

Supplement to Smith et al.: Assessing the effect of article processing  
charges on the geographic diversity of authors using Elsevier's  
'Mirror Journal' system

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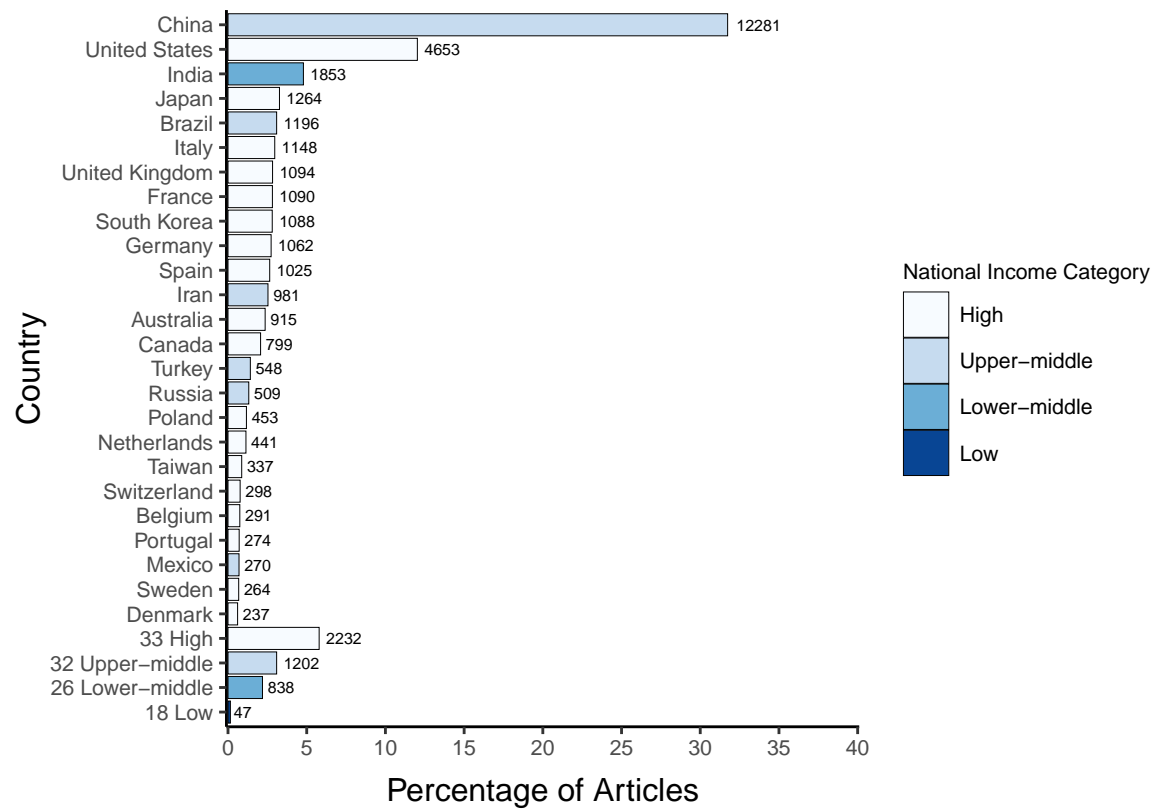


Figure S1: Percentage of lead authors (i.e., first and single-authors) based in different countries; Parent and Mirror journals combined. Numbers adjacent to bars are the number of articles with lead authors based in that country.

