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"From Global Indicators to Local Applications"

#STI2022GRX

*Research in progress*

## **STI 2022 Conference Proceedings**

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26<sup>th</sup> International Conference on Science and Technology Indicators | STI 2022

## “From Global Indicators to Local Applications”

7-9 September 2022 | Granada, Spain

#STI22GRX

### Geographic differences in the uptake of diamond open access and APCs

Marc-André Simard<sup>\*</sup>, Isabel Basson<sup>\*</sup> and Vincent Larivière<sup>\*,\*\*</sup>

*\* marc-andre.simard.1@umontreal.ca; isabel.basson@umontreal.ca; vincent.lariviere@umontreal.ca*  
École de bibliothéconomie et des sciences de l’information, Université de Montréal, Pavillon Lionel-Groulx,  
3150 rue Jean-Brillant, Montréal, Québec, H3T 1N8 (Canada)

*\*\** Observatoire des sciences et des technologies, Université du Québec à Montréal, Pavillon Paul-Gérin-Lajoie,  
1205 rue Saint-Denis, Montréal, Québec, H2X 3R9 (Canada)  
DST-NRF Centre of Excellence in Scientometrics and STI Policy; and Centre for Research on Evaluation,  
Science and Technology, Stellenbosch University, Krotoa Building, 52 Ryneveld Street, Stellenbosch, Western  
Cape, 7600 (South Africa)  
School of Public Policy, Georgia Institute of Technology, D.M. Smith Building, 685 Cherry Street, Atlanta,  
Georgia, 30332 - 0345 (USA)

#### Introduction

Article processing charges (APCs) have been often regarded as the elephant in the room of open access (OA) publishing. While the Budapest Open Access Initiative (2002) initially advocated for a new generation of OA journals that would find alternative sources of revenue, APCs have become one of the most important sources of OA funding, especially among for-profit publishers. These processing charges have garnered criticisms from the scientific community, especially for their sometimes colossal prices ranging as high as \$11,500.00 USD for some publishers (Else, 2020), which is likely to exclude early career researchers, researchers from low-income countries (Carling et al., 2018), or those from specific disciplines (Chan et al., 2019).

The diamond OA model, in which scientific publication are free for both authors and readers alike (Bosman et al., 2021), was recently reintroduced by OA advocates to promote “non-commercial publishing models for Open Access” (cOAlition S, 2020). Despite concerns about their quality (Suber, 2009), their sustainability (Bosman et al., 2021; Suber, 2009), and their overall lower scale and outputs (Bosman et al., 2021), these smaller community-based diamond journals could represent an adequate alternative from the expensive gold journals, especially in a context where more prestigious gold journals from for-profit publishers have been charging more and more (Butler et al., 2022; Siler & Frenken, 2020).

This research in progress paper aims to provide a global picture of the current state of the adoption of gold (including their APCs) and diamond journals based on their geographic location and their associated country income. More specifically this paper aims to answer the following research questions:

Q1. What is the growth of gold and diamond journals in the Directory of Open Access Journals (DOAJ) between 2015 and 2020?

Q2. What is the share of gold and diamond journals among the various income groups and geographical regions?

Q3. How much APCs do authors have to pay to publish in a journal based on their income groups or their geographical region?

