



A new geography of research

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Notes of a study in progress
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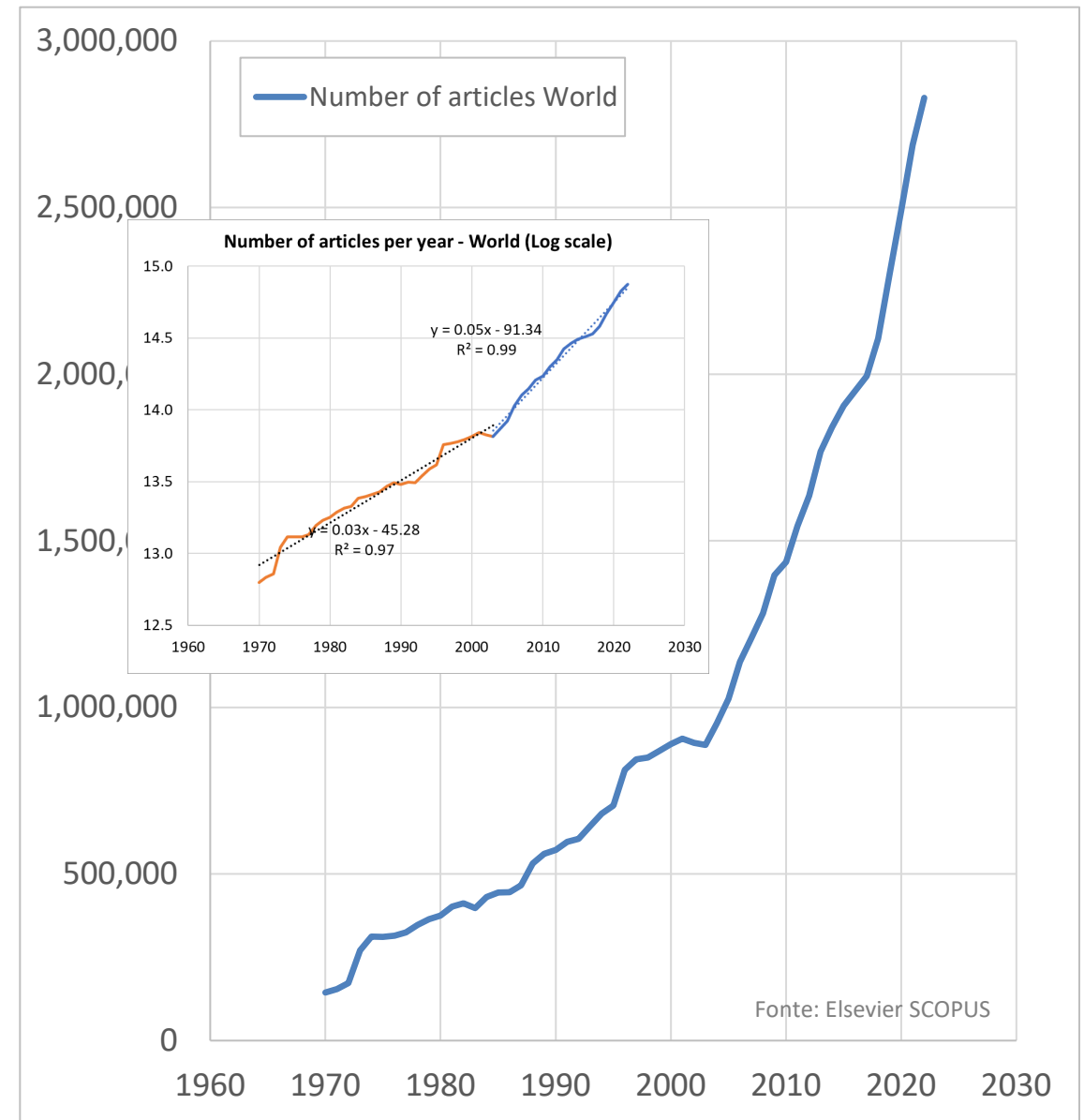




- Changes in the world of research in the last 40 years
- Capacity building bears fruits
- More Low-and-Middle Income Countries become competitive in research
 - Identifying their own opportunities
 - Training professionals and researchers to focus on their own priorities – including in economics, engineering, law, social sciences, humanities, arts, natural sciences, health
- Advances and challenges

Scientific communication – a strong growth in the number of scientific publications + 4% per year

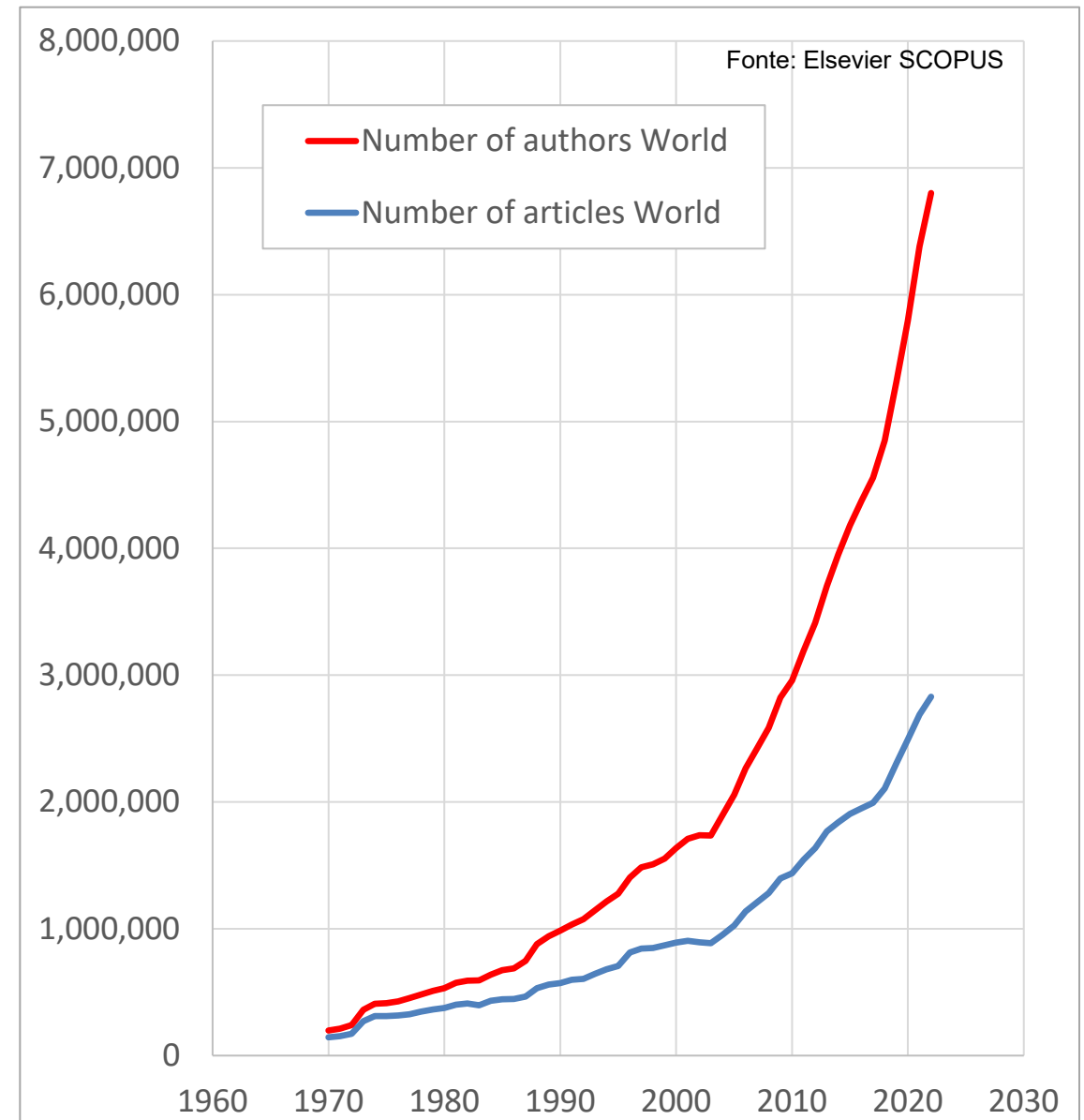
- Presenting and receiving communication on scientific results is essential to the advancement of knowledge
 - Discuss and improve results, change research paths
 - Inform the public (society, government, media) on scientific advances and their impacts
- Communication among scientists differs from communication with the public
 - Different objectives
 - Different formats – mediation, use of technical jargon, ...
- Comunicação entre cientistas
 - Scientific articles
 - Preprints
 - Books, book chapters
 - Patents
 - Conference presentations, discussions
 - Personal communications
- Increasing growth rate in the number of published articles
 - 1970-2003: +3% per year
 - 2003-2023: +5% per year
 - Drivers of growth?



