

Article Chinese Universities' Cross-Border Research Collaboration in the Social Sciences and Its Impact

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Abstract: This paper examined the coauthorship patterns in Chinese researchers' cross-border research collaboration in the social sciences based on articles and reviews indexed in the Scopus database (2010–2019). We explored the evolution of coauthorship patterns by proportion of collaboration, year, research field, country/region, and research institution; additionally, the quality/impact of the coauthored publications was examined using four levels of paper quality (Q1–4), citations per paper, and FWCI. We found that collaboration between Chinese and international scholars is very common, and more than 40% of all papers published by Chinese scholars from 2010 to 2019 involved cross-border collaboration. The growth in collaboration was very steady over the past 10 years, increasing by an average of 20% per year. United States scholars are the most common research collaboration partners for Chinese scholars in the social sciences, followed by those in Hong Kong, the United Kingdom, Australia, and Canada. The field of psychology seeks the most collaboration, followed by economics and finance, business and management, and social issues. The percentage of Q1 papers increased from 36% in 2010 to 66% in 2019. Thus, in the past 10 years, Chinese scholars' cross-border collaboration has grown extensively in terms of both quantity and impact.

Keywords: cross-border research collaboration; Chinese university; international influence; citation

1. Introduction

In the era of economic globalization, the global flow of research resources has increased along with the development of information and communication technology [1,2]. As a result, international research collaboration in the form of coauthored articles has become increasingly prevalent [2–4], and the number of coauthored articles has grown exponentially [5–7]. Scientists from all over the world cowrite papers with their foreign peers to improve the efficiency and impact of scientific research [2].

International research collaboration has also contributed greatly to the rapid growth of scientific research in China [2,8]. A growing number of empirical studies have shown that the growing quantity and impact of China's scientific knowledge creation can be attributed to international research collaboration [1,6,8–12]. There is also a thread of collaborative research with the aim of conducting comparative studies by using the same frameworks or tools [13].

In addition, several bibliometric studies have evaluated the research performance of China's international collaboration in terms of coauthored publications from bilateral [14,15], interregional [16], and multilateral [6] perspectives. They have focused on a variety of research domains, but mostly on technology or natural sciences, including nanotechnology [16], physics [14], and food and agriculture [15]. Moreover, grant data have been used to investigate international research collaboration in China, as such col-



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laboration has been greatly promoted from the top, particularly through governmental funding programs [8,17].

Although there have been some insightful studies probing the patterns and dynamics of China's social science research via bibliometric analyses [18–23], we identified an evident research gap surrounding Chinese scholars' performance in international research collaboration in the general social sciences and the impact of this collaboration on citations. The status of China's social science research within the wider internationalization process remains unclear. To fill this research gap, this study used coauthored publications from Chinese authors indexed in the Scopus database (2010–2019) at a macro level and survey data at a micro level to examine the performance, patterns, and dynamics of Chinese scholars' international co-authorship efforts in the general social sciences and the citation effects of such work.

This study makes both scholarly and practical contributions: First, it complements the existing bibliometric literature on China's international research collaboration using bibliometric analysis at a macro level; second, it triangulates studies on internationalization in China's social sciences through a survey method at a micro level; and third, it provides implications for China's policymaking regarding funding for international research collaboration in the social sciences.

2. Literature Review

International coauthorship emerges through a dynamic interplay of a variety of factors at different levels: (1) At the individual level, these include the proximate research motives of both partners [24], cognitive proximity, geographical proximity [25,26], and migration [27]; (2) at the institutional level, these include academic linkages between institutions [28] and interdisciplinarity and intrascientific factors [18,29]; and (3) at the national level, these include the intention to promote economic development [1,28], geopolitical and cultural affinity, and features of national science and technology systems [18,28].

Despite the difficulties in international coauthorship (for example, individual scholars' research motives may be misaligned [24,30]), such work is increasingly prevalent, as it has numerous potential benefits: It can connect scholars with productive academic networks, allow them to share knowledge and research resources, decrease research costs, generate academic knowledge, transfer knowledge, expedite the research process, enhance research productivity and visibility, and secure a higher citation impact than other types of research [1,20,31–34].

Thus, international coauthorship is globally accepted as a positive phenomenon [18]. However, globally speaking, mainland China ranks near the bottom of international coauthorship productivity, with only 10.2% of its publications coauthored with international partners, even though China ranks fourth in total number of authors [2]. Due to historical reasons [27,35] and linguistic obstacles [19], the number of international coauthored publications from Chinese scholars has grown much more slowly than its total number of publications [11].

