

**CONSULTATION DRAFT –
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**Developing a globally fair pricing model
for academic publishing**

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informationpower

commissioned by
cOAlition S



Plan S

Making full & immediate
Open Access a reality

Developing a globally fair pricing model for academic publishing

Project Background

cOAlition S commissioned [Information Power](#) to explore how a globally fair pricing framework for academic publishing could be devised and implemented. The key objective of this study is to identify ways in which readers and producers of scholarly publications or their proxies - research funders and universities - can financially contribute to supporting the academic publishing services valued by their research communities as a function of their means in a manner that is globally equitable and sustainable.

The current pricing practices in publishing models do not currently serve regional and global equity, as they do not reflect equitable standards such as local purchasing power. Admittedly, some researchers may qualify for discounts or waivers, but practices differ widely and can be confusing or opaque and this approach is perceived as patronizing and neocolonial. They are a mechanism unilaterally controlled by publishers and do not afford any agency to the stakeholders who are paying for publishing services.

The transition of academic publishing from the subscription model to open access has shifted payments for publishing services from readers to producers of knowledge. Although this transition makes publications accessible to readers globally, many authors and institutions worldwide do not have access to publishing in journals whose prices they cannot afford.

About this Document

Information Power, on behalf of cOAlition S, has developed a fairer global pricing framework and tool, based on open and transparent data, that can be used across the spectrum of publishing business models. We are consulting with the broader community about the framework and tool while *in draft*. Based on feedback received during the consultation, Information Power will finalize the framework and tool for cOAlition S.

From the outset, it has been clear that we will not be able to come up with a single approach that will be objectively and perfectly equitable – simply because such a thing is impossible. It is worth acknowledging this from the start. We need to be aware from the start that *any* model will be intrinsically riddled with compromises and approximations.

Our job is to make those compromises transparent and reasonable and show what sort of effect size errors in the approximations will have so that people can make their own judgments. We

want to present an approach that is demonstrably and measurably fairer than the present system, and then publishers (and other service providers) can decide whether it's possible and desirable to adopt. The stakeholders that pay for publishing services can also decide if they support the framework and want to use it in their negotiations with publishers.

There may be some points on which publishers or those that pay for publishing services will need or want to make their own judgments. The more users can tailor the framework to their own needs, the more likely they are to adopt it. Of course, the more changes there are, the less consistency and transparency there will be.

What we ultimately seek to deliver is inspiration for publishers (and other service providers) to adopt more equitable approaches to pricing and a practical approach and tool to help them achieve this.

Why is this important?

There is a very wide array of business models for open access¹ and other types of publishing and increasing concern that adjustments are needed to make the system more equitable (see Appendix 5). While some business models would appear to be more equitable than others, the application of Purchasing Power Parity (see definition below) can only aid in making any of them more equitable, enabling greater participation and transparency.

APC waivers and discounts are often used to make the system fairer and while appreciated, have also triggered significant concerns. They are seen as a form of charity and viewed as intrinsically untransparent, condescending, and undermining solidarity in the global research community.

There are concerns around transparency in terms of who is paying what. As one participant from the Global South put it in the same OASPA workshop, "By talking about giving equal access to the Global South, are we creating an inequitable situation for the Global North? Where is the math? I cannot calculate. So, we have to think of both ways. When are we creating an equitable world, are we creating inequity for some other part of the world?"

What is Purchasing Power Parity and why is it important?

Purchasing Power Parity is a concept: it is more equitable to charge different prices for the same goods/services based on factors varying by country. A concept that if applied to scholarly publishing could lead to greater diversity and inclusivity in scholarly publishing.

¹ Wise, A., & Estelle, L. (2020). How society publishers can accelerate their transition to open access and align with Plan S. *Learned Publishing*, 33(1), 14-27. <https://doi.org/10.1002/leap.1272>

There is some tension between differentiated pricing and calls, by the same stakeholders, for cost-based pricing. Is it really seen by all stakeholders as acceptable for publishers to charge different authors different amounts when the cost of publishing their articles is roughly the same? Differentiated pricing approaches are already used in academic publishing, with publishers charging different subscription prices for the same content in different countries. However, the calculation of these price differentials has not been based on a shared framework but has been up to each individual publisher, depending on their drive for sales in different countries or the negotiation power of customers.

Transparency is thus a fundamental missing ingredient from current, less equitable, practices. A new framework for more equitable differential pricing for publishing services must be based on reliable and open data and be fully transparent.

Components of the Fair(er) Pricing Framework

To develop a framework that moves from this ideal PPP concept to real-world practice we have used Purchasing Price Indices (PPIs), weighted bands, and exchange rates. We have also provided a Fairer Pricing Tool to enable others to develop their own pricing based on a shared PPI but with different bands and weights.

What is a PPI?

Purchasing Price Indices (PPIs) were developed for analysis rather than price setting, and therefore we are deploying PPIs in a novel way. Their primary use is a means of comparison between economies, and they weren't envisaged as a tool for setting comparative prices². This helpful image is from that World Bank page on the uses (to date!) of PPIs:

² Note that vocabulary is not settled, and in the footnotes to this report you will encounter varied acronyms and diversity in how shared acronyms are expanded. Further context is provided at this link, but note that they use PPPs where we use PPP, and PLIs where we use PPI: https://www.worldbank.org/en/programs/icp/brief/VC_Uses.

Recommended uses:

- To make spatial comparisons of GDP and its expenditure components.
- To make spatial comparisons of price levels.
- To group economies by their volume indexes and price levels.

Recommended uses with limitations:

- To analyze changes over time in relative GDP per capita and relative prices.
- To analyze price convergence.
- To make spatial comparisons of the cost of living.
- To use PPPs calculated for GDP and its expenditure components as deflators for other values.

Uses not recommended:

- As a precise measure to establish strict rankings of economies.
- As a means of constructing national growth rates.
- As a measure to generate output and productivity comparisons by industry.
- As an indicator of the under- or overvaluation of currencies.
- As an equilibrium exchange rate.

Which PPI to use?

Any PPI will be derived from a selection of local costs and prices combined in some defined way. Using that as a proxy for the ability to pay for goods or services that are produced or provided elsewhere is just that – a proxy measure, and it is reasonable to expect that reasonable people may have different views about the extent to which any given PPI is a reasonable proxy.

If we could somehow have a PPI tailored exactly to the investment in or costs of doing research in any country, calibrated to regional wealth variations within countries, and updated daily, this would be ideal. However, there is no such PPI (perhaps that task can be tackled later!) and if there were there would still be any number of other unknown variables. Within any given country there could be variations between funders in what they are willing to finance in terms of publications, differences between well-resourced and less-well-supported universities, and big

differences in support for research in different subject areas. No single approach will be able to bridge all these differences and deliver global equity in one magical, wonderful step.

Our job in developing a fair(er) pricing framework is to make those compromises transparent and reasonable and show what sort of effect size errors in the approximations will have so that people can make their own judgments. We want to present a framework that is demonstrably and measurably fairer than the present system, and then publishers, service providers, funders, librarians and consortia can decide whether it's possible and desirable to adopt.

We evaluated the Big Mac, Eurostat/OECD, ICP/World Bank, Numbeo, and United Nations Statistical Department PPIs on the basis of update frequency, countries covered, methodology, and data quality (see Appendix 1). It quickly became apparent that coverage was best with the ICP/World Bank data. While the Numbeo index has data for c. 140 countries the data are skewed toward the richest cities in those countries.

The next challenge to overcome is that there is not only one ICP/World Bank PPI but rather a series of 47 different PPIs, of which 11 (those ticked below) looked relevant to our cause:

<input checked="" type="checkbox"/> 100000:GROSS DOMESTIC PRODUCT	<input type="checkbox"/> 1101000:FOOD AND NON-ALCOHOLIC BEVERAGES
<input type="checkbox"/> 1101100:FOOD	<input type="checkbox"/> 1101110:Bread and cereals
<input type="checkbox"/> 1101120:Meat	<input type="checkbox"/> 1101130:Fish and seafood
<input type="checkbox"/> 1101140:Milk, cheese and eggs	<input type="checkbox"/> 1101150:Oils and fats
<input type="checkbox"/> 1101160:Fruit	<input type="checkbox"/> 1101170:Vegetables
<input type="checkbox"/> 1101180:Sugar, jam, honey, chocolate and confectionery	<input type="checkbox"/> 1101190:Food products n.e.c. (Class)
<input type="checkbox"/> 1101200:NON-ALCOHOLIC BEVERAGES	<input type="checkbox"/> 1102000:ALCOHOLIC BEVERAGES, TOBACCO AND NARCOTICS
<input type="checkbox"/> 1102100:ALCOHOLIC BEVERAGES	<input type="checkbox"/> 1102200:TOBACCO
<input type="checkbox"/> 1103000:CLOTHING AND FOOTWEAR	<input type="checkbox"/> 1105000:FURNISHINGS, HOUSEHOLD EQUIPMENT AND ROUTINE HOUSEHOLD MAINTENANCE
<input type="checkbox"/> 1107000:TRANSPORT	<input type="checkbox"/> 1107100:PURCHASE OF VEHICLES
<input type="checkbox"/> 1107300:TRANSPORT SERVICES	<input type="checkbox"/> 1108000:COMMUNICATION
<input type="checkbox"/> 1111000:RESTAURANTS AND HOTELS	<input type="checkbox"/> 1113000:NET PURCHASES ABROAD
<input checked="" type="checkbox"/> 1300000:INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT	<input checked="" type="checkbox"/> 1400000:COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT
<input type="checkbox"/> 1500000:GROSS CAPITAL FORMATION	<input type="checkbox"/> 1501000:GROSS FIXED CAPITAL FORMATION
<input type="checkbox"/> 1501100:MACHINERY AND EQUIPMENT	<input type="checkbox"/> 1501200:CONSTRUCTION
<input checked="" type="checkbox"/> 1501300:OTHER PRODUCTS	<input type="checkbox"/> 1502000:CHANGES IN INVENTORIES
<input type="checkbox"/> 1503000:ACQUISITIONS LESS DISPOSALS OF VALUABLES (Category)	<input type="checkbox"/> 1600000:BALANCE OF EXPORTS AND IMPORTS
<input checked="" type="checkbox"/> 9020000:ACTUAL INDIVIDUAL CONSUMPTION	<input type="checkbox"/> 9060000:ACTUAL HOUSING, WATER, ELECTRICITY, GAS AND OTHER FUELS
<input type="checkbox"/> 9080000:ACTUAL HEALTH	<input checked="" type="checkbox"/> 9100000:HOUSEHOLDS AND NPISHS FINAL CONSUMPTION EXPENDITURE
<input type="checkbox"/> 9110000:ACTUAL RECREATION AND CULTURE	<input checked="" type="checkbox"/> 9120000:ACTUAL EDUCATION
<input checked="" type="checkbox"/> 9140000:ACTUAL MISCELLANEOUS GOODS AND SERVICES	<input checked="" type="checkbox"/> 9250000:DOMESTIC ABSORPTION
<input checked="" type="checkbox"/> 9260000:INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS WITHOUT HOUSING	<input checked="" type="checkbox"/> 9270000:GENERAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE
<input type="checkbox"/> SP.EXCHG.RATE.ICP:Exchange Rate Value	<input type="checkbox"/> SP.POP.TOTL.ICP.ZS:Population shares (World=100)
<input type="checkbox"/> SP.POP.TOTL.ICP:Population	

We evaluated these 11 PPIs (see Appendix 2) and found many of them too narrow in terms of the economic sectors they covered. Of the 11, the World Bank 9020000 Actual Individual Consumption would perhaps be our preferred PPI. However, the World Bank GDP is the PPI we decided to go with as it is not much different and covers a much broader range of countries (i.e., 192). It was last updated in 2017 but is scheduled to be refreshed at the end of 2023 and then refreshed every 3 years thereafter. A PPI based on each country's investments in research would have been ideal, but no such PPI exists.

