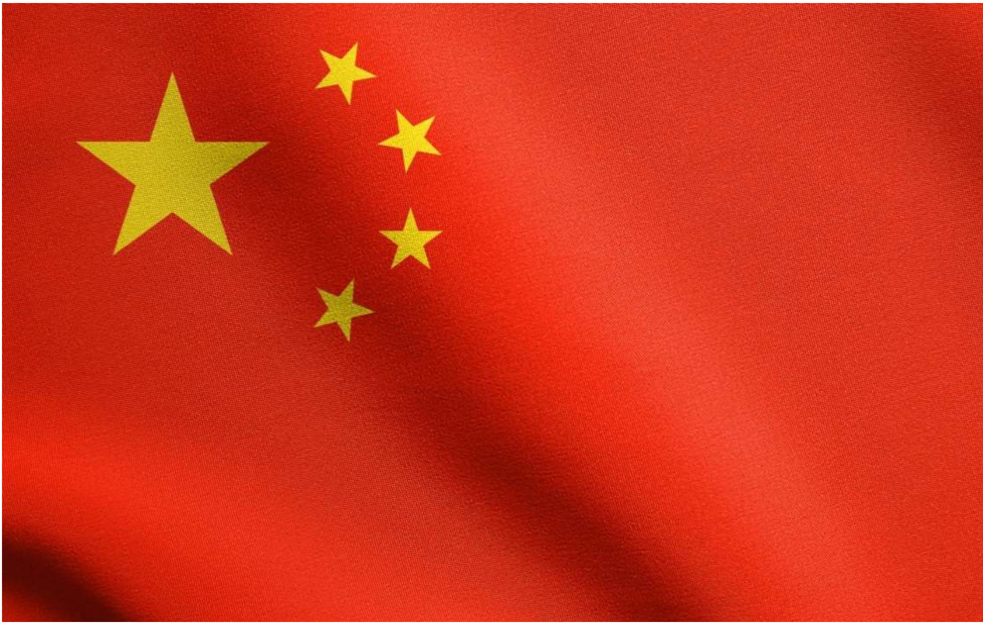


Country Report – China

STINT
Stiftelsen för internationalisering av
högre utbildning och forskning
The Swedish Foundation for International
Cooperation in Research and Higher Education

CR 2021:04
ISSN 1404-7209

Foreword

Recognising the importance of intelligence and analyses for the development of international strategies for higher education and research at various levels of the knowledge system, STINT has compiled a series of brief country reports focused on their academic profiles and performance.

Released as a pilot series covering 16 countries, these country reports aim to provide national overviews using current and reliable data. The selection of countries is based on STINT's existing collaborations and other criteria, not least that the selected portfolio provides an interesting illustration of developments in the academic world:

- Brazil
- Canada
- Chile
- China
- India
- Indonesia
- Japan
- Malaysia
- Kenya, Rwanda, Tanzania and Uganda
- South Africa
- South Korea
- United States of America
- Vietnam

The reports provide insight into each country's knowledge system as well as its demographic and economic context. Primarily, our intention is that both policy and decision makers, as well as practitioners within the Swedish higher education system, will utilise these reports in furthering international strategic collaboration at various levels.

Special effort has been made to include the latest available data. Data were collected in July 2020; for further details about the data and methods, see the Appendix. Several persons at STINT have been involved in the production of these reports: Erik Forsberg, Andreas Göthenberg, Niklas Kviselius, Tommy Shih and Hans Pohl, who was the project leader and developed the tables and figures.

Introduction

The Chinese university system was non-existent at the beginning of the 1970s, as it had been shut down as part of the Cultural Revolution. All colleges and universities remained closed until 1970; most universities did not reopen until 1972, and merit-based admission was not reintroduced until 1977 when college entrance exams were reinstated. Since then, the Chinese government has had the long-term aim of developing China's scientific prowess. Research spending in China has dramatically increased during recent decades. Continual increases in research and development (R&D) expenditure as a percentage of the gross domestic product (GDP), coupled with rapid GDP growth, have enabled China to evolve into one of the world's leading science nations. As of 2017, China's R&D spending accounted for 2.1% of the GDP, representing about 20% of total global research spending. China's R&D investment growth remains significantly greater than that of the United States and the EU.

Research in China focuses strongly on the natural, engineering, and medical sciences. Significantly smaller proportions of the total research output pertain to the social sciences, arts and humanities, or business, management, and economics than, for example, in Sweden.

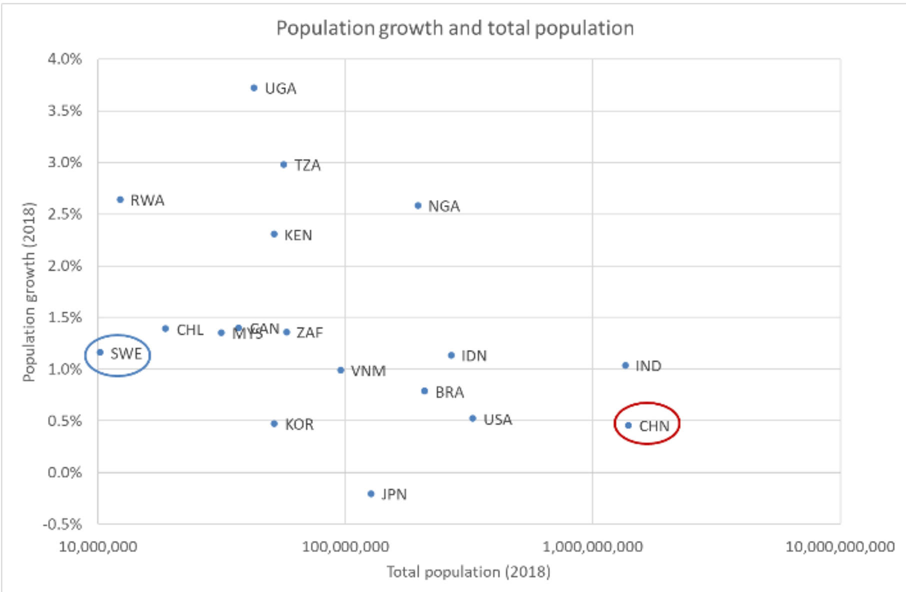
In parallel with R&D growth, China has also seen a rapid increase in the number of outbound students and international research collaborations, both of which have been important factors in the country's scientific development. China is not only the greatest source of outbound international students in the world, but also the third largest receiver of inbound international students.

China's scientific development during the past four decades has been astounding and can be expected to continue given continued strong growth in R&D spending; however, recent political developments also raise concerns, for instance regarding the prospects of future academic freedom, and the resulting impact on China's scientific strength and academic collaborations with the country.