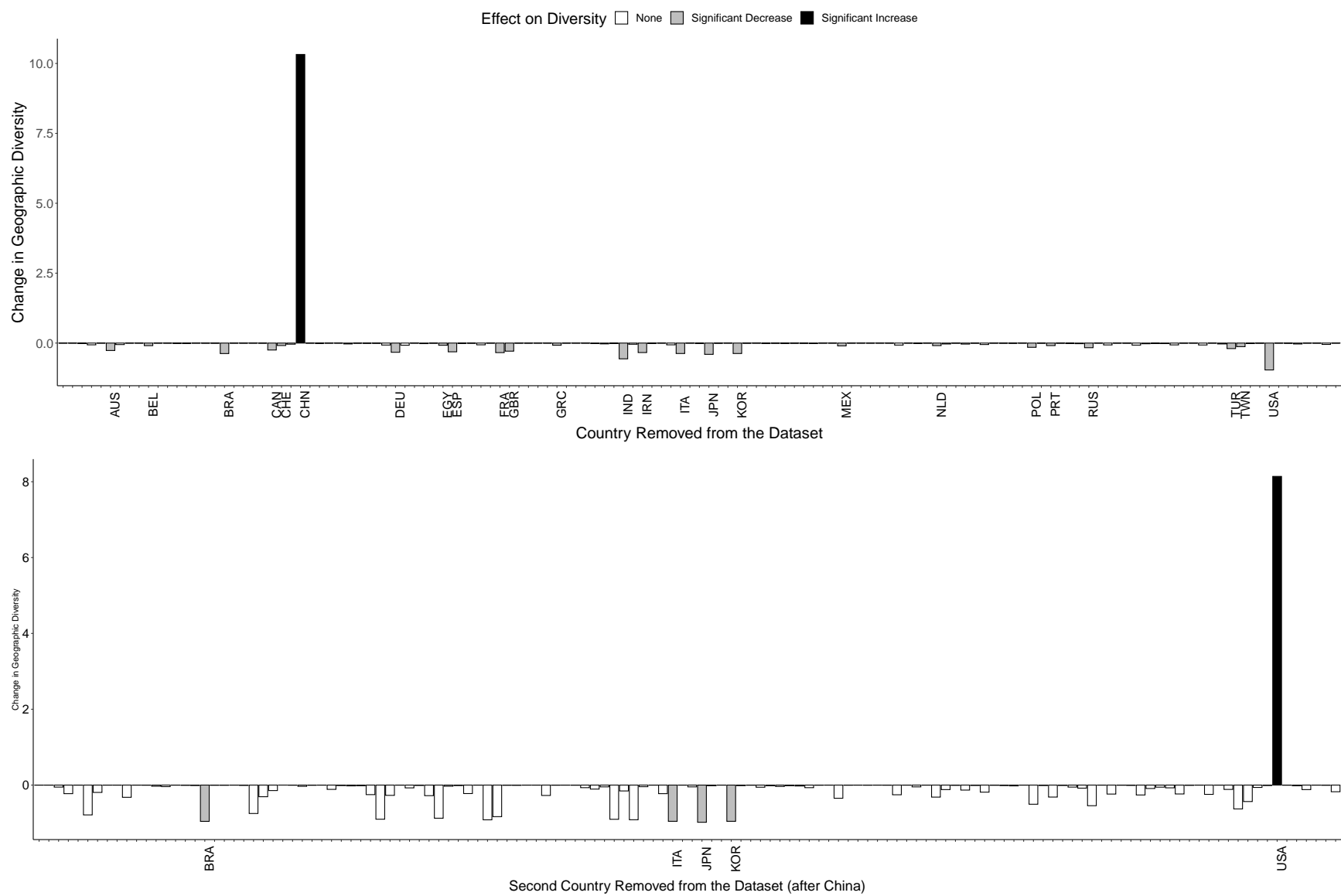


Figure S2: The effect on  $D_2$  of excluding authors from individual countries (B) The effect on  $D_2$  of excluding authors from individual countries after having first removed China.

