



Open Access publications, 2008-2020

**A bibliometric analysis by
the State Secretariat for Education,
Research and Innovation SERI**



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Preface

This year, SERI is publishing its first special report on open access (OA) publications, a form of publication that makes scientific research results freely accessible online. In Switzerland, it is a legal requirement to make the results of all publicly funded research available to the public free of charge as research findings are not only useful to science, but are also key to the economy and society.



Why is this topic so important? Open access guarantees that the results of scientific research are more easily and quickly accessible to the public and therefore enjoy greater attention and visibility. Open access also ensures the necessary transparency as it makes it easier to verify and expand on scientific findings through new scientific work. In addition, open access supports interdisciplinary collaboration throughout the world. Other positive side effects include avoiding duplication and plagiarism in scientific research. New technologies in artificial intelligence such as text mining may also accelerate new scientific discoveries through results linked to data analysis.

This report shows that all countries have been able to significantly increase their open access publication output and that OA is becoming more important all over the world. In Switzerland, OA publications make up 60% of all publications (2016–2020). Switzerland is therefore one of the countries with the largest share of OA publications (8th place in the world ranking). Another interesting observation of this report is that OA has a positive effect on publication impact, specifically for Switzerland (3rd place in the world ranking). However, the report also shows that there are major differences in publication form between the various research fields, both worldwide and in Switzerland.

The fact that Switzerland is so well placed in terms of open access is also the result of a national strategy of Swiss higher education institutions and funding bodies (Swiss National Science Foundation, Innosuisse and Swiss Academies of Arts and Sciences), who decided that all publicly funded publications must be available in open access form from 2024. Open access is therefore set to become the norm in Switzerland and worldwide. We're not there yet but we're on the right track.

I hope you will find this report a source of inspiration!

Nicole Schaad

Deputy Director of Research and Innovation

Introduction

This report is a bibliometric analysis of open access publications (OA publications) in Switzerland and in an international comparison. For several years now, SERI has been publishing bibliometric analyses of scientific publications and highlighting Switzerland's favourable position in science and research compared to other countries around the world. Scientific publications in Switzerland, 2008–2020 – A bibliometric analysis of scientific research in Switzerland, a report published in 2022, contains the main bibliometric indicators as well as two short analyses on quantum publications and OA publications. The aim of this report is to flesh out the chapter on OA publications by also looking in detail at how Switzerland is positioned in terms of this type of publication.

Researchers mainly disseminate the results of their work through publications in scientific journals. These journals have acquired an ever-growing market share and compel universities and libraries to pay costly subscriptions. Over time, a movement has emerged to allow researchers and the public free access to research results. The term 'open access' (OA) emerged from that movement and is used to describe the practice of providing free online access to scientific publications. OA publications are made available according to several economic models. Either the articles are initially published in subscription journals and then later published on an open access repository, or they are released directly in publications that are available free of charge, or they employ other models. These different models are called gold, green, bronze or hybrid. In this report, all these types are grouped together under a single category 'OA publications' in chapters 1, 2, 3 and 4. In chapter 5, the OA results are broken down into the different models.

This report uses the same types of bibliometric indicators as previous reports: publication volume, the relative citation indicator (impact) and the collaboration indicator. It does, however, introduce a new indicator: the share of OA publications in total publications.

This report uses the following databases: the Science Citation Index Expanded (SCIE), the Social Science Citation Index Expanded (SSCIE), the Arts & Humanities Citation Index (A&HCI) and the Emerging Sources Citation Index (ESCI) compiled by Clarivate Analytics for the period 2008 to 2020 (see details in Annex A.2 Methodology and box on the limitations of bibliometrics). On the basis of this data, we can compile various indicators. The indicators presented in this report are based on the following dimensions:

- Publication volume (output indicator): the number of publications is counted by region of the world, by country or by research field (Engineering, Computing & Technology; Physical, Chemical & Earth Sciences; Agriculture, Biology & Environmental Sciences; Life Sciences; Clinical Medicine; Social & Behavioural Sciences; Arts & Humanities). These fields are based on the Current Contents journal classification system. For Switzerland, the publications are also grouped according to four institutional sectors: higher education, research institutes, private businesses and international organisations (for details, see Annex A.2 Methodology)
- Impact of these publications or the relative citation indicator (international competitiveness indicator): the absolute number of citations is not presented as such, as it depends on the publication volume and the research field. The impact indicator used here is a relative citation indicator, in other words the number of citations received by a publication is set against the world average of citations in the research field in question. This indicator is then standardised on a scale from 0 to 200, where 100 represents the world average.
- Collaboration between researchers (partnerships indicator): collaborations are determined by the number of partnership pairs between the institutional addresses of authors featured on a single publication.

It should also be noted that the indicators are calculated over a five-year period in order to iron out any statistically non-significant differences between two successive years.

Bibliometrics and its limitations

Bibliometrics is the statistical analysis of scientific publications. Using a series of indicators, it can be used to observe trends in research and changes over time and among countries and to rank countries and institutions globally or by research field.

Interpreting the results requires a degree of caution as bibliometrics is not without its limitations:

- The data used include only articles published in scientific journals that have an international readership, and so do not reflect other means of publicising research such as presentations at conferences (e.g. in engineering sciences), monographs and books (e.g. in the humanities), or patents or ad-hoc reports (applied research)
- English is normally the reference language in these international journals, which means that a significant number of publications in languages other than English are not included, although in recent years efforts have been made to increase the number of journals in languages other than English.

Consequently, a degree of caution must be applied when analysing the results, especially in the fields of Social & Behavioural Sciences and Arts & Humanities.

Abstract

OA publications: Switzerland in global comparison

The volume of OA publications worldwide has steadily increased since the beginning of the period studied, rising from 5.8 million to 15.8 million (a 2.7-fold increase). This increase is higher than for total publications (OA + non-OA), which only rose by a factor of 2 (see SERI bibliometric analysis 2022¹).

In terms of total publications, the United States is in 1st place, followed by China and the United Kingdom. Meanwhile, Switzerland is ranked 20th (see SERI bibliometric analysis 2022). When it comes to OA publications, the United States is also the biggest producer, followed by the same major countries. However, Switzerland fares better in terms of OA publication output: in 2008–2012, Switzerland produced 1.4% of the world's OA publications, and therefore ranked 15th. For the period 2016–2020, it ranked 16th, producing 1.3% of the world's OA publications.

To gauge the importance of OA publications, it makes sense to compare a country's proportion of OA publications as a share of its publication output (in other words total publications), rather than its gross OA publication volume. This allows us to compare countries of different sizes. For example, Switzerland's OA publications make up 60% of its total output (in 2016–2020), which puts it among the countries with the largest shares of OA publications, ranking 8th internationally.

This share of OA publications in relation to total output has been steadily rising worldwide, from 34% in 2008–2012 to 48% in 2016–2020, thereby highlighting the growing importance of OA. Switzerland's share of OA publications is therefore above the world average as it was already at 43% in 2008–2012 and has now reached 60%. In 2016–2020, the United Kingdom was the country with the greatest share of OA publications (69%), followed by Finland (65%) and the Netherlands (65%). Among the top countries on this indicator we find countries such as Hungary, Indonesia and Chile, which, although not among the top producers of OA publications, are among those that place the greatest emphasis on this type of publication.

Impact of OA publications: Switzerland enjoys outstanding position

The impact of Switzerland's total publications is outstanding: the country is ranked 3rd worldwide (see SERI bibliometric analysis 2022), with an impact score 27 points above the world average. This report looks at whether there is a difference between the impact of OA and non-OA publications, and the impact of total publications. For Switzerland, the impact of OA publications is greater than non-OA publications, at 133 points (3rd place internationally) versus 116 points (5th place) for non-OA publications. But the same cannot be said for all countries, for example the Netherlands (125 points for OA and 135 points for non-OA) and Sweden (113 and 127 points respectively). We cannot conclude, then, that OA publications always enjoy greater recognition than non-OA publications.

¹ SERI 2022 [‘Scientific publications in Switzerland, 2008–2020: A bibliometric analysis of scientific research in Switzerland’](#)

OA publications by research field: major differences between fields

Publication output can be differentiated by research field. Like previous bibliometric reports, this report uses seven research fields. We note that the share of OA publications varies by field. The field that publishes the most in the form of OA publications is Life Sciences (accounting for 59% worldwide and 69% in Switzerland in 2016–2020). The field that publishes the least in the form of OA worldwide is Engineering, Computing & Technology (28%) and, in Switzerland, Arts & Humanities (27%).

OA publications by institutional sector in Switzerland

The breakdown of OA publications across the four institutional sectors is almost identical to the overall breakdown (see SERI bibliometric analysis 2022), in other words 70.4% higher education sector, 14.8% research institutes, 7.9% private businesses and 6.9% international organisations.

Partnerships in OA publications

Like for total partnerships (see SERI bibliometric analysis 2022), international collaboration on OA publications is very important to Switzerland, with a rate of 87% in 2016–2020.

Green OA, gold OA and bronze OA publications

In 2016–2020 green OA publications were the most common type worldwide, representing 20% of publications, followed by gold (19%) and then bronze (8%). In Switzerland, green OA publications also make up the greatest share (31%), followed by gold (20%) and bronze (9%). However, these rates vary from country to country and there is no typical breakdown for all countries.

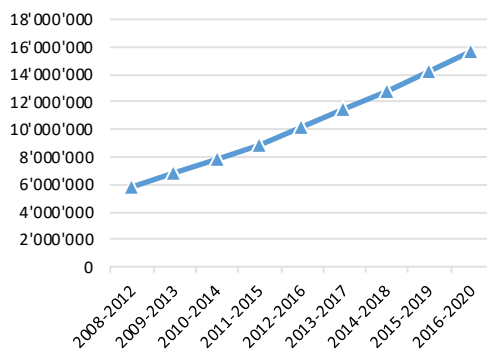
1 OA publications

Open access (OA) refers to information that is freely available online. This literature is free of charge and often has less restrictive copyright and licensing restrictions than traditionally published works, for both users and authors. There are several open access publishing options (e.g. gold, green, bronze, hybrid); for the purposes of this chapter, these are all grouped together as open access publications (OA publications) with no further distinction.

1.1 OA publications worldwide

The SERI bibliometric analysis 2022 shows that the number of worldwide publications (OA and non-OA) is steadily increasing, almost doubling between the periods 2008–2012 and 2016–2020 (see SERI bibliometric analysis 2022, Fig. 5). For OA publications only, this increase is even sharper, with output rising by a factor of 2.7, from 5.8 million in 2008–2012 to 15.8 million in 2016–2020 (Fig. 1). This type of publication is increasingly preferred over the traditional mode of publication and is therefore growing in importance.

Figure 1: Evolution of OA publications worldwide



Source: Clarivate Analytics (SCIE/SSCIE/A&HCI/ESCI), graphic by SERI

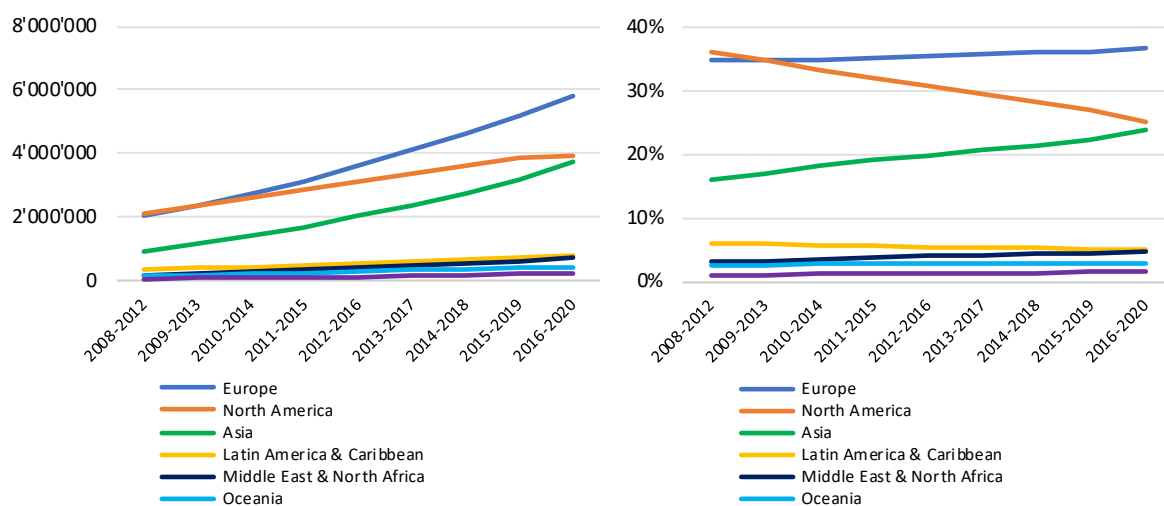
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1.2 Breakdown of OA publications by world region ²

Firstly, we note that the breakdown of OA publications by region is similar to the worldwide breakdown (see SERI bibliometric analysis 2022, Figs. 6 and 7), with Europe being the region that produced the most OA publications in 2016–2020 with a 37% share of worldwide publications, followed by North America (25%) and Asia (24%) (Fig. 2).

While OA publication output is increasing worldwide, the rate of growth is not the same in all regions of the world. In 2008–2012, North America and Europe were almost level and Asia was still lagging well behind in this publication category (Fig. 2). All the regions are seeing their absolute number of OA publications increase, albeit with differing dynamics: Asia is seeing a sharp rise in its share and the United States a marked decline. This is due to a stagnation in the number of OA publications in North America in recent years.

Figure 2: Evolution in the volume and world shares of OA publications by world region



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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² United Nations: composition of world regions <https://unstats.un.org/unsd/methodology/m49/>. The regions taken into account in this report are: Africa (Eastern Africa, Middle Africa, Southern Africa and Western Africa); North America (northern America); Latin America and the Caribbean (Central America, South America and the Caribbean); Asia (Central Asia, Eastern Asia, Southern Asia and South-Eastern Asia); Europe (Eastern Europe, Northern Europe, Southern Europe and Western Europe); Middle East and North Africa (Western Asia and Northern Africa); and Oceania (Australia and New Zealand, Melanesia, Micronesia and Polynesia).

1.3 Comparison of the volume of OA publications by country

In this chapter we will look at the regions in more detail and therefore drill down to country level. Once the countries' shares of world OA publications have been calculated, the countries are ranked by share in descending order, and for the country comparison, the top 20 countries are presented over two periods (the first is 2008–2012 and the second 2016–2020). The evolution of the absolute number of OA publications and the countries' world shares are shown in country factsheets in annex A.1; only Switzerland is presented in detail in Chapter 1.4.

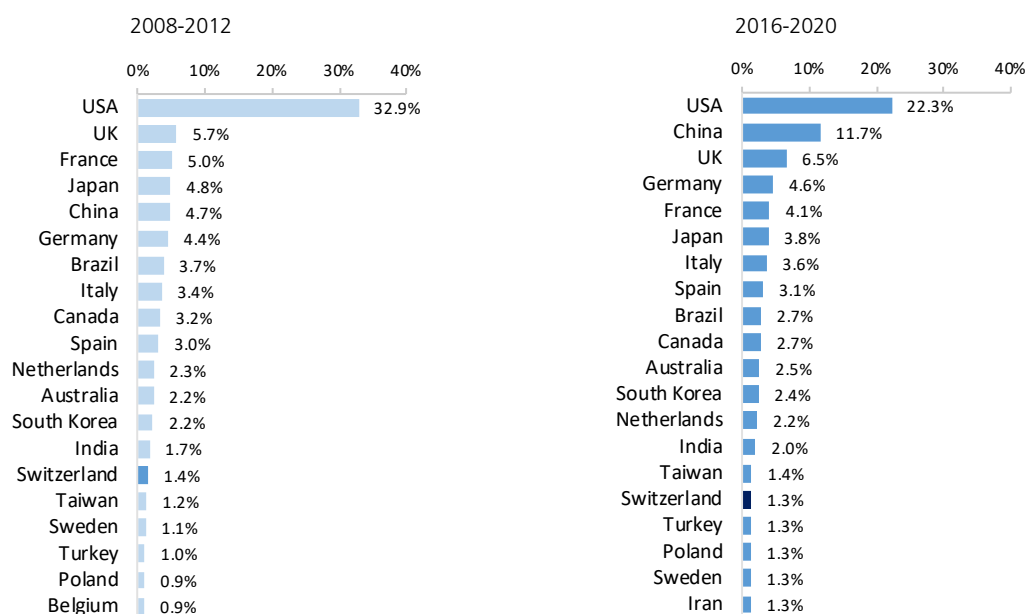
Worldwide, the main producers of OA publications are the same as for total publications, i.e. the United States, China, the United Kingdom, Germany, France, Japan etc. (see SERI bibliometric analysis 2022, Fig.8).

The United States produces the majority of the world's OA publications, but its share is declining (from 32.9% in 2008–2012 to 22.3% in 2016–2020, Fig. 3) as the volume of OA publications from other countries increases, with more and more countries encouraging this publishing option.

In 2008–2012 Switzerland produced 1.4% of the world's OA publications and ranked 15th. In 2016–2020 Switzerland produced 1.3% of the world's OA publications and ranked 16th.

Switzerland is better ranked here than for total publications (see SERI bibliometric analysis 2022, Fig. 8, Switzerland: 20th place, 1% of worldwide publication output), which shows that it is a more active player in the production of this type of publication than in traditional publications.

Figure 3: World share of OA publications by country for the periods 2008–2012 and 2016–2020, the top 20 countries



Source: Clarivate Analytics (SCIE/SSCIE/A&HCI/ESCI), graphic by SERI

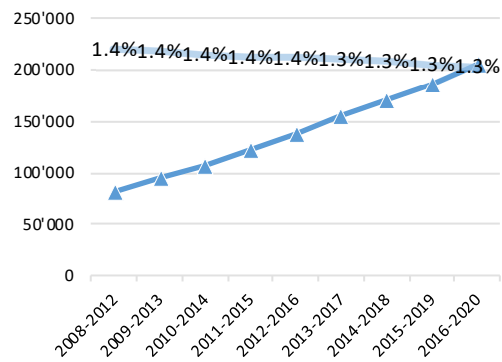
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1.4 Swiss OA publications

The volume of Switzerland's OA publications is growing steadily, rising from around 82,000 publications in 2008–2012 to 205,000 in 2016–2020 (Fig. 4).

However, Switzerland's world share of OA publications has decreased slightly, from 1.4% in 2008–2012 to 1.3% in 2016–2020. This slight decline in percentage terms can be explained by a greater increase in other countries' shares.

Figure 4: Evolution in Switzerland's absolute volume and world share of OA publications



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

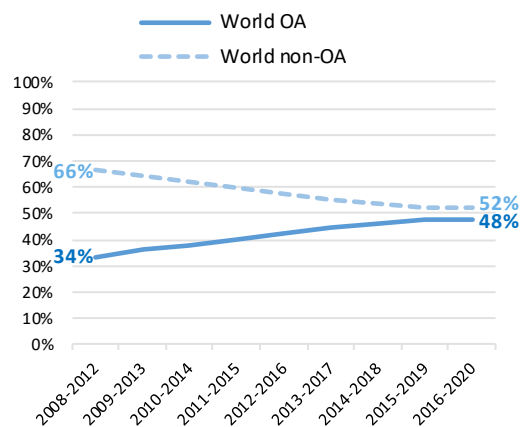
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1.5 Shares of OA and non-OA publications

The indicator from the previous chapter (world share of OA publications) shows which are the major (and minor) producers of OA publications. This indicator therefore depends on the country's size. It does not really tell us much about the significance of the OA publications in the country's total output. To determine this, we will calculate an indicator that does not depend on the country size: the share of OA publications in the country's total output. Calculating this share of OA publications allows us to determine whether this category of publications is becoming the most commonly used form of publication in the country or not.

If we start by looking at this indicator at worldwide level, we observe that while the share of OA publications has increased – rising from 34% in 2008–2012 to 48% in 2016–2020 (Fig. 5) – this type of publication is still in the minority as 52% of publications are still in non-OA form.

Figure 5: Evolution of shares of OA and non-OA publications worldwide



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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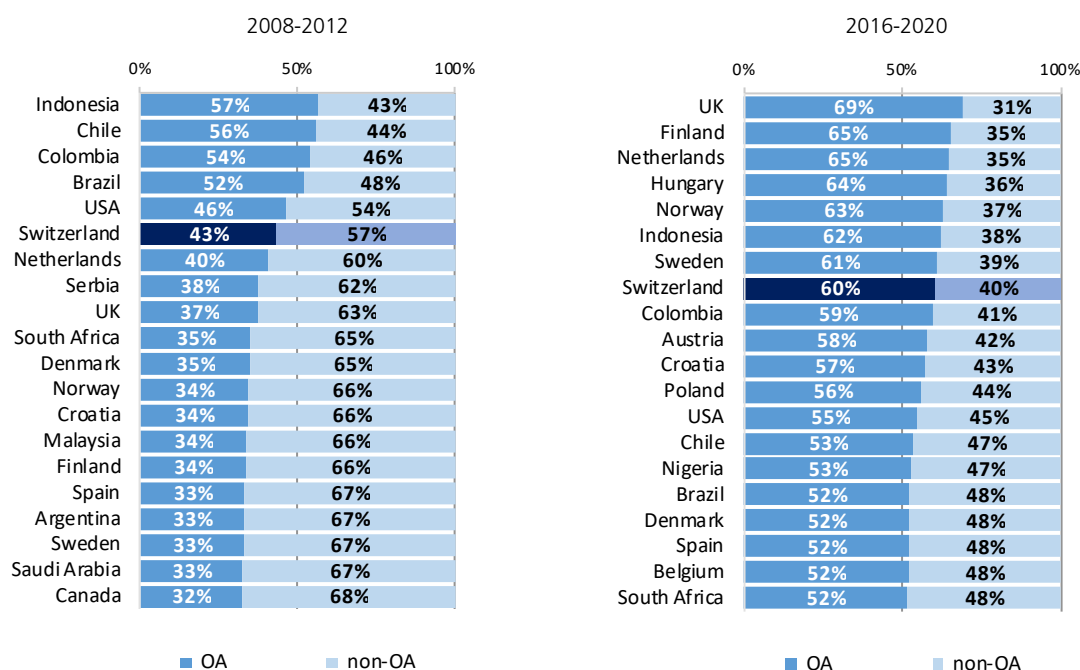
1.6 Comparison of countries' shares of OA and non-OA publications

The country comparison in this chapter is based on the indicator that does not depend on country size and yields different results to the country comparison by volume in Figure 3. For example, countries such as Indonesia, Chile and Finland, which are small players in terms of publication volume, are among the top-ranking countries in terms of share of OA publications.

In 2008–2012, there were only four countries where OA publications made up more than 50% of total publication output: Indonesia (57%), Chile (56%), Colombia (54%) and Brazil (52%). They are followed by the United States (46%), Switzerland (43%) and the Netherlands (40%) (Fig. 6).

This share of OA publications is increasing everywhere, and OA publications currently comprise more than 50% of total output in 22 countries. In the 2016–2020 period, the UK holds the lead with 69% of its output in the form of OA publications, followed by Finland (65%) and the Netherlands (65%). Switzerland ranks 8th, with 60% of its publication output in OA form.

Figure 6: Share of OA and non-OA publications in the country's output, for the top 20 countries with the largest shares of OA publications, for the periods 2008–2012 and 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

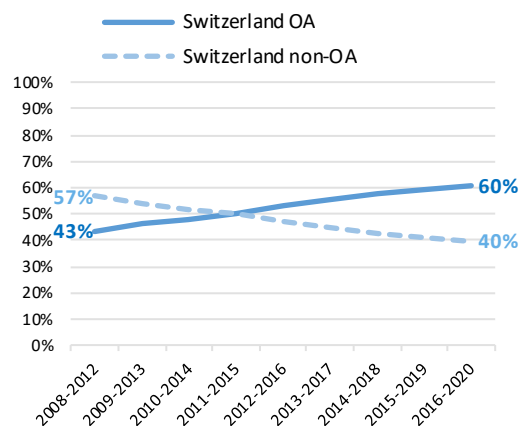
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Annex A.1 contains charts showing the volumes and world shares of OA publications and the evolution of OA shares to allow an in-depth analysis by country.

1.7 Evolution of the share of OA publications in Switzerland and selected countries

The share of OA publications in total output is higher in Switzerland than worldwide (Fig. 5): in 2008–2012 it was 43%, it exceeded the 50% mark in 2011–2015 and reached 60% in 2016–2020 (Fig. 7), putting Switzerland in the top 10 countries (Fig. 6).

Figure 7: Evolution of shares of OA and non-OA publications in Switzerland



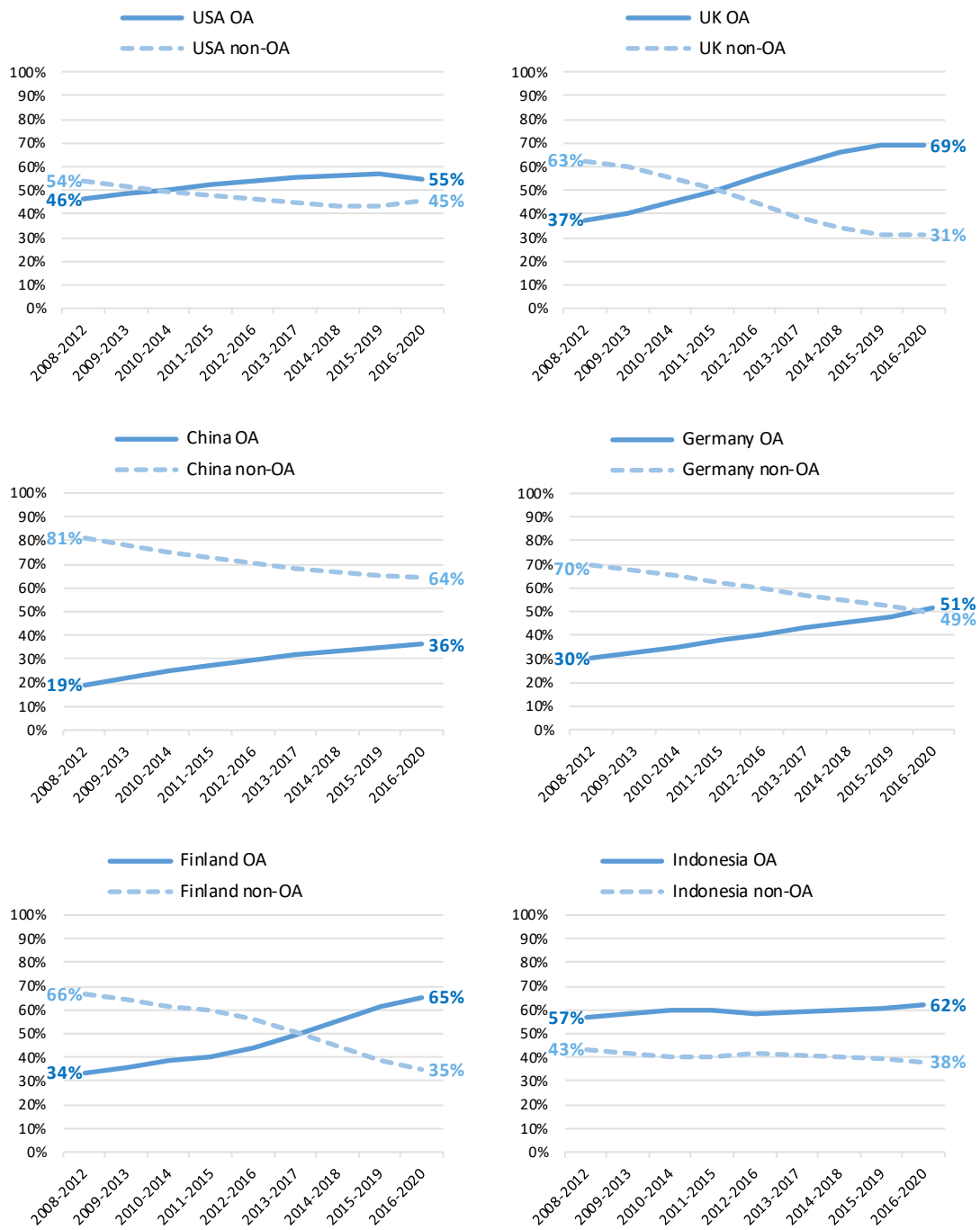
Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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This evolution towards an increasing volume of publications in OA form can be seen in all countries. However, this development differs by country, and some examples are shown on Figure 8, with the following selection criteria:

- the four largest producers of OA publications: the United States, China, the United Kingdom and Germany (Fig. 3). In the United States, OA publications have made up more than half of publication output since 2010–2014. Their share continues to increase steadily but fell slightly in the most recent period (55% in 2016–2020). China has also increased its gross volume of OA publications, but they are still well in the minority in the country's total publication output (accounting for 36%). The United Kingdom has strongly opted for the OA path, currently reaching a share of almost 70%, while in Germany, OA publications only made up 51% of total publication output in 2016–2020.
- two small producers, such as Finland and Indonesia, that nevertheless have a large share of OA publications (Fig. 6). Finland shows a development similar to that of the UK, reaching 65% in 2016–2020. And Indonesia, the country with the largest share of OA publications in 2008–2012 (57%), has only slightly increased this share, currently reaching 62%.

Figure 8: Evolution of shares of OA and non-OA publications by country



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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Annex A.1 contains charts showing the evolution of OA and non-OA publications for 32 countries.

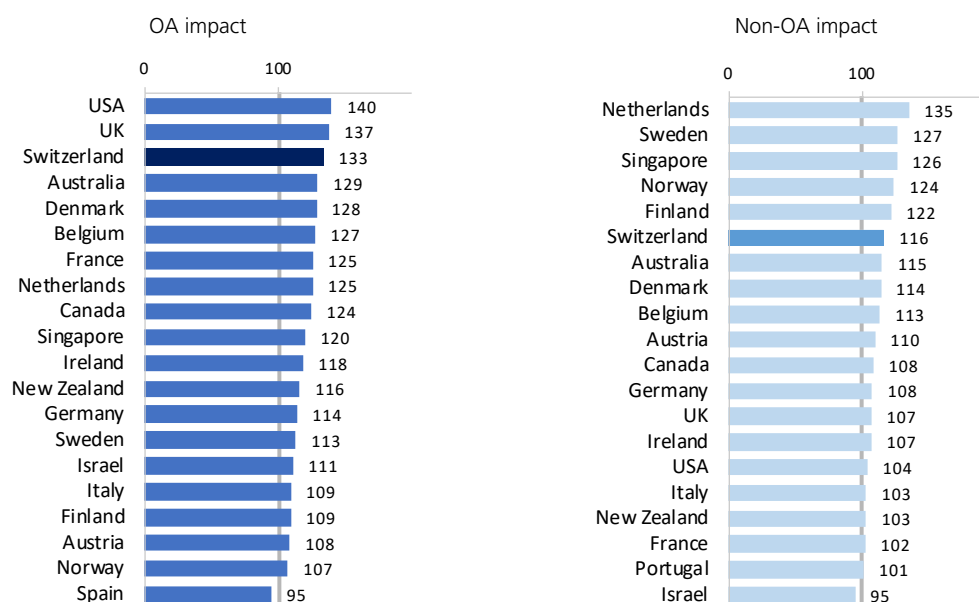
1.8 Impact of OA publications

A publication's impact is measured by the number of times it is cited by researchers (see box for definition). The impact is an indicator of the level of recognition among peers.

The impact of Switzerland's total publications (OA and non-OA) puts it in 3rd place (see SERI bibliometric analysis 2022, Fig. 10). Switzerland's overall impact score is 127 points. The impact of OA publications is slightly higher, at 133 points, which also puts Switzerland in 3rd place (Fig. 9). The impact of non-OA publications is 116 points, putting Switzerland in 5th place worldwide.

The United States and United Kingdom also have a higher impact score for OA publications than non-OA publications, but this is not the case for all countries: for example, for countries such as the Netherlands, Sweden, Singapore and Finland, the impact of non-OA publications is higher than that of OA publications. We cannot therefore conclude that OA publications always enjoy greater recognition than non-OA publications.

Figure 9: Impact indicator for OA and non-OA publications, period 2016–2020, top 20 countries



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

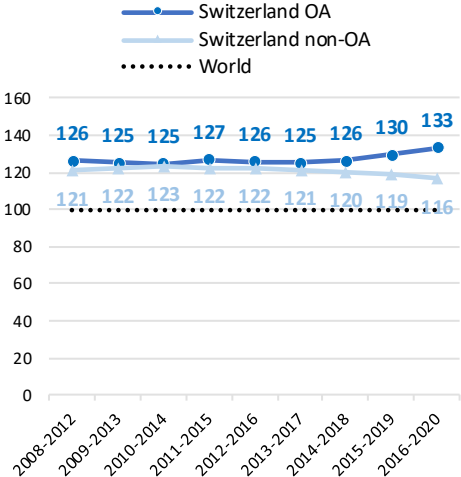
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Calculating impact (relative citation indicator)

The impact of a country's publications indicates the readership that these publications reach among the research community. It is measured by the number of citations a publication receives. For each publication, the number of citations is put into context, i.e. divided by the global average citations in the research field in question, and then standardised on a scale where 100 represents the world average. The analysis window is five years, as for publication counting. See annex A.2 for more details on definition and calculation methods.

The evolution of the impact for the two publication categories shows that for Switzerland the difference between OA impact and non-OA impact was not very significant up to 2013–2017. After this, a greater distinction emerged between the two categories of publications, with the impact of OA publications increasing to 133 points, and that of non-OA publications decreasing to 116 points (Fig. 10).

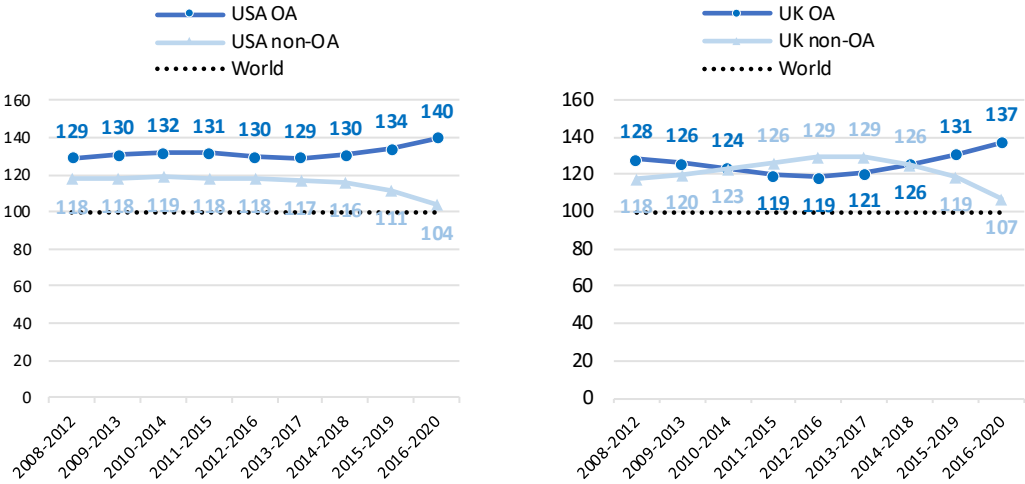
Figure 10: Evolution of the impact of OA and non-OA publications from Switzerland



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI © SERI 2023

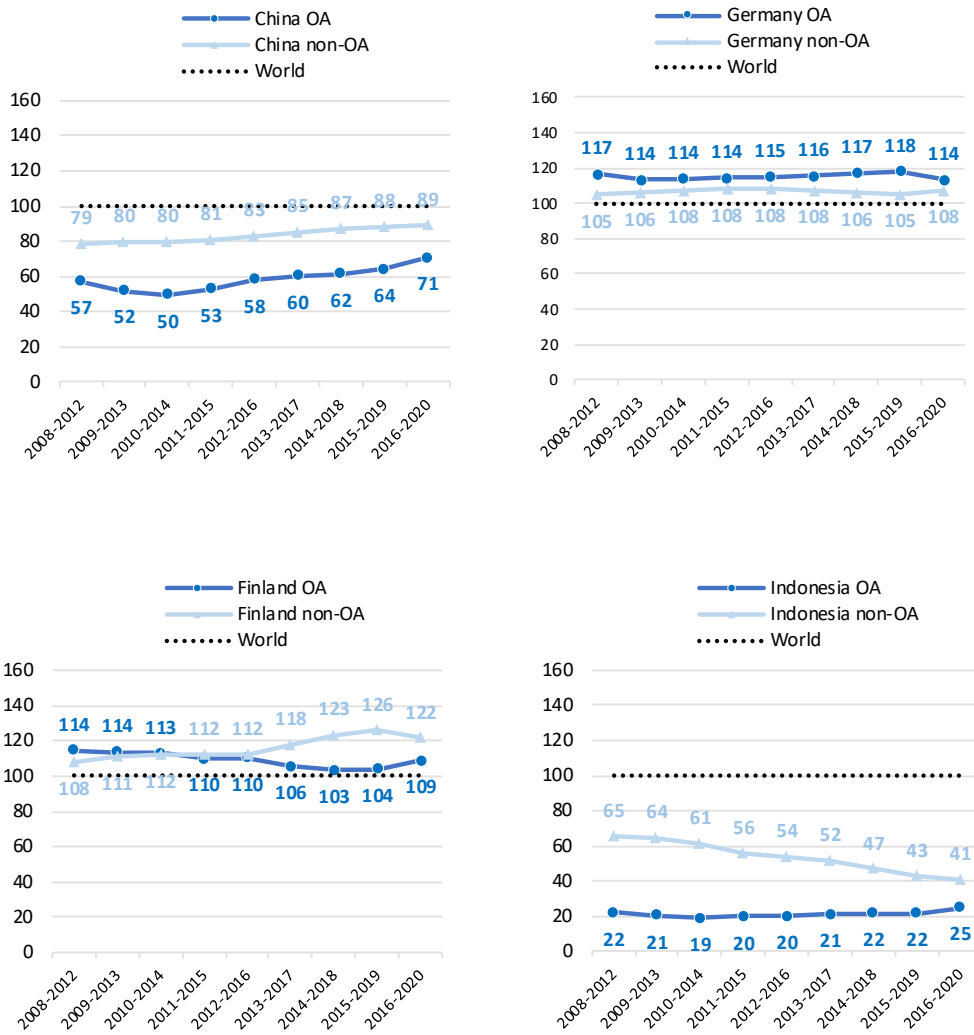
The evolution patterns regarding the impact of OA versus non-OA publications are quite different from country to country. In some cases, the impact of OA publications is always above that of non-OA publications, or always below, or it may fluctuate between the two below (see the six examples of countries as per the selection in Chapter 1.7; Fig. 11).

Figure 11: Evolution of the impact of the country's OA and non-OA publications



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI © SERI 2023

Figure 11 (cont.): Evolution of the impact of the country's OA and non-OA publications



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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Annex A.1 contains charts showing the evolution of OA and non-OA publications for 32 countries.

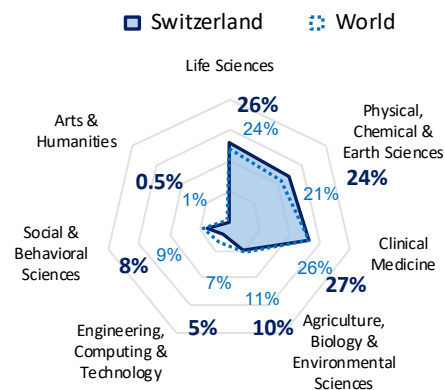
2 OA publications by research area

2.1 Profile of Switzerland's OA publications by research field

The breakdown of publications into the seven research fields (see box for definition) allows us to establish a profile of each country and to see in which fields research efforts are focused.

The breakdown of OA publications into the seven research fields results in a similar profile to that of total publications (OA and non-OA) (see SERI bibliometric analysis 2022, Fig. 15). The field that produces the most OA publications is Clinical Medicine (27% of Switzerland's OA publication output), followed by Life Sciences (26%) and Physical, Chemical & Earth Sciences (24%) (Fig. 12).

Figure 12: Breakdown of OA publications by research field, Switzerland and the world, 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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Research fields

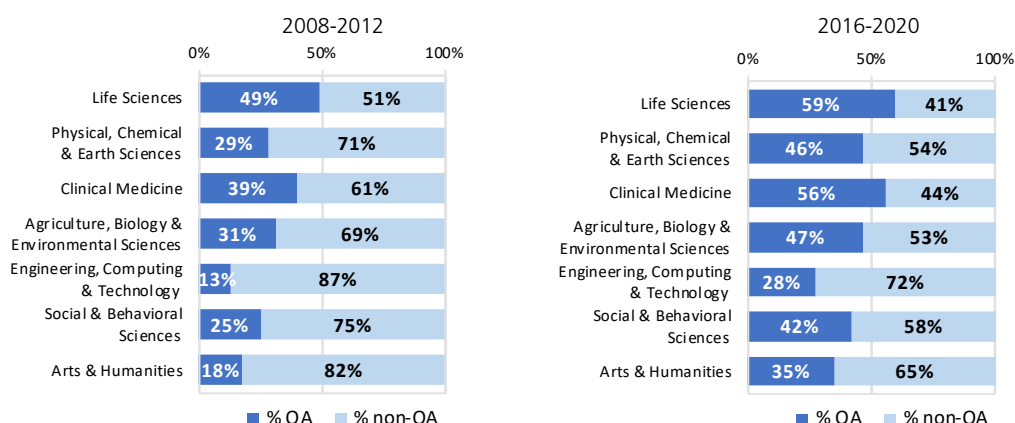
The definition of research fields depends on the classification used by a database to split scientific journals into categories. Here, scientific journals are split according to their content into seven broad categories (or research fields; see *Current contents* <https://mjl.clarivate.com/search-results> Web of Science coverage/*Current contents*): Life Sciences; Physical, Chemical & Earth Sciences; Clinical Medicine; Agriculture, Biology & Environmental Science; Social & Behavioural Science; Engineering, Computing & Technology; and Arts & Humanities. The research fields themselves are split into several sub-fields. See annex A.2 for a full list of research fields and sub-fields.

2.2 OA publications as a share of publication output by research field

As in Chapter 1, the breakdown of OA publications by research field is also an indicator that depends on size (publication volume), here of the research field. To compare these research fields, this chapter uses the share of OA publications in each field's total output.

Worldwide, the share of OA publications in total publication output is currently 48% (see Chapter 1.5) but, as we can see in Figure 13, publication practices vary by research field: fields such as Life Sciences and Clinical Medicine published more than 50% in OA form in 2016–2020, while fields such as Engineering, Computing & Technology and Arts & Humanities were at 28% and 35% respectively.

Figure 13: Share of OA and non-OA publications by research field, for the seven research fields, worldwide, in 2008–2012 and 2016–2020

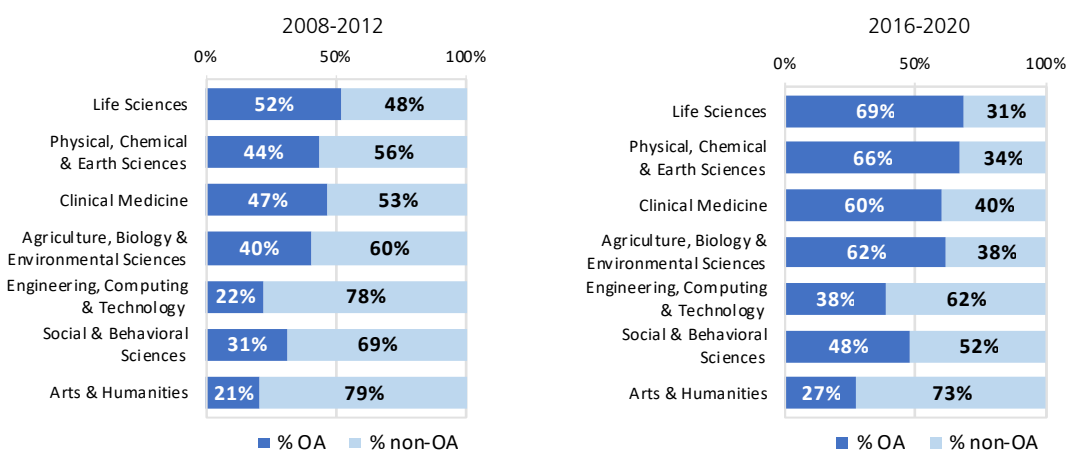


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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In Switzerland, Life Sciences is the field with the greatest share of OA publications: 69% in 2016–2020. It is followed by the field Physical, Chemical & Earth Sciences (66%) then by Agriculture, Biology & Environmental Sciences (62%) and Clinical Medicine (60%). The other three fields publish less than 50% in OA form (Fig. 14).

Figure 14: Share of OA and non-OA publications by research field, for the seven research fields, in Switzerland, in 2008–2012 and 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

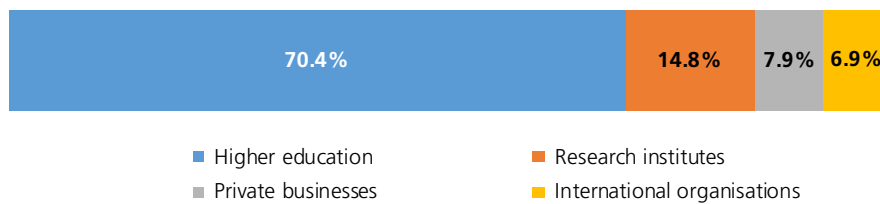
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3 OA publications by institutional sector in Switzerland

The research institutions that produce publications in Switzerland were broken down into four institutional sectors (see box for definition of sectors).

The breakdown of OA publications by institutional sector is almost identical to the breakdown for total publications (see SERI bibliometric analysis 2022, Fig. 21): 70.4% higher education, then 14.8% research institutes, 7.9% private businesses and finally 6.9% international organisations (Fig.15).

Figure 15: Breakdown of Swiss OA publications by institutional sector, Switzerland and the world, 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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Institutional sectors

The breakdown of research institutions into institutional sectors has been done only for those located in Switzerland. Four institutional sectors have been defined:

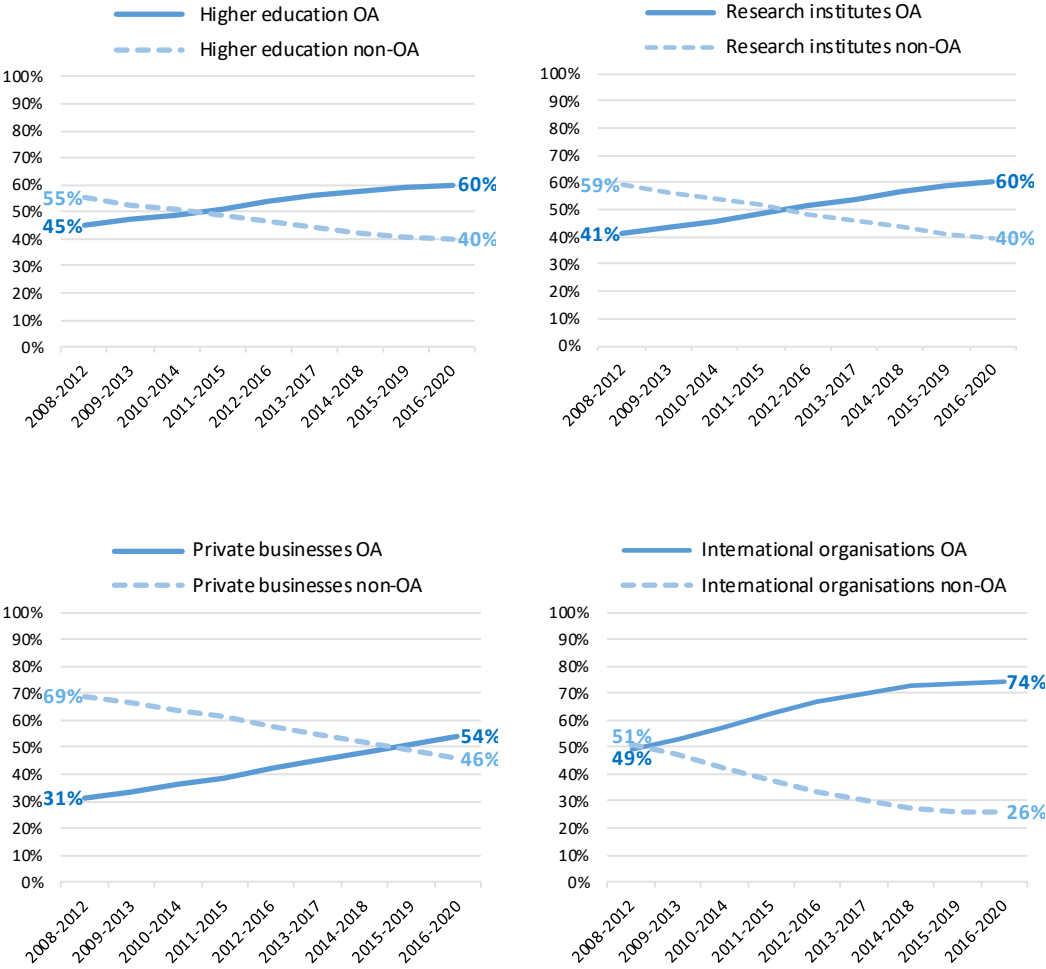
- Higher education: cantonal universities, Swiss federal institutes of technology, universities of applied sciences, private colleges and universities, and teaching hospitals.
- Private businesses: private companies in Switzerland, as well as private clinics and hospitals.
- Research institutes: research institutes of the ETH Domain, federal research institutes, foundations, as well as public hospitals that are not teaching hospitals.
- International organisations.

3.1 Evolution of the breakdown of OA publications by institutional sector

As in the other chapters, we will compare the institutional sectors according to the indicator that does not depend on their size: the share of OA publications in the sector's total publication output.

The four institutional sectors now publish more than half of their publication output in OA form, but the evolution has been different (Fig. 16): the higher education and research institutes sectors have a similar pattern, both going from around 45% OA in 2008–2012 to 60% in 2016–2020. Meanwhile, the international organisation sector has seen the strongest growth, rising from 49% OA to 74%, while the private businesses sector has seen the weakest growth in the share of OA publications, rising from 31% to 54%.

Figure 16: Evolution of the share of OA and non-OA publications in the total output of institutional sectors in Switzerland



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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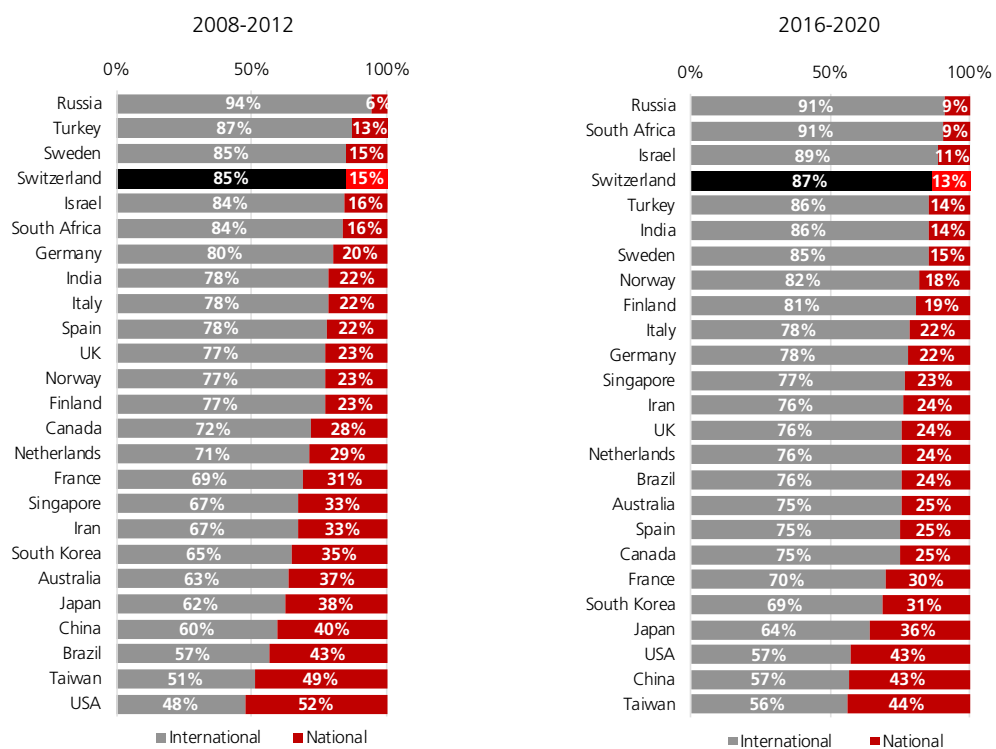
4 Partnerships in OA publications

This chapter concerns publications involving collaboration (see box for definition of partnerships). It shows the share of national and international partnerships, and the countries with which Swiss researchers collaborate the most.

4.1 National and international partnership rates for OA publications by country

As with total publications (see SERI bibliometric analysis 2022, Fig. 12), Switzerland's OA publications have a very high level of international collaboration. In 2008–2012 this figure was 85% (Fig. 17) and increased slightly to 87% in 2016–2020 (Fig. 17).

Figure 17: Rate of national and international partnerships in OA publications for a selection of 25 countries, for 2008–2012 and 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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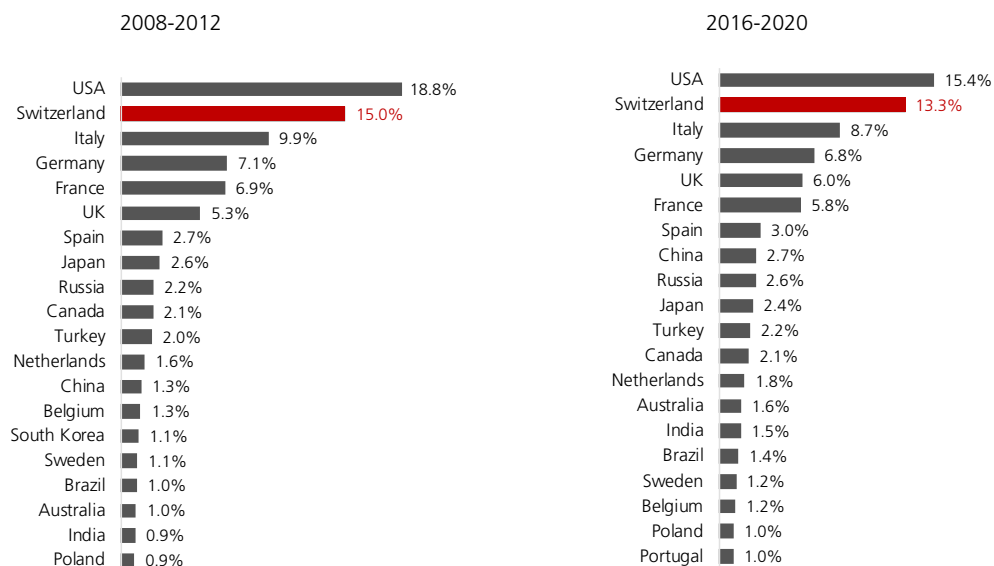
Methods of counting publication partnerships

For each Swiss institution appearing on a publication, we count the other institutions involved in the publication, and according to the country where these institutions are located, we classify the partnership as national or international. The percentages of partnerships are calculated on the basis of the country's total partnerships. This indicator thus refers to total partnerships and not total publications.

4.2 Partnerships in Swiss OA publications

The leading partner for Swiss researchers is the United States, with 18.8% in 2008–2012 and 15.4% in 2016–2020 (Fig. 18). Neighbouring countries are the second most important partners for Swiss researchers.

Figure 18: Origin of partners in OA publications of Swiss-based researchers as a percentage of Switzerland's total OA partnerships, top 20 countries, 2008–2012 and 2016–2020



Source : Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), traitement SEFRI

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5 Green OA, gold OA and bronze OA publications

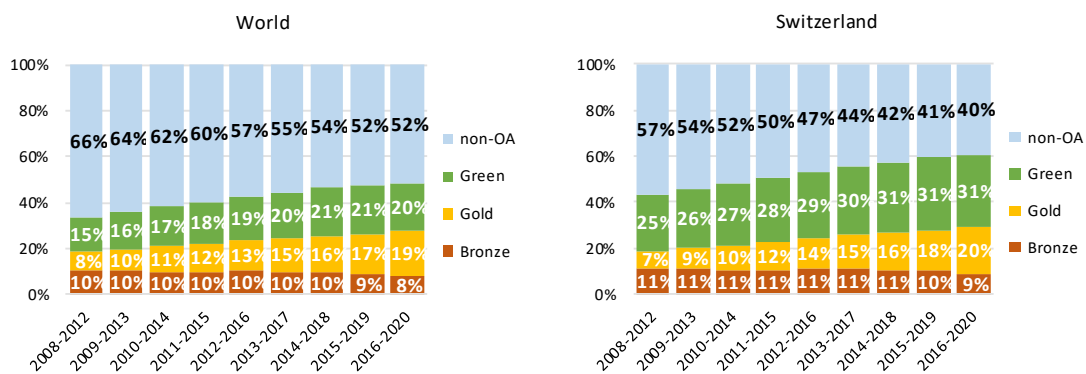
Open access publications are made available according to various models. They include green, gold, bronze, and hybrid options. Up until 2020, the Clarivate database only contained the first three options. This chapter reuses the previous 'OA and non-OA' results but sub-divides the OA results according to the three groups based on Clarivate's data classification.

5.1 Evolution of the shares of green OA, gold OA and bronze OA publications

Worldwide, the green option has been the most commonly used since the beginning of the period under review, accounting for 15% of publications in 2008–2012 and 20% in 2016–2020 (Fig. 19). In 2008–2012, bronze OA publications made up a slightly larger share than gold OA publications (10% versus 8%). The gold option was then clearly more popular among researchers, and now accounts for 19% versus 8% for bronze.

In Switzerland, the evolution of the three options is similar to the worldwide pattern, with green on the rise, and gold becoming more important than bronze. However, the percentage of green OA publications is much higher in Switzerland than worldwide (31% versus 20% in 2016–2020) (Fig. 19).

Figure 19: Evolution of the share of green OA, gold OA and bronze OA publications and non-OA publications, worldwide and in Switzerland



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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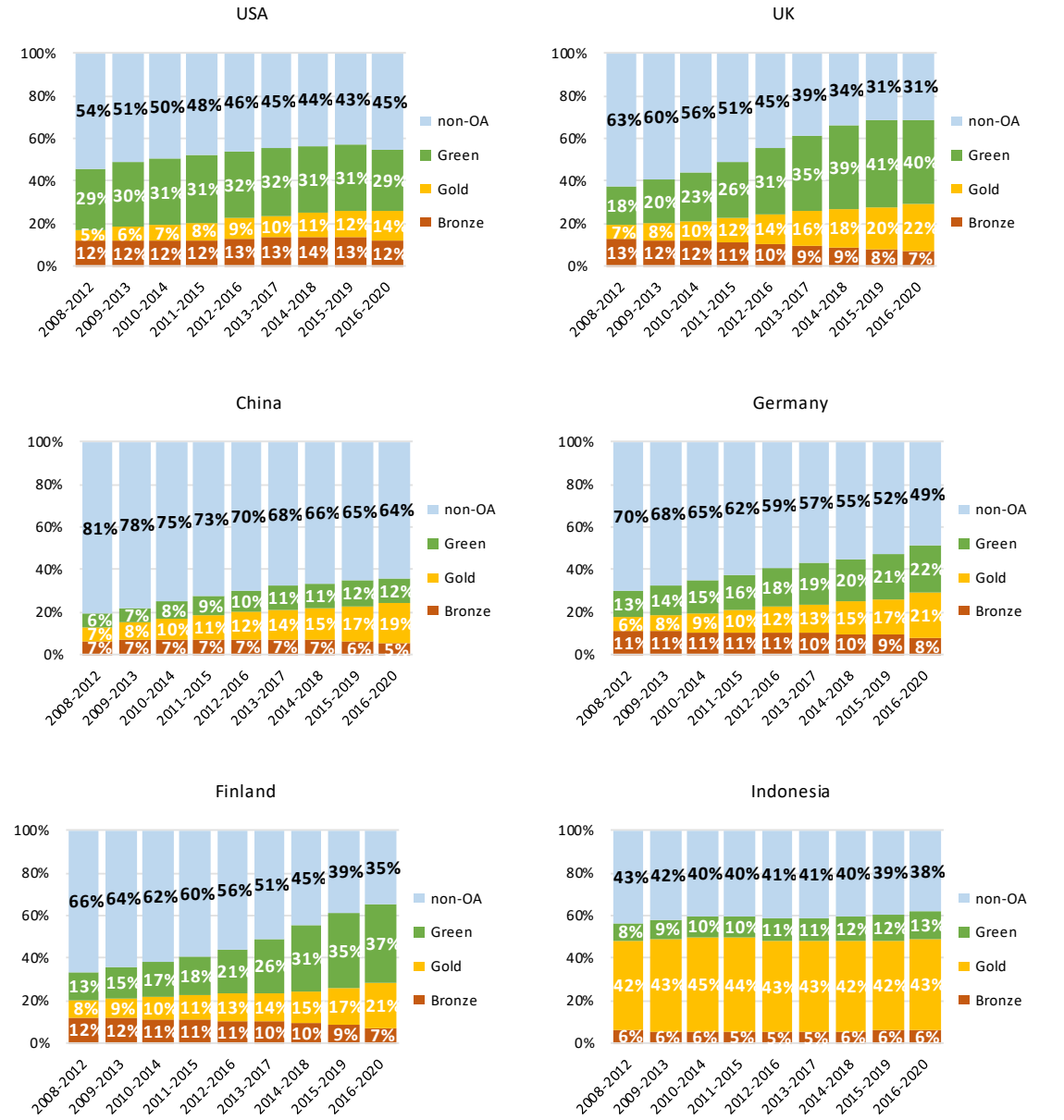
Open access publications (OA)

Open access publications are publications that are made available to the public online free of charge. There are several open access publishing options:

- Gold open access: publications in a freely available journal
- Green open access: publications in a journal that are also available in an open access repository
- Hybrid open access: publications in a subscription journal that are open access with a licence
- Bronze open access: publications that are freely available without a licence in a subscription journal

This pattern (where the majority of OA publications use the green option) is found in many countries, such as the United States, the United Kingdom and Finland (Fig. 20, the six country examples correspond to the selection in Chapter 1.7; Fig. 11). But other countries such as China and Indonesia have more gold OA than green OA publications, and a country such as Germany has almost the same rates of green OA and gold OA publications (Annex A.1 contains charts showing the evolution of green OA, gold OA and bronze OA publications and non-OA publications, for 32 countries). There is no typical pattern that applies to all countries.

Figure 20: Evolution of the share of green OA, gold OA and bronze OA publications and non-OA publications, in six countries



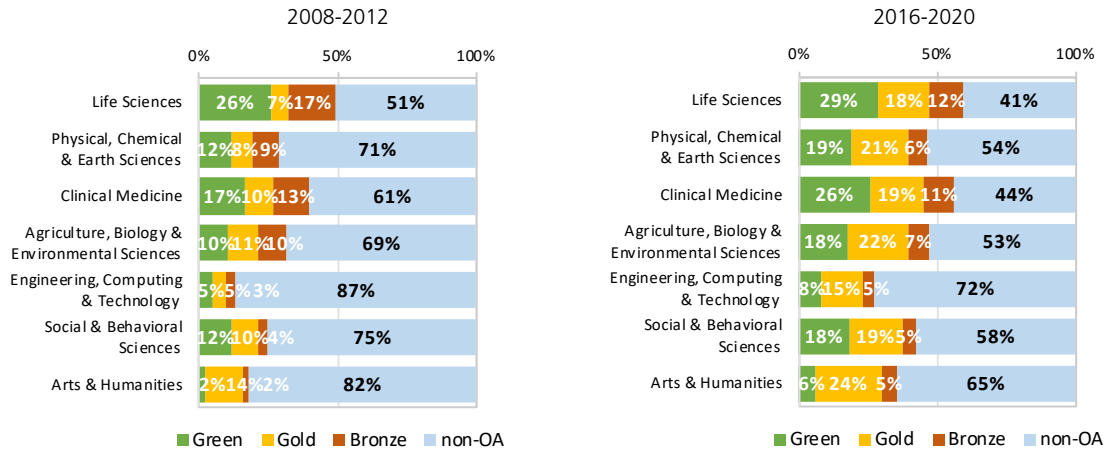
Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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5.2 Share of green OA, gold OA and bronze OA publications by research field

In 2016–2020, gold OA publications made up the greatest share worldwide in almost all fields except Life Sciences and Clinical Medicine, where green OA publications made up a slightly larger share (Fig. 21).

Figure 21: Share of green OA, gold OA and bronze OA publications and non-OA publications, by research field, for the seven research fields, worldwide, in 2008–2012 and 2016–2020

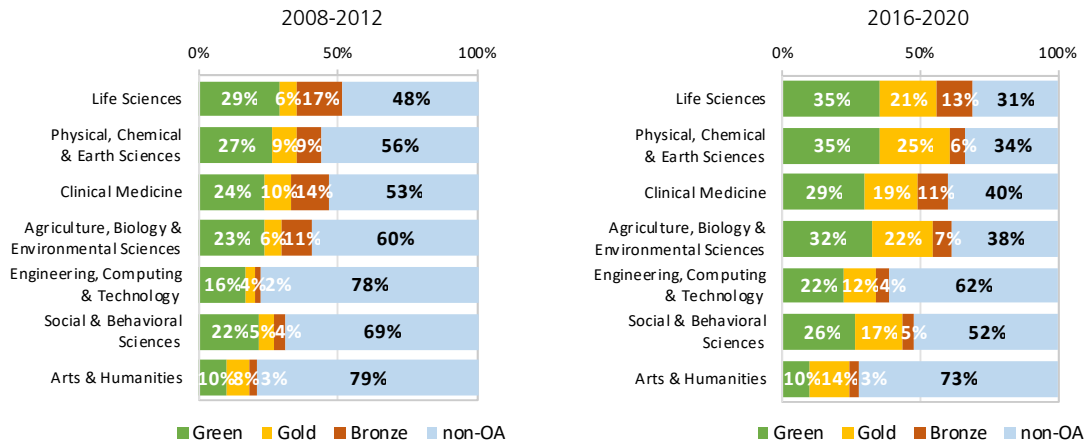


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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By contrast, in 2016–2020 in Switzerland, green OA publications made up the greatest volume in all research fields except Arts & Humanities, followed by gold OA and finally bronze OA publications (Fig. 22).

Figure 22: Share of green OA, gold OA, bronze OA and non-OA publications by research field, for the seven research fields, in Switzerland, in 2008–2012 and 2016–2020



Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

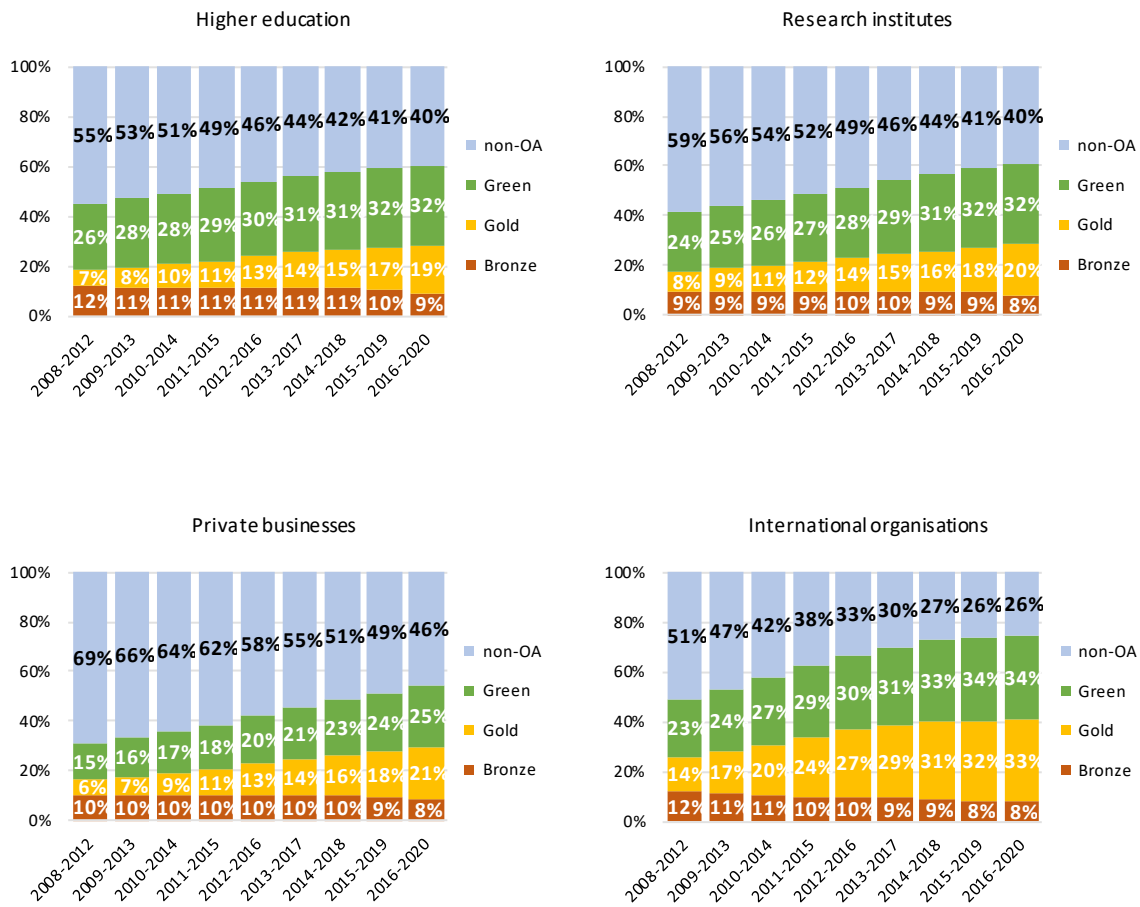
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Annex A.1 contains charts showing the shares of green OA, gold OA, bronze OA and non-OA publications by research field in 32 countries.

5.3 Green OA, gold OA and bronze OA publications, by institutional sector in Switzerland

If we look at Switzerland broken down into the four institutional sectors, we see that all sectors favour the same approach: the green OA option (Fig. 23). Only one sector (international organisations) has a very similar share of green and gold OA publications and there is no marked preference for one or the other.

Figure 23: Evolution of the share of green OA, gold OA, bronze OA and non-OA publications for the four institutional sectors in Switzerland



Source: Clarivate Analytics (SCIE/SSCIE/A&HCI/ESCI), graphic by SERI

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A Annexes

A. 1 Country factsheets

In this Annex, each page presents a country through the following five charts:

- evolution in the volume of OA publications and the country's world share between 2008–2012 and 2016–2020
- evolution in the country's share of OA and non-OA publications between 2008–2012 and 2016–2020
- evolution of the impact of the country's OA and non-OA publications between 2008–2012 and 2016–2020
- evolution in the shares of green OA, gold OA, bronze OA and non-OA publications in the country's publication output between 2008–2012 and 2016–2020
- shares of green OA, gold OA, bronze OA and non-OA publications for the seven research fields, in 2016–2020

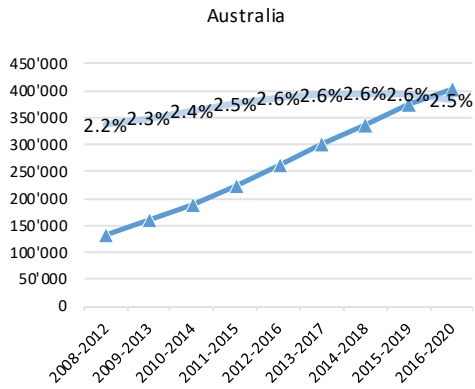
Selection of countries:

The top 20 countries with the largest world shares of OA publications in 2016–2020 (Fig. 3) and the top 20 countries with the greatest share of OA publications in their domestic output (Fig. 6), which makes 32 countries, presented in alphabetical order:

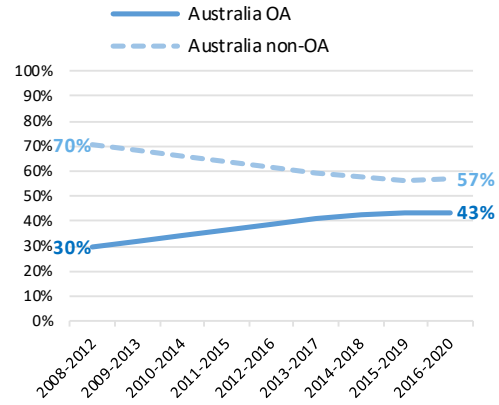
Si vous êtes intéressé par une fiche pays qui ne figure pas dans cette annexe, vous pouvez l'obtenir à l'adresse suivante : isabelle.maye@sbfi.admin.ch

1 Australia

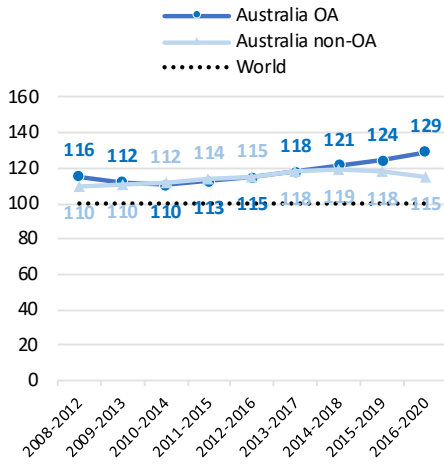
Volume and global share of OA publications



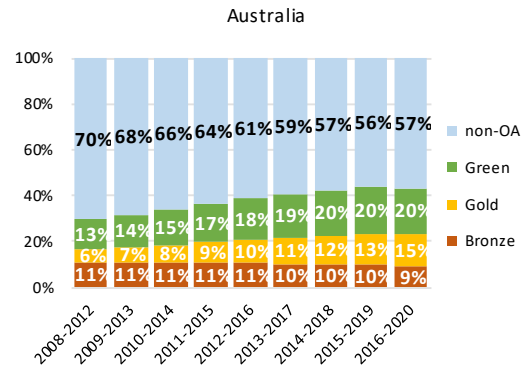
Shares of OA and non-OA publications



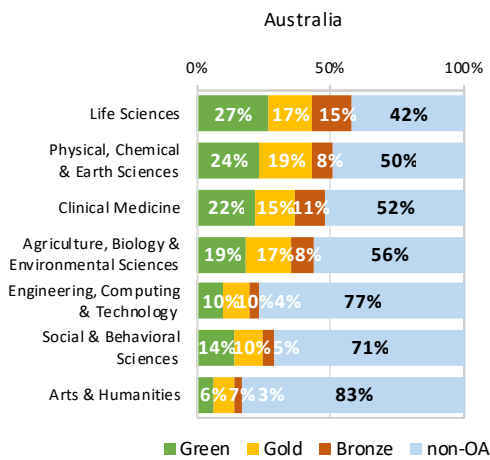
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

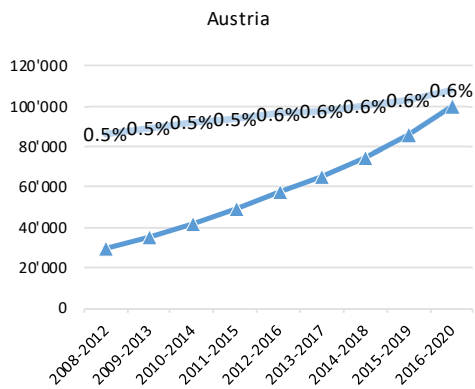


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

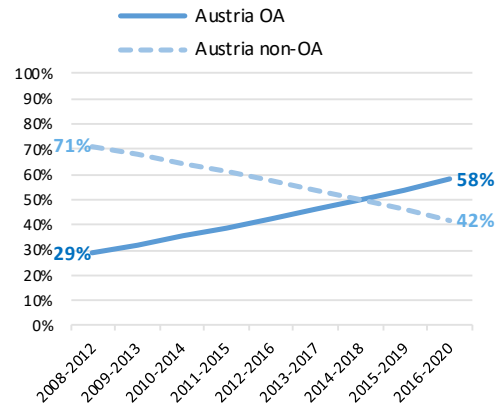
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2 Austria

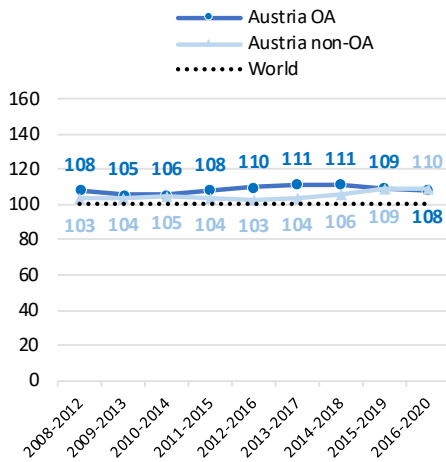
Volume and global share of OA publications



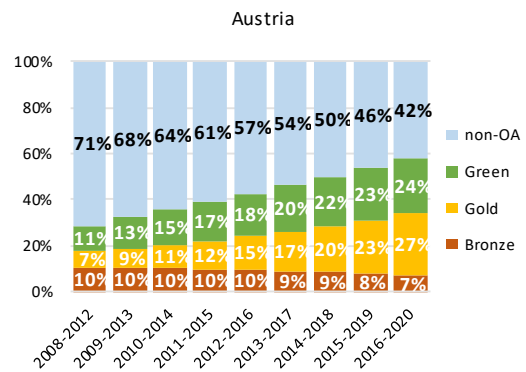
Shares of OA and non-OA publications



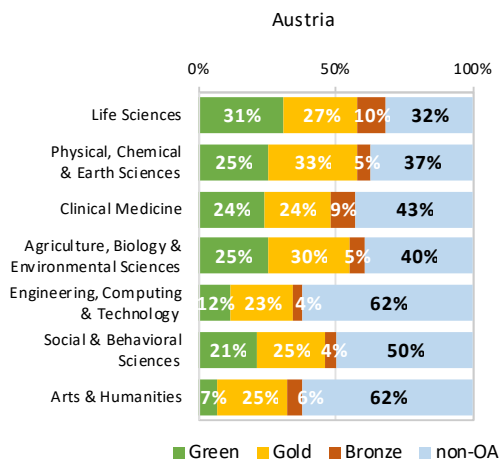
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

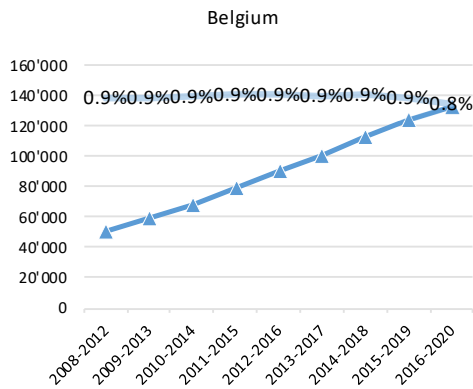


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

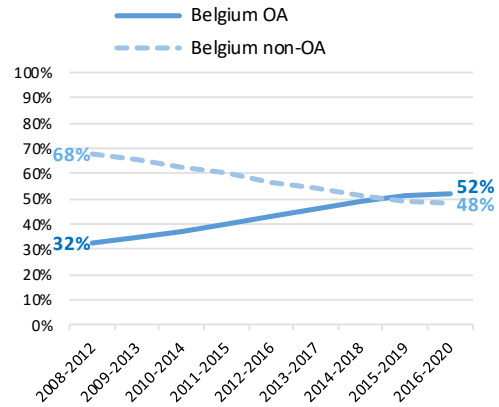
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3 Belgium

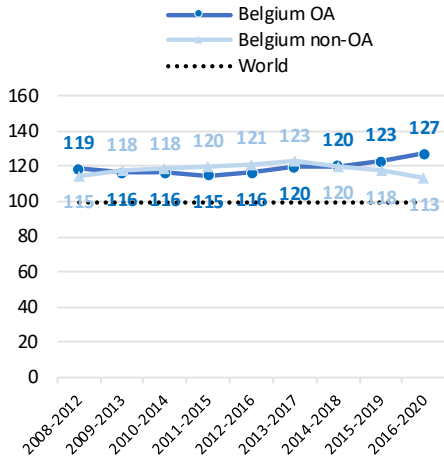
Volume and global share of OA publications



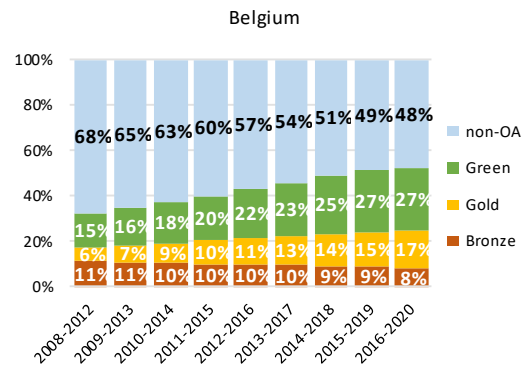
Shares of OA and non-OA publications



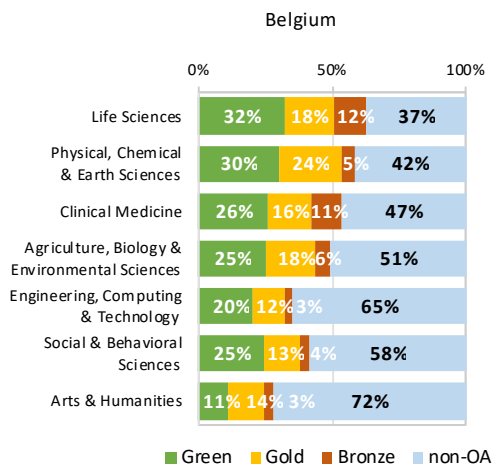
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016–2020

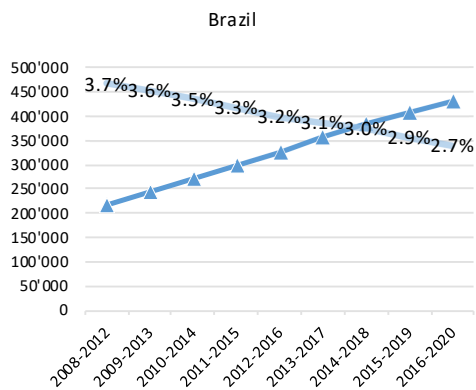


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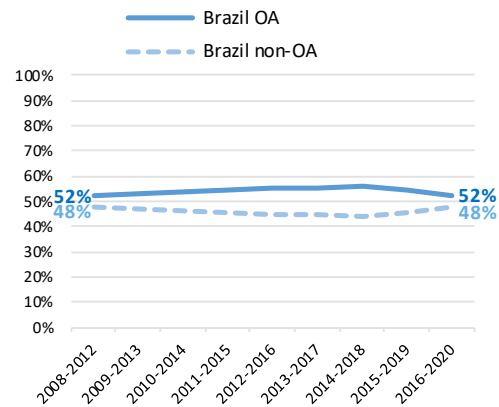
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4 Brazil

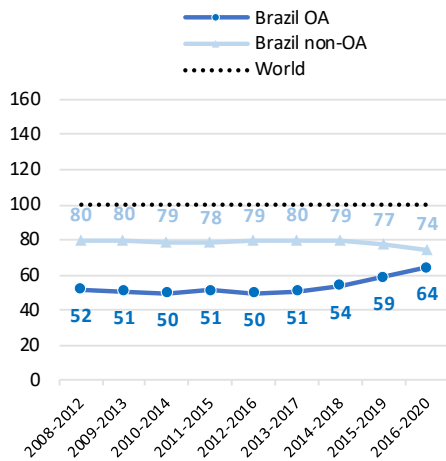
Volume and global share of OA publications



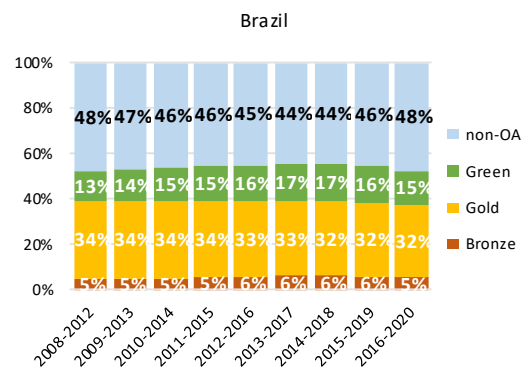
Shares of OA and non-OA publications



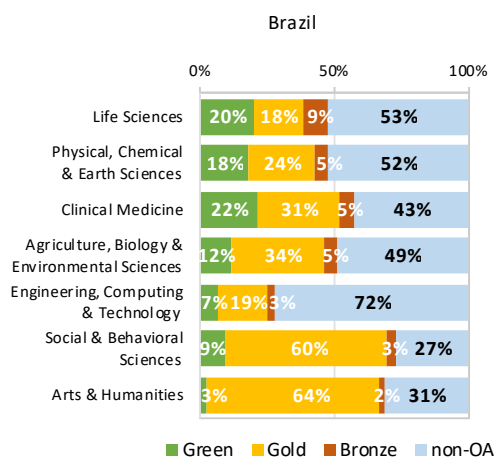
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

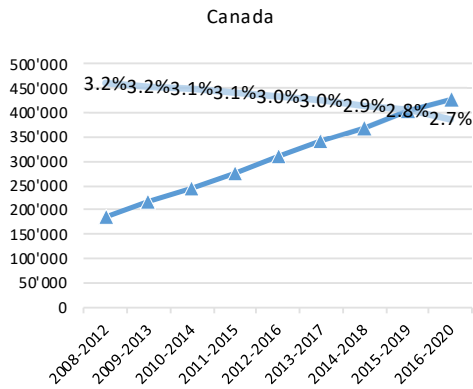


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

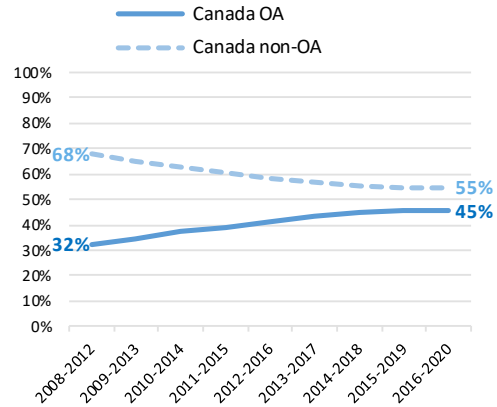
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5 Canada

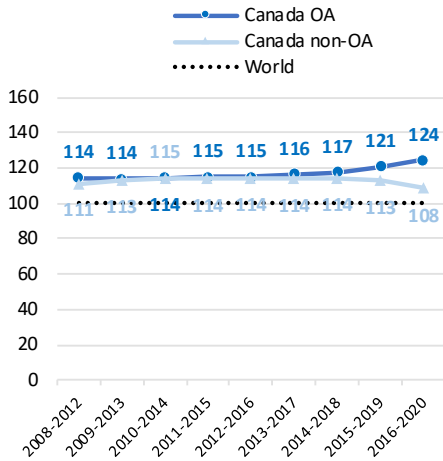
Volume and global share of OA publications



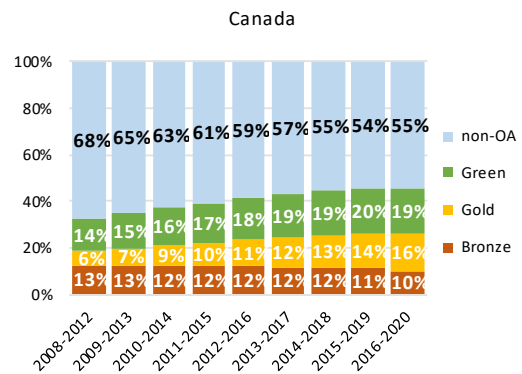
Shares of OA and non-OA publications



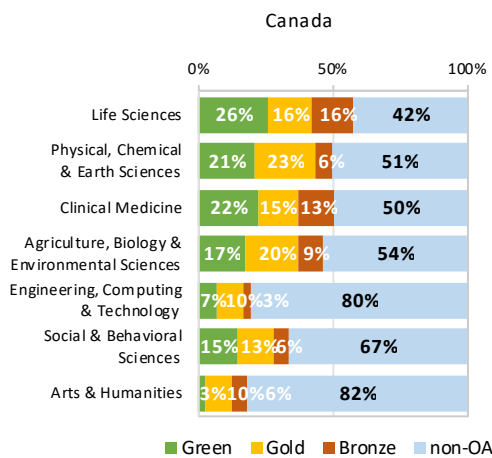
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016–2020

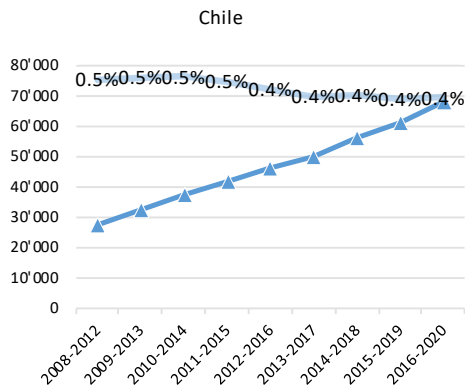


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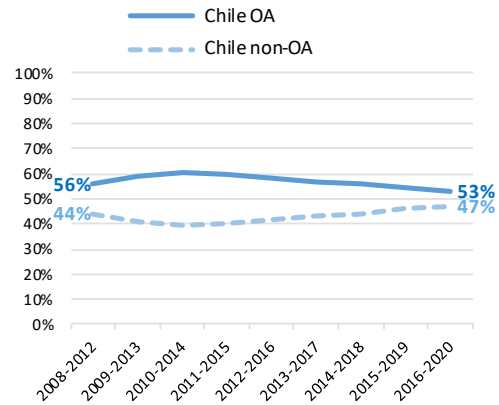
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6 Chile

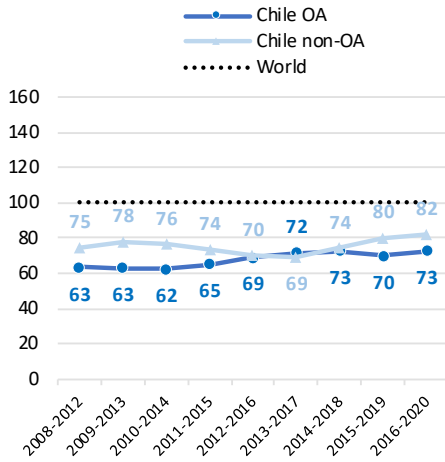
Volume and global share of OA publications



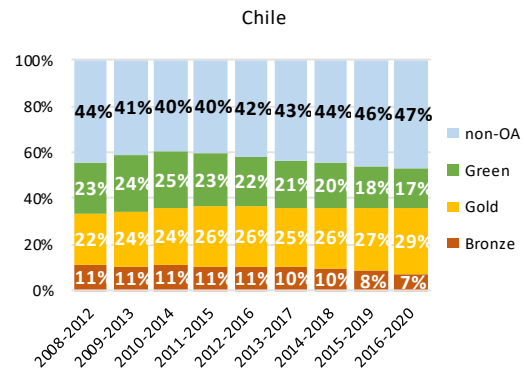
Shares of OA and non-OA publications



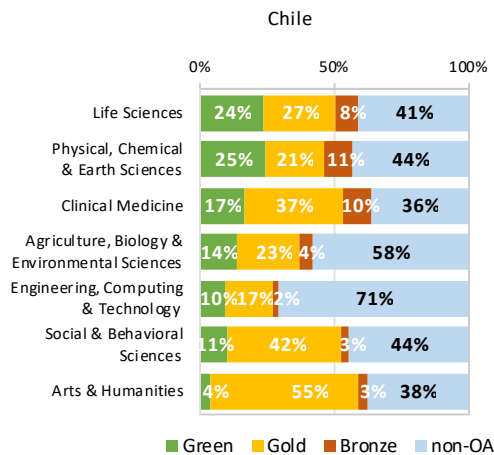
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

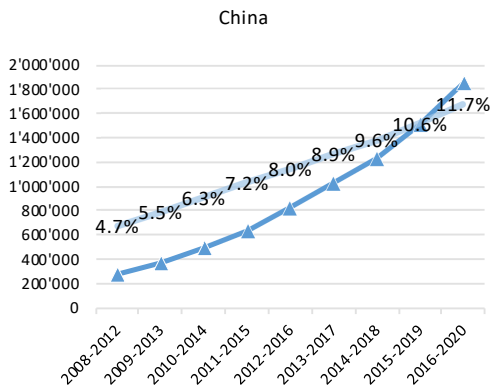


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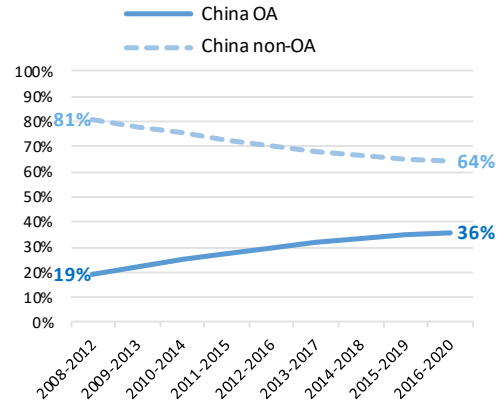
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7 China

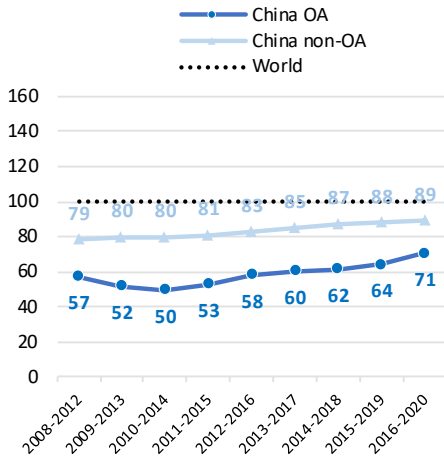
Volume and global share of OA publications



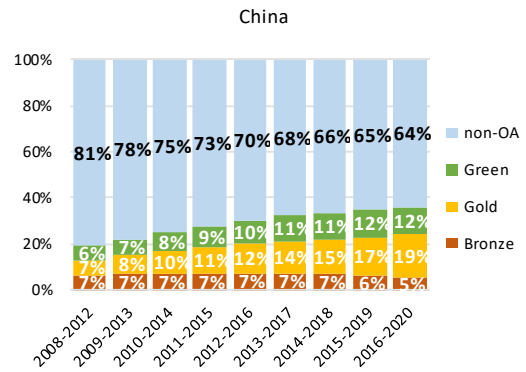
Shares of OA and non-OA publications



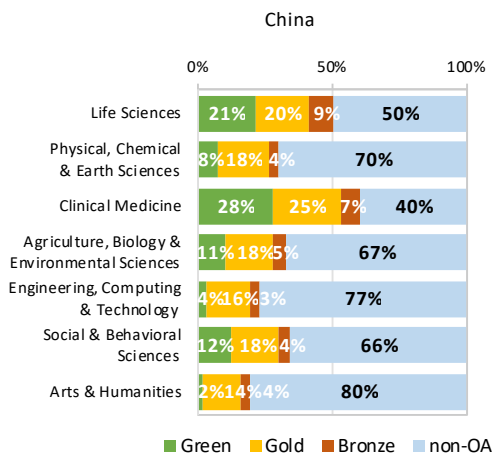
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

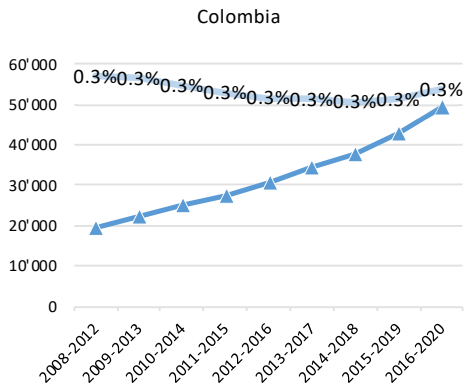


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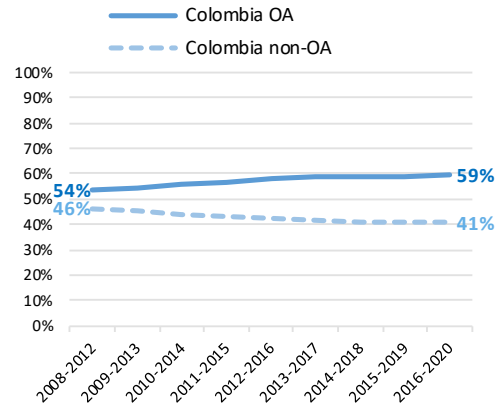
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8 Colombia

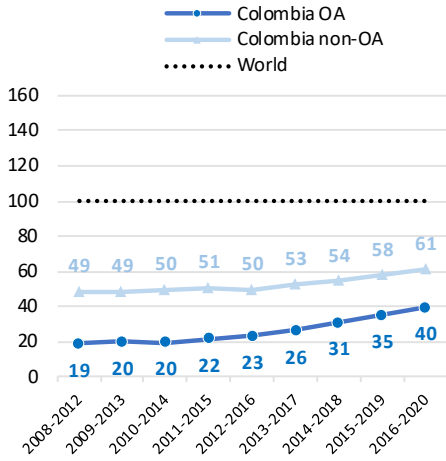
Volume and global share of OA publications



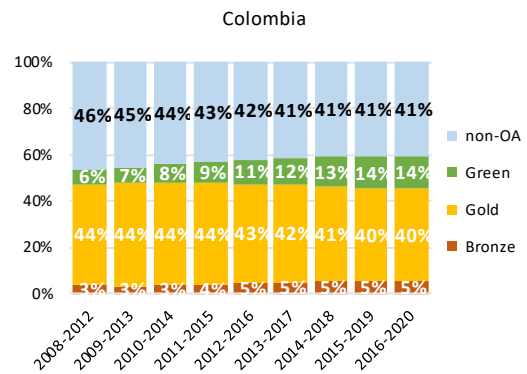
Shares of OA and non-OA publications



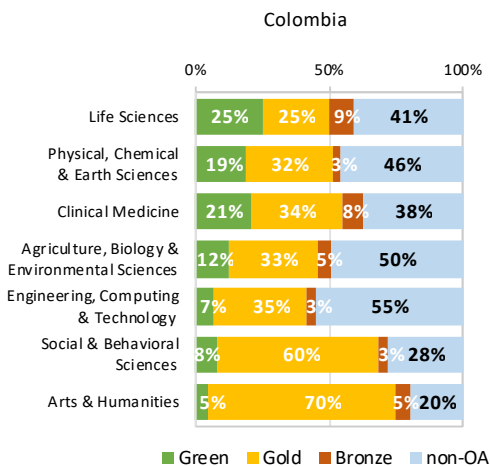
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016–2020

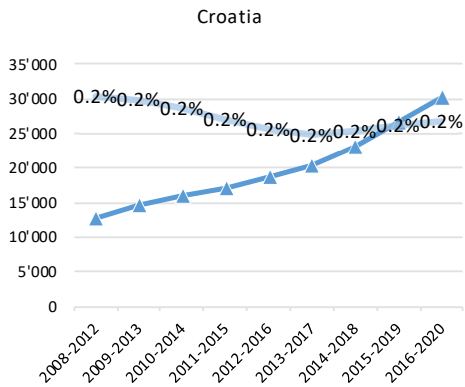


Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

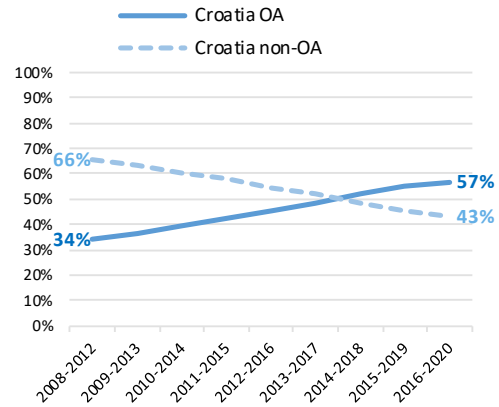
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9 Croatia

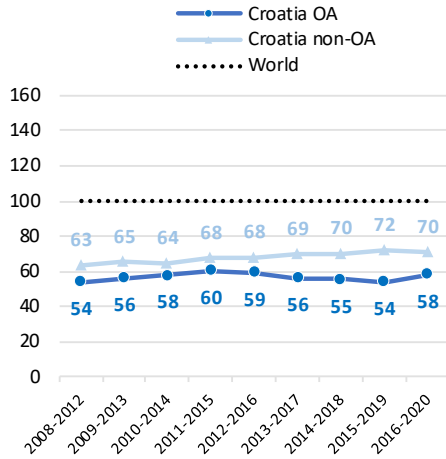
Volume and global share of OA publications



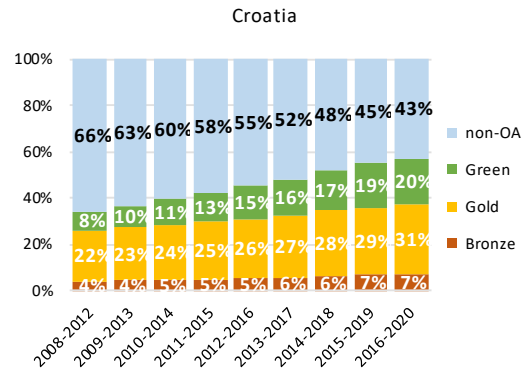
Shares of OA and non-OA publications



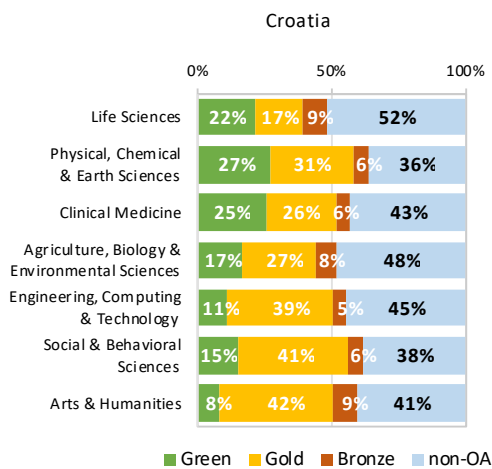
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

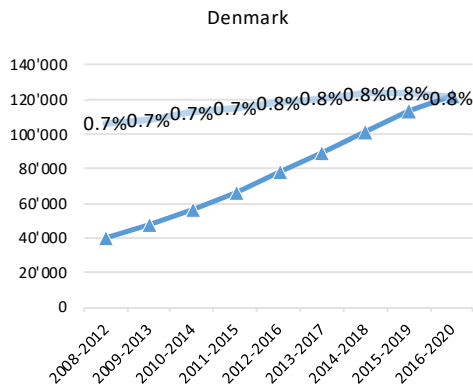


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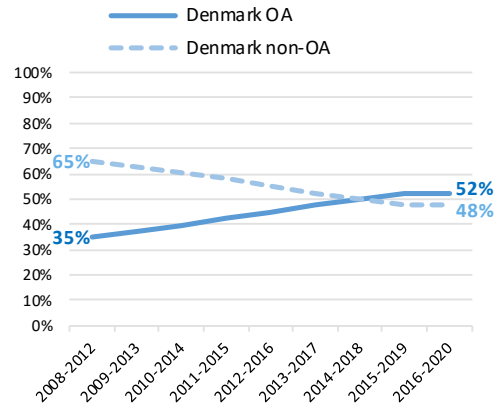
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10 Denmark

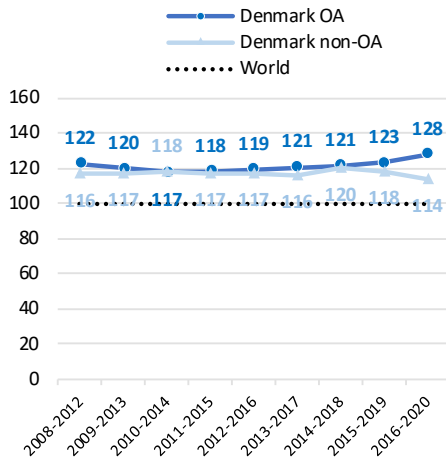
Volume and global share of OA publications



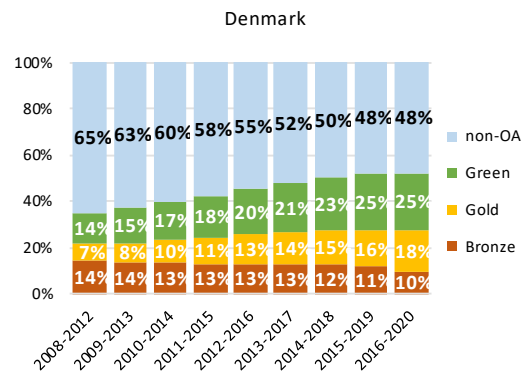
Shares of OA and non-OA publications



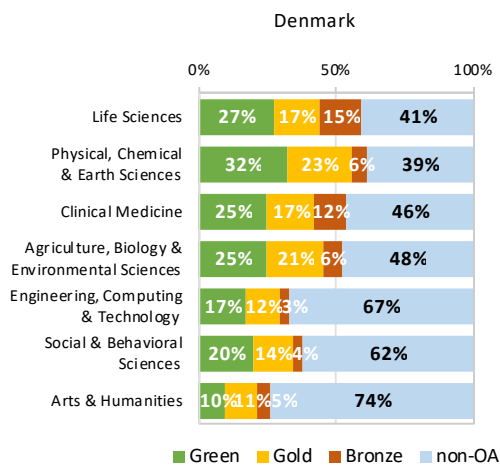
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

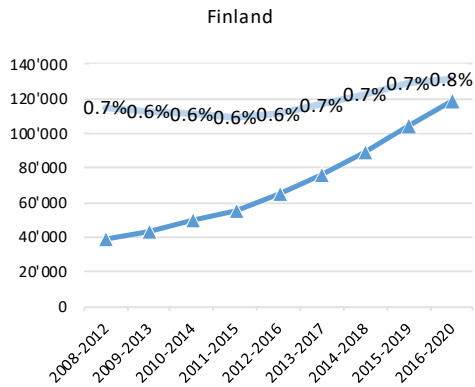


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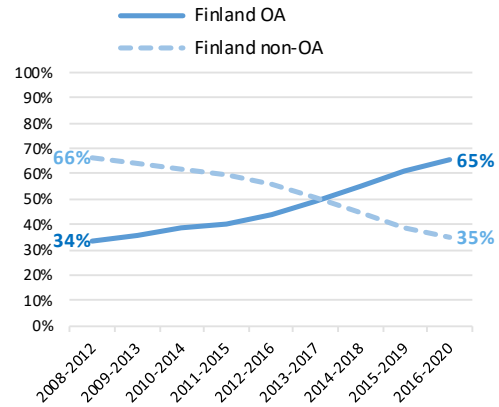
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11 Finland

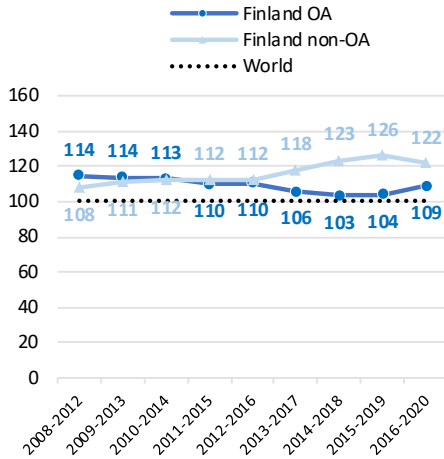
Volume and global share of OA publications



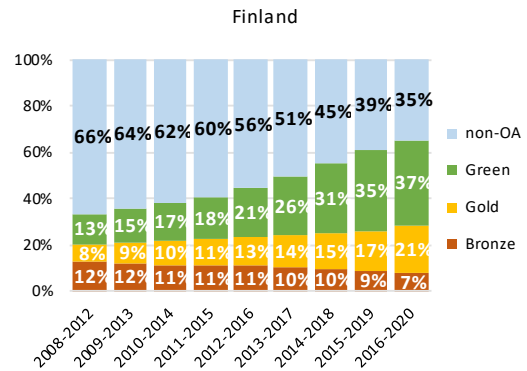
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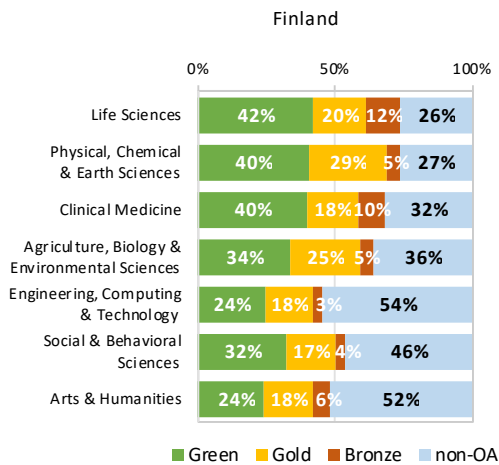
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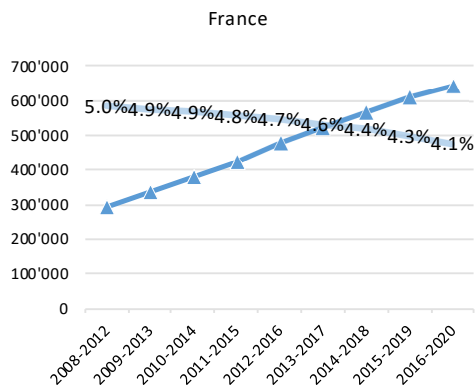


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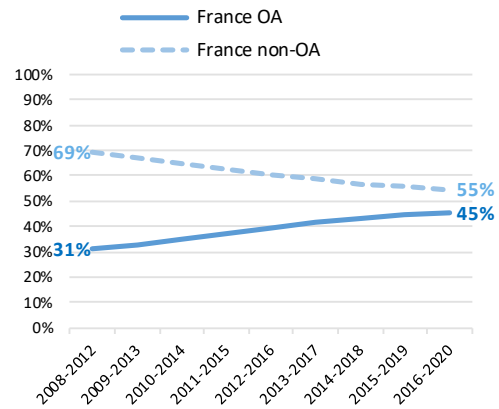
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12 France

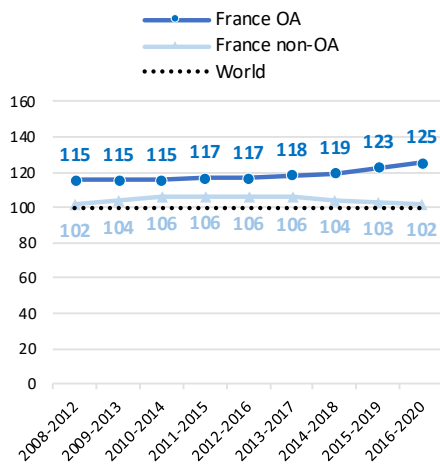
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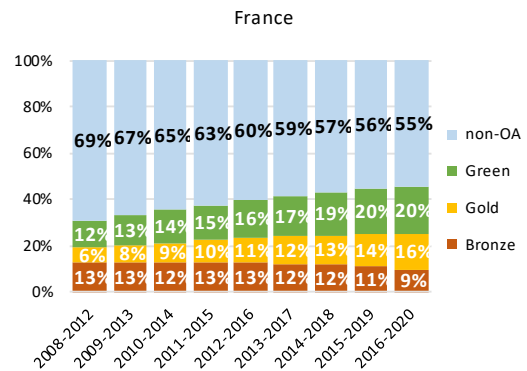
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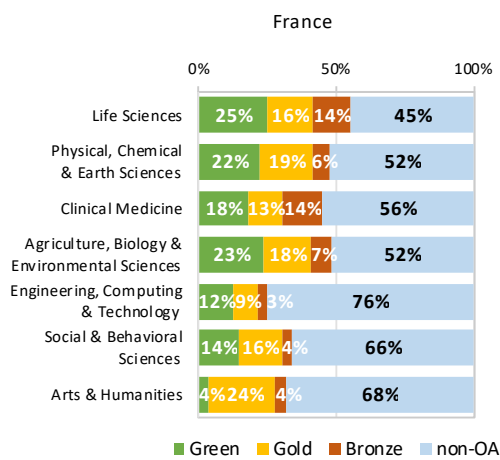
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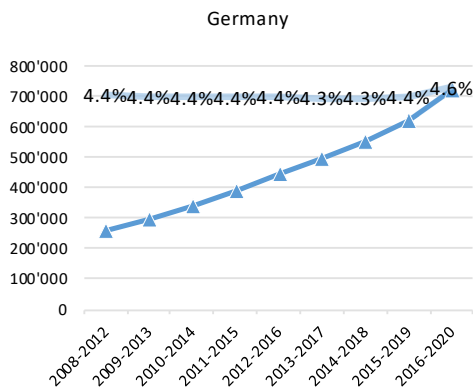


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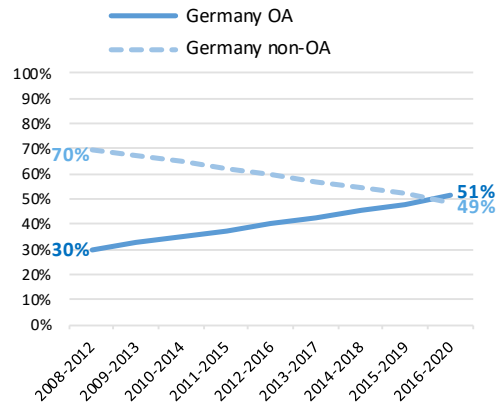
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13 Germany

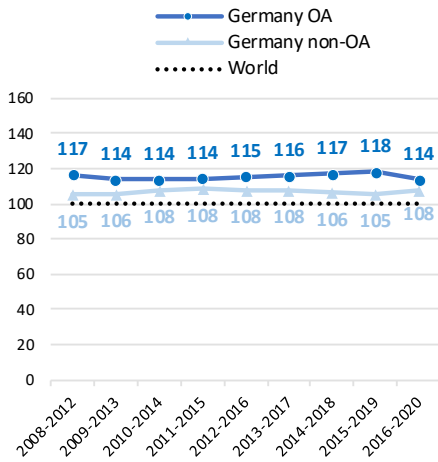
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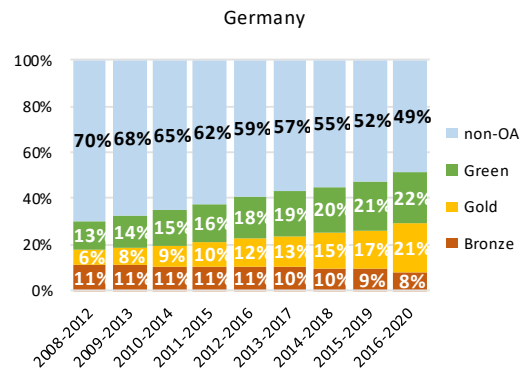
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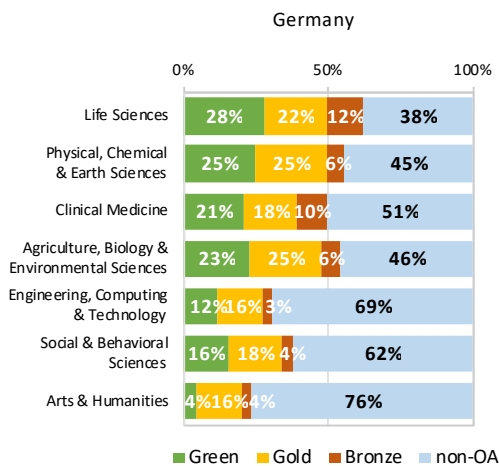
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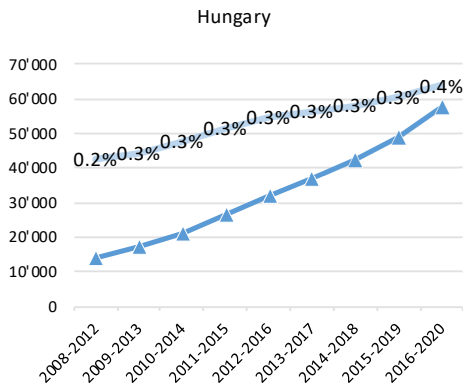


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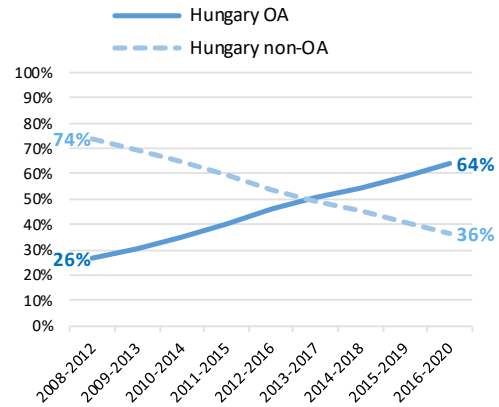
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14 Hungary

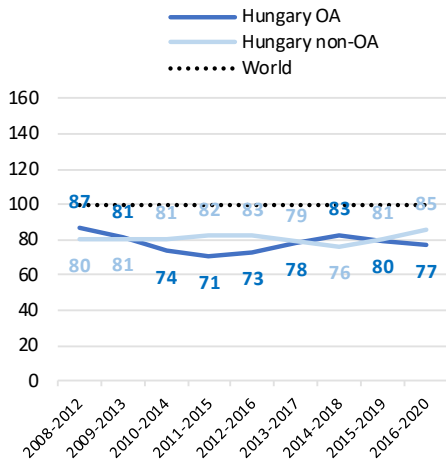
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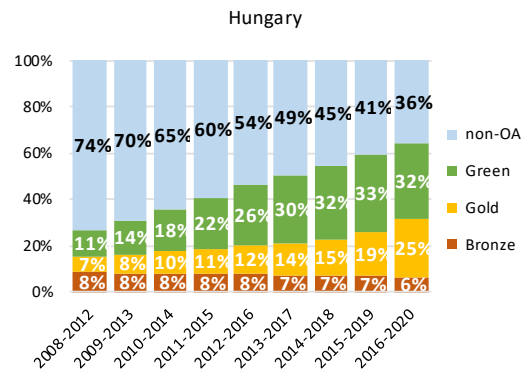
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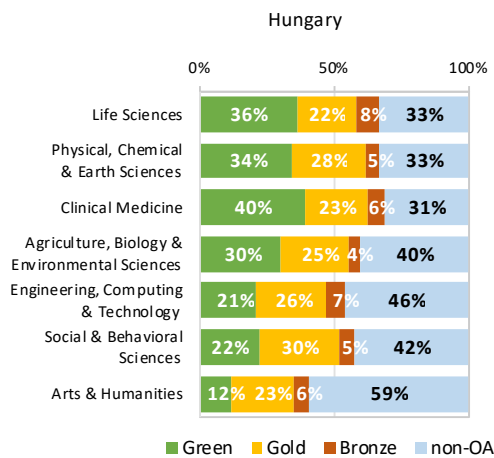
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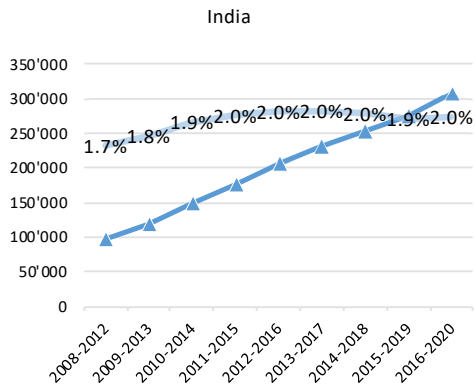


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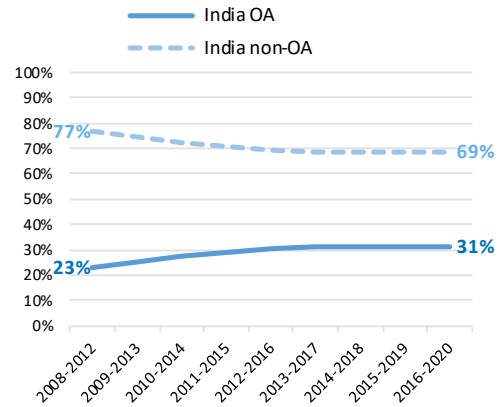
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15 India

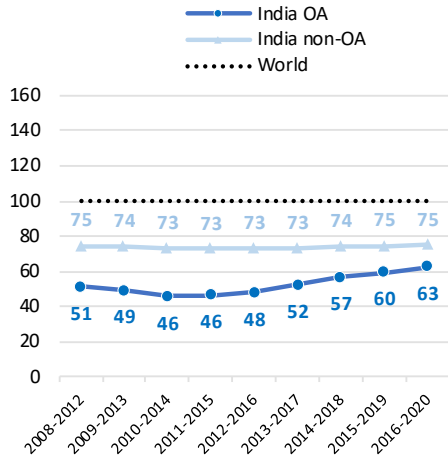
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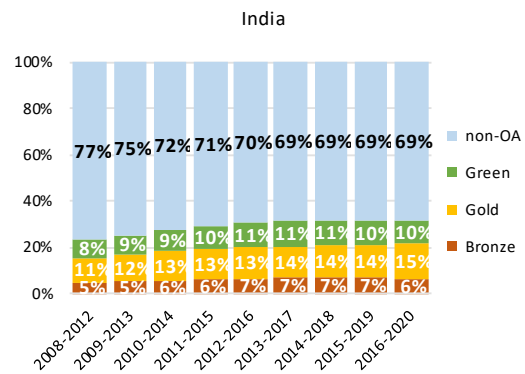
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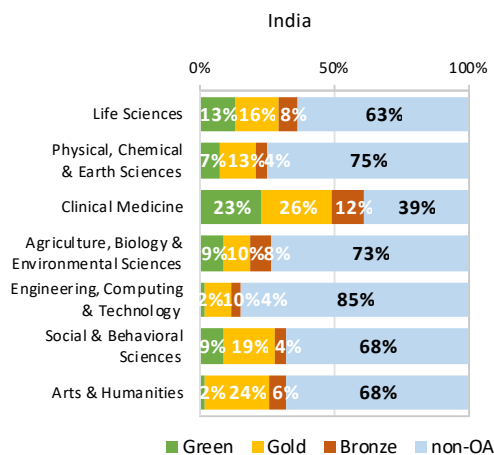
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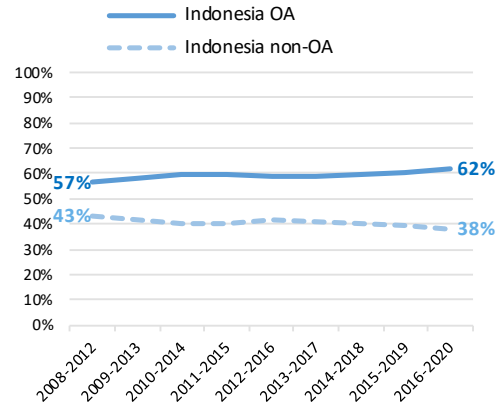
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16 Indonesia

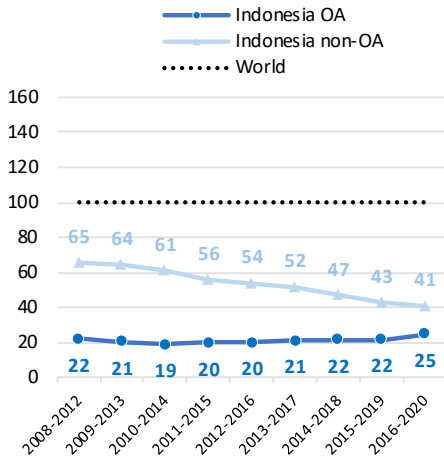
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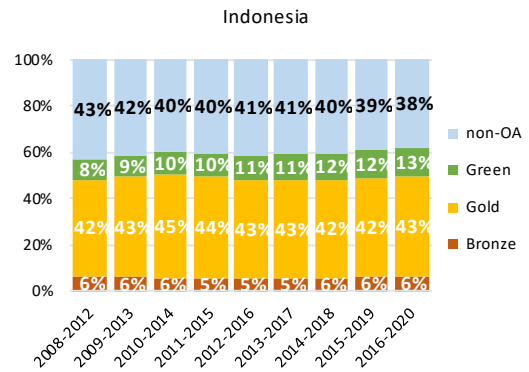
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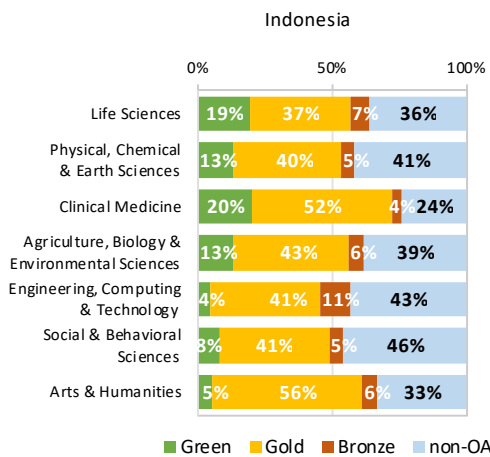
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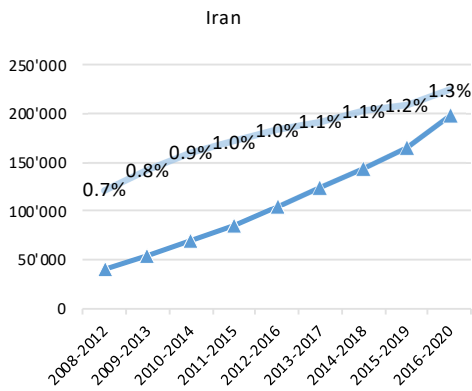


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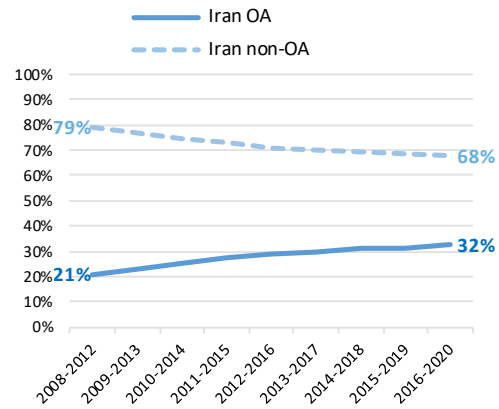
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17 Iran

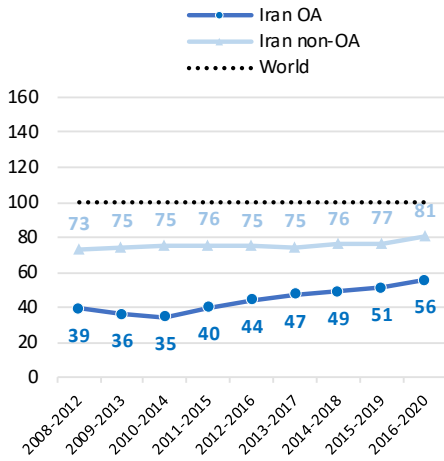
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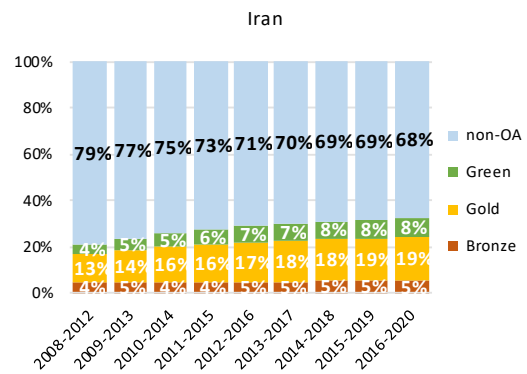
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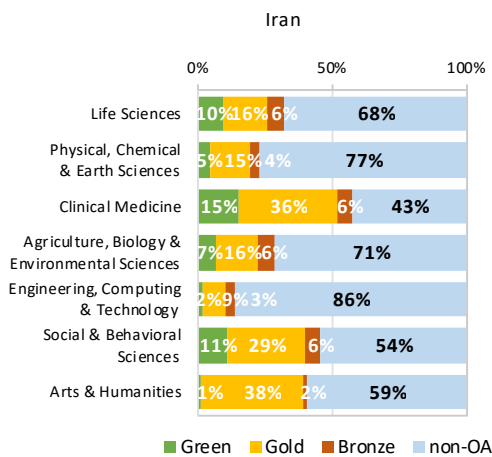
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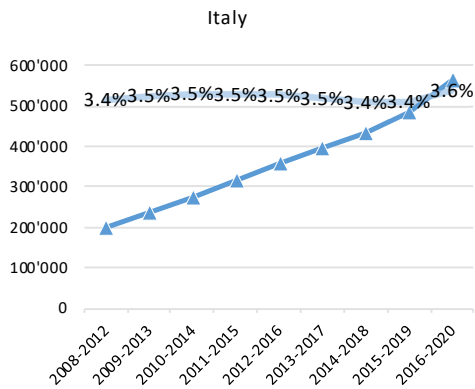


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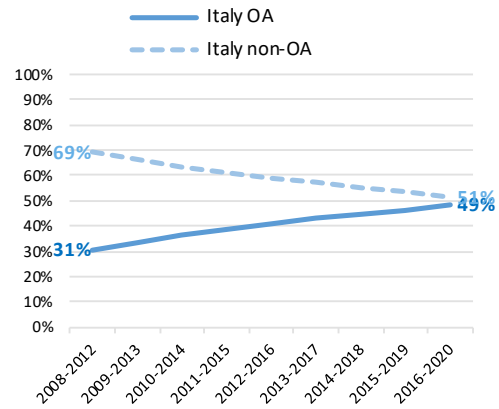
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18 Italy

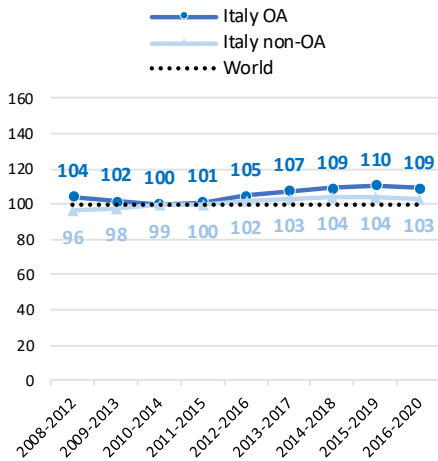
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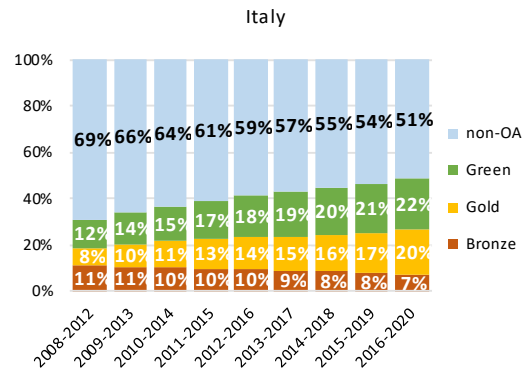
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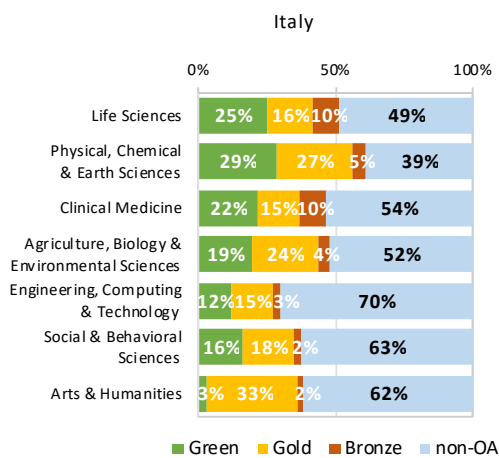
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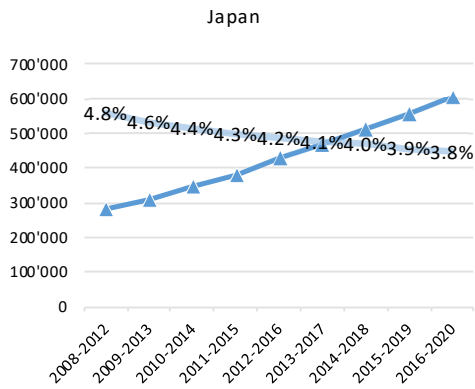


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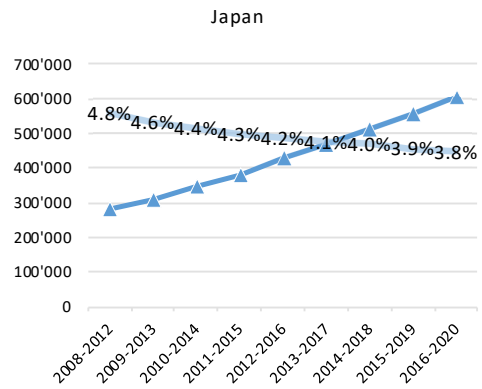
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19 Japan

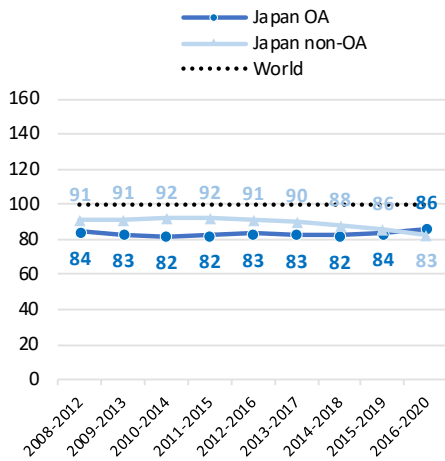
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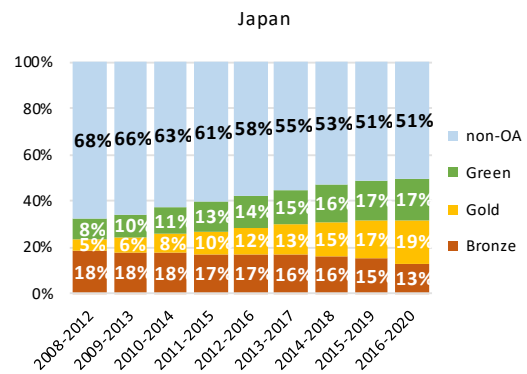
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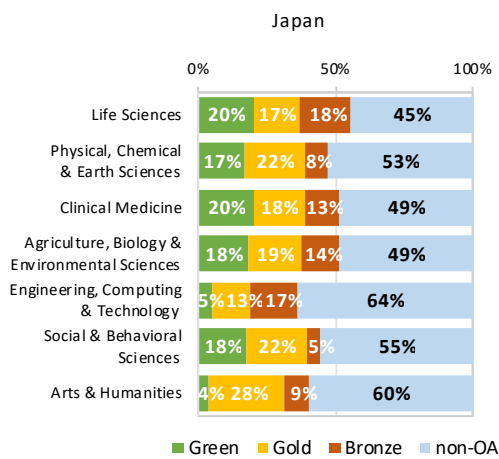
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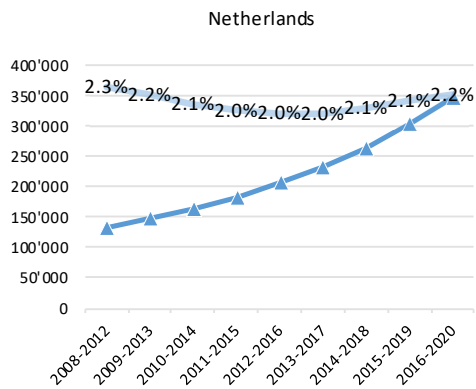


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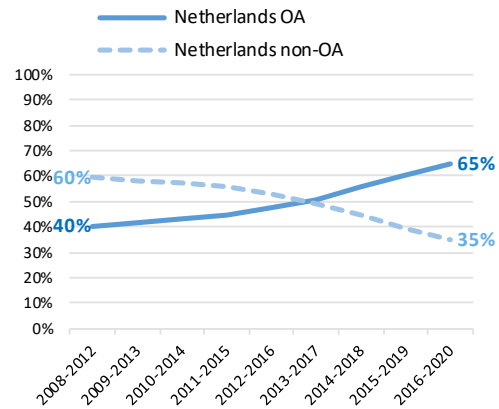
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20 Netherlands

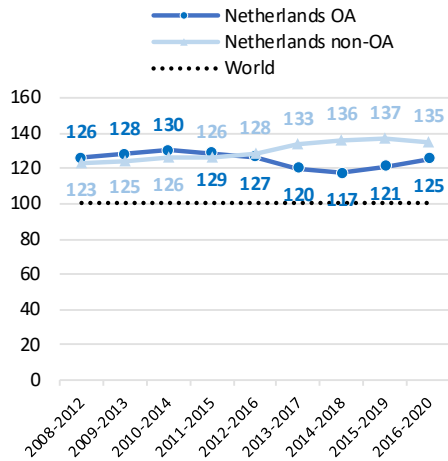
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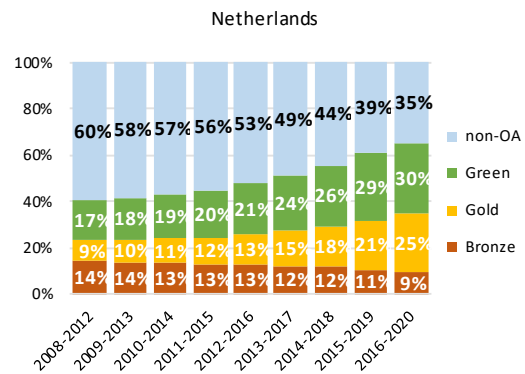
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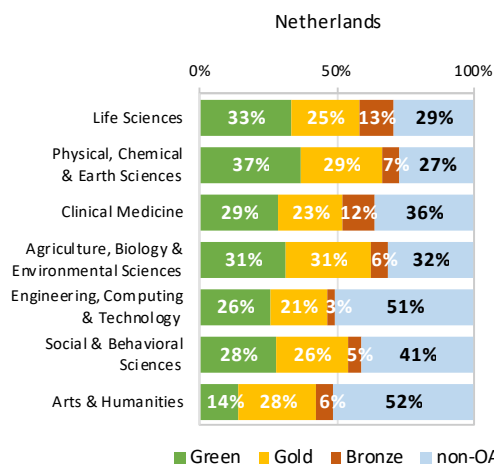
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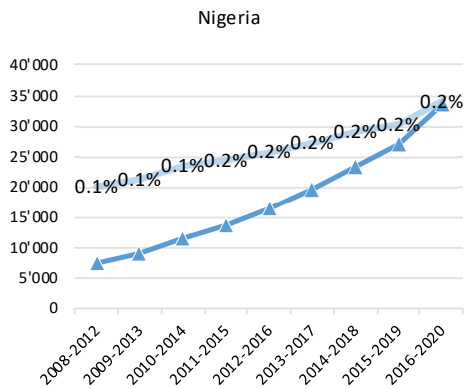


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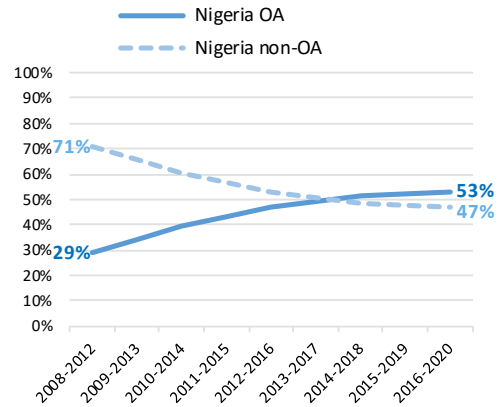
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21 Nigeria

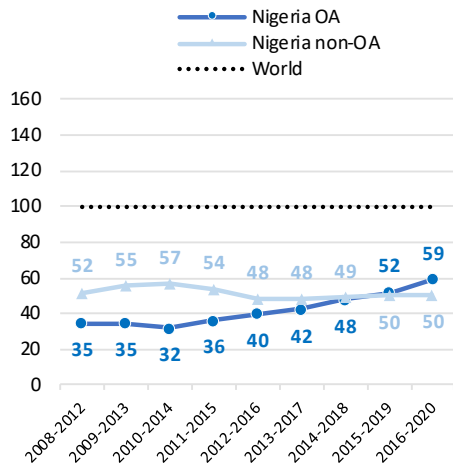
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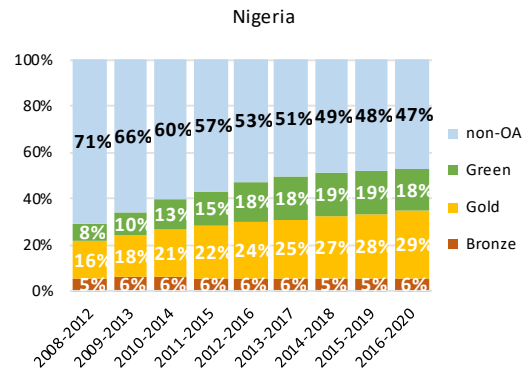
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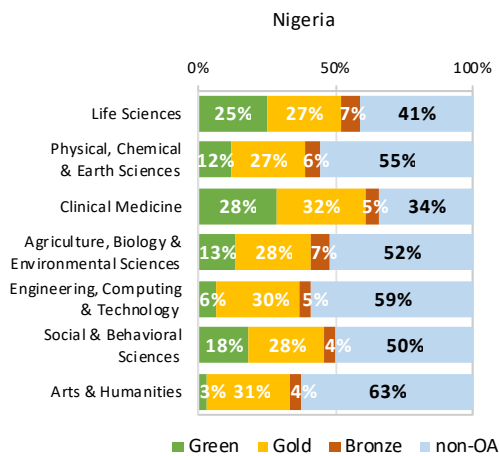
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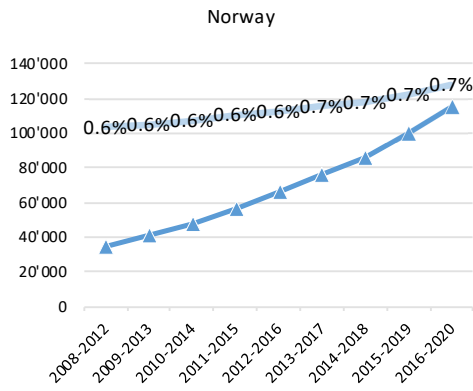


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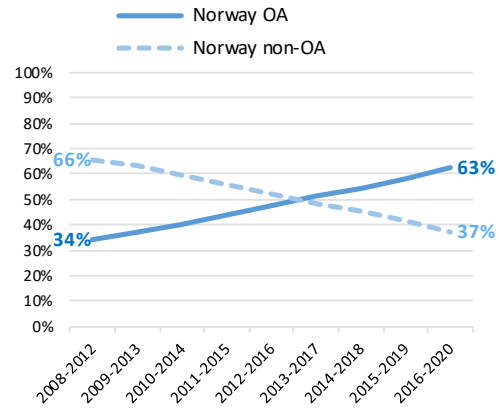
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22 Norway

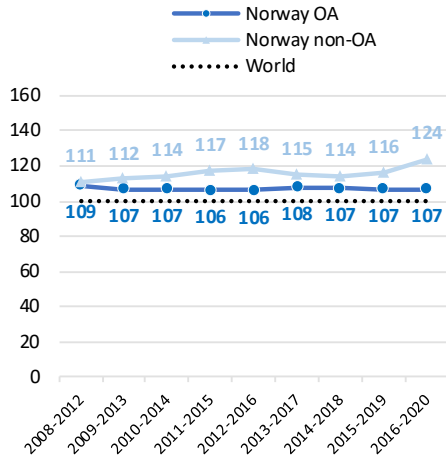
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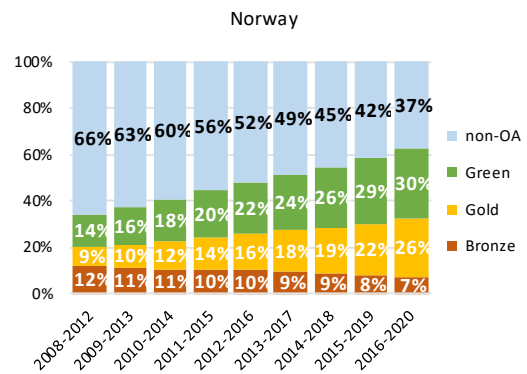
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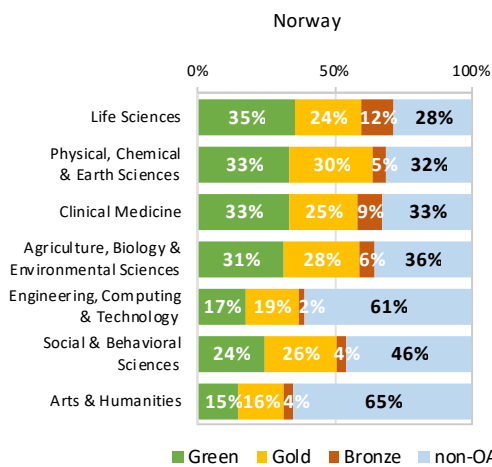
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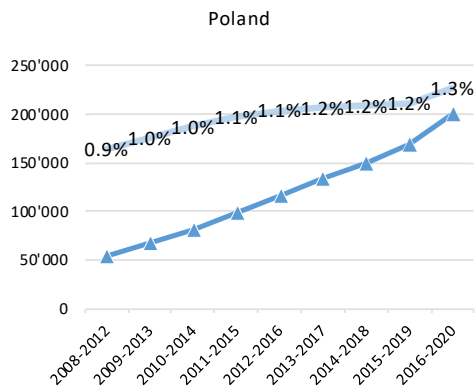


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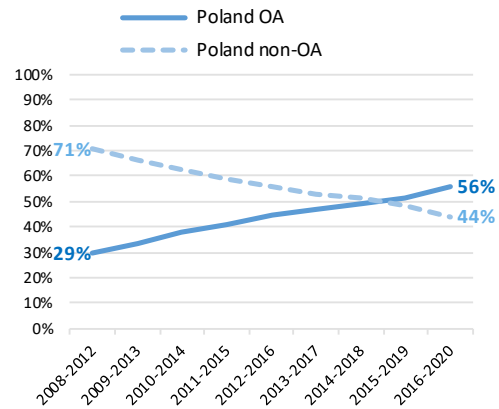
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23 Poland

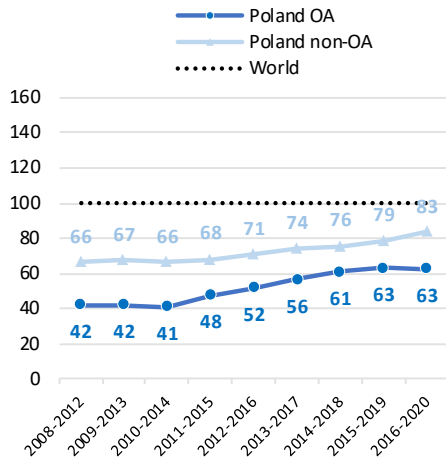
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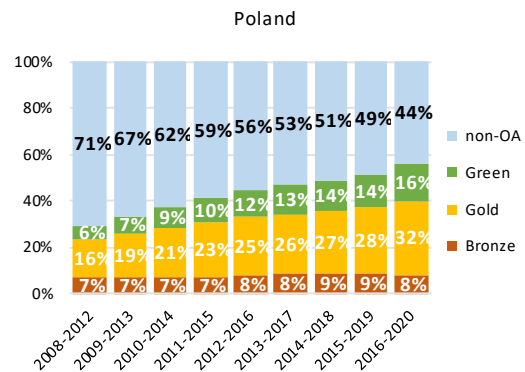
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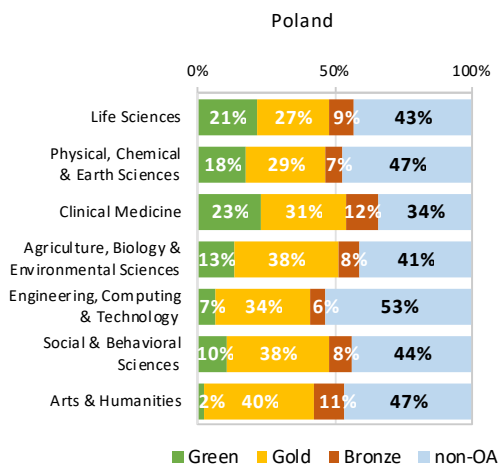
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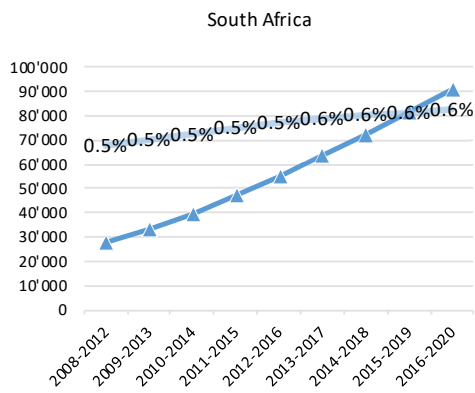


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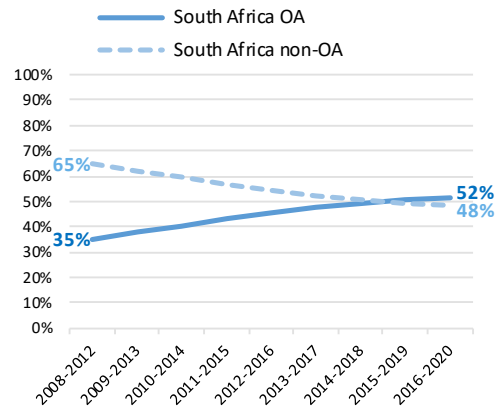
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24 South Africa

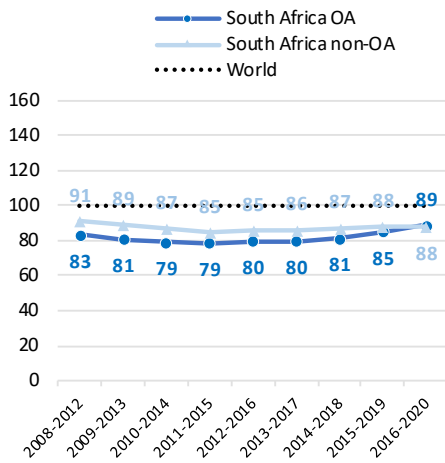
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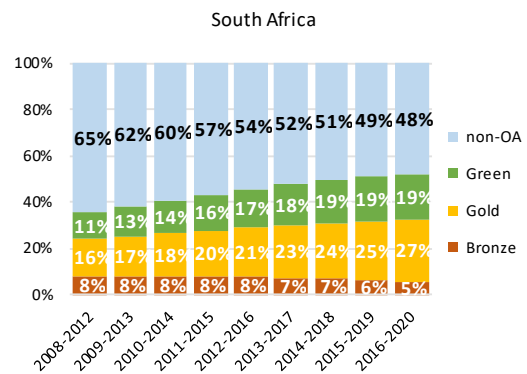
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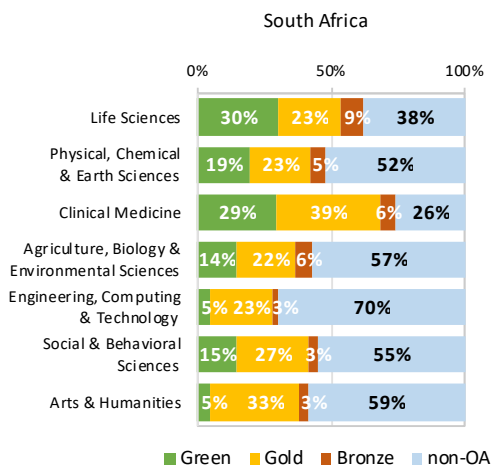
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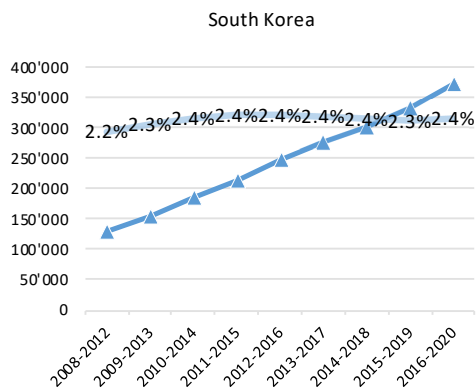


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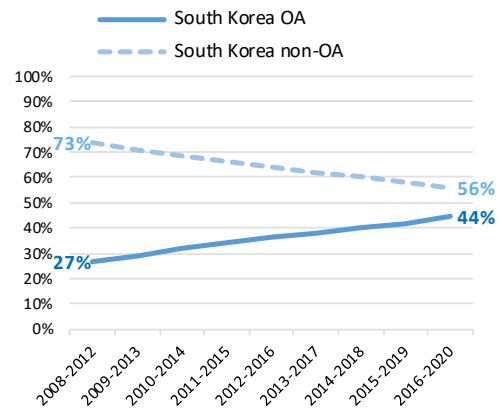
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25 South Korea

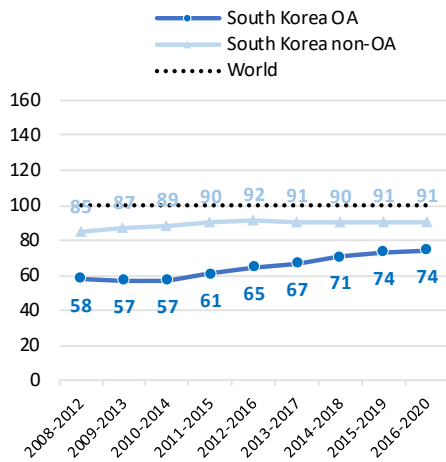
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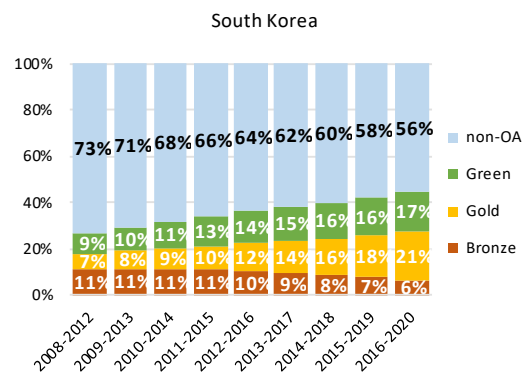
Shares of OA and non-OA publications



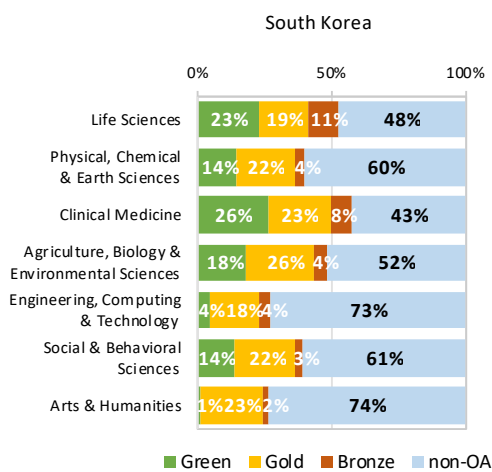
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

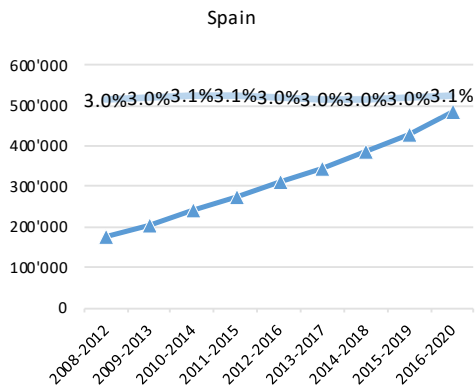


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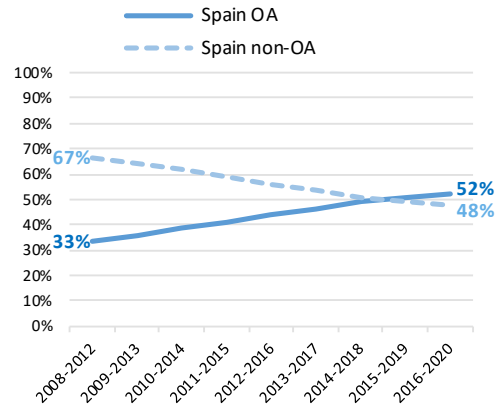
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26 Spain

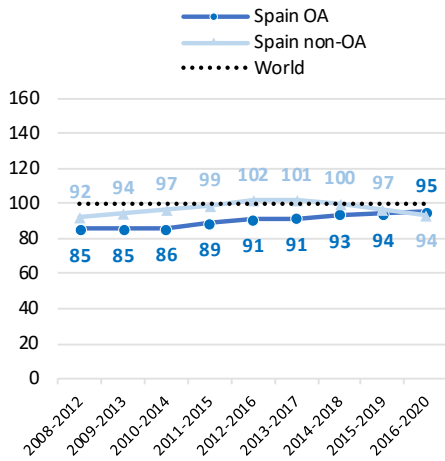
Volume and global share of OA publications



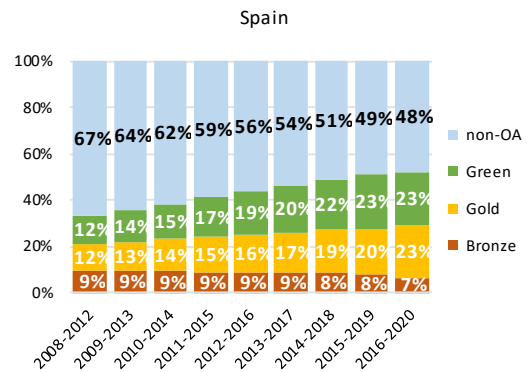
Shares of OA and non-OA publications



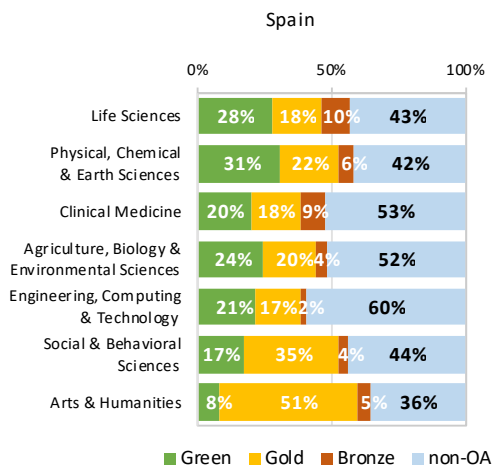
Evolution of the impact of OA and non-OA publications



Shares of green, gold, bronze and non-OA publications



Share of green, gold, bronze and non-OA publications for the seven research fields, 2016-2020

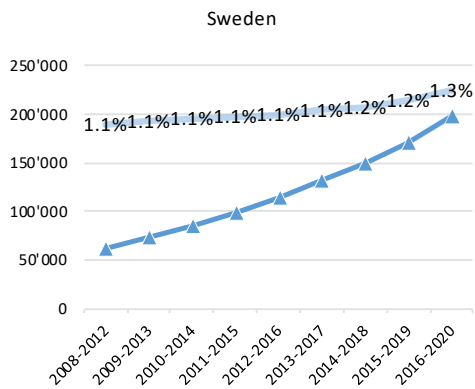


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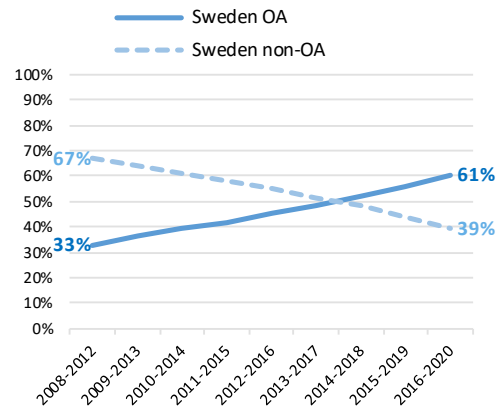
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27 Sweden

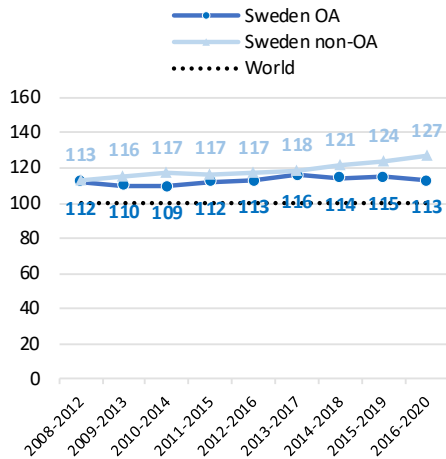
Volume and global share of OA publications



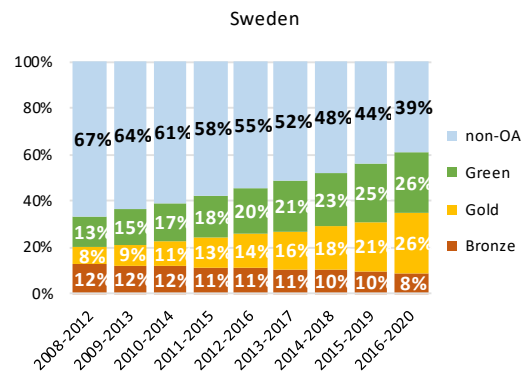
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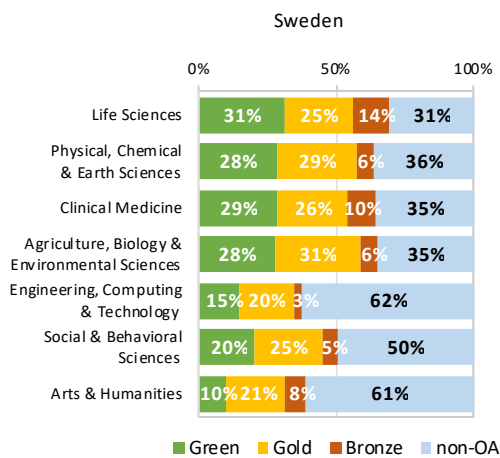
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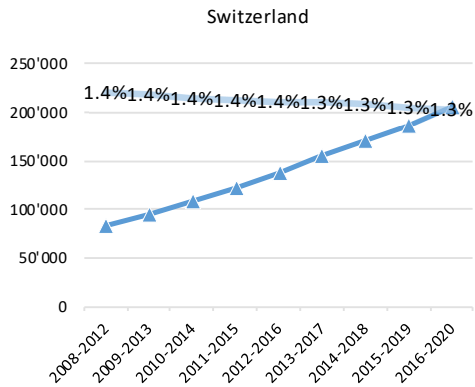


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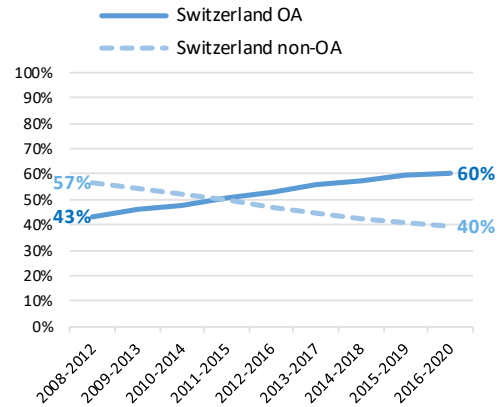
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28 Switzerland

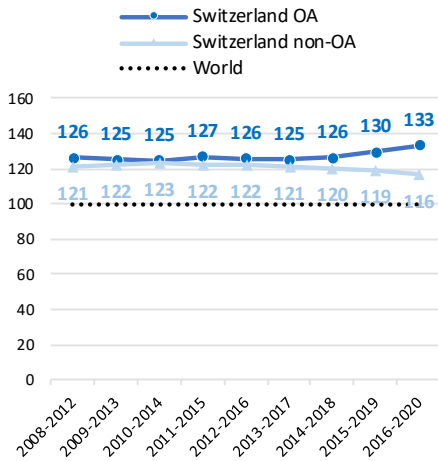
Volume and global share of OA publications



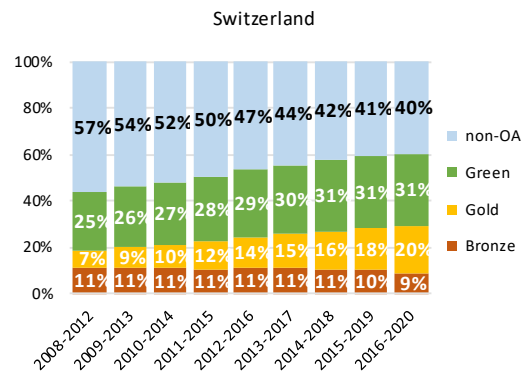
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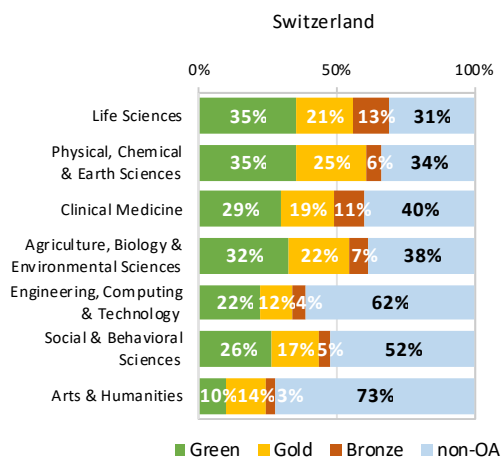
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Share of green, gold, bronze and non-OA publications for the seven research fields, 2016–2020

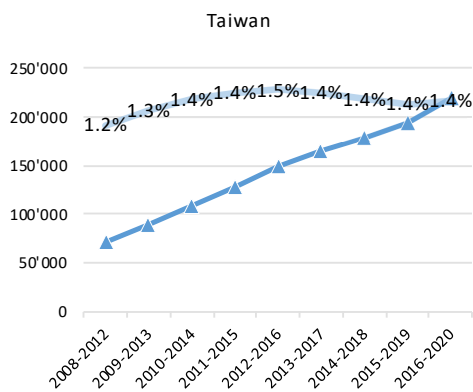


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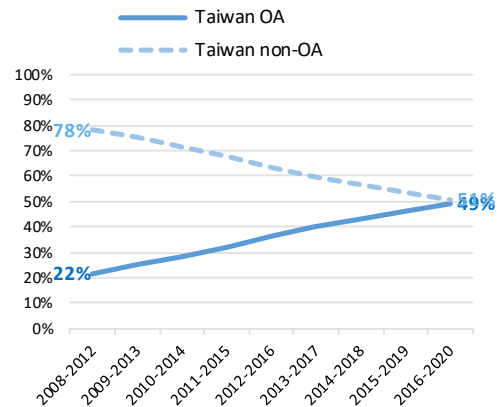
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29 Taiwan

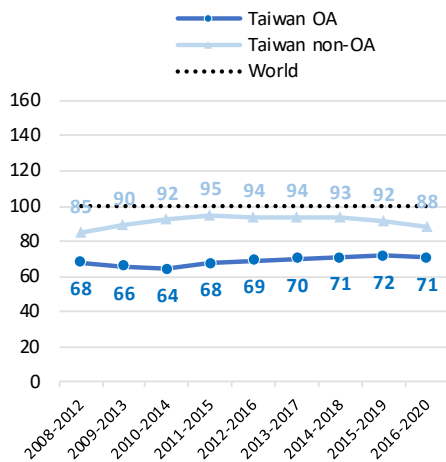
Volume and global share of OA publications



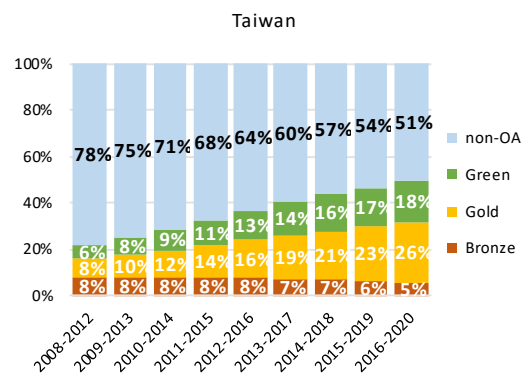
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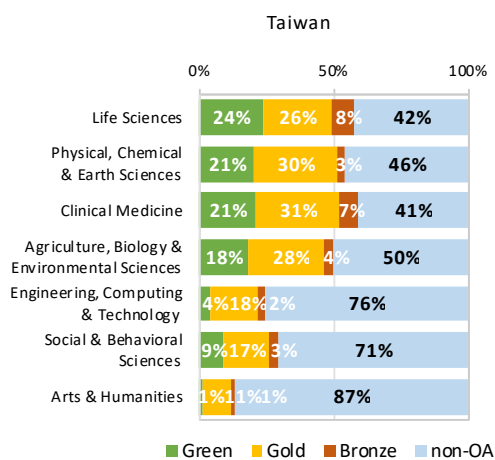
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Share of green, gold, bronze and non-OA publications for the seven research fields, 2016–2020

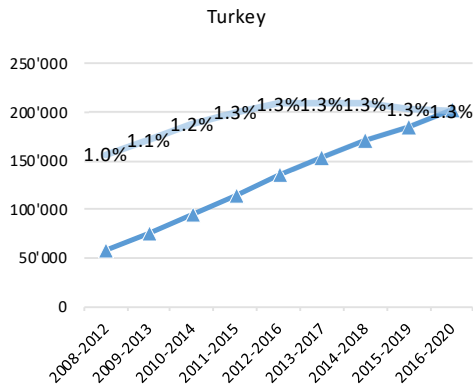


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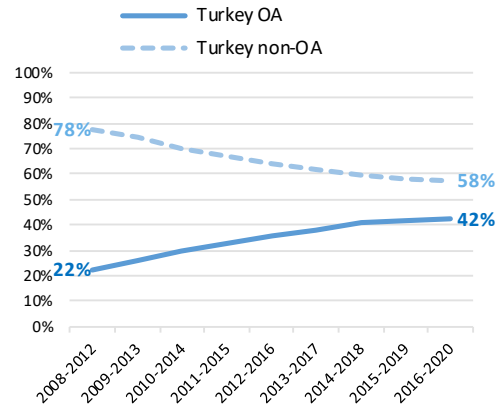
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30 Turkey

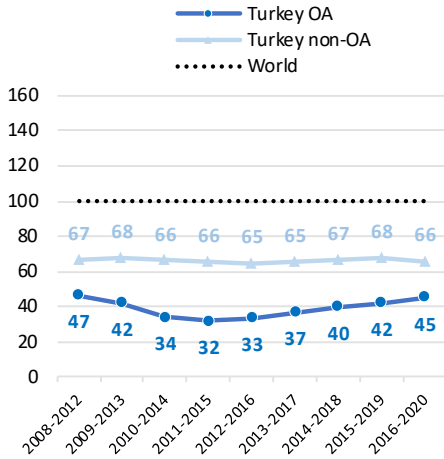
Volume and global share of OA publications



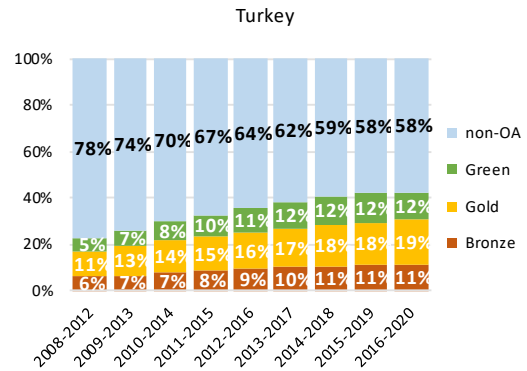
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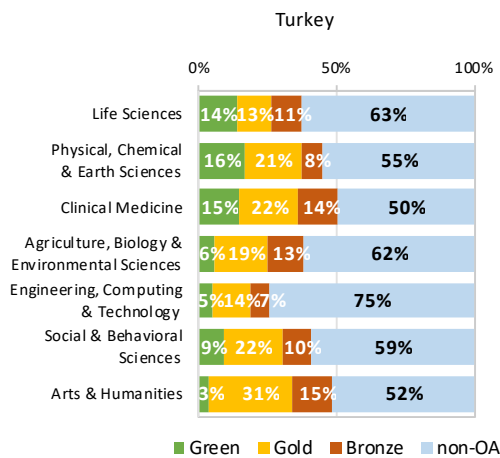
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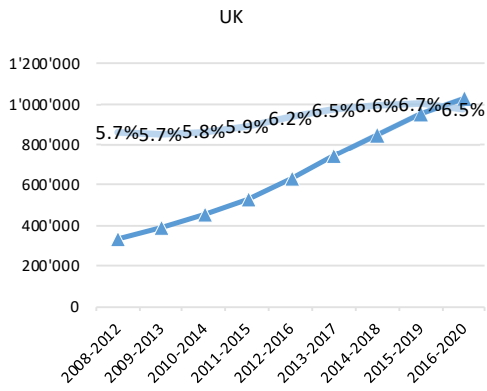


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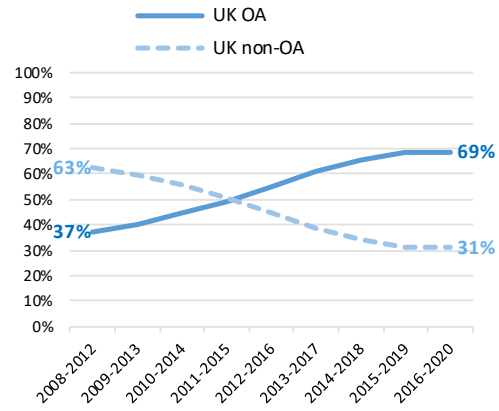
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31 UK

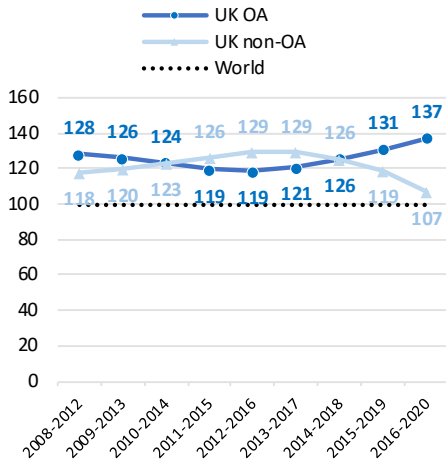
Volume and global share of OA publications



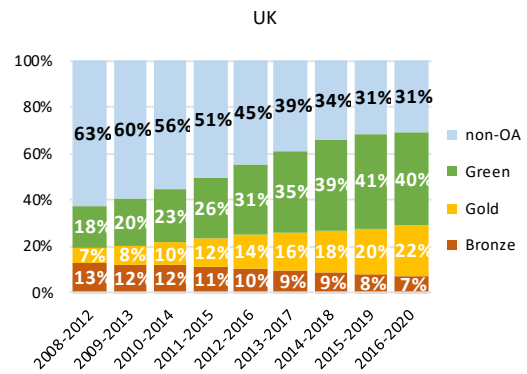
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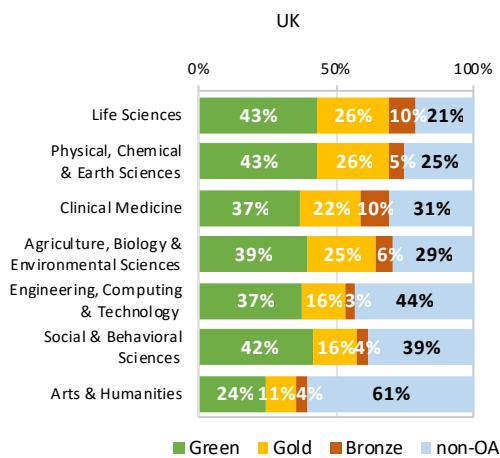
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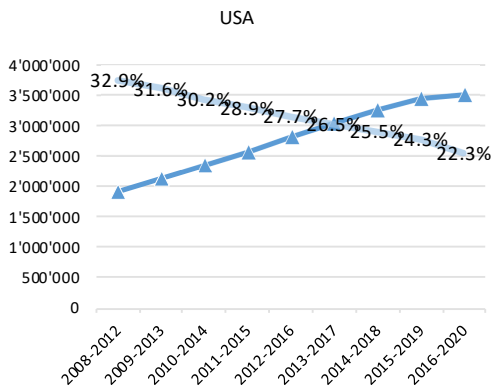


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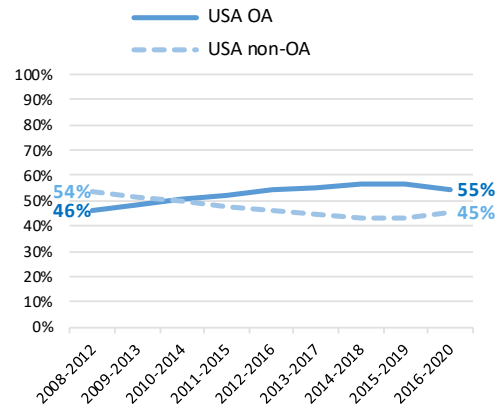
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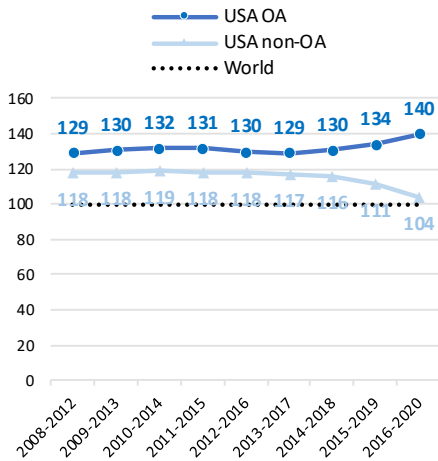
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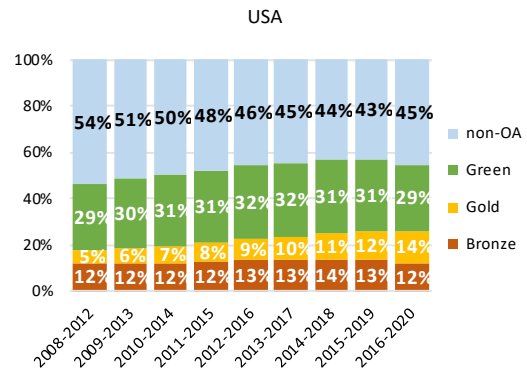
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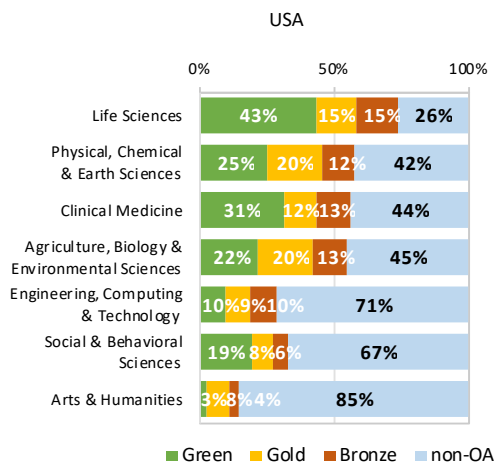
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Source: Clarivate Analytics (SCIE/SSCI/A&HCI/ESCI), graphic by SERI

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A. 2 Methods

Databases

The following databases were used in this report: the *Science Citation Index Expanded (SCIE)*, the *Social Science Citation Index Expanded (SSCIE)*, the *Arts & Humanities Citation Index (A&HCI)* and the *Emerging Sources Citation Index (ESCI)* produced by Clarivate Analytics (formerly Thomson Reuters) for the years 2008 to 2020. These databases contain the bibliographical references of articles published in almost 24,000 peer-reviewed scientific journals, most of which have an international readership. Journals are selected by Clarivate Analytics according to an evaluation process.³ Consequently, this bibliometric analysis does not take account of articles which are not recorded in this database, or articles printed in general-interest journals, books or at conferences.

OA and non-OA publications: In the Clarivate database, every publication is labelled as green, gold or bronze, or it has no label. For the counting of OA publications, the publications from these three categories are added together. And those without a label are counted as non-OA publications.

Volume of publications

One of the key methodological issues is the method used to count publications. A scientific article usually has multiple authors, can contain one or more institutional addresses (institutional affiliation of the researchers), and authors can come from one or more countries. Attributing this article to a single author, institution or country would be unfair to the other authors, countries or institutions.

Bibliometric experts generally use one of two methods for counting scientific publications:

- **Full address counting** in which each address referred to in the article is counted as one unit. If an article has only one author who is affiliated to one institution in one country, it will be counted only once. If multiple institutions were involved (even with the same authors), the number of times that an article is counted will match the number of institutional addresses appearing on it.
- **Fractional address counting** divides each article by the number of institutional addresses indicated by its authors, so that the sum of the fractions relating to each publication is 1. In the case of multiple institutions or countries, an article will be counted once, but a share of this article (the relevant percentage) will be assigned to each institution and country.

In order to obtain comparable data, it is vital that scientific production is classified in the same way for all institutions and all countries. One way of doing this is to classify research activities by fields and sub-fields of research, so they can then be compared on the basis of their contribution to each of these fields of research. This report uses the Current Contents (CC) classification system. This divides research activities into seven research fields (Engineering, Computing & Technology; Physical, Chemical & Earth Sciences; Agriculture, Biology & Environmental Sciences; Life Sciences; Clinical Medicine; Social & Behavioural Sciences; and Arts & Humanities), which are in turn subdivided into 109 sub-fields (see list below).

³ See journal selection process: <https://clarivate.com/essays/journal-selection-process/>

List of the seven research fields and 109 research sub-fields

Engineering, Computing & Technology

AI, Robotics & Automatic Control
Aerospace Engineering
Chemical Engineering
Civil Engineering
Computer Science & Engineering
Electrical & Electronics Engineering
Engineering Management / General
Engineering Mathematics
Environmental Engineering & Energy
Geological, Petroleum & Mining Engineering
Information Technology & Communications Systems
Instrumentation & Measurement
Materials Science & Engineering
Mechanical Engineering
Metallurgy
Nuclear Engineering
Optics & Acoustics

Physical, Chemical & Earth Sciences

Applied Physics / Condensed Matter / Materials Science
Chemistry
Earth Sciences
Inorganic & Nuclear Chemistry
Mathematics
Multidisciplinary in Physical, Chemical & Earth Sciences
Organic Chemistry / Polymer Science
Physical Chemistry / Chemical Physics
Physics
Space Science
Spectroscopy / Instrumentation / Analytical Sciences

Agriculture, Biology & Environmental Sciences

Agricultural Chemistry
Agriculture / Agronomy
Animal Sciences
Aquatic Sciences
Biology
Biotechnology & Applied Microbiology
Entomology / Pest Control
Environment / Ecology
Food Science / Nutrition
Multidisciplinary in Agriculture, Biology & Environmental Sciences
Plant Sciences
Veterinary Medicine / Animal Health

Life Sciences

Animal & Plant Science
Biochemistry & Biophysics
Cardiovascular & Hematology Research
Cell & Developmental Biology
Chemistry & Analysis
Endocrinology, Nutrition & Metabolism
Experimental Biology
Immunology
Medical Research, Diagnosis & Treatment
Medical Research, General Topics
Medical Research, Organs & Systems
Microbiology
Molecular Biology & Genetics
Multidisciplinary in Life Sciences
Neurosciences & Behavior
Oncogenesis & Cancer Research
Pharmacology & Toxicology
Physiology

Clinical Medicine

Anesthesia & Intensive Care
Cardiovascular & Respiratory Systems
Clinical Immunology & Infectious Disease
Clinical Psychology & Psychiatry
Dentistry / Oral Surgery & Medicine
Dermatology
Clin. Endocrinology, Metabolism & Nutrition
Environmental Medicine & Public Health
Gastroenterology & Hepatology
General & Internal Medicine
Health Care Sciences & Services
Hematology
Neurology
Nursing
Oncology
Ophthalmology
Orthopedics, Rehabilitation & Sports Medicine
Otolaryngology
Pediatrics
Clin. Pharmacology / Toxicology
Radiology, Nuclear Medicine & Imaging
Reproductive Medicine
Research / Laboratory Medicine & Medical Technology
Rheumatology
Surgery
Urology & Nephrology

Social & Behavioral Sciences

Anthropology
Communication
Economics
Education
Environmental Studies, Geography & Development
Law
Library & Information Sciences
Management
Political Science & Public Administration
Psychiatry
Psychology
Public Health & Health Care Science
Rehabilitation
Social Work & Social Policy
Sociology & Social Sciences

Arts & Humanities

Archaeology
Art & Architecture
Classical Studies
General
History
Language & Linguistics
Literature
Performing Arts
Philosophy
Religion & Theology

Impact (relative citation indicator)

A scientific publication usually cites other publications on which it draws. Impact is calculated by the number of citations received per publication. In principle, the more a publication is cited, the greater the impact it is considered to have. It can be concluded that the absolute number of citations is an adequate measurement of impact. This is true within a field of research, but not between different fields. As the number of citations depends on publication and citation practices, which can vary considerably according to the field of research, a more sophisticated and standardised indicator is needed to allow individual fields to be compared fairly with one another. The absolute number of citations received by publications is set against the world average of citations per publication for each research field, and then this relative indicator is standardised on a scale of 0 to 200, where 100 represents the world average.

A minimum of 50 publications per year are required in order to calculate this indicator.

Partnerships

Only articles written collaboratively are taken into account for this indicator. Partnerships are determined by the number of partnership pairs between the institutional addresses of authors featured on a single publication. For this indicator, publications are counted using the *full counting* method, which means that an article written collaboratively is attributed to each institutional address and to each contributing country. The number of partnerships does not therefore designate a number of articles, but the frequency with which a country is involved in collaboration. The counting of addresses allows us to calculate both national collaborations and those with other countries. The results (national or international partnerships) are expressed as a percentage of a country's total partnerships.

Institutional sectors

In Switzerland, institutions conducting research are split into four institutional sectors:

- Higher education: cantonal universities, the Swiss federal institutes of technology, universities of applied sciences, private colleges or universities, and teaching hospitals.
- Private businesses: Switzerland's large corporations (such as Novartis, Hoffmann-La-Roche, ABB, IBM, Nestlé), small and medium-sized enterprises, as well as private clinics, veterinary practices and hospitals.
- Research institutes: the research institutes of the ETH Domain (PSI, EAWAG, WSL and Empa), cantonal laboratories, federal research institutes (e.g. Agroscope), research facilities of national importance (Art. 15 RIPA), foundations (such as the Friedrich Miescher Institute, ISREC), as well as public hospitals that are not teaching hospitals.
- International organisations: institutions such as CERN, WHO, Unicef and various UN agencies, the Ludwig Institute, the World Bank, etc.

A.3 References

- SERI 2022 'Scientific publications in Switzerland, 2008–2020: A bibliometric analysis of scientific research in Switzerland'. This study is available on the SERI website under Publications & Services/ Publications, or at https://www.sbf.admin.ch/dam/sbf/en/dokumente/webshop/2022/pub-08-20.pdf.download.pdf/analyse-bibliometrique_2022_d.pdf
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- SERI 2015 'Most cited publications: Switzerland's performance 1997–2011'. This study is available on the SERI website under Publications & Services/ Publications, or at https://www.sbf.admin.ch/dam/sbf/en/dokumente/webshop/2015/meist_zitierte_publicationenleistungderschweiz1997-2011.pdf.download.pdf/publications_lesplusciteespermancedelasuisse19972011.pdf