Population and economic development

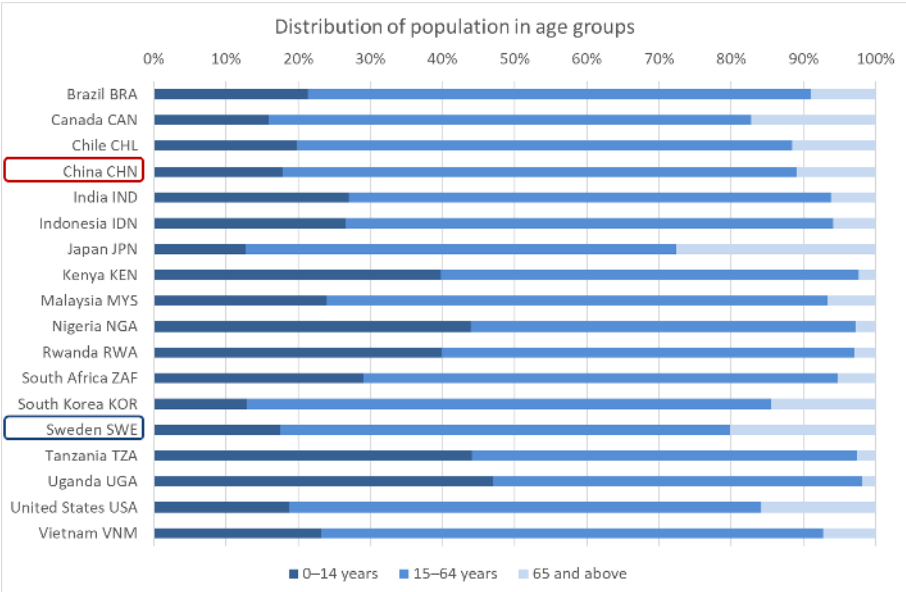
China has the largest population in the world with approximately 1.4 billion people, or 18.5% of the global population. China's post-1949 Communist Party leaders were ideologically disposed to view a large population as an asset and encouraged Chinese to have as many children as possible in the hope of building a larger army and producing more food. Policies aimed at curbing population growth were first introduced in the 1970s, and in 1980 the Chinese government formally introduced the one-child policy, permitting each family only one child.

Figure 1: **Total population (logarithmic scale) and population growth**



Today, the population continues to grow at a very low level, despite raising the limit to two children for all families in 2016. China is facing its swiftest decline population growth in decades, setting the stage for potential demographic and economic crises. Additionally, a serious gender imbalance poses future challenges. Like most Asian nations, China has a traditional bias for sons.

Figure 2: **The percentage of the population in each age group**

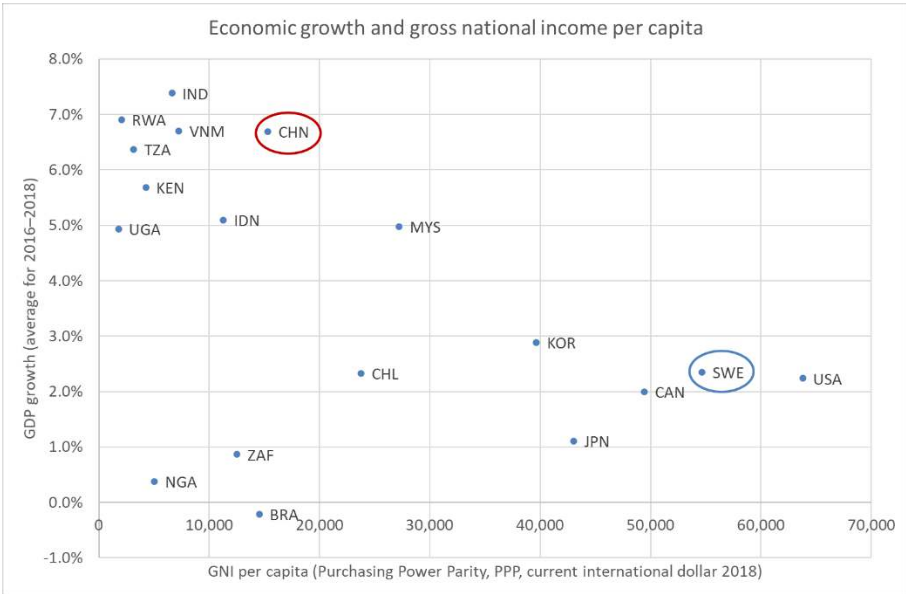


While many developed countries and mature economies have ageing populations, the ageing process in China began at an earlier stage of development and is more accelerated than that experienced by most countries. By 2050, 330 million Chinese will be over the age of 65. This leaves less time and less of a buffer for adjusting welfare systems. A comparison with India is interesting. India's working-age population is expected to surpass China's sometime between 2020 and 2030, which could potentially lead to a shift in manufacturing jobs from China to India. Traditionally, India has lagged in this sector.

In addition to the aftermath of the one-child policy, the trend is worsened by the "middle-income trap," a stage at which rapidly developing economies stagnate as incomes reach median level and the emerging middle-class start having fewer children.

Fewer people mean less domestic consumption, and thus rapidly slowing economic growth. The ratio of young to old will be dramatically imbalanced by the rising ranks of the elderly, placing unprecedented stress on the ties that hold society together.

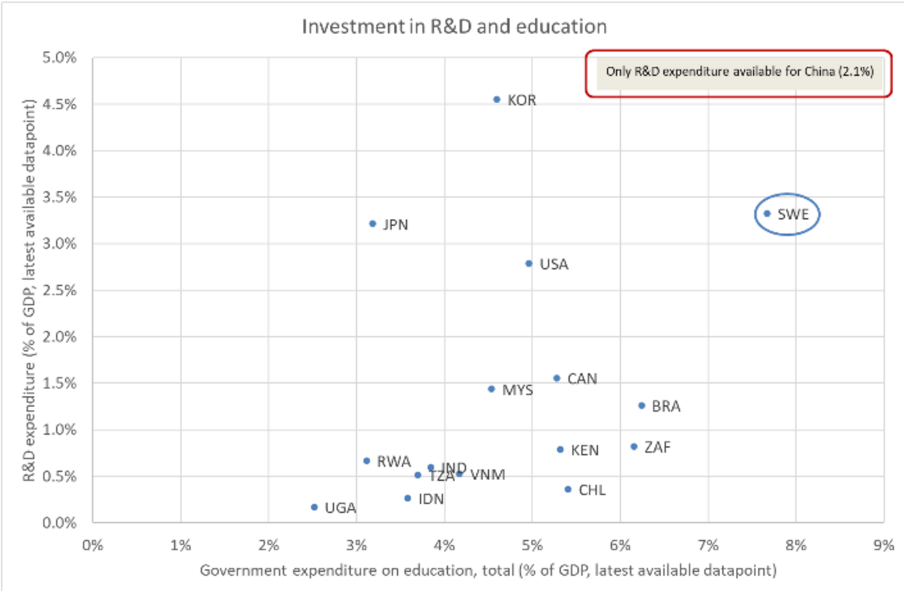
Figure 3: **Gross national income (GNI) and gross domestic product (GDP) growth**



In 1992, a Western national accounting system was officially introduced in China, replacing the Soviet-style accounting system, and GDP became China's most important economic indicator. As of 2008, GDP measurements had been officially harmonised and back-calculations from 1952 could be recorded. Official national statistics, for example on income equality, are often a matter of debate between Chinese and Western analysts.