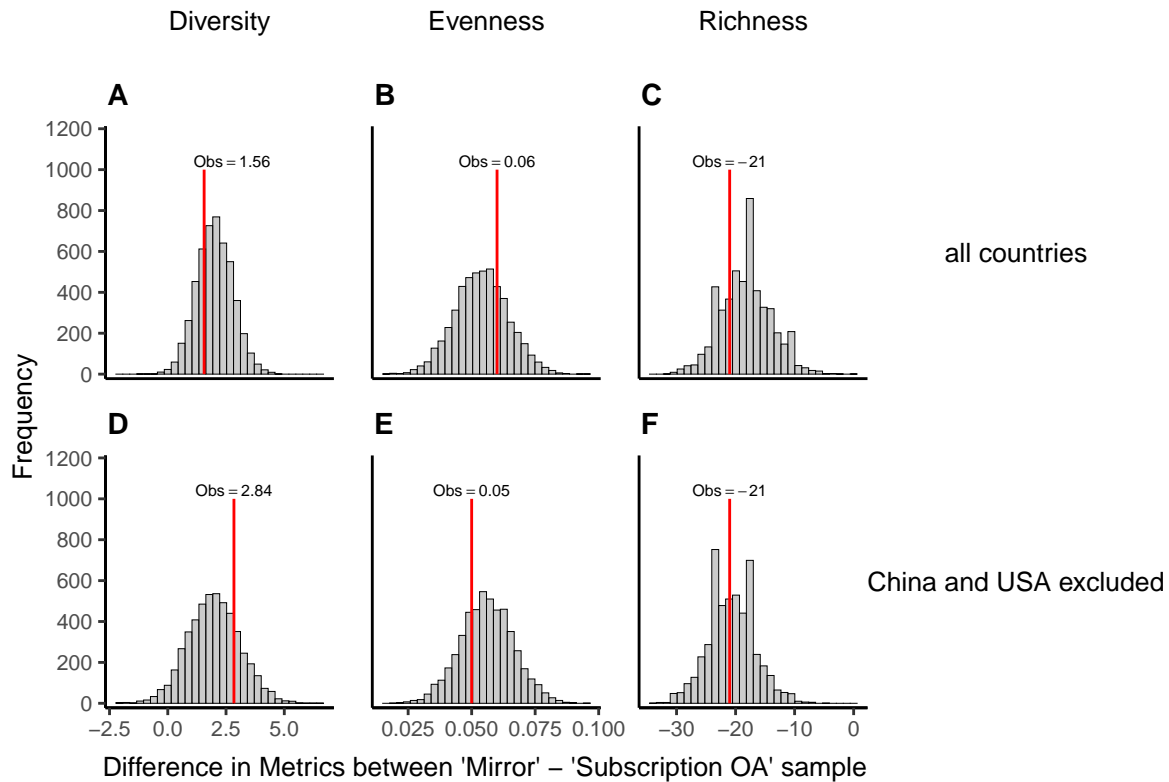


Figure S3: Results of permutation tests comparing author Diversity, Richness, and Evenness of open access articles published in Parent and Mirror journals. The line indicates the observed difference between the two populations, while the bars represent the frequency in 5000 permutations of the difference between two groups identical in size and structure to the observed collections but to which articles were assigned at random without replacement. Results are shown for analyses including all countries (A-C) and when excluding articles by first- and single-authors based in China or the USA (D-F). Note also that these analyses were conducted by pooling first- and single-author articles within each journal type; we were unable to do permutation tests comparing by authorship category (e.g., single-author in Mirror vs. Parent, first-author in Mirror vs. Parent) because several journals had no articles in one of the categories; alternative attempts to test for differences using bootstrapping did not suggest there were significant differences in diversity when comparing by category.

