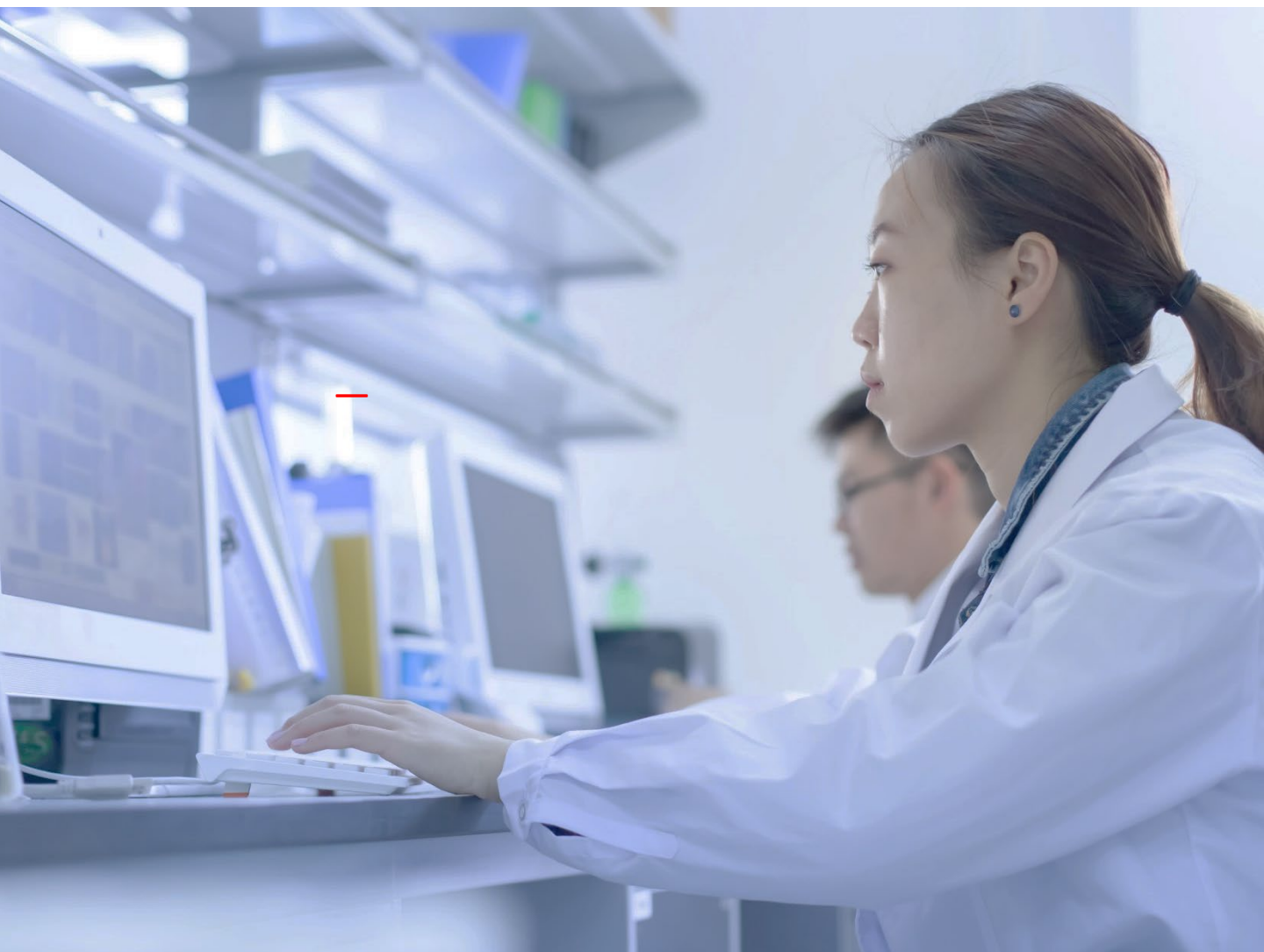


# For the Global Common Good: APRU and the China-US Research Landscape



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## APRU and the China-US Research Landscape

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# Preface

A core purpose of the Association of Pacific Rim Universities (APRU) is building collaboration between leading research universities to address global challenges.

China and the United States are the most productive research leaders in the international community. Their research relationship, in terms of co-publications, is the largest globally. Universities from these two countries comprise almost half APRU's members.

Using Elsevier's Bibliometric tools, Scopus and SciVal, this report, as part of an ongoing collaboration between Elsevier and APRU, provides an overview of the China-US research relationship and in the context of the collective research output of APRU universities.

As we confront overlapping global crises, this report indicates the enduring strength of the China-US research relationship as well as the high research capabilities of APRU member universities. It also shows that much could be achieved by acting together for the common good through research collaboration on selected Sustainable Development Goals and on COVID-19 and broader pandemic research.

This report was created following discussions between APRU and Elsevier.

# Executive Summary

## The Big Picture

### China-United States Research Relationship

- China and the United States are the world's largest contributors to research and each publish around **20%** of the world's scholarly output.
- China and the United States are each other's largest collaborators and also the largest collaborators in the world. Co-publications between the two countries have been increasing gradually, but saw a slight dip in 2021.

### APRU

- APRU member universities collectively published **2,044,029** publications in the 2017-2021 period, around **11.8%** of the scholarly output worldwide. The FWCI was 1.41, 41% higher than the world average (1.0).
- Of the 100 universities with the largest scholarly outputs in the world, **twenty-six** were APRU members. **Five** APRU members were in the top 10, all of which were from **China**.
- **36%** of APRU publications were published with another country or region, reflecting the highly global nature of the APRU member universities.
- Around **40%** of China-US co-publications involve at least one APRU member university.

