

US-China collaboration in science for the global common good

John P. Haupt & Jenny J. Lee
Center for the Study of Higher Education
University of Arizona



Collaboration amid Rising Geopolitical Tensions

- Science and technology (S&T) cooperation's importance in US-China relationship¹
- S&T cooperation involves government, corporate, and university channels¹
- Rising geopolitical tensions between China and the US
 - US-China technology competition and decoupling²
 - Actions have directly impacted academic scientists threatening collaboration between the countries^{3,4}
- While earlier evidence showed growth in collaboration despite tensions^{5,6,7}, recent research has demonstrated declines in collaboration between the countries⁸

Our Chapter

- Focuses on three main questions
 - What impact may geopolitical tensions have on US-China collaboration and their knowledge production capabilities?
 - How might the geopolitical tensions impact knowledge production within the global network of science?
 - What impact may these tensions have on the ability of academic scientists in both countries and other countries to contribute to global common goods, particularly universal global science?
- Data examined
 - Cross-border student and scholar mobility data
 - US-China co-publication data over the last two decades

Cross-border Mobility, Scientific Training, and Knowledge Production

- Steady growth in graduate students and scholars from China to the US (Figure 1)
- Increase in Chinese returning to China
- Resulted in:
 - Capacity building in both countries
 - Increased output in both countries
 - Increased ties between the two countries

