The impact of Economic Sanctions towards China-US Scientific collaboration:
Evidence from the Civil Universities in the Entity List

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Abstract

China and the United States have enjoyed a long peroid of scientific collaboration. However, the economic sanctions imposed by the U.S. government on China since 2018 appear to have disrupted this productive relationship. This study examines the potential impact of these sanctions on China-U.S. scientific collaboration, using the seven civilian universities, commonly referred to as SSND, as a case study. Drawing on scientific publication data from the Web of Science spanning more than 20 years, we assess how political tensions may have affected collaboration among individual researchers in both countries. Preliminary analysis of over 300,000 records suggests that, following China's entry into the World Trade Organization (WTO) and especially around the time of the 2008 Beijing Olympics, SSND universities formed increasingly strong partnerships with U.S. institutions, benefiting researchers in both nations. However, after the U.S. government issued the Entity List to restrict trade with Chinese companies and even civilian universities, SSND institutions—representative of many Chinese universities affected by the sanctions—showed a significant decline in collaborations with U.S. affiliations. Instead, they shifted toward partnerships with domestic organizations and institutions in other countries. From a publication output perspective, these sanctions have negatively impacted not only Chinese researchers but also their close American collaborators.

Research Questions

RQ1: What has been the overall trend in SSND-U.S. scientific collaboration over the past 20 years?

RQ2: How have the economic sanctions imposed by the U.S. government on China affected SSND-U.S. scientific collaborations, in comparison to collaborations with other countries or regions?

RQ3: How have scientists from SSND and the U.S. responded to these sanctions in terms of their scientific collaborations?

Methodology

Data Source. To address the research questions outlined above, we collected publication data by the SSND universities using the Web of Science Core Collection. The search query used is presented in Fig. 1. We focused exclusively on the SCI and SSCI indexes, as these are the most commonly used metrics for evaluating scientific performance in Chinese universities. In total, we gathered metadata for 361,573 publications, including their references, authored by researchers from the seven SSND universities.


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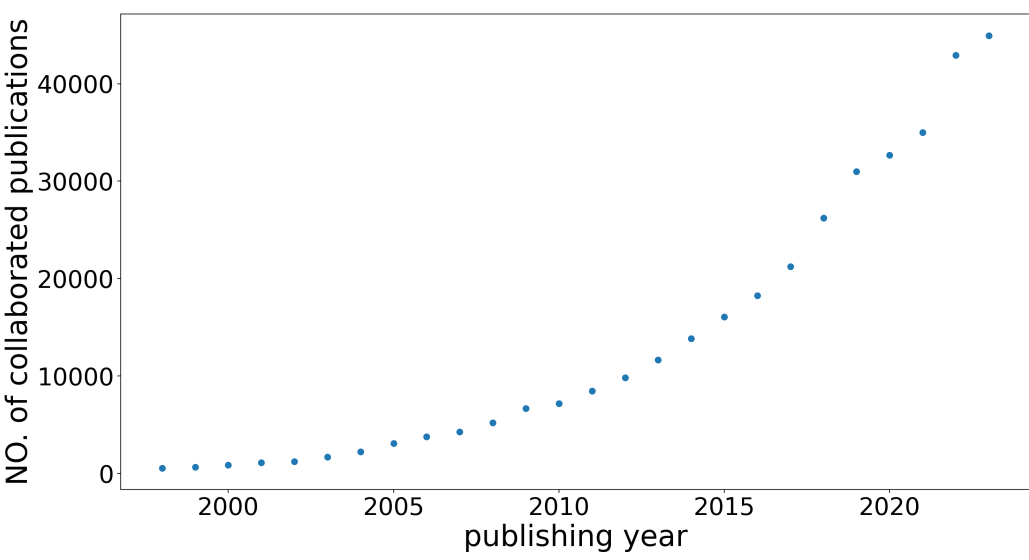

**Fig. 1.** Search query used in this study

Fig. 2. Yearly distribution of collaborated publications with the SSND universities

Identifying Collaborative Publications. After excluding single-author articles and those published before 2024, we identified 350,686 collaborative publications. The yearly distribution of these publications is presented in Fig. 2.

