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Article Processing Charges and the Stratification of Open Access Publishing

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Open Science → Equity?

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Stating the obvious: Academia is unequal

Structural inequalities persist across regions and demographics

For example:

- Global North dominates, pushing Global South research to the periphery
- Even within richer regions, a fetish for the poorly-defined goal of “excellence” breeds cumulative advantage in funding allocation for the highest-funded institutions
- Women occupy relatively fewer higher positions, tend to achieve senior positions at a later age, are awarded less grant funding and have fewer publications
- STEM privileged over SSH

Open Science and Equity

The Budapest Open Access Initiative claimed Open Access could share learning between rich and poor and "lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge" (Chan et al. 2002).

But: open practices alone do not necessarily lead to more equity and diversity

Factors like region, gender, discipline and access to resources will continue to shape the possibilities of participation in an Open Science world

Might Open Science be at risk of reinforcing existing privileges or creating new ones?

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The ON-MERRIT project

- H2020 project: October 2019 - March 2022
- Methods: Sociological, bibliometric and computational approaches
- https://on-merrit.eu

Objectives

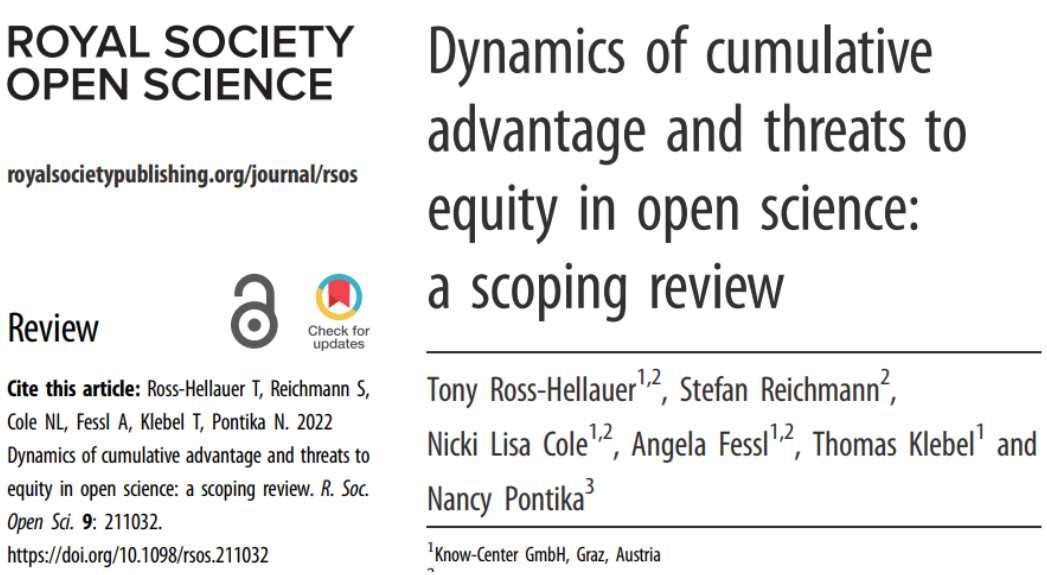
- Ensure that Open Science & RRI interventions contribute to a more equitable scientific system
- Distribution of rewards based on merit rather than privilege

Scoping review

Question:

"What evidence and discourse exists in the literature about the ways in which dynamics and structures of inequality could persist or be exacerbated in the transition to Open Science, across disciplines, regions and demographics?"

Synthesizing results from 268 relevant studies



ROYAL SOCIETY OPEN SCIENCE

royalsocietypublishing.org/journal/rsos

Review

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Dynamics of cumulative advantage and threats to equity in open science: a scoping review

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Many (diverse) threats – for example:

- Costs of participation
- Discriminatory OA APC business-model
- Cumulative nature of data inequalities
- Platform-logic of Open Science
- Lack of reward structures
- Exclusion of societal voices

The APC issue

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Stratification of OA publishing

- In US, authors from higher-ranked institutions publish APC-OA more often, and pay higher APCs (Siler et al. 2018)
- Publishing OA with APCs is more likely for authors of male gender, from prestigious institutions, with previous federal (US) research funding, or an association with a STEM field (Olejniczak & Wilson 2020)
- OA involving APCs is associated with lower geographic diversity of authors (Smith et al. 2021)

We investigated:

- the relationship between proxies of institutional resourcing and average APCs on a global level.
- Differences between fields and countries
- Changes over time

