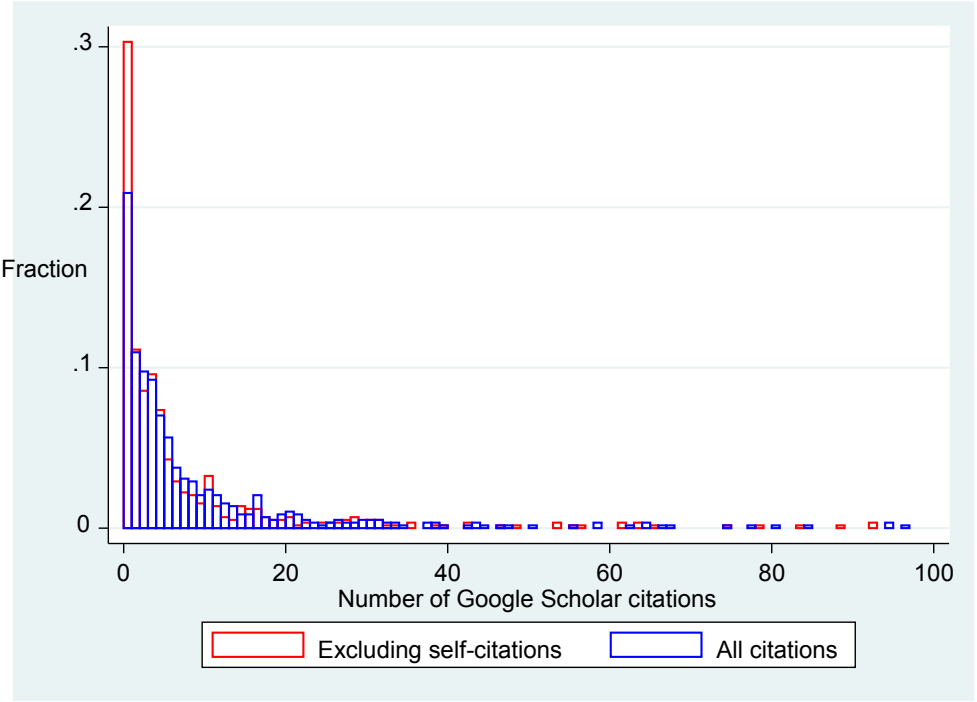


Figure 2: **Citations of articles in Beall's list journals**



Note: The figure does not include 3 observations with more than 100 citations.

Appendix A. Data

The data on the participants in Italian evaluations were available on the website of the Italian Ministry of Higher Education and Research during the evaluation process. We extracted all the individual characteristics that we use in the analysis from these CVs. Information on tenured researchers' affiliation was obtained from the Consortium of Italian universities (CINECA).

Affiliation of nontenured researchers is from the most recent publication of the CV. Experience is the number of years elapsed from the candidate's first publication.

Candidates were required to report the ISSN code of their journal publications in their submitted CVs. This facilitates the process of merging information in candidates' CVs with various journal lists. To identify publications in Beall's list journals, we first collected titles and the ISSN codes of the whole set of journals of each publisher that appeared in Beall's list in January 2015. We also collected the ISSN codes of journals included in the list of standalone predatory journals. We then matched the whole set of articles with candidates' CVs lists using the ISSN code of the journals. To avoid mistakes, we ignored Beall's list journals with no ISSN codes (about 40%). We also exclude from the list the journals run by MDPI, a publisher that in 2015 was removed from the Beall's list after its successful appeal.

We also collected information on bibliometric information from Scopus and the Web of Science. First, we check whether journals in candidates' CVs were indexed in Scopus and the Web of Science at the moment when candidates submitted their applications in 2012. Second, we consider journals citations ranks based on Scimago Journal Rank (2011) and Article Influence Score (2012). For a subsample of journals, we consider whether they are indexed in Google Scholar as in 2016 and their Google Scholar h-index.

An average candidate submitted 1.5 applications. About 14% of initially submitted applications were withdrawn during two weeks following the selection of committee when withdrawals were still allowed. To avoid the problem of potentially endogenous self-selection of candidates into evaluation process, when analyzing the determinants of candidates' success, we use information on all initial applications.

The Ministry also provided online CVs of all eligible, initially selected and actual evaluators. Unfortunately, CVs of evaluators based in non-Italian universities are very heterogeneous in their content and often incomplete, so in our analysis we focus only on the impact of the research quality of evaluators based in Italy.

