Strategic citations for a fairer academic landscape

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Abstract

Scientific publishing is increasingly dominated by for-profit journals, which attract
prestige and submissions through high impact factors. While some of these partly
reinvest in research and dissemination and can be considered academia-friendly, non-
profit journals - those that fully reinvest revenue into the academic community - often
struggle for visibility despite promoting more equitable publishing models. Using
citation data from over 70,000 publications in ecology and evolution, we show that
citation practices are siloed: for-profit journals disproportionately cite other for-profit
journals, academia-friendly journals preferentially cite other academia-friendly
journals, and non-profit journals likewise favor citations to non-profit sources. This
asymmetry structurally reinforces the IF advantage of for-profit journals simply
because they are dominant in the publishing system. To address this inequity, we
propose a soft-power, low-risk approach of "strategic citation". By deliberately
choosing to cite relevant articles from non-profit journals when multiple references
would be equally valid, researchers can contribute to increasing those journals visibility
and IF. This approach preserves scientific rigor and does not restrict publishing
choices, but adds a layer of ethical intentionality to citation practices. Strategic citation
offers a practical, actionable lever for researchers to promote a more balanced and
ethical publishing system that complements broader structural reforms.

Introduction

Academic journals play an essential role in the scientific process by ensuring that new findings are critically evaluated through peer review, widely disseminated, and serve as a foundation for future research. This role carries a significant social responsibility for journals and their governing bodies. Journals operate over a broad spectrum of publishing strategies, ranging from strictly for-profit to non-profit [1–5]. The landscape of academic publishing has undergone a significant transformation over recent decades, marked by a notable shift towards for-profit models [6–8]. In contrast, publishers that invest surplus funds to support scientific research or its dissemination have seen a relative decline [7]. For example, the five largest for-profit publishers accounted for 20% of publications in the 1970s, a figure that rose to 53% in 2013 [9]. This shift may have been catalysed by the growing reliance on journal-level metrics, particularly the impact factor (IF), as proxies for journal prestige and research quality. Originally designed to measure citation frequency, the IF is now often used to indicate journal excellence [10], potentially leading to increased submissions and citations.

The increasing prevalence of for-profit journals has two major implications for the academic system. First, a system dominated by for-profit publishing increases the financial stress on academic institutions, libraries and researchers, who are subjected to rising subscription costs. The widening gap between the actual costs of publication and the fees charged to access these publications – both through subscription models and article processing charges – often far exceeds what could reasonably be considered fair or proportional compensation for reviewing and publishing services [11–13]. Second, the business models adopted by many for-profit journals have drawn considerable criticism from the research community and have been accused of prioritising financial gain over the equitable dissemination of knowledge [14–16]. This dynamic poses an existential challenge to the integrity of scientific research [17,18].

Academic researchers are pressured to publish in journals perceived as most excellent, a perception still largely based on IF, to the benefit of their career and institutions [19]. This pressure is particularly acute for early career researchers, who often face employment insecurity and rely heavily on their publication records to secure funding, fellowships, and academic appointments [20]. As a result, science – long upheld as a public good intended to serve the advancement of society [21,22] –

is arguably becoming a "tragedy of the commons" [23], where the pursuit of individual or institutional gain undermines the collective benefits of open, equitable knowledge production [24]. For-profit publishers, such as Springer, Reed-Elsevier, Wiley-Blackwell, and Taylor & Francis, now control an increasing share of high-IF journals [25]. Given the commercial logic underpinning for-profit journals and the central role of the IF in shaping perceptions of prestige and visibility, these journals are naturally driven to maximize their IF. This dynamic feeds a self-reinforcing cycle in which for-profit journals gain increasing visibility and submissions, further entrenching the dominance of the for-profit model (Figure 1). Notable exceptions challenge the narrative that only for-profit journals can succeed and demonstrate that non-profit journals can rise to the top of their fields. For instance, *Science* – a non-profit journal published by the American Association for the Advancement of Science – consistently ranks among the highest IF journals in the science and technology fields (IF ≈ 45 in 2024, [26,27]).

