

# 1 **Strategic citations for a fairer academic landscape**

## 2 **Abstract**

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

## 21 **Introduction**

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

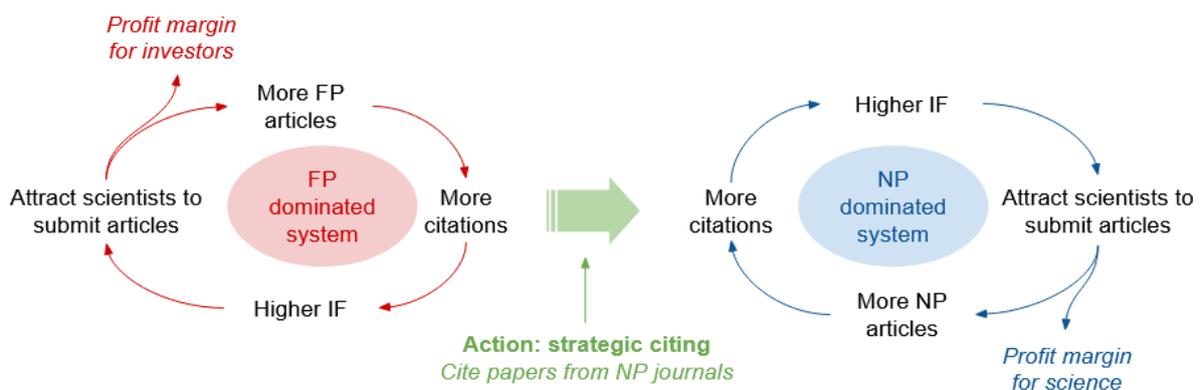
37 The increasing prevalence of for-profit journals has two major implications for  
38 the academic system. First, a system dominated by for-profit publishing increases the  
39 financial stress on academic institutions, libraries and researchers, who are subjected  
40 to rising subscription costs. The widening gap between the actual costs of publication  
41 and the fees charged to access these publications, both through subscription models  
42 and article processing charges, often far exceeds what could reasonably be  
43 considered fair or proportional compensation for reviewing and publishing services  
44 [11–13]. Second, the business models adopted by many for-profit journals have drawn  
45 considerable criticism from the research community and have been accused of  
46 prioritising financial gain over the equitable dissemination of knowledge [14–16]. This  
47 dynamic poses an existential challenge to the integrity of scientific research [17,18].

48 Academic researchers are pressured to publish in journals perceived as most  
49 excellent, a perception still largely based on IF, to the benefit of their career and  
50 institutions [19]. This pressure is particularly acute for early career researchers, who  
51 often face employment insecurity and rely heavily on their publication records to  
52 secure funding, fellowships, and academic appointments [20]. As a result, science,

53 long upheld as a public good intended to serve the advancement of society [21,22], is  
54 arguably becoming a “tragedy of the commons” [23], where the pursuit of individual or  
55 institutional gain undermines the collective benefits of open, equitable knowledge  
56 production [24]. For-profit publishers, such as Springer, Reed-Elsevier, Wiley-  
57 Blackwell, and Taylor & Francis, now control an increasing share of high-IF journals  
58 [25]. Given the commercial logic underpinning for-profit journals and the central role  
59 of the IF in shaping perceptions of prestige and visibility, these journals are naturally  
60 driven to maximize their IF. This dynamic feeds a self-reinforcing cycle in which for-  
61 profit journals gain increasing visibility and submissions, further entrenching the  
62 dominance of the for-profit model (Figure 1). Notable exceptions challenge the  
63 narrative that only for-profit journals can succeed and demonstrate that non-profit  
64 journals can rise to the top of their fields. For instance, *Science* – a non-profit journal  
65 published by the American Association for the Advancement of Science – consistently  
66 ranks among the highest IF journals in the science and technology fields (IF  $\approx$  45 in  
67 2024, [26,27]).