### Methods

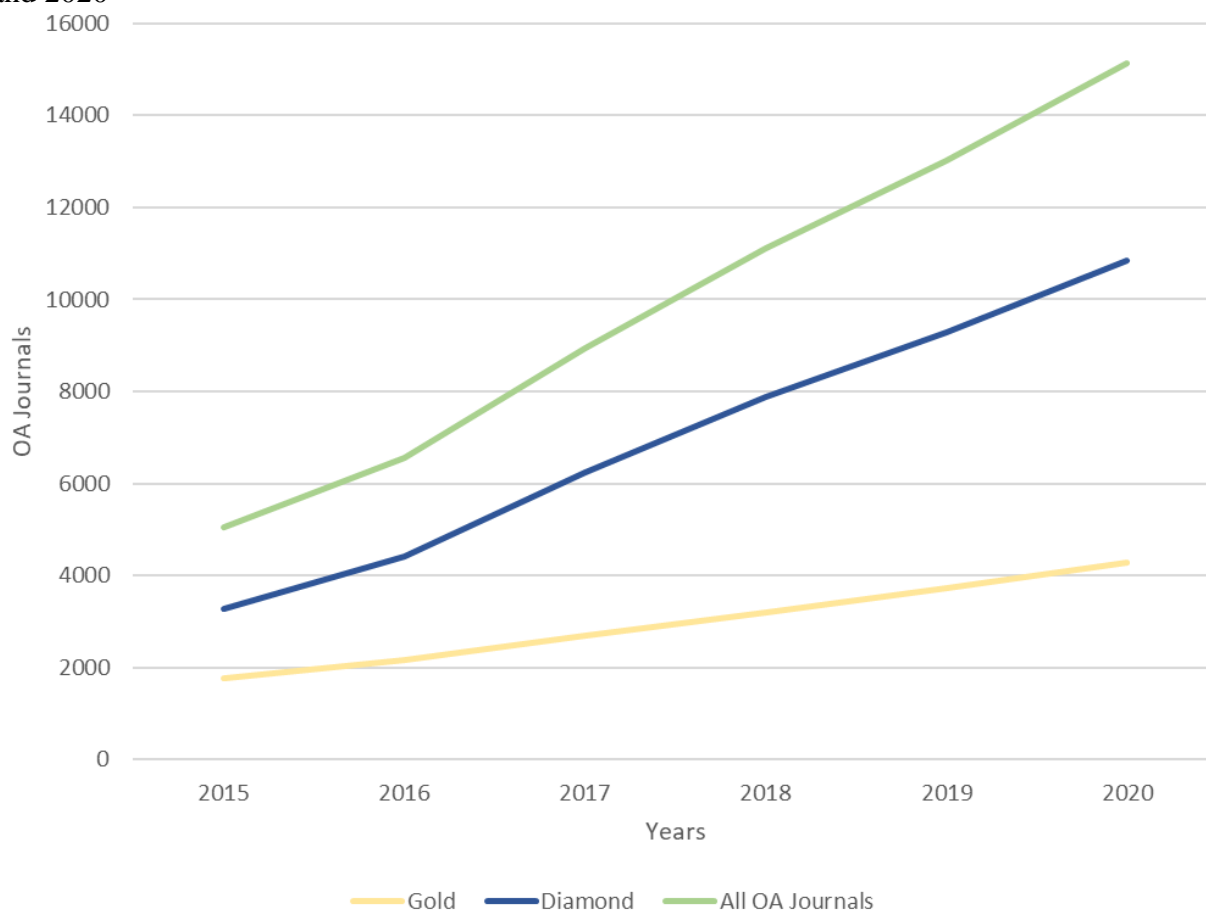
We extracted journal metadata (country, APC information and dates added) from the DOAJ Public Data Dump (<https://doaj.org/docs/public-data-dump/>) from 2021-10-27, which resulted in a total of 17,050 journals from 129 different countries with APCs ranging from \$0.00 to \$6,000.00 USD. We separated these journals into two categories based on if they charged APCs (gold) or not (diamond), which gave us a total of 4,980 gold and 12,070 diamond journals. We converted the global costs of APCs to USD using the global exchange rate from 2021-10-27 to allow for more accurate comparisons between countries. We also used the World Bank's 2021–2022 country classifications to classify the journals based on their country's income level. Journals from Venezuela were removed from the analyses based on income groups since Venezuela has been temporarily unclassified by the World Bank (2021), pending release of revised national accounts statistics. Journals from low-income countries were also removed from the income analyses since they were underrepresented compared to the other income groups ( $n = 23$ ). We further classified the journal publisher's countries by geographical regions using UNESCO's Regional Electoral Groups (UNESCO, 2022). For the geographical analyses, all the countries were matched, and thus both low income and Venezuelan journals were included in the geography-based analyses. Descriptive statistical analyses were produced from this dataset.

### Results

#### *Growth of OA Journals*

Figure 1 shows the growth of OA journals indexed in the DOAJ between 2015 and 2020. Overall, the number of journals indexed, including those that were removed from the income-based analyses, has gone from 5,039 in 2015 to 15,137 in 2020, which represents a growth of over 300%. Over the same period, the number of gold journals has grown from 1,762 in 2015 to 4,287 in 2020 (growth of 243.3%), while diamond journals have grown from 3,277 in 2015 to 10,850 in 2020 (growth of 331.1%).