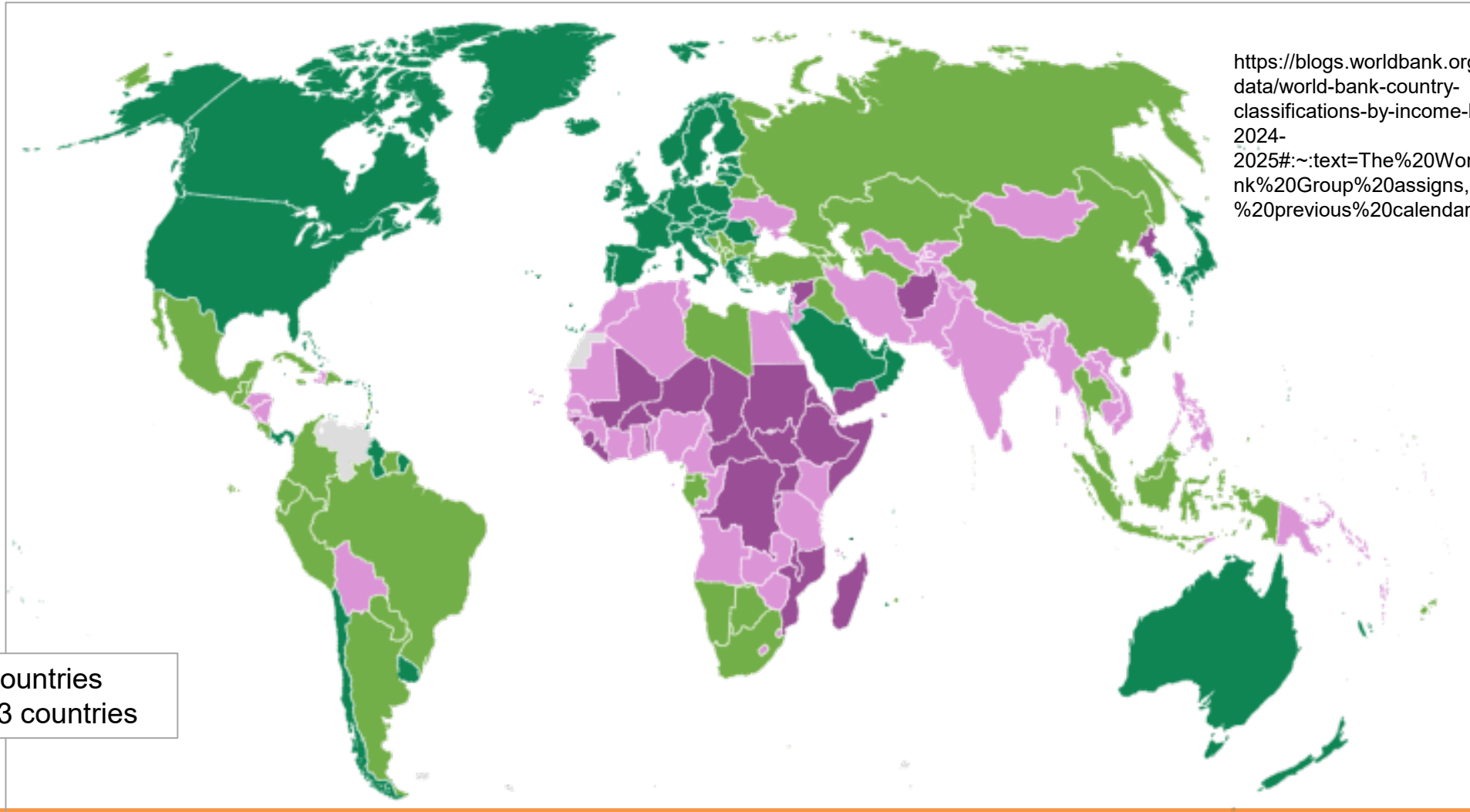


More authors publish more articles The number of scientists in the World has been growing

- One of the main drivers for the growth of the number of published articles is the increase in the number of authors
 - From 1970 to 2022:
 - # of articles grew by a factor of 20
 - # or authors grew by a factor of 34



- High Income Countries and Low-and-Middle Income Countries
 - World Bank classification: a threshold of \$PPP 13,845 on GNI per capita (2022)



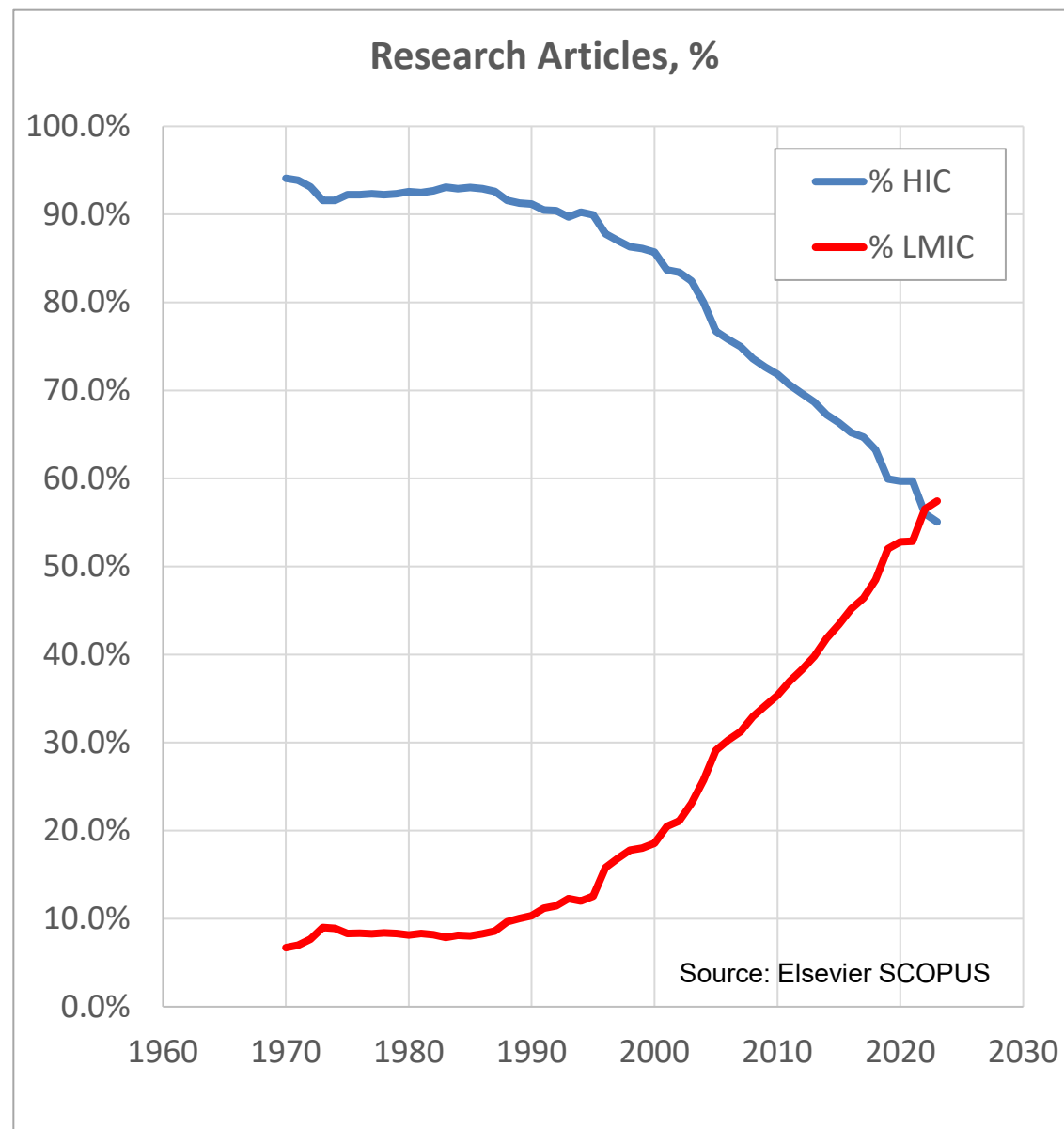
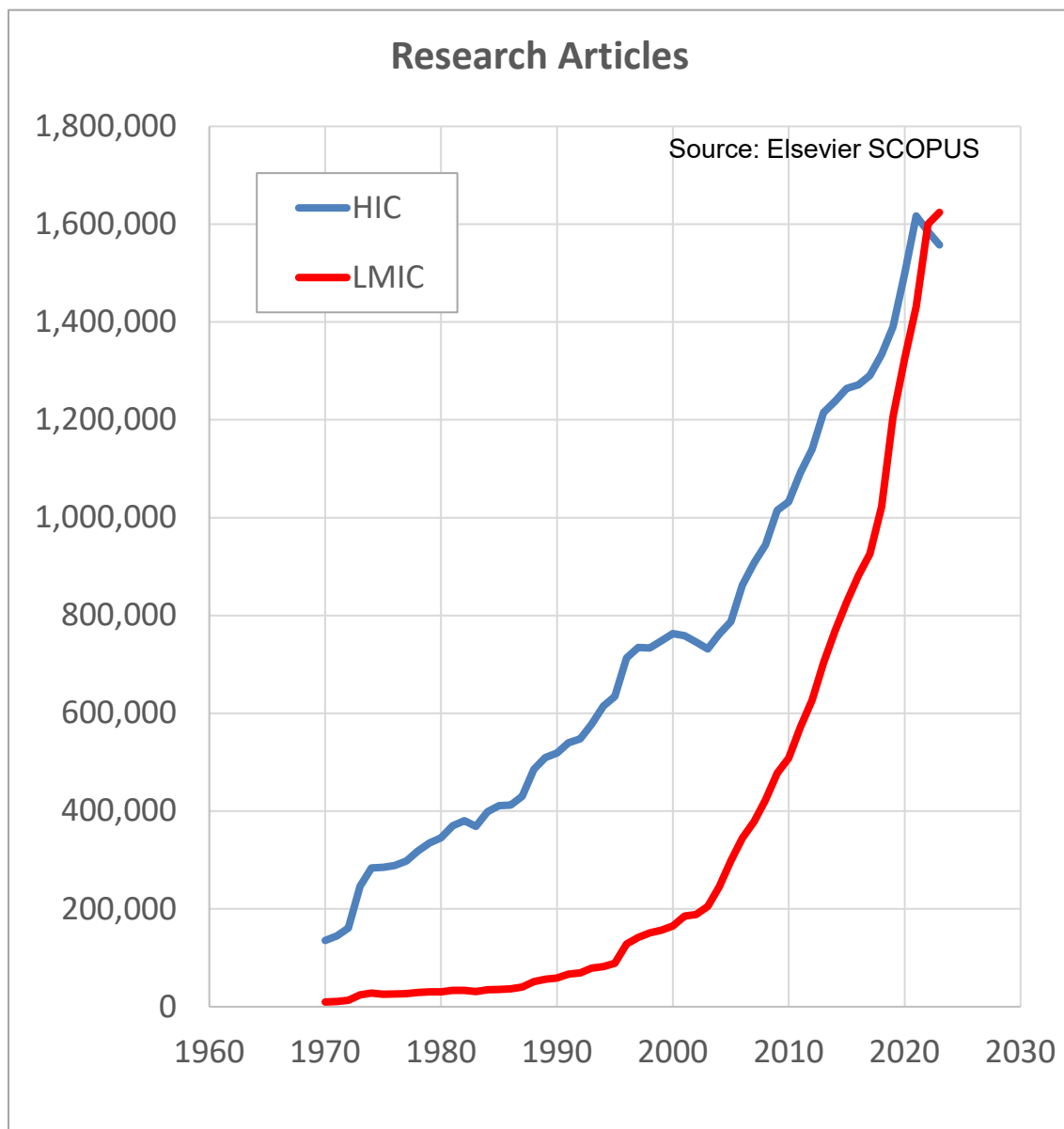
<https://blogs.worldbank.org/en/open-data/world-bank-country-classifications-by-income-level-for-2024-2025#:~:text=The%20World%20Bank%20Group%20assigns,of%20the%20previous%20calendar%20year.>