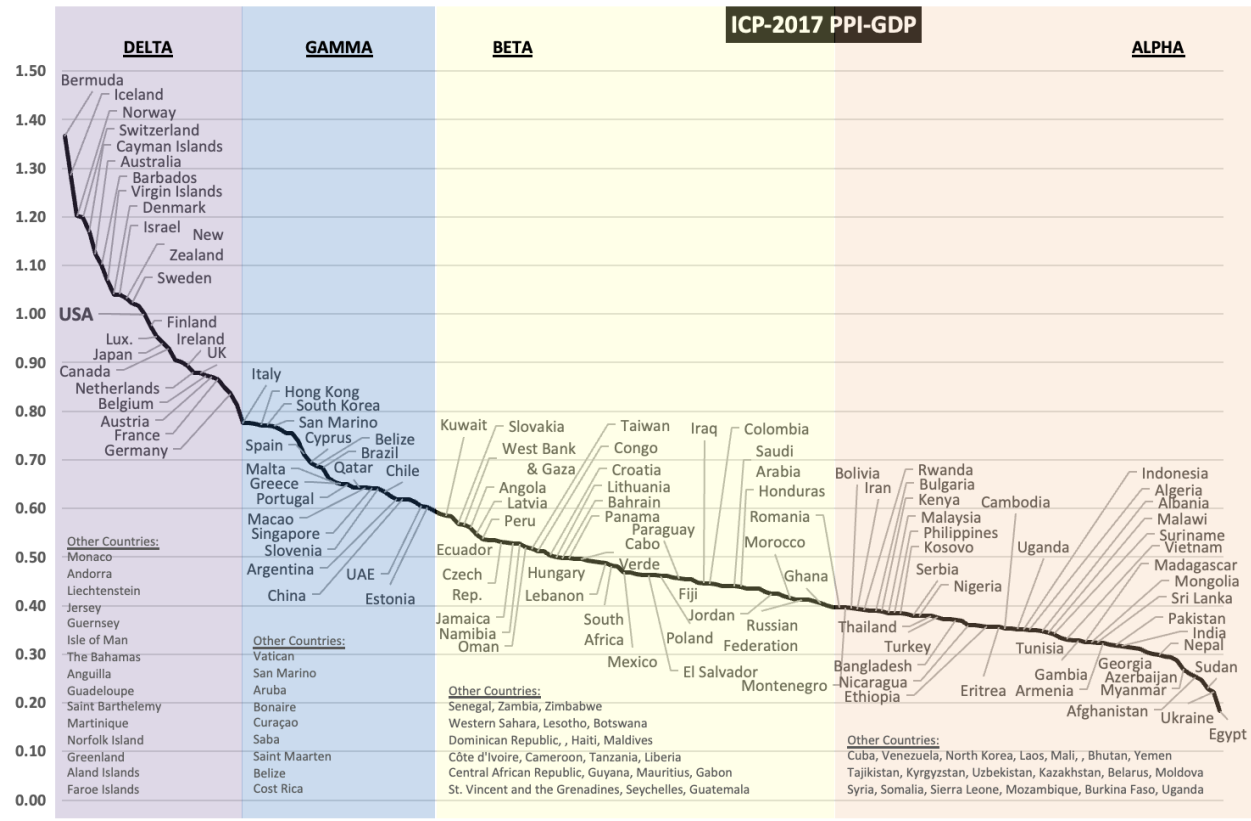
Banding Countries

Banding countries together into groups based on the PPI values makes sense for the following reasons:

- A smaller number of bands is far easier to administer than individual prices for 200+ countries.
- However, banding can be more granular with more bands, or even eliminated altogether so that there is a separate price for each country.
- Although it is tempting to opt for as much granularity as possible, we must recognize that such an approach would not necessarily result in fairer outcomes. The level of granularity adopted for pricing needs to be commensurate with the level of approximation inherent in the framework in the first place.
- Banding introduces a degree of stability in that most detailed changes will occur within a band and not affect the overall picture.
- There are countries not covered by any PPI including the World Bank GDP PPI (although this is the most comprehensive index available). Those countries can be assigned to the bands of the countries most similar in terms of geography and economics.
- As already noted, PPIs are ratios of spending power based on a number of factors, and the relevance of each factor may vary considerably between countries. Banding countries together in groups smooths out any disruptive effects caused by quirks in local circumstances.

The example in Graph A uses four bands, showing countries and their banding on the x-axis and the 2017 World Bank GDP PPI values on the y-axis. This is the banding we recommend using for new services. ***Appendix 3 provides more detail about the Bands, nuances in how they can be used, and guidance on using the Fairer Pricing Tool to explore bands using your own data. We strongly recommend you read this appendix before using the Tool.***

Graph A: An example of banding with four bands



Weighting the Bands

In order to be more equitable, prices need to vary across the bands. Countries in the DELTA Band are wealthier than countries in the ALPHA Band, and it is fair that they do pay more. How to assign weights to the different bands can vary and is something we discuss later in this paper where we propose that for new services, DELTA Band countries pay the list price, GAMMA Band countries pay 80% of the list price, BETA Band countries pay 50% of the list price, and ALPHA Band countries pay 20% of list price.

Note that institutions within each country will also have variable spending power, and so within-country banding may also be needed. We note that banding is already used by some national consortia to allocate different percentages of total publisher invoices across different types of institutions. For example, Jisc banding for UK universities is explained here:

<https://subscriptionsmanager.jisc.ac.uk/about/jisc-banding>. Research4Life also uses bands to determine eligibility for and cost of participation which is explained here:

<https://www.research4life.org/access/eligibility/>.

Banding also helps with the one major outlier in the data. China has a relatively low PPI, at 0.62, and the largest output of journal articles³, so how it is treated has a huge impact on other countries. In recognition of the great disparity of population and wealth within the country, we considered the possibility of assigning separate PPIs to rural and urban parts of China which would have raised the country's PPI from 0.62 to 0.77. We rejected this idea because it is complex and untransparent and because such an exception would open the door to other exceptions based on judgment and discussion rather than objective data.

Exchange rates and currency selection

Exchange rates are also a factor to consider when considering fairer approaches to pricing.

Either a price is set in the publisher's currency of choice and the institution shoulders the risks of currency fluctuation, or a price is set in local currency and the publisher takes the risk. It's not necessary to change, of course, if libraries and publishers are already used to dealing with pricing in one partner's choice of currency and are happy to do so as there is no reason to change what is working for both parties. However, this has been identified as a very significant pain point for libraries in many parts of the world⁴.

It is better (in the sense of being more stable and manageable for institutions in resource-limited countries) for prices to be set in local currency. Publishers are better placed to shoulder the risks of exchange rate fluctuations for two reasons. Firstly, for any given currency the sums involved will represent the entire budget of institutions using that currency, whereas they are likely to represent a small part of the publisher's total revenue. Secondly, the risk to publishers is mitigated by being spread across a wide range of currencies; some fluctuations will disadvantage publishers, but some will benefit them, smoothing the overall impact.

We modelled the impact of this approach and describe this exercise in more detail in Appendix 4. We were surprised that the risk, if mitigated by limiting the use of customer's local currency to some of the bands only, was an order of magnitude less than we had expected it would be.

Here's how it would work in practice:

1. Publisher sets global prices informed by PPP in US dollars (or their normal currency)
2. For the lowest bands, prices are translated into local currencies using the then-current exchange rates (or, for example, a three-month or 6-month average).
3. Fixed prices for all bands are published and transparent.

³ According to Dimensions, China contributed 17% of global gold OA papers in 2022.

⁴ Ellen Tise and Glenn Truran. "Unbuckling the subscription model: a South African perspective." (2019). [open.uct.ac.za
https://open.uct.ac.za/bitstream/handle/11427/30746/Unbuckling%20the%20Subscription%20Model-%20a%20South%20African%20Perspective%20-%206%20December%202019.pdf?sequence=1](https://open.uct.ac.za/bitstream/handle/11427/30746/Unbuckling%20the%20Subscription%20Model-%20a%20South%20African%20Perspective%20-%206%20December%202019.pdf?sequence=1)

4. Publisher issues invoices to customers at the fixed price (in dollars etc. or local currency according to the band).
5. Customers invoiced in dollars etc. bear the cost of any currency exchange.
6. Customers invoiced in local currency convert the amount into dollars for payment.
7. Publisher receives money and bears the risk that the exchange rate has changed between price setting and payment receipt.

The challenges of this approach are:

- There is some extra administrative burden on the publisher (e.g., in reconciling transactions that may differ slightly due to currency conversions and administrative fees).
- It may be unreasonable to expect this from smaller publishers. As publishers already tend to quote in three major currencies, we assume that the larger publishers have some sophisticated mechanisms for dealing with exchange rate fluctuations. Smaller publishers, though, have always been at the mercy of the markets.
- Publishers without financial reserves would face more risk as losing even modest revenue could leave them struggling to support their journal.