Evidence base

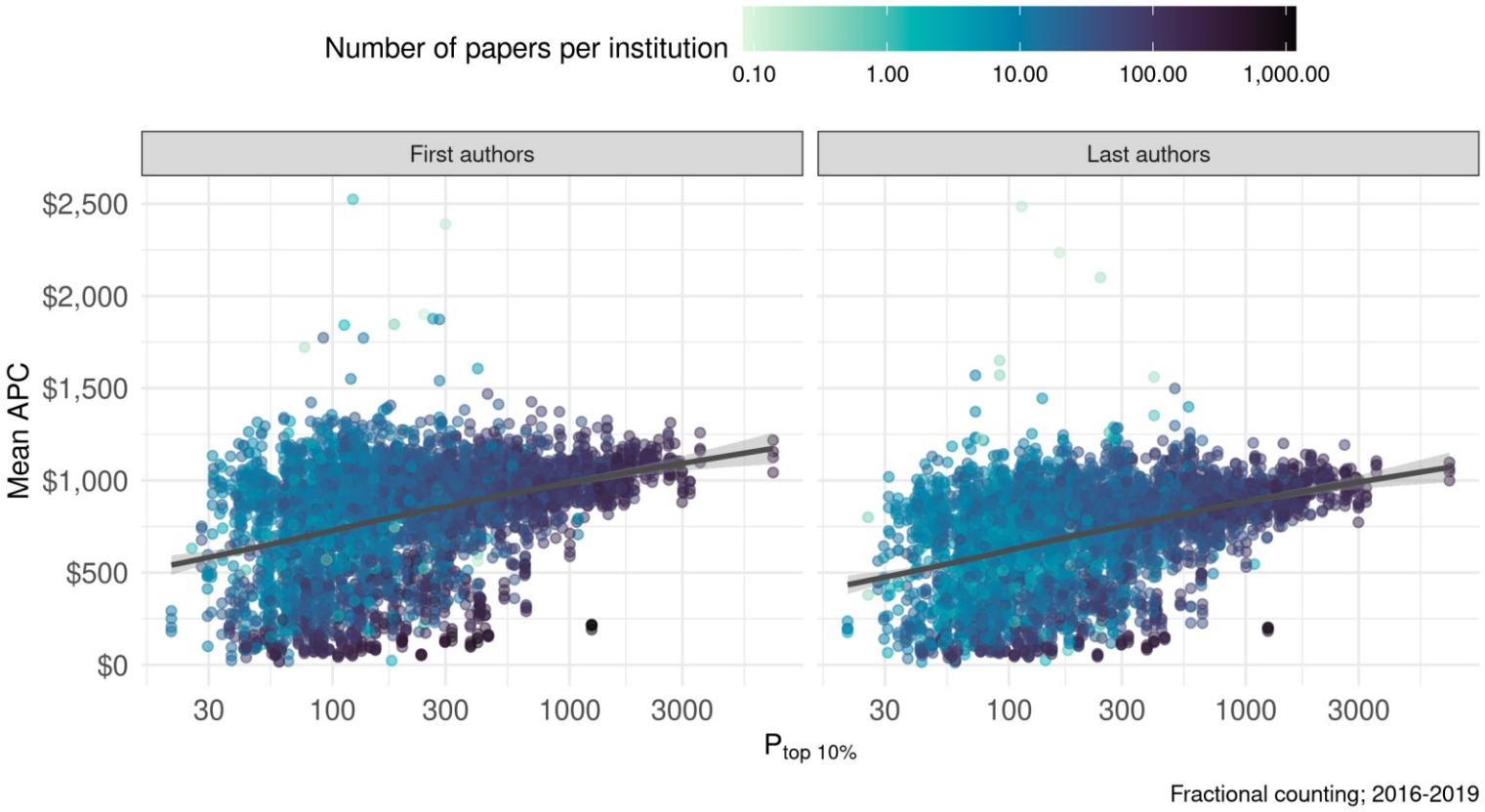
Sample: 1.5 million journal articles

- Articles published in journals listed in the *Directory of Open Access Journals*
- Timeframe: 2009-2019
- First and/or last author affiliated with university listed in *2021 CWTS Leiden Ranking*
- Data sources: *OpenAlex*, DOAJ, CWTS Leiden Ranking, World Bank

Main indicator: $\mathbf{P_{top\ 10\%}}$

"[t]he number [...] of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 10% most frequently cited."