HICs: 79 countries
LMICs: 133 countries



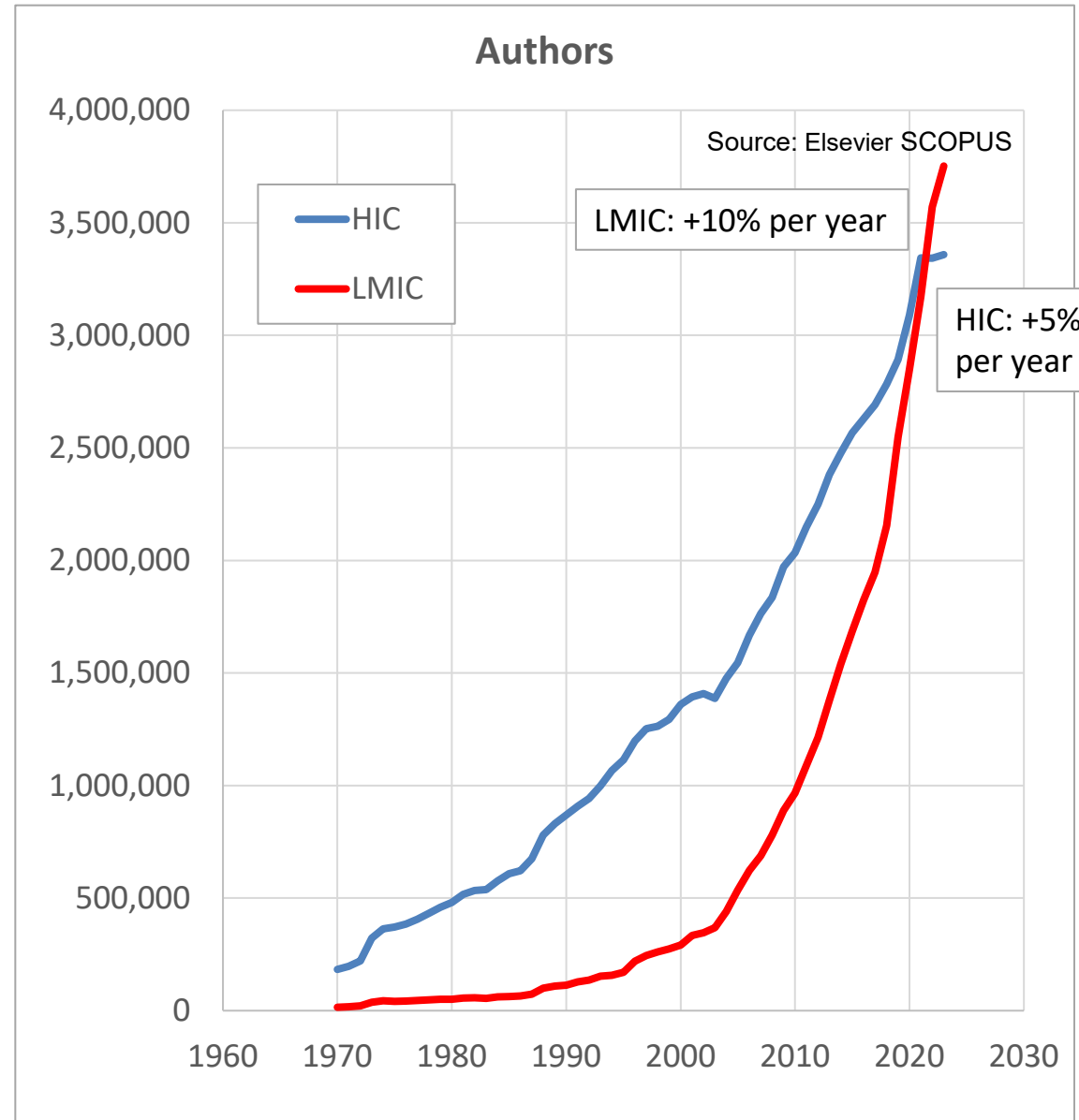
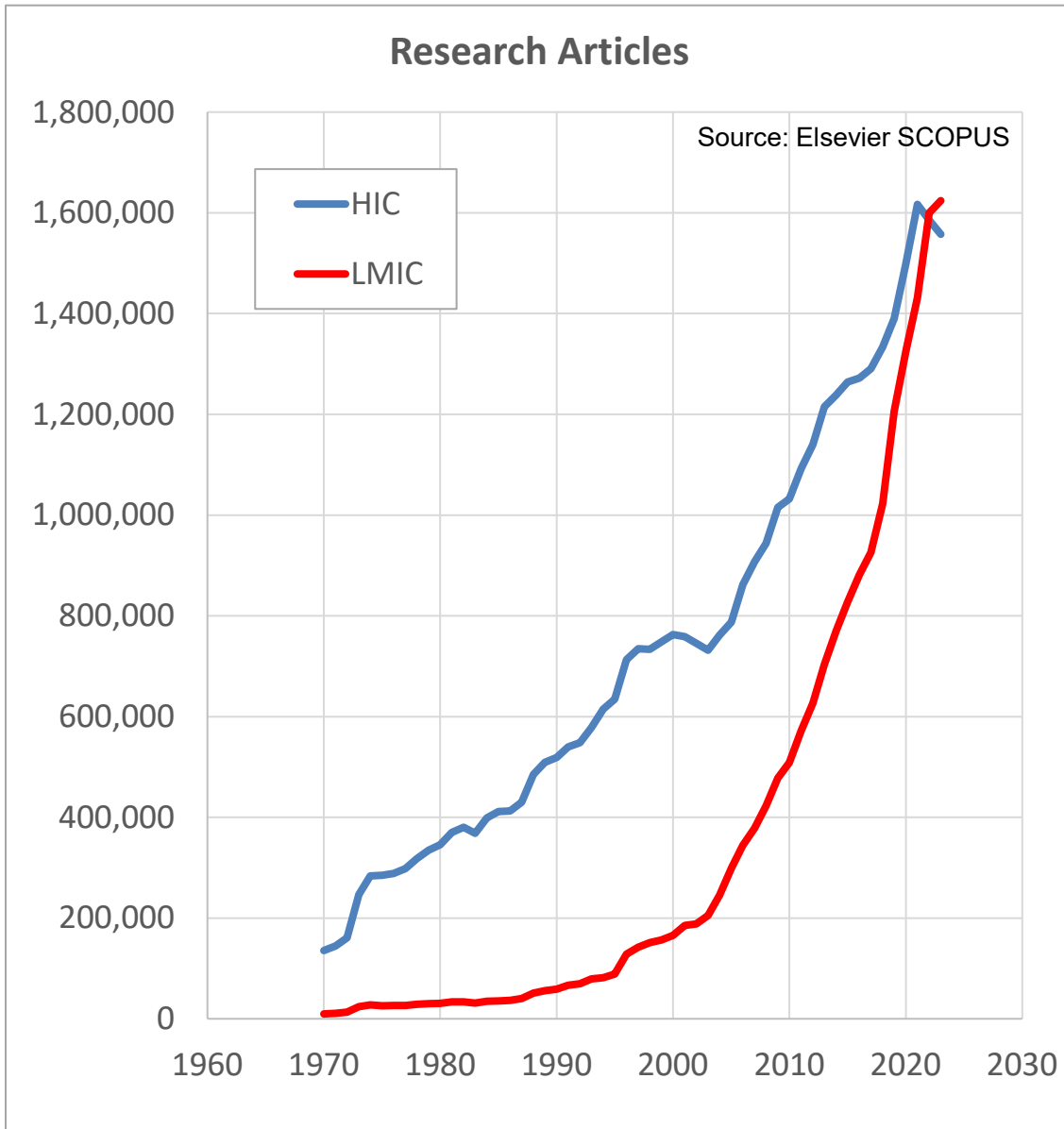
Capacity is being built in Low-and-Middle Income Countries :

Number and percentage of scientific articles with authors in High Income and Low-and-Middle Income Countries





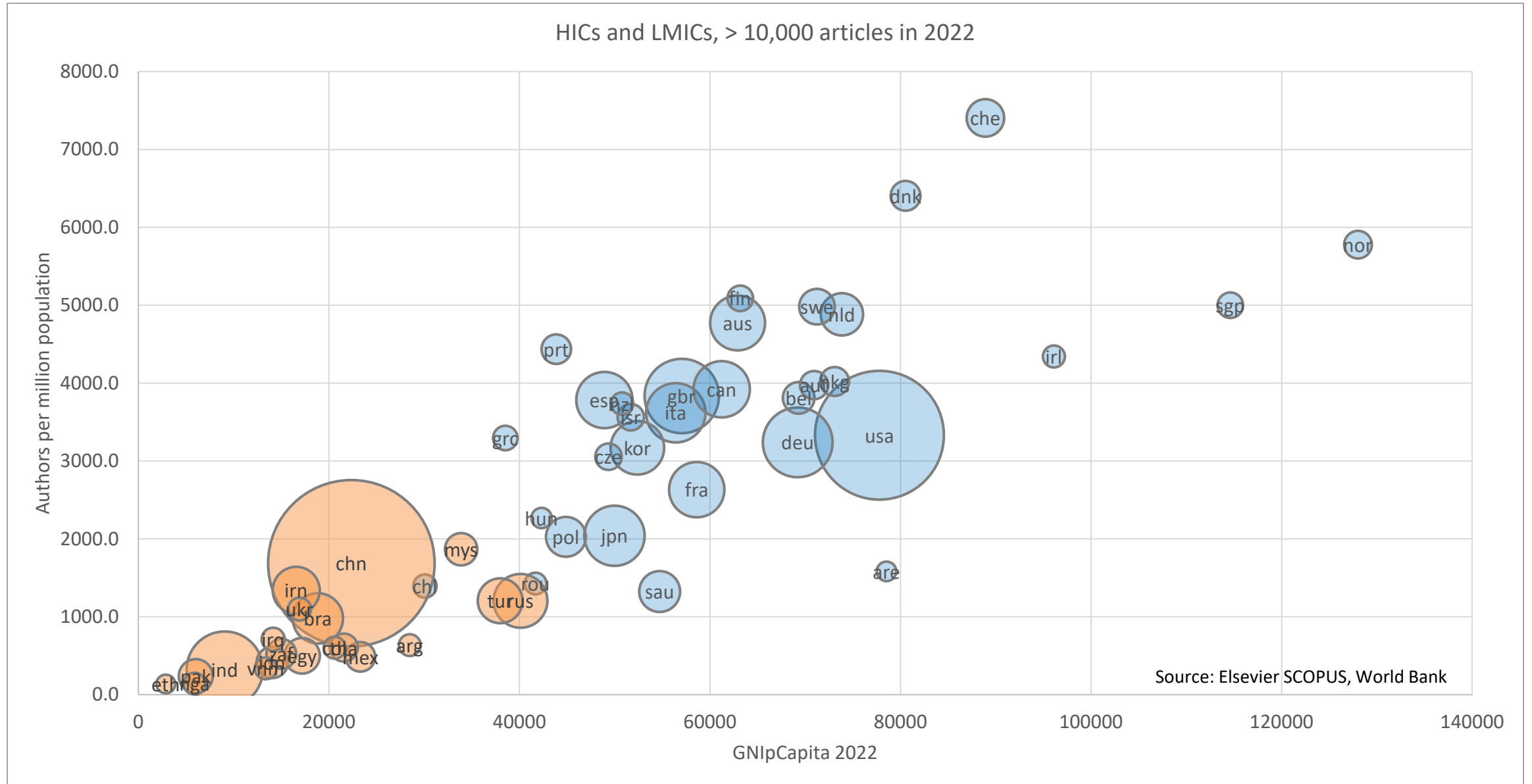
High Income Countries (HIC) and Low-and-Middle Income Countries (LMIC) Number of scientific articles and number of authors