### Areas of Strength

- China-US and APRU universities have a high relative activity in the physical and life sciences. In health related sciences such as medicine, APRU member universities have a much higher relative activity than China-US, a value that is close to the world average.
- SDG 3 (Good Health and Well-Being), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action) are particular areas of strength for China-US and APRU.
- APRU universities were involved in **13.5%** of global COVID-19 research in 2019-2021.



# The Growth of China

China and the United States are the world's two power houses when it comes to scientific research. Looking at the 2017-2021 period, China has seen a steady growth in scholarly output with a compound annual growth rate (CAGR) of 5.5%, surpassing the United States in 2019. Meanwhile, the United States has maintained its high scholarly output over the same five years. The two countries published around a fifth of global research in the 2017-2021 period, with China publishing 20.3% and the United States publishing 20.8%. When looking at 2021 alone, China published 21.7% of the world's overall research, while the United States published 19.3%, reflecting China's incredible growth in research volume.

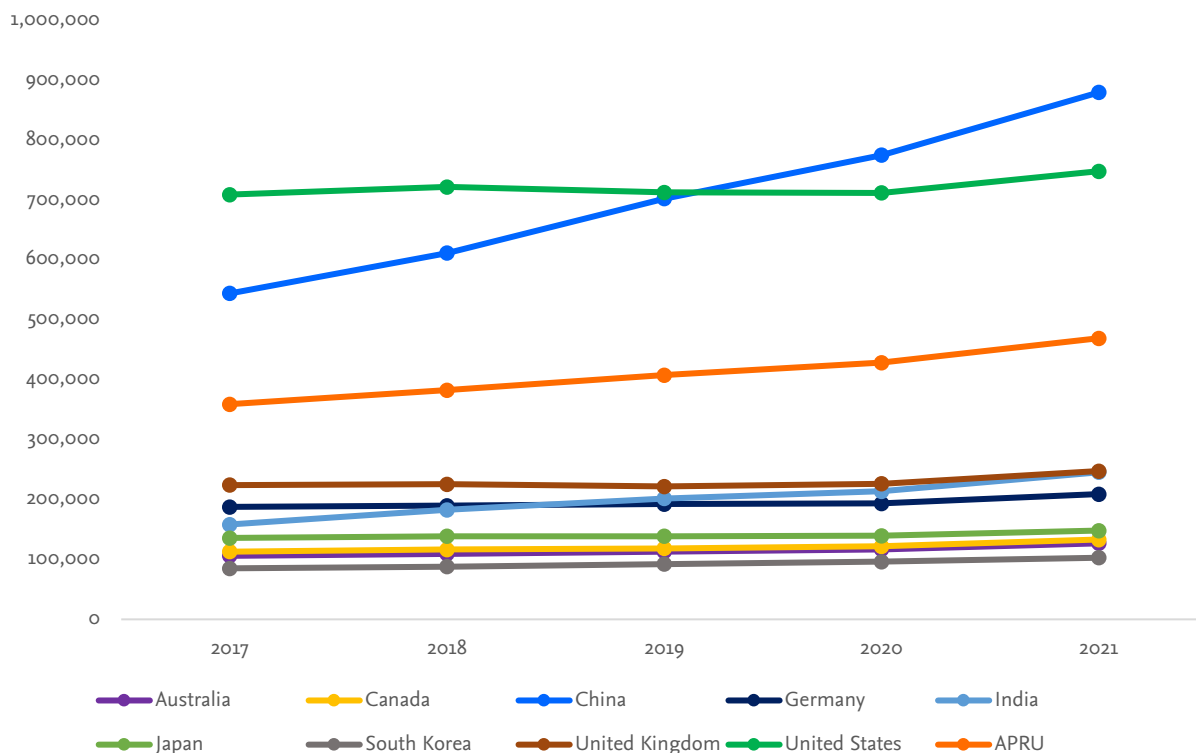


Fig 1: Scholarly output for China and the United States, APRU member universities, and seven additional selected countries for the 2017-2021 period. All types of publications included.

Fig. 1 shows China, the United States, as well as 7 of the world's research-intensive countries, alongside APRU, a group which consists of 60 member universities. The list of APRU member universities can be seen in *Appendix B*. While these countries lead the world in terms of scholarly output, we can see that China and the United States are indeed in their own league.

The United Kingdom has the third largest scholarly output in the world, publishing 6.6% of the world's scholarly output in the 2017-2021 period. Germany and India follow the United Kingdom, publishing 5.6% and 5.8% of the world's total scholarly output respectively, in the same period. India in particular has seen a steady growth over the last five years, overtaking Germany in 2019. Japan, Canada, Australia and South Korea, where many of APRU's member universities reside, also have high research outputs. It is particularly note-worthy that APRU universities collectively have an incredibly large scholarly output (at 2,044,029 publications over the 2017-2021 period), surpassing many highly prolific countries.

# The Largest Collaborators

While co-publications between China and the United States have been growing gradually, the numbers saw a slight dip in 2021. Despite this, the two countries remain each other's largest collaborators, and also the largest collaborators in the world, and China-US co-publications make up around 1.8% of the world's overall research.