Between 1978 and 2015, China changed from a poor, underdeveloped country into the world's leading emerging economy. From 1979 to 2010, China's average annual GDP growth was 9.9%, reaching a historical high of 15% in 1984 and a record low of 3.8% in 1990. Relatively little is known about how the distribution of income and wealth within China has changed over this critical period. There are no consistent estimates of the extent to which the different income and wealth groups have benefited from such rapid macroeconomic growth.

Figure 4: **Expenditure on education and research and development (R&D), both as a percentage of GDP; data predominantly for 2017 or 2018**



Chinese expenditure on R&D is 2.1% of GDP, which is rather high internationally. However, neighbouring Japan and South Korea have significantly higher R&D expenditures in terms of a percentage of their GDP. No recent data are available on the Chinese government education expenditure. In comparison, Swedish expenditure is more than 7% of GDP for education and more than 3% of GDP for R&D (see Figure 4).

Higher education institutions in China

China has the largest university system in the world. Some 8 million students graduate annually, a number expected to rise by 300% by 2030. The quality of education and strength of the research output vary considerably, although both are generally improving. The top universities in China are now also leading universities internationally. Six Chinese universities, Tsinghua University, Peking University, Fudan University, Shanghai Jiao Tong University, Zhejiang University and the University of Science and Technology of China, now rank among the global top 100 in all three of the most commonly cited university rankings.[1] While significantly fewer Chinese higher education institutions (HEIs) can be found at the top of such rankings, which are still dominated by US and European HEIs, it is a stark improvement compared to half a decade ago. Quality enhancement at mid-ranked Chinese universities, which are more likely to have a broader impact on the development of science and higher education in China, has recently started to result in improved rankings globally.

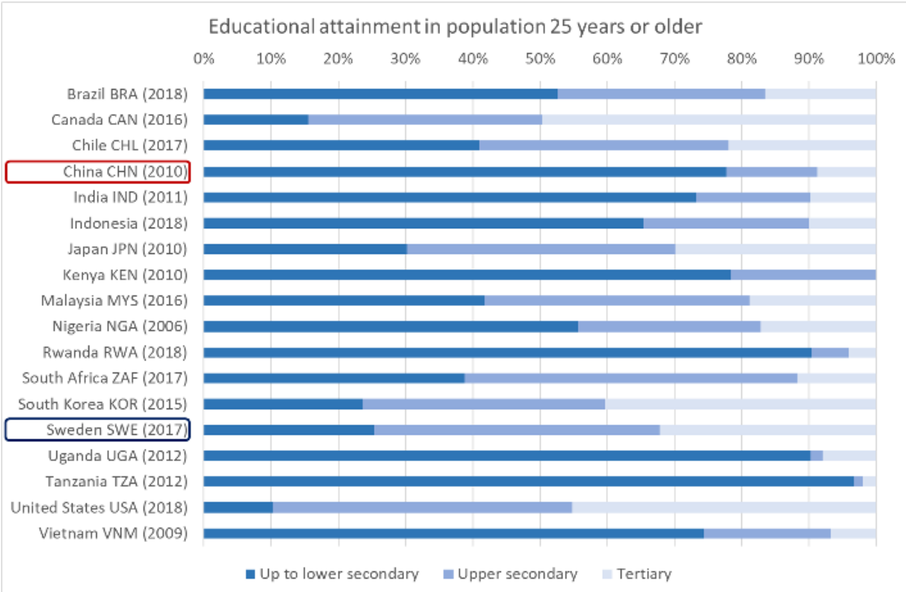
The leading nine universities in China are grouped in the C9 League, which, in addition to the six universities in the global top 100, includes Nanjing University, Harbin Institute of Technology and Xi'an Jiaotong University. Special resources are allocated to C9 League universities, and they generally have access to substantial funding.

Academies also play an important role in Chinese research. The Chinese Academy of Sciences (CAS), by far the most significant of these, is the world's largest research organisation, comprising over 100 research institutes and two universities. China is also home to the highest number of international branch campuses in the world, with some of the most noteworthy being the University of Nottingham Ningbo, NYU Shanghai, and Duke Kunshan University.

[1] QS World University Rankings 2021, *Times Higher Education* World University Rankings 2021, and the Academic Ranking of World Universities (ARWU) 2020.

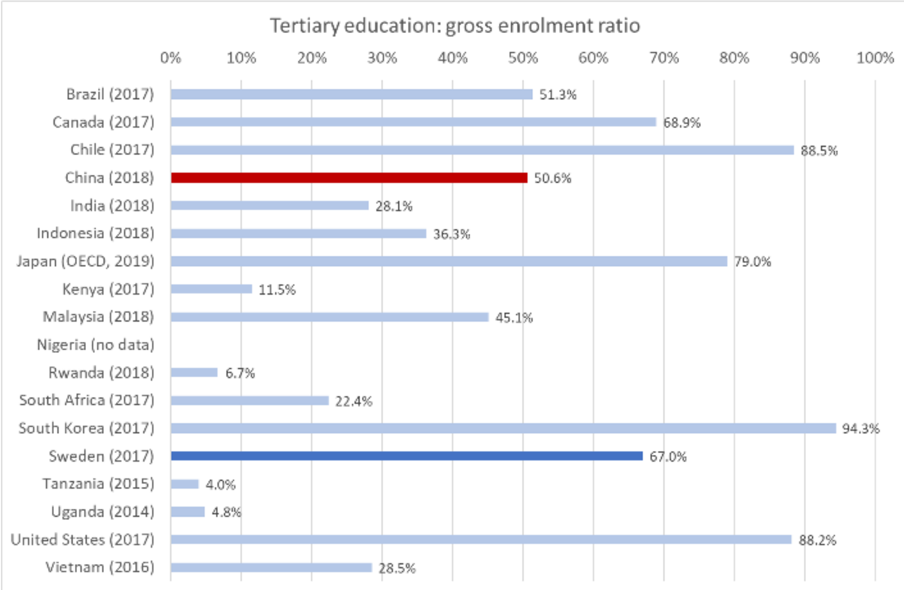
Educational attainment and student mobility

Figure 5: **Educational attainment**



There are no recent data on educational attainment for the population of China. Data from 2010 indicate that a large majority of the population (25 years and older), close to 80%, had not attained upper secondary education or higher, which was rather similar to the situation in India. Under 10% had attained tertiary education, as can be seen in Figure 5. By comparison, in Sweden about 40% of the population had attained upper secondary and more than 30% tertiary education (2017).

