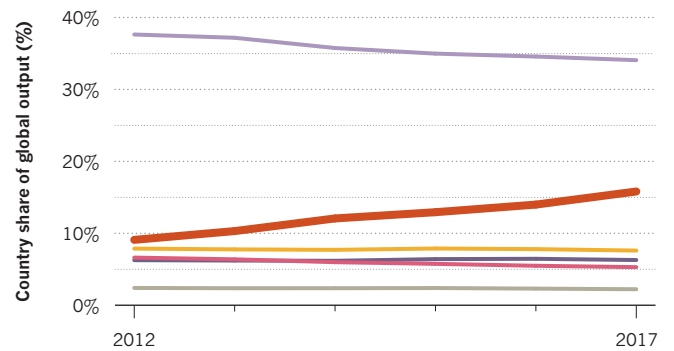
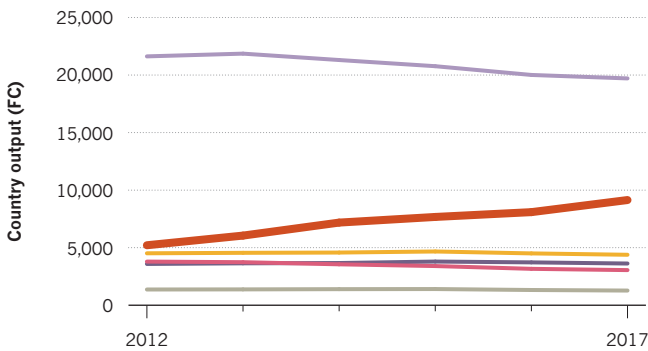
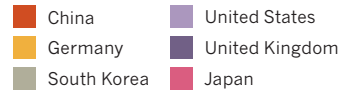


ONGOING CHALLENGE

China now publishes more scientific research than the United States, but on measures of quality, including publication of articles in the top-notch journals tracked by the Nature Index, it still falls short, with some notable subject exceptions.

CHINA'S RISE

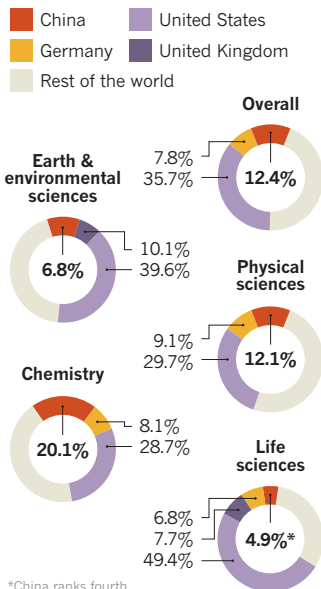
Fractional Count (FC) measures the relative contribution of authors to articles published in the 82 high-quality natural science journals tracked by the Nature Index. FC for China rose 75% between 2012 and 2017, much more than a selection of leading countries in the index. China's share of global output also continued to rise, from 9% to 16% based on FC. During this period, FC for the US fell both in absolute terms and as a share of global output.



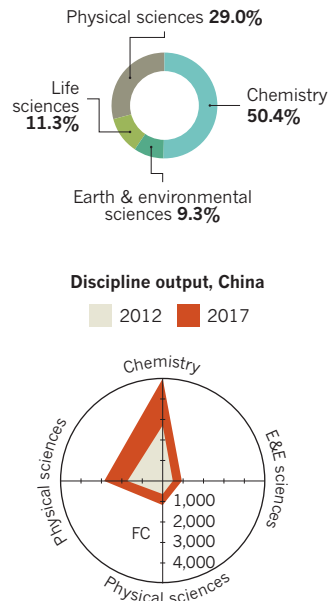
STRENGTH IN NUMBERS

Half of China's FC in the Nature Index concerns chemistry, which is by far the country's strongest field of research in the natural sciences. In the five years to 2017, China produced a fifth of global chemistry output in the Nature Index, but only 4.9% of high-quality output in the life sciences.