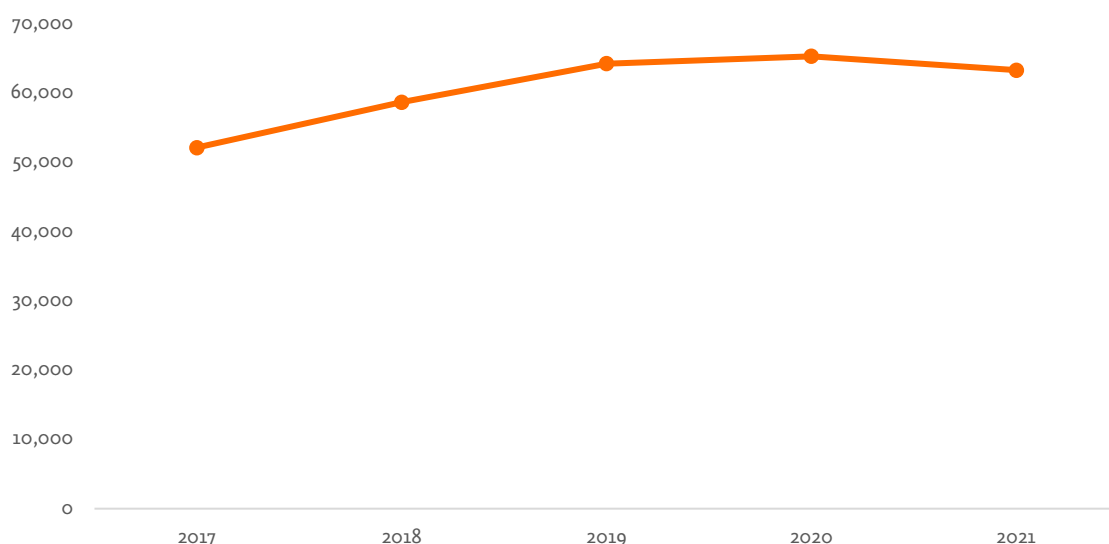


Fig 2: Number of China-US co-publications in 2017-2021 period, all types of publications included.

## China

Collaborating with **218 countries and regions**

A total of **788,865 co-authored publications**

China's Top 5 collaborators:

Countries & Regions	Co-authored publications	FWCI
United States	301,404	1.96
United Kingdom	89,572	2.25
Australia	76,037	2.42
Hong Kong	62,363	2.19
Canada	54,123	2.28

## The United States

Collaborating with **230 countries and regions**

A total of **1,289,261 co-authored publications**

United States' Top 5 collaborators:

Countries & Regions	Co-authored publications	FWCI
China	301,404	1.96
United Kingdom	178,762	2.70
Canada	138,203	2.43
Germany	138,192	2.58
France	90,239	2.84

## Top collaborators in the world

Collaborators	Co-authored publications	FWCI
China-United States	301,404	1.96
United Kingdom-United States	178,762	2.70
Canada-United States	138,203	2.43
Germany-United States	138,192	2.58
Germany-United Kingdom	93,468	2.79

## Top collaborators excluding China and US

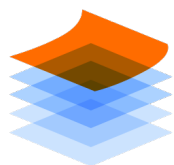
Collaborators	Co-authored publications	FWCI
Germany-United Kingdom	93,468	2.79
Italy-United Kingdom	70,527	2.86
Australia-United Kingdom	66,265	3.0
France-United Kingdom	65,491	3.0
France-Germany	59,484	2.84

Tables 1-2: Top 5 collaborations for China (left) and United States (right), 2017-2021, all types of publications included.

Tables 3-4: Top 5 collaborations in the world (left) and Top 5 collaborations in the world excluding China and US (right), 2017-2021, all types of publications included. These co-publications may involve a third, or more countries/regions.

# APRU in a Global Context

APRU member universities collectively published 2,044,029 publications in the 2017-2021 period. This accounts for around 11.8% of the scholarly output worldwide. Of the 100 universities with the largest scholarly outputs in the world, twenty six were APRU member universities.



2,044,029 publications,  
up 30.7% over the 2017-2021 period.

FWCI of 1.41,  
41% higher than the world average.



36% of publications are co-authored with institutions in other countries or regions. In comparison, 21% of the world's publications are international collaborations.



4.4% of publications have both academic and corporate affiliations. In comparison, 2.7% of the world's research is a result of academic-corporate collaboration.



14.6% of publications are in the top 10% most cited publications. In comparison, 10% of the world's publications are in the top 10% most cited worldwide.



37.6% of publications are in the top 10% most cited journals. In comparison, 25% of the world's publications are in the top 10% most cited worldwide.

Looking at China-US co-publications in the APRU context, 39.8% of co-publications involved at least one APRU member university in the 2017-2021 period. 4.3% of China-US co-publications involved at least one Chinese and one US APRU university for the same period. This might suggest that much of the collaborative work by APRU member universities are global in nature, involving not just China and the United States, but many other countries as well.

## What is Field-Weighted Citation Impact?

Field-Weighted Citation Impact (FWCI) is the ratio of the total citations actually received by the denominator's output, and the total citations that would be expected based on the average of the subject field.

A Field-Weighted Citation Impact of:

- Exactly 1 means that the output performs just as expected for the global average.
- More than 1 means that the output is more cited than expected according to the global average. For example, 1.48 means 48% more cited than expected.
- Less than 1 means that the output is cited less than expected according to the global average.

Field-Weighted Citation Impact takes into account the differences in research behaviour across disciplines. It is particularly useful for a denominator that combines a number of different fields, although it can be applied to any denominator.

# Top APRU Member Universities by Scholarly Output

Of the 100 universities with the largest scholarly output in the world, twenty six were APRU members. Of the twenty six, **twelve were universities from China** and **six were from the United States**, reflecting the tremendous research power of the two countries. Five APRU members were in the top 10, all of which were from China.