Nevertheless, a growing body of empirical literature has shown that China's scientific knowledge creation is increasingly dependent on international research collaboration, and the most frequently adopted collaborative method is coauthored publications [1,6,9–11,14,16,19,23,31,36]. It has also been suggested that international authorship increases China's overall citation impact [11,27], which implies that international coauthorship has improved the international academic community's perception of Chinese publications [27].

Among the above-cited bibliometric studies about China's international coauthorship, only one article has focused on an area in the social sciences, management science [23]. The study used scientometrics and social network analysis approaches and found that China's international coauthorship in management research has risen sharply but that the collaboration network is immature and unstable [23]. Apart from this article, few bibliometric studies have addressed China's social science research [18–22] in terms of international research collaboration or at least research collaboration.

While China has been recognized as a global scientific power in terms of the quantity and impact of journal articles by Chinese authors [19,27,37–39], scholars have tended to examine China's position in social science research in a global context [18,19], as they understand that the goal of social science research is to reveal the society and the manner in which people behave and influence the world around them [40].

Zhou and colleagues [18] used data from the Social Sciences Citation Index (SSCI) database from 1974 to 2007 to sketch an overall picture of China's research performance in the social sciences in a regional and global context. They pointed out the essential differences between social science research and research on natural and applied sciences. The peculiarities of social science research have greatly impacted patterns of international research collaboration; for example, social science research is inherently more nationally oriented, and social scientists have unique communication behaviors and channels [41,42].

To elaborate on the findings regarding communication behaviors and channels [18], Zhou and colleagues [21] drew upon 2007 data from both the SSCI and Chinese Social Sciences Citation Index (CSSCI) databases to examine the communication structures of China's domestic and international social science research. The study concluded that the density of China's social sciences citation network is much lower than that of its international counterparts. Additionally, using data from the CSSCI database from 1998 to 2011, Ma and colleagues [22] probed into collaborative patterns in different humanities and social science research disciplines in China and highlight intradisciplinary cooperation in economics, management, and library and information science.

In a more recent study, Liu and colleagues [19] utilized the SSCI database (1978–2013) and surprisingly found that when publishing in SSCI journals, Chinese social scientists were more likely to collaborate with international partners (46%) than their counterparts in the natural sciences (23%). In this time period, Chinese researchers collaborated on SSCI papers with coauthors from 140 countries/regions. The authors concluded that despite the expanded scale of coauthorship in terms of the number of countries and China's world share of publications, ranking, and volume of papers, the country is not yet a giant in the international arena of social science research given its comparatively low publication numbers and lack of world-class scholars [19].

Another relevant study by Li and Li [20] examined the evolution of coauthorship patterns in China's humanities and social science research in four phases, i.e., 1956–1977 (the pre-reform phase), 1977–1991, 1991–2000, and 2001–present (the rapid growth phase). To achieve this, they looked at the SSCI and Arts and Humanities Citation Index (AHCI) datasets of the Web of Science from 1956 to 2012. This study highlighted the spread of major international research collaboration and focused on the cross-border collaboration between mainland China and Hong Kong. In particular, the authors emphasized the influence of the Chinese government's Prosperity Planning on Philosophy and Social Sciences in Universities and Colleges 2011–2020, which has increased the volume of publications [20].

3. Data and Methods

3.1. The Data

The data for this study came from a database platform, i.e., Scopus. As one of the largest databases in the world, Scopus was launched in November 2004. Scopus is a sourceneutral abstract and citation database curated by independent subject matter experts, and it is increasingly used in academic research and research evaluation [43–45]. According to Scopus's content coverage guide for 2020, which covers over 25,100 journals from more than 5000 international publishers, Scopus contains 12,464 social science journals. The Scopus database has a special classification method for the social sciences, which includes social issues, sociology, and cultural studies, but excludes psychology, management, economics, pedagogy, and law. Therefore, we obtained data from Scopus for different disciplines and then reclassified and merged the data. Finally, in this study, the social sciences include six disciplines or fields: (1) social issues, political science, and administration, (2) business and management, (3) economics and finance, (4) psychology, (5) education, and (6) law (see Appendix A).

Since China's international development and collaboration in the social sciences before 2013 have already been reviewed and analyzed by scholars such as Zhou et al. (1974–2006), Li and Li (1956–2012), and Liu et al. (1978–2013) [12–14], we decided to explore the collaborative pattern in the last 10 years. The publication and citation numbers discussed in this study were derived from items in the Scopus database published between 2010 and 2019. In terms of the publication type, only articles and reviews were taken into consideration in this study.

As mentioned above, coauthorship has always been used as the main indicator of research collaboration [2]. Since this paper mainly focuses on international research collaboration, the percentage of cross-border collaboration was used as an indicator of collaboration size. This study used multiple regression analysis to examine the impact of international research collaboration on the citation of publications.