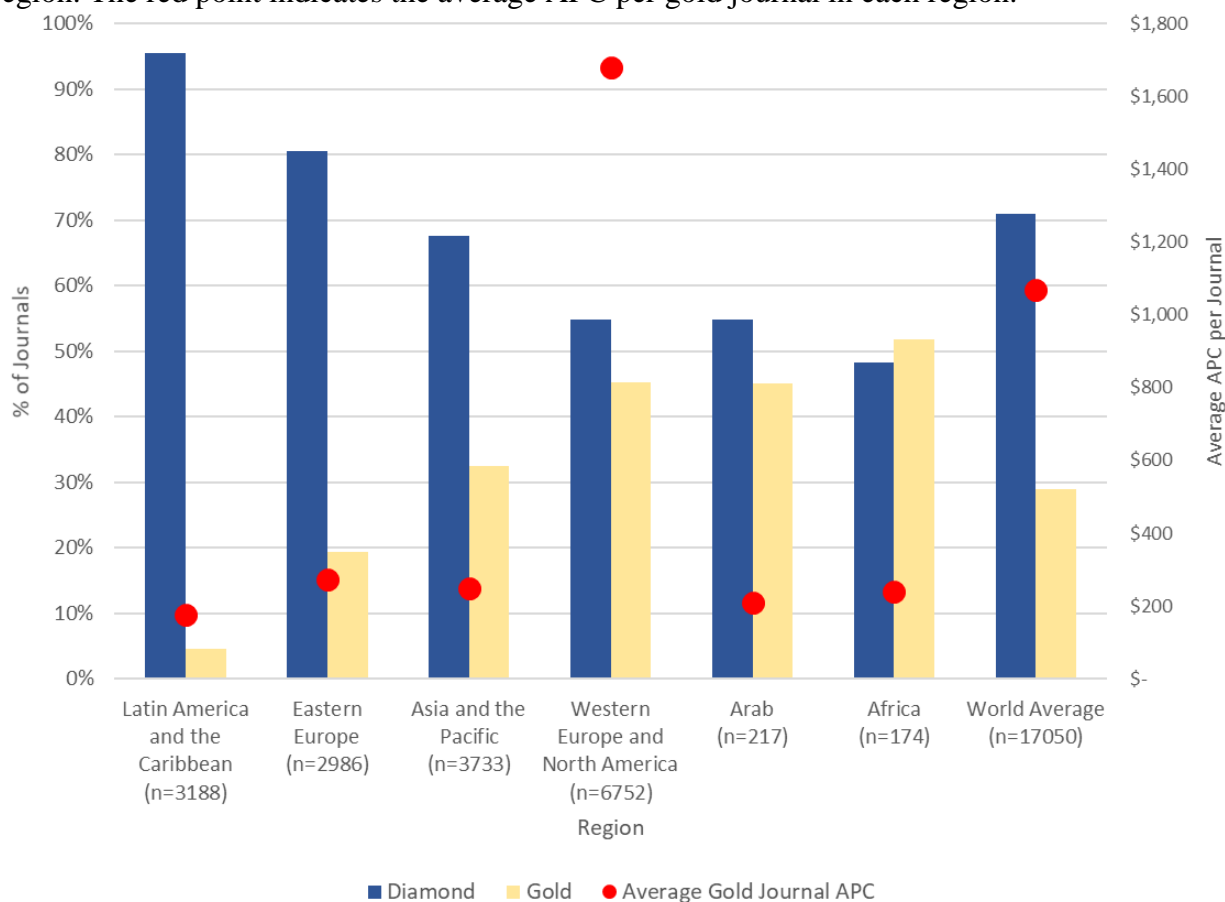
Figure 1. Growth of Open Access Journals per Model in the DOAJ between the years 2015 and 2020



### *Regional Differences in Article Processing Charges*

Figure 2 shows both the shares of gold and diamond OA journals per geographical region, and the average APC per gold journal in each of these regions. On average, 71% of the OA journals indexed in the DOAJ did not have APCs (diamond). There are some large differences between the various geographical regions, ranging from a share of 48% diamond journals in Africa to 95% in Latin America and the Caribbean. Western Europe and North American journals remain under the world average with a share of 55% diamond journals, while Eastern Europe, Asia and the Pacific and Arab states have a share of 81%, 68%, and 55% respectively. Looking at the APCs, the average charged by gold journals (29% of all journals) is \$1,068.62 per article. However, this average APC paid is fairly skewed by Western Europe and North American journals who charge on average \$1,679.00. The average APC by journals outside Western Europe and North American remains generally consistent among the other regions, ranging from an average of \$176.72 in Latin America and the Caribbean to \$271.79 in Eastern Europe.