Waivers

Would this PPP approach replace the need for any waivers? Yes and no. Yes, in the sense that fairer differentiated pricing that is transparently communicated could be deployed directly by publishers. PPP means that every country has a financial contribution to make, no matter how modest.

However, our approach does not compel publishers to charge in every country, it just helps them do so more equitably if they do charge. Publishers might still choose to waive charges entirely in some countries. They could, for example, decide not to charge countries with a PPI below 0.40, (the ALPHA band in our example) and to only apply the differential pricing to countries with a PPI above that level. Using this framework means that there is no nominal price that must be specifically waived; the price for the band is simply set to zero.

We anticipate that this approach will not remove the need for all waivers. For example, publishers may still be approached for waivers by *unfunded researchers* in any country.

How this framework could be used in practice

We envisage there are at least three ways this model could be used in practice.

As a conversation starter

As this is a complicated area around which reasonable people can reasonably differ - and price is a matter on which publishers can, and should, compete - this framework and the Fairer

Pricing Tool might simply be an inspiration or reference for publishers and other service providers who wish to take a different approach.

Librarians and funders could use the framework and tool as a conversation starter between publishers and other service providers about whether equitable global pricing has been considered, and if so how the approach used aligns or differs from this framework.

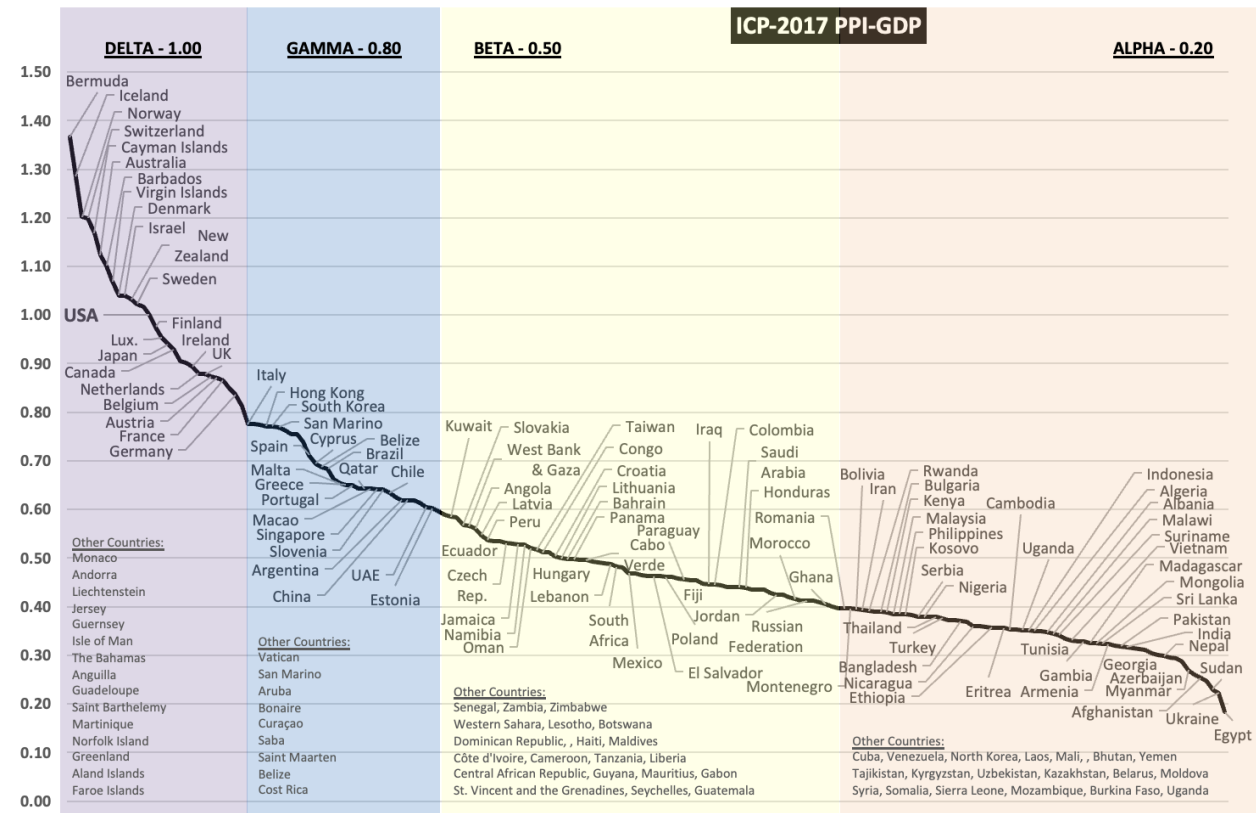
For new services

First, the approach we have developed, and the supporting Fairer Pricing Tool, could be used by a publisher or other service provider to launch entirely new services with equitable pricing from the outset.

If you would like to use an out-of-the-box approach, we suggest:

- DELTA band countries pay x price
- GAMMA band countries pay 80% of x price
- BETA band countries pay 50% of x price
- ALPHA band countries pay 20% of x price

Two ways to visualize this are:



and

Band	PPI range	Band PPI
DELTA	0.8 - 1.37	1.0
GAMMA	0.6 - 0.8	0.8
BETA	0.4 - 0.6	0.5
ALPHA	0.0 - 0.4	0.2

To transition existing services

Any more equitable model will reallocate costs in some way, and the question of how much of the burden of this change should fall on the shoulders of customers and how much on the shoulders of publishers requires discussion. The principle of cost sharing seems a sensible one. If this principle is agreed, it will be important for stakeholders to engage in dialogue to find a mutually agreeable way forward.

Issues that warrant further discussion between stakeholders include:

- Publishers and other service providers will have a current revenue stream that they may seek to retain by moving to this framework and adjusting their base prices. However, publishers could instead contribute to increased equity by decreasing the total amount of revenue they expect. It is important to consider this point because there are possible consequences if we do not. The first is that publishers may not implement the framework at all because they do not want to increase prices for existing customers or because they risk losing revenue from established sources. Alternatively, publishers may implement the framework, but mitigate the risk to their current revenue by introducing higher prices for current customers.
- The new fair price in less well-off countries may be higher than current prices, particularly where there are full waivers. Publishers are not compelled to charge in all countries and could just apply the framework to countries that do not currently receive full waivers.
- Although fairer, stakeholders from countries with a high PPI might find getting additional money to pay difficult or even impossible. Wherever prices rise this fairer approach could therefore be a significant challenge in practice if not in principle and therefore may be unacceptable to some or all customers.

To aid these conversations, let us quantify the size of the problem for the total market, and for four example publishers: two large mixed-model publishers, one medium mixed-model university press, and one medium-sized publisher that is fully open access. (***There is further detail in Appendix 3 which we strongly encourage you to read***).

Using 2022 global article publication data for gold OA papers from the Dimensions database⁵ our analysis indicated that, on average and without banding, list price APCs would need to increase by c. 39% if publishers were to retain their current revenue and implement fair pricing based on PPI. This clear picture is distorted in various ways: for example, the widespread use of full or partial waivers, and discounts negotiated by some consortia and customers because of their wealth, influence, or ability to pilot new approaches. We also assume that fairer pricing is deployed for all business (not just new business), that APC revenue streams are the only revenue streams for these journals, and that there will be no increase in the number of articles published because of more equitable pricing⁶.

The transition of existing services to the fairer pricing framework is where consideration would really need to be given to the pace of change and on how to weight the bands. The ALPHA-DELTA example that we are recommending for new services is **not** banding we recommend for existing services. Existing services need to have a bespoke banding model developed and applied because the geographic spread of current authors will vary. The framework and tool enable this to happen, and for the new bands to be based on the same open transparent PPI.

Some possible variations to consider when weighting bands for an existing service:

1. Base case (no banding)
2. Banding PPIs in 0.1 increments and assigning a PPI to the band based on the mid-point (e.g. all countries with a PPI between 0.5 and 0.6 are banded together and assigned a PPI band value of 0.55)
3. Banding in 0.1 increments by upper limit (as above, but in the example the band value would be 0.6)
4. Bandings in 0.2 increments where band value takes upper limit
5. Bandings in 0.2 increments where band values are more nuanced (there are

⁵ Dimensions defines “gold OA thus: “Publication is published in a fully open access journal (this includes all publications with a Gold OA status in Unpaywall and those on our own fully OA list of journals)”. Note that our calculations primarily concern ratios; if the profile of country splits is similar, variations in precise definitions will have little impact on the estimates. Users of the Fairer Pricing Tool we have developed will be able to use whatever definitions they need to.

⁶ We would sound a note of caution to any funders and libraries who might argue that a fairer approach to pricing could enable publishers to increase their customer base - and therefore revenue - without increasing prices for any customer. Publishers are already actively trying to increase submissions and article numbers. Such an expansion would be exceedingly unlikely to plug the gap. A publisher incurs costs for every paper published, and the average revenue per paper must exceed this cost if a publisher is to stay in business and must exceed it sufficiently for continued investment if they are to thrive.

various possible variations on this, but for example, the topmost and bottom-most band values are based on the mid-band value, while the middle bands take the top of the band range as their value)

6. Bandings are more finely spaced at the top and bottom and are more widely spaced in the middle; the band value takes the upper limit.
7. Limit the top band value so that no country pays more than the default.

Using the Fairer Pricing Tool, you can explore the effects of various types of banding. The percentage figures in Table 1 show the proportional uplift that would need to be applied to the current APC to maintain current total revenues globally and for four publishers.

In example banding 4, the bands are set in increments of 0.2 (i.e., 0-0.2, 0.2-0.4, 0.4-0.6 and so on) and the effective PPI for countries in each band is set to the upper limit of the band (0.2, 0.4, 0.6 etc.). The APCs charged in the USA by Publisher 1 would need to increase by 15% if they wanted to adopt equitable pricing while maintaining current revenue. Publisher 2 would need to increase APCs charged in the USA by 6%, Publisher 3 by 5%, and Publisher 4 by 5%. Rates for other countries would then be set using this new APC as the base, modified by the amended PPI value for that country. That needn't be the way the shortfall is handled, but it indicates the relative size of the issue.

A full description of the set-up for each example banding is given in **Appendix 3**.