3.2. Indicators

This paper used three indicators: the proportion of cross-border collaboration, citations, and the field-weighted citation impact (FWCI) of the publication. The proportion of cross-border collaboration means the percentage of cross-border collaboration publications out of all publications. Citations, which indicates the academic influence of a paper, is measured by counting the number of times the paper is cited in other papers. The FWCI can be used to analyze the influence of cross-border coauthored papers. The FWCI divides the actual citation frequency of a paper by the average citation frequency of all papers in the same discipline, of the same document type, and with the same publishing year. This overcomes some of the challenges brought about by the lag between input and output, differences between publications, and differences in citation frequency between disciplines. This index defines the global average baseline as 1.0, which facilitates horizontal comparison [46].

4. Results

4.1. Patterns in China's Cross-Border Collaboration in the Social Sciences

4.1.1. General Patterns of Cross-Border Collaboration

According to the data from Scopus, from 2010 to 2019, the total number of publications published by Chinese scholars in the social sciences was 145,933; of these, 60,377 were cross-border collaborative publications (see Table 1). Thus, the results show that 41.4% of all papers published by Chinese scholars involved cross-border collaboration. Additionally, collaboration among Chinese scholars is very common, accounting for 48.83% of all published papers (23.3% at the national level and 25.5% at the institutional level), while those with single authorship account for only 9.8% (see Figure 1). This distribution means that cross-border collaboration between Chinese and international scholars is very common, but there is still room for growth.

In the period of 2001–2012, the percentage of cross-border collaborative publications was approximately 56% of all international publications authored by Chinese scholars (23,102), according to Li & Li [14]. Compared with the number of publications in previous twelve years (2001–2012), the total number of publications in the last 10 years increased rapidly, growing 6.3 times greater, while the percentage of cross-border collaborative papers decreased to 41% of all published papers.

Table 1. Chinese scholars' publications by collaboration type.



Figure 1. Percentage of four types of authorship among all publications.

4.1.2. Cross-Border Collaborations by Research Field

There was a very large variance in the number of cross-border collaborative papers in different research fields. The largest number of collaborative papers came from the field of social issues, political science, and administration, accounting for 37.9% of the total number of collaborative papers. This was followed by the fields of business and management (29.8%), economics and finance (14.8%), psychology (10.2%), education (5.6%), and law (1.7%) (see Figure 2). The fields of economics and finance and business and management comprised a very large part of the total cross-border collaboration; they accounted for 45% of all collaborative papers. The psychology and education disciplines accounted for nearly 16% of such papers. Finally, legal studies accounted for the smallest part (1.2%).



Figure 2. Percentage of collaborative papers in each research field among all collaborative papers.

However, this comparison and analysis does not consider the differences among research fields because some fields are very interdisciplinary (i.e., social issues, political science, and administration), while other fields are more isolated and contain only a single discipline (such as psychology, education, and law). Therefore, we further compared the publications within each of these fields and calculated the percentage of collaborative papers within each field. As we can see from Figure 3, in four different research fields, the number of collaborative papers exceeded one quarter of all the papers in that field. Psychology was the most collaborative field, as more than 51.5% of the papers were collaborative field.

orative papers. The other two most collaborative fields were economics and finance (46.7%) and business and management (45.7%). Social issues, political science and administration (36.6%), education (35.1%), and law (30.0%) had less collaboration.



Figure 3. The proportion of collaborative publications in each research field.

4.1.3. Cross-Border Collaboration by Year

Figure 4 shows the pattern of papers published by Chinese scholars in the past 10 years. The number of papers increased from 6040 (2010) to 30,627 (2019). The basic trend of collaboration growth was very steady, increasing by of 17.6% per year on average over the past 10 years. Figure 5 shows the development trend of Chinese scholars' cross-border collaborative papers in the past 10 years. The number of papers increased from 2157 (2010) to 13,513 (2019), and the growth rate was about 20.1% on average over the 10 years. This means that the increase in the rate of Chinese publications exceeded that of Chinese collaborative publications in the past 10 years. We also find that the percentage of cross-border collaborative papers of all international publications increased from 35% in 2010 to 44% in 2019. All these findings mean that the collaboration between Chinese scholars and foreign scholars is growing.



Figure 4. The number of papers with Chinese authorship by year (2010–2019).



Figure 5. The number of cross-border collaborative papers by year (2010–2019).

Furthermore, the increase in cross-border collaborative papers was especially marked after 2017, when the Belt and Road Initiative was launched. The average annual growth rate of collaboration in the first 5 years examined by this study was 17.7%, while in the later 5 years, this figure increased to 20.0%. Chinese scholars have shown a very rapid increase in international collaboration in the past five years.