Institutional resources and APCs are linked

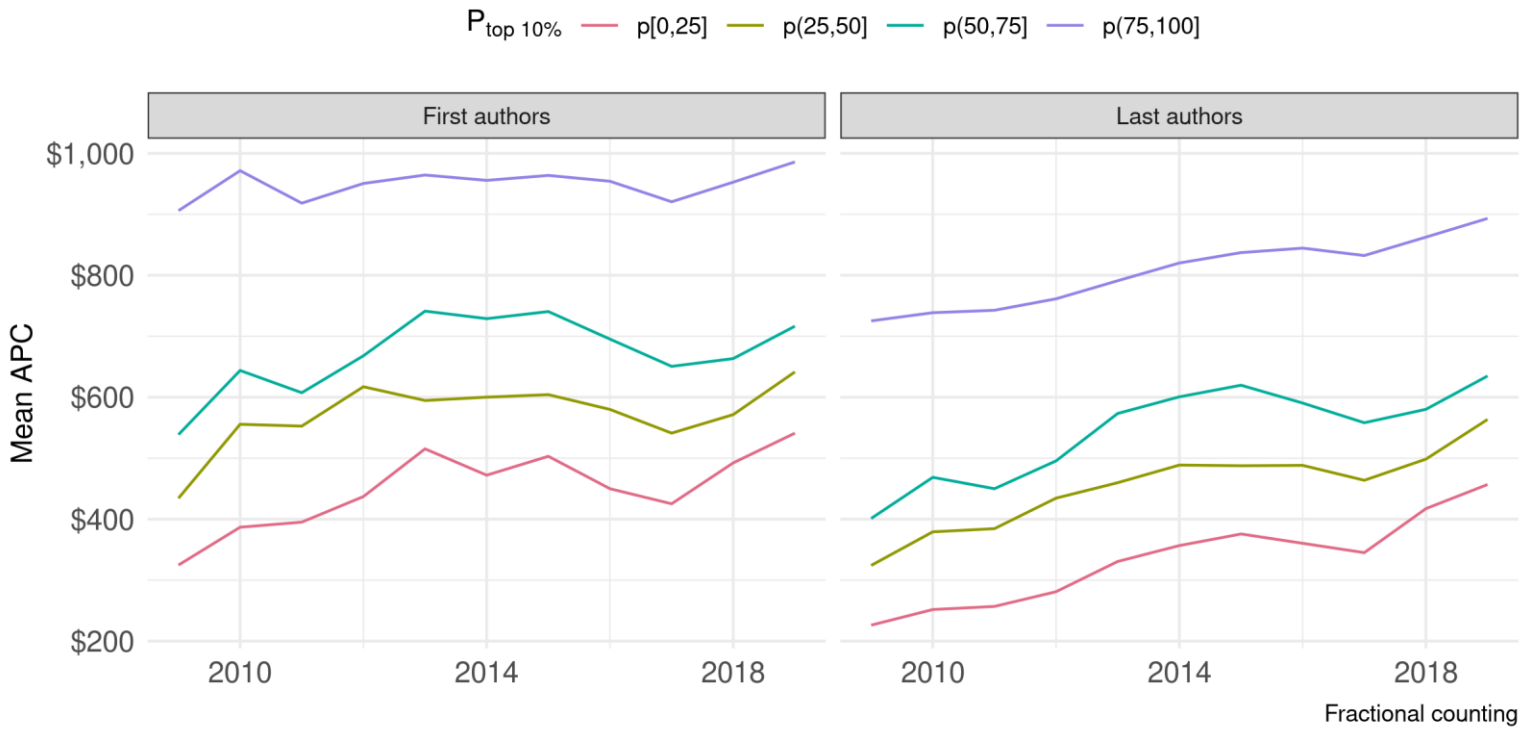


There is an association between institutional resources and average APCs

Equally strong for first and last authors

Might be explained by other factors (country, field)