Appendix B. Survey email and questionnaire

In this section, we report the translated version of the email and questionnaire used in our survey. The original version is available in the online appendix.

TRANSLATED VERSION

Email *Subject*: One of your published articles

Dear [NAME SURNAME],

We contact you regarding your article "[ARTICLE TITLE]" published in [JOURNAL TITLE].

The aforementioned article (or its publisher) had been included by prof. Jeffrey Beall (University of Colorado) in a list of "potentially, possibly, or probably" do not respect international scientific standards. To give you an example, according to prof. Beall, some of the included journals accept articles without a proper refereeing system, or include in their web pages inaccurate information concerning their impact factor, the composition of their editorial board, or their precise location. You can find more information on the list and Beall criteria at this link:
[HYPERLINK TO BEALL'S LIST]

"Beall's list" created a few controversies and some publishers initially included have been removed after a successful appeal. In an ongoing research project, our main goal is to shed some light on the reliability of the list and possibly to improve it. Your experience with the aforementioned journal is very important for our research.

Hence, we shall be pleased if you could devote just 2 minutes of your time to answer 7 short questions concerned with your experience with [JOURNAL TITLE]:
[HYPERLINK TO QUESTIONNAIRE]

We wish to make clear that our goal is not to question the seriousness of your scientific work or of other articles published in the same aforementioned journal. Our only goal is to understand its editorial functioning.

Your answers will be anonymized and employed only for research purposes. After the end of our project, also to thank you for your collaboration, we shall send you a report on the main results. Yours sincerely,

Manuel Bagues, Aalto University, Helsinki (email: manuel.bagues@aalto.fi)
Mauro Sylos Labini, University of Pisa (email: mauro.syloslabini@unipi.it)
Natalia Zinovyeva, Aalto University, Helsinki (email: natalia.zinovyeva@aalto.fi)

Questionnaire

1. How did you first hear about the aforementioned journal?
    - I received suggestion from a colleague
    - An email/invitation to submit a paper
    - Reading its published articles
    - Attending a conference
    - Other/I do not remember
2. After submitting your article, did you receive referee reports?
    - No, I did not
    - Yes, I did receive trivial referee report only addressing the editing

- Yes, I did and they also addressed the paper's contents
- I do not remember

3. Did you pay any fee to publish your article?
    - No, I did not
    - Yes, I did and it was clear from the journal guidelines
    - Yes, I did and I found out after the article was accepted for publication
    - I do not remember

    If you did, could you please indicate how much you paid? (in US dollar)

4. During the process of revision/acceptance of your paper, did you noticeanything that made you distrust the integrity/professionalism of the journal?
    - No, I did not
    - Yes, I did
    - I do not remember

    In case you did, could you briefly tell us what?

5. According to your past experience, what is the academic value of articles published on this journal?
    - High
    - Average
    - Low
    - None
    - Negative
6. According to your opinion, what should be the academic value of articles published on this journal?
    - High
    - Average
    - Low
    - None
    - Negative
7. Have you ever heard about "Beall list" before getting the invitation toparticipate to this survey?
    - Yes

- No

In case you would like to add any comment or suggestion you can use the box below

Table A1: **Sample selection: Beall's list journals**

	1	2	3	4
	All journals	**Journals where Italians published**	**Journals in the targeted sample**	**Journals with survey info**
Number of journals	7210	599	379	268
Indexed in:				
Scopus	284	131	88	74
- Q1 SJR	6	3	3	3
Web of Science	14	10	6	5
- Q1 AIS	0	0	0	0
ANVUR list	273	213	128	102
- A-journal	2	2	2	2
Google Scholar	n.a.	n.a.	143	112
- GS h-index (mean)	n.a.	n.a.	12	12

Notes: Column 1 includes information on all journals from Beall's list with non-missing ISSN codes. *Q1 SJR* stands for the top-quartile journals in Scopus according to Scimago Journal Rank. *Q1 AIS* indicates top-quartile journals in the Web of Science according to the Article Influence Score. n.a. - information is not available (not collected).