4.1.4. Major Cross-Border Collaborative Countries/Regions

From 2010 to 2019, mainland Chinese scholars coauthored publications in international journals with researchers from 156 countries/regions. Table 2 and Figure 6 show that the United States has been China's most frequent research collaboration partner in the social sciences, and nearly 31% of China's cross-border collaborative papers have involved researchers from the United States. The 10 most frequent cross-border collaboration partners have accounted for 76% of all cross-border collaborative papers; after the United States, these collaborative partners have been Hong Kong (11%), the United Kingdom (9%), Australia (7%), Canada (5%), Taiwan (3%), Singapore (3%), Germany (3%), Japan (2%), and the Netherlands (2%). This means that China's scholars have preferred to collaborate with scholars from developed countries and regions, i.e., the United States, the United Kingdom, Australia, Canada, etc., and these countries are mainly English-speaking countries, whose researchers have a language advantage in publishing papers in international journals. This finding is consistent with those of previous studies, such as Zhou et al. (2009), Li & Li (2013), and Liu et al. (2015).

Table 2. China's 10 most common cross-border collaborative countries/regions.

Countries/Regions	Frequency of Collaboration	% of Total
1. United States	25,247	30.97
2. Hong Kong	8903	10.92
3. United Kingdom	6932	8.50
4. Australia	5618	6.89
5. Canada	4395	5.39
6. Taiwan	2544	3.12
7. Singapore	2336	2.87
8. Germany	2184	2.68
9. Japan	1965	2.41
10. Netherlands	1807	2.22
Others		24.02



Figure 6. The percentage of collaborative countries/regions among all countries/regions.

There was no notable change between the top 10 collaborative countries in the period from 2002–2013 [13] or in the last 10 years, and the US, UK, Australia, etc., are still China's closest collaborators; however, Hong Kong has been mainland China's second most common collaborative region in this recent period.

4.1.5. Main Research Institutions in China Participating in Collaborations

As for the Chinese institutes turning out collaborative publications, the most productive institution is the Chinese Academy of Science, which published 4112 collaborative papers accounting for 6.8% of all collaborative papers in China. This is followed by Peking University (2885, 4.8%), Tsinghua University (2541, 4.2%), Beijing Normal University (2310, 3.8%), Zhejiang University (2105, 3.5%), Sun Yat-sen University (1959, 3.3%), Shanghai Jiao Tong University (1931, 3.2%), Renmin University of China (1760, 2.9%), Fudan University (1695, 2.8%), and Tongji University (1358, 2.3%) (see Table 3). These are all top universities in China. The top 10 institutions published 22,656 collaborative papers, accounting for 37.5% of all collaborative papers in China. Therefore, in China, the top comprehensive universities and the Chinese Academy of Science are the main institutions participating in cross-border collaborative research.

Table 3. Institutions in China publishing collaborative papers.

Institutions	Number of Papers	% of All Papers
Chinese Academy of Sciences	4112	6.81%
Peking University	2885	4.78%
Tsinghua University	2541	4.21%
Beijing Normal University	2310	3.83%
Zhejiang University	2105	3.49%
Sun Yat-Sen University	1959	3.25%
Shanghai Jiao Tong University	1931	3.20%
Renmin University of China	1760	2.92%
Fudan University	1695	2.81%
Tongji University	1358	2.25%
TOTAL	22,656	37.5%

All institutions except the Chinese Academy of Sciences are top universities in China, and they are a key part of the "First-class universities and disciplines of the world construction" strategy instituted by the Ministry of Education, the Ministry of Finance, and the National Development and Reform Commission of China; this strategy aims to build world-class universities and disciplines. This may be part of why these universities collaborate more than others with foreign institutions.

4.1.6. Main Institutions Collaborating across Borders with Mainland China

When looking at the cross-border research institutions that collaborate with Chinese institutions, we can see from Table 4 that the top 3 of the 20 most frequent collaborating institutions are in Hong Kong: Hong Kong Polytechnic University (2358 collaborative papers), the Chinese University of Hong Kong (1965), and the City University of Hong Kong (1824). These are followed by two universities in Singapore: the National University of Singapore (1213) and Nanyang Technological University (747). There are 5 Hong Kong universities and 9 U.S. universities among the top 20 collaborative institutions, followed by 2 Australian universities and 1 Canadian university. The main cross-border collaborative institutions are in Hong Kong, the United States, and Singapore, and these collaborative institutions are comprehensive research universities that have been counted among the top 100 universities in the world according to rankings such as QS, US News, and the World Report. There was a total of 15,860 collaborative papers from the top 20 universities in this period, and these accounted for 26.3% of all collaborative papers, which means that more than a quarter of all collaborative papers were published by these 20 universities.