Linkage is stable over time

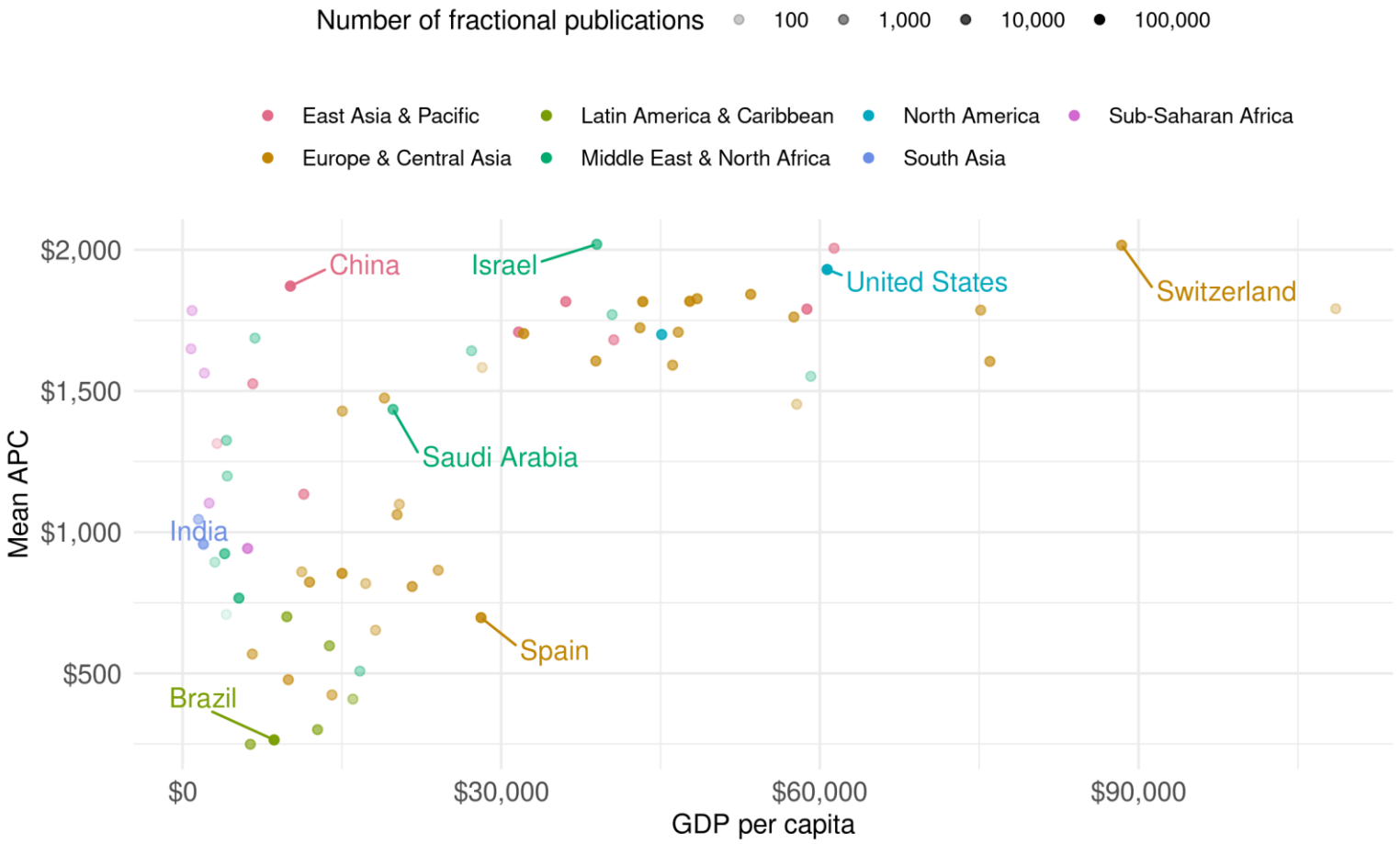


Top quartile has substantially higher APCs

Stratification (gaps between quartiles) mostly stable

Average APCs among last authors rising

Heterogeneous dynamics on country level



High APCs in countries with > $30,000 GDP p. cap.