Figure 6: **Gross enrolment ratio for tertiary education**

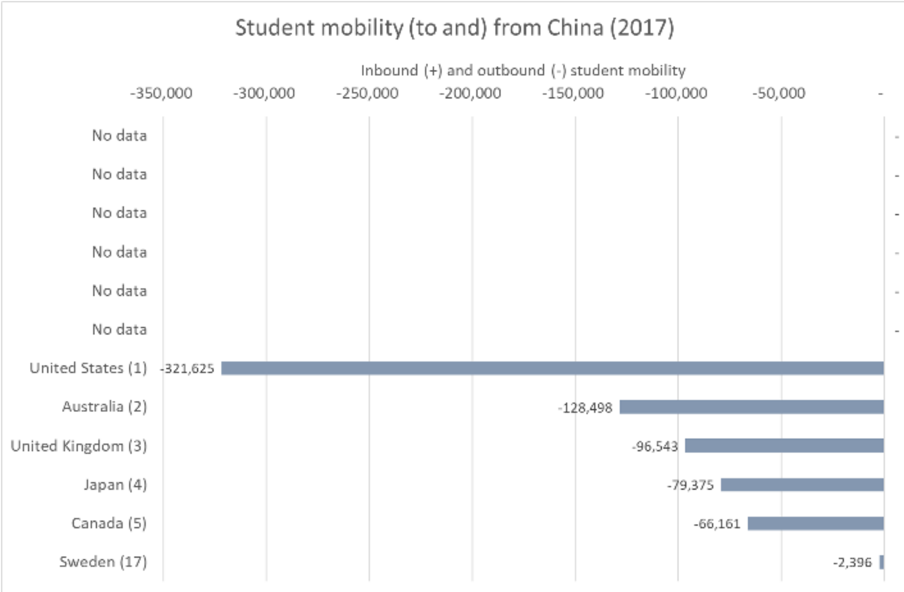


The gross enrolment ratio (GER) for tertiary education is shown in Figure 6. This is the ratio of students enrolled in tertiary education divided by the 5-year age group starting from the official secondary school graduation age. The GER indicates the capacity of the education system to enrol students of a particular age group.

China's proactive policies in the fields of science and technology and education have had a great impact on the enrolment of tertiary students. The GER was only 7.6% in 2000 and grew dramatically to 50.6% in 2018, partially facilitated by the substantial growth in the number of higher education providers. In 2017, China had 2,914 institutions with university or college status (MoE). The quality of education and the resource endowments differ considerably between universities.

Due to severe competition for admission to top universities and the stressful study situation, as well as for career enhancement opportunities, many Chinese students also choose to study abroad.

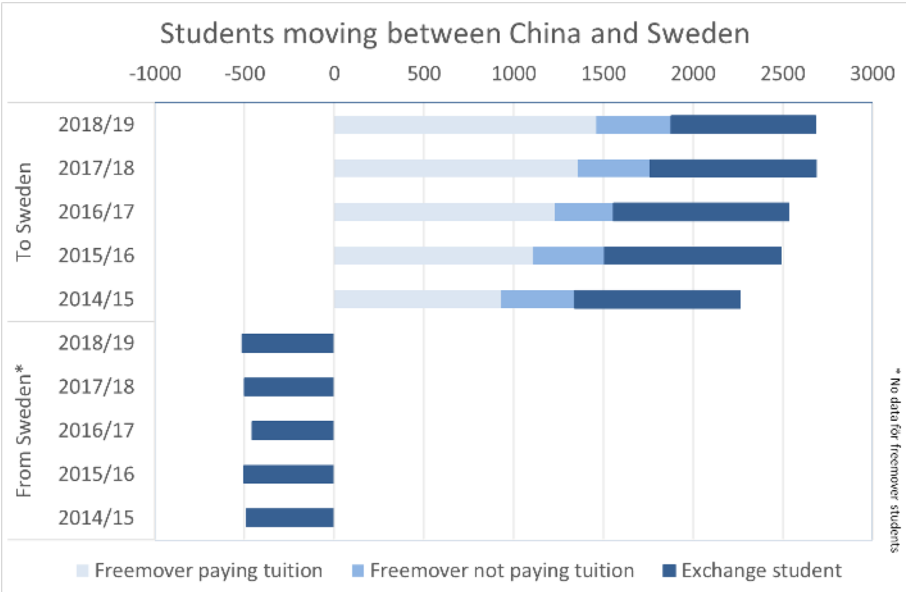
Figure 7: **Inbound and outbound students, origins, and destinations**



Globally, Chinese students are currently by far the largest group studying abroad and their numbers keep increasing. In 2017, roughly 600,000 students left China to study abroad. This number increased by c. 11% in 2018.

While the Covid-19 pandemic and increasing geopolitical tensions have somewhat limited Chinese students' opportunities to study overseas, the group remains the largest. Greater difficulties in obtaining visas, and overall increasing suspicion towards China in countries such as the United States, Australia, and the United Kingdom, have led to some redirection of Chinese students to other countries. It is still too early to discern clear future directions for the mobility of Chinese students. However, currently European countries are experiencing a notable increase in applications from Chinese students. This development will probably continue after Covid-19. Chinese students have in recent years also comprised the largest group of foreign students in Sweden.

Figure 8: **Inbound and outbound students to and from Sweden per year**



Chinese students constitute the largest fee-paying group of students in Sweden. The number of students paying for their studies has gradually increased over the years, as well as the total number of Chinese students in Sweden. Swedish data include students from Swedish universities who study in China on exchange. This number has remained fairly consistent for the past five years (see Figure 8). In general, there are more inbound students from China to Sweden than outbound students from Sweden to China. These structural differences have made it difficult to expand the number of exchange programmes, as universities usually aim to have a reciprocal number of students going in both directions.

Figure 9: **Inbound and outbound students to and from Sweden 2018/19, per higher education institution**

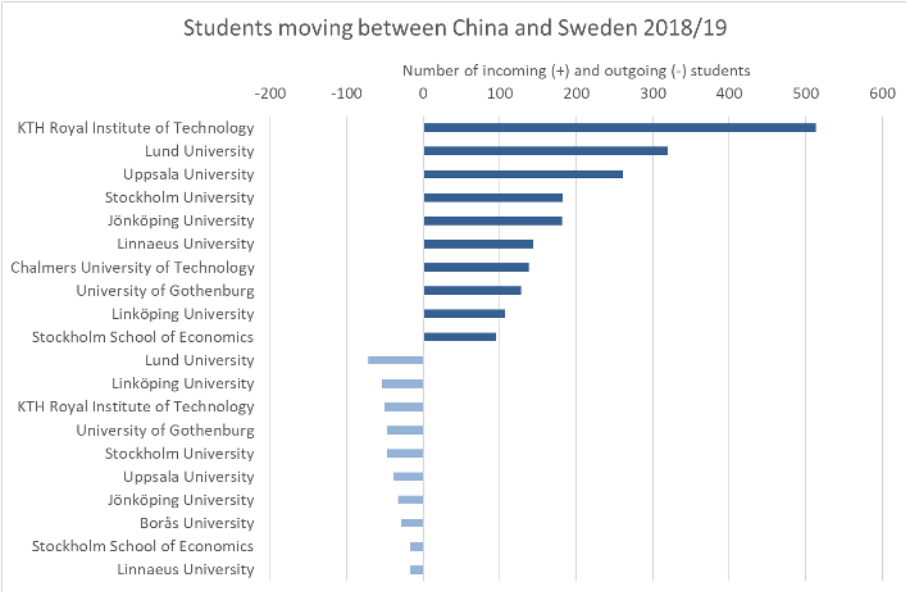


Figure 9 illustrates the inbound students from China to specific Swedish HEIs. The highest number of students, by far, go to KTH Royal Institute of Technology, followed by the comprehensive universities in Lund, Uppsala, and Stockholm. More proactive recruitment strategies for China and strategic collaboration with a few specific Chinese partner universities might help explain KTH's relatively high numbers. Outbound students from Sweden to China, a group comprised almost entirely of exchange students from Swedish HEIs, generally come from the larger Swedish universities. Exceptions are Jönköping University, the University of Borås, and the Stockholm School of Economics.