HIC AND LMIC COUNTRIES

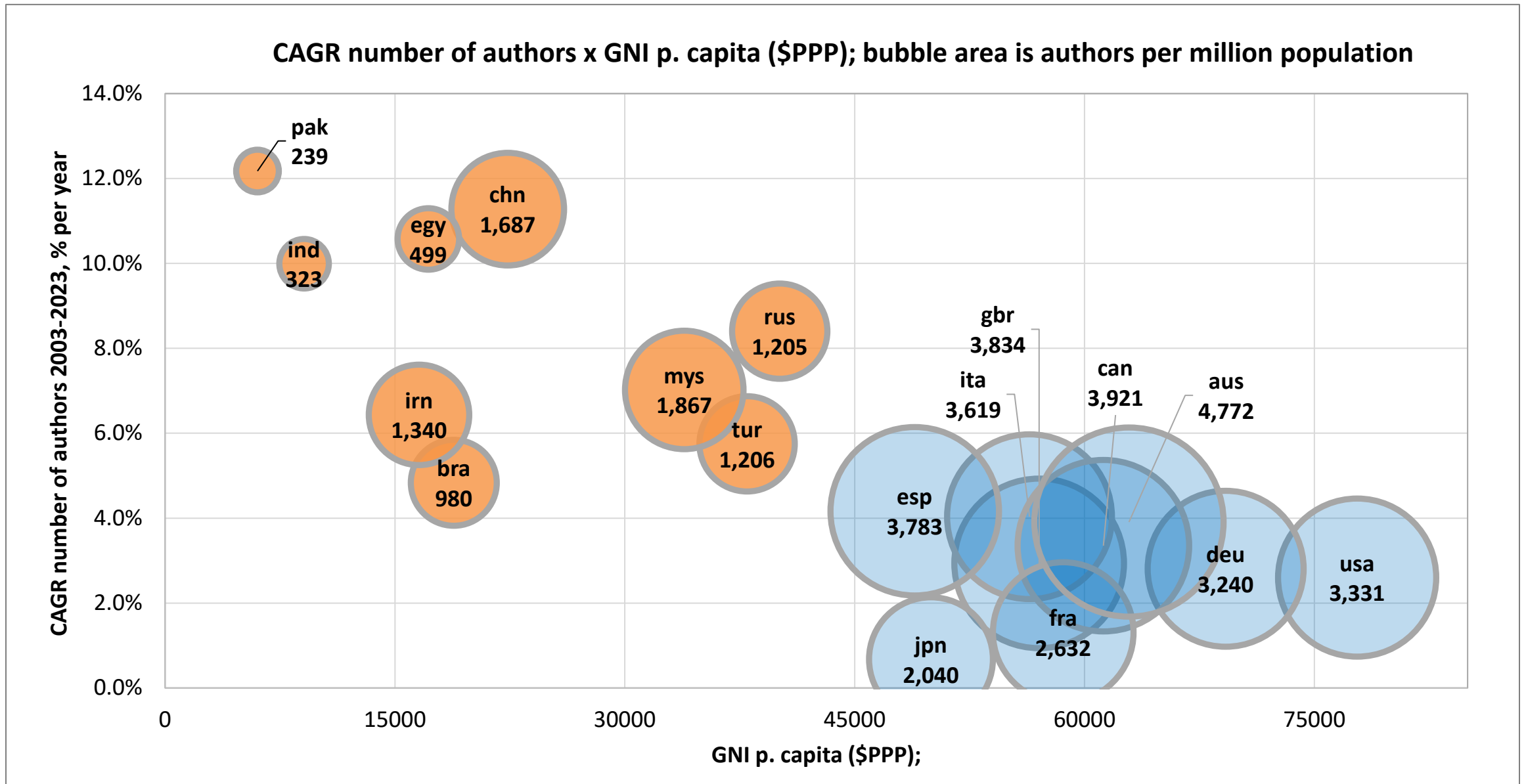


High Income Counties and Low-and-Middle Income Countries Authors per million population, GNI per Capita, and Number of articles in 2022

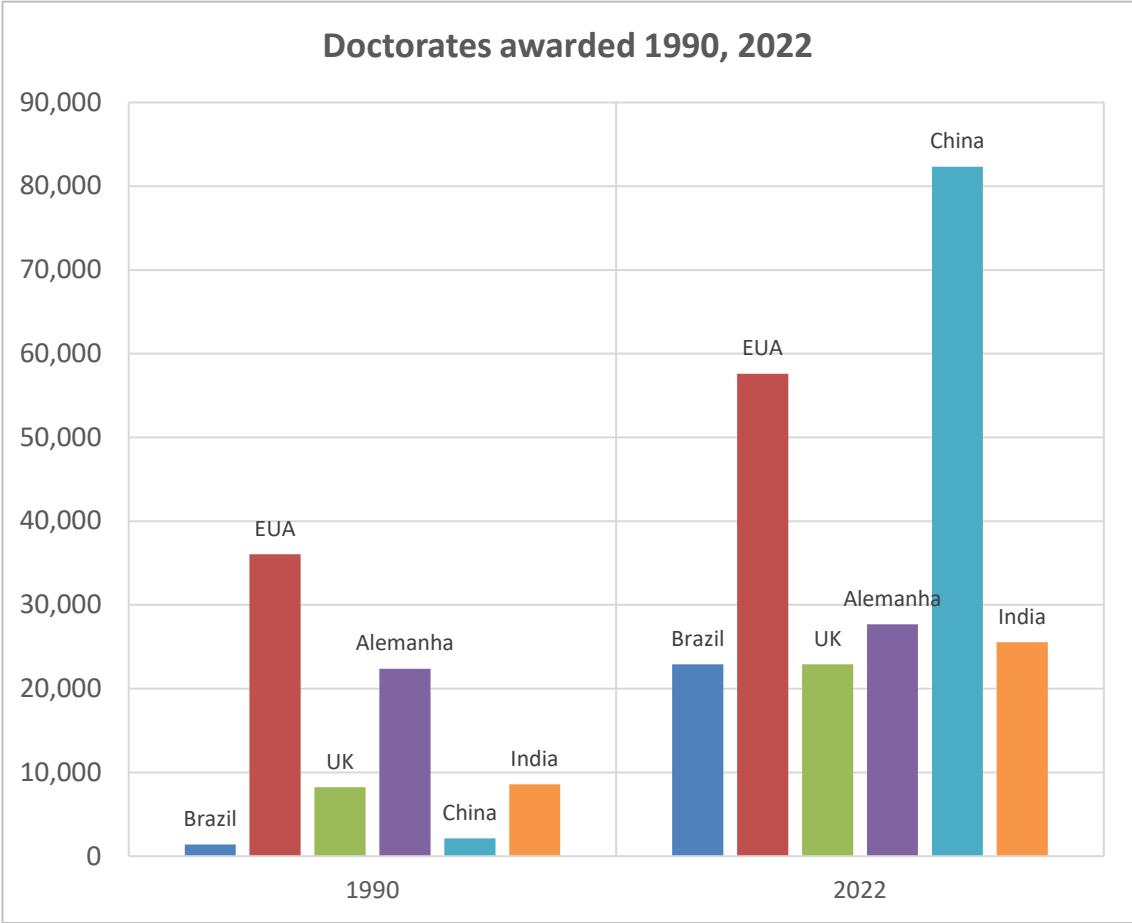
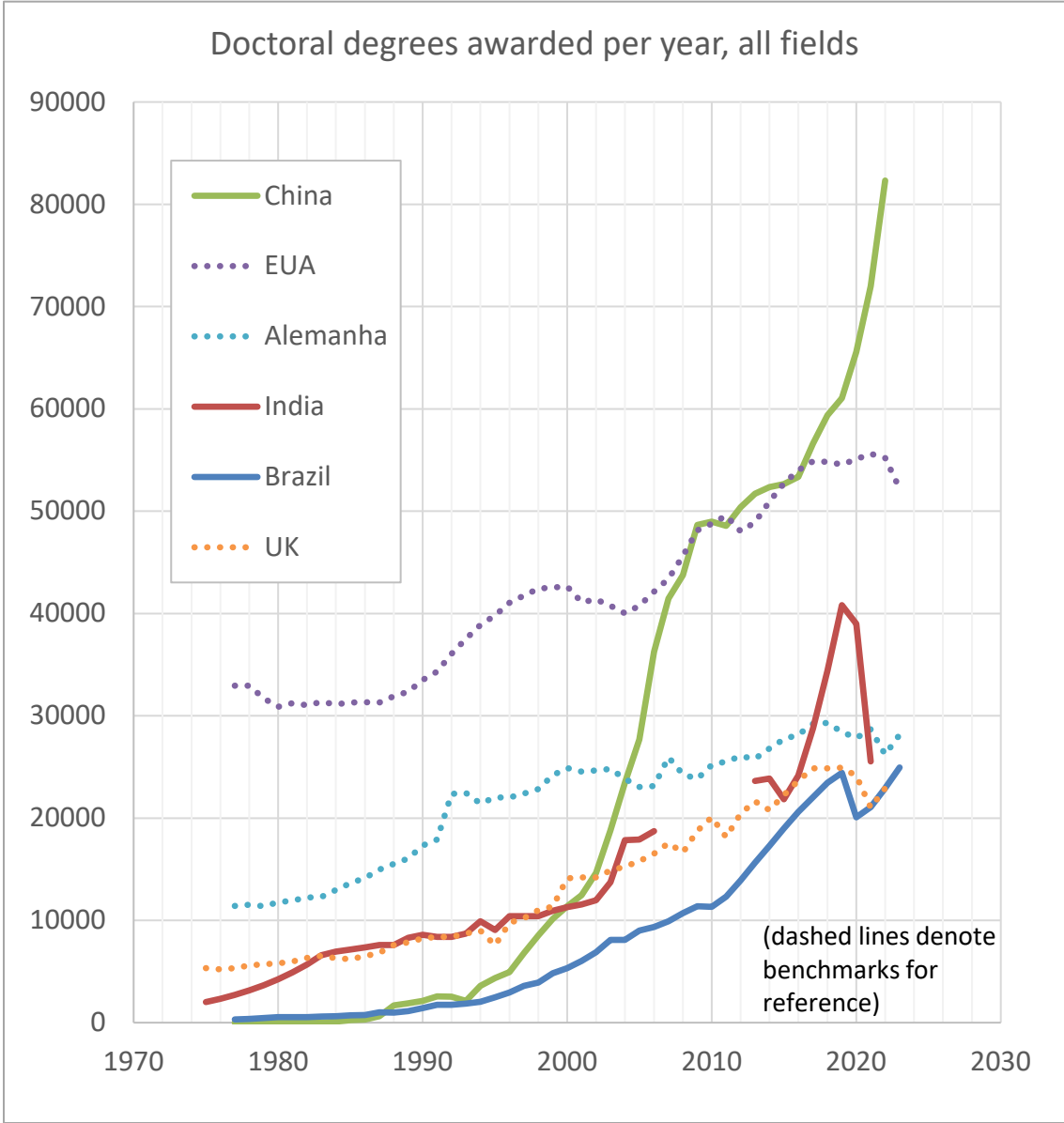