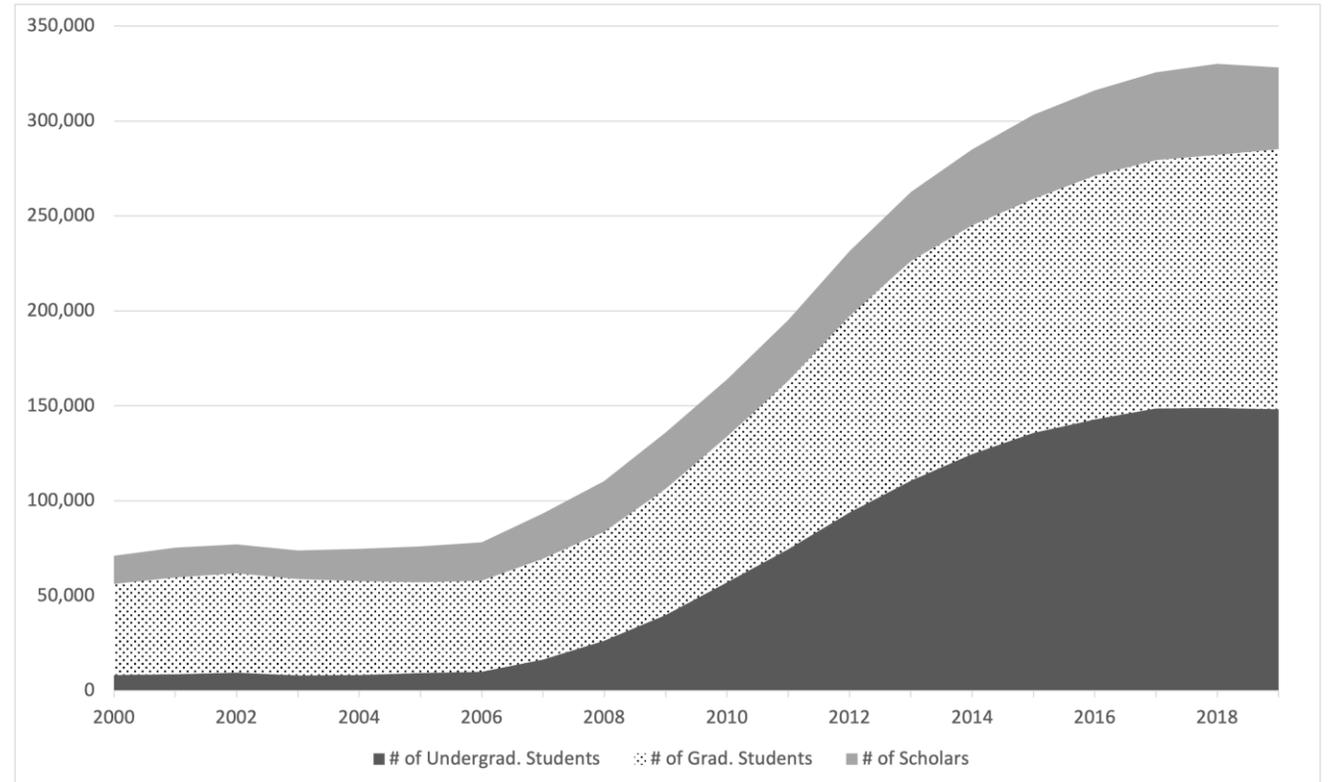


Figure 1. Growth in Chinese students and scholars to the US from 2000 to 2020

Growth in US-China Co-publications

- Steady rise in co-publications between the US and China (Figure 2)
- Growth in both bilateral and multilateral collaborations
- Volume of output is unique to US-China collaboration
- Demonstration of contribution to universal global science and global stock of knowledge