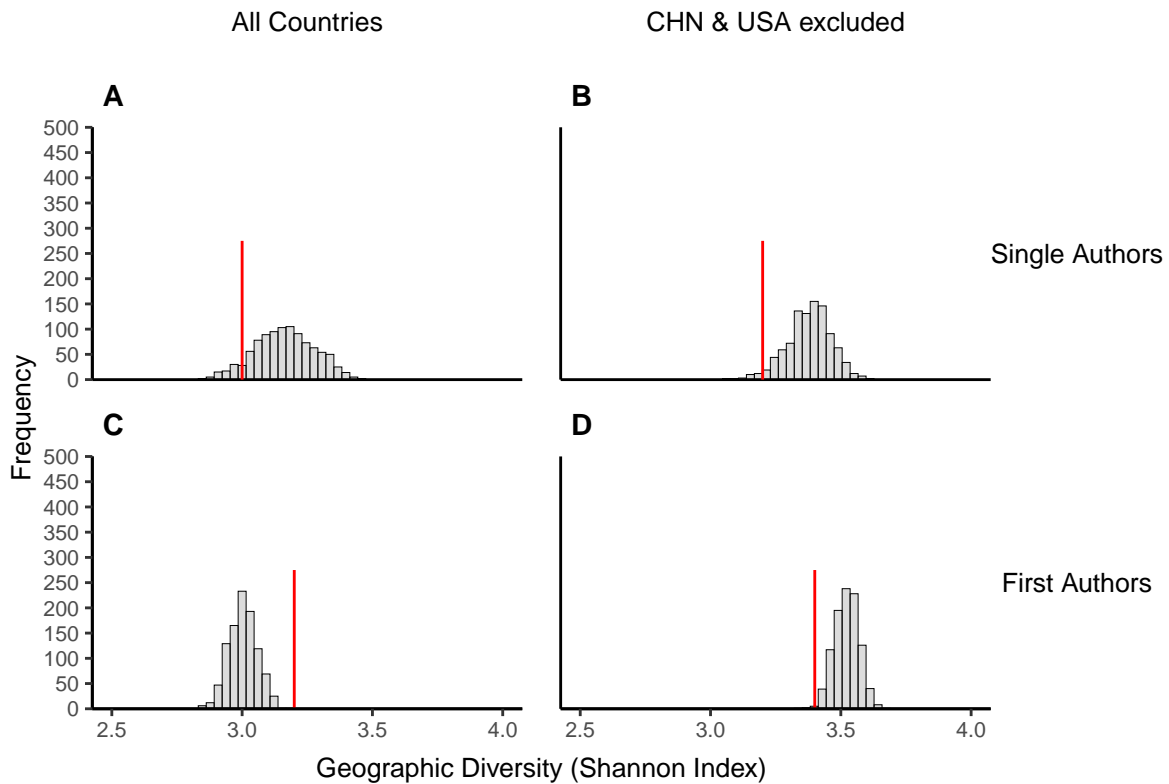


Figure S4: Author Geographic Diversity (Shannon's Index) for  $N = 975$  articles in Mirror journals (solid line) and 1000 identically sized collections generated by selecting an identical number of non-open access articles in Parent journals by bootstrapping from the pool of  $N = 34400$  total articles. Results are shown for analyses including all countries (A, C) and when excluding articles by first- and single-authors based in China or the USA (B, D).