Source: Elsevier SCOPUS, World Bank

*Growth rate of number of authors (2003-2023) x GNI per capita (2022),
Bubbles area show number of authors per million population (2023)*



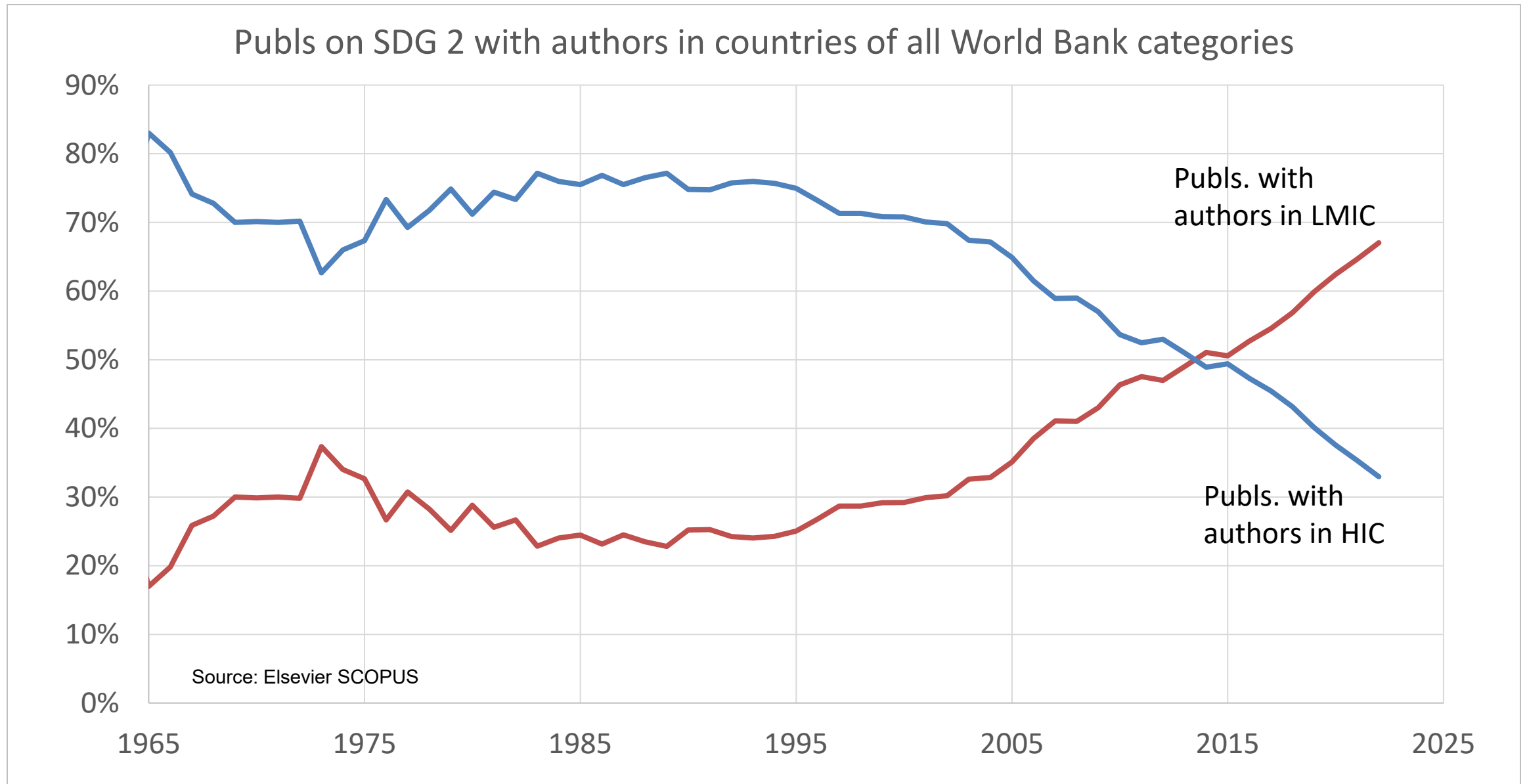
- Capacity building requires developing research training institutions
 - Research universities, graduate courses

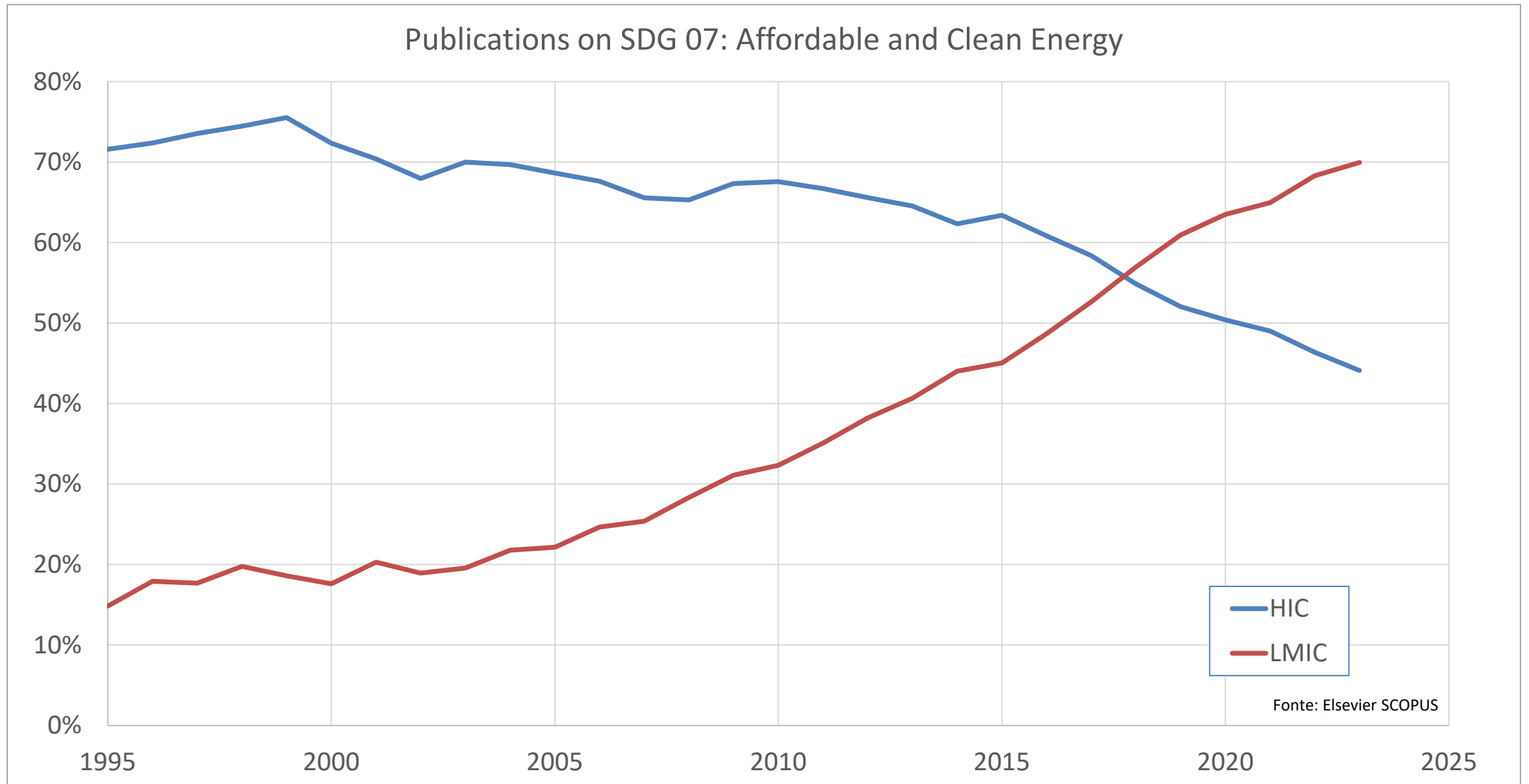


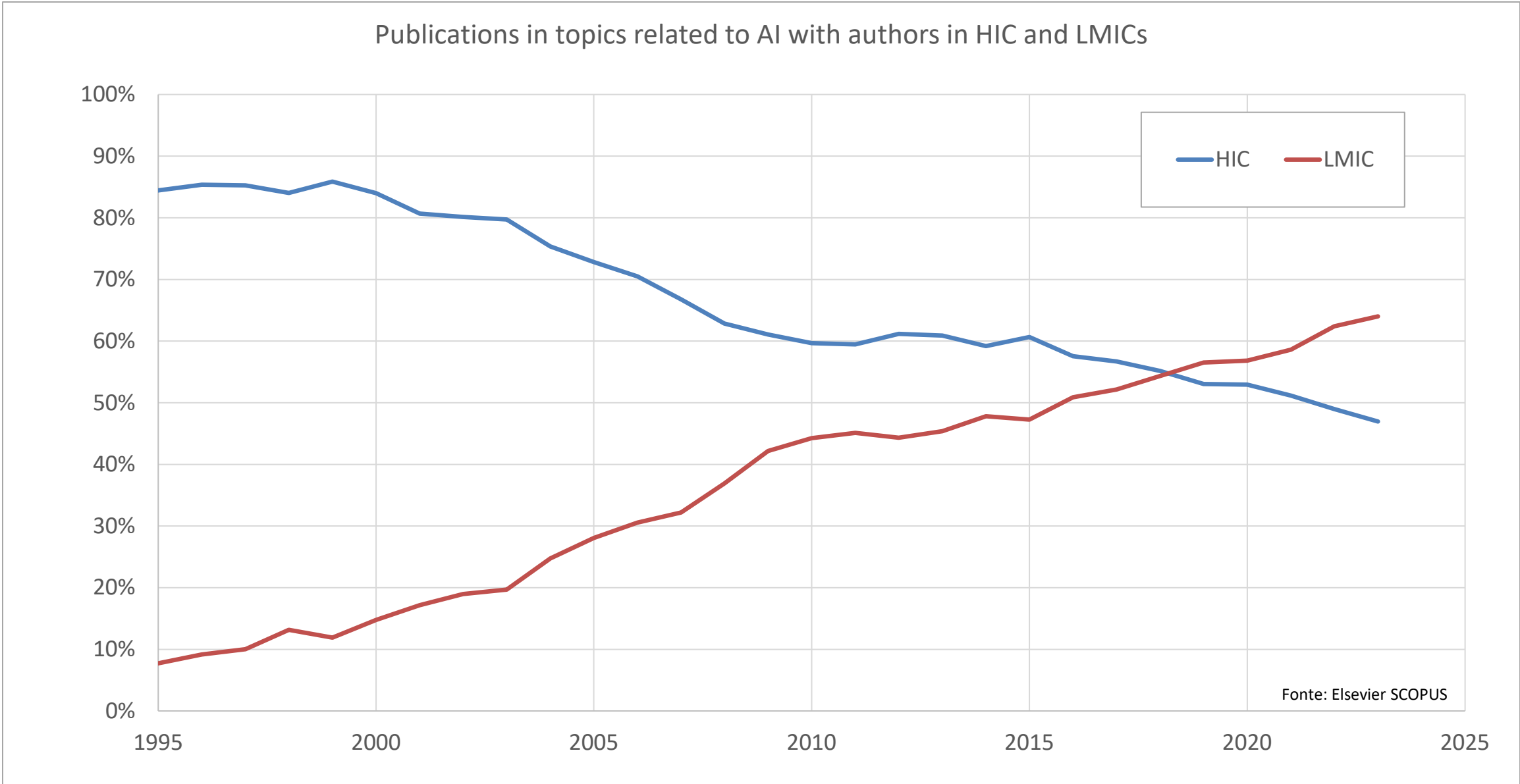
PERFORMANCE IN SOME RELEVANT RESEARCH TOPICS



