ENABLING OPEN SCIENCE AND DIGITAL INNOVATION THROUGH COMPETITION POLICY
(EUA contribution to topic 3: Preserving digital innovation through competition policy)

Summary
There is mounting evidence to suggest that the market for scientific publishing is being dominated by a small number of large publishing companies leading to considerable profit margins of publishers to the detriment of publicly funded research. One root cause for this situation is an overreliance on journal impact factors in the assessment of researchers resulting in an oligopolistic situation hampering the flow of knowledge, the generation of new insights, collaboration amongst researchers and the creation of an open scholarly knowledge exchange system.

The EUA response to the call for contributions on "shaping competition policy in the era of digitisation" addresses the topic of 'preserving digital innovation through competition policy'. This contribution argues that competition principles are gravely endangered in the current make-up of the market for scientific publishing. EUA looks at open access to research publications and data as a need for a better use and service of research outcomes to society. It does so from a holistic point of view, whereby the economic and market contexts are two of the aspects to be taken into consideration. The other aspects that must be considered are described in detail below and range from the capacity of researchers to publish in journals of their choice while retaining copyright to the competitiveness of publishing platforms and markets.

Introduction
In her speech of 18 September 2017, Commissioner Vestager's stated "[i]f our businesses aren't challenged, if they don't have to compete, then they don't have any reason to work to serve people better. Competition is the motor that drives businesses to do better for consumers. To cut prices. To offer more choice. To produce innovative products." EUA subscribes to the view that competition authorities must help in keeping prices low, in protecting choice and in defending innovation when it comes to the business of scientific publishing. Researchers must be empowered to freely select their publishing venue of choice.This is ever more important in the light of the recently adopted amendments of the Copyright Directive by the European Parliament for the trilogue negotiations. Notably, neither the original proposal by the European Commission nor the Council's mandate or the report by the European Parliament include any provisions to limit embargo periods for research publications establishing inalienable ownership rights of researchers to the results of their publicly funded research projects. It is also important to note that research in itself and particularly open science activities are build on cooperation. Cooperation and competition are inextricably linked in the creation of new knowledge.

For scientific publishing, EUA ultimately calls for creating an open scholarly knowledge exchange system offering numerous benefits, such as:

- accelerating progress of research and innovation through seamless knowledge transfer,

- fostering interdisciplinary cooperation in addressing global challenges encapsulated in the Sustainable Development Goals,
- increasing societal awareness on the way any academic discipline contributes to the development of our societies and engagement with scientific knowledge stemming from all academic disciplines,
- last but not least, other spill-over effects in digital and traditional economies.

An open scholarly knowledge exchange system, moreover, optimises the accountability and transparency of research towards taxpayers and promises in general a better return on public investment in research.

The magnitude of public spending for scientific literature

Data gathered and presented by EUA in its 2018 report on 'big deals' with scientific publishers, i.e. large contracts with big academic publishing companies comprised of a broad portfolio of journals or other products, indicated a combined expenditure of EUR 421,047,848 for periodicals, databases and e-books across Europe. Total national expenditure on these contracts varies widely from EUR 1,410,937 to EUR 97,542,034 per annum. It is also important to bear in mind that these figures aggregate only the three most expensive contracts for these three types of resources. The indicated cost estimate is hence conservative. Using GDP/capita figures for all countries covered by the survey, we estimated the number of persons required to work for a full year to bear the reported Big Deal expenditures per country. This ranges from costs equal to 31 persons working an entire year in the lowest case to 2494 persons in the highest case. As total national expenditure and the relationship between national big deal expenditure and national GDP very rarely match, no simple, straightforward connection between total national big deal expenditure and national GDP can be drawn. Pricing for 'big deals' is, in other words, determined by a multiplicity of factors which remain largely opaque to public authorities, research funding organisations and universities despite bottom-up initiatives to independently collect data such as Hybrid OA Journal Monitor, Jisc Monitor, Open APC, OpenAIRE.

