

Annual
Meeting

Interlaken
27 – 31 May
2024

Open Science and sustainable access to knowledge

Paolo Crosetto

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Sustainable publication in the age of Open Science

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The (un)Sustainable publication landscape

Paolo Crosetto

Published papers: exponential growth

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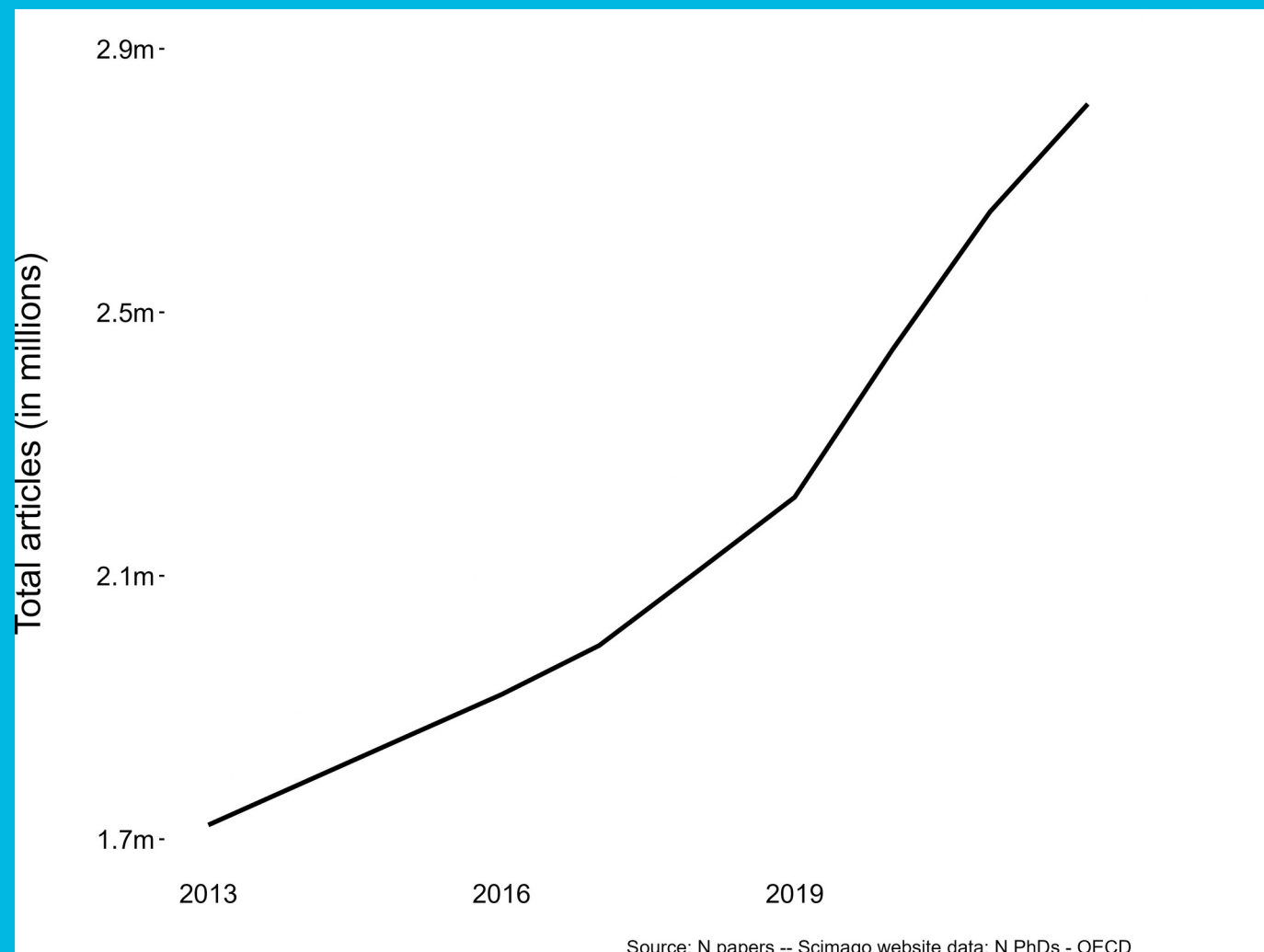
Annual articles

(Web of Science*Scopus)

2013: ~ 1.7 million

2016: ~ 1.9 million

2022: ~ 2.8 million



This is **not** news

Science, March 1982

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In 1958, when James D. Watson worked his way up to the rank of associate professor at Harvard, the young biochemist had on his curriculum vitae 18 papers. One of them, published 5 years earlier, described the structure of deoxyribonucleic acid.

Today, the bibliography of a candidate facing a similar climb often lists 50 or even 100 papers.

As the comparison suggests, paper inflation has become a fact of academic life during the past two decades. This is

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Science, March 1982

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Ibn-Khaldun, XIV century

ance and impudence.

Aristotle, when he enumerated the purposes (by which an author must be guided) and had come to the last one, therefore said: 'Everything else is either superfluosity or greed', by which he meant ignorance and insolence.

34 The great number of scholarly works available is an obstacle on the path to attaining scholarship

It should be known that among the things that are harmful to the human quest for knowledge and to the attainment of a thorough scholarship are the great number of works available, the large variety in technical terminology (needed for purposes) of instruction, and the numerous methods (used in those works). The student is required to have a ready knowledge of all that. Only then is he considered an accomplished scholar.