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

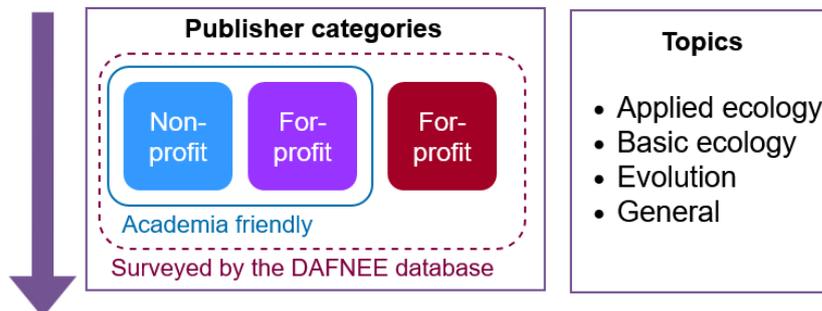
86 As a necessary first step towards this goal, we assessed the current state of  
87 citation patterns by quantifying the representation of distinct business models in the  
88 references of the scientific literature, exemplified for the fields of ecology and  
89 evolution. For these fields, an assessment of the journal's business model has been  
90 facilitated *via* the DAFNEE database [1] (Database of Academia Friendly jourNals in  
91 Ecology and Evolution, <https://dafnee.isem-evolution.fr/>). The 2025 version of  
92 DAFNEE catalogues 611 journals that are oriented towards the academic community  
93 (i.e., "academia-friendly") based on indicators like ownership, fee structure,  
94 institutional partnerships, and reinvestment practices. Based on this database, we  
95 analysed 70,848 articles published in 2023 across 270 journals following three  
96 different business models (Box 1). For each publication, we extracted the cited  
97 references and classified them based on the publishing journal as (a) for-profit, (b) for-  
98 profit academia-friendly, or (c) non-profit citations.  
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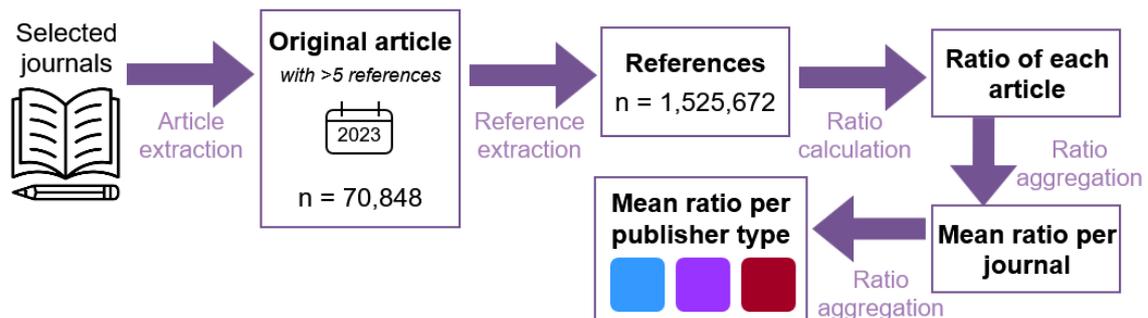
100  
101 **Figure 1. Illustration of a transition from a vicious to a virtuous circle of journal prestige:**  
102 *Strategic citing of articles from non-profit journals can help increase their impact factor, thus*  
103 *enhancing the perceived prestige and notoriety of non-profit journals. IF: impact factor; FP:*  
104 *for-profit journals; NP: non-profit journals.*  
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## Box 1. Characterizing current citation practices in ecology and evolution across journal business models.

### 1. Journal selection (n = 287)



### 2. Data extraction and ratio calculation



Our analysis is based on the DAFNEE database [1] that lists journals classified as “academia-friendly” (see figure above). We limited our analysis to journals within the thematic fields of “applied ecology”, “basic ecology”, “evolution” and “general” to minimize the variation in citation practices across disciplines. To represent the broader publishing landscape we include purely for-profit journals from the list of surveyed journals - evaluated by DAFNEE but not meeting the criteria for “academia friendly” - that matched our selected thematic fields. The business model of those journals was obtained from each journal’s website, while for academia-friendly journals it was retrieved from the DAFNEE database. The final journal list comprised 287 journals, among which 93 were classified as “non-profit”, 83 “for-profit academia-friendly” and 111 as “for-profit” (see S7).

Using OpenAlexR [28], we identified all articles published in 2023 by the selected journals (n = 130,324 “original articles”) and retrieved their cited references (n = 6,604,473). 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 70,848 original articles with 1,525,672 cited references (mean = 21.53 +/- 18.01 SD references per article) from 270 journals. This filtering did not influence the general outcome (S6).

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.