Table A2: **Sample selection: researchers**

	1	2	3	4	5
	Authors with Beall's list		**Targeted**	**t-test for equality of Means (p-values)**	
				Replied vs. not targeted	**articles replied vs. not**
Female	0.36	0.37	0.35	0.487	0.213
Experience	15	16	16	0.163	0.238
Disciplinary group:					
- Sciences	0.27	0.27	0.29	0.780	0.152
- Engineering	0.22	0.22	0.21	0.606	0.788
- Medicine	0.31	0.31	0.28	0.737	0.026
- Business and Economics	0.16	0.16	0.17	0.658	0.235
- Social Sciences and Humanities	0.04	0.04	0.05	0.622	0.749
Permanent position in an Italian university:	0.74	0.73	0.77	0.865	0.003
- Assistant professor	0.62	0.59	0.57	0.019	0.226
- Associate professor	0.38	0.41	0.43	0.019	0.226
University location:					
- North	0.37	0.35	0.36	0.152	0.615
- Center	0.23	0.24	0.25	0.544	0.150
- South	0.41	0.41	0.39	0.376	0.084
All publications	62	63	62	0.775	0.857
Journal articles	32	33	32	0.920	0.324
Q1 or A-journal articles	9.6	9.4	9.2	0.376	0.714
Bealls list articles	1.6	1.6	1.6	0.214	0.579
Characteristics of the Beall's list article inquired about in the survey:					
Year of publication	-	2010	2010	-	0.783
Citations in Google Scholar	-	8.9	9.3	-	0.469
Journal is indexed in Google Scholar	-	0.52	0.54	-	0.109
Journal Google Scholar H-index	-	17	16	-	0.721
Journal is indexed in Scopus	-	0.43	0.45	-	0.201
Journal Scopus SJR score	-	0.55	0.55	-	0.698
Journal is indexed in WoS	-	0.13	0.14	-	0.628
Journal WoS AIS score	-	0.87	0.85	-	0.316
Observations	2225	1088	584		

Notes: Column (1) includes information on 2225 authors who have published at least one article in a Beall's list journal. Columns (2) and (3) provide information on authors who were targeted in the survey and authors who replied to the survey respectively.

Table A3: **Survey responses**

	1	2	3
	All	**In Scopus/WoS:**	

		No	Yes
How did you first hear about this journal?			
A suggestion from a colleague	33	28	39
An email/invitation to submit a paper	27	30	23
Reading its published articles	16	15	17
Attending a conference	12	13	11
Other / Do not remember	13	15	10
After submitting your article, did you receive refe ·ee reports?			
Yes, I did and they also addressed paper's contents	64	65	62
Yes, I did and they only addressed the editing	12	13	10
No, I did not	7	7	8
I do not remember	18	15	20
Did you pay any fee?			
No, I did not	44	45	42
Yes, I did and it was clear from the journal guidelines	30	31	28
Yes, I did and I found out after the article was accepted for publication	8	10	6
I do not remember	18	14	24
Did you find anything odd in the process of revision/acceptance of the paper?			
No, I did not	78	77	80
Yes, I did	10	10	11
I do not remember	12	14	9
According to your experience, what's the academic value of pu in this lications journal (in formal national research evaluations)?			
High	4	4	3
Average	20	15	26
Low	39	38	41
None	24	30	16
Negative	1	0.3	1.9
I do not know	13	14	12
In your opinion, what should be the academic value of public this ations in journal (in formal national research evaluations)?			
High	5	5	5
Average	35	33	37
Low	35	36	34
None	10	11	9
Negative	1.2	0.3	2.3
I do not know	14	15	13
Have you ever heard about Beall's list before?			
No	90	88	93
Yes	10	12	7

Notes: The table reports percentages of non-missing answers to each question.

Table A4: Journals with at least one reported bad practice

Journal title	Replies	Any bad practice, %	Scopus 2012	WoS 2012	NSQ 2012	Google Scholar
APPLIED MATHEMATICS	3	100	0	0	1	0