Thus, the student must know all the works, or most of them, and observe the methods used in them. His whole lifetime would not

414



This is not news

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This is (also) good news



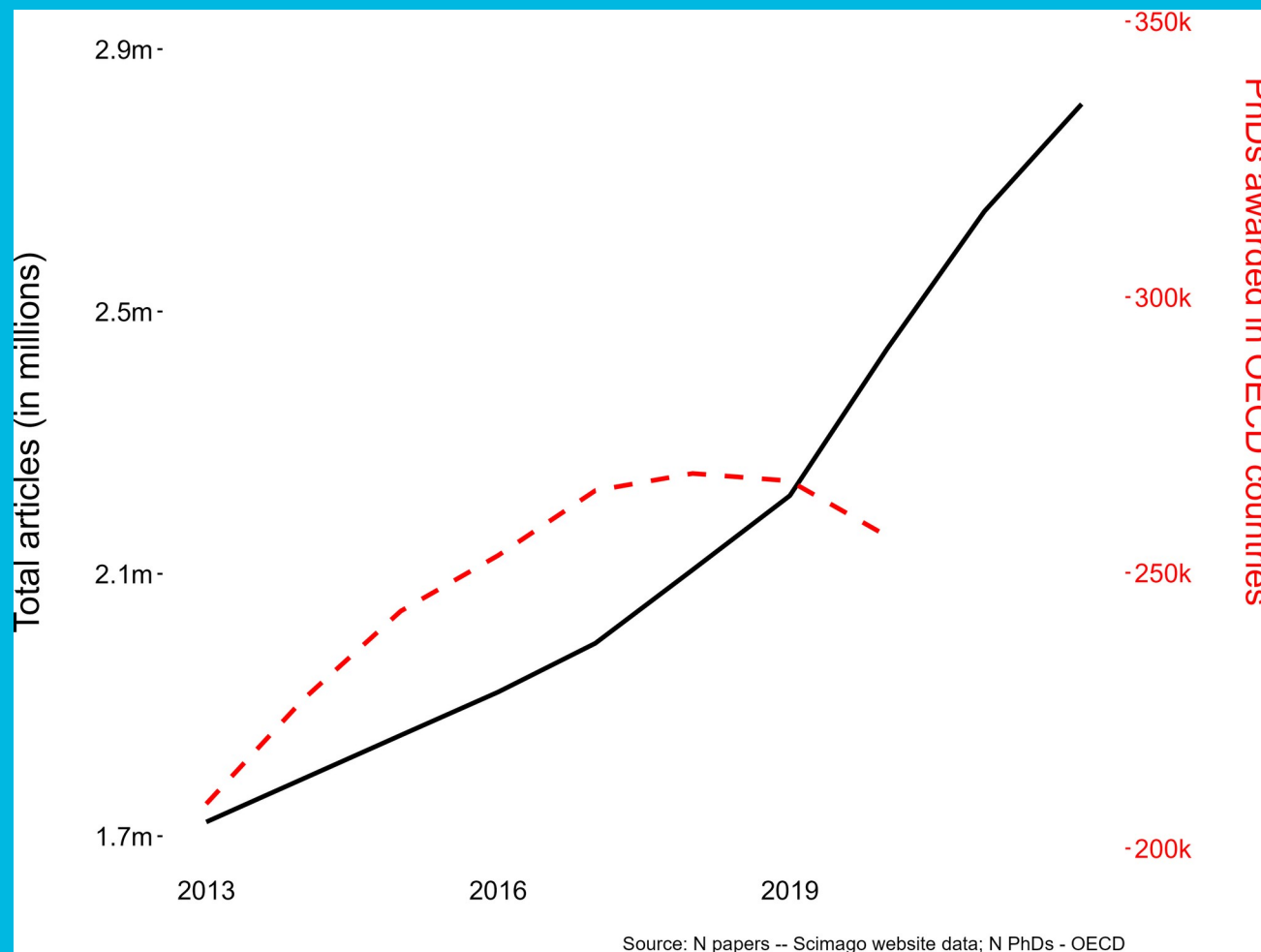
- More scientists around
- More funds for research
- Open Access: more accessible results
- Web tools: faster dissemination of ideas
- Lower file drawer effects
- More replications, robustness, meta-analyses...

...but growth causes strain

More & more papers per scientist

- publish or perish
- reviewers overworked
- editors resigning
- paper mills
- mass retractions
- increasing cost

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Things we care about

- Quality
- Accessibility
- Fairness
- Stable & reliable signals
- Cost



Things we **care** about



- Quality
- Accessibility
- Fairness
- Stable & reliable signals
- Cost

Is the current publishing system **providing** them?

Are currently publishing practices sustainable?

Four quantitative indicators



- Number of papers and size of journals
- Number and role of special issues
- Turnaround times
- Impact factor inflation

Two main business models

Subscription

- many small journals
- \$ through subscription
- readers pay
- sell each paper **multiple** times
- high editorial autonomy
- “artisanal” + common tools



Two main business models

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“polish your gems”

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For-profit OA

- few mega journals
- \$ through publication
- authors pay
- sell each paper once
- low editorial autonomy
- “industrial” efficiency



Two main business models



Subscription

“polish your gems”