Leading Country Classification. In China, publications where scholars are listed as the first author and their affiliation is listed first are typically prioritized in scientific performance evaluations, including for funding applications, tenure-track evaluations, and academic promotions. Based on this, we classified the collaborative publications into three categories: 330,656 collaborations led by China, 4,827 led by the U.S., and 15,203 led by scholars from 113 other countries or regions.

SSND-U.S. Collaborations. In this study, we are particularly focused on collaborations between China and the United States, using SSND universities as a case study. Thus, we concentrate on the publications from the first two categories of our classification, which consist of 335,483 records. In the first category, 249,151 publications were led by SSND universities, while the remaining 81,505 collaborations were led by other Chinese institutions in partnership with SSND universities. In the second category, we found 42 publications that lacked affiliation information for SSND universities, leaving 4,827 publications led by U.S. institutions in collaboration with SSND universities. Therefore, our final dataset comprises 253,978 publications from the Web of Science.

Scientific collaborations led by SSND
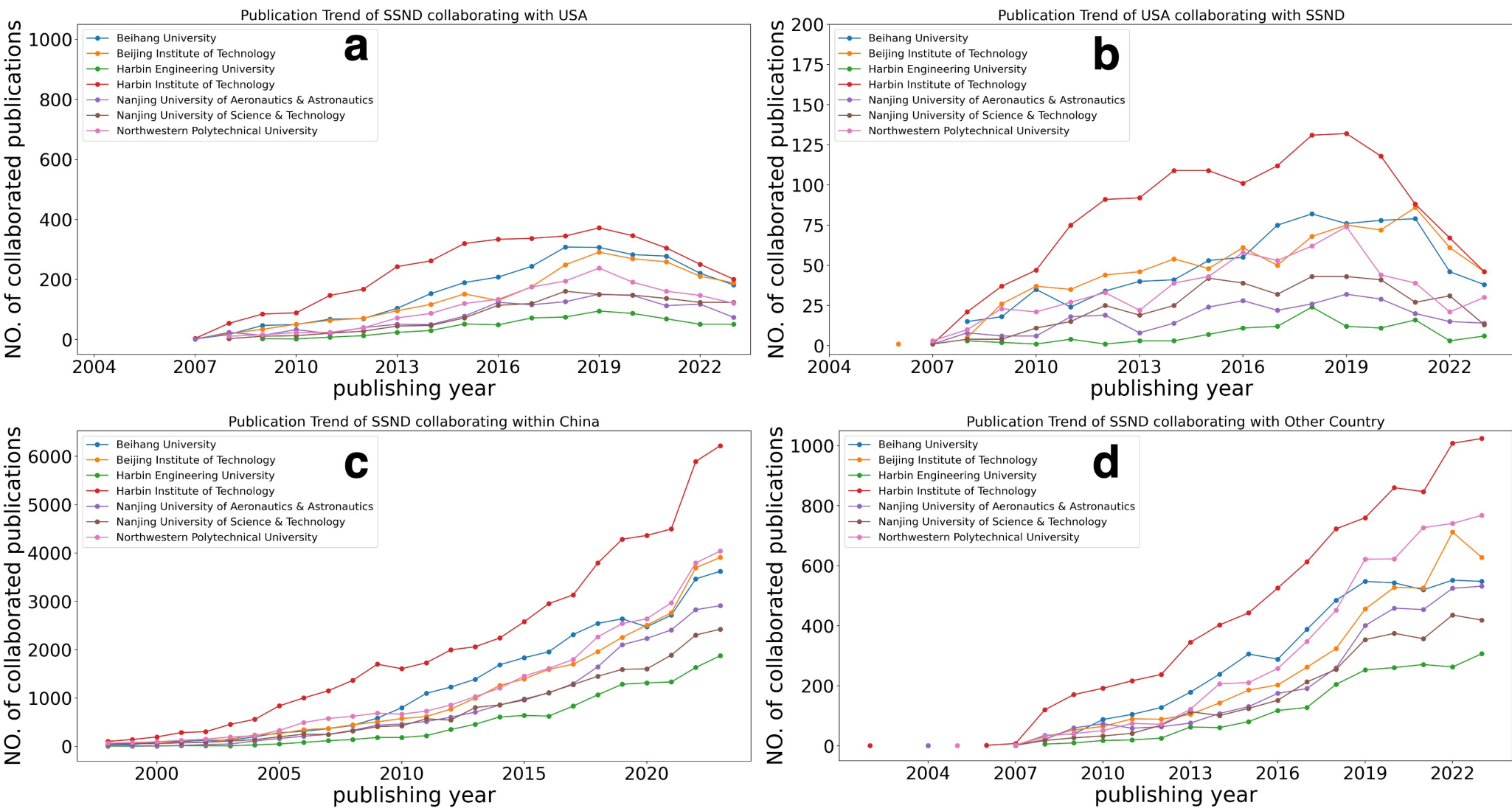
Conclusions