Institutions	Country/ Region	Total Number of Papers	% of All Papers
1. Hong Kong Polytechnic University	Hong Kong	2358	3.91%
2. Chinese University of Hong Kong	Hong Kong	1965	3.26%
3. City University of Hong Kong	Hong Kong	1824	3.02%
4. National University of Singapore	Singapore	1213	2.01%
5. Nanyang Technological University	Singapore	747	1.24%
6. Hong Kong University of Science and Technology	Hong Kong	729	1.21%
7. University of Nottingham	ŪK	724	1.20%
8. Hong Kong Baptist University	Hong Kong	675	1.12%
9. University of Michigan	USA	519	0.86%
10. Purdue University	USA	500	0.83%
11. Massachusetts Institute of Technology	USA	490	0.81%
12. Pennsylvania State University	USA	485	0.80%
13. University of Toronto	Canada	478	0.79%
14. University of New South Wales	Australia	468	0.78%
15. University of Queensland	Australia	457	0.76%
16. Harvard University	USA	456	0.76%
17. Texas A & M University	USA	446	0.74%
18. University of Maryland	USA	445	0.74%
19. Stanford University	USA	442	0.73%
20. University of Illinois at Urbana Champaign	USA	439	0.73%
TOTAL		15,860	26.30%

Table 4. Cross-border institutions collaborating with mainland China.

This shows that Chinese universities have a strong willingness to cooperate with top universities from Southeast Asia and North America. Almost all of the top 10 institutions were in Hong Kong or Singapore, which may be attributed to the common Chinese cultures in these two areas. They have a close connection with mainland China in academic research, especially in the social sciences, because Chinese populations in these places may share similar social problems in terms of economic and social development or educational problems. It is not surprising that US universities occupied rankings 10–20, as they have very strong global academic influence.

4.2. Impact of Cross-Border Collaboration

4.2.1. Cross-Border Collaborative Papers in the Four Journal Levels

All journals in the Scopus dataset were divided into four levels: Q1 (top 25%), Q2 (top 26–50%), Q3 (top 51–75%), and Q4 (top 76–100%). We compared the cross-border collaborative papers within each level and found that there were only small differences in the percentages of cross-border collaborative papers at each level in 2010; however, as time has passed, the gaps increased very rapidly. As of 2019, the percentage of Q1 papers had increased from 36% (in 2010) to 66%, while that of Q2 papers remained relatively constant and maintained at about 21%. Meanwhile, the percentage of Q3 and Q4 papers decreased continuously from 36% (in 2011) to 9% and from 27% (in 2010) to 5%, respectively. In 2019, the percentage of Q1 papers (accounting for 66% of the four types of journal papers) significantly exceeded that of the other three types (21%; 9%; and 5%). Since Q1 journals usually had more citations than other journals, papers in Q1 journals are considered to have a higher quality than those in journals at the other three levels. This means that in the past 10 years, Chinese scholars' cross-border collaboration has seen substantial progress in terms of not only quantity but also academic impact (Figure 7).



Figure 7. Percentage of cross-border collaborative papers in the four journal levels by year.

4.2.2. Cross-Border Collaborative Papers in the Four Journal Levels by Research Field

We separated the cross-border collaborative papers in the 10 studied years into 6 fields and further divided them into 4 Q areas by journal quality. Figure 8 shows that Q1 papers in the field of law accounted for 67% of all papers in this field (the most for any quartile in any of the fields), while Q1 papers in the field of education accounted for only 36% of all papers in this field (the lowest ranking for any quartile). In the other four fields, the percentages of Q1 papers ranged from 50% to 60% of the papers in that field. However, when we amalgamated Q1 and Q2 together in each field and considered papers in either quartile to be high-quality papers, then the top fields changed to psychology, economics, and law, accounting for 83%, 81%, and 80% of all papers in those fields, respectively, while education was still last in all Q areas.





Figure 8. Percentage of cross-border collaborative papers in the four levels by research field.

4.2.3. Citation Impact of Cross-Border Coauthored Papers

In this study, we used several indicators, i.e., citation count, citations per paper, and FWCI to measure the impact of collaborative articles. Table 5 shows that the total citation count for cross-border collaborative papers was 1,072,265, which was higher than the citation counts of other types of collaborations: only national collaboration (404,952), only institutional collaboration (374,837), and single authorship (83,694). Meanwhile, papers published by cross-border coauthors (citations per paper = 17.76) had a higher number of citations per paper than did papers of other types of authorship. Furthermore, the academic impact (citations per paper) of cross-border collaborative papers was on average 1.49 times that of national collaborative papers, 1.76 times that of institutional collaborative papers had, on average, higher academic impacts than those of non-cross-border collaborative papers. Cross-border collaboration produced higher impact publications than national collaboration did, and national collaboration produced higher-impact publications than institutional collaboration and single authorship did, according to the indices of citations, citations per paper, and FWCI (Table 5).