Research and collaboration with Sweden

China is now the largest producer of scientific publications in the world and has over the past decade shown substantial continued growth at a rate significantly exceeding those of the countries traditionally regarded as advanced science nations. On average, the quality and impact of Chinese research have markedly increased in conjunction with this rapid increase in publication output.

Co-publications involving researchers based in Sweden and China have also increased rapidly. Today, Swedish co-publications with researchers at Chinese universities are ranked eighth by volume of all Swedish international co-publications. The increase seems to be a continuing trend, while China's collaboration intensity with Sweden is relatively low. See the Appendix for detailed explanations of some of the indicators in Table 1.

Table 1: **Selected publication indicators**

Based on publications 2015–2019							
Country	**Annual publication volume (average)**	**Share of world**	**Annual volume growth 2015–2019**	**Citation impact**	**Share of int'l co-publ**	**Share of ac.-corp. co-publ.**	**Collabo-ration intensity with Sweden**
		%	**%**	**FWCI**	**FWIS**	**%**	**$NCII_{100}$**
Brazil	79,128	2.54%	4.4%	0.90	0.79	2.1%	72%
Canada	110,493	3.55%	2.0%	1.51	1.31	4.2%	75%
Chile	13,929	0.45%	5.9%	1.22	1.42	2.0%	70%
China	559,913	17.98%	8.7%	1.02	0.55	2.4%	47%
India	164,707	5.29%	6.5%	0.82	0.43	1.2%	55%
Indonesia	24,572	0.79%	54.3%	0.92	0.58	0.7%	31%
Japan	133,011	4.27%	1.0%	0.95	0.69	5.4%	70%
Kenya	3,082	0.10%	7.2%	1.73	1.92	4.5%	124%
Malaysia	32,636	1.05%	5.8%	1.01	1.06	1.5%	30%
Nigeria	8,476	0.27%	14.0%	0.98	1.17	1.3%	36%
Rwanda	427	0.01%	11.2%	3.30	2.40	5.2%	203%
South Africa	24,423	0.78%	6.2%	1.26	1.29	2.9%	111%
South Korea	85,265	2.74%	2.0%	1.05	0.69	4.5%	35%
Sweden	42,975	1.38%	2.2%	1.68	1.55	8.3%	n/a
Tanzania	1,660	0.05%	7.8%	1.81	1.98	3.4%	178%
Uganda	1,741	0.06%	7.1%	1.76	2.04	4.8%	170%
United States	685,704	22.02%	0.9%	1.42	0.86	4.7%	74%
Viet Nam	7,649	0.25%	24.9%	1.43	1.67	2.2%	40%
World	3,113,580	100.00%	2.8%	1.00	1.00	2.6%	n/a

Figure 10: **Annual co-publications per number of co-authors**

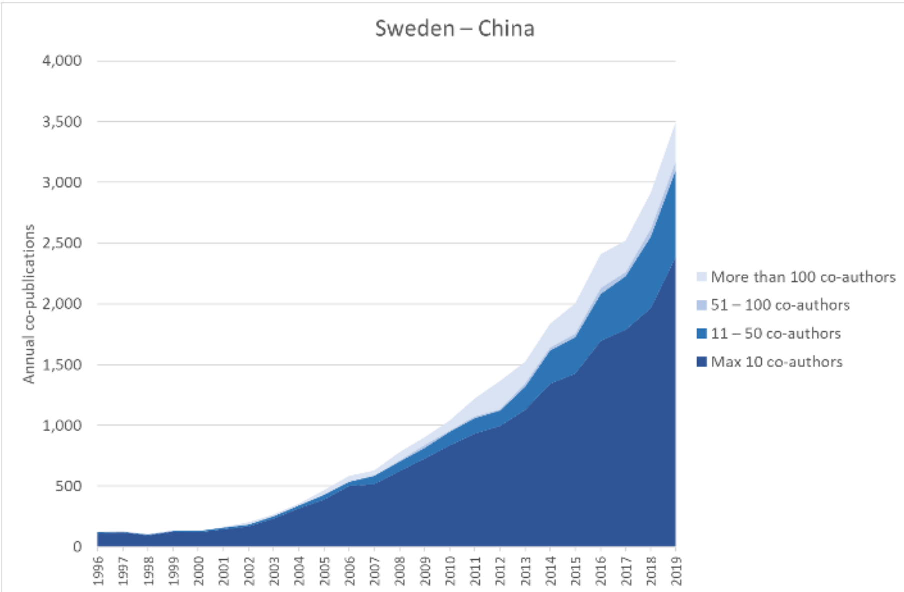
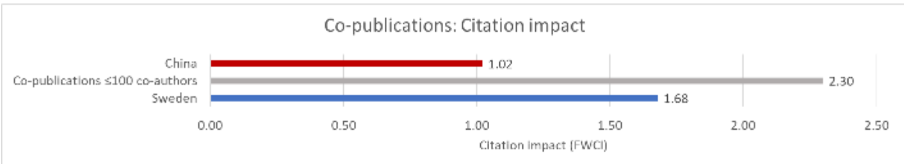
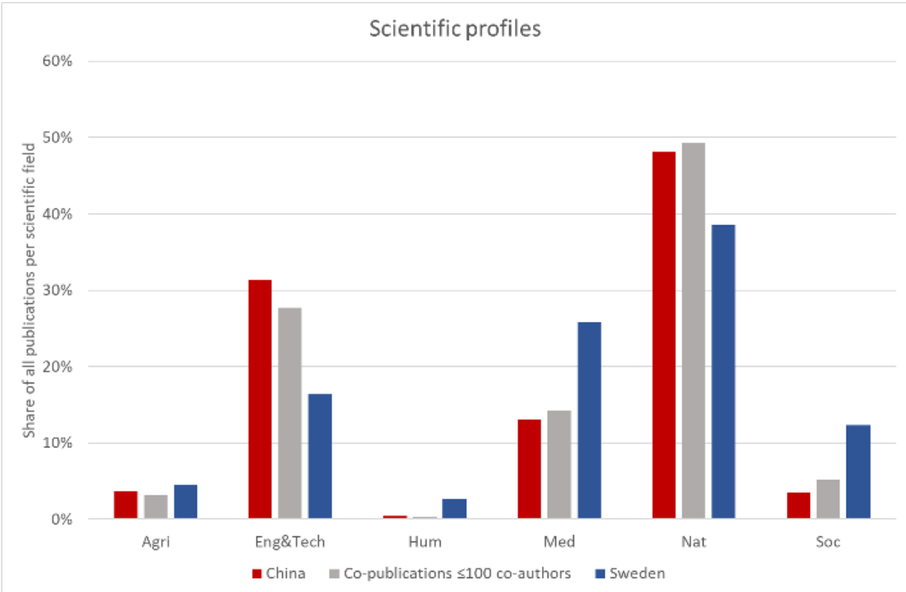


Figure 11: **Field-weighted citation impact for each country and their co-publications with ≤100 co-authors (2015–2019)**



Co-publications between Sweden and China are dominated by cooperations with up to ten co-authors, as indicated in Figure 10. During the last decade there has been a drastic increase in the number of co-publications between Sweden and China, especially regarding small cooperations with up to ten co-authors. As can be seen in Figure 11, co-publications (with up to 100 co-authors) have a significantly higher field-weighted citation impact (FWCI) than that of each country, i.e., collaborations increase the quality of both Swedish and Chinese research.