However, the publishing landscape is more nuanced, and some journals published by for-profit companies reinvest revenues into research or dissemination, and can be considered "academia-friendly" [1]. These include journals affiliated with public research institutions or scholarly societies. For example, *Landscape Ecology* is published by Springer but is affiliated with the International Association for Landscape Ecology [26]. A more balanced system, where also non-profit publishers thrive, would benefit the academic and civil societies. Here we propose a constructive approach to shift the publishing landscape from a "vicious" to a "virtuous" cycle (Figure 1) by re-evaluating the citation practices of publishing researchers. By strategically choosing to cite articles published in non-profit journals, researchers can help enhance the visibility of these journals, and contribute to increasing the journals perceived prestige. Importantly, scientific quality and relevance must remain the primary criteria for citation, and any shift in citation behavior should happen within the bounds of scholarly norms grounded in content relevance and scientific rigor. In order to implement this strategy, we encourage authors to select sources published in non-profit or academia-friendly journals where multiple suitable references exist, such as for broadly accepted statements often found in the introduction or discussion sections of scientific publications (*i.e.,* "The biodiversity crisis is accelerating worldwide").

As a necessary first step towards this goal, we assessed the current state of citation patterns by quantifying the representation of distinct business models in the

references of the scientific literature, exemplified for the fields of ecology and evolution. For these fields, an assessment of the journal's business model has been facilitated *via* the DAFNEE database [1] (Database of Academia Friendly Journals in Ecology and Evolution, https://dafnee.isem-evolution.fr/). It catalogues 611 journals that are oriented towards the academic community (*i.e.*, "academia-friendly", including both non- and for-profit business models) based on indicators like ownership, fee structure, institutional partnerships, and reinvestment practices. Based on this database, we analysed 71,885 publications published in 2023 across 270 journals following three different business models (Box 1). For each publication, we extracted the cited references and classified them as (a) for-profit, (b) for-profit academia-friendly, or (c) non-profit academia-friendly (hereafter only non-profit) citations, based on the business model of the journal cited.

Figure 1. Illustration of a transition from a vicious to a virtuous circle of journal prestige: *Strategic citing of articles from non-profit journals can help increase their impact factor, thus enhancing the perceived prestige and notoriety of non-profit journals. IF: impact factor; FP: for-profit journals; NP: non-profit journals.*

Box 1. Characterizing current citation practices in ecology and evolution across for-profit, for-profit academia-friendly and non-profit journal business models.

Method/material used

Our analysis is based on journals listed in the DAFNEE database (Database of academia-friendly jourNals in Ecology and Evolution; https://dafnee.isem-evolution.fr/). We limited our analysis to journals of the closely-related fields of "applied ecology", "basic ecology", "evolution" and "general" (as indexed in DAFNEE, n=172, assessed on July 1, 2025) to limit variation in citation practices across disciplines. The publisher type "university press" was merged into the "non-profit" category, assuming that their revenues are reinvested to serve the scientific community. To represent the whole publishing environment, we also included journals considered purely for-profit. For this, we manually scanned the list of surveyed journals (> 1,100 scientific journals evaluated by DAFNEE but not meeting the criteria for "academia friendliness") and extracted 128 journals matching our selected research fields and having an international scope. The business model of each journal was obtained manually from the journal's website. Non-profit, non-academia-friendly journals were identified as being largely associated with the scientific community and were merged into the "non-profit" category. The final journal list comprised 300 journals, with 101 classified as "non-profit", 84 "for-profit academia-friendly" and 115 as "for-profit" (see Table S3).

Using OpenAlexR [28], we identified all articles published in 2023 within the selected journals (n = 131,681 "original articles") and retrieved their cited references (n = 1,662,563) in these publications, Each reference was classified based on the business model of its publishing journal into one of the three categories. Only references to journals in our selection were included in the further analysis. To reduce noise from atypical citation behavior and small sample sizes, we excluded publications with fewer than five references and removed special article types (*e.g.*, comments, responses). This resulted in a final dataset of 71,885 publications with 1,554,261 cited references (mean = 22.62 +/- 18.12 SD references per article) from 270 journals. This filtering did not influence the general outcome (Fig. S1).

For each article, we calculated the proportion of its references published in each of the three categories of journals. These ratios were aggregated at the journal-level, and subsequently at the business model level, by computing unweighted mean citation ratios for each group. A more detailed description of the methods is provided in the supplementary material.