Preliminary findings indicate that since China's entry into the WTO, particularly around the time of the Beijing Olympic Games, SSND universities have developed a steady and expanding partnership in scientific research, benefiting researchers on both sides. However, with the issuance of the U.S. Entity List, which restricted trade with Chinese companies and institutions—including SSND universities—there has been a significant decline in collaborations with American affiliates. Instead, SSND universities have increasingly turned to partnerships with other Chinese organizations and international entities. From a publishing perspective, these economic sanctions have not only affected Chinese researchers but also their American collaborators. The preliminary results suggest that political actions have a tangible impact on scientific endeavors, and irrational policies can significantly hinder scientific progress. This study underscores the need for policymakers to foster a more conducive environment for global scientific collaboration.

This preliminary study has some limitations and areas for further investigation. First, we have not yet quantified the causal effects of the economic sanctions on China-U.S. scientific collaborations. Future work will address this aspect. Second, our current analysis focuses solely on the quantity of scientific collaborations between China and the U.S. Subsequent research will explore how sanctions affect the quality of these collaborations and their impact on scientific innovation in both countries, aiming to provide additional political insights.

Reference

Gui Q, Liu C, Du D. Globalization of science and international scientific collaboration: A network perspective[J]. Geoforum, 2019, 105: 1–12.

Coccia M, Wang L. Evolution and convergence of the patterns of international scientific collaboration[J]. Proceedings of the National Academy of Sciences, 2016, 113(8): 2057–2061.

Wang X, Xu S, Wang Z, et al.. International scientific collaboration of China: collaborating countries, institutions and individuals[J]. Scientometrics, 2013, 95(3): 885–894.

Bote V P G, Olmeda-Gómez C, Moya-Anegón F de. Quantifying the benefits of international scientific collaboration[J]. https://asistdl.onlinelibrary.wiley.com/doi/10.1002/asi.22754.

Chinchilla-Rodríguez Z, Bu Y, Robinson-García N, et al.. An empirical review of the different variants of the probabilistic affinity index as applied to scientific collaboration[J]. Scientometrics, 2021, 126(2): 1775–1795.

Sonnenwald, D. H. (2007). Scientific collaboration. Annu. Rev. Inf. Sci. Technol., 41(1), 643-681.

Hou, L., Pan, Y., & Zhu, J. J. (2021). Impact of scientific, economic, geopolitical, and cultural factors on international research collaboration. Journal of Informetrics, 15(3), 101194.

Lee, J. J., & Haupt, J. P. (2021). Scientific collaboration on COVID-19 amidst geopolitical tensions between the US and China. The Journal of Higher Education, 92(2), 303-329.

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