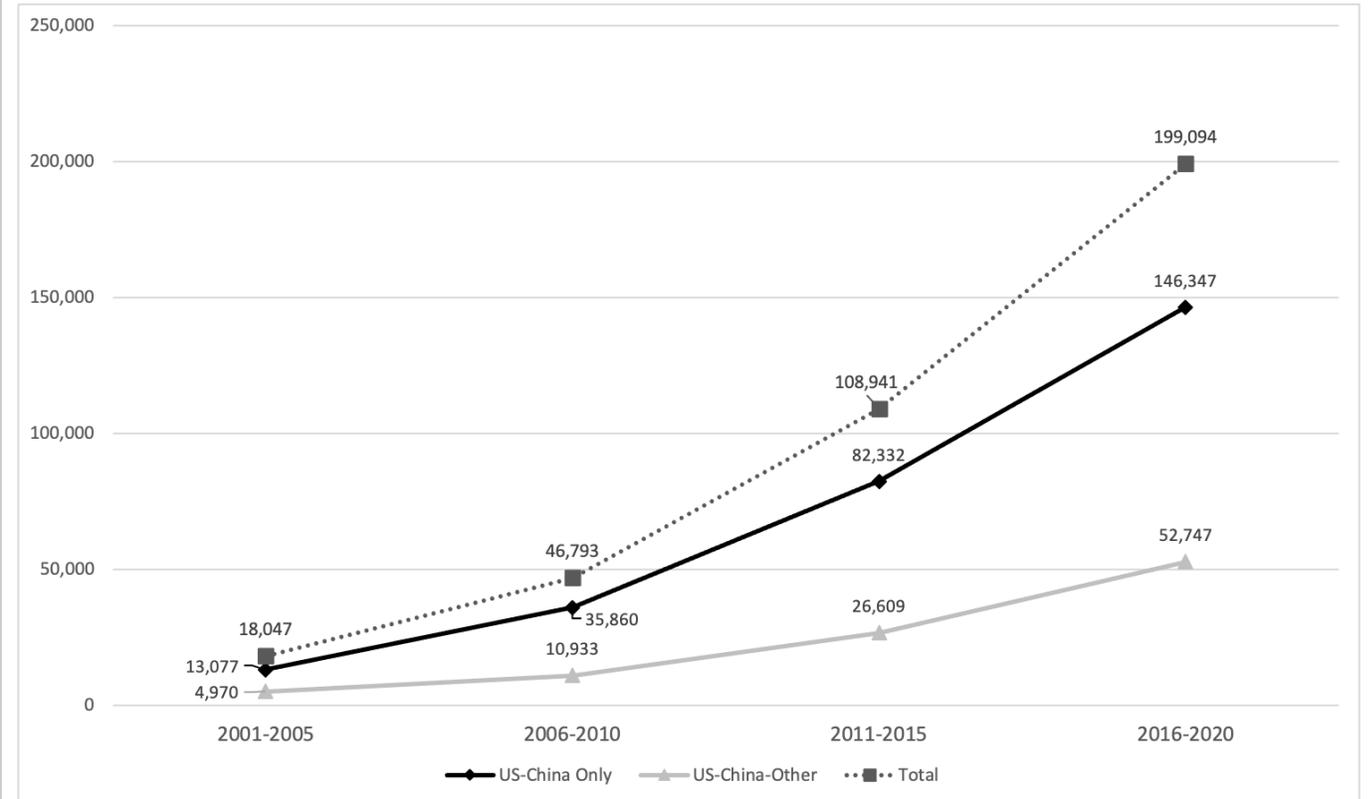


Figure 2. Growth in US-China co-publications from 2001 to 2020

Source: Scopus

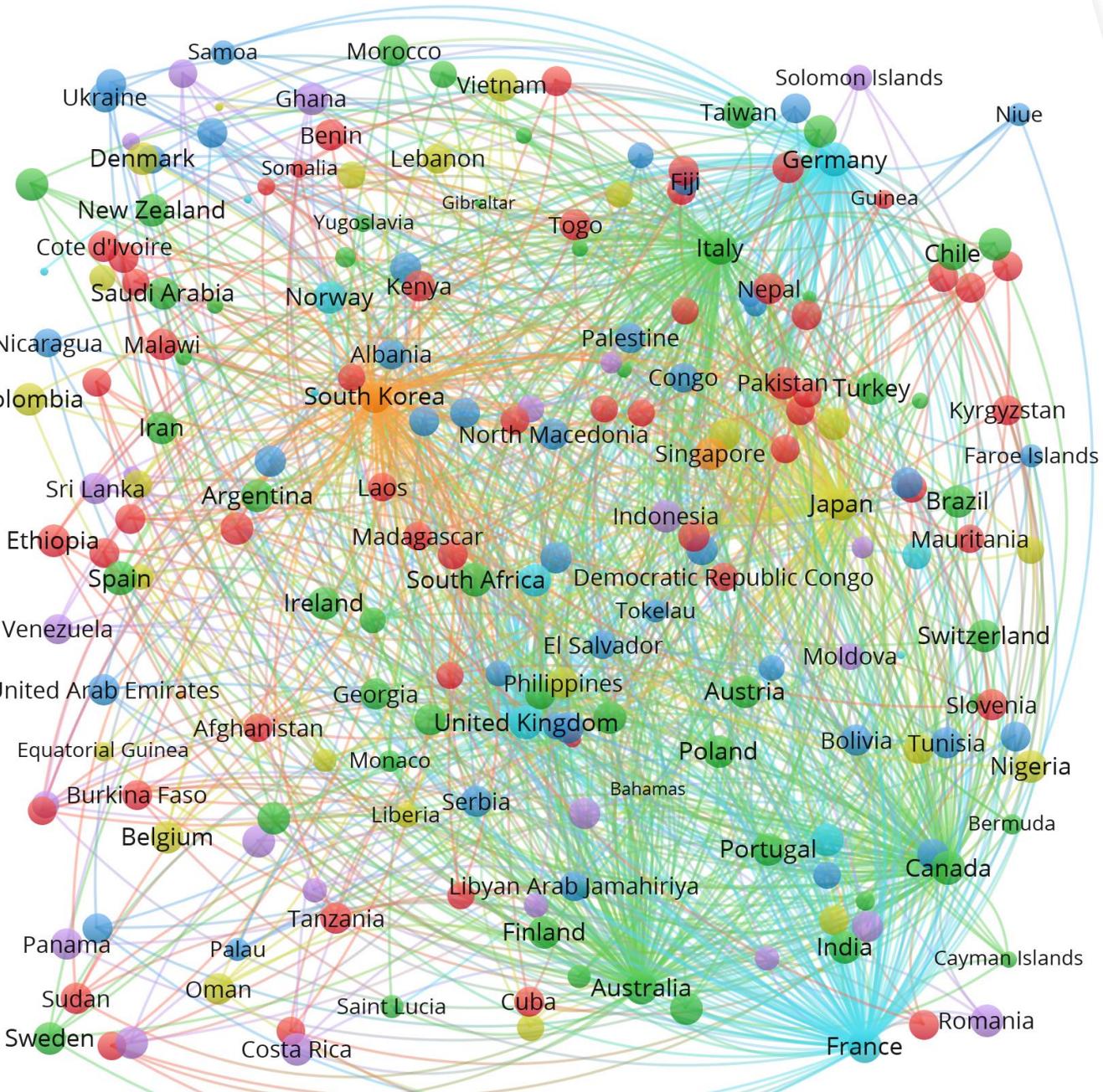


Figure 3. US-China multilateral co-publication network from 2016-2020

Multilateral Co-publications and the Global Network of Science

- Global network of science's network structure is evident in US-China multilateral co-publication networks⁹
- Features include:
 - More connections between countries
 - More countries collaborating on articles
 - Less clustering around central nodes
- Greater potential to contribute to global common goods
 - Increased inclusivity and interconnectedness within network
 - Increased potential to produce and disseminate knowledge

*New Data on China Academic Mobility to the US

- Decline in mobility from China to US in 2020 and 2021 (Figure 4)
- Greatest declines in undergraduate students and scholars to the US
- Small increase in number of graduate students from 2020 to 2021 (+4,323), but number remains below pre-pandemic numbers