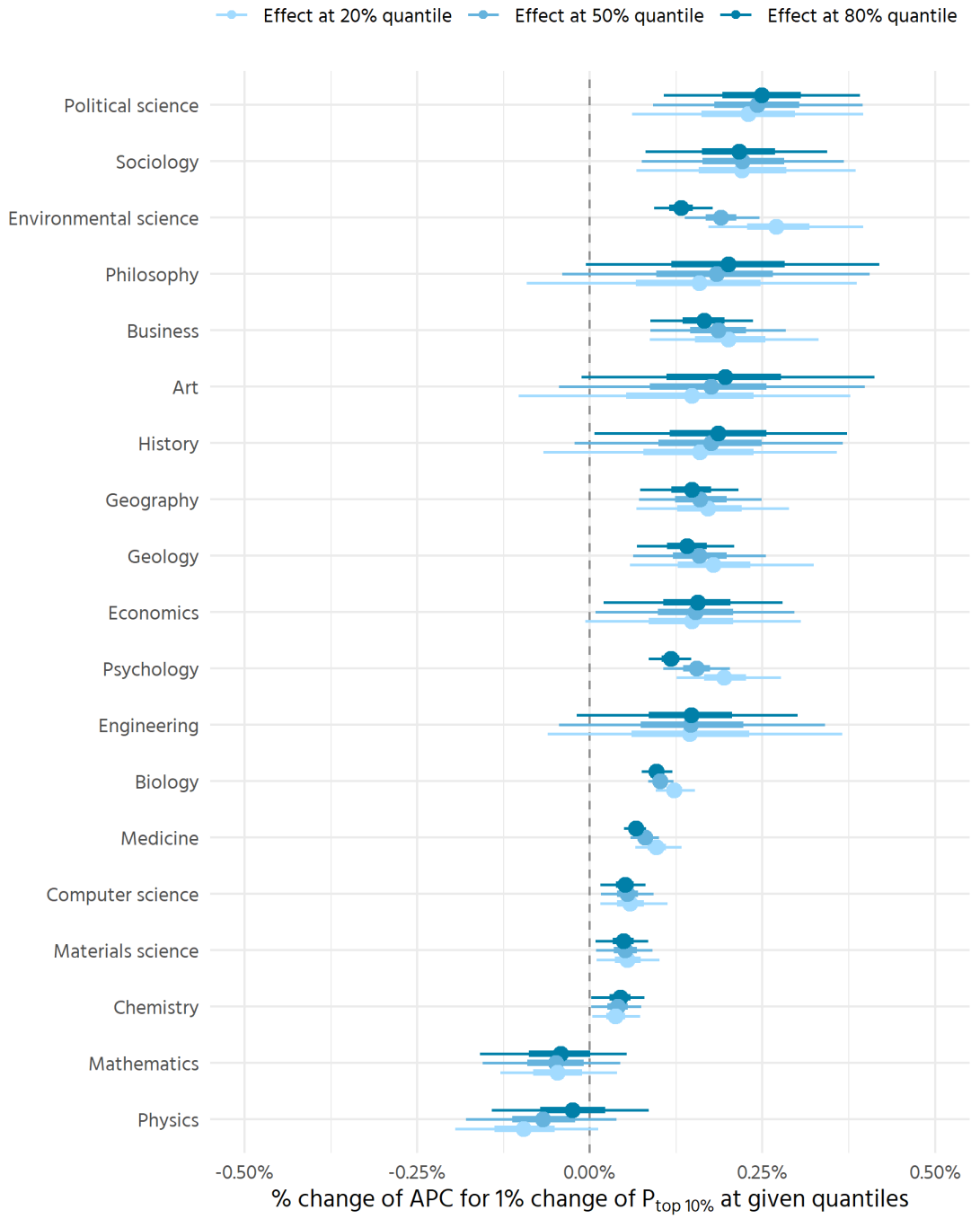
High variability for countries < $30,000 GDP p. cap