Examples of banding set-ups	Total	Publisher 1	Publisher 2	Publisher 3	Publisher 4
1. Base case (no banding)	39%	30%	20%	16%	15%
2. Banding in 0.1, mid-points	39%	31%	20%	18%	17%
3. Banding in 0.1, upper limit	29%	22%	13%	10%	10%
4. Bandings in 0.2, band value takes upper limit	21%	15%	6%	5%	5%
5. Bandings in 0.2, band values more nuanced	27%	19%	9%	9%	7%
6. Bandings in 0.2, band values more nuanced (v2)	26%	18%	8%	8%	6%

7. Bandings more finely spaced at top and bottom, wider in middle, bands take top value	22%	16%	7%	5%	5%
8. Bandings in 0.2, upper limit, top band set to 1 (i.e. nobody pays more than the default US rate).	23%	18%	9%	8%	8%

Table 1. Effects of various types of banding. The ‘Total’ column is for all the publishers in the Dimensions database. We also looked at Dimensions data for four publishers individually: two large mixed-model publishers (Publishers 1 and 2), one medium-sized publisher that is fully open access (Publisher 3), and one medium mixed-model university press (Publisher 4). For each example of banding set-up, the percentages show the proportional uplift that would be required to maintain current revenues.

The detailed settings that generate the examples in Table 1 are shown in **Appendix 3**. In each case the lower and upper limits of each band and the PPI assigned to each country that fall in that band (the Band Value) are given.

The Fairer Pricing Tool

This tool, published alongside this report, allows those interested in implementing this framework to evaluate the effects of doing so. The input required is the number of papers published (or projected) from each country, along with details of the waiver/discount regime currently in effect. The user can then set their own parameters for banding, either trying out custom set-ups that might suit their particular circumstances or choosing from several preset options.

There are two simple outputs. The first output shows any reduction in income that introducing banded differentiated pricing would incur. This is expressed as the percentage by which, for those settings and with that background data, the price would need to increase to maintain present revenues. The second output demonstrates the sort of income fluctuations that would have been seen historically over several successive years had local currency pricing been in force.

Note that, although we have used gold OA data (from Dimensions) in our examples, there is no reason why publishers should not use the tool to derive figures for hybrid OA papers, or indeed for other sorts of pricing (e.g., subscriptions). However, note that it is probably advisable to separate full OA, hybrid, and subscription (or other papers) into different calculations, as the profile of countries from which the papers come most likely vary.

Conclusion

This framework and the accompanying Fairer Pricing Tool are now out to all stakeholders for consultation, and we look forward to your comments and suggestions.

We would really emphasize that a transition to fairer global pricing (following this framework or any other) will need to be done in close dialogue between publishers and their global institutional customers so that the change is transparent and well-supported and the acceptable rules for transition are agreed upon. Open, transparent, mutually agreeable, and flexible approaches are needed.

Transition to fairer and more transparent pricing will take time. It is a complex change, and it takes time to transition economies, mindsets, and systems. Some institutions will be asked to pay more, including those that have never paid for access to scholarly content before. A gradual movement from full discounts and waivers to even deeply discounted payments will be essential. In reality, at least some of these institutions would still not be able to pay anything at all. Publishers might find it helpful to have the flexibility to use PPP in some parts of the world and not others.

Acknowledgments

We have appreciated and learned from the following people as we developed this draft for consultation. We hasten to add that these people may not agree with all of the contents of this document or our approach. Thank you to:

Our Steering Group members

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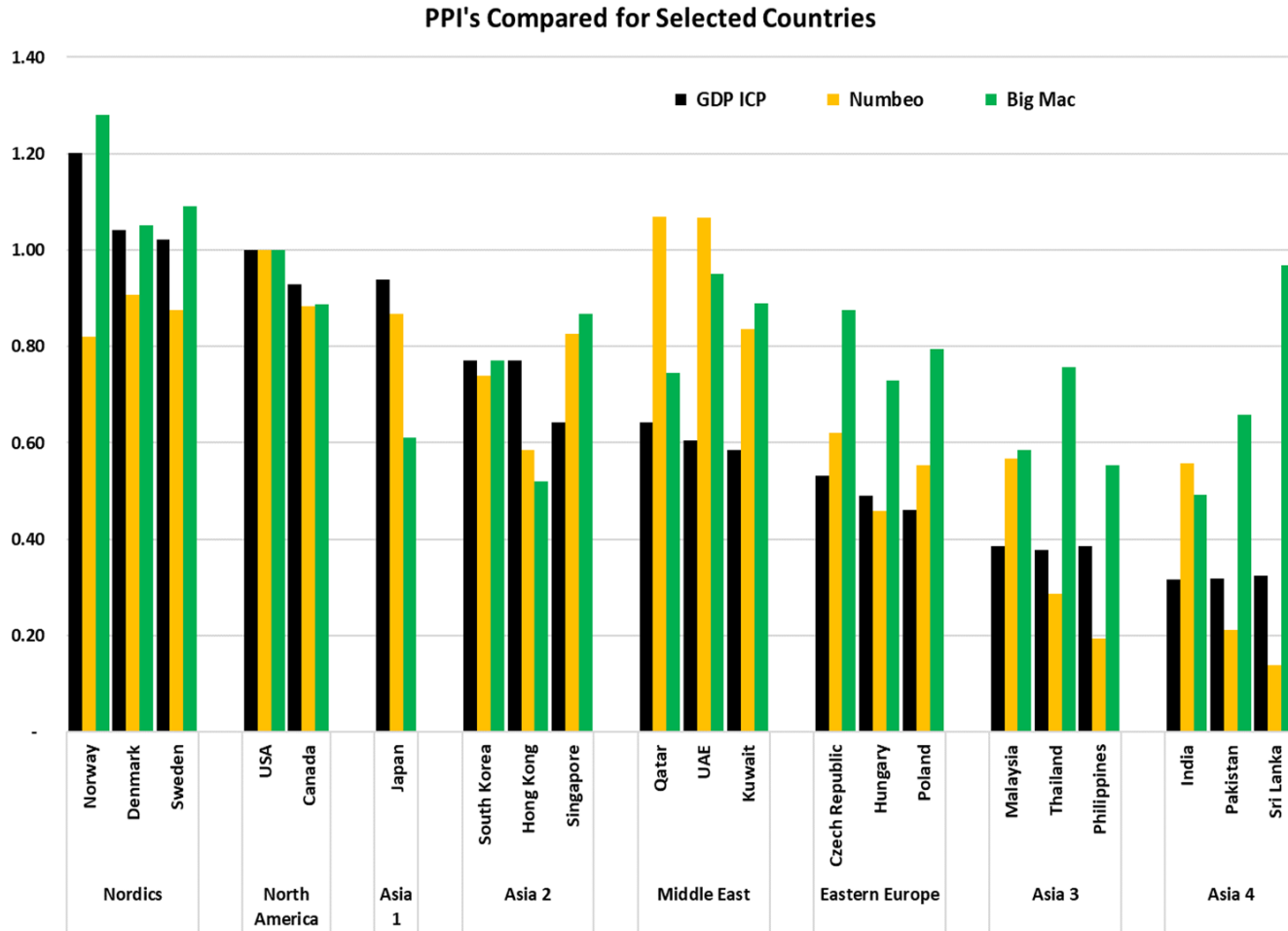
Our interviewees and early readers

Katharina Baier, Rod Cookson, Adam Der, Richard Gallagher, Mandy Hill, Steven Inchcoombe, Malavika Legge, Niamh O’Conner, César Pallares, Kimberley Parker, Frances Pinter, César Rendon, Glenn Truran, Jeremy Upton, Charles Watkinson, and Stuart Whayman.

Appendix 1 - Comparison of PPIs

Comparing PPI's	ICP / World Bank	Numbeo	Big Mac	United Nations Statistical Department	Eurostat / OECD
Coverage / Number of Countries	192, very complete	84, limited coverage particularly in less-populated or less-developed regions	55, some large areas are even taken as 1, like the Eurozone. And, depending on the presence of MacDonald's.	Patchy coverage. Each country has to empower its statistical unit to participate and the country needs to be selected by UN-based researchers for some sort of project in order to be included.	Only EU / member countries. EU36 (all countries coordinated by the OECD).
Update Frequency / Latest Update	Once every 5-6 years, latest end of 2017, new one expected end of 2023 and frequency expected to change to once every 3 years	Does not have a fixed schedule for updates. Parts are updated depending on several factors, including the availability of new user-contributed data and the resources allocated by Numbeo for data maintenance and updates.	Semi-Annual, January & July, latest January 2023.	Very irregular, depending on the ongoing character of the academic research or country necessity.	Yearly in December for the EU36. Yearly estimates for current year in March for the EU27 Member States (based on full use of latest available price data).
Methodology & Limitations	Very sound and consistent method. Extensive on goods & services measured. Part of ICP (International Comparison Program). The indices are based on weighted baskets of goods and services, which may not accurately reflect the consumption patterns and preferences of all different countries.	The user-generated nature of the data means that it may not be a representative sample of the population (self-reporting bias). In general, there is a lack of methodological transparency.	Simplistic Approach: The Big Mac Index relies on a single product, the Big Mac burger. Furthermore, it is an economic indicator produced by a commercial magazine: The Economist.	The System of National Accounts (SNA 2008), provides guidelines and methodologies for calculating PPI's. Academic institutions and National Statistical Agencies utilize these standards to estimate PPI ratios for their respective countries.	Derived from the ICP / World Bank method. More detailed in specific EU-related categories.
Data Quality	Varies per country. In some cases, data may be outdated, incomplete, or subject to manipulation. Furthermore, it is typically calculated at the national level, which may overlook regional variations within countries that can be significant, particularly in large and diverse countries.	The data may be more readily available and reliable for popular cities or tourist destinations, while other areas may have insufficient or unreliable data. This affects accuracy.	Tends to favor countries with a strong presence of fast-food chains. This bias can skew the results and overlook the relative prices and purchasing power in countries where fast food is not as prevalent or where local food markets dominate.	Varies per research and country.	High quality, mostly well developed countries.

In the graph below the ICP/World Bank GDP, Numbeo, and Big Mac PPIs are compared. This highlights some peculiar differences. For the DELTA Band countries, like the Nordics and in North America, the differences between the PPIs are quite trivial but in other parts of the world the differences are large and problematic.