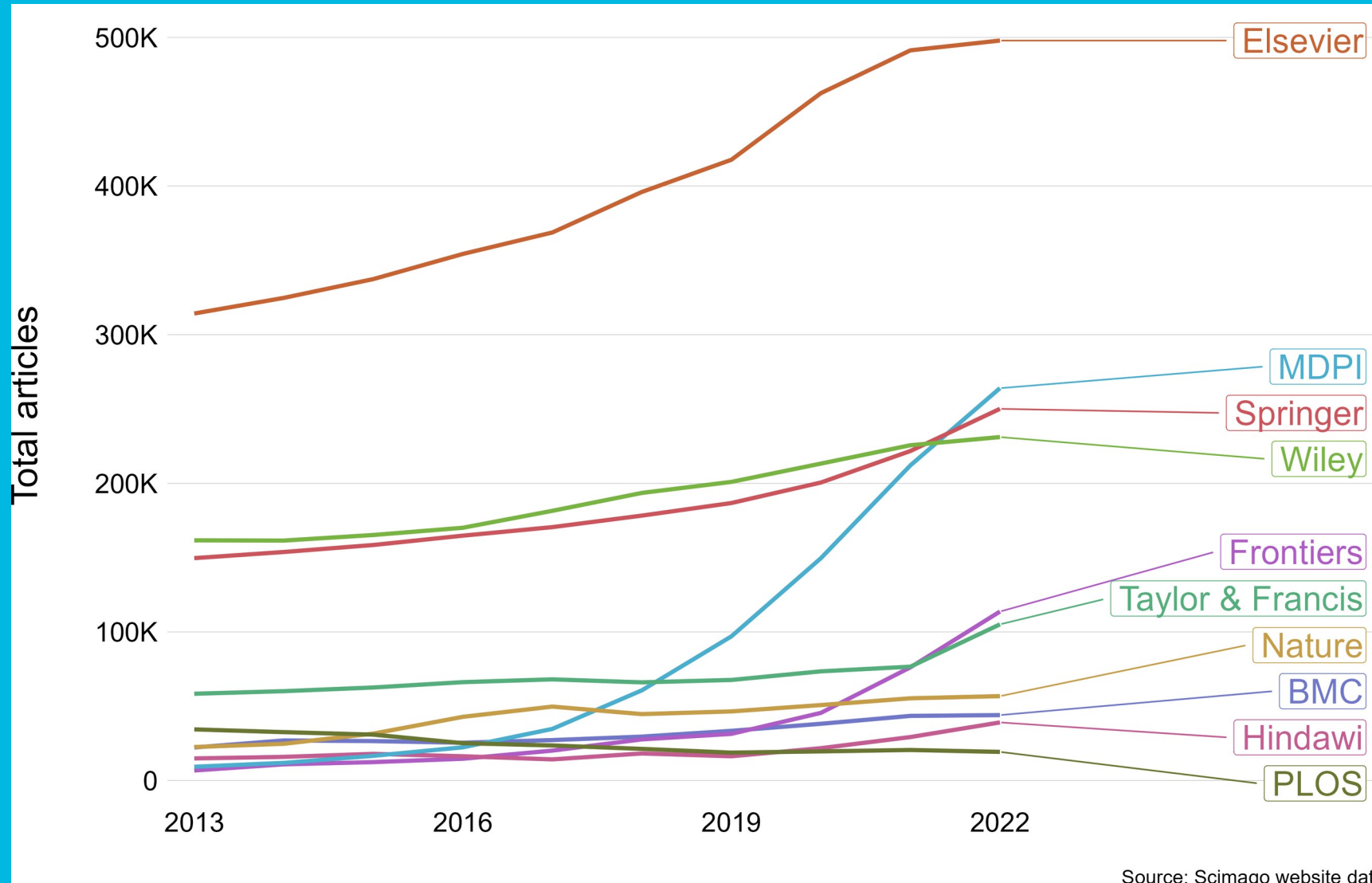
- many small journals
- \$ through subscription
- readers pay
- sell each paper multiple times
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For-profit OA

“get authors on board”