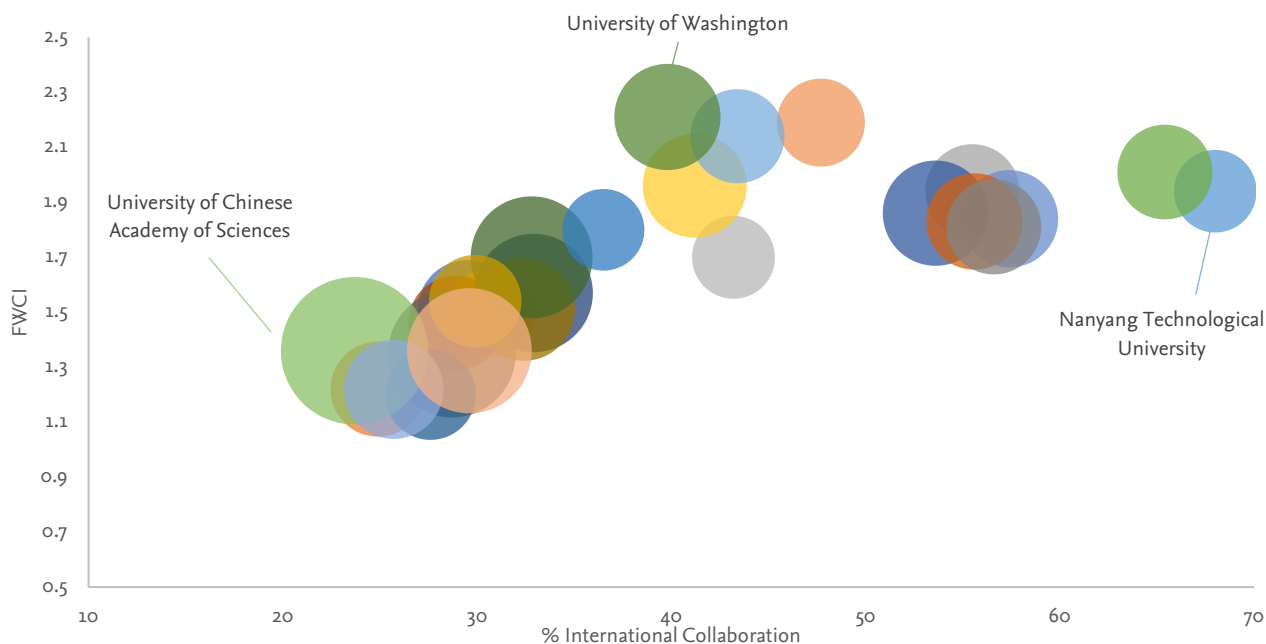


Fig 3. Horizontal axis shows % international collaboration, vertical axis shows FWCI, bubble size indicates scholarly output, for the twenty-six APRU member universities, for the 2017-2021 period. All types of publications included.

When looking at specific numbers, the University of Chinese Academy of Sciences had the largest scholarly output out of the twenty-six APRU members with 133,899 publications during the 2017-2021 period, coming second to Harvard University. To note, the University of Chinese Academy of Sciences is a public university for graduate education, and it is affiliated with Chinese Academy of Sciences, the national academy for the natural sciences in China.

Fig 3. also shows the international nature of APRU member universities. As mentioned previously, 36% of APRU publications are co-authored with institutions in other regions or countries—this number is higher than the world average (21%) and China (22.5%), and is in line with the United States (35.8%). All twenty-six APRU member universities shown in the chart have a higher percentage of international collaboration than the world average, with the highest percentage being Nanyang Technological University at 68%.

Furthermore, APRU member universities also have high FWCI. APRU as a group has an FWCI of 1.41, 41% higher than the world average (1.0), a value that is higher than China (1.08) and more or less in line with the United States (1.37). As shown in Fig 3., all twenty-six APRU member universities shown in the chart have an FWCI higher than the world average, and a handful much higher than China or the United States. The University of Washington had the highest FWCI at 2.21.

The twenty seven universities and their scholarly outputs and FWCI for the 2017-2021 period have been listed in *supplemental data*.



# Areas of Strength: ASJC subject areas

There are many ways to look into a country or institution's areas of strength. One such method is the Relative Activity Index (RAI). RAI is a measure of the proportion of a country or institution's research output in any particular subject, relative to the proportion seen globally. A value of 1.0 indicates that the institution's research activity in a field corresponds exactly with the global activity in the same field, a value higher than 1.0 implies a greater emphasis and a value lower than 1.0 suggests a lesser focus.

Fig. 4-8 look at the RAI for the 27 All Science Journal Classification (ASJC) subjects in four radar charts for APRU universities collectively, for China-US co-publications, and the world (average). The ASJC category 'Multidisciplinary' has been included in the Social Sciences chart, but includes research from all four areas.

The relative activity for APRU universities collectively and China-US co-publications follow a similar pattern. This may not be surprising given that almost half of APRU member universities are from China or the United States. Areas with high RAI may be considered areas of strength, for example for the physical sciences and life sciences, APRU's RAI is higher than or similar to the world average. In the health sciences, APRU's RAI values are closer to the world average than China-US. While the RAI for social sciences subject areas are lower than the world average, it should be noted that for non-English speaking countries, publications in these subjects may be published in local language outputs that are not covered in Scopus, and thus, the data may not reflect the full extent of research being conducted.