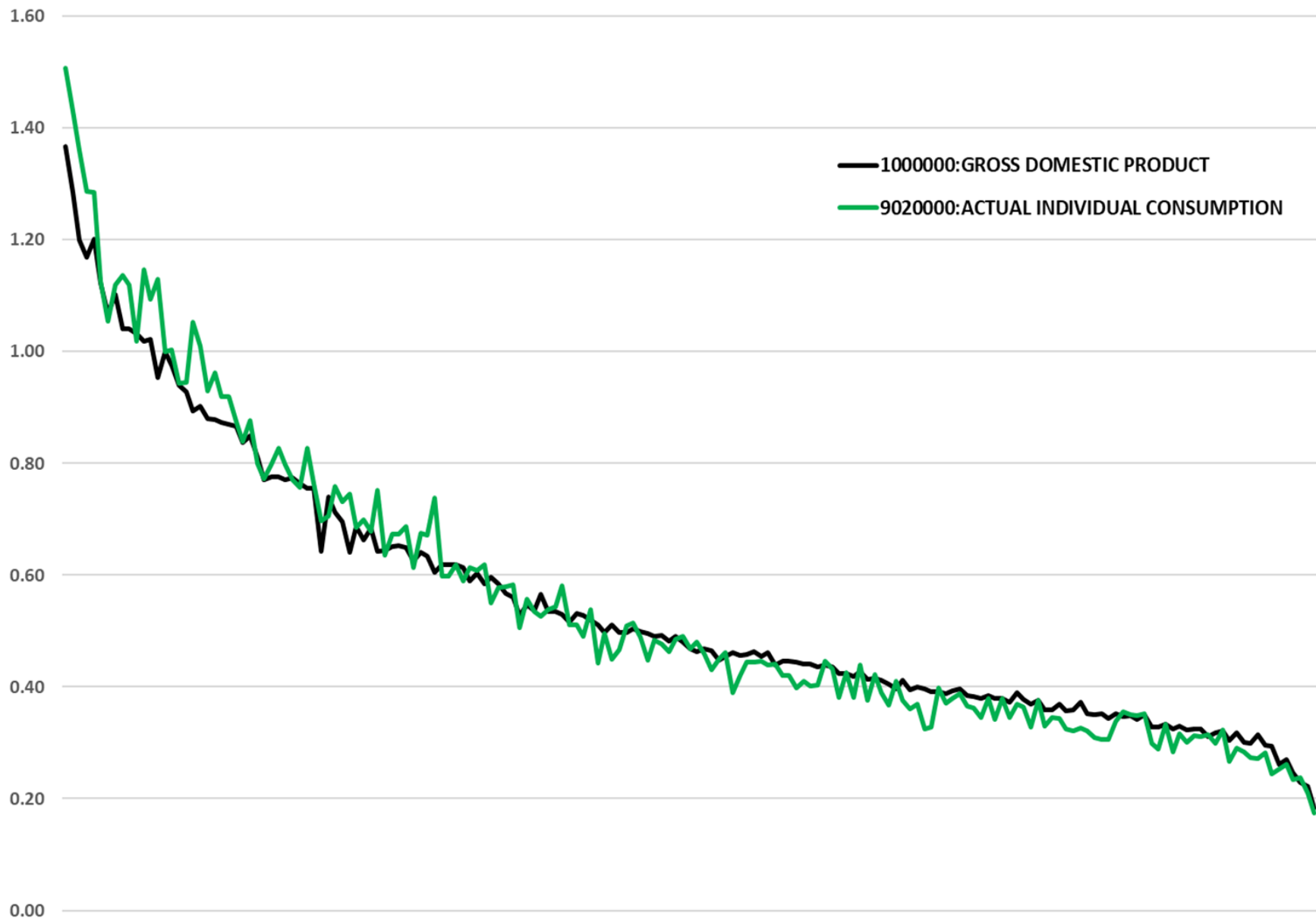


Appendix 2 - ICP/World Bank PPIs

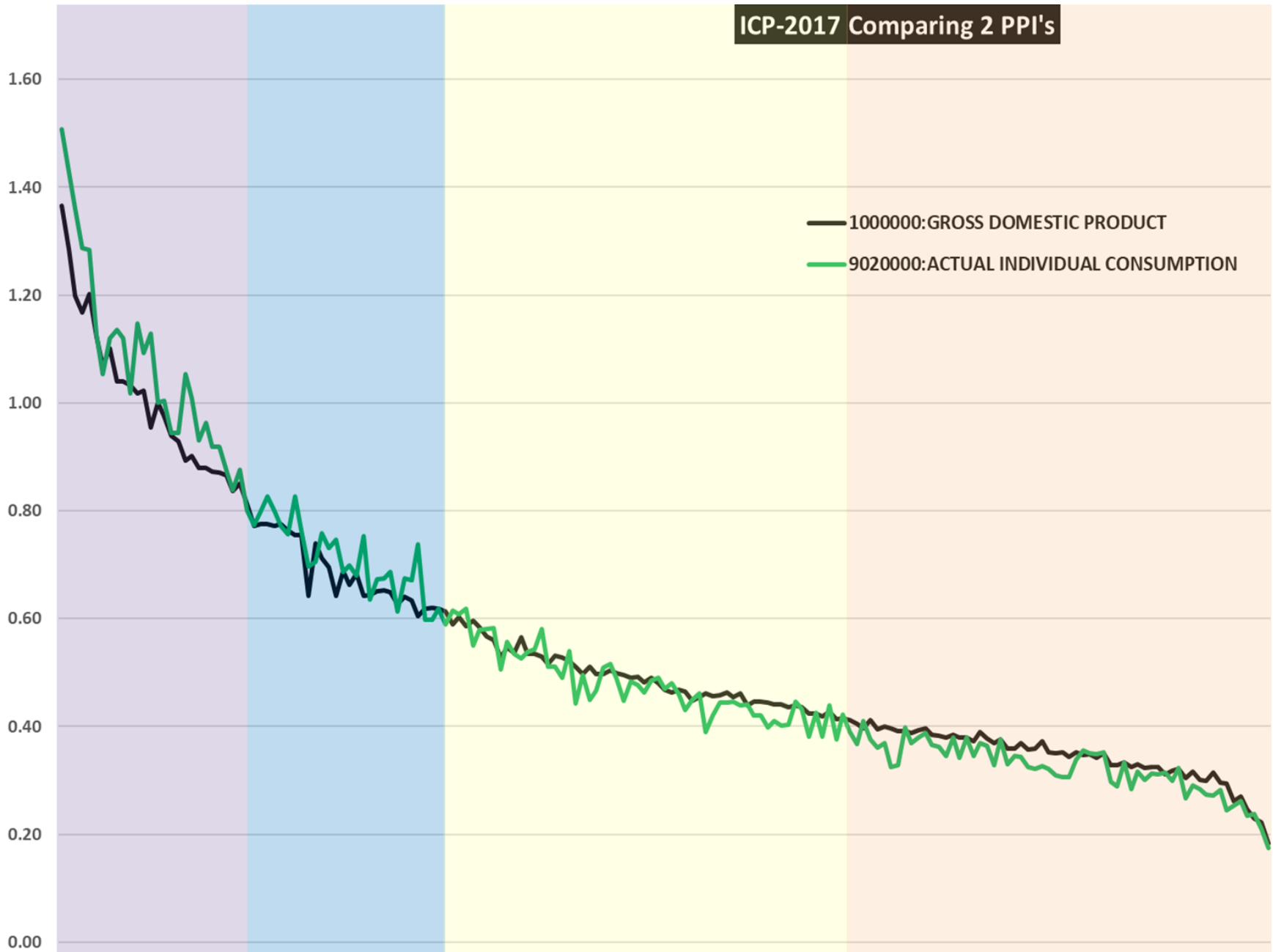
The ICP uses a classification system known as the International Classification of Products by Activity (ICPA), which categorizes goods and services into various groups for the purpose of collecting and comparing price data across countries. The ICPA classification system consists of different levels, starting from broad categories down to more detailed subcategories. Each level represents a different level of aggregation and specificity in terms of the products and activities being classified.

Code / Name	11 Indicators Explained	Judgement
1000000:GROSS DOMESTIC PRODUCT	This ICP classification heading covers individual consumption expenditure by households; individual consumption expenditure by nonprofit institutions serving households (NPISHs); individual consumption expenditure by government; collective consumption expenditure by government; gross capital formation; balance of exports and imports.	Broad / Covers all, and broadly accepted
1300000:INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT	This ICP classification heading covers individual consumption expenditures by government for Housing; Pharmaceutical products; Other medical products; Therapeutic appliances and equipment; Out-patient medical services; Out-patient dental services; Out-patient paramedical services; Hospital services; Compensation of employees - Ind. Hth. Govt; Intermediate consumption - Ind. Hth. Govt; Gross operating surplus - Ind. Hth. Govt; Net taxes on production - Ind. Hth. Govt; Receipts from sales - Ind. Hth. Govt; Recreation and culture; Education benefits and reimbursements; Compensation of employees - Ind. Edu. Govt; Intermediate consumption - Ind. Edu. Govt; Gross operating surplus - Ind. Edu. Govt; Net taxes on production - Ind. Edu. Govt; Receipt from sales - Ind. Edu. Govt; Social protection;	Too Specific in Medical
1400000:COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT	This ICP classification heading covers collective consumption expenditures by government for Compensation of employees - Coll. Govt; Intermediate consumption - Coll. Govt; Gross operating surplus - Coll. Govt; Net taxes on production - Coll. Govt; Receipts from sales - Coll. Govt.	Only specific Government expenditures
1501300:OTHER PRODUCTS	This ICP classification heading covers expenditures for Other products.	Only Consumer Goods
9020000:ACTUAL INDIVIDUAL CONSUMPTION	The total value of the individual consumption expenditures of households, nonprofit institutions serving households (NPISHs), and government at purchasers' prices.	This might be more commercially sound vs. GDP since it is at actual Purchaser's Price; covers all
9100000:HOUSEHOLDS AND NPISHS FINAL CONSUMPTION EXPENDITURE	The total value of actual and imputed final consumption expenditures incurred by households and NPISHs on individual goods and services. It also includes expenditures on individual goods and services sold at prices that are not economically significant.	Broader in Services, but excluding Government
9120000:ACTUAL EDUCATION	Household expenditure on pre-primary, primary, secondary, postsecondary, and tertiary education plus expenditure of nonprofit institutions serving households (NPISHs) on education plus general government expenditure on education benefits and reimbursements and the production of education services.	Only Education, heavily off for some countries, because of certain specific local educational dynamics.
9140000:ACTUAL MISCELLANEOUS GOODS AND SERVICES	Household expenditure on personal care, personal effects, social protection, insurance, and financial and other services plus expenditure by nonprofit institutions serving households (NPISHs) on social protection and other services plus general government expenditure on social protection.	Very specific in social protection
9250000:DOMESTIC ABSORPTION	Actual individual consumption at purchasers' prices plus collective consumption expenditure by government at purchasers' prices plus gross capital formation at purchasers' prices.	Also at Purchaser's Prices, excluding Non-Profit, including heavy investments
9260000:INDIVIDUAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS WITHOUT HOUSING	The total value of actual and imputed final consumption expenditures incurred by households and NPISHs on individual goods and services, without housing related expenditures. It also includes expenditures on individual goods and services sold at prices that are not economically significant.	Excluding Government and Housing
9270000:GENERAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE	The total value of actual and imputed final consumption expenditures incurred by government on individual goods and services and final consumption expenditure of government on collective services.	Only Government

ICP-2017 Comparing 2 PPI's



ICP-2017 Comparing 2 PPI's



1000000:GROSS DOMESTIC PRODUCT

9020000:ACTUAL INDIVIDUAL CONSUMPTION

Appendix 3 - Bands and the Fairer Pricing Tool

To build the Fairer Pricing Tool we used Dimensions.ai to produce a list of all countries with at least one gold OA publication⁷ in 2022, along with the number of papers for each country. To this list we added the ICP/World Bank GDP PPI for each country.