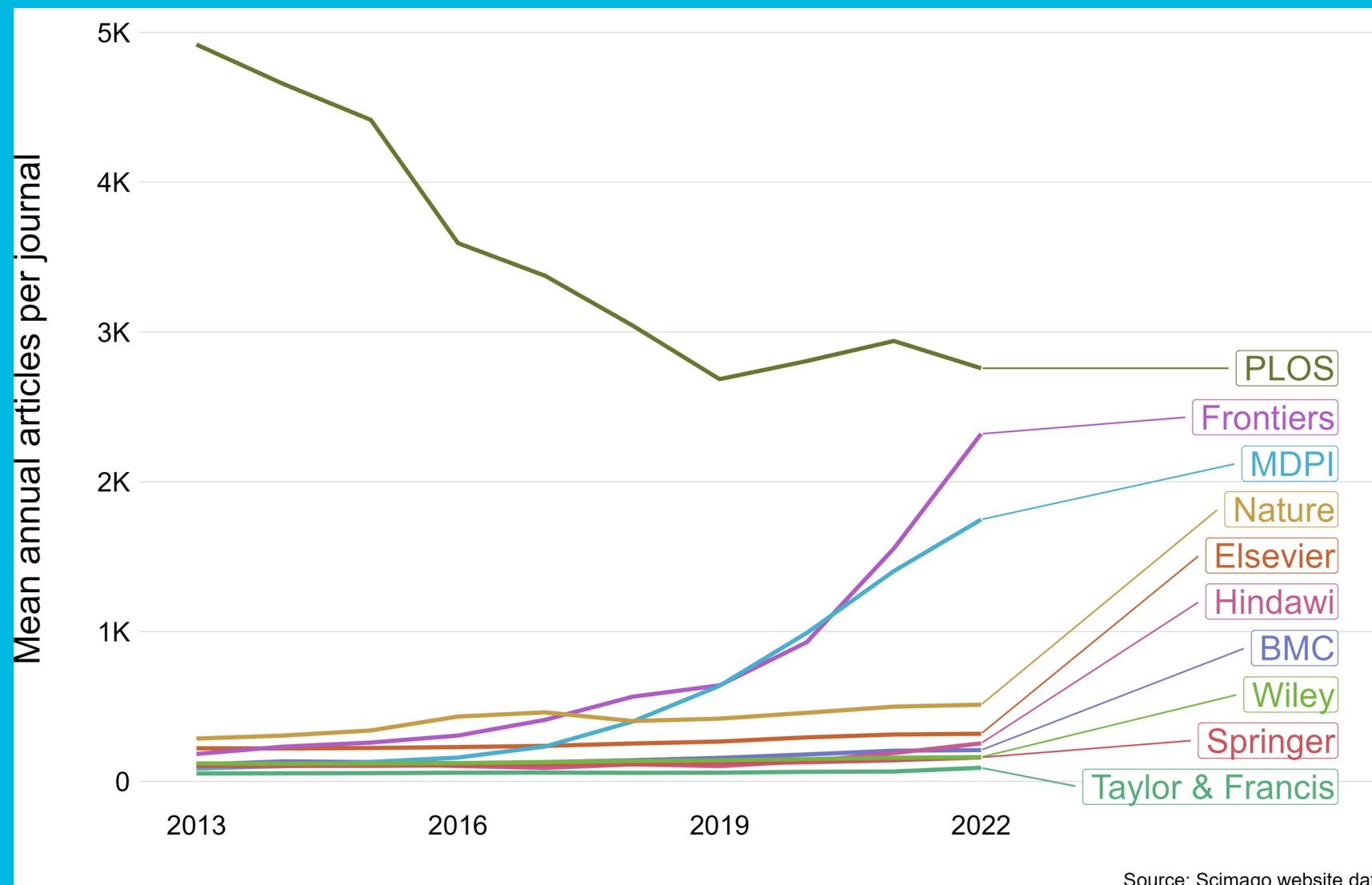
- few mega journals
- \$ through publication
- authors pay
- sell each paper once
- low editorial autonomy
- “industrial” efficiency