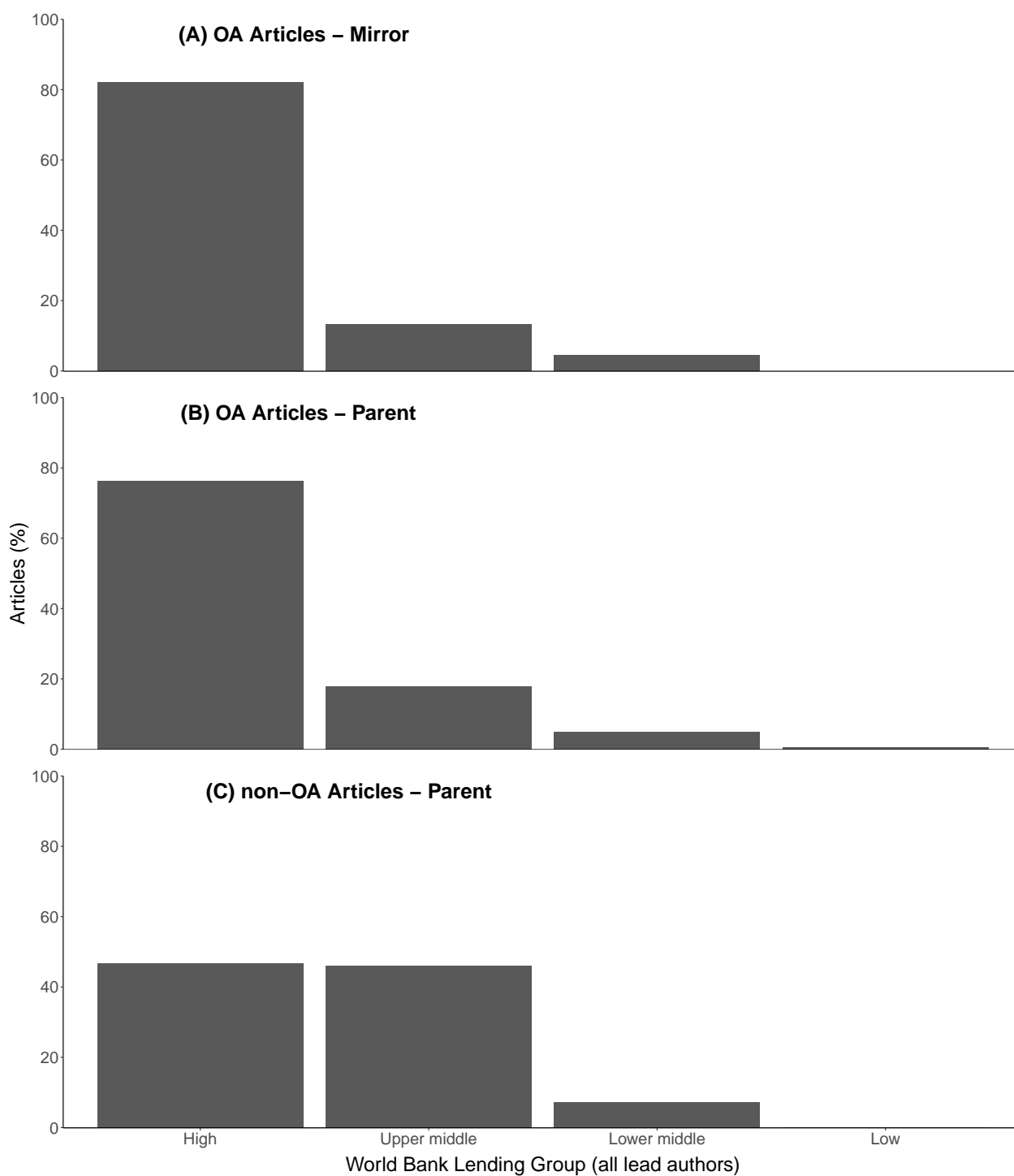


Figure S5: Proportion of lead authors based in different World Bank Lending Groups when pooling all of the (A) N = 975 articles in open access (OA) Mirror journals, (B) N = 1832 OA articles in Parent journals, and (C) N = 34400 non-OA articles in Parent journals.

Table S1: Countries eligible for APC waivers through Elsevier's 'Research4Life' program by World Bank Global Region and Income Group.

Region	Income Group	A - 100%	B - 50%	no waiver
South Asia	Low income	Afghanistan, Nepal	-	-
	Middle income	Bangladesh, Bhutan	Maldives, Pakistan, Sri Lanka	India
Sub-Saharan Africa	Low income	Benin, Burkina Faso, Burundi	-	-
		Central African Republic, Chad, Dem. Repub. Congo, Eritrea	-	-
		Ethiopia, Gambia, Guinea, Guinea-Bissau	-	-
		Liberia, Madagascar, Malawi, Mali	-	-
		Mozambique, Niger, Rwanda, Sierra Leone	-	-
		Somalia, South Sudan, Tanzania, Togo	-	-
	Middle income	Uganda	-	-
		Angola, Cabo Verde, Cameroon	Botswana, Gabon, Mauritius	South Africa
		Comoros, Congo, Equatorial Guinea, Eswatini	Namibia, Nigeria	-
		Ghana, Ivory Coast, Kenya, Lesotho	-	-
		Mauritania, Sao Tome & Principe, Senegal, Sudan	-	-
		Zambia, Zimbabwe	-	-
	High income	-	Seychelles	-
Latin America & Caribbean	Low income	Haiti	-	-
	Middle income	Belize, Nicaragua	Bolivia, Colombia, Cuba	Argentina, Brazil, Costa Rica
		-	Dominica, Ecuador, El Salvador, Grenada	Dominican Republic, Mexico
		-	Guatemala, Guyana, Honduras, Jamaica	-
		-	Paraguay, Peru, Saint Lucia, Saint Vincent & the Grenadines	-
		-	Suriname, Venezuela	-
	High income	-	Antigua & Barbuda, Saint Kitts & Nevis	Aruba, Bahamas, Barbados
		-	-	British Virgin Islands, Cayman Islands, Chile, Curaçao
		-	-	Panama, Puerto Rico, Saint Martin (FRA), Sint Maarten
		-	-	Trinidad & Tobago, Turks & Caicos Islands, U.S. Virgin Islands, Uruguay
Middle East & North Africa	Low income	Syrian Arab Republic, Yemen	-	-
	Middle income	Djibouti	Algeria, Egypt, Iraq	Iran, Lebanon
		-	Jordan, Libya, Morocco, Tunisia	-
		-	West Bank & Gaza Strip	-
	High income	-	-	Bahrain, Israel, Kuwait
		-	-	Malta, Oman, Qatar, Saudi Arabia
		-	-	United Arab Emirates
		-	-	-
E. Asia & Pacific	Low income	Democratic People's Republic Korea	-	-
	Middle income	Cambodia, Fed. States Micronesia, Kiribati	Fiji, Mongolia, Nauru	American Samoa, China, Indonesia
		Laos, Marshall Islands, Myanmar, Papua New Guinea	Vietnam	Malaysia, Philippines, Thailand
		Samoa, Solomon Islands, Timor-Leste, Tonga	-	-
	High income	Tuvalu, Vanuatu	-	-
		-	Palau	Australia, Brunei, French Polynesia
		-	-	Guam, Hong Kong, Japan, Macao
		-	-	N. Mariana Islands, New Caledonia, New Zealand, Singapore
		-	-	South Korea, Taiwan
		-	-	-
Europe & Central Asia	Low income	Tokelau	Cook Islands, Niue	-
		Tajikistan	-	-
	Middle income	Kyrgyzstan, Republic Moldova	Albania, Armenia, Azerbaijan	Bulgaria, Kazakhstan, Romania
		-	Belarus, Bosnia & Herzegovina, Georgia, Kosovo	Russia, Turkey, Turkmenistan
		-	Montenegro, North Macedonia, Serbia, Ukraine	-
		-	Uzbekistan	-
	High income	-	-	Andorra, Austria, Belgium
		-	-	Croatia, Cyprus, Czechia, Denmark
		-	-	Estonia, Faroe Islands, Finland, France
		-	-	Germany, Gibraltar, Greece, Greenland
		-	-	Hungary, Iceland, Ireland, Isle Man
		-	-	Italy, Latvia, Liechtenstein, Lithuania
		-	-	-
		-	-	-
North America	High income	-	Saint Helena	-
		-	-	Bermuda, Canada, United States