Table 5. Citation of papers by different authorship type.

Type of Paper	Number of Publications	Citations	Citations per Paper	FWCI
Cross-border collaboration	60,377	1,072,265	17.76	1.66
Only national collaboration	34,048	404,952	11.89	1.18
Only institutional collaboration	37,214	374,837	10.07	0.97
Single authorship	14,294	83,694	5.86	0.69
Total	145,933	1,935,748	13.26	1.28

4.2.4. FWCI of Cross-Border Collaborative Papers (2010–2019)

However, this index of citation counts and citations per paper does not consider some factors, such as the differences between research fields and publication years, even though different research fields and publication years vary widely in terms of the impact of citations. Therefore, we used the FWCI to eliminate the influence of research fields. Table 3 shows that cross-border collaborative papers had a higher FWCI (1.66) than other types of papers (only national collaboration, 1.18; only institutional collaboration, 0.97; and single author, 0.69) when we controlled for the research field. The FWCI of crossborder collaborative papers is, on average, 1.41 times the FWCI of national collaborative papers, 1.71 times that of the institutional collaborative papers, and 2.46 times that of singleauthor papers. This result shows that cross-border collaborative papers have generally had greater academic influence than non-cross-border collaborative papers after eliminating the influence of the research field and publication date. This means that, in the same field and the same year, cross-border collaborative papers have more international influence than other types of papers.

4.2.5. Citation of Cross-Border Collaborative Papers by Research Field

Table 6 shows that different research fields have had different citation impacts. This is because citation counts may be affected by the total number of papers in a field. Therefore, we used citations per paper to compare the citations in different fields. Business and management, psychology, and economics and finance have had higher citation impacts, and each paper in these fields has been cited an average of 23.3, 18.5, and 15.8 times, respectively. Interestingly, these research fields share common concepts, research methods, and theoretical frameworks in China and the international academic community, so these publications are more likely to be cited by Chinese researchers' international colleagues. However, the FWCI rankings are very different; the top three are law (2.13), business and management (1.85), and social issues, political science, and administration (1.66). This means that publications in these fields have had more international impact within their field and in the same year.

Table 6. Citation of cross-border collaborative papers by research field.

Fields of Research	Paper Count	Citation Count	Citations per Paper	FWCI
Law	1036	14,472	13.97	2.13
Business and Management	17,998	420,014	23.34	1.85
Social Issues, Political Science, and Administration	22,855	342,720	15.00	1.66
Education	3391	39,651	11.69	1.61
Economics and Finance	8918	140,962	15.81	1.48
Psychology	6179	114,446	18.52	1.32

Although legal studies (law) have seen a smaller number of collaborative publications than other fields, this field still obtained the highest of the six fields' FWCI scores, which means that the publications in the legal studies field have comparatively higher quality and greater influence after considering and controlling for the effect of discipline, document type, and publishing year. Psychology obtained the lowest FWCI score of all six fields, while it had the second highest number of citations per paper. This is in sharp contrast to business and management, which obtained not only a higher FWCI (the second highest score) but also the highest citation score per paper.

4.2.6. FWCI of Cross-Border Collaborative Publications by Country

Different countries have engaged in different amounts of collaboration with China, and these collaborations may result in different FWCIs for the publications that such collaboration produces. Table 7 shows that the highest FWCI of any country was Spain, with a score of 3.72, followed by Sweden (2.85), India (2.84), France (2.77), New Zealand (2.72), Italy (2.70), Belgium (2.56), Germany (2.50), the United Kingdom (2.04), and South Korea (2.03).

Country	FWCI
Spain	3.72
Sweden	2.85
India	2.84
France	2.77
New Zealand	2.72
Italy	2.70
Belgium	2.56
Germany	2.50
UK	2.04
South Korea	2.03
Australia	1.95
Canada	1.80
USA	1.78

Table 7. The FWCI	ranking of	collaborative	papers b	y country	y.
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This ranking shows that most European countries engaged in higher-quality collaboration with China, while the USA, Canada, and Australia were at the bottom of the list. This implies that the collaborations between most European countries and China have a greater impact than those which China engages in with North American countries and Australia.