The Fairer Pricing Tool can be used as follows:

A separate worksheet has a table allowing Band boundaries to be set, based on the actual PPI, and a single adjusted PPI value to be assigned to every country within that band. For example, bands can be set from 0-0.2, 0.2-0.4, 0.4-0.6, and so on. The adjusted values for each band can be set however one chooses, so for these three bands, the adjusted band values could be 0.1, 0.3 and 0.5 (i.e. set to the band midpoints), or 0.2, 0.4, 0.6 (i.e. set to the band ceiling), or any other structure.

The Fairer Pricing Tool then checks each country for its actual PPI, determines which band it falls into using the current settings, and assigns an adjusted PPI using the current settings. For example, Ecuador has a PPI of 0.53, so this would fall into the 0.4-0.6 band (if it is set up as in the example), and result in an adjusted PPI of 0.5 (midpoint) or 0.6 (ceiling).

A total nominal value for the global revenue derived from those papers (pre-PPI banding) is set by taking the total number of papers, minus the numbers from countries that qualify for a Research4Life (R4L) waiver, minus half the numbers which qualify for a R4L 50% discount, and multiplying by a nominal APC figure. For example, if a journal published 100 papers a year, of which 20 were authored by researchers based in countries which enjoy a R4L full waiver and a further 20 from authors who enjoy a R4L 50% discount, then the tool calculates the number of “revenue-earning” papers as $(100 - 20 - (50\% \times 20)) = 70$. (The actual APC value is irrelevant, as we are interested only in ratios and the number eventually cancels out).

⁷ Dimensions defines “gold OA thus: “Publication is published in a fully open access journal (this includes all publications with a Gold OA status in Unpaywall and those on our own fully OA list of journals)”. Note that our calculations primarily concern ratios; if the profile of country splits is similar, variations in precise definitions will have little impact on the estimates. Users of the tool we have developed will be able to use whatever definitions they need to.

The new nominal revenue after banding can be calculated by multiplying the number of papers for each country by the adjusted PPI for that country and the nominal APC, and then summing across all countries. This figure can then be easily compared with the original revenue figure, and the change in APC that would be needed to generate the same income after banding is calculated as a percentage increase.

It is a simple matter to repeat this process using the OA numbers for a specific individual publisher, again using Dimensions data for the number of OA papers per country. The tool can calculate the effect of waivers and discounts in with the publisher's stated waiver policy if R4L is not used. We undertook this using data for four publishers: two large mixed-model publishers, one medium mixed-model university press, and one medium-sized publisher that is fully open access.

There are some obvious simplifications in the Fairer Pricing Tool:

- It is based on one year's worth of data (2022).
- We are taking the Dimensions data at face value.
- Notably, our modelling takes no account of a possible increase in submissions resulting from the change in pricing approach.
- The tool also ignores currency exchange fluctuations (for the sake of this analysis; these are considered elsewhere).
- It ignores variations in pricing due to negotiated consortial deals.

However, it does serve to give an idea of the scale of the funding gap that would need to be somehow addressed if the framework were to be adopted, and shows how careful choice of banding can help maximize the benefits while minimizing the potential downsides that might be a barrier to adoption.

Dimensions lists papers from 59 "countries" (they aren't all actually separate countries) that do not have a PPI assigned. Collectively the numbers are trivial, accounting for 0.3% of OA papers published in 2022. However, to tidy up we have categorized them in three ways:

- Firstly, any countries currently appearing on the Research4Life waiver lists were assigned a starting PPI of zero - i.e. they will always fall into the lowest band and take the value set for the lowest band.
- Secondly, any regions with a close political affiliation to a larger country were assigned the PPI of the "parent" country (e.g. Faroe Island to Denmark, Jersey to the UK).
- Finally, the few remaining countries were assigned a PPI based on that country's economic status (e.g. Liechtenstein has one of the highest gross domestic products per person in the world) or based on countries with similar geographies and economies (e.g. Bonaire, Saint Eustatius and Saba were allocated a PPI based on the average of Curacao, Sint Maartin and Aruba).

The global list is shown in Table 2.

Table 2. PPIs and total Gold OA⁸ output in 2022 by country

Country	Gold OA publications ⁹	PPI
Afghanistan	475	0.25
Aland Islands	15	0.98
Albania	467	0.35
Algeria	2309	0.35
Andorra	16	0.71
Angola	152	0.56
Anguilla	20	0.85
Antarctica	2	1.00
Antigua and Barbuda	52	0.78
Argentina	6724	0.62
Armenia	463	0.32
Aruba	24	0.75
Australia	30395	1.12

⁸ Dimensions defines “gold OA thus: “Publication is published in a fully open access journal (this includes all publications with a Gold OA status in Unpaywall and those on our own fully OA list of journals)”.

Austria	9556	0.87
Azerbaijan	712	0.29
Bahamas	43	0.90
Bahrain	775	0.50
Bangladesh	7271	0.37
Barbados	122	1.10
Belarus	1587	0.32
Belgium	11430	0.87
Belize	38	0.69
Benin	472	0.37
Bermuda	33	1.37
Bhutan	160	0.29
Bolivia	243	0.39
Bonaire, Saint Eustatius and Saba	9	0.76
Bosnia and Herzegovina	1022	0.39
Botswana	377	0.46
Brazil	59754	0.68
British Indian Ocean Territory	1	0.88

British Virgin Islands	9	1.07
Brunei	455	0.47
Bulgaria	2261	0.39
Burkina Faso	563	0.36
Burundi	93	0.38
Cabo Verde	47	0.50
Cambodia	408	0.35
Cameroon	1432	0.40
Canada	34414	0.93
Cayman Islands	12	1.17
Central African Republic	68	0.49
Chad	80	0.42
Chile	6805	0.63
China	282232	0.62
Cocos Islands	1	1.12
Colombia	7628	0.45
Comoros	47	0.44
Cook Islands	5	0.00

Costa Rica	1132	0.62
Croatia	4460	0.50
Cuba	658	0.00
Curacao	75	0.76
Cyprus	1684	0.69
Czechia	7768	0.53
Democratic Republic of the Congo	568	0.44
Denmark	10008	1.04
Djibouti	16	0.60
Dominica	24	0.64
Dominican Republic	278	0.45
Ecuador	2643	0.53
Egypt	19519	0.18
El Salvador	361	0.46
Equatorial Guinea	16	0.43
Eritrea	47	0.36
Estonia	1298	0.60
Eswatini	97	0.47

Ethiopia	8023	0.36
Falkland Islands	13	0.88
Faroe Islands	66	1.04
Fiji	186	0.45
Finland	6917	0.98
France	31062	0.87
French Guiana	74	0.87
French Polynesia	53	0.87
French Southern Territories	1	0.87
Gabon	189	0.48
Gambia	195	0.33
Georgia	530	0.32
Germany	55329	0.84
Ghana	3337	0.41
Gibraltar	41	0.88
Greece	8653	0.65
Greenland	65	1.04
Grenada	231	0.63

Guadeloupe	83	0.87
Guatemala	212	0.54
Guernsey	2	0.88
Guinea	212	0.35
Guinea-Bissau	36	0.38
Guyana	41	0.50
Haiti	100	0.45
Honduras	291	0.44
Hungary	5723	0.49
Iceland	653	1.29
India	59949	0.32
Indonesia	65144	0.35
Iran	21694	0.39
Iraq	6307	0.45
Ireland	5416	0.89
Isle of Man	11	0.88
Israel	6628	1.04
Italy	49913	0.78

Ivory Coast	472	0.44
Jamaica	129	0.53
Japan	52030	0.94
Jersey	23	0.88
Jordan	3412	0.42
Kazakhstan	2551	0.37
Kenya	2968	0.39
Kiribati	7	0.00
Kosovo	380	0.38
Kuwait	1192	0.59
Kyrgyzstan	441	0.25
Laos	157	0.00
Latvia	1270	0.55
Lebanon	1670	0.49
Lesotho	89	0.41
Liberia	83	0.46
Libya	365	0.43
Liechtenstein	50	1.30

Lithuania	2529	0.50
Luxembourg	818	0.95
Madagascar	264	0.33
Malawi	668	0.34
Malaysia	14790	0.38
Maldives	67	0.53
Mali	330	0.37
Malta	381	0.65
Marshall Islands	7	0.00
Martinique	70	0.87
Mauritania	110	0.31
Mauritius	179	0.49
Mayotte	14	0.87
Mexico	12119	0.47
Micronesia	6	1.00
Moldova	256	0.30
Monaco	87	0.87
Mongolia	442	0.32

Montenegro	265	0.40
Montserrat	6	0.66
Morocco	3949	0.42
Mozambique	586	0.36
Myanmar	296	0.27
Namibia	268	0.53
Nauru	1	0.00
Nepal	3595	0.30
Netherlands	20302	0.88
Netherlands Antilles	2	0.76
New Caledonia	73	0.87
New Zealand	4719	1.03
Nicaragua	296	0.36
Niger	154	0.44
Nigeria	8053	0.38
Niue	2	0.00
Norfolk Island	49	1.12
North Korea	110	0.00

North Macedonia	742	0.35
Norway	9150	1.20
Oman	1336	0.52
Pakistan	17066	0.32
Palau	9	0.00
Palestinian Territory	746	0.57
Panama	431	0.50
Papua New Guinea	171	0.00
Paraguay	274	0.46
Peru	3272	0.54
Philippines	2502	0.38
Poland	29210	0.46
Portugal	13621	0.65
Qatar	2639	0.64
Republic of the Congo	254	0.51
Reunion	138	0.87
Romania	9067	0.40
Russia	40749	0.41