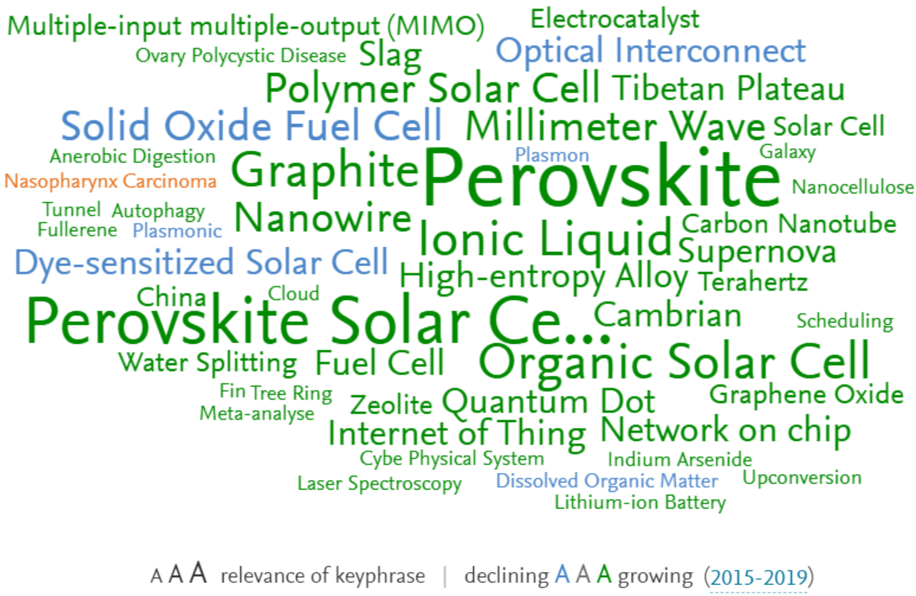
Figure 12: **Distribution of publications per scientific field (2015–2019)**



In Figure 12, the scientific profiles of research collaborations between Sweden and China are compared with the overall profiles of these countries in various fields. For example, approximately 31% of the publications with Chinese participation are within engineering and technology. In Sweden, the share is clearly lower at 17%. If all scientific fields collaborated internationally to the same extent, the shares of co-publications involving both countries would typically lie between the national shares, as is the case in most fields except for the natural and agricultural sciences, for which co-publication shares are slightly over- and underrepresented, respectively.

The HEIs with high numbers of Sino–Swedish co-publications are listed below. Given the distribution of these co-publications, institutions focused on the natural sciences and engineering and technology are well represented, as could be expected.

Figure 13: **Word cloud based on co-publications with ≤100 co-authors (2015–2019)**

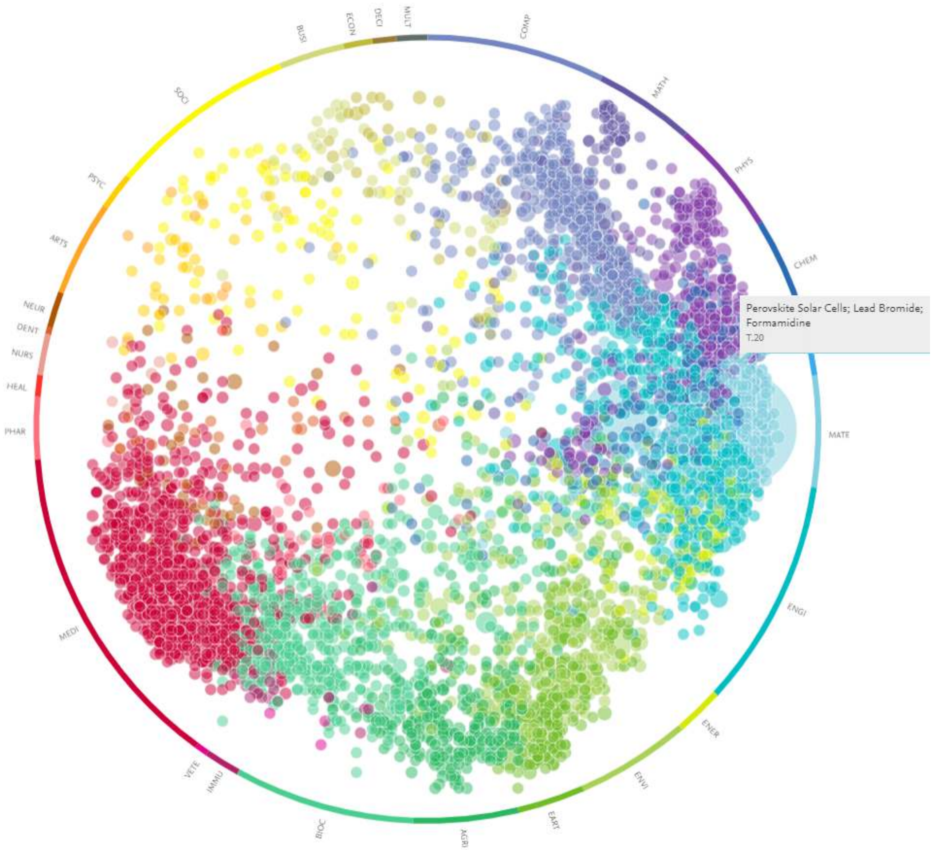


The word cloud in Figure 13 was produced using Elsevier's Fingerprint Engine. It shows the most prominent keyphrases occurring in publications with co-authors affiliated to Swedish and Chinese institutions, based on their titles, abstracts, and keywords. Large, green words signal highly relevant and growing keyphrases. Given the overall growth in co-publications between Sweden and China, most keyphrases are green.

Several keyphrases appear to pertain to energy technology, such as photovoltaics, fuel cells and similar. Materials sciences are also prominent. Given the considerable interest in batteries and China's position as the largest producer of such publications, the relatively low relevance of such research in Sino–Swedish collaborations is surprising.

Some keyphrases, such as 'biodiversity', 'environmental safety' and 'conservation of natural resource', clearly pertain to environmental research. 'China' is among the keyphrases whereas 'Sweden' is not. One interpretation is that the research done in collaboration between the countries has a stronger focus on the Chinese context.

Figure 14: **Wheel of science based on co-publications with ≤100 co-authors (2015–2019)**



Publications involving Swedish and Chinese researchers cover almost all scientific fields, as seen in Figure 14. The bubbles in the centre of the circle indicate multidisciplinary collaborations. There are fewer yellow bubbles, indicating limited collaborative research in the social sciences.

The dominance of purple and blue bubbles confirms the high number of co-publications within physics, chemistry, and materials sciences. The largest bubble pertains to a specific type of solar cell including perovskite. Its size indicates that a high number of all included co-publications are on this topic.

