

# Article Processing Charges (APCs) and the new enclosure of research

*Drawing on a recent analysis of APC pricing and movements within the commercial publishing sector, **Gunnar Sivertsen and Lin Zhang** argue that APCs have now firmly established themselves as the predominant business model for academic publishing. Highlighting the inequalities inherent to this model, they posit now is the time to consider alternatives.*

In 2020 we estimate the annual revenues from article processing charges (APCs) among major scholarly journal publishers to have exceeded 2 billion US dollars. Alongside these revenues, a pattern of mergers and takeovers in the industry indicate that publishers find APCs to be an even more profitable business model than subscriptions. This has significant implications for research and researchers, as researchers who cannot make their country, institution or project pay are not able to fulfil their research, ultimately closing access to research.

In a recent paper, which we were (fortunately) able to pay to make [freely available](#), we combined an analysis of global trends in scientific publishing from 2015 to 2020 with an APC price list. The price list covered journals published by the twelve major publishers responsible for 70 percent of the world's scientific journal articles: Springer Nature, Elsevier, Wiley, Taylor & Francis, MDPI, SAGE, IEEE, American Chemical Society, Frontiers, Oxford University Press, Public Library of Science, and Hindawi. We collected APC prices for the gold alternative (all articles in a journal are free to read) as well as for the hybrid alternative (individual articles are made free to read in subscription-based journals).

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Visiting the publishers' webpages to collect the APC prices provided interesting insights from the outset. Almost all journals from the twelve publishers now require or offer the gold or hybrid alternative against payment. The hybrid alternative is promoted not only among individual authors, but also by asking institutions or countries to sign "[Read and publish](#)" agreements. While such agreements seem to be efficient in reaching the OA goals of the public research sector, they also imply paying the publishing sector at both ends.

Most of the journals we analysed remain hybrid, but there are signs that the gold alternative is commercially attractive. The gold only publishers Frontiers and MDPI are taking increasing shares of the APC-based market and now dominate the pioneers of gold open access, Public Library of Science and BiomedCentral. Gold mega journals such as *IEEE Access* and *Nature Communications* are rapidly increasing their shares in the world's articles. Traditional publishers with Springer Nature in the lead followed by Elsevier and Wiley are increasing their shares of all articles in the gold only [Directory of Open Access journals](#), where [the number of articles has doubled while the total revenues from APC have tripled](#) between 2016 and 2020. Traditional publishers have also invested in gold only publishers. The owner of Springer Nature has acquired BiomedCentral and Frontiers, Wiley has acquired Hindawi, Taylor & Francis has acquired Dove, and Elsevier has acquired KeAi.

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Publishing is an inextricable part of the research process. As such, we consider the mainstreaming of APCs as a 'paywall' to perform research, using the same term as is used to characterise the subscription model in publishing from a reader's perspective. The global trends towards paying to perform research seem less dependent on the OA policies of countries than on the dynamics of the commercial publishing market. Notably, we found that APC expenses have sharply increased among six countries with different OA policies: the USA, China, the UK, France, the Netherlands, and Norway. The increases are most dramatic in the four European countries collaborating in [cOAlition S](#) and thereby in practice supporting the gold and hybrid alternatives (as long as the latter is viewed as temporary). The USA has prioritised the green alternative (institutional repositories) by which paying APCs can be avoided in principle, but not in practice. We found Green OA decreased from 53 percent to 37 percent between 2015 and 2020. China's OA policies are mostly advisory, not mandatory, but Chinese research policy [has until recently had a strong focus on publishing in journals covered by Web of Science](#) where the major commercial publishers dominate. For this reason, China is now the world's largest payer of APCs. Taken as a whole, our findings show how the public sector so far has only been able to stimulate trends towards paying to perform research, rather than steering the sector to a specific end.



The six countries we studied represent more than half of the world's scientific output. We also used the APC price list to estimate the global annual revenues from APC among the major publishers. They have been rapidly increasing and seem to have exceeded 2 billion US dollars in 2020, which, for comparison, is three times the annual budget of UNESCO. Insiders will know whether such a turnover provides profits in the industry, but the APC is a mechanism that must work in this direction.

Unlike subscriptions, APCs are not constrained by library budgets. It asks for payment from those exposed to the pressure to publish. Scientific publications are not only used to communicate new results. They are also used to document the experience and qualifications of researchers in contexts where they are assessed for funding, recruitment or promotion. Publications are important for careers. This might explain why our study also observed sharp annual increases in the APC required by individual journals, as well as large variations in the prices which seem to partly depend on the prestige of journals.

Without global regulation, APCs will depend on supply and demand like other prices, but also on affordability, thereby affecting the traditional norms of equal opportunities and sharing in science and, ironically, the more recent idea of Open Science. While intended to make the scientific literature more accessible, it is now reported that OA publishing fees [deter researchers in the global south from performing research](#) and our own study has already raised the same concern [from an African perspective](#). In all parts of the world, APCs can be said to restrict research activity to institutionalised and/or funded activities. The admission to perform research in these contexts is sometimes based on [questionable selection mechanisms](#), it also entirely overlooks unfunded research. In principle, funded science in the public sector should be open to new ideas and observations from the outside. However, research is rapidly closing around state-funded insiders, which is a dramatic change in the history of science and, for example, against the [Open Science policy of the EU](#).

We conclude that paying to perform research already seems to be more than commercially viable as a business model for the publishing industry. APCs have also been very effective in achieving higher rates of Open Access publishing. However, this new paywall for performing research is at odds with fundamental norms of equal opportunities and sharing in scientific work. It creates dependencies and closed doors among researchers. Alternative ways to promote Open Access should be discussed.

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*This blog post is based on the authors' article, [Should open access lead to closed research? The trends towards paying to perform research](#), published in *Scientometrics*.*

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