Number of papers: more, faster



Source: Scimago website data

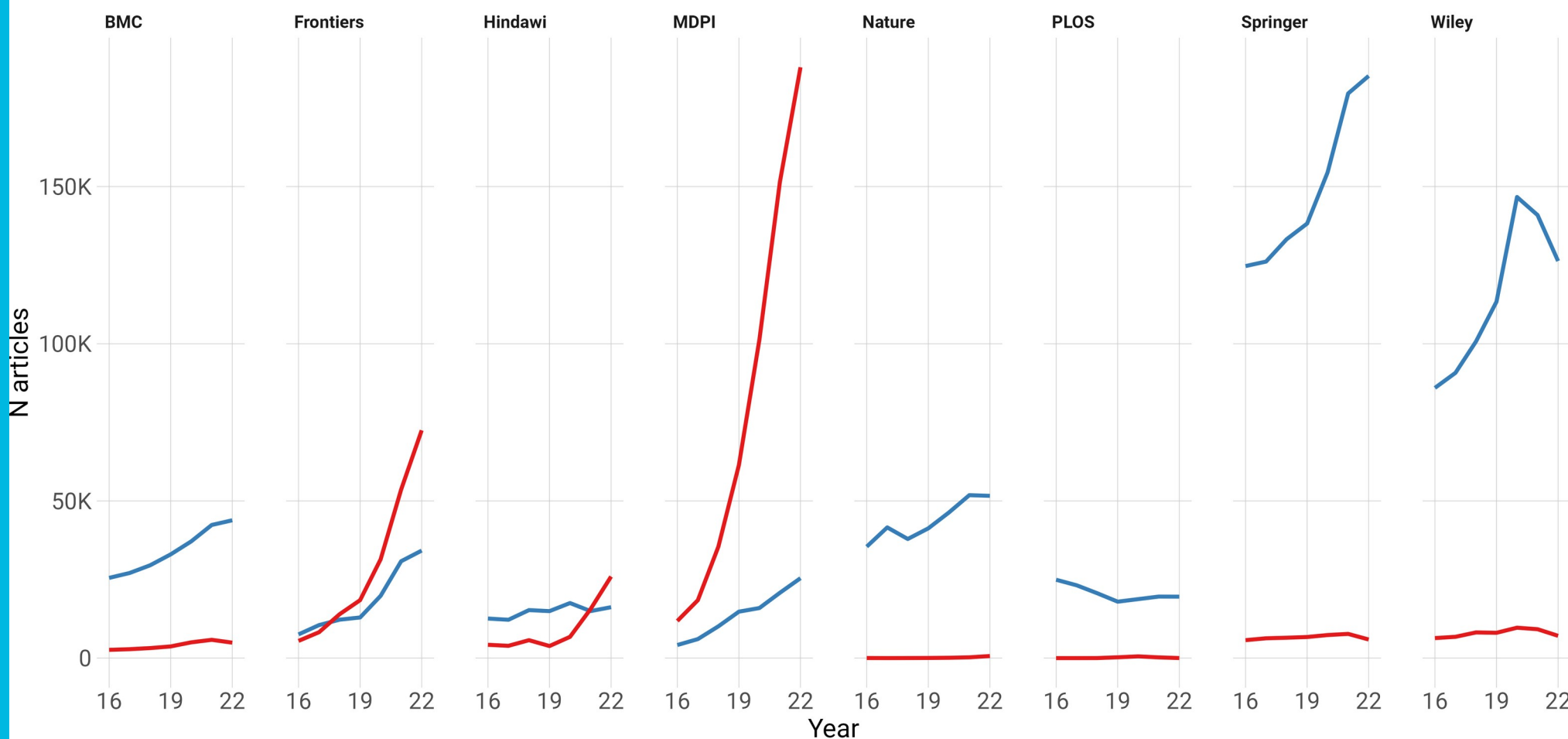
Bigger and bigger (OA) journals



Growth through special issues

Number of papers published in regular vs special issues, 2016-22

Wiley decrease in 2022 likely due to limited coverage of Wiley papers in 2022



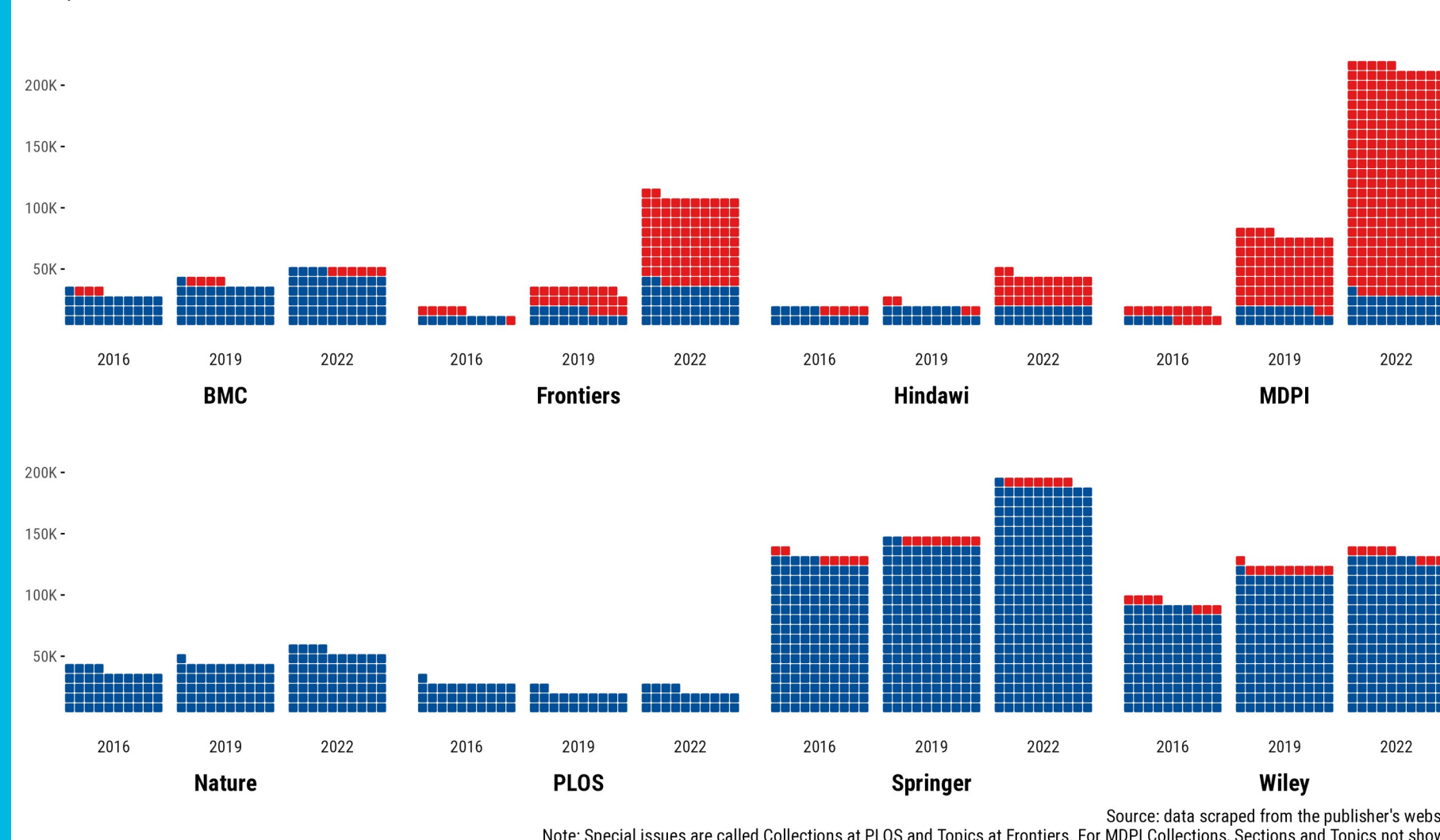
Source: data scraped from the publisher's website

Notes: Special issues are called Collections at PLOS and Topics at Frontiers. For MDPI Collections, Sections and Topics not shown.