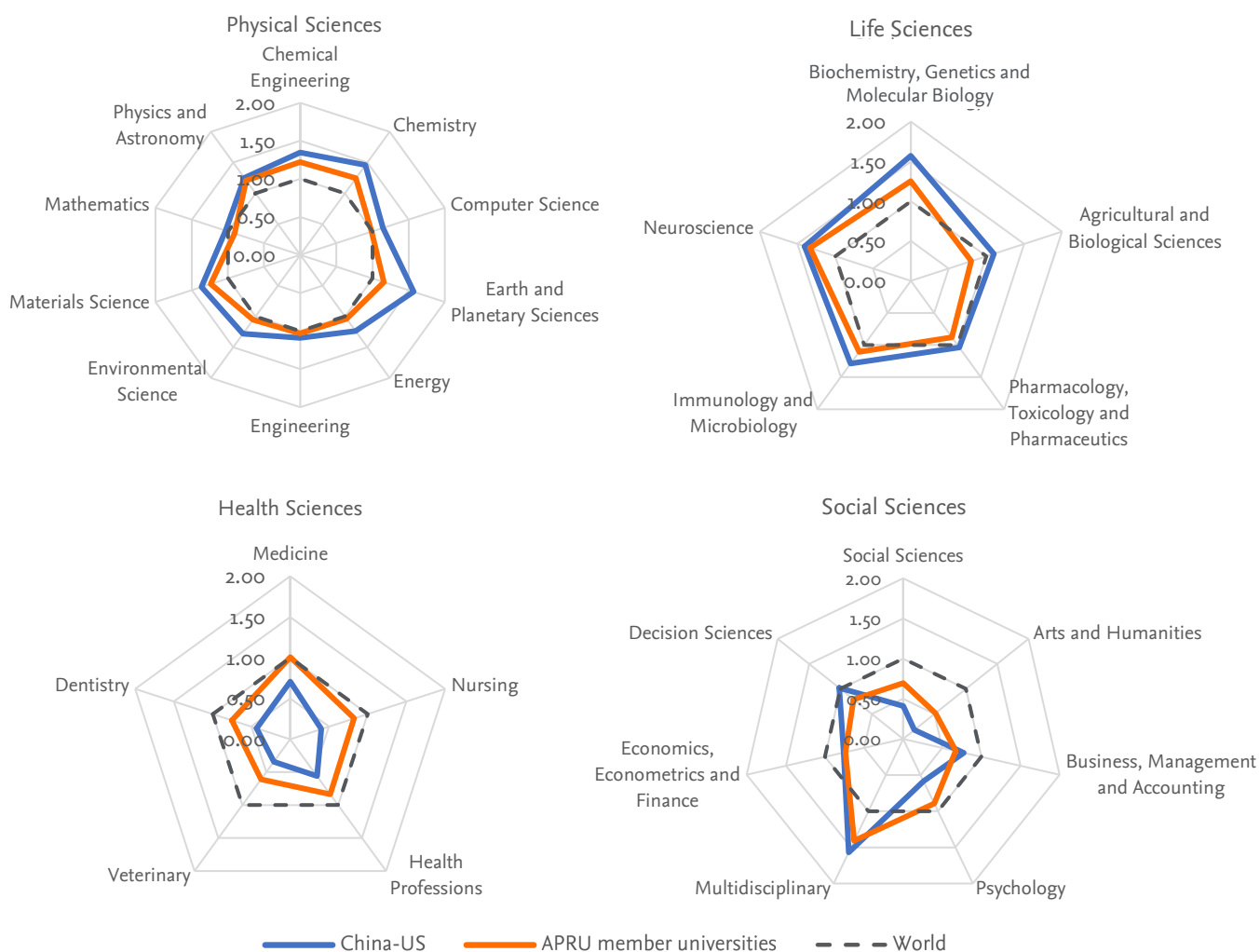


Fig 4-8: Relative Activity Index (RAI) for ASJC categories. (1) Physical Sciences (2) Life Sciences (3) Social Sciences (4) Health Sciences. All charts for the 2017-2021 period. All types of publications included.

# Areas of Strength: SDGs research

Similarly, Fig 9 looks at RAI for research related to SDGs 1-16. SDG 17 (Partnerships for the Goals) has not been included due to difficulties in defining the queries.

SDGs where both China-US and APRU member universities have higher relative activity than the world are SDG 3 (Good Health and Well-Being), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). This is encouraging, given that many of APRU's activities, such as the *APRU Sustainable Cities and Landscapes Program* hosted by the University of Oregon, and *APRU Global Health Program* hosted by the University of Southern California, align closely with the SDGs.

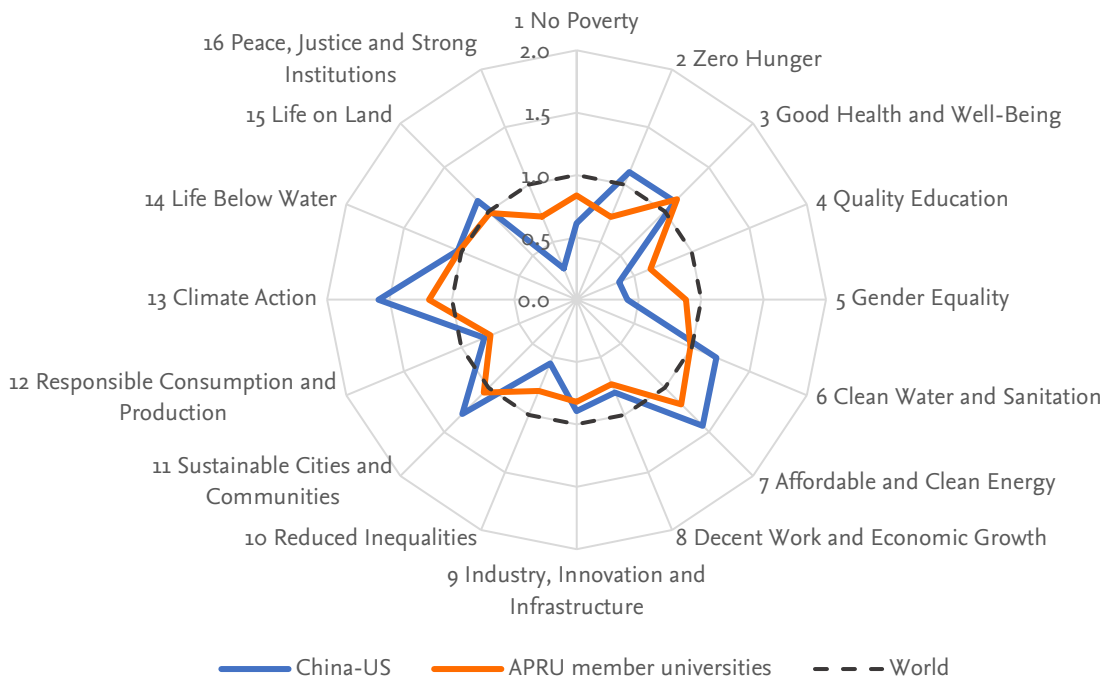


Fig 9: Relative Activity Index (RAI) for SDG 1-16, for the 2017-2021 period. All types of publications included.