Concentration in the market for scientific publishing and its pitfalls

In contrast, evidence discussed already in 2003 by Bas Savenije shows that increasing concentration in scientific publishing through mergers and acquisitions did not lead to price decreases which could be expected as a result of economies of scale, but rather resulted in price increases (Savenije 2003, 213-215). A recent analysis in 2015 of 45 million documents indexed in the Web of Science database confirmed this trend by demonstrating that Reed-Elsevier, Wiley-Blackwell, Springer, and Taylor & Francis were jointly responsible for more than 50% of all papers published in 2013 (Larivière et al. 2015, 5). Larivière et al. continue to show that profit margins for Springer Science + Business Media in 2012 were at 35%, for John Wiley & Sons Scientific, Technical, Medical and Scholarly division at 28.3% and Taylor and Francis at 35,7%, "putting them on a comparable level with Pfizer (42%), the Industrial & Commercial Bank of China (29%) and far above Hyundai Motors (10%)" (Larivière et al. 2015, 10).

Advances in digital technologies throughout the last decades have also reduced marginal costs in academic publishing. As noted by Savenije (2003, 212) and Larivière et al. (2015, 12) cost categories related to activities such as typesetting manuscripts, printing copies of journals and distributing them to subscribing institutions are decreasing and are more and more being replaced by digital production and distribution methods with marginal costs close to zero. Data from the aforementioned 2018 EUA report on 'big deals' demonstrates, however, that annual price increases for 'big deal' contracts were ranging between 2% to 4% in more than a third of cases reported in the study (EUA 2018, 13). At the same time, the average harmonised inflation in Europe grew from 0.24% in 2016 to 1.54% in 2017. Annual price increases for 'big deals' do not correspond to trends in inflation development. This leads us to believe that universities and their researchers are facing an oligopolistic market with limited competition and non-transparent pricing mechanisms.

A veil of opacity: the status of non-disclosure agreements

The situation is further exacerbated by non-disclosure agreements included in 'big deal' contracts by publishers. Information on prices, their composition, the exact range of journals and other services offered by publishing companies is distributed asymmetrically between buyers and sellers. Bearing in mind that buyers are largely spending public funds, fulfil a public mission and are accountable to the public for their actions, it is highly problematic to demand them to sign non-disclosure clauses inhibiting transparency and stifling competition. Legislators and courts in a number of countries where freedom of information acts are in place increasingly acknowledge this difficulty. In fact, countries such as the Netherlands or Finland publish contracts nullifying non-disclosure agreements. Italy also makes contracts available and in Slovenia national public procurement legislation stipulates that signed contracts with publishers must be available in the national public procurement portal. As long as these initiatives remain limited to select countries across Europe, progress will remain slow and transparency piecemeal. EUA therefore calls on DG Competition to investigate the market for scientific publishing on the European level. This investigation promises to increase the cost efficiency of scientific publishing and could lead to a closer alignment between scientific publishing and the interests of scientific communities and research organisations. EUA has been actively pursuing this objective since the release of its Roadmap on Open Access to Research Publications in February 2016.

Immobilising researchers: non-substitutability of journals and transfer of ownership for research results

In addition to the arguments described above, research by Theodore C. and Carl T. Bergstrom (Bergstrom / Bergstrom 2004) underlines that journals and articles are non-substitutable goods. A request for a specific article by a researcher cannot be satisfied through access to another article. Yet traditional pricing mechanisms in classic economic theory operate on substitutability. Bergstrom / Bergstrom concluded in their article more than a decade ago "[b]ecause of this lack of substitutability, commercial publishers of established second-rank journals have substantial monopoly power and are able to sell their product at prices that are much higher than their average costs and several times higher than the price of higher quality, non-profit journals." (Bergstrom / Bergstrom 2004) Some scholars refer to each academic journal being a "natural mini-monopoly" undercutting market feedback (Suber 2012, 39).

Another important factor cementing the strong position of large publishers and limiting researchers' abilities to share their results widely and create new insights in open exchange with their peers stems from transferral of ownership at the request of academic journals. While researchers perform free of charge the twin roles of producers and purveyors of the quality of new knowledge, ownership is traditionally transferred to publishers for commercial exploitation. Researchers are exchanging ownership against prestige, i.e. real value against symbolic value (cf. Eve 2014, 44-55).