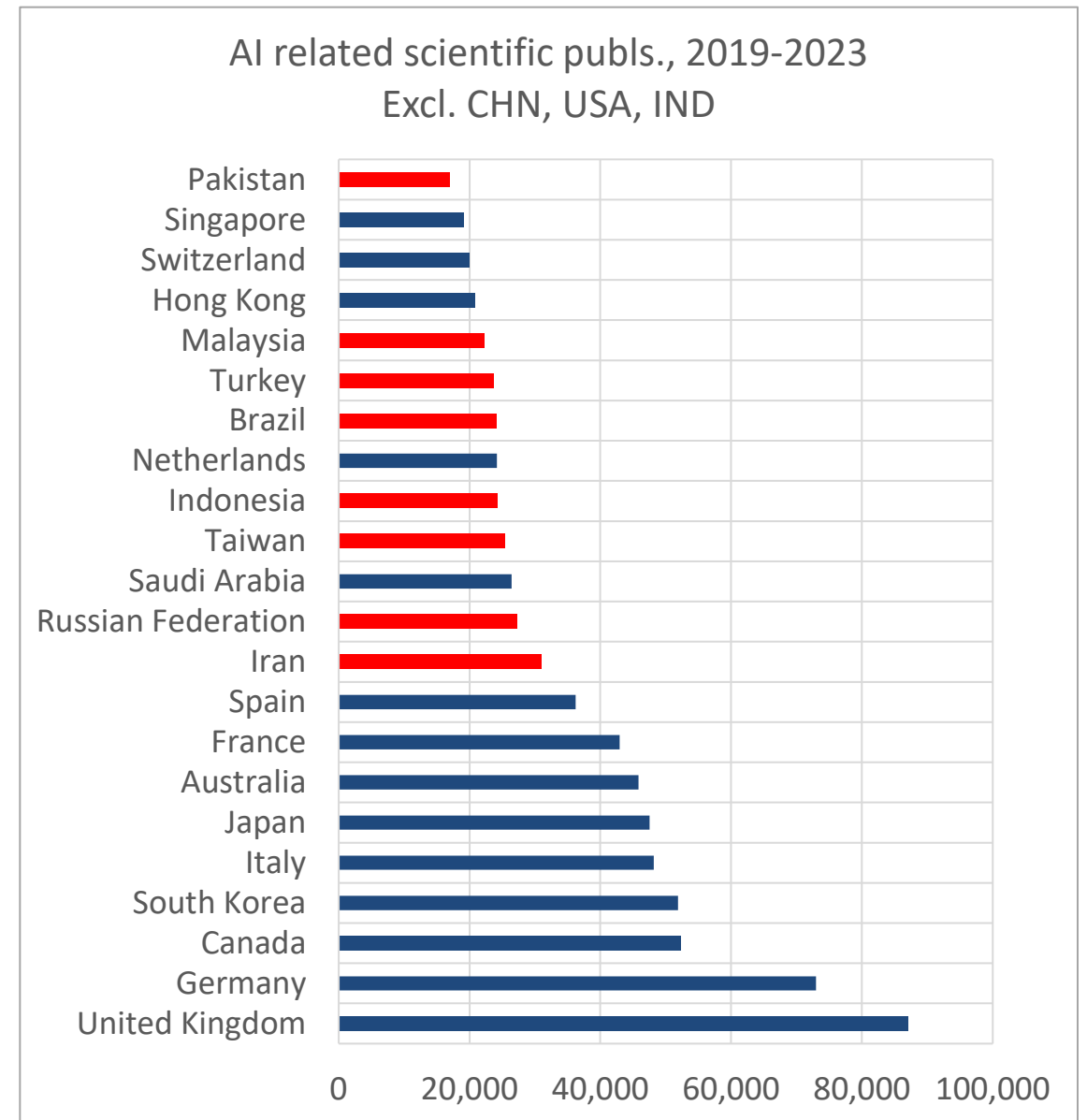
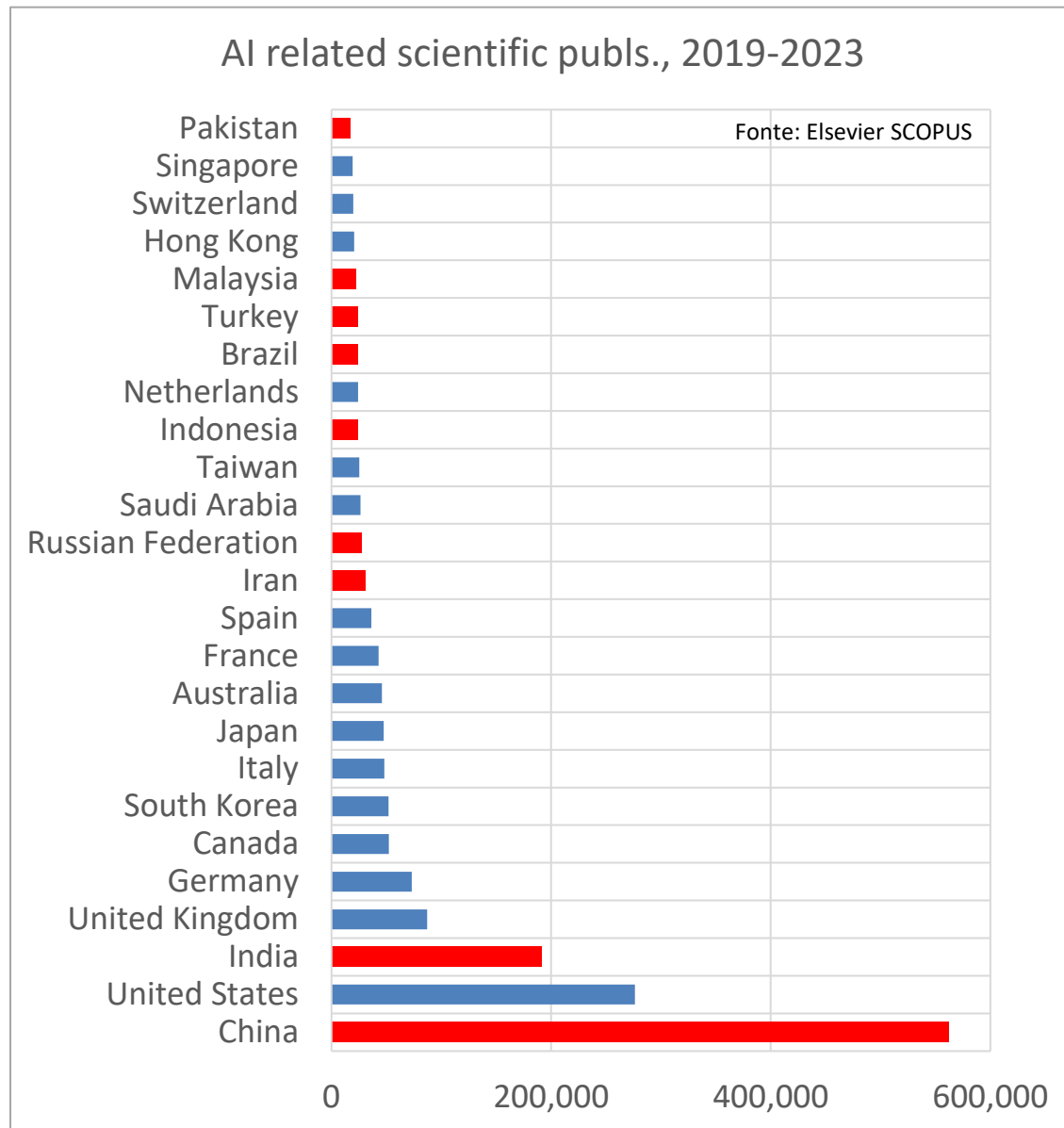
SDG 2 – Zero Hunger: publications with authors in High-Income Countries and Low-and-Middle Income Countries