When looking at SDGs related research overall for the 2017-2021 period, not surprisingly, China and the United States excel in terms of scholarly output, often appearing in the Top 3 globally. The exception is SDG 5 (Gender Equality) and SDG 16 (Peace, Justice and Strong Institutions) where China was 8<sup>th</sup> for both SDGs. As mentioned in a previous page however, publications in Arts, Humanities and the Social Sciences in non-English speaking countries may be published in local language outputs that are not covered in Scopus, and thus, the data may not reflect the full extent of research being conducted. Furthermore, this data looks at SDGs related research and does not reflect SDGs related activities in general.

# Areas of Strength: SDG 3 and 7

While APRU has many areas of strength, four SDGs stand out in particular, as identified in the RAI charts on the previous page. Here we look at specific data from SDG 3 (Good Health and Well-Being) and SDG 7 (Affordable and Clean Energy).

## SDG 3 (Good Health and Well-Being)



There were 2,418,887 SDG 3 related publications in the world in the 2017-2021 period, with an FWCI of 1.26. The top 3 countries publishing SDG 3 related research in the world were the United States, China and United Kingdom.

1.8% of global SDG 3 related research (or 46,882 publications) were China-US co-publications. The FWCI was 2.47.

Meanwhile, APRU member universities were involved in 12.1% of global SDG 3 research (or 293,340 publications). The FWCI was 1.79. Twenty of the top 100 universities with the largest scholarly outputs in SDG 3 research were APRU member universities, and three were in the top 10, listed below.

## SDG 7 (Affordable and Clean Energy)



There were 763,160 SDG 7 related publications in the world in the 2017-2021 period, with an FWCI of 1.37. The top 3 countries publishing SDG 7 related research in the world were China, United States and India.

2.5% of global SDG 7 related research (or 19,002 publications) were China-US co-publications. The FWCI was 2.79.

Meanwhile, APRU member universities were involved in 13.2% of global SDG 7 research (or 100,428 publications). The FWCI was 1.96. Twenty one of the top 100 universities with the largest scholarly outputs in SDG 7 research were APRU member universities, and six (all Chinese universities) were in the top 10, listed below.

### Top 10 universities by scholarly output

#### SDG 3 (Good Health and Wellbeing)

1. Harvard University
2. Johns Hopkins University
3. University of Toronto
4. Shanghai Jiao Tong University
5. Fudan University
6. University College London
7. University of California at San Francisco
8. University of Pennsylvania
9. Université Paris Cité
10. University of Washington

#### SDG 7 (Clean and Affordable Energy)

1. Tsinghua University
2. University of Chinese Academy of Sciences
3. North China Electric Power University
4. Zhejiang University
5. Anna University, India
6. Shanghai Jiao Tong University
7. University of Science and Technology of China
8. Huazhong University of Science and Technology
9. Tianjin University
10. Xi'an Jiaotong University

Left: List of top 10 universities with largest scholarly in SDG 3 research for the period 2017-2021.

Right: List of top 10 universities with largest scholarly in SDG 7 research for the period 2017-2021.

Orange indicates that the university is an APRU member.

# Areas of Strength: SDG 11 and 13

Here we look at specific data from SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).

## SDG 11 (Sustainable Cities and Communities)



There were 383,284 SDG 11 related publications in the world in the 2017-2021 period, with an FWCI of 1.11. The top 3 countries publishing SDG 11 related research in the world were China, United States and United Kingdom.

2.3% of global SDG 11 related research (or 8,644 publications) were China-US co-publications. The FWCI was 2.09.

Meanwhile, APRU member universities were involved in 11.2% of global SDG 11 research (or 42,960 publications). The FWCI was 1.49. Twenty four of the top 100 universities with the largest scholarly outputs in SDG 11 research were APRU member universities, and four (all Chinese universities) were in the top 10, listed below.

## SDG 13 (Climate Action)



There were 261,751 SDG13 related publications in the world in the 2017-2021 period, with an FWCI of 1.41. The top 3 countries publishing SDG 13 related research were the United States, China and the United Kingdom.

2.8% of global SDG 13 related research (or 7,236 publications) were China-US co-publications. The FWCI was 2.56.

Meanwhile, APRU member universities were involved in 12.4% of global SDG 13 related research (or 32,469 publications). The FWCI was 1.93. Twenty of the top 100 universities with the largest scholarly output in SDG 13 related research were APRU member universities, four of which were in the top 10.

### Top 10 universities by scholarly output

#### SDG 11 (Sustainable Cities and Communities)

1. **Tongji University**
2. **University of Chinese Academy of Sciences**
3. **Tsinghua University**
4. Wuhan University
5. Beijing Jiaotong University
6. Beijing Normal University
7. Southeast University, Nanjing
8. **Peking University**
9. University College London
10. Delft University of Technology

#### SDG 13 (Climate Action)

1. **University of Chinese Academy of Sciences**
2. **Tsinghua University**
3. Swiss Federal Institute of Technology Zurich
4. CSIC
5. Université PSL
6. Beijing Normal University
7. Wageningen University & Research
8. **Peking University**
9. **Zhejiang University**
10. Université de Paris

Left: List of top 10 universities with largest scholarly in SDG 11 research for the period 2017-2021.