(not so) special issues

Number of papers published in regular vs special issues, 2016-22

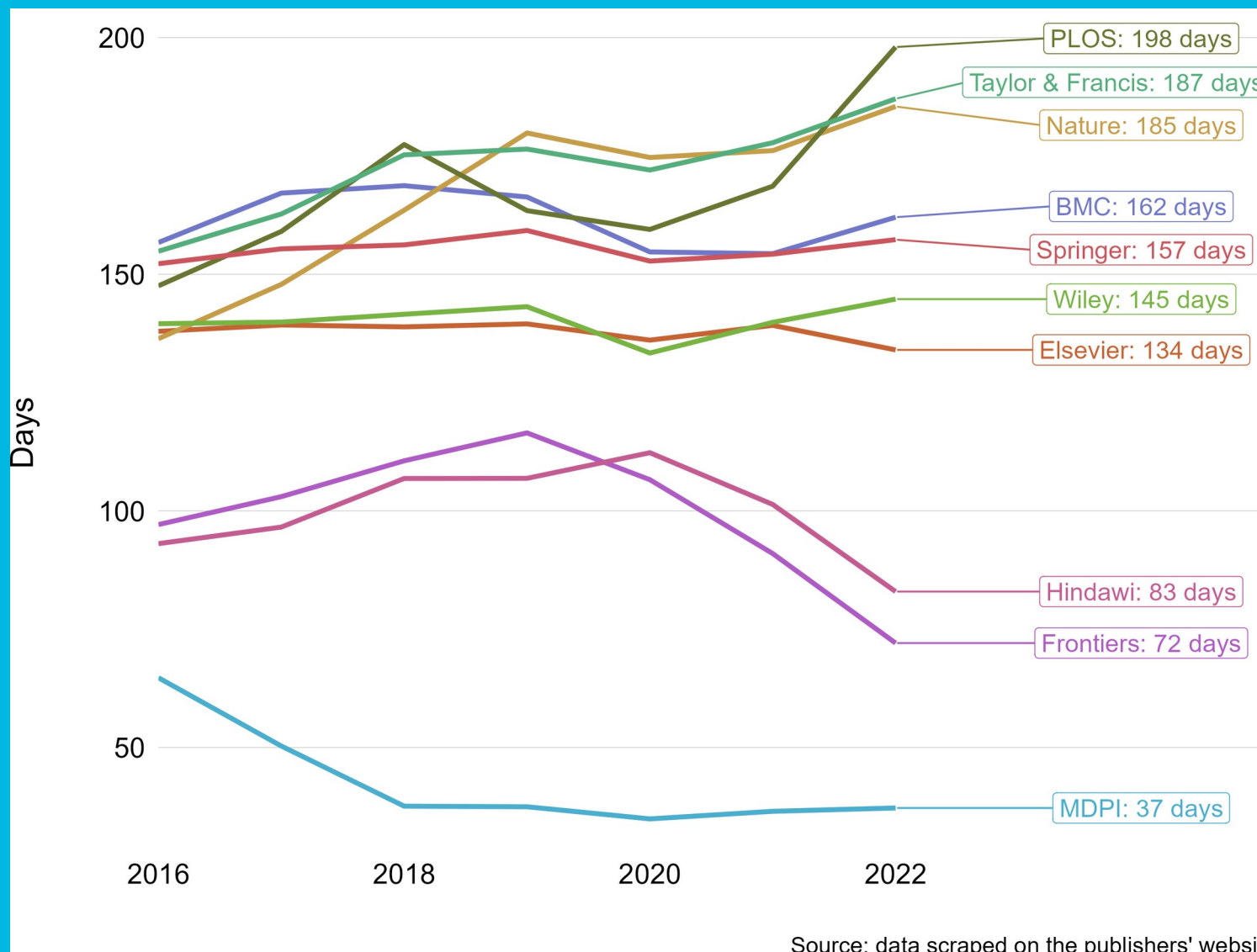
One square = 800 articles



Source: data scraped from the publisher's website

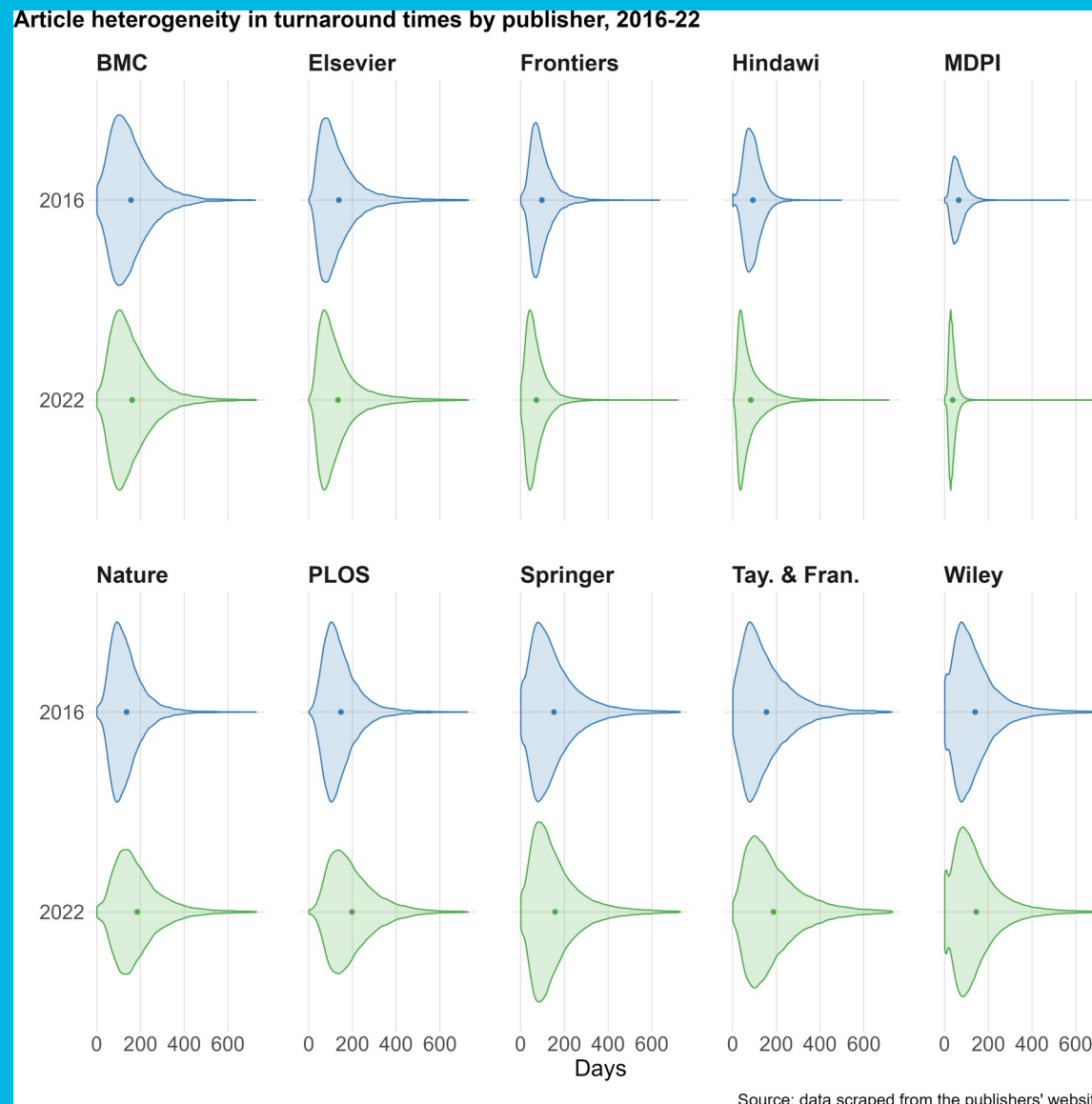
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Turnaround times (submit → accept)