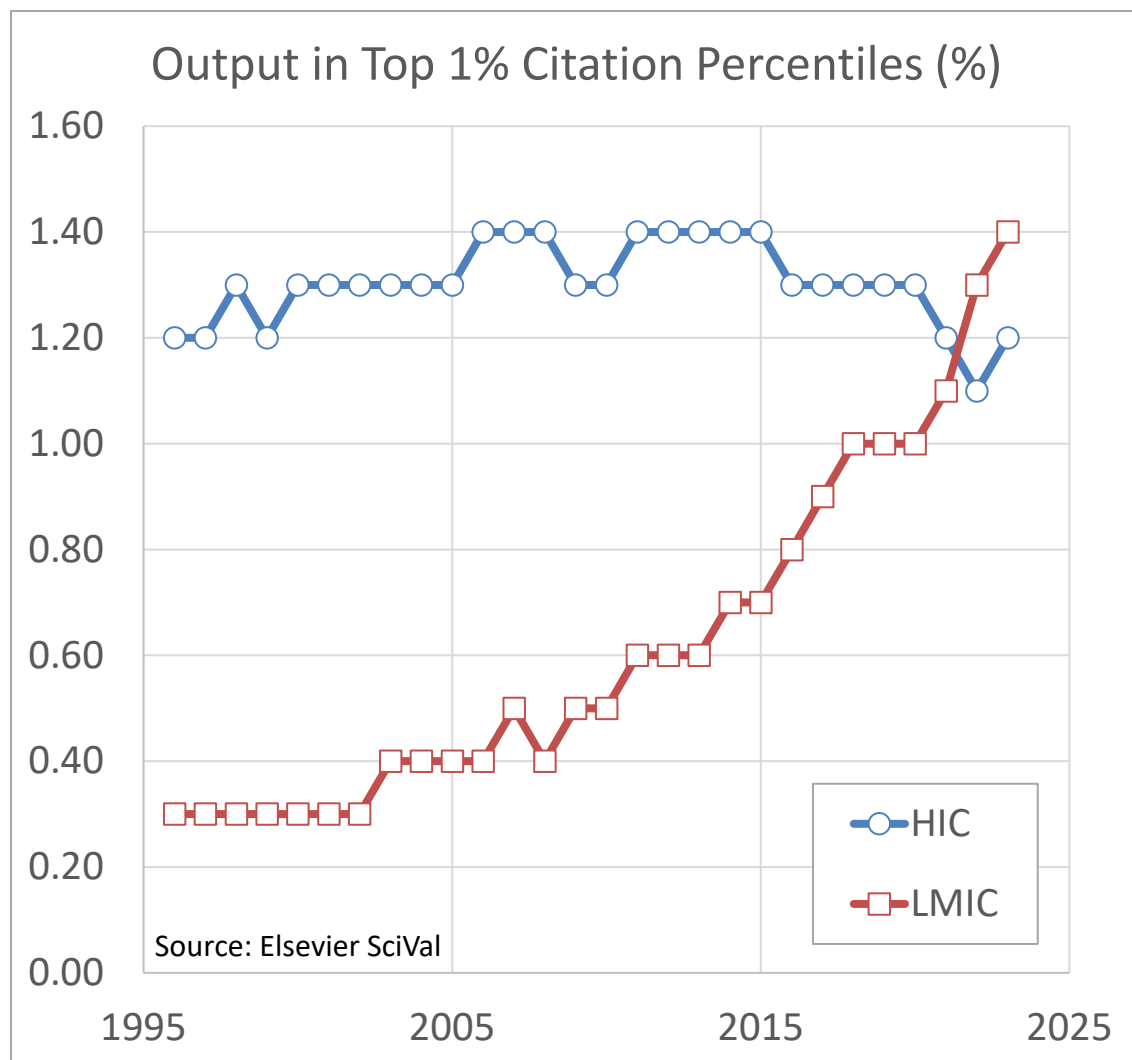




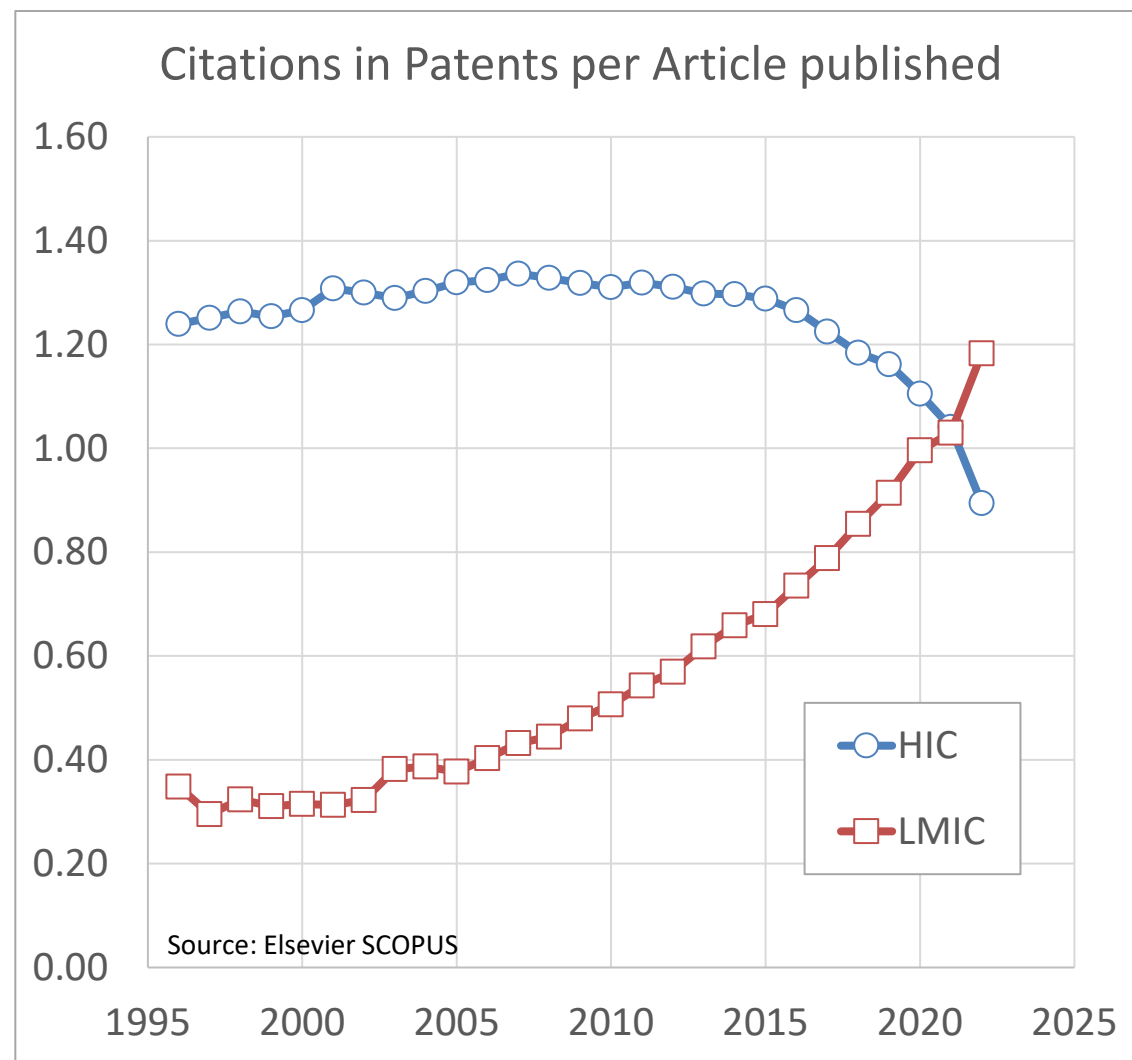
Scientific publications on AI related topics, 2019-2023 25 countries with more publications

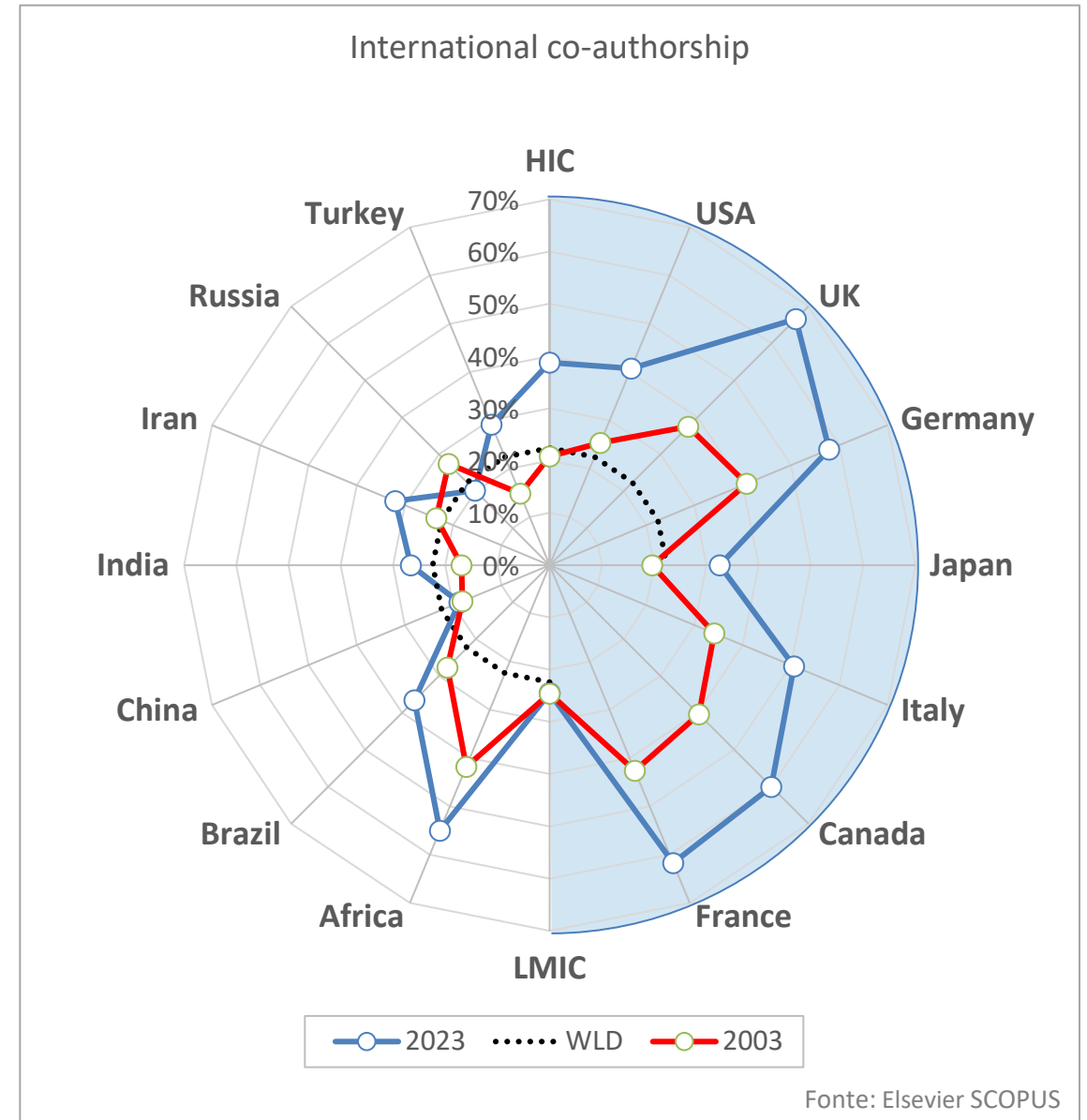
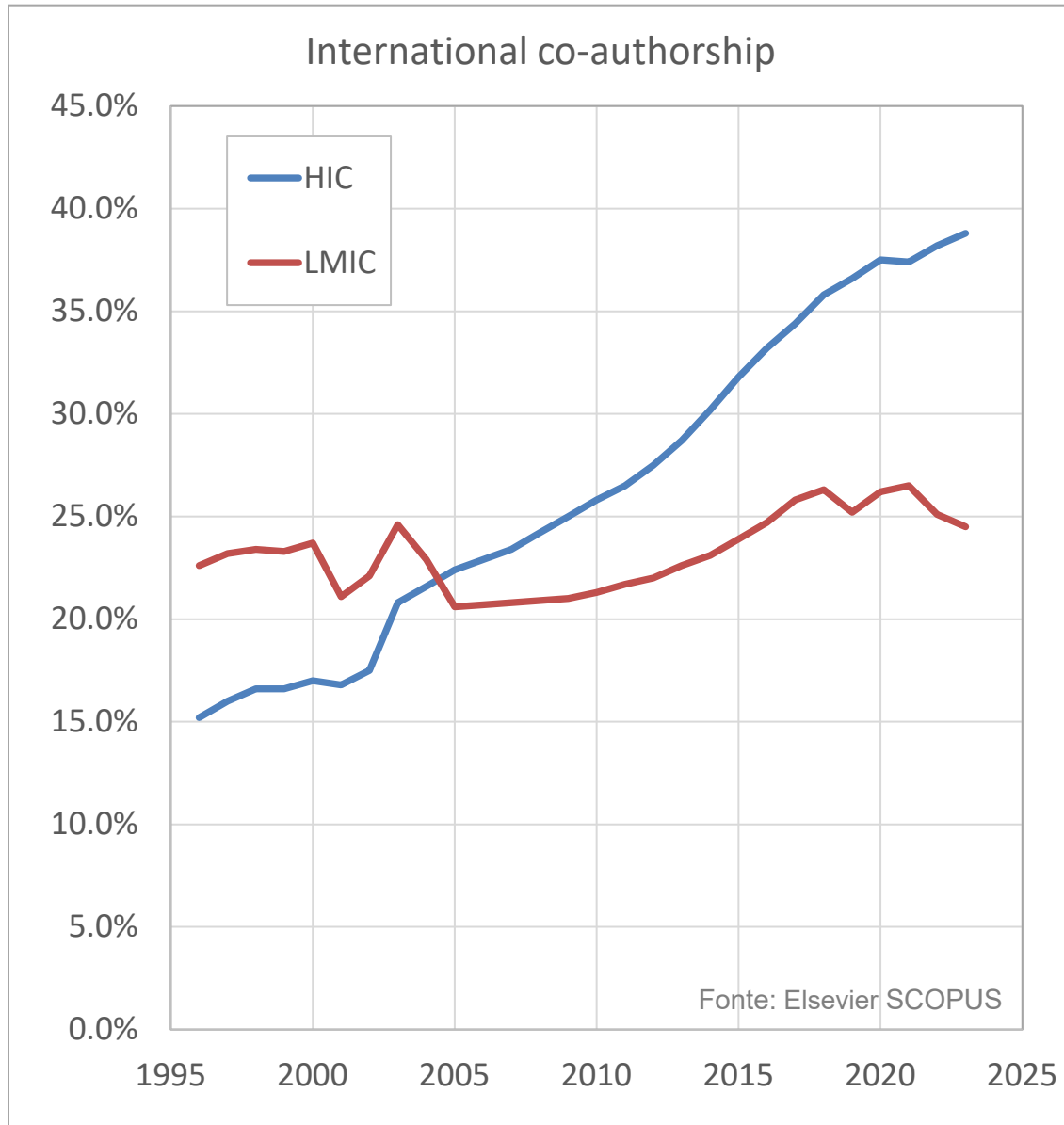