Multilevel mixing: fields differ

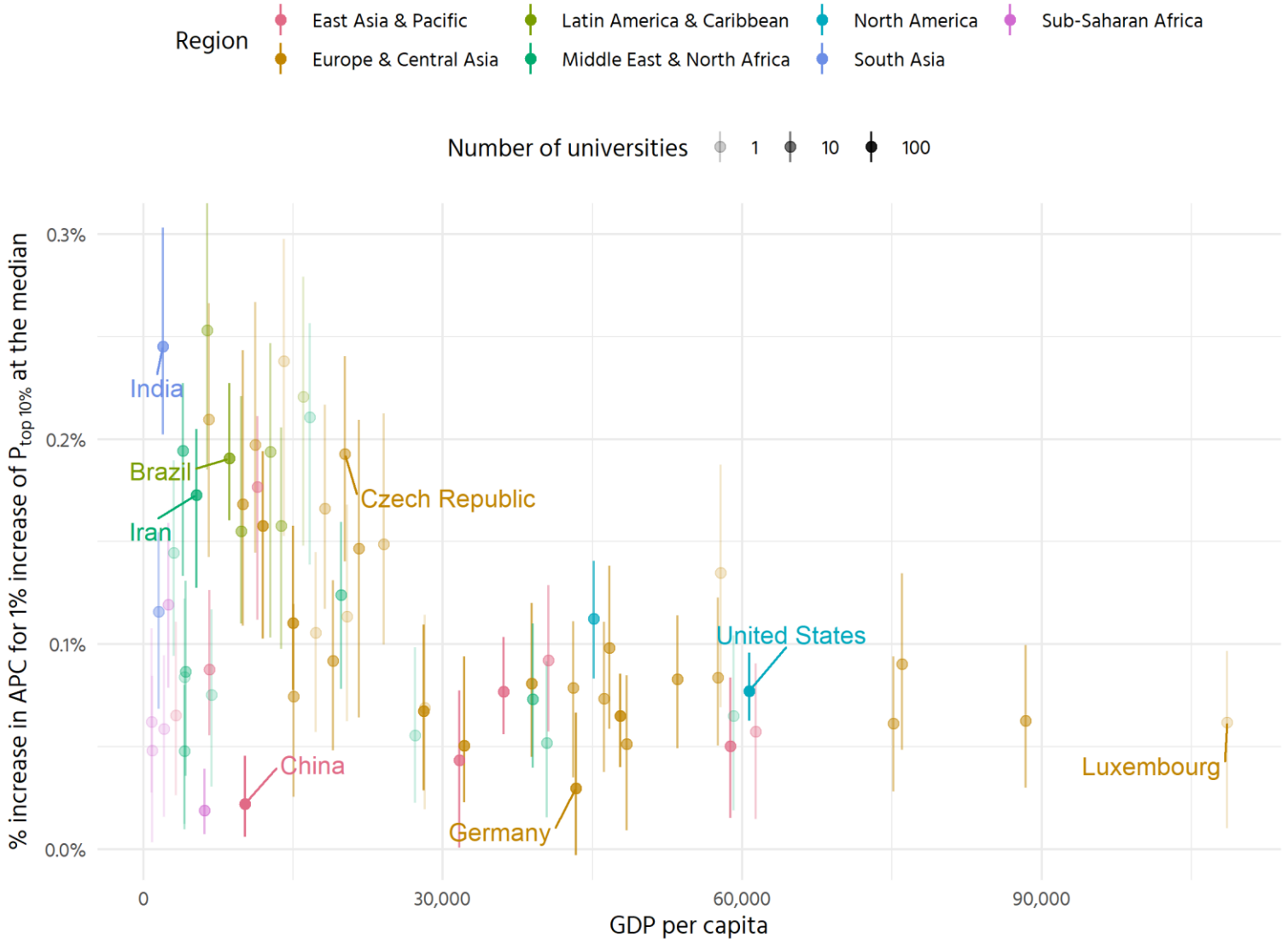
Bayesian multilevel hurdle model to control for field and country effects.

We find:

- Small to moderate effect of institutional resources on APCs in most fields
- Strongest effects in social sciences
- Inverse effect in „Mathematics“ and „Physics“ better resourced institutions publish more in OA journals with *no APC*



Countries as well



Effect of levels of resourcing on APCs low in high-GDP countries

High variability in low-GDP countries, but tendency for moderate effects (important exception: China)

Summary: Stratification in APC-based OA

Higher-ranked (better resourced) institutions publish more APC-based OA and pay higher APCs

Photo by Joshua Hoehne on Unsplash

OA publishing involving APCs is creating a new barrier for who can publish where

Implications

- Voices from societies and communities less embedded in global science are further marginalised
- Global issues need global perspectives, APC-OA is leading to the opposite
- Existing inequities are amplified (citation advantage, future reward structures)

Contributing factors

- Potential effect of institutional resources on research quality
- Association between institutional resources and grant funding (policies)
- Agreements between publishers and universities in higher-income countries
- Waivers and discounts

How can we improve?