Table S2: Results of permutation tests comparing the difference in diversity and richness of (A) articles in Mirror journals and (B) open access articles in parent journals.

Countries	Metric	Mirror (OA)	Parent (OA)	Obs. Diff.	$\hat{P}$
All Countries	Diversity	14.83	13.27	1.56	27.98
	Richness	64.00	85.00	-21.00	21.82
	Evenness	0.77	0.72	0.06	72.34
NA	NA	NA	NA	NA	NA
China and USA excluded	Diversity	20.08	17.24	2.84	78.54
	Richness	62.00	83.00	-21.00	41.52
	Evenness	0.82	0.76	0.05	28.18



Table S3: Geographic Evenness and Richness of lead authors publishing Open Access (i.e., OA) articles in Mirror and Parent journals vs. subscription-only, non-OA, articles in Parent journals (Psub). The value for Psub is the mean of 1000 bootstrap-generated article collections identical in size and structure to each OA group with which they are being compared (i.e., OA in Mirror, OA in Parent). Single: authors of single-authored articles; First: first authors of co-authored articles.

Metric	OA Source	Author	All Countries			China & USA Excluded		
			OA	Psub (mean $\pm$ SD)	$\hat{P}$	OA	Psub (mean $\pm$ SD)	$\hat{P}$
Evenness	Mirror	First	0.78	$0.73 \pm 0.01$	0.00	0.82	$0.85 \pm 0.01$	0.00
		Single	0.82	$0.84 \pm 0.03$	0.00	0.88	$0.92 \pm 0.02$	0.00
	Parent	First	0.71	$0.74 \pm 0.01$	0.00	0.76	$0.83 \pm 0.01$	0.00
		Single	0.88	$0.91 \pm 0.07$	0.00	0.94	$0.92 \pm 0.1$	0.19
		NA	NA	NA	NA	NA	NA	NA
Richness	Mirror	First	63	$60.94 \pm 3.25$	0.69	61	$62.58 \pm 3.37$	0.49
		Single	38	$43.08 \pm 2.71$	0.02	36	$40.01 \pm 2.59$	0.16
	Parent	First	85	$70.38 \pm 3.17$	1.00	83	$70 \pm 3.17$	1.00
		Single	15	$15.52 \pm 1.83$	0.30	14	$13.29 \pm 1.47$	0.79

Table S4: Number of Open Access (OA) and non-OA articles in Mirror and Parent journals. Values are given for both the collection of articles with all countries included and the one from which first authors based in China or the USA are excluded.

Author	Category	Number of Articles	
		All Countries	China and USA Excluded
Coauthored	OA - Mirror	768	571
	OA in Parent	1804	1271
	non-OA in Parent	33644	18112
Single Author	OA - Mirror	207	142
	OA in Parent	28	20
	non-OA in Parent	756	560
		37207	20676