Right: List of top 10 universities with largest scholarly in SDG 13 research for the period 2017-2021.

Orange indicates that the university is an APRU member.

# COVID-19 Research

The entire world was impacted by the COVID-19 pandemic and now many universities and research organizations are looking ahead in terms of pandemic-preparedness. Here we look at COVID-19 research, which is a promising area of research for APRU universities moving forward. This data is based on a custom search string created by Elsevier during the early stages of the pandemic, and was also used in the Novel Coronavirus Information Center. The search string can be found in Appendix A.

Globally, there were 172,324 COVID-19 related publications in the 2019-2021 period. The FWCI was 4.48. The top three countries publishing in COVID-19 research were the United States, United Kingdom, and China. 1.4% of global COVID-19 research (or 2,454 publications) were China-US co-publications, with an FWCI of 10.5.

APRU member universities were collectively involved in 23,219 publications, making up 13.5% of global COVID-19 research. The FWCI was 5.97. While eighteen of the Top 100 universities with the largest scholarly output in COVID-19 research were APRU members, none were in the Top 10. The highest ranked APRU member university was the University of Washington at number 14, and the ten APRU member universities with the highest scholarly output are listed below. These results may be explained by the fact that we are looking at a shorter time period (2019-2021), and that different universities have different research priorities and thus, may not have a focus on medicine or pandemic related research.

If we look at the ASJC category 'Medicine', where much of the pandemic-related research is concentrated, APRU universities collectively had a scholarly output of 513,209 in the 2017-2021 period and a 52.4% growth in the same period, thus suggesting that health and medical research is a promising area of research for many APRU universities. Looking at the subcategory 'Infectious Diseases,' the growth is even higher at 59.5%.

## Top 10 universities publishing in COVID-19 research: by scholarly output

1. Harvard University
2. University of Toronto
3. University College London
4. Imperial College London
5. Johns Hopkins University
6. Huazhong University of Science and Technology
7. University of Oxford
8. King's College London
9. University of Milan
10. University of Pennsylvania

## Top 10 APRU universities publishing in COVID-19 research: by scholarly output

1. (14) University of Washington
2. (23) The University of Melbourne
3. (29) The University of British Columbia
4. (31) University of California at Los Angeles
5. (32) National University of Singapore
6. (36) The University of Sydney
7. (37) The University of Hong Kong
8. (39) Monash University
9. (40) Fudan University
10. (42) UNSW Sydney

# Conclusion

In this report, we observed that China and the United States are two of the largest contributors to research, each publishing around 20% of the world's research. While they are the largest collaborators in the world, the number of China-US co-publications decreased slightly in 2021. Meanwhile, we've seen equally impressive numbers from APRU: the group of universities published 11.8% of the world's research in the 2017-2021 period. Of the 100 universities with the largest scholarly output in the world, twenty-six were APRU members, reflecting the research-power of APRU universities as a whole. This is encouraging given the numerous global challenges we face today, many of which could be addressed with scientific research.

We also considered the areas of strength for APRU universities collectively, as well as for China-US co-publications, by looking into the relative activity of each entity in various subject areas and 16 of the 17 SDGs. The two groups have similar disciplinary strengths- this is not surprising as many of China's top universities are APRU members. While high relative activity was seen in the physical and life sciences for both groups, in the health sciences, APRU members had a higher relative activity. This reflects the diverse nature of APRU: different universities are prioritizing different areas of research and as a result, the group is very well balanced. Similarly for SDG related research, APRU and China-US have similar strengths, notably in SDG 3 (Good Health and Well-Being), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action). Again, given that APRU is very well balanced, the group has a high relative activity in areas where China-US do not.

Finally, we also looked at COVID-19 research given the ongoing pandemic. COVID-19 research has no doubt been a point of focus for global research in the last three years, and pandemic-related research will likely continue to be a point of focus for many. This is a promising area of research for APRU: medical research is a growing area for APRU universities collectively.

With China and the United States, their growing collaborative relationship, and a diverse and productive group of universities like APRU, it will be exciting to see their continued growth, but also their continued contributions to research, particularly in addressing global challenges. There are high expectations for the two countries, and there is no doubt that much of China-US collaborative research will be impactful. Similarly, there is much to look forward to for APRU as well. Given the high research capabilities of its universities, it is undeniable that many APRU members will be contributing significantly to various areas of research in the future. APRU, as a network that brings together these leading universities in the world, is well-placed to facilitate meaningful collaborative opportunities.

# Appendix A- Methodology

All data included in this report were extracted from Elsevier's bibliometric tools, SciVal and Scopus on 24, 27, and 28 June 2022. APRU's SDGs related data which were extracted by the data science team on 28 June 2022. There are no significant differences in the numbers given that the same time period is being examined.

## **Types of Publications included**

All types of publications were included in the analysis, unless stated otherwise. The types of publications included are articles, conference papers, reviews, books and book chapters.

## **Identification of Publications**

For publications by APRU member universities, the SciVal group *APRU - Association of Pacific Rim Universities* was used. In the cases where Scopus was used to identify publications, APRU member universities were identified by their affiliation IDs.

For US-China co-publications, the *Collaboration* module in SciVal or the following search string was used in Scopus.

AFFILCOUNTRY("United States" and "China")

To note, publications by 'China' only include those of Mainland China.

For subject specific publications, pre-defined research areas or subjects were used in SciVal.

## **All Science Journal Classification (ASJC)**

ASJC is the Scopus journal classification system, whereby titles in Scopus are classified under four broad subject clusters (life sciences, physical sciences, health sciences and social sciences). These are further divided into 27 major subject areas, which in turn are composed of more granular subcategories. Journals are classified into one or more of these subcategories based on their content.