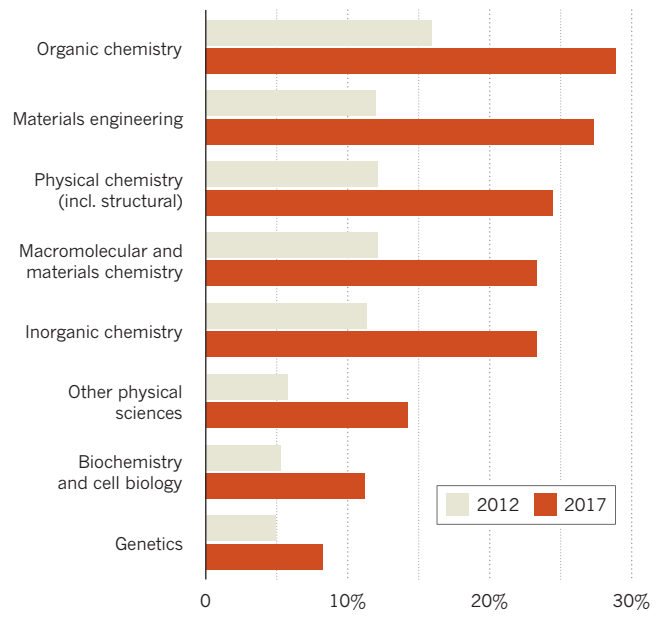
Global share of FC 2012-2017 showing top 3 countries