Source: data scraped on the publishers' website

Turnaround times homogeneity



Impact factor

$$\frac{\# \text{ citations (N years)}}{\# \text{ papers}}$$

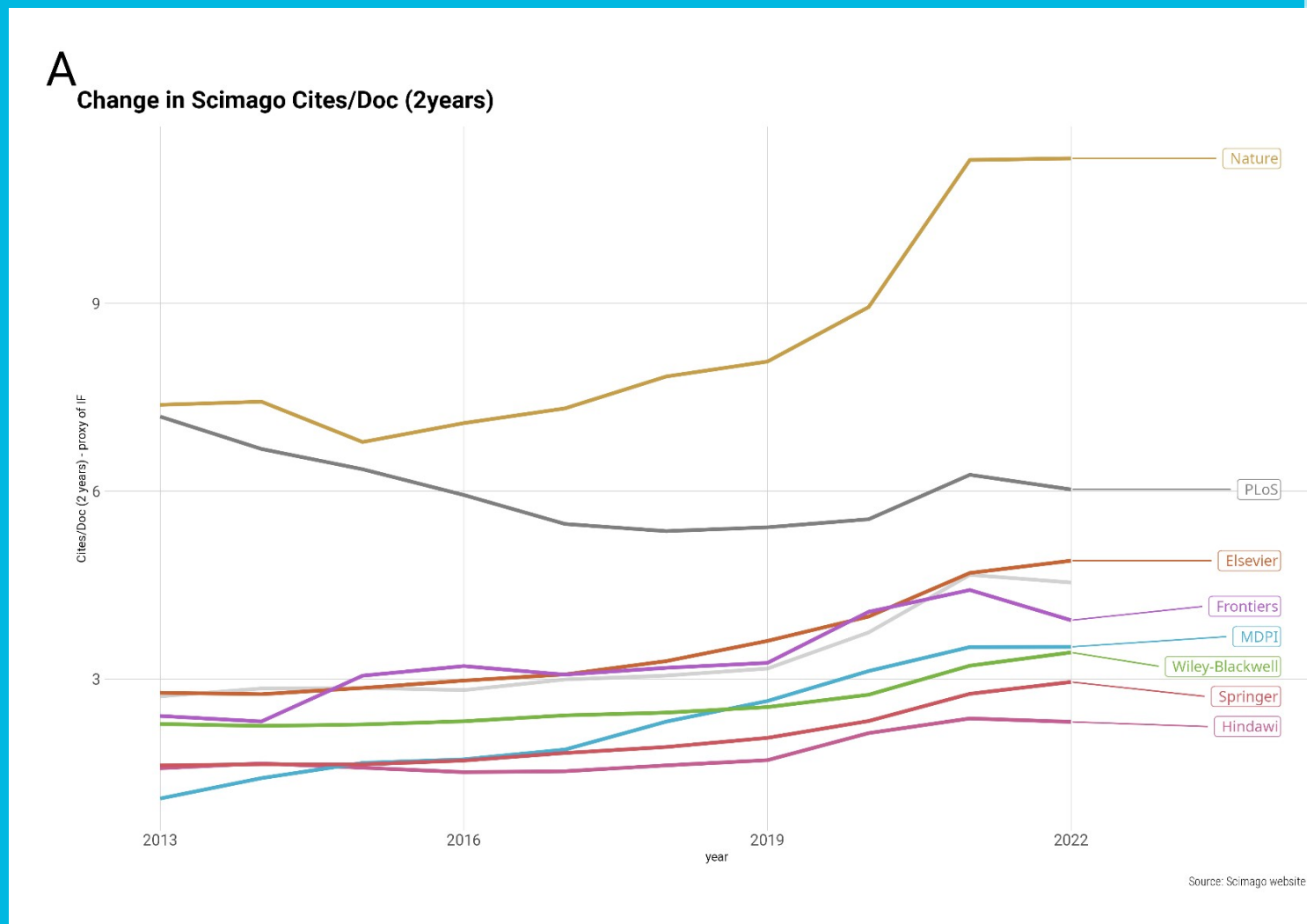


Impact factor inflation

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$$\frac{\# \text{ citations (N years)}}{\# \text{ papers}}$$

- universally increased
- more citations
- self-citations
- citation rings
- ...