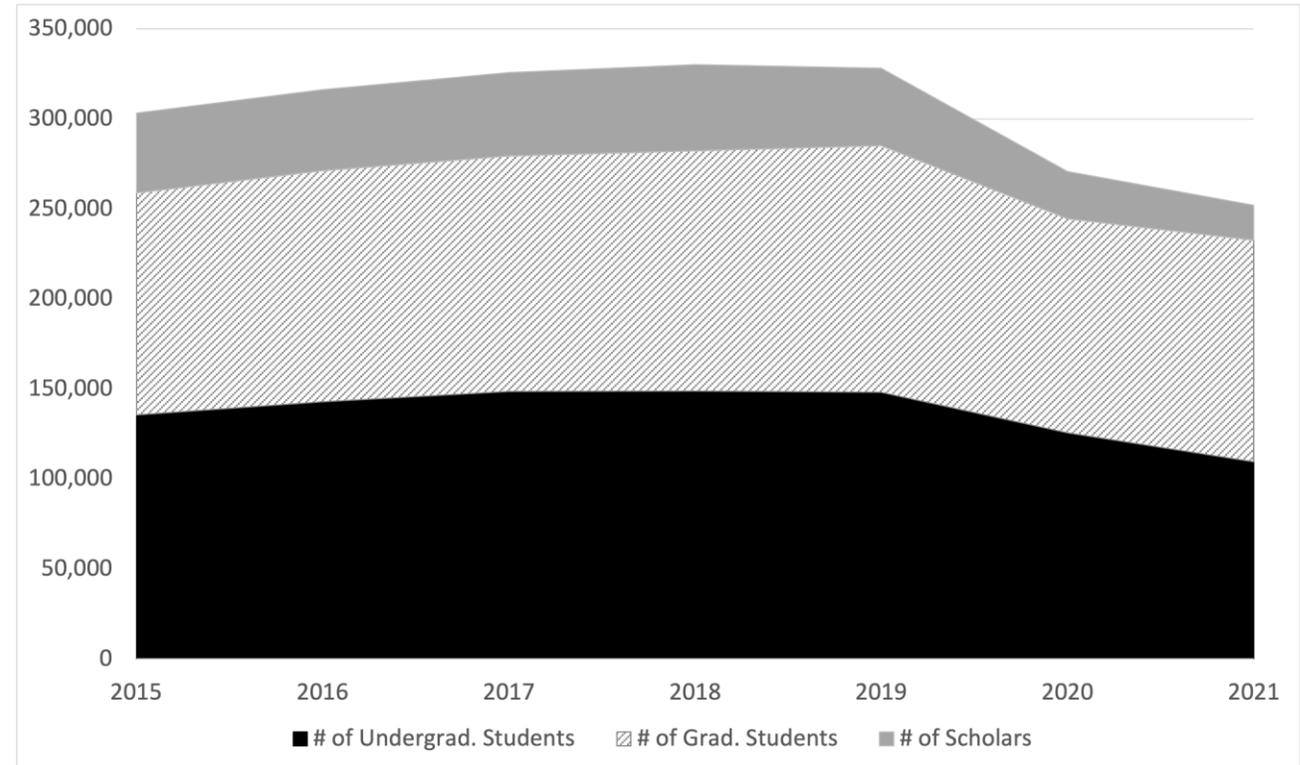


Figure 4. Growth in Chinese students and scholars to the US from 2015 to 2021

*New Data on US-China Co-publications

- Decline in co-publications between the US and China in 2021 and 2022 (Figure 5)
- Marked decline in bilateral compared to multilateral collaborations
- Demonstration of the possibility of more resiliency in the multilateral network than in the bilateral network