4.2.7. FWCI and Citations of Cross-Border Collaborative Papers by Institution

Table 8 shows the top 10 Chinese institutions by number of citations of collaborative publications. The first is the Chinese Academy of Sciences with 93,775 citations, followed by Peking University (61,906) and Tsinghua University (53,738). In terms of the average citations per collaborative paper, the Chinese Academy of Sciences again ranked first (each collaborative paper from this institution was cited 22.81 times on average), and Shanghai Jiao Tong University (22.08) and Peking University (21.46) ranked second and third. When the FWCI was examined, the top three institutions changed to the Chinese Academy of Sciences (1.98), Zhejiang University (1.92), and Tongji University (1.87). All these universities are top research universities or institutions, and most of them are "double-first-class" construction universities (a project launched by the Chinese government to fund first-class universities in China in order to build world-class universities). The Chinese Academy of Sciences was the top-ranking research institution in all three indices. Peking University, Tsinghua University, Shanghai Jiao Tong University, and Zhejiang University also had excellent results in terms of the number of citations (impact) of their collaborative publications.

Table 8.	Citations	and FWCI	of cross-	border	collaborative	papers by	y institution.
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Name of Institutions	Citations	Citations per Paper	FWCI	
1. Chinese Academy of Sciences	93,775	22.81	1.98	
2. Peking University	61,906	21.46	1.81	
3. Tsinghua University	53,738	21.15	1.84	
4. Shanghai Jiao Tong University	42,632	22.08	1.79	
5. Zhejiang University	41,931	19.92	1.92	
6. Sun Yat-Sen University	38,546	19.68	1.76	
7. Beijing Normal University	38,539	16.68	1.53	
8. Fudan University	30,918	18.24	1.56	
9. Renmin University of China	27,684	15.73	1.42	
10. Tongji University	24,566	18.09	1.87	

The ranking of the institutions by FWCI is basically consistent with that by number of citations, except for Zhejiang University and Tongji University, whose FWCI scores placed them higher among the top 10 universities. This means that the two universities had a

higher impact in certain same disciplines, with certain document types, and in certain publishing years.

5. Discussion

Undisputedly, social science research has played an increasingly significant role in policymaking both nationally and internationally. China's cross-border research collaboration in the social sciences resulting in co-authorship improved from 2010 to 2019 in terms of not only quantity but also academic impact. This means that Chinese social science scholars are becoming increasingly connected with the international academic community.

This is partially attributed to policy impetuses. The most influential policy has been the "Prosperity Planning on Philosophy and Social Sciences in Universities and Colleges 2011–2020" jointly launched by the Ministry of Education and the Ministry of Finance of China and aimed at strengthening the development of social sciences. Another driving force has been the increasing financial support for scholars and students to study abroad with funding from the China Scholarship Council (CSC). Chinese scholars and doctoral students have had more chances to cooperate with international peers through coauthorship [14]. The analysis also shows that Hong Kong has been China's second most frequent collaborative region over the past decade, which is attributed to the national strategy to construct the Guangdong-Hong Kong-Macau Greater Bay Area (hereinafter referred to as "the Greater Bay Area") [47]. On 18 February 2019, the Development Plan for the Guangdong-Hong Kong-Macau Greater Bay Area was promulgated and proposed to "promote the cooperative development of education", which set the tone for the integrated development of education in the Greater Bay Area [48–50]. With the support of various policies and governmental funding, Chinese social science scholars have been motivated to increase their international publishing.

We also noticed that cross-border research collaboration in the social sciences has been more common in some research fields, such as psychology, economics, and management, than in others. The higher level of cross-border collaboration in these fields may reflect their greater use of internationally utilized concepts, topics, theoretical frameworks, quantitative research methods, and data analysis techniques [51], thus making Chinese research in these fields more consistent with that in the international academic community. In other fields, such as social issues, education, and law, Chinese researchers have been more likely to use China-specific concepts, topics, and methods, so this naturally meant less collaboration with international colleagues. The research fields with less international collaboration are more localized in terms of using topics, theoretical frameworks, and research methods specific to mainland Chinese society [52]. Therefore, research paradigms may be a very important factor in improving cross-border collaboration: The more common a field's research paradigm is in the international academic community, the more cross-border collaboration can occur.

The analysis in this study shows a comparatively low level of international visibility among Chinese publications in the social sciences. Additionally, the Chinese scholars' collaboration has been imbalanced in terms of the countries whose researchers they collaborate with. Chinese social science scholars have coauthored more publications with their counterparts in the United States, the United Kingdom, and Australia than with those in other countries.