Share of China's output 2012-2017

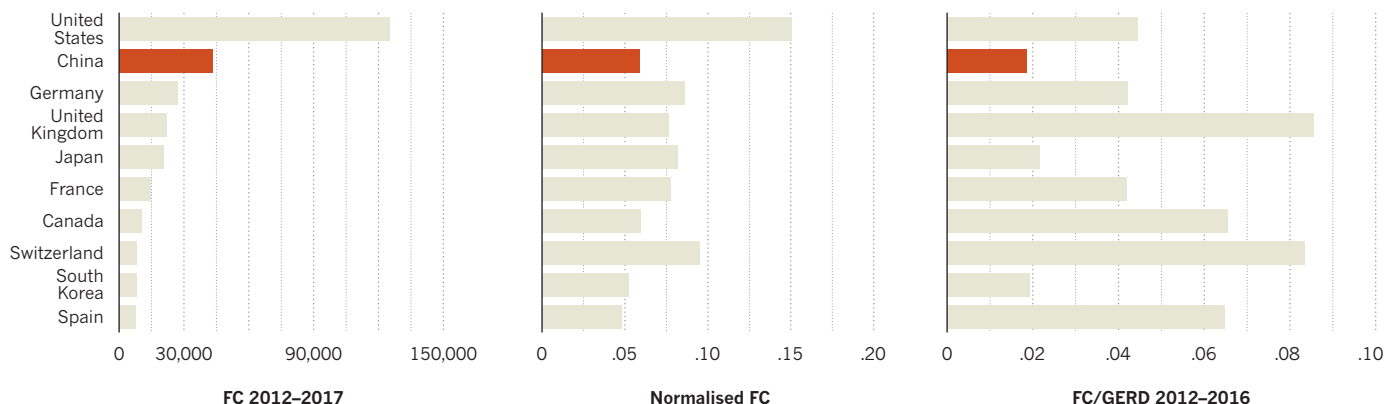


Share of global FC by field



A LONG WAY TO THE TOP

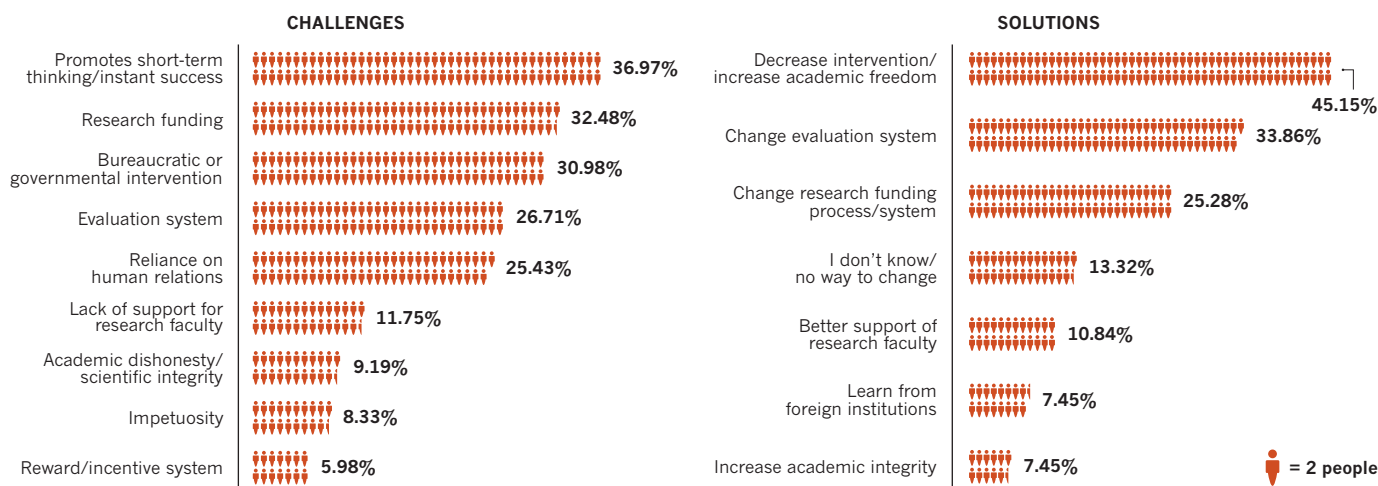
Its total output in the index is second highest, but on measures of quality and efficiency – such as high-quality output normalised against total natural sciences output in the Dimensions database (Normalised FC) and against gross expenditure on R&D, shown here – China is well down the country ranks.



SOURCE: NATURE INDEX/DIMENSIONS FROM DIGITAL SCIENCE/OECD

VIEW FROM THE BENCH

Short-term thinking and official intervention were high among respondents' concerns in 2016, when two US researchers surveyed 18,000 science, technology, engineering and mathematics researchers in China's top universities. There were 466 responses on challenges and 443 on solutions.



SOURCE: HAN XUEYING AND RICHARD P. APPLEBAUM, PLOS ONE 13(4): E0196347 (2018).

PARTNERS IN SCIENCE

Just under 50% of China's articles in the Nature Index were internationally collaborative in 2015-17, about the same proportion as the US, but much less than the UK and Germany (each around 75% internationally collaborative). Here, multilateral collaboration score (MCS) measures the Chinese institution's collaboration with multiple overseas institutions, while the bilateral collaboration score (CS) is a measure of the collaboration between the two institutions shown.

TOP 10 CHINESE INSTITUTIONS BY INTERNATIONAL COLLABORATION 2015-17

CHINESE INSTITUTION	INTERNATIONAL MCS 2015-2017	TOP GLOBAL PARTNER	COUNTRY	PARTNER'S COUNTRY RANK BY FC 2015-2017	CS 2015-2017
Chinese Academy of Sciences	1657.88	Georgia Institute of Technology	United States	35	157.75
Peking University	461.42	Harvard University	United States	1	36.26
Tsinghua University	436.79	Stanford University	United States	2	47.03
Nanjing University	389.25	Stanford University	United States	2	23.41
Zhejiang University	332.59	Nanyang Technological University	Singapore	1	23.05
University of Science and Technology of China	308.91	Nanyang Technological University	Singapore	1	33.73
Fudan University	298.54	Harvard University	United States	1	26.57
Shanghai Jiao Tong University	234.34	Dresden University of Technology	Germany	16	19.95
Xiamen University	200.59	National Institutes of Health	United States	5	17.91
Soochow University	185.72	Florida State University	United States	84	13.05

SOURCE: NATURE INDEX