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Shih, Tommy; Cooney-O'Donoghue, Diarmuid; Chubb, Andrew

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LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00



## **Scientific collaboration amid geopolitical tensions: Global variation in responses to China engagement**

### **Abstract**

A global rules-based order is in flux amid intensifying United States (US)-China geopolitical competition for economic and technological advantage. Concerns about the economic and security risks of dependency on China increasingly shape economic and political decision-making in the West. This paper looks at various national responses to the rise of China in the sphere of scientific collaboration and the underlying factors to their variation. While there are an emerging field related to studies of responses to Chinese research collaboration, there is yet to be a cross-national comparative examination to describe how global science is being affected by geopolitical competition, the responses taken by nations and what explains the patterns of variation. This paper will fill this gap in the literature.

## Introduction

A global rules-based order is in flux amid intensifying United States (US)-China geopolitical competition for economic and technological advantage. Concerns about the economic and security risks of dependency on China increasingly shape economic and political decision-making in the West. As a driver of economic growth and technological innovation, global science has become a critical battleground. Since the 1990s, global science has undergone dramatic shifts in which high quality research has increased and by an increasing number of countries. China is today the world's largest producer of scientific publications and is world-leading in areas including mathematics and engineering (Schwaag Serger et al., 2021). In this context, extensive Sino-foreign collaborations have formed over the past three decades. However, a multipolar world imposes substantial challenges to international exchanges, especially in the fields of science and technology. With the absence of a monolithic force driving the norms of interaction, and a rule-based order increased tensions are noticeable between advanced science nations.

In short, the multipolar power dynamics challenges the Euro-American hegemony, which has exacerbated global political tensions. At the same time, the world is facing existential threats caused by man, such as climate change, environmental deterioration, energy, and pandemics. These threats inherently need to be solved globally and in interaction between countries. The issue that we seek to address is how scientific collaboration develops amidst changing power dynamics and rising apolarity. Bibliometric data of collaborative patterns shows that military alliances generally do not dictate science or technology cooperation. For example, data from 2022 shows that in the US the largest source of foreign research collaborators is China (Scival). For the United Kingdom (UK), collaborators in China were the second largest source of international research collaborations in 2022 (Scival). These collaborative patterns suggest that factors such as scientific opportunities, resource complementarity, and individual drivers are more important considerations for international scientific cooperation (Shih & Forsberg, 2023). However, in an era where national and global security concerns as well as nations' global competitiveness are gaining precedence on the political agenda in many countries, impact is seen in the technological and scientific spheres.

In recent years, there have been growing concerns that China has used increasing global scientific collaboration to its economic, technological, and military advantage. For example, across the US, the European Union (EU), the UK, Japan, and Australia, fears have been raised that scientific collaboration is assisting to develop the People's Liberation Army's military technology. Moreover there is an extensive critique by Western politicians and analysts that China is taking advantage of the open global science system in order to build its innovative and technological capacity. The US now seeks to counter China's military and scientific development and restrict its access to technology (The White House, 2022). Existing literature has demonstrated how geopolitical tensions have affected international scientific collaboration. Governments, research institutes, and academics have taken varying responses to manage the economic, security, and ethical risks and opportunities of science collaboration with China (Shih, 2022).

This paper looks at various national responses to the rise of China in the sphere of scientific collaboration and the underlying factors to their variation. As d'Hooghe & Lammertink (2020) have described there are various emerging approaches to Chinese research collaboration in several European countries. Shih (2023) note that the EU and the US to some extent focus on different aspects of risks, but also view opportunities in different ways. Existing research has described the variance in responses taken globally (d'Hooghe & Lammertink, 2022). However, there is yet to be a cross-national comparative examination to describe how global science is being affected by geopolitical competition, the responses taken by nations and what explains the patterns of variation. For example, the US has taken top-down compliance and security focused responses, such as the US Department of Justice's 'The China Initiative' that has investigated the linkages of academics to China. In contrast, Sweden's government has taken a more discretionary approach, in which the university sector have led a bottom-up approach, such as through the development of international collaboration guidelines.