Citation practices are siloed between for-profit and non-profit journals

126
If citation practices were completely unbiased, we would expect no significant
differences in the proportion of citations towards for-profit *vs.* for-profit academia-
friendly *vs.* non-profit journals. We found that publications in for-profit journals included
significantly more references from for-profit journals than articles published elsewhere
(Fig. 2; t-test with p < 0.01). Likewise, publications in for-profit but academia-friendly
journals most frequently cited for-profit academia-friendly references, while
publications in non-profit journals showed the highest proportion towards non-profit
references (Fig 2, t-test with p < 0.01). This suggests a strong tendency for
researchers to cite articles published in journals within the same business model.
While this pattern may partly reflect a tendency to cite articles from the same journal,
potentially to increase the chances of publication acceptance [29,30], our findings
remain robust even after excluding such self-citations. Several explanations leading
to these patterns are possible. Researchers' citation behaviour may reflect their ethical
views on the role of profit in academic publishing. Authors who choose to publish in
non-profit journals may be more motivated to support the non-profit publishing system
through their citation choices compared to authors publishing in for-profit journals.
Financial aspects might also play a role, since academia-friendly journals often have
lower processing fees [1]. Even if authors cite unconsciously, another mechanism
might be field-specific clustering, where certain subfields are predominantly covered
by specific business models thereby reinforcing internal citation loops within each
business model.
Our results come with inherent limitations, largely due to possible bias from our
focus on the journals listed or surveyed in the DAFNEE database. Every scientific field
has its own publishing system, which may differ substantially from those observed in
ecology and evolution. Moreover, the distinction between for-profit, and non-profit
journals, even when considering in-between business types, may not always be
obvious. A more thorough evaluation of citation practices would require including
journals from a broader range of disciplines to assess the robustness of our findings
and to explore how these patterns vary across academic fields. In addition, a time
series analysis could reveal whether citation practices have shifted over time, which
would be particularly relevant given the rapid expansion of for-profit publishing in
recent years. For instance, the portfolio of Nature-branded journals (published by

Springer Nature, a for-profit publisher) has grown from a single flagship journal in 2009
to 34 titles in 2024 (see [7]), illustrating the accelerating commercialisation of scientific
publishing.

162
Figure. 2. *Proportion of citations towards articles published in (a) for-profit, (b) for-profit*
(academia-friendly) and (c) non-profit journals among the same three publisher types. Citation
proportions were first calculated at the article level, and then aggregated to the journal-level
using unweighted means. The boxplot indicates the median with the box comprising values
between first and third quartile; scatters and density curve indicate the distribution of the data
points. Horizontal brackets indicate statistically significant differences in citation ratio between
two publisher types. Asterisks denote significance levels: p < 0.05 (*), p < 0.01 (**) and p <
0.001 (***), based on pairwise t-tests following significant ANOVAs. Non-significance is not
indicated. The analysis is based on n=106, n=82 and n=82 journals for journals following for-
profit, for-profit academia-friendly and non-profit business models, respectively.

Strategic citation to support a balanced publishing system

Our results show a clear bias in citation practices: researchers tend to cite more
articles published in journals that share the same business model (Fig. 1).
Hypothetically, if both for-profit and non-profit journals received a similar boost from
these within-group citations, their impact factors could grow at comparable rates. But
in reality, the system is heavily imbalanced, with nearly five times more for-profit
journals than non-profit ones [9]. As a consequence, purely by numbers, for-profit
journals are more likely to accumulate citations, leading to faster growth in their IFs.
Even if non-profit journals maintain strong internal citation networks, the dominance of
for-profit journals in the publishing landscape gives them a structural advantage in
visibility and prestige. Although our analysis focuses on journals in ecology and
evolution, similar patterns likely exist in other fields. Without efforts to correct this
imbalance, there is a real risk that non-profit journals will continue to see their IF, and

thus their visibility and attractiveness, decline over time. Few flagship titles, such as
Science, might be able to retain their standing, while most will be overshadowed by a
growing landscape of for-profit journals with stronger citation performance and
perceived prestige.

For individual researchers who wish to promote non-profit journals, the most
straight-forward action is to prioritise publishing in non-profit journals, or even to
boycott for-profit journals [31]. However, such a strategy comes at significant cost, as
choosing to publish exclusively in non-profit journals can significantly limit available
publishing venues and access to high impact journals. Given that IF remains a widely
used - albeit contested [10] - proxy for academic excellence, boycotting for-profit
journals creates disproportionate risks for early-career researchers [20,32,33]. An
alternative is to propose actions that meaningfully challenge the *status quo* while
minimising personal risks [20]. While we acknowledge the validity of boycott
approaches, we propose a soft leverage: a strategic choice of citations that promotes
greater equity in academic publishing without requiring individual restrictions on the
choice of venues. Although many for-profit journals are important active actors of the
publishing landscape, we need to foster a healthier, more balanced system – one
characterized by a fairer distribution of prestige and influence and not guided by profit
margins.