Table 2: **The 20 institutions in Sweden with the highest share of co-publications with ≤100 co-authors (2015–2019). Only institutions with at least 300 publications during the period are included**

Institution	Co-publications with China (≤100 co-authors)	Share of all publications at the Swedish institution	FWCI
KTH Royal Institute of Technology	2,578	11.71%	1.85
Mälardalen University	242	10.06%	3.37
Luleå University of Technology	473	8.56%	2.21
Swedish Museum of Natural History	113	8.48%	1.90
ABB Corporate Research	73	8.00%	1.88
University of Borås	79	7.77%	1.21
RISE ICT	75	7.37%	2.13
Vattenfall	21	6.75%	1.17
Chalmers University of Technology	983	6.70%	1.75
Dalarna University	68	6.61%	2.43
IVL Swedish Environmental Research Insti	25	6.35%	4.00
NORDITA	57	6.23%	1.72
University of Gävle	67	5.42%	1.13
Stockholm University	953	5.27%	2.37
Royal Swedish Academy of Sciences	21	5.20%	2.58
Uppsala University	1,500	5.08%	2.63
Lund University	1,483	4.70%	2.26
Linköping University	643	4.52%	3.65
Halmstad University	47	4.41%	2.49
Karolinska Institutet	1,551	4.31%	2.79

Table 2 ranks Swedish institutions based on their co-publications with China as a share of their total publication output. The list is dominated by HEIs and research institutes. ABB, one of the two corporates in the list, has a significant operation in China. The technical universities and a few of the smaller Swedish universities have a significant share of co-publications with China, while this share is less significant for the larger comprehensive universities. KTH stands out among the research-intensive HEIs: co-publications with China constitute over 10% of publications and are produced in significantly greater number than at any other institution in Sweden. Engineering and the natural sciences dominate Sino–Swedish academic exchanges and, as expected, technical universities have a higher share of co-publications with China. One active collaboration can make a clear impact on the share of Chinese co-publications at smaller universities with a low research output, as can a university management's active focus on China.

Figure 15: **Top ten Swedish institutions with the highest number of co-publications with ≤100 co-authors (2015–2019)**

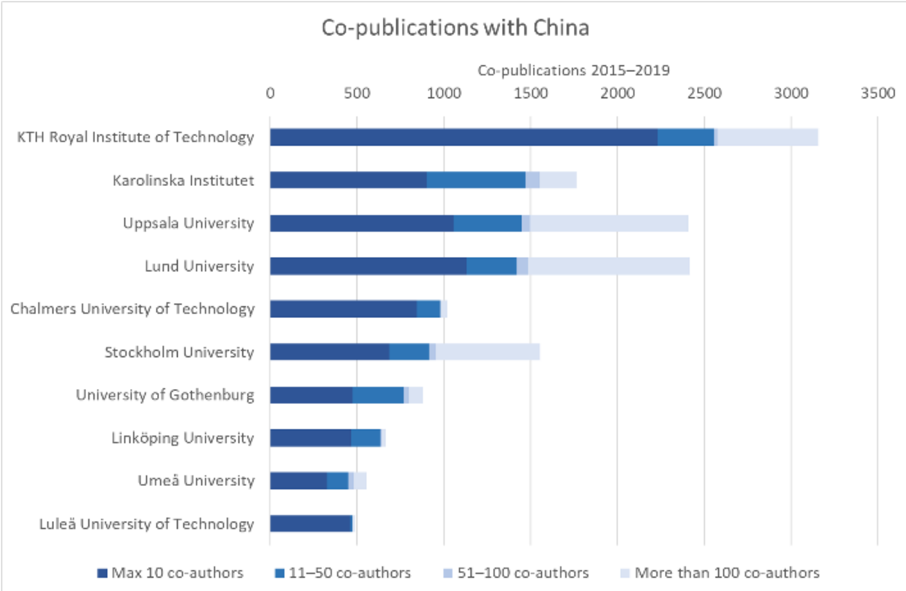
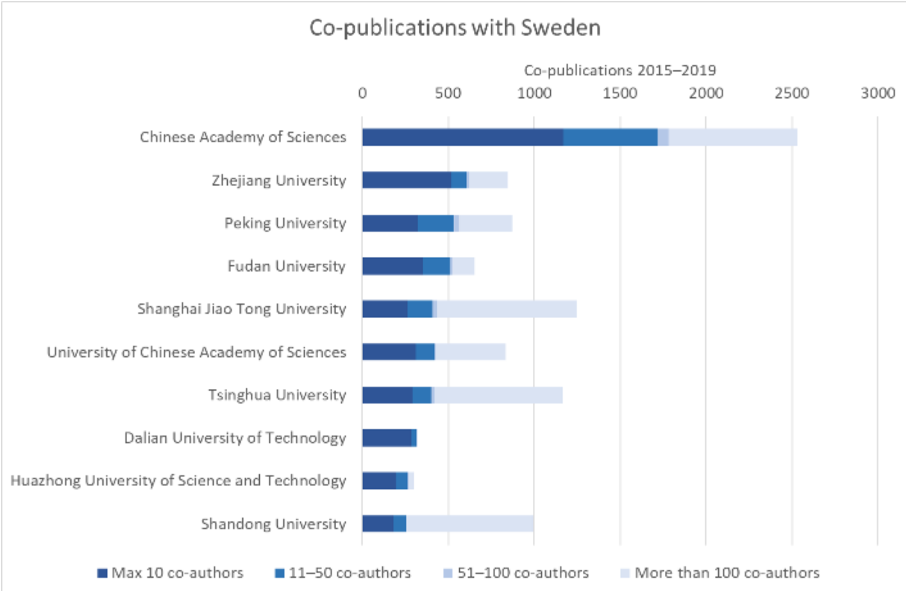


Figure 15 ranks the top ten Swedish HEIs based on the number of co-publications with China during the period 2015–2019. The ranking is based on publications with up to 100 co-authors, although data on publications with more than 100 co-authors are also included in the figure. Overall, the ranking more or less reflects the total number of publications from Swedish HEIs, i.e., the large universities with a high overall research output also produce a high number of co-publications with China. A notable exception at the top of the ranking is KTH, here ranked higher than in a ranking of overall publication output. Similarly, Chalmers is ranked relatively higher in the co-publication list. Table 2 and Figure 15 clearly show that KTH's strong collaboration with China is unique in Sweden.

Figure 16: **Top ten Chinese institutions with the highest number of co-publications with ≤100 co-authors (2015–2019)**



China's most highly ranked research institutions are also the most active in international collaborations overall. These institutions are more capable and attractive collaborators for international partners because they have larger proportions of faculty who studied and/or conducted research abroad, higher numbers of foreign faculty members, better funding, and a high output of quality research. This is reflected in the top ten Chinese research partners with Sweden measured by number of co-publications: the top six institutions listed in Figure 16 are also China's most highly ranked universities. As the world's largest research organisation, the Chinese Academy of Sciences unsurprisingly tops the list. Mid-ranked Chinese universities made the top ten for more specific reasons. High-quality research in optoelectronics with a strong connection to Sweden is for example conducted at Huazhong University of Science and Technology, and in the case of Dalian University of Technology there is one very prolific research partnership.