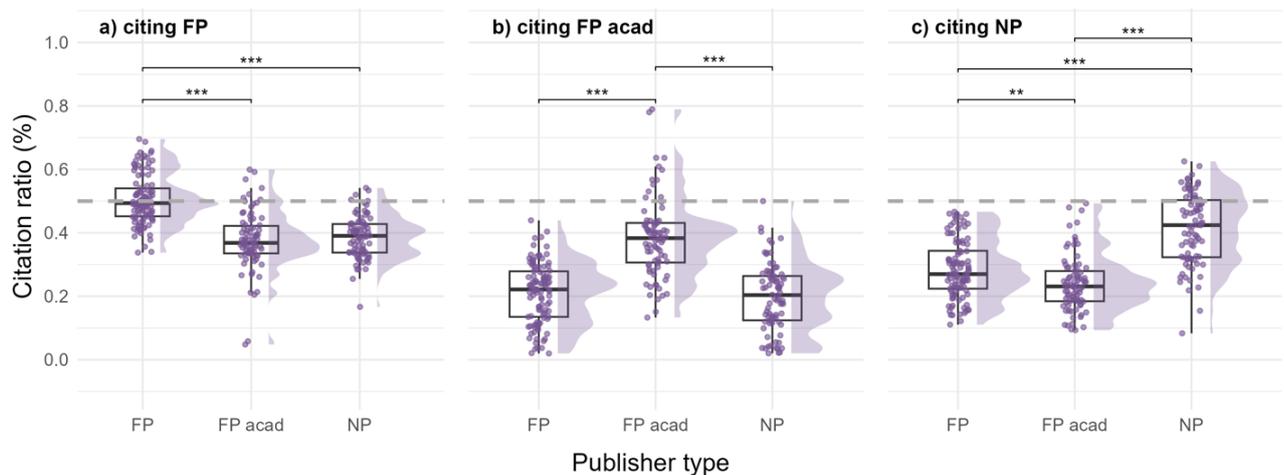
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## 116 **Citation practices are siloed between for-profit and non-profit journals**

117 If citation practices were completely unbiased, we would expect no significant  
118 differences in the proportion of citations towards for-profit vs. for-profit academia-  
119 friendly vs. non-profit journals. Instead, we found that publications in purely for-profit  
120 journals included significantly more references from for-profit journals than articles  
121 published elsewhere (Fig. 2; Dunn test with  $p < 0.001$ ). Likewise, publications in for-  
122 profit but academia-friendly journals most frequently cited for-profit academia-friendly  
123 references (Fig. 2; Dunn test with  $p < 0.001$ ), while publications in non-profit journals  
124 showed the highest proportion towards non-profit references (Fig. 2; Dunn test with  $p$   
125  $< 0.001$ ). This suggests a strong tendency for researchers to cite articles published in  
126 journals within the same business model. In part, this may reflect a tendency to cite  
127 articles from the same journal (see S5), potentially to increase the chances of  
128 publication acceptance [29,30]. Beyond this, financial aspects might also play a role,  
129 since academia-friendly journals often have lower processing fees [1]. Researchers'  
130 citation behaviour may also reflect their ethical views on the role of profit in academic  
131 publishing. For example, authors who choose to publish in non-profit journals may be  
132 more motivated to support the non-profit publishing system through their citation  
133 choices compared to authors publishing in for-profit journals. Another mechanism  
134 might be field-specific clustering, where certain subfields are predominantly covered  
135 by specific business models, thereby reinforcing internal citation loops within each  
136 business model.

137 Our results come with inherent limitations, largely due to possible bias from our  
138 focus on the journals listed or surveyed in the DAFNEE database. Every scientific field  
139 has its own publishing system, which may differ substantially from those observed in  
140 ecology and evolution. Moreover, the distinction between for-profit, and non-profit  
141 journals, even when considering in-between business types, may not always be  
142 obvious. A more thorough evaluation of citation practices would require including

143 journals from a broader range of scientific fields to assess the robustness of our  
144 findings and to explore how these patterns vary across academic fields. In addition, a  
145 time series analysis could reveal whether citation practices have shifted over time,  
146 which would be particularly relevant given the rapid expansion of for-profit publishing  
147 in recent years. For instance, the portfolio of Nature-branded journals (published by  
148 Springer Nature, a for-profit publisher) has grown from a single flagship journal in 2009  
149 to 34 titles in 2024 (see [7]), illustrating the accelerating commercialisation of scientific  
150 publishing.