Against this backdrop the paper's follows as: First, this research aims to compare national responses to geopolitical competition in science. Second, it seeks to explain why nations take varying approaches, which will lead to the development of an explanatory model and an original typology to explain the variation. Third, recommendations will be proposed for good practice approaches to manage the security and scientific risks and opportunities of scientific engagement with China. To these ends the study looks at Sweden, Norway, Australia, Japan and the US and asks the following questions:

- i. How is geopolitical competition affecting national academic collaboration with China?
- ii. What factors explain the different responses?

### **Analytical lens**

This research begins with Marginson's (2022) conceptual framework of the system of global science. First, Marginson writes that global science is characterised by 'flat open networked relations', which refers to how the internet and new digital communication technologies enable borderless communication and the consequent expansion of collaborative linkages and scientific output. This has facilitated greater multipolarity as China has become a central node in global science. Second, global science is still shaped by global inequalities, through the hegemony of wealthy Anglo-European nations. Third, the autonomy of academics is shaped by governments, such as through funding, and by relations at the institutional and collegial level. Due to the rise of China recalibration of global research norms is currently happening.

China's development into a world leading science nation during the past two decades is unprecedented. The development has both benefitted and taken advantage of the open global science system (as perceived by Western actors). China's rise, and the responses from Western nations has inevitably reshaped institutional conditions for global science. This infer that the harmonization of research practices and norms needs to happen in a multipolar setting where new or emerging science nations can be part of the process. However, this has by looking at various country responses to the rise of China not happened. Instead, there is considerable opposition to multipolarity.

But China is not the only new science nation. Other new players, include a number of authoritarian countries, which brings additional challenges. First, the transition towards a more levelled playing field between liberal democracies and autocracies in science and technology will further reconfigure global distribution of power. The responses from advanced liberal democracies are becoming increasingly tougher in order to limit further loss of power. Second, rapidly developing science systems often do not have rigorous ethical overview (see Tang, 2022). Stringent institutional structures and practices for ethical conduct take time to form, and can be disrupted by myopic research practices in hypercompetitive environments. Third, the growth of science in an authoritarian context also comes with challenges, such as the lack of institutional autonomy of research organizations and academic freedom (Shih, Gaunt & Östlund, 2020).

To describe the variation in responses taken at national levels, the project will draw on Shih's conception of the conflicts that impact global science (Shih, 2022). Within each national context, the nexus between open international research collaboration and competing national security imperatives varies along three key dimensions: actors (who responds); methods (by what means); and goals (to what ends). Shih (2022) explains the range of responses taken from uncritical engagement with China, in which there is little reflection on the economic, security, and ethical challenges involved. On this side, the response (or lack thereof) is shaped by individual academics and research institutes, based on discretion, and fosters a highly open system. On the other side is 'securitisation' in which actors, typically security authorities, draw scientific activities further in security-dominated debates and which leads to state led requirements and a more closed system.