In addition to the ideological disparities between China and the West, various factors have resulted in Chinese scholars' low international visibility in the social sciences, including English-language barriers, unfamiliarity with international academic writing and publishing standards, and tensions between international ambitions and local commitments (e.g., China's policy to encourage the domestical publication of research) [53]. However, cross-border research collaboration can help relieve these challenges faced by Chinese social science scholars. However, long-term effort is needed to overcome the obstacles caused by structural disadvantages. Social science scholars marginalized within the world knowledge system face an imbalanced knowledge structure in global social sciences, which manifests in the dominance of English-language publications and Western ideas, theories, concepts, and values [53,54] and a concentration of the leading scholars, institutions, and means of knowledge dissemination in English-speaking countries, as demonstrated by international journals, databases, and publishers in countries at the center of the world knowledge system [55].

This situation calls for more attention to be given to the societal impact of Chinese scholars' cross-border research collaboration in the social sciences. Societal impact can be realized in three ways. First, the academic level of such collaboration can be improved. High-quality coauthored publications can provide international insights, solutions, and responses to interwoven processes of social, economic, political, and cultural transformation, and they can also promote socially, economically, and environmentally sustainable development. Second, cross-border research collaboration with researchers in developing countries and regions can be expanded. Third, Chinese social scientists can interpret the social changes in China for the international academic community. Cross-border coauthorship provides a channel across which Chinese social scientists can act as ferrymen between Eastern and Western knowledge and social value systems [56].

6. Conclusions

During the decade of 2010–2019, Chinese scholars' cross-border collaboration in the social sciences have grown extensively in terms of quantity and academic impact. We noticed that the increase rate of Chinese scholars' collaborative publications in the social sciences exceeded 20% on average from 2010 to 2019. However, due to the persistent and rapid increase in publications and collaborations during the past decades, the rate of growth may decrease in the long run [57] for various reasons. Meanwhile, more attention should be paid to both the academic and social impacts of cross-border research collaboration in the social sciences.

Furthermore, compared with the preceding period of 2001–2009, the total number of publications in the 2010–2019 period increased rapidly, while the percentage of crossborder collaborative papers decreased. This suggests a possible trend of Chinese social science scholars' growing independence in international publishing, but this varies across research fields. We see higher levels of cross-border collaboration in social issues, political science, and administration, business and management, economics and finance, and psychology, while collaboration is lower in education and law. We can infer that disparity in research paradigms may affect cross-border collaboration negatively. If common research paradigms are adopted in certain fields in the international academic community, cross-border collaboration is more likely to take place.

Mainland Chinese social sciences scholars coauthored publications with researchers from 156 countries/regions. There have been few changes in the top collaborative countries in the 10 years, and the US, UK, and Australia have been China's closest collaborators. Incentives can be provided in terms of research grants or awards to encourage diversification in the collaborative countries.

Chinese social sciences scholars' cross-border collaboration has also grown extensively in terms of its impact during the 10 years. The percentage of papers published in Q1 journals significantly exceeded that of papers published in the other three levels of journals. When using the indicator of FWCI to evaluate the impact of co-authorship, the cross-border collaborative papers had a higher FWCI than that of the other groups of papers. Chinese social science scholars have made progress to increase their international academic impact, and they significantly rely on cross-border research collaboration to achieve this impact. In the next decade, and in the long run, Chinese scholars should commit to take the lead in cross-border research collaborations, especially in social science fields, to allow the academic community and the world to better understand the real China. On the other hand, Chinese social science scholars need to pay more attention to increasing the societal impact of cross-border research collaboration. **Author Contributions:** Overall research design and conceptualization: Y.L. and J.M.; methodology: Y.L. and X.L.; data source: X.L.; data analysis: Y.L., J.M., H.S. and Z.Q.; writing of the original draft: Y.L. and J.M.; extensive review and editing: J.M. and H.S.; and funding acquisition: Y.L. and J.M. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: Publicly available datasets were analyzed in this study. This data can be found here: [https://www.scopus.com] (accessed on 7 September 2021).

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Classification in This Paper Classification in Scopus Database		
	Business, Management and Accounting (miscellaneous) Accounting	
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	Management Information Systems	
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Economics and	Economics and Econometrics	
Finance	Finance	
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	Applied Psychology	
	Clinical Psychology	
Psychology	Developmental and Educational Psychology	
	Experimental and Cognitive Psychology	
	Neuropsychology and Physiological Psychology	
	Social Psychology	

Appendix A

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Classification in This Paper	Classification in Scopus Database
Social Issues, Political Science, and Administration	Social Sciences (miscellaneous) Archaeology Development Geography, Planning, and Development Health (social science) Human Factors and Ergonomics Linguistics and Language Safety Research Sociology and Political Science Anthropology Communication Cultural Studies Demography Gender Studies Lifespan and Life course Studies Library and Information Sciences Transportation Political Science and International Relations Public Administration Urban Studies
Education Law	Education Law

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