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152 **Figure 2.** Proportion of citations towards articles published in (a) for-profit (FP), (b) for-profit  
153 academia-friendly (FP acad) and (c) non-profit (NP) journals among the same three publisher  
154 types. The boxplot indicates the median with the box comprising values between first and third  
155 quartile; scatters and density curve indicate the distribution of the datapoints. Horizontal  
156 brackets indicate statistically significant differences in citation ratio between two publisher  
157 types. Asterisks denote significance levels:  $p < 0.05$  (\*),  $p < 0.01$  (\*\*) and  $p < 0.001$  (\*\*\*), based  
158 on Dunn tests with Bonferroni correction following significant Kruskal-Wallis tests ( $p < 0.001$ ).  
159 Non-significance is not indicated. The analysis is based on  $n=106$ ,  $n=82$  and  $n=82$  journals for  
160 journals following for-profit, for-profit academia-friendly and non-profit business models,  
161 respectively.

## 162 Strategic citation to support a balanced publishing system

163 Our results show a clear bias in citation practices: researchers tend to cite more  
164 articles published in journals that share the same business model (Fig. 1).  
165 Hypothetically, if both for-profit and non-profit journals received a similar boost from  
166 these within-group citations, their impact factors could grow at comparable rates. But  
167 in reality, the system is heavily imbalanced, with nearly five times more for-profit  
168 journals than non-profit ones [9]. As a consequence, purely by numbers, for-profit  
169 journals are more likely to accumulate citations, leading to faster growth in their IFs.

170 Even if non-profit journals maintain strong internal citation networks, the dominance of  
171 for-profit journals in the publishing landscape gives them a structural advantage in  
172 visibility and prestige. Although our analysis focuses on journals in ecology and  
173 evolution, similar patterns likely exist in other fields. Without efforts to correct this  
174 imbalance, there is a real risk that non-profit journals will continue to see their IF, and  
175 thus their visibility and attractiveness, decline over time. Few flagship titles, such as  
176 *Science*, might be able to retain their standing, while most will be overshadowed by a  
177 growing landscape of for-profit journals with stronger citation performance and  
178 perceived prestige.

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

194 What does this mean for action? The strategic citation approach we propose  
195 offers a practical way for researchers to support a more equitable publishing  
196 landscape. Scientific articles are typically structured around a review of the state of  
197 the art in the introduction and often include general statements supported by well-  
198 known references. For example, in biodiversity science, authors might cite studies on  
199 the global extinction crisis, while in climate research, references to global warming  
200 trends are common. Similar types of general or widely accepted claims also appear in  
201 the discussion or perspective sections. In these cases, where multiple valid sources  
202 exist, authors can choose to cite relevant articles published in non-profit journals, if  
203 available. This approach does not compromise scientific accuracy but adds a layer of

204 intentionality to citation choices. These choices could be implemented as an additional  
205 step during manuscript preparation: after the content is finalised, authors could  
206 calculate the ratio of for-profit vs. non-profit references and, where possible, adjust it.

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

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

## 232 **Conclusion**

233         The current academic publishing system is structurally imbalanced, with for-  
234 profit publishers dominating publication volume and increasing their perceived  
235 excellence [35] through IF inflation. Their reliance on subscriptions and article

236 processing charges shifts financial burdens onto researchers and institutions,  
237 reinforcing global inequalities in access and visibility [36,37]. Non-profit journals offer  
238 more equitable models, such as diamond open access (*i.e.*, no publication nor reading  
239 fees), but remain under-resourced in a system driven by the for-profit vicious circle  
240 (Figure 1) [38]. While a complete transition to non-profit publishing is unrealistic under  
241 the market-oriented systems prevalent in many leading research nations, reinforcing  
242 the visibility and legitimacy of non-profit journals can incrementally boost their IF,  
243 helping them (re)gain recognition and compete within the current evaluation systems.  
244 There is still time to change and sustain the virtuous cycle of non-profit and for-profit,  
245 academia-friendly journals (Figure 1), provided we have reliable information on  
246 journals' business models. In the short-term, the commitment to research ethics  
247 should extend to how we cite, because it begins with the choices we make in the  
248 reference lists. This individual-level action complements long-term, broader  
249 institutional reforms needed to reduce reliance on journal-level metrics and re-  
250 establishing science as a public good.

251

## 252 **Code and data availability**

253 All data and code needed to evaluate the conclusions in the paper are present in the  
254 corresponding git repository: [removed for peer-review].  
255 This paper cites 60% NP journals and 40% FP journals.

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