*Publications by Subject Area* in the *Overview* module in SciVal was used to identify these publications.

## **Sustainable Development Goals (SDGs)**

The publications are identified by Elsevier from a combination of a comprehensive search query and are supplemented with publications identified through a machine learning model. The machine learning publications make up approximately 10% of the total publications for the SDGs. The SDG queries can be found on Digital Commons, [here](#).

SDGs related publications were identified through pre-determined research areas in SciVal. In the case of APRU's SDGs publications, data was provided by Elsevier's data science team.

# Appendix A- Methodology

## COVID-19 Research

The COVID-19 research query used in this report was created by Elsevier to help identify research done on COVID-19 from 2019. This query is used to feed the interactive map on the [Novel Coronavirus Information Center](#). The query was defined as follows, using Scopus advanced search.

```
TITLE-ABS-KEY("coronavirus disease 2019" OR covid19 OR covid OR ncov OR sars-cov-2 OR {novel coronavirus}) AND (PUBYEAR > 2018)
```

## Counting

Analyses of publications make use of whole counting rather than fractional counting. For example, if a paper has been co-authored by one author from China and one author from the United States, then the paper counts towards both the scholarly output for China and the scholarly output of the United States. Total counts for each entity represent unique counts of papers.

## Relative Activity Index (RAI)

RAI is a measure of the proportion of a country or institution's research output in any particular subject, relative to the proportion seen globally. The following formula was used to calculate RAI in this report:

$$\frac{(\text{entity X's publications in subject Y} / \text{entity X's publications overall})}{(\text{World's publications in subject Y} / \text{World's publications overall})}$$

Entity X can be any entity such as a country, organization or university (for example, APRU) and Subject Y can be any defined subject (for example, SDG 3).



# Appendix B-

## APRU Member Universities

There were 60 member universities at the time of writing this report, listed by region as below.

### **Australia**

Monash University  
The Australian National University  
The University of Melbourne  
The University of Queensland  
The University of Sydney  
UNSW Sydney

### **Canada**

Simon Fraser University  
The University of British Columbia

### **Chile**

University of Chile

### **China and Hong Kong SAR**

Fudan University  
Harbin Institute of Technology  
Nanjing University  
Peking University  
Shanghai Jiao Tong University  
Sun Yat-sen University  
The Chinese University of Hong Kong  
The Hong Kong University of Science and Technology  
The University of Hong Kong  
Tongji University  
Tsinghua University  
University of Chinese Academy of Sciences  
University of Science and Technology of China  
Xi'an Jiaotong University  
Zhejiang University

### **Chinese Taipei**

National Taiwan University  
National Tsing Hua University

### **Colombia**

Universidad de los Andes

### **Ecuador**

Universidad San Francisco de Quito

### **Indonesia**

Universitas Indonesia

### **Japan**

Keio University  
Kyushu University  
Nagoya University  
Osaka University  
Tohoku University  
Waseda University

### **Korea**

KAIST  
Korea University  
POSTECH  
Pusan National University  
Seoul National University  
Yonsei University

### **Malaysia**

Universiti Malaya

### **Mexico**

Tecnológico de Monterrey

### **New Zealand**

The University of Auckland

### **Philippines**

University of the Philippines

### **Russia**

Far Eastern Federal University

### **Singapore**

Nanyang Technological University  
National University of Singapore

### **Thailand**

Chulalongkorn University

### **USA**

University of California, Berkeley  
University of California, Davis  
University of California, Los Angeles  
University of California, Riverside  
University of California, San Diego  
University of California, Santa Barbara  
University of California, Santa Cruz  
University of Hawai'i at Mānoa  
University of Oregon  
University of Southern California  
University of Washington

# Appendix C- Supplemental Data

Out of the 100 universities with the largest scholarly output in the world, twenty-six were APRU members. These universities are listed here.

Position in Top 100	Institution	Scholarly Output	FWCI
2	University of Chinese Academy of Sciences	133,899	1.36
4	Shanghai Jiao Tong University	100,335	1.35
5	Zhejiang University	95,943	1.3
6	Tsinghua University	91,345	1.70
8	Peking University	86,428	1.57
18	University of Washington	69,308	2.21
20	The University of Melbourne	68,266	1.86
23	University of California, Los Angeles	66,286	1.96
26	Sun Yat-Sen University	64,571	1.51
29	The University of Sydney	61,810	1.92
30	Xi'an Jiaotong University	60,683	1.22
31	Fudan University	60,562	1.51
33	The University of British Columbia	58,323	1.84
39	UNSW Sydney	57,101	1.83
42	Seoul National University	55,611	1.46
43	Harbin Institute of Technology	55,529	1.22
44	National University of Singapore	55,421	2.01
45	The University of Queensland	55,414	1.81
46	University of California, San Diego	54,543	2.14
47	Monash University	54,475	1.94
51	University of Science and Technology of China	52,669	1.54
57	Tongji University	50,470	1.20
67	Nanjing University	47,710	1.50
68	University of California, Berkeley	47,661	2.19
86	University of California, Davis	42,188	1.70
87	Nanyang Technological University	41,866	1.94
89	University of Southern California	41,139	1.80

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## About APRU

As a network of leading universities linking the Americas, Asia and Australasia, the Association of Pacific Rim Universities (APRU) is the Voice of Knowledge and Innovation for the Asia-Pacific region. APRU brings together thought leaders, researchers, and policy-makers to exchange ideas and collaborate on effective solutions to the challenges of the 21st century.

APRU leverages collective education and research capabilities of our members into the international public policy process. Their primary research areas include natural hazards & disaster risk reduction, women in leadership, population aging, global health, sustainable cities, artificial intelligence & the future of work, the Pacific Ocean, and labor mobility. [www.apru.org](http://www.apru.org)

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