Copyright legislation on the level of member states increasingly redresses the balance by effectively limiting embargo periods for research outcomes, e.g. in France in 2016 through its law on a digital republic or in the Dutch 'auteurswet' (for an analysis of the latter, cf. Visser 2015). Institutional leadership of universities across Europe also identified the detrimental effects of an overreliance on journal impact factors and 'publish or perish' principles by adopting in 2018 the EUA Roadmap on Research Assessment in the Transition to Open Science. Despite these recommendations and efforts, recent data by Piwowar et al. (2018) shows that in practice 72% of scholarly literature remains locked behind paywalls. It is safe to surmise that for most of these cases ownership was transferred from researchers to publishers. Combined with the insight of Larivière et al. (2015) that a majority of academic journals is controlled by only five large publishing companies this points to the need for an in-depth investigation of competitive forces in scientific publishing.

Inelastic demand and high entry barriers: further factors impeding competition

More than fifteen years ago, the 2002 statement by the Office of Fair Trading on the market for scientific, technical and medical journals in the United Kingdom also indicated additional features characteristic of the scientific publishing market: inelastic demand and high barriers to enter the market. On the former, the statement explained that "[m]any journals have a particular reputation or specific focus in the subject matter that they cover, and there is often an unwillingness of researchers or institutions to substitute a cheaper journal. The price sensitivity of demand for many journals is thus very low and journals are generally perceived as competing on quality rather than price." (OFT 2002, 15) On the latter, OFT noted that establishing and securing a strong reputation for a new journal "is very difficult", while the limited budget of libraries on the demand side also posed "an immediate barrier to establishing a new journal successfully" and "the most highly regarded journals attract the most eminent experts in a field" leading to a "positional advantage" against new rival journals (Ibd., 15f.; cf. also Eve 2014, 50, 55 and Johnson et al. 2017, 27-31).

Journal impact factors and quantitative research assessment: a big trump for large publishers

While journal impact factors were initially devised in the 1970s as a bibliometric tool to assess different journals within a specific field of research, this instrument was increasingly used as a proxy to assess the merits of researchers. Research career assessment and funding decisions were taken by preponderantly looking at publication venues instead of publication contents. Researchers adopted this logic bolstering the power of a select number of journals in any given field and increasing their dependency on these flagship journals and their commercial owners. This led to exorbitant price increases, the 'serials crisis' since the 1990s (cf. Panitch/Michalak 2005) and presently into deadlock of the relationship between large scientific publishers and research performing organisations, e.g. in Germany or Sweden. New approaches to research assessment must hence be developed that include quantitative and qualitative elements. As recently stated in the EUA Roadmap on Research Assessment, 'EUA is committed to encouraging and supporting changes in research assessment based on peer-review and precise article-level metrics that contribute to a fairer and more transparent evaluation of research.' (p. 2). An analysis of the scientific publishing market must consequently plot journal impact factors onto ownership of periodicals to gain more insight into the field of forces dominating the sector.

Injecting competition into an oligopoly? Initiatives for open publishing platforms

Growing discontent with the status quo of the scientific publishing market can also be observed in recent initiatives by private foundations and the European Commission's own Directorate-General for Research and Innovation (DG RTD). Wellcome Open Research was launched by the Wellcome Trust in autumn 2016 offering an author-driven publishing platform open for a broad range of contributions. In spring 2017 the Bill and Melinda Gates Foundation followed suit and launched Gates Open Research. In spring 2018 DG RTD ran a tender for Open Research Europe an open research publishing platform modelled on the initiatives started by the Wellcome Trust and the Gates Foundation. While it is hoped that these initiatives will develop momentum and will eventually result in more diversity of scientific publishing, an accompanying analysis by DG Competition on the structure of the scientific publishing market promises to lead to an increase of transparency and efficiency in this market segment. As noted in past EUA statements on the subject, the rapidity of research in the digital age and new opportunities for scientific collaboration increasingly challenge traditional ways of publishing resulting in novel and innovative publishing venues and business models. These trends could be reinforced through a comprehensive study of competitive forces in the scientific publishing market.