What does this mean for action? The strategic citation approach we propose
offers a practical way for researchers to support a more equitable publishing
landscape. Scientific articles are typically structured around a review of the state of
the art in the introduction and often include general statements supported by well-
known references. For example, in biodiversity science, authors might cite studies on
the global extinction crisis, while in climate research, references to global warming
trends are common. Similar types of general or widely accepted claims also appear in
the discussion or perspective sections. In these cases, where multiple valid sources
exist, authors can choose to cite relevant articles published in non-profit journals, if
available. This approach does not compromise scientific accuracy but adds a layer of
intentionality to citation choices. These choices could be implemented as an additional
step during manuscript preparation: after the content is finalised, authors could
calculate the ratio of for-profit *vs.* non-profit references and, where possible, adjust it
to favor non-profit journals.

Accompanying this article, we provide the easy-to-use R package "fairpub"
(https://github.com/frbcesab/fairpub/) that allows users to quantify the proportion of
non-profit and/or academia-friendly references based on a BibTeX file (currently
limited to the fields of ecology and evolution). Given our finding that articles published
in for-profit journals tend to strongly favour citations from other for-profit journals (and
vice versa for academia-friendly and non-profit publications), this check should be
prioritised by authors publishing in for-profit journals. We concur with previous studies
that emphasise scientific quality and relevance must remain the primary criteria for
citation choice (*i.e.*, [34]). However, with most articles containing dozens of references,
there is meaningful room to shift citation patterns without compromising scientific rigor.
Ultimately, this approach will not replace for-profit journals, but maintain the visibility
and perceived quality of non-profit journals while the academic community works
toward broader reforms. Our proposal is a complementary, low-risk strategy that can
help sustain a balanced publishing system during this necessary transition.

To be truly effective, researchers need awareness of the issue and access to
reliable, transparent information about journal business models, something that is not
currently easily accessible. While initiatives like the DAFNEE database and the
"fairpub" package can provide valuable insights for ecology and evolution journals,
similar tools are largely missing in other disciplines. Moreover, as business models
evolve and ownership structures shift, these databases must be regularly updated.
Ideally, a neutral regulatory body or institution could evaluate and clearly label journals
based on how their revenues are used. Greater transparency and awareness could
enable researchers to make informed, strategic publishing and citations choices and
foster positive change across the publishing system.

Conclusion

The current academic publishing system is structurally imbalanced, with for-
profit publishers dominating publication volume and increasing their perceived
excellence [35] through IF inflation. Their reliance on subscriptions and article
processing charges shifts financial burdens onto researchers and institutions,
reinforcing global inequalities in access and visibility [36,37]. Non-profit journals offer
more equitable models, such as diamond open access (*i.e.*, no publication nor reading
fees), but remain under-resourced in a system driven by the for-profit vicious circle

(Figure 1) [38]. While a complete transition to non-profit publishing is unrealistic under the market-oriented systems prevalent in many leading research nations, reinforcing the visibility and legitimacy of non-profit journals can incrementally boost their IF, helping them (re)gain recognition and compete within the current evaluation systems. Strategic citation is a practical, low-risk action that researchers can take now. In the short-term, the commitment to research ethics should extend to how we cite, because it begins with the choices we make in the reference lists. This individual-level action complements long-term, broader institutional reforms needed to reduce reliance on journal-level metrics and re-establishing science as a public good.

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Code and data availability

All data and code needed to evaluate the conclusions in the paper are present in the corresponding git repository: https://github.com/FRBCesab/ethical-citations. This paper cites 60% NP journals and 40% FP journals.

Author contributions

All authors contributed to the conceptualization of the project as well as writing and review of the final manuscript. Methodology was advanced by CC, MBe, MU, NC, and NM. CC, MBe, and NC conducted the formal analysis; CC, NC, and NM the data curation. CM, MBe, MBu, and NM lead the visualisation. The first draft was advanced by AT, BO, CM, CPC, CV, MBu, MU, NM, PA, and DV.

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