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https://on-merrit.eu/results/

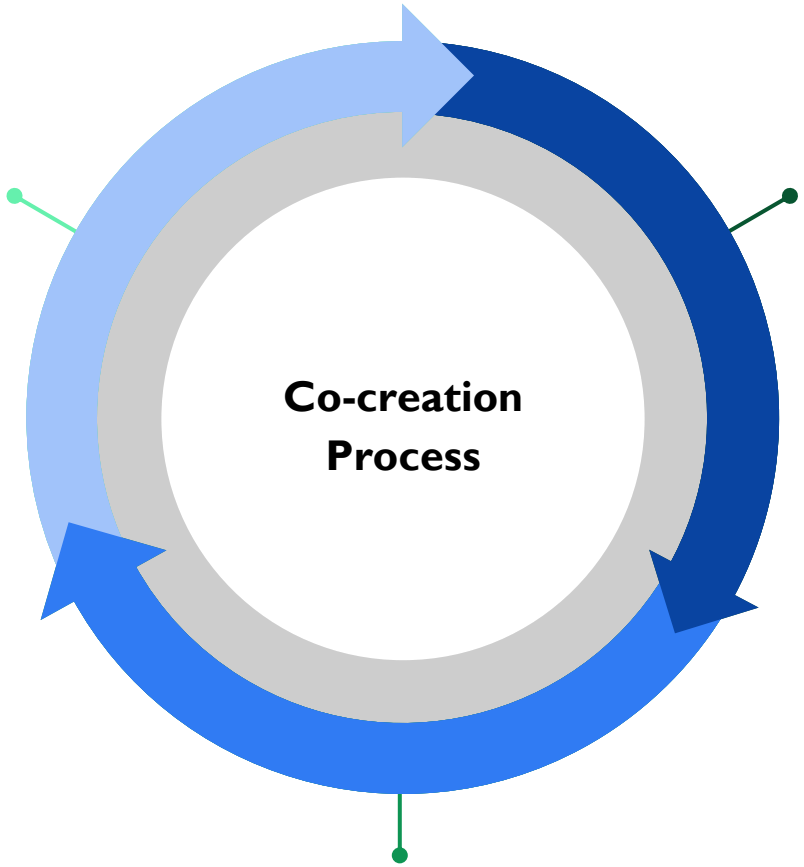
Hundreds of pages of primary research:

- **Cumulative Advantage in Open Science** and RRI: A Large-Scale Quantitative Study
- Investigating **Institutional Structures of Reward & Recognition** in Open Science & RRI
- Drivers and barriers to **uptake of Open Science resources in industry**
- Quantifying the **influence of Open Access on innovation and patents**
- Results of a survey on the uptake of **Open Science in information seeking practices in policymaking**
- **Networks of engagement in deliberative policymaking**: Expert reflections on barriers to participation

Leading into our recommendations:

Global Thinking. ON-MERRIT recommendations for maximising equity in open and responsible research

Co-Creating Recommendations



- Funders
- Institutions
- Researchers

Funders

Institutions

Researchers

Find it on our website https://on-merrit.eu/ under Results, listed as D6.4, and at this link https://zenodo.org/record/6276753

Four focus areas

Funders

Institutions

Researchers

- Resource-intensity of Open Research: Putting open and responsible research into practice requires considerable resources (including infrastructures, services, and training). The structural inequalities that exist within institutions, regions and nations, and on a global scale, create structural advantages for well-resourced actors and structural disadvantages for less-resourced actors, in terms of capacity and ability to engage in these practices.

- Article processing charges and the stratification of Open Access publishing: The article processing charge (APC) model within Open Access publishing seems to discriminate against those with limited resources (especially those from less-resourced regions and institutions). These facts seem to be having effects of stratification in terms of who publishes where.

- Societal inclusion in research and policy-making: Open and responsible research processes take place within broader social systems where inequalities continue to structure access and privilege certain actors while others are disadvantaged. Despite laudable aims of equity, inclusion and diversity in open and responsible research, the most marginalised, vulnerable, and poor remain mostly excluded.

- Reform of reward and recognition: Institutional processes for reward and recognition not only do not sufficiently support the uptake of open and responsible research, but often get in the way of them. This disadvantages those who wish to take up these practices (putting early-career researchers especially at risk).

How to reduce stratification in OA publishing?

1. Funders, institutions and researchers should collectively demand greater transparency from publishers on publication costs, regarding prices and services, and (where possible) support open infrastructures to collect this information.
2. Funders, institutions and researchers should support alternative publishing models where those show potential to be more inclusive, including consortial funding models for open publishing infrastructures which support Open Access publishing with no author-facing charges.
3. Funders, institutions and researchers should encourage and support the use and maintenance of sustainable, shared and open source publishing infrastructure, to reduce costs and promote open standards.
4. Institutions and researchers should ensure the accepted version (or later) of peer-reviewed works are deposited in an open repository.
5. Funders and institutions should consider supporting authors' right to self-archive publications by implementing rights retention strategies.

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Thank you!

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