Rwanda	579	0.39
Saint Barthelemy	2	0.87
Saint Helena	21	0.00
Saint Kitts and Nevis	105	0.76
Saint Lucia	35	0.74
Saint Martin	13	0.87
Saint Vincent and the Grenadines	35	0.59
Samoa	39	0.00
San Marino	19	0.77
Sao Tome and Principe	15	0.00
Saudi Arabia	26890	0.44
Senegal	677	0.42
Serbia	4461	0.38
Serbia and Montenegro	5	0.38
Seychelles	28	0.58
Sierra Leone	222	0.30
Singapore	6258	0.64
Sint Maarten	36	0.77

Slovakia	3184	0.57
Slovenia	2951	0.64
Solomon Islands	21	0.00
Somalia	201	0.36
South Africa	12239	0.48
South Korea	38907	0.77
South Sudan	68	0.31
Spain	42966	0.71
Sri Lanka	2117	0.32
Sudan	1165	0.23
Suriname	30	0.34
Svalbard and Jan Mayen	18	1.20
Sweden	14779	1.02
Switzerland	18489	1.20
Syria	803	0.00
Taiwan	16520	0.52
Tajikistan	109	0.26
Tanzania	1685	0.40

Thailand	10085	0.38
Timor Leste	54	0.41
Togo	204	0.41
Tokelau	1	0.00
Tonga	37	0.00
Trinidad and Tobago	223	0.61
Tunisia	3091	0.33
Turkey	24319	0.38
Turkmenistan	14	0.46
Turks and Caicos Islands	4	1.02
Tuvalu	4	0.00
Uganda	1841	0.35
Ukraine	13880	0.22
United Arab Emirates	5264	0.60
United Kingdom	61348	0.88
United States	178419	1.00
Uruguay	851	0.81
Uzbekistan	1066	0.29

Vanuatu	22	0.00
Vatican	4	0.78
Venezuela	536	0.00
Vietnam	4719	0.33
Wallis and Futuna	2	0.87
Western Sahara	5	0.42
Yemen	1032	0.00
Zambia	591	0.44
Zimbabwe	670	0.51
Total	1637818	

(Note that this table only shows the articles published in fully OA journals because more open access articles by authors from lower PPI countries publish in these journals. Publishers can model the impact of publications in both fully OA and hybrid journals using the Fairer Pricing Tool).

Using the Fairer Pricing Tool, we can show the effects of various types of banding. The percentage figures in Table 3 show the proportional uplift that would need to be applied to the current APC to maintain current total revenues. In example 4, for example, the bands are set in increments of 0.2 (i.e., 0-0.2, 0.2-0.4, 0.4-0.6 and so on) and the effective PPI for countries in each band is set to the upper limit of the band (0.2, 0.4, 0.6 etc.) A full description of the set-up for each example is given below.

In example 4, the APCs charged in the USA by Publisher 1 would need to increase by 15% if they wanted to adopt equitable pricing while maintaining current revenue. Rates for other countries would then be set using this new APC as the base, modified by the amended PPI value for that country. That needn't be the way the shortfall is handled, but it indicates the relative size of the issue.

Examples of banding set-ups	Total	Publisher 1	Publisher 2	Publisher 3	Publisher 4
1. Base case (no banding)	39%	30%	20%	16%	15%
2. Banding in 0.1, mid-points	39%	31%	20%	18%	17%
3. Banding in 0.1, upper limit	29%	22%	13%	10%	10%
4. Bandings in 0.2, band value takes upper limit	21%	15%	6%	5%	5%
5. Bandings in 0.2, band values more nuanced	27%	19%	9%	9%	7%
6. Bandings in 0.2, band values more nuanced (v2)	26%	18%	8%	8%	6%
7. Bandings more finely spaced at top and bottom, wider in middle, bands take top value	22%	16%	7%	5%	5%
8. Bandings in 0.2, upper limit, top band set to 1 (i.e. nobody pays more than the default US rate).	23%	18%	9%	8%	8%

Table 3. Effects of various types of banding. The 'Total' column is for all the publishers in the Dimensions database. We also looked at Dimensions data for four publishers individually: two large mixed-model publishers (Publishers 1 and 2), one medium-sized publisher that is fully open access (Publisher 3), and one medium mixed-model university press (Publisher 4). For each example of banding set-up, the percentages show the proportional uplift that would be required to maintain current revenues.

The 'Total' column is for all the publishers in the Dimensions database. We also looked at four publishers individually.

The detailed settings that generate the examples in Table 3 are shown below. In each case the lower and upper limits of each band and the PPI assigned to each country that fall in that band (the Band Value) are given.

Example 2. Banding in 0.1, mid-points

Lower	Upper	Band value
0	0.1	0.05
0.1	0.2	0.15
0.2	0.3	0.25
0.3	0.4	0.35
0.4	0.5	0.45
0.5	0.6	0.55
0.6	0.7	0.65
0.7	0.8	0.75
0.8	0.9	0.85
0.9	1	0.95
1	1.1	1.05
1.1	1.2	1.15
1.2	1.37	1.25
1.37	1.37	1.35

Example 3. Banding in 0.1, band value takes upper limit

Lower	Upper	Band value
0	0.1	0.1
0.1	0.2	0.2
0.2	0.3	0.3
0.3	0.4	0.4
0.4	0.5	0.5
0.5	0.6	0.6
0.6	0.7	0.7
0.7	0.8	0.8
0.8	0.9	0.9
0.9	1	1
1	1.1	1.1
1.1	1.2	1.2
1.2	1.37	1.37
1.37	1.37	1.37

Example 4. Bandings in 0.2, band value takes upper limit

Lower	Upper	Band value
0	0.2	0.2
0.2	0.4	0.4
0.4	0.6	0.6
0.6	0.8	0.8
0.8	1	1
1	1.2	1.2
1.2	1.37	1.37

Example 5. Bandings in 0.2, band values more nuanced

Lower	Upper	Band value
0	0.2	0.2
0.2	0.4	0.3
0.4	0.6	0.5
0.6	0.8	0.8
0.8	1	1
1	1.2	1.1
1.2	1.37	1.3

Example 6. Bandings in 0.2, band values more nuanced (v2)

Lower	Upper	Band value
0	0.2	0.2
0.2	0.4	0.3
0.4	0.6	0.5
0.6	0.8	0.8
0.8	1	1
1	1.2	1.2
1.2	1.37	1.37

Example 7. Bandings more finely spaced at top and bottom, wider in middle, bands take top value

Lower	Upper	Band value
0	0.1	0.1
0.1	0.2	0.2
0.2	0.3	0.3
0.3	0.4	0.4
0.4	0.6	0.6
0.6	0.8	0.8
0.8	1	1
1	1.1	1.1

1.1	1.2	1.2
1.2	1.37	

Example 8. Bandings in 0.2, upper limit, top band set to 1 (i.e. nobody pays more than the default US rate)

Lower	Upper	Band value
0	0.2	0.2
0.2	0.4	0.4
0.4	0.6	0.6
0.6	0.8	0.8
0.8	1	1
1	1.2	1

Appendix 4 - Exchange rates and currency selection

The PPI index offers an objective way to set differentiated pricing and also to assess the impact of billing some/all customers in their local currency. Since downward fluctuations in some currencies tend to be balanced out by upwards fluctuations in others, the risk of this approach turns out to be less than publisher intuition might suggest.

We assume here that prices are set in the local currency at the usual time for price-setting, and apply without change through the whole of the following year, with the publisher taking on the risk that exchange rate fluctuations will lower the value (in the publisher's currency) of the set price. In practice, the price is likely to be set using a 3-month or 6-month average rate, and overall that should not affect the calculations much. We also assume for the purpose of this exercise that APCs (or other fees) paid throughout the following year are converted into dollars at that year's average rate. In aggregate this should be the case, and the more papers that are published throughout the year in that country (and thus, the more important that country is in its contribution to the calculations), the more likely this is to be an accurate approximation.

The risk to overall income is determined by two factors: the proportion of overall income that comes from each country, and the volatility of that country's currency. We used the Digital Science Dimensions¹⁰ database to establish gold OA¹¹ article volumes by country for 2022 (as we are looking forward to potential future risks, the most up-to-date profile of publications is the relevant one to use). We looked at data both across the board and also for four specific publishers. We selected two large mixed-model publishers at random, one medium mixed-model university press, and one medium-sized publisher that publishes OA exclusively.

This enabled us to estimate the proportion of the total revenue that would be generated by countries in each of the bands, taking into account the reduced prices in those bands resulting from the application of the framework.

Next, we explored the magnitude of individual currency fluctuations averaged across all countries. We used World Bank data (<https://data.worldbank.org/indicator/PA.NUS.FCRF>) for average exchange rates year by year, from 2013 to 2022. The data is incomplete for a few countries, in two ways. Firstly, data was unavailable for some countries for 2022. These countries included Turkey and Iran, both of which publish significant numbers of papers, so we omitted 2022 from the analysis. Secondly, a few countries showed gaps in various years (or no data at all). Comparison with the publication volumes showed that these countries produced no

¹⁰ We are grateful to Digital Science for access to Dimensions (<https://www.digital-science.com/product/dimensions/>).

¹¹ Dimensions defines "gold OA thus: "Publication is published in a fully open access journal (this includes all publications with a Gold OA status in Unpaywall and those on our own fully OA list of journals)". Users of the Fairer Pricing Tool will no doubt use their own data, which will give results appropriate to that data source.

or trivial numbers of papers, so they were excluded from the analysis on a country-by-country basis.

The calculation proceeded as follows. The number of OA papers published from each country was added to the currency tables, along with the country's band (for the calculations below, we had band settings as per Example 4 in Appendix 3). For each successive year, the proportional change in exchange rate for each country was weighted by the number of papers for that country, and the totals for the year were summed by band across countries. The annual totals can then be compared to show how exchange rate variations impact across the board. Looking at this across a ten-year range allows us to exclude the possibility that any single year was a particularly stable year for currencies. We looked at the maximum year-on-year rate drops and increases over that period and took an average across the whole period.