Table 3: **Co-publication matrix for the top ten in both countries showing the number of co-publications with ≤100 co-authors (2015–2019)**

Publications 2015–2019 with up to 100 co-authors	Chinese Academy of Sciences	Zhejiang University	Peking University	Fudan University	Shanghai Jiao Tong University	University of Chinese Academy of Sciences	Tsinghua University	Dalian University of Technology	Huazhong University of Science and Technology	Shandong University	With China
KTH Royal Institute of Technology	273	291	69	93	102	41	105	229	101	37	2,574
Karolinska Institutet	75	63	91	168	89	20	16	4	31	104	1,550
Uppsala University	266	35	58	77	28	42	51	72	33	37	1,496
Lund University	191	93	127	63	39	26	41	28	19	15	1,484
Chalmers University of Technology	244	26	23	11	42	71	42	16	20	12	982
Stockholm University	211	26	94	12	21	52	82	15	32	14	950
University of Gothenburg	177	19	51	57	22	55	24	-	3	7	797
Linköping University	109	33	47	9	26	29	17	5	18	23	642
Umeå University	81	6	20	22	37	23	10	2	5	18	478
Luleå University of Technology	33	5	-	3	33	10	11	4	4	2	472
With Sweden	1,782	859	624	564	525	434	424	417	316	271	11,915

The co-publication matrix in Table 3 shows the co-publications (with up to 100 co-authors) between the top ten collaborating institutions in Sweden and China and thus gives an indication of the distribution of collaborations between Swedish and Chinese HEIs. The blue/green bars represent the ratio of the number of co-publications between two HEIs to the total number of co-publications (for the Swedish institution). Apart from the Chinese Academy of Sciences, which is the largest collaborating institution by far for all except KTH and Karolinska Institute, the largest collaborating institutions vary from institution to institution; i.e., Sino–Swedish partnerships are not centred on a handful of institutions. The top ten Chinese institutions contribute to about 50% of the total number of Sino–Swedish co-publications by the top ten Swedish collaboration institutions (with the exception of Luleå University of Technology). Thus, while all universities have one or a few key collaborating institutions, Sino–Swedish research collaboration can overall be said to be fairly broad in terms of participating institutions on both sides.

Appendix: Data and methods

Data

The report is based on data from the following organisations, accessed in June/July 2020:

- Population and economic data: World Bank, see https://databank.worldbank.org/home.aspx
- Educational attainment and student mobility: UNSCO, see http://data.uis.unesco.org, and the Swedish Higher Education Authority (UKÄ), see https://www.uka.se/statistik--analys/statistikdatabas-hogskolan-i-siffror.html (with one data point from the OECD for Japan)
- Research: Publication data from Scopus, the broadest available publication database, see https://www.elsevier.com/solutions/scopus?dgcid=RN_AGCM_Sourced_300005030

In some cases, there are clear differences in the student mobility data from UNESCO and UKÄ. Different reporting periods and definitions (see below) might explain some of these differences.

Methods

According to the UNESCO Institute for Statistics, an internationally mobile student is an individual who has physically crossed an international border between two countries with the objective to participate in educational activities in a destination country, where the destination country is different from his/her country of origin. For measuring international mobility in education, UNESCO, the OECD and Eurostat have agreed that the preferred definition of the country of origin should be based on students' educational careers prior to entering tertiary education. See http://uis.unesco.org/en/methodology#Q5

The research section includes several indicators and figures that might require further explanation.

Table 1, Selected publication indicators. The annual growth is calculated by using linear regression to approximate the volume development during the period 2015–2019. The field-weighted citation impact (FWCI) is a normalised indicator comparing the citations a publication receives with other publications in the same scientific field, from the same year, and in the same type of publication. If the FWCI is above one, the publication is more frequently cited than the world average, and vice versa. The field-weighted internationalisation score (FWIS) is normalised in a similar manner. A FWIS above one means that the publications are more international (include more international co-authorships) than the world average, and vice versa[2] Academic–corporate co-publications include at least one academic and one corporate affiliation and at least two co-authors. Finally, the normalised collaboration intensity index (NCII) illustrates how the collaboration differs from a situation when Sweden (or another entity) collaborates with all countries in proportion to their share of all international co-publications globally. For example, authors with an affiliation in the United States participate in 16% of all international co-publications globally. In Sweden's international co-publications, the share of US co-authors is 11%. The NCII is calculated as the actual share divided by the 'expected' share, i.e. 11/16 = 67%, which indicates that US collaboration is underrepresented in Sweden's portfolio of international co-publications.[3]

Figure 12, Distribution of publications per scientific field (2015–2019). The scientific profile is calculated using the OECD categorisation of publications in six scientific fields: agricultural sciences, engineering and technology, humanities, medical sciences, natural sciences, and social sciences. For each field, the share of publications is calculated using the

---

[2] For more details, see Pohl, H., Warnan, G. and Baas, J. (2014), 'Level the playing field in scientific collaboration with the use of a new indicator: Field-weighted internationalization score', *Research Trends* 39, 3–8.

[3] For a more detailed description, see Pohl, H. (2020), 'Collaboration with countries with rapidly growing research: supporting proactive development of international research collaboration', *Scientometrics* 122(1), 287–307. https://doi.org/10.1007%2Fs11192-019-03287-6

number of publications within the field and the total number of publications in the dataset.

The **word cloud (Figure 13)** is a feature in SciVal, which uses the Elsevier Fingerprint Engine to extract distinctive keyphrases within the publication set. For more information, see https://www.elsevier.com/solutions/elsevier-fingerprint-engine

The **wheel of science (Figure 14)** is another feature directly available in SciVal. Each bubble represents a topic. The size of the bubble indicates the output of the entity on that topic. The position of the bubble is based upon the All Science Journal Classification (ASJC) categories of the journals in which the scholarly output is published. The position is related to the topic as a whole and is not affected by the entity examined. The greater influence an ASJC has over a topic, the closer the topic is dragged to its side of the wheel. As a result, the topics closer to the centre of the wheel are more likely to be multidisciplinary, compared to the topics along the edge of the wheel.

Note that a topic may be placed at the edge of the wheel, but still be considered multidisciplinary because it is equally influenced by a number of ASJCs that are located on the same side of the wheel.

STINT, the Swedish Foundation for International Cooperation in Research and Higher Education, was set up by the Swedish Government in 1994 with the mission to internationalise Swedish higher education and research.

STINT promotes knowledge and competence development within internationalisation and invests in internationalisation projects proposed by researchers, educators and leaderships at Swedish universities.

STINT promotes internationalisation as an instrument to:

- Enhance the quality of research and higher education
- Increase the competitiveness of universities
- Strengthen the attractiveness of Swedish universities

STINT's mission is to encourage renewal within internationalisation through new collaboration forms and new partners. STINT for example invests in young researchers' and teachers' international collaborations. Moreover, STINT's ambition is to be a pioneer in establishing strategic cooperation with emerging countries in research and higher education.

STINT
Stiftelsen för internationalisering av
högre utbildning och forskning
The Swedish Foundation for International
Cooperation in Research and Higher Education

Wallingatan 2, SE-111 60 Stockholm, Sweden
Telephone +46 8 671 19 90. Fax +46 8 671 19 99
info@stint.se, www.stint.se