Inquiries into the market for scientific publishing: litigation on the national level

United Kingdom

The aforementioned 2002 statement by the Office of Fair Trading on the market for scientific, technical and medical journals (OFT 2002, 1) highlighted that the UK market for these journals "may not be working well", "many commercial journal prices appear high, at the expense of education and research institutions" and "it remains to be seen whether market forces [...] will remedy the problems that may exist".

Apparently, the problems may still exist. In 2016 Martin Paul Eve filed a notification of potential monopolistic behaviour to the UK Competition and Markets Authority on anti-competitive practices of the RELX group, owner of Elsevier, on the grounds of abuse of a dominant market position and problems in a market sector based on his own research and other existing literature. His complaint largely revolves around arguments and data also put forth in the present text.

A call to action: towards a comprehensive analysis of scientific publishing in the digital age

While 'big deals' with large publishers of academic journals continue to be the present *modus operandi* across Europe, the business model behind these deals was already criticised fifteen years ago. Savenije (2003, 216f.) emphasised four major negative consequences for a functioning market in scientific publishing:

- "Control mechanisms on demand and supply side disappear. [...]
- There is no possibility to cancel individual titles. [...]
- The chance of effective entry of new titles is low. [...]
- The exit of the smallest publishers is more than likely. [...]
- Increasing problems as a result of mergers: larger publishers offer larger bundles".

These risks have not disappeared, leading some authors to write about "often irrational big deals" (Larivière et al. 2015, 12), and were also taken up recently in a report on a joint 2016 workshop by Science Europe, LIBER and EUA on "Challenging the Current Business Models in Scientific Publishing". Next to an overarching call for more cost transparency in scientific publishing, the report resulted in issuing a number of concrete recommendations, such as redirecting money flows to co-operative or collaborative publishing models; capping funding for article-processing charges; and, exploring alternative funding models for supporting open access journals.

Some of these measures were also taken up in "Plan S", consisting of a coalition of national research funders, with the support of the European Commission which is committed to accelerate the transition to open access by 2020. The key principle of this initiative stipulates that "after 1 January 2020 scientific publications on the results from research funded by public grants provided by national and European research councils and funding bodies, must be published in compliant Open Access Journals or on compliant Open Access Platforms." Plan S demonstrates growing discontent of the scientific community and its funding bodies with big academic publishers and their business models. EUA welcomes and supports this initiative as a step in the right direction. The Association considers, however, that alternative publishing models need to be developed leading to an open, competitive and cooperative scholarly knowledge system with affordable and limited costs for universities.

As highlighted above, expanding profits by only a select number of scientific publishers need to be contrasted with Europe's long-term university funding trends, taking into account that universities fund 48 % of 'big deal' contract payments (EUA 2018, 10). Figures for the 2008-2016 period in the EUA Public Funding Observatory demonstrate that only Austria, Germany and Sweden exhibit a sustainable investment pattern when considering funding trends against student enrolment growth, while 19 countries suffered funding cuts. The European university sector is generally operating under severe financial strains.

EUA believes that action on the European level is necessary echoing a conclusion of the UK Office of Fair Trading in 2002 wishing "to consider whether any action might be best conducted internationally" (OFT 2002, 21) if competition was not improving. A comprehensive analysis of market forces in

scientific publishing in the digital age could increase the transparency and efficiency of this segment, ultimately leading to an open scholarly knowledge exchange system. This open system would offer numerous benefits, such as a better return on public investment in research, increasing societal acceptance and engagement with scientific knowledge in all of its disciplinary variety, improving accountability towards tax payers, accelerating progress of research and innovation through seamless knowledge transfer, enabling interdisciplinary cooperation in addressing global challenges, and, last, not least, creating numerous spill over effects in digital and traditional economies.
On its part, EUA's Roadmap on Research Assessment provides guidance for universities to develop research assessment approaches focusing on research quality, potential and future impact and taking Open Science practices into account. It is expected that these approaches will support universities and researchers to move away from an overreliance on journal impact factors in assessing research outcomes and academic careers. As a consequence, novel approaches in research assessment will contribute to reducing the current dependency of researchers and universities on large academic publishers. This will be instrumental in changing the oligopoly in scientific publishing to a more competitive market segment benefitting research and society at large.