Convergence in citations

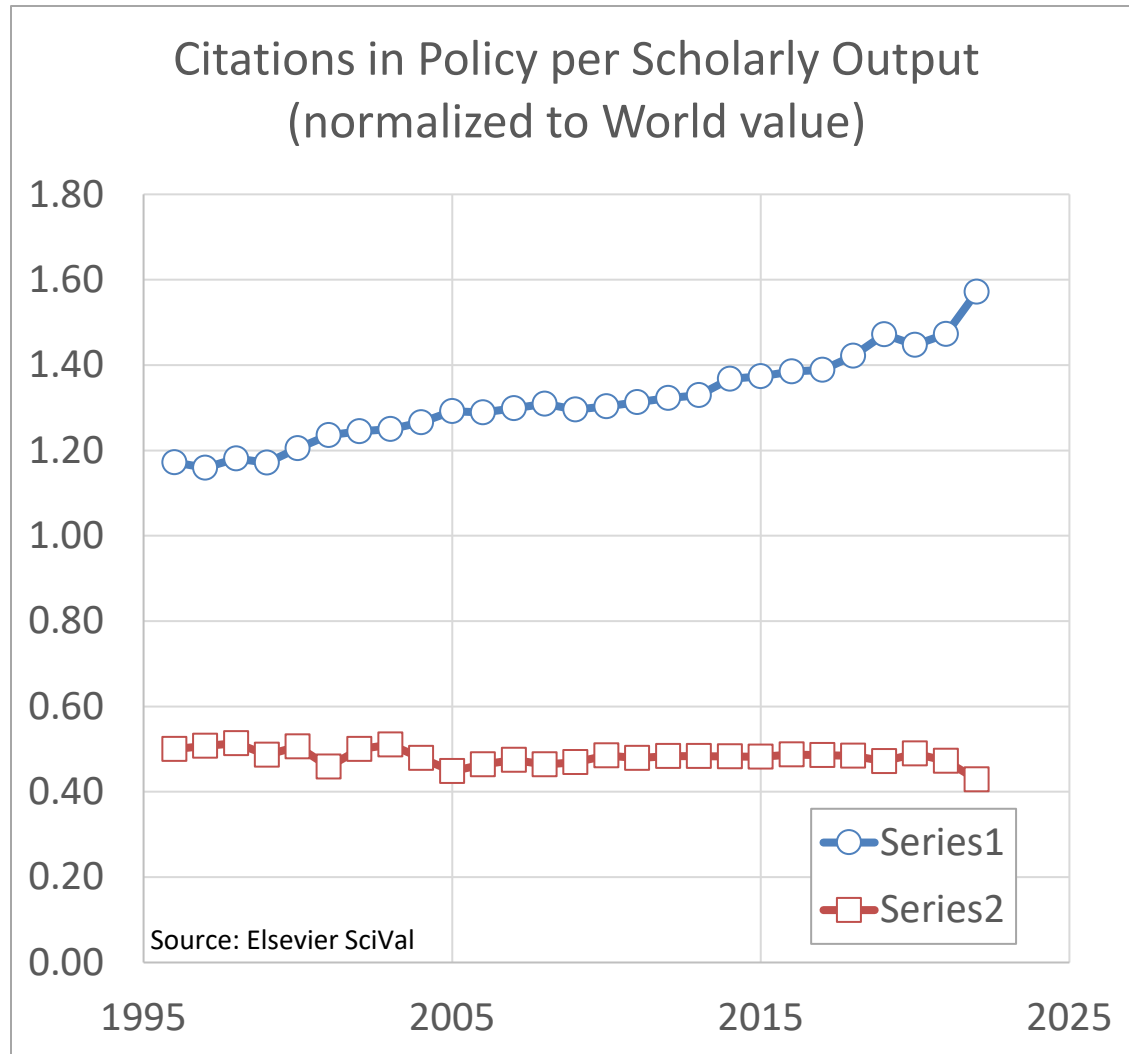


No convergence in citations in policy orienting documents

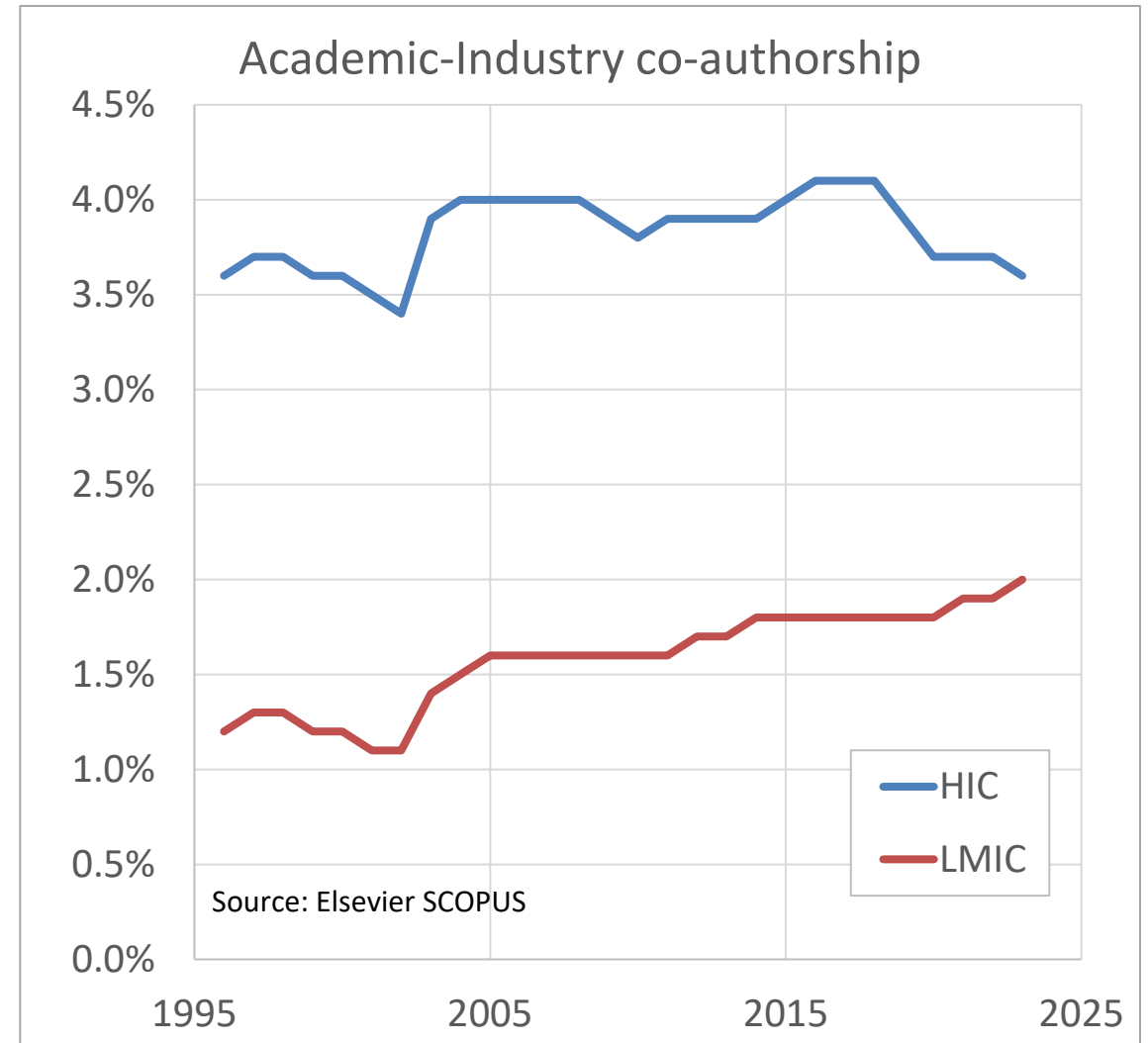




No convergence in citations by policy orienting documents



Much slower convergence in Academic-Business co-authorships





- A different World in terms of scientific and innovation capacity
 - Resulting from decades of capacity building in and mostly by LMIC
- The increase in the number (and quality) of researchers in all fields working in LMIC allows for a much more inclusive discussion
 - LMICs can learn from each other experiences and discoveries
 - Possibility (necessity?) for more inclusive international conversation among researchers
 - Inclusive use of a more varied bibliography with authors working in LMIC
 - Increase inclusion in international committees, editorial boards, colleges of reviewers for journals, professional societies.
- The changes in the geography of research impact research collaboration
 - More ideas in LMICs → more knowledge connected to local experience -> more agency in agenda definition
 - Participation by LMICs in the science enterprise (governance, guidance, norm setting, publishing, international councils, academic freedom, security) is lagging relative to their publication performance
- Hurdles definitely exist for LMICs
 - LMICs might learn more from one another: avoid mistakes, adapt successes