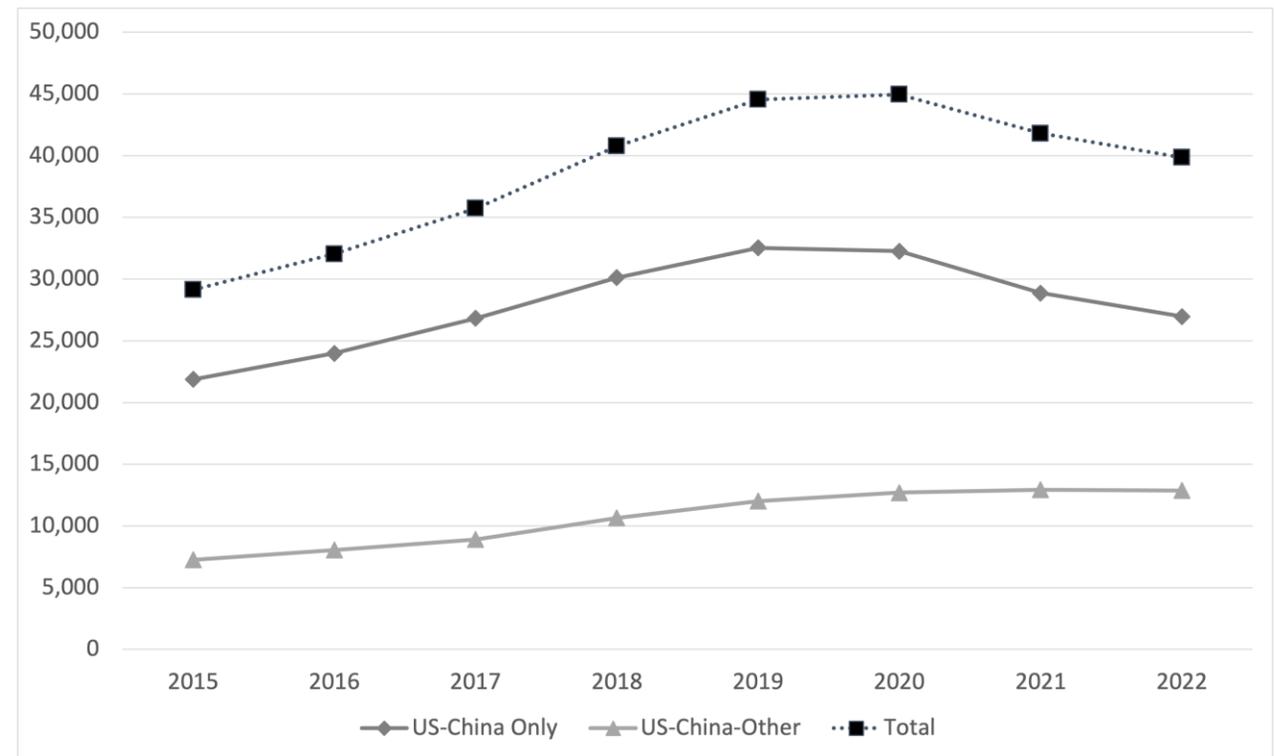


Figure 5. Growth in US-China co-publications from 2015 to 2022

*New Data on US-China Collaboration on COVID-19 Research

- Interviewed and surveyed US and Chinese researchers about their collaboration on US-China bilateral COVID-19 related research
 - US researchers (N = 50 interviews; N = 91 surveys)
 - Chinese researchers (N = 50 interviews; N = 150 surveys)
- Research explored
 - Relationship formation between scientists
 - Length of relationships
 - Motivations for collaborating
 - Roles and responsibilities on research projects
 - Challenges associated with the pandemic and geopolitical tensions

*New Data on US-China Collaboration on COVID-19 Research

- Relevant Findings

- Nearly all relationships between US and Chinese researchers formed in a self-organizing manner
- Most US and Chinese researchers formed their working relationships prior to the start of the pandemic
- The most important motivating factors:
 1. Shared interests and goals
 2. Personal trust
 3. Access to collaborators expertise and/or data
- Geopolitical tensions generally did not deter scientists but is impacting scientists' proclivity to collaborate

Implications

- Policies that reduce opportunities for cross-border mobility and network formation may impede both countries' S&T capabilities and their abilities to contribute to global science
- Restrictions on collaboration between US and Chinese scientists may interfere with the ability of international teams of scientists to gather and share information that is needed to produce knowledge and solve global problems
- Trends in multilateral co-publication data raise some doubts about the extent of the negative impact that geopolitical tensions may have due to the evolving relationship between the nation-state and science and the self-organizing nature of global science

References

- ¹Suttmeier, R.P. (2014). Trends in U.S.-China science and technology cooperation: Collaborative knowledge production for the twenty-first century? Retrieved from <https://www.uscc.gov/sites/default/files/Research/Trends%20in%20US-China%20Science%20and%20Technology%20Cooperation.pdf>
- ²Kahata, A. (2020). Managing U.S.-China technology competition and decoupling. <https://www.csis.org/blogs/strategic-technologies-blog/managing-us-china-technology-competition-and-decoupling>
- ³US Department of Justice. (2020). Information about the Department of Justice's China Initiative and a compilation of China-related prosecution since 2018. <https://www.justice.gov/opa/information-about-department-justice-s-china-initiative-and-compilation-china-related>
- ⁴Lee, J.J. & Li, X. (2023). Neo-racism, neo-nationalism, and the costs for scientific competitiveness: The China Initiative in the United States. *The Review of Higher Education*.
- ⁵Haupt, J.P. & Lee, J.J. (2021). Geopolitical tensions and global science: Understanding US-China scientific research collaboration through scientific nationalism and scientific globalism. In J.J. Lee (Ed.), *U.S. Power in International Higher Education*. Rutgers University Press.
- ⁶Lee, J.J. & Haupt, J.P. (2020). Winners and losers in US-China scientific research collaborations. *Higher Education*, 80, 57-74.
- ⁷Lee & Haupt (2020). Scientific collaboration on COVID-19 amidst geopolitical tensions between the US and China. *The Journal of Higher Education*, 92,2,302-329.
- ⁸Wagner, C. & Cai, X. (2022). Changes in co-publication patterns among China, the European Union (28) and the United States of America, 2016-2021. <https://doi.org/10.48550/arXiv.2202.00453>
- ⁹Wagner, C., Park, H., & Leydesdorff, L. (2015). The continuing growth of global cooperation networks in research: A conundrum for national governments. *PLoS ONE*, 10(7), e0131816.