About EUA

The European University Association is the comprehensive umbrella organisation representing more than 800 universities and national rectors' conferences in 48 European countries. EUA plays a crucial role in the Bologna Process and in influencing EU policies on higher education, research and innovation. Responding to the growing importance of Open Science and Open Access the Association set up in 2015 an Expert Group on 'Open Science/Science 2.0' and a High-Level Group on 'Big Deals with large academic publishers'. These groups are comprised of university leadership and experts from more than 20 European countries. Both groups contributed to preparing the present document.

References

Bergstrom / Bergstrom 2004: Bergstrom, Theodore C. / Bergstrom, Carl T. (2004). Can "Author Pays" Journals Compete with "Reader Pays"? Nature: Web Focus: Access to the Literature. Available online at www.nature.com/nature/focus/accessdebate/22.html

EUA 2018: European University Association (2018). EUA Big Deals Survey Report: The First Mapping of Major Scientific Publishing Contracts in Europe. Brussels: European University Association. Available online at https://eua.eu/component/attachments/attachments.html?id=358

Eve 2014: Eve, Martin Paul (2014). Open Access and the Humanities: Contexts, Controversies and the Future. Cambridge: Cambridge University Press. DOI: http://dx.doi.org/10.1017/CBO9781316161012

Johnson et al. 2017: Johnson, Rob / Fosci, Mattia / Chiarelli, Andrea / Pinfield, Stephen / Jubb, Michael (2017). Towards a competitive and sustainable OA market in Europe - A study of the open access market and policy environment. Brussels: Research Consulting. DOI: http://doi.org/10.5281/zenodo.401029

Larivière et al. 2015: Larivière, Vincent / Haustein, Stefanie / Mongeon, Philippe (2015). The Oligopoly of Academic Publishers in the Digital Era. PLoS One. 10 (6), p. 1-15. DOI: https://doi.org/10.1371/journal.pone.0127502

OFT 2002: Office of Fair Trading (2002). The market for scientific, technical and medical journals: a statement by the OFT. London: Office of Fair Trading. Available online at http://webarchive.nationalarchives.gov.uk/20100402140949/http://www.oft.gov.uk/shared_oft/reports/media/oft396.pdf

Panitch/Michalak 2005: Panitch, Judith M. / Michalak, Sarah (2005). The Serials Crisis: A White Paper for the UNC-Chapel Hill Scholarly Communications Convocation, Chapel Hill: University of North

Carolina. Available online at http://wayback.archive-it.org/3491/20180622141722/http://www.unc.edu/scholcomdig/whitepapers/panitch-michalak.html

Piwowar et al. 2018: Piwowar, Heather / Priem, Jason / Larivière, Vincent / Alperin, Juan Pablo / Matthias, Lisa / Norlander, Bree / Farley, Ashley / West, Jevin / Haustein, Stefanie (2018). The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles, PeerJ 6, p. 1-23. DOI: https://doi.org/10.7717/peerj.4375

Savenije 2003: Savenije, Bas (2003). Economic and strategic analysis of scientific journals: recent evolutions. LIBER Quarterly. 13 (3-4), p. 207-221. DOI: http://doi.org/10.18352/lq.7735

Suber 2012: Suber, Peter (2012). Open Access. Cambridge, Mass.: MIT Press. Available online at http://bit.ly/oa-book

Visser 2015: Visser, Dirk (2015). The Open Access provision in Dutch copyright contract law. Journal of Intellectual Property Law & Practice, p. 1-7. Available online at http://www.openaccess.nl/sites/www.openaccess.nl/files/documenten/journal_of_intellectual_property_law_practice-2015-visser-jiplp_jpv161.pdf