CHINA-USA BUSINESS REVIEW	2	100	0	0	1	1
ENVIRONMENTAL ECONOMICS	2	100	0	0	1	0
INTERNATIONAL JOURNAL OF CONTEMPORARY MATHEMATICAL SCIENCES	2	100	0	0	1	0
THE OPEN FUELS & ENERGY SCIENCE JOURNAL	2	100	1	0	0	0
THE OPEN PROTEOMICS JOURNAL	2	100	1	0	0	0
ACTA INFORMATICA MEDICA	1	100	1	0	0	1
AFRICAN JOURNAL OF AGRICULTURAL RESEARCH	1	100	1	0	1	1
AMERICAN JOURNAL OF FOOD TECHNOLOGY	1	100	1	0	1	0
ATMOSPHERIC AND CLIMATE SCIENCE	1	100	0	0	0	1
CREATIVE EDUCATION	1	100	0	0	0	1
ENERGY AND ENVIRONMENT RESEARCH	1	100	0	0	0	1
EUROPEAN JOURNAL OF MANAGEMENT (EJM)	1	100	0	0	1	0
EUROPEAN JOURNAL OF SCIENTIFIC RESEARCH	1	100	0	0	1	0
GLOBAL ECONOMY AND FINANCE JOURNAL	1	100	0	0	1	0
INTERNATIONAL JOURNAL OF APPLIED PSYCHOLOGY	1	100	0	0	0	0
INTERNATIONAL JOURNAL OF COMPUTER SCIENCE ISSUES	1	100	0	0	0	1
INTERNATIONAL JOURNAL OF HUMANITIES AND SOCIAL SCIENCE	1	100	0	0	1	1
INTERNATIONAL JOURNAL OF MATERIAL SCIENCE	1	100	0	0	0	0
INTERNATIONAL JOURNAL OF MATHEMATICAL ANALYSIS	1	100	1	0	1	0
INTERNATIONAL JOURNAL ON ADVANCES IN SOFTWARE	1	100	0	0	0	0
JOURNAL OF ANTIVIRALS AND ANTIRETROVIRALS	1	100	1	0	0	0
JOURNAL OF AQUACULTURE RESEARCH & DEVELOPMENT	1	100	0	0	0	1
JOURNAL OF CLINICAL MEDICINE RESEARCH	1	100	0	0	0	1
JOURNAL OF FOOD RESEARCH	1	100	0	0	0	1
JOURNAL OF INTERNATIONAL ENVIRONMENTAL APPLICATION & SCIENCE	1	100	0	0	0	1
JOURNAL OF MATHEMATICAL SCIENCES: ADVANCES AND APPLICATIONS	1	100	0	0	1	0
JOURNAL OF NANOMEDICINE & BIOTHERAPEUTIC DISCOVERY	1	100	0	0	0	0
JOURNAL OF PHARMACY AND NUTRITION SCIENCES	1	100	0	0	0	1
JOURNAL OF TRAUMA & TREATMENT	1	100	0	0	0	0
NATURAL SCIENCE	1	100	0	0	0	1
OPEN CONFERENCE PROCEEDINGS JOURNAL	1	100	0	0	0	0
RESEARCH IN APPLIED ECONOMICS	1	100	0	0	1	1
SURGICAL SCIENCE	1	100	0	0	0	1
THE OPEN CRYSTALLOGRAPHY JOURNAL	1	100	0	0	0	0
THE OPEN ECONOMICS JOURNAL	1	100	0	0	1	0
THE OPEN FOOD SCIENCE JOURNAL	1	100	0	0	0	0
THE OPEN MEDICAL IMAGING JOURNAL	1	100	0	0	0	0
THE OPEN PSYCHOLOGY JOURNAL	1	100	0	0	0	0
UNIVERSAL JOURNAL OF MANAGEMENT AND SOCIAL SCIENCES	1	100	0	0	1	0
WORLD APPLIED SCIENCES JOURNAL	1	100	1	0	0	1

Continued on next page

Table A4 – Journals with at least one reported bad practice (continued)

Journal title	Replies	Any bad practice, %	Scopus 2012	WoS 2012	NSQ 2012	Google Scholar