Impact factor inflation

$$\frac{\text{\# citations (N years)}}{\text{\# papers}}$$

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Goodhart's Law

When a measure becomes a target, it ceases to be a good measure

Impact factor inflation: indicator

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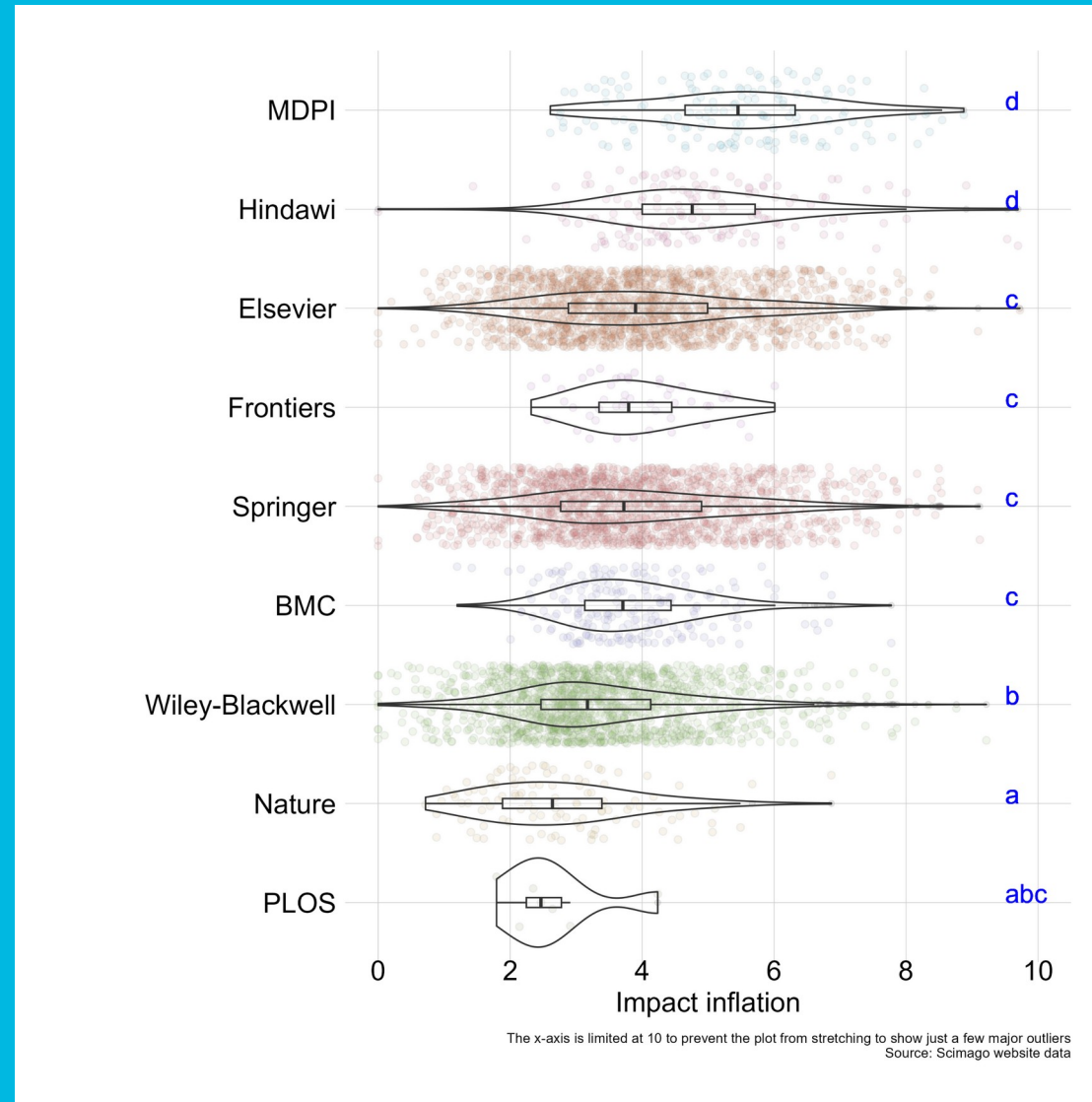
Scimago Journal Rank

- universally increased
- more citations
- self-citations
- citation rings
- ...

- stable
- network approach
- self-citations not rewarded
- weighted sums

Impact factor inflation: indicator

$$\frac{IF}{SJR}$$



So,
are currently publishing practices sustainable?

A strained system that feeds predators

- Growth means change & confusion
- Semantic confusion
 - what is a *publication*?
 - what is a *special issue*?
 - what does Impact Factor *measure*?
- Instability of quality signals
- A rent-extraction system, with huge cost
- Some groups & practices cause more strain

What can be done?



- **Funders** are the key player, as they
 - impose *quantitative* criteria → publish or perish
 - *finance* the system → with increasing cost
 - *steer* collective action → change the rules of the game

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 - *steer* collective action → change the rules of the game
- Potentially beneficial **changes**
 - impose more *transparency* to publishers
 - move towards *qualitative* assessment
 - beware of the *perverse incentives* of new policies

Want to know **more?** the *strain* preprint:



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Hanson, Gomez Barreiro, Crosetto & Brockington, 2023

Thanks!