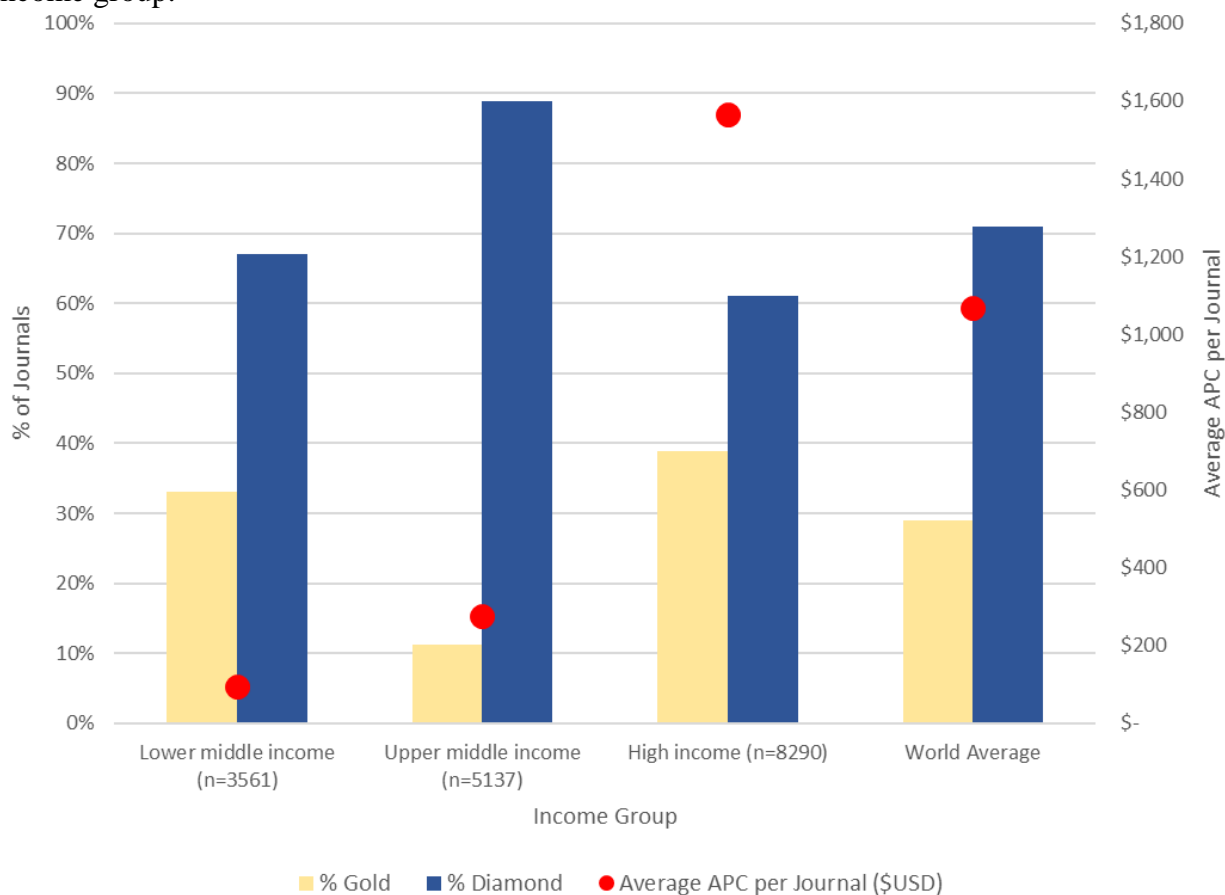
Figure 2. Share of gold and diamond OA journal indexed in the DOAJ per geographical region. The red point indicates the average APC per gold journal in each region.