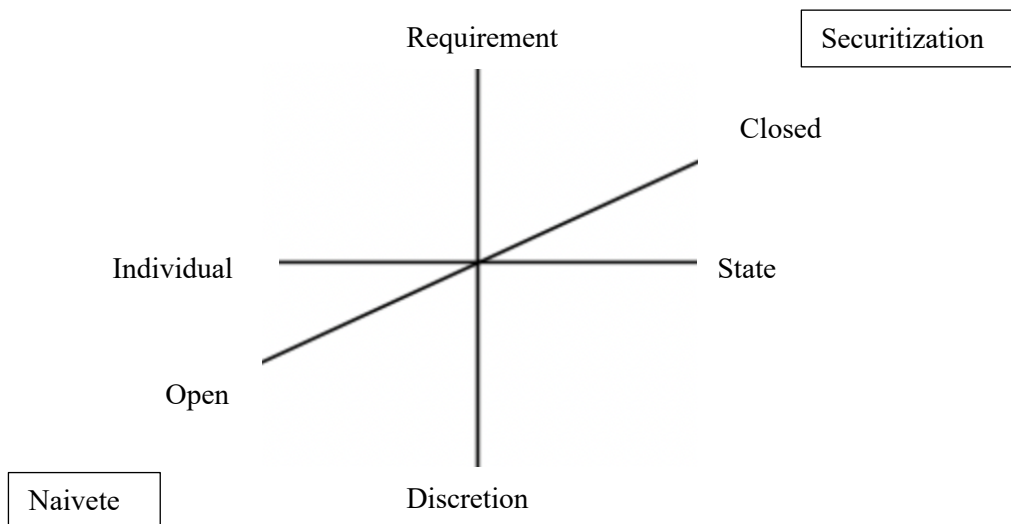


Figure 2: Conflicts impacting global collaboration in science

### Research methodology

This research proposes a cross-national comparative study to describe the variation in responses to scientific collaboration with China. Case studies include Sweden, Japan, US, Norway and Australia. These case studies illustrate a subset of countries that are aligned with respect to political affinity, security interests and level of economic development, but are different with regards to geographical location, size and level of trade openness. The dominating government narratives is a proxy for the main responses to knowledge engagement with China. The findings contribute to the discussion in the academic literature on the impact of geopolitics on global science. Underlying reasons indicating a certain institutionalized national response can include a plethora of conditions.

- Level of technological advancement
- Economic size
- Level of protectionism/openness
- Financial interdependencies (research funding)
- Commodification of higher education
- Institutional autonomy
- Drivers of internationalization
- Regulatory frameworks

In order to situate each country in the proposed framework the paper has drawn on document analysis and existing literature on the US, Norway Australia, Japan and Sweden. Interviews with scientists, university leaders, policy-makers, government officials, funding agencies, and professional university staff involved in managing internationalisation have provided additional information about the underlying reasons for a certain response.

### Discussion

There are a number of pertinent topics that need be addressed against the backdrop of an increasingly complex science landscape fraught with geopolitical tensions. Below we discuss a few select areas or research that could advance the understanding of organizing science in a multipolar research landscape:

*Forming science norms in glocal intersections:* How norms, conducive for international scientific collaboration in a landscape fraught with growing geopolitical tensions and higher collaborative barriers is one of the more challenging issues in contemporary research policy. Ahead of us are

unprecedented challenges related to global health, food security, energy, biodiversity conservation, and climate, which tend not to manifest themselves in the aggressively disruptive and globally encompassing manner that the COVID-19 pandemic has done. Addressing these challenges will require open international collaboration. However, as research actors are trying to come to terms with a multipolar research landscape fraught with geopolitical tensions, strong reactions to China's rise as a major global science node are especially apparent in Western countries. In order to manage the increased complexity in the contemporary global research landscape, guidelines are starting to emerge that seek to mainly tackle foreign interference (JASON, 2019; EC, 2022). Responses have included required measures (e.g., export control or data security compliance) to more discretionary choices (e.g., whether to collaborate with research actors in authoritarian countries based on moral considerations).

*The contestation and appropriation of science by political actors:* As Brown (2015) notes science is inherently political. However, the last couple of years have seen politicization of science due to a more levelled playing field between autocratic and democratic states. Against the background of the UN sustainable development goals, stringent scientific research and effective political responses are necessary to mitigate adverse consequences of global challenges. In a global science landscape fraught with severe geopolitical conflict and international competition, there is a risk that the openness of science will diminish, which in turn decrease likelihood that solutions will be developed or implemented. A mechanism that could lead to deterioration of the conditions for global scientific collaboration include, political contestation and appropriation of knowledge (Druckman, 2017). Extraordinary efforts from powerful actors to stem facts are seen in Russia, the United States, China and some parts of Europe (e.g., Hungary). As Bowden, Gond, Nyberg and Wright (2021) describe it is increasingly important to