WSEAS TRANSACTIONS ON BIOLOGY AND BIOMEDICINE	1	100	1	0	0	0
WSEAS TRANSACTIONS ON CIRCUITS AND SYSTEMS	1	100	1	0	0	1
WSEAS TRANSACTIONS ON COMMUNICATIONS	1	100	1	0	0	1
WSEAS TRANSACTIONS ON MATHEMATICS	1	100	1	0	1	1
WSEAS TRANSACTIONS ON SIGNAL PROCESSING	1	100	0	0	1	0
JOURNAL OF ANIMAL AND VETERINARY ADVANCES	8	75	1	1	0	1
INTERNATIONAL MATHEMATICAL FORUM	7	71	0	0	1	0
JOURNAL OF LIFE SCIENCES	3	67	0	0	1	1
THE EUROPEAN JOURNAL OF ECONOMICS, FINANCE AND ADMINISTRATIVE SCIENCES	3	67	1	0	1	0
THE OPEN MECHANICAL ENGINEERING JOURNAL	3	67	1	0	0	1
WSEAS TRANSACTIONS ON COMPUTERS	6	50	1	0	1	1
WSEAS TRANSACTIONS ON INFORMATION SCIENCE AND APPLICATIONS	6	50	1	0	1	1
JOURNAL OF US-CHINA PUBLIC ADMINISTRATION	4	50	0	0	1	1
BRITISH JOURNAL OF MEDICINE AND MEDICAL RESEARCH	2	50	0	0	0	1
INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ACCOUNTING, FINANCE AND MANAGEMENT SCIENCES	2	50	0	0	1	1
INTERNATIONAL JOURNAL OF COMPUTER SCIENCE AND NETWORK SECURITY (IJCSNS)	2	50	0	0	1	1
JOURNAL OF KNOWLEDGE MANAGEMENT, ECONOMICS AND INFORMATION TECHNOLOGY	2	50	0	0	1	1
JOURNAL OF MODERN ACCOUNTING AND AUDITING	2	50	0	0	1	1
JOURNAL OF PURE AND APPLIED MATHEMATICS: ADVANCES AND APPLICATIONS	2	50	0	0	1	0
PSYCHOLOGY	2	50	0	0	1	0
SOCIOLOGY MIND	2	50	0	0	1	1
THE OPEN ZOOLOGY JOURNAL	2	50	0	0	0	0
THEORETICAL ECONOMICS LETTERS	2	50	0	0	1	0
US-CHINA FOREIGN LANGUAGE	2	50	0	0	1	1
APPLIED MATHEMATICAL SCIENCES	9	44	1	0	1	0
INTERNATIONAL JOURNAL OF ENGINEERING BUSINESS MANAGEMENT	5	40	1	0	1	1
WSEAS TRANSACTIONS ON SYSTEMS	8	38	1	0	1	0
INTERNATIONAL JOURNAL OF PURE AND APPLIED MATHEMATICS	12	33	1	0	1	1
HEAD AND NECK ONCOLOGY	3	33	1	0	0	0
INTERNATIONAL JOURNAL OF BUSINESS AND MANAGEMENT	3	33	0	0	1	1
JOURNAL OF BUSINESS AND POLICY RESEARCH	3	33	0	0	1	0
JOURNAL OF COMMUNICATIONS (JCM)	3	33	0	0	0	1
JOURNAL OF EARTH SCIENCE AND ENGINEERING	3	33	0	0	0	1
JOURNAL OF ENVIRONMENTAL SCIENCE AND ENGINEERING	3	33	0	0	1	1
JOURNAL OF INTELLIGENT LEARNING SYSTEMS AND APPLICATIONS	3	33	0	0	1	1
MEDITERRANEAN JOURNAL OF SOCIAL SCIENCES	3	33	0	0	1	1
NANOMATERIALS AND NANOTECHNOLOGY	3	33	0	0	0	0
CHINESE BUSINESS REVIEW	4	25	0	0	1	1
INVESTMENT MANAGEMENT & FINANCIAL INNOVATIONS	4	25	1	0	1	0

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Table A4 – Journals with at least one reported bad practice (continued)

Journal title	Replies	Any bad	Scopus	WoS	NSQ	Google

		practice, %	2012	2012	2012	Scholar
JOURNAL OF APPLIED SCIENCES	4	25	1	0	1	1
JOURNAL OF AGRICULTURAL SCIENCE AND TECHNOLOGY	5	20	0	0	1	1
JOURNAL OF ENVIRONMENTAL PROTECTION	5	20	0	0	1	1
FRONTIERS IN BIOSCIENCE	45	16	1	1	0	1
INTERNATIONAL JOURNAL OF ADVANCED ROBOTIC SYSTEMS	7	14	1	1	1	1
PHARMACOLOGYONLINE (PHOL)	8	13	1	0	1	0

Notes: The number of replies stands for the number of replies by respondents that could recall the experience with the journal. 'Bad practice' indicates cases when the author did not receive a referee report, received only a superficial referee report, or noticed something that made him/her distrust the integrity/professionalism of the journal.