### *Income Group Differences in Article Processing Charges*

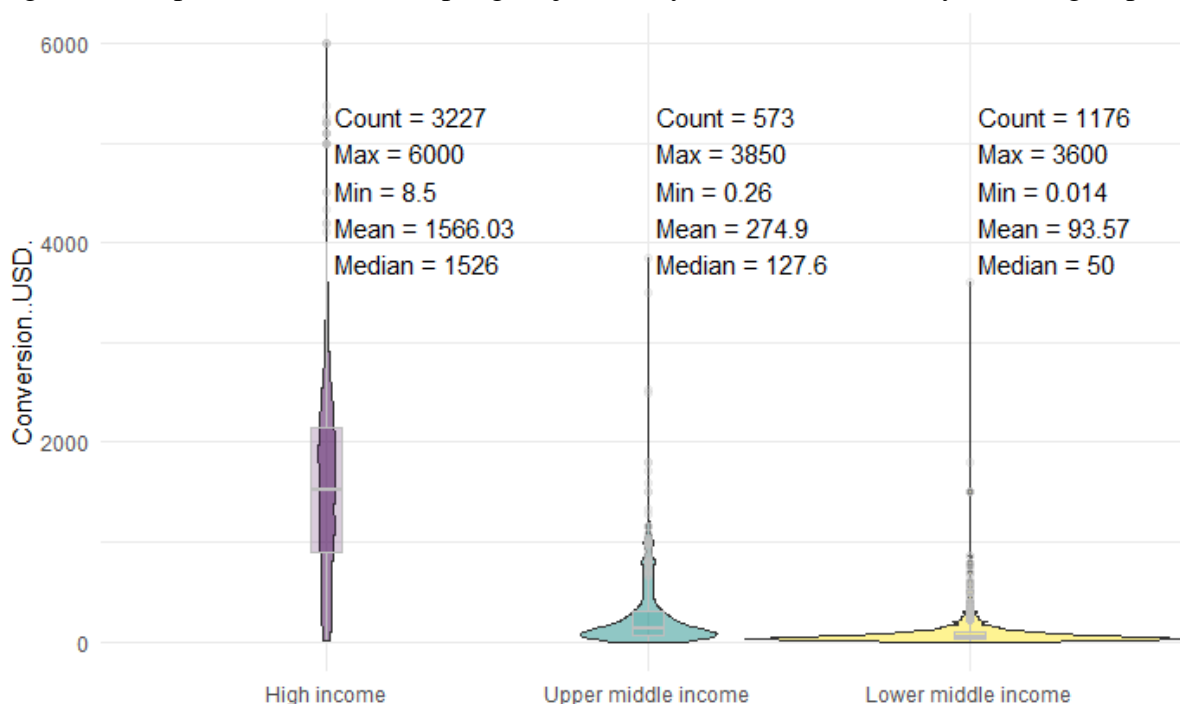
Figure 3 shows both the shares of gold and diamond OA journals per World Bank country (low-income countries removed) income group and the average APC per gold journal in each of these income groups. Results show large differences between the various income groups, ranging from a share of 61% diamond journals in high-income countries to 89% in upper-middle-income countries. As previously stated, the average APC by gold journals is \$1,068.62. Once again, this average APC paid is fairly skewed by journals from high-income countries who charge on average \$1,566.00 to publish in a gold journal. Gold journals from lower middle income and upper-middle-income countries charge on average \$93.57 and \$274.90 respectively for a publication.

Figure 3. Share of gold and diamond OA journals indexed in the DOAJ based on their World Bank country income group. The red point indicates the average APC per gold journal in each income group.



The distribution of APCs also differs substantially (Figure 4) between the three income groups with the mean and median APC for journals from high-income countries being very similar ( $M = \$1,566.03$ ,  $Mdn = \$1,526.00$ ), and for the other two income groupings this distribution is skewed to lower APCs (Upper-middle income:  $M = \$274.90$ ,  $Mdn = \$127.60$ ; Lower middle income:  $M = \$93.57$ ,  $Mdn = \$50.00$ ).

Figure 4. Boxplot of APC in USD per gold journal by World Bank country income group



### Discussion and conclusion

Geographical and income level analyses have shown that gold OA journals tend to be much more expensive in the Western world and in richer countries compared to other regions where APCs are generally much cheaper and skewed by a minority of expensive journals (Figure 4). Despite that, APCs often dominate the conversation regarding the sustainability and affordability of OA publishing. However, this ignores the funding models that the vast majority of DOAJ listed journals (71%) are using as they do not charge APCs. These diamond journals have also increased at a higher rate than their APC-based counterparts. Differences in the adoption of diamond OA may be observed between regions with Latin America achieving close to 100% diamond OA through regional initiatives such as the SciELO platform. While problems related to the perceived quality of diamond journals persist among researchers, our results shows that the Western APC-based way to do OA does not have to be the only way for researchers.

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