For illustration purposes, the table below shows how this looks for a small portion of the data. Looking at Laos, for example, the exchange rate shifted from \$1 = K7833 in 2013 to K8042 in 2014. The number of papers from Laos is 157, so the relative contribution of Laos to the total revenue drops from 157 in 2013 to 152.92 in 2014. In our little table here, Laos is the only Band ALPHA country, so the impact on revenue for Band ALPHA is -2.6%. In other words, publishers setting a Laos rate in K in 2013 will see 2.6% less revenue than anticipated in 2014 due to currency shifts.

Country	No. Pubs, 2022	Band	Local currency = \$1			Weighted value per \$1		
			2013	2014	2015	2013	2014	2015
Vietnam	4719	BETA	20933	21148	21698	4719	4671.12	4599.47
Indonesia	65144	BETA	10461	11865	13389	65144	57435.73	57728.25
Laos	157	ALPHA	7833	8042	8128	157	152.92	155.35
Uzbekistan	1066	BETA	2095	2311	2568	1066	966.38	959.30
Paraguay	274	GAMMA	4304	4462	5205	274	264.28	234.90
Band ALPHA total						157	153	155
Change year on year							-2.6%	-1.0%
Bands ALPHA and BETA total						71,086	63,226	63,442
Change year on year							-11.1%	-10.8%
Bands ALPHA, BETA and GAMMA total								
Change year on year						71,360	63,490	63,677
							-11.0%	-10.8%

Across all the data, we end with the results for the year-on-year changes shown below:

	2014	2015	2016	2017	2018	2019	2020	2021	Max	Min	Average
ALPHA	-2.8%	-7.9%	-22.4%	-40.1%	1.6%	2.7%	4.2%	-0.7%	4.2%	-40.1%	-8.2%
ALPHA+BETA	-8.7%	-11.5%	-5.7%	-4.8%	-6.3%	-3.4%	-4.1%	-2.1%	-2.1%	-11.5%	-5.8%
ALPHA+BETA+GAMMA	-7.8%	-12.5%	-5.6%	-1.2%	-4.0%	-3.6%	-4.4%	-1.1%	-1.1%	-12.5%	-5.0%

Similar tables were constructed for each of the publishers we looked at, using their country data for the weightings. (Note that while for clarity we show results here for just the lowest three bands in one particular band setting, the Fairer Pricing Tool generates figures across all bands for any given band setting.)

The second part of the calculation involves estimating what proportion of the total revenue (or each publisher's total revenue) is affected by these changes. This is a simple matter of weighting the number of papers for each country by the PPI value assigned for its band, summing those figures across the band, and then dividing by the total for all bands. This gives us the following:

	% income in Band ALPHA	% income in Band BETA	% income in Band GAMMA	ALPHA+BETA	ALPHA+BETA+GAMMA
Total	0.4%	9.8%	9.9%	10.2%	20.1%
Publisher 1	0.4%	5.4%	5.7%	5.8%	11.5%
Publisher 2	0.1%	4.8%	3.9%	5.0%	8.9%
Publisher 3	0.2%	7.2%	6.8%	7.4%	14.2%
Publisher 4	0.1%	1.9%	3.1%	2.0%	5.1%

Combing the two sets of data, we can produce estimates for the effect on total revenue of pricing in local currency, whether that is applied to Band ALPHA alone, or bands with successively higher PPIs. Again, we show this here for the first three bands.

Projected income fluctuations due to XR changes				
		Maximum	Minimum	Average
Total	ALPHA	0.0%	-0.1%	0.0%
	ALPHA and BETA	-0.2%	-1.2%	-0.6%
	ALPHA, BETA and GAMMA	-0.2%	-2.5%	-1.0%
Publisher 1	ALPHA	0.0%	-0.2%	0.0%
	ALPHA and BETA	-0.1%	-0.6%	-0.4%
	ALPHA, BETA and GAMMA	-0.1%	-1.2%	-0.6%
Publisher 2	ALPHA	0.0%	-0.1%	0.0%
	ALPHA and BETA	-0.1%	-0.5%	-0.3%
	ALPHA, BETA and GAMMA	-0.1%	-0.9%	-0.5%
Publisher 3	ALPHA	0.0%	-0.1%	0.0%
	ALPHA and BETA	-0.3%	-0.6%	-0.4%
	ALPHA, BETA and GAMMA	-0.3%	-1.4%	-0.7%
Publisher 4	ALPHA	0.0%	0.0%	0.0%
	ALPHA and BETA	0.0%	-0.2%	-0.1%
	ALPHA, BETA and GAMMA	0.0%	-0.6%	-0.2%

This table shows the maximum annual changes (positive and negative) that would have been experienced over this period, along with the average over the whole period. So, for example, if one of our selected publishers were to adopt local currency for countries in Bands ALPHA, BETA and GAMMA, on the basis of the swings experienced over the past decade they might expect annual swings in budgeted global income of -0.1%% to -0.9%, with an average of -0.5%. A one-off price increase of 0.5% in the first year would mitigate this (on average) in perpetuity.

Note that these calculations ignore any possible increases in revenue generated by applying the framework itself (i.e., one would hope that PPI-based pricing would encourage an overall increase in volumes). The numbers here are small enough that if such an increase is seen to any significant degree, the resulting revenue could easily outweigh even the most disadvantageous currency swings.

These calculations are built into the Fairer Pricing Tool, since they require no additional data to perform. For any given banding setting, the tool gives an estimate of the risk involved in offering prices set in local currency for any level of banding.

Appendix 5 - Reading List

This helpful list has been compiled by Malavika Legge of OASPA, and is reused here with her permission.

There is a growing literature about equity in open access publishing, and the issues and challenges. The OASPA bibliography below provides some recent articles, blogs, and reports that they have found helpful and hope you will also find helpful.

- AAAS survey on scholarly publication experiences and perspectives (2022). *Exploring the Hidden Impacts of Open Access Financing Mechanisms*.
https://www.aaas.org/sites/default/files/2022-10/OpenAccessSurveyReport_Oct2022_FINAL.pdf?adobe_mc=MCMID%3D11896003748148392993734663459286990672%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1681806744
- Beard, R (2021) *EIFL agreements result in increased OA publishing*
<https://eifl.net/blogs/eifl-agreements-result-increased-oa-publishing>
- Butler L, Matthias L, Simard M, Mongeon P, & Haustein S (2022). *The Oligopoly's Shift to Open Access. How For-Profit Publishers Benefit from Article Processing Charges* (Version v2). Zenodo. <https://doi.org/10.5281/zenodo.7158818>
- Druelinger, D and Ma, L (2023). *Missing a golden opportunity? Analysis of publication trends by income level in the Directory of Open Access Journals 1987–2020*. Learned Publishing.
<https://doi.org/10.1002/leap.1543>
- ESAC Market Watch (2023) <https://esac-initiative.org/market-watch/#TAs>
- Fontúrbel F E, and Vizentin-Bugoni J (2021). *A Paywall Coming Down, Another Being Erected: Open Access Article Processing Charges (APC) may Prevent Some Researchers from Publishing in Leading Journals*. Bull Ecol Soc Am 102(1):e01791.
<https://doi.org/10.1002/bes2.1791>
- Nobes A and Harris S (2019). *Open Access in low- and middle-income countries: attitudes and experiences of researchers* [version 1; peer review: 2 approved with reservations]. *Emerald Open Res* 2019, 1:17.
<https://doi.org/10.35241/emeraldopenres.13325.1>
- [OASPA](#)
- [The 'OA market' – what is healthy? Part 1, January 2023](#)
- [The 'OA market' – what is healthy? Part 2, January 2023](#)

- [OA Market-Issue-Brief, 2021](https://oaspa.org/wp-content/uploads/2021/06/OASPA-OA-Market-Issue-Brief.pdf)<https://oaspa.org/wp-content/uploads/2021/06/OASPA-OA-Market-Issue-Brief.pdf>
- OASPA (2021), [Workshop Report](https://oaspa.org/wp-content/uploads/2021/09/OASPA-Workshop-Summary-Report_Final-21-09-21.pdf) https://oaspa.org/wp-content/uploads/2021/09/OASPA-Workshop-Summary-Report_Final-21-09-21.pdf
- Olejniczak A J, Wilson M J (2020). *Who's writing open access (OA) articles? Characteristics of OA authors at Ph.D.-granting institutions in the United States*. *Quantitative Science Studies*; 1 (4): 1429–1450. https://doi.org/10.1162/qss_a_00091
- Osman, F and Rooryck J (2022). *A fair pricing model for open access*. *Research Professional News*. <https://www.researchprofessionalnews.com/rr-news-europe-views-of-europe-2022-9-a-fair-pricing-model-for-open-access/>
- Pooley, J (2020). *Read-and-Publish Open Access deals are heightening global inequalities in access to publication*. <https://www.researchprofessionalnews.com/rr-news-europe-views-of-europe-2022-9-a-fair-pricing-model-for-open-access/>
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- Pourret O et al. (2020) “Open Access Publishing practice in geochemistry: Overview of current state and look to the future,” *Heliyon*, 6(3). <https://doi.org/10.1016/j.heliyon.2020.e03551>.
- Ross-Hellauer T, Reichmann S, Fessl A, Klebel T, Pontika N (2022). *Dynamics of cumulative advantage and threats to equity in open science: a scoping review* <https://doi.org/10.1098/rsos.211032>
- Ross-Hellauer T (2022) *Open science, done wrong, will compound inequities*. *Nature* <https://www.nature.com/articles/d41586-022-00724-0>
- Rouhi S, Beard R, Brundy C (2022). *Left in the cold: the failure of APC waiver programs to provide author equity*. *Sci Ed.*;45:5-13. <https://doi.org/10.36591/SE-D-4501-5>
- Segado-Boj F, Prieto-Gutiérrez J-J and Martín-Quevedo J (2022). Attitudes, willingness, and resources to cover article publishing charges: The influence of age, position, income level country, discipline and open access habits. *Learned Publishing*, 35: 489-498. <https://doi.org/10.1002/leap.1455>
- Smith A C, Merz L, Borden J B, Gulick C K, Kshirsagar, A R, Bruna E M (2022). *Assessing the effect of article processing charges on the geographic diversity of authors using Elsevier's "Mirror Journal" system*. *Quantitative Science Studies* 2022; 2 (4): 1123–1143. https://doi.org/10.1162/qss_a_00157

- Zhang L, Wei Y, Huang Y, et al. *Should open access lead to closed research? The trends towards paying to perform research*. *Scientometrics* 127, 7653–7679 (2022). <https://doi.org/10.1007/s11192-022-04407-5>.