C 7 Scientific publications[346]

A large proportion of new technologies and services are based on developments and results from science. Bibliometric indicators and metrics are regularly used as yardsticks for evaluating scientific achievements to estimate the performance of a research and science system in both quantitative and qualitative terms.

The bibliometric database Web of Science covers worldwide publications in scientific journals, as well as citations from these publications. The research affiliation of scientists referenced in the database makes it possible to assign individual publications to a specific country. Fractional counting is employed in cases where several co-authors from different countries contribute to a publication. Indicators on the quantity and quality of scientific publications can be used to assess the performance of a research and science system.

Significant changes can be identified in selected countries' and regions' shares of all publications in Web of Science (C 7-1) by comparing the years 2008 and 2018. Most countries' publication shares have declined, including the major western European nations of Germany, France and the United Kingdom, as well as the USA. Germany's share of publications fell from 5.4 to 4.3 percent, the UK's from 5.6 to 4.5 percent, France's from 3.9 to 2.7 percent and the USA's from 24.4 to 18.6 percent. By contrast, China's share of publications grew enormously from 8.4 to 20.4 percent. Denmark was the only European country to increase its share of publications: between 2008 and 2018 its share rose from 0.6 to 0.7 percent.

The international alignment (IA) of publications in Web of Science from selected countries and regions (C 7-2) is an indicator of the quality of scientific publications. Germany's index value rose from 13 to 16 between 2008 and 2016. The quality of publications by authors from Germany has thus improved. According to this indicator, publications from Switzerland, the USA and the Netherlands are of the highest quality. China has been able to improve its publication quality considerably and for the first time achieved an above-average value for 2016 with an index value of 3.

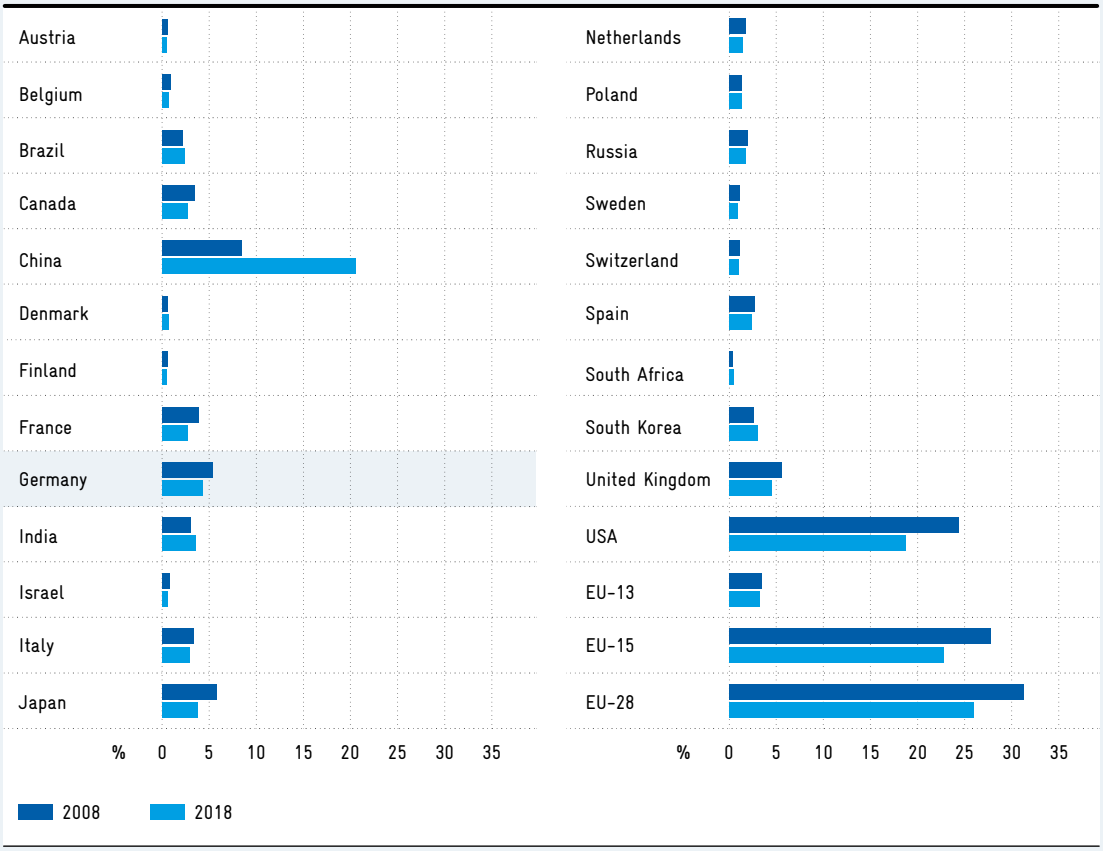
The scientific regard (SR) of specific countries and regions for publications in Web of Science (C7-3) shows that the index value for articles written in Germany fell from 9 to 3 between 2008 and 2016. In 2016 compared to 2008, articles from Germany were thus cited less frequently than other articles in the journals in which they were published.

Percentages of all publications in Web of Science from selected countries and regions in 2008 and 2018

Fig. C 7-1

Download data

The analysis concentrates on countries' shares, rather than on absolute figures, to compensate for changes, especially the ongoing expansion of data collection.



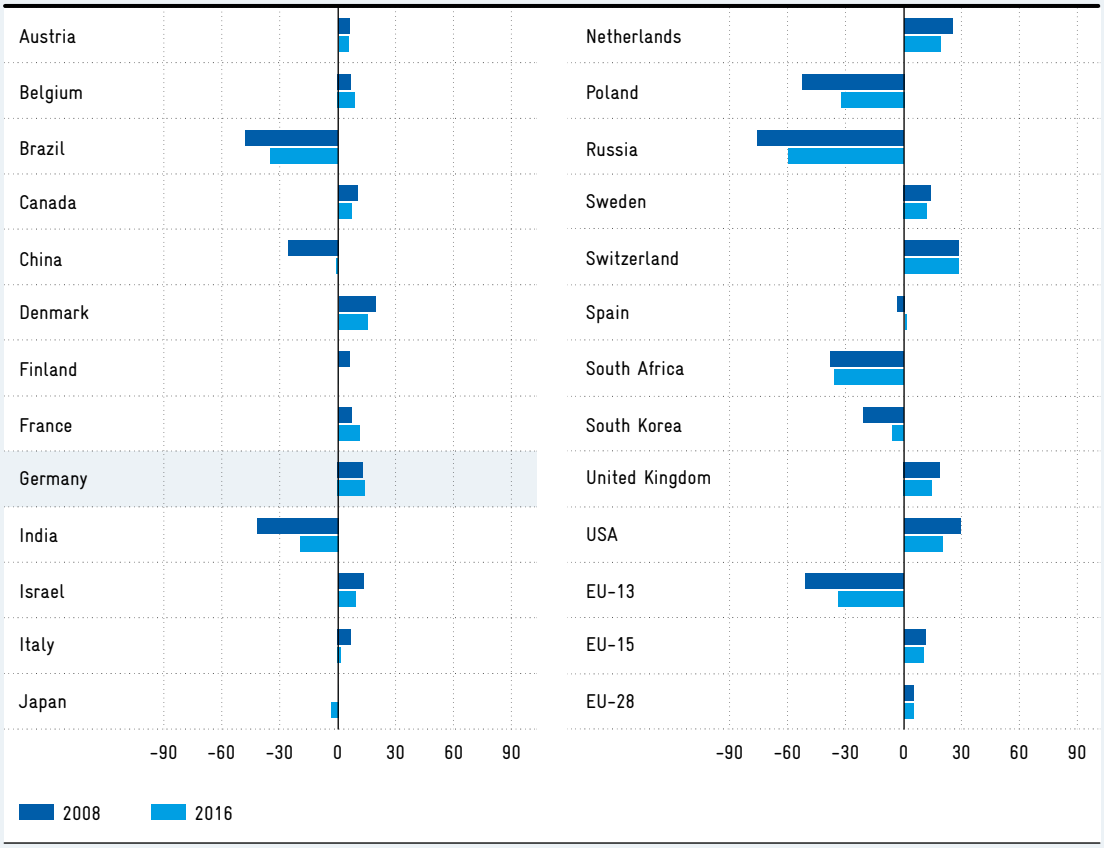
Fractional counting.
Source: Web of Science. Research and calculations by DZHW in Stephen et al. (2020).

Fig. C 7-2

Download data

International alignment (IA) of publications in Web of Science from selected countries and regions in 2008 and 2016 (index values)

The IA index indicates whether a country's authors publish in internationally more highly recognized or less highly recognized journals relative to the world average. Positive or negative values indicate an above-average or below-average IA.



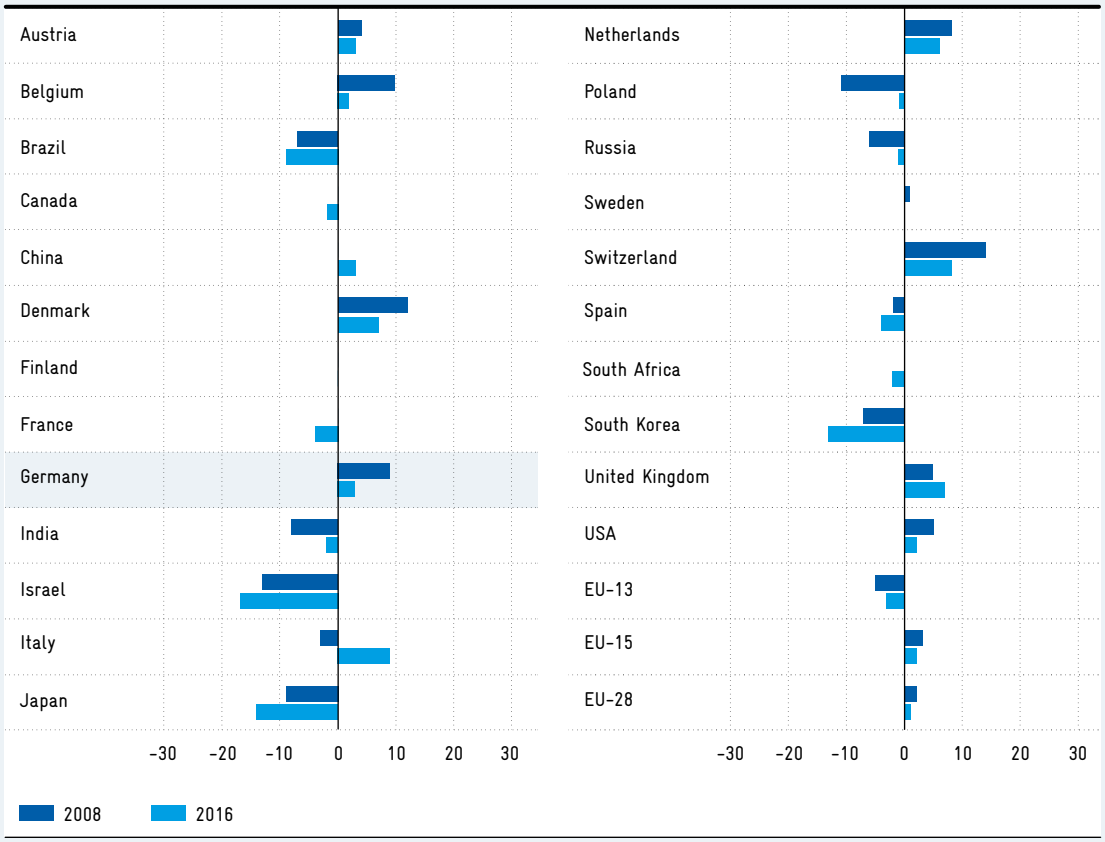
Fractional counting.
Source: Web of Science. Research and calculations by DZHW in Stephen et al. (2020).

Scientific regard (SR) of publications in Web of Science from selected countries and regions in 2008 and 2016 (index values)

Fig. C 7-3

Download data

The SR index indicates whether a country's articles are cited on average more frequently or more seldom than other articles in the journals in which they appeared. Positive or negative values indicate an above-average or below-average scientific regard. The index is calculated without self-citations.



Fractional counting.
Source: Web of Science. Research and calculations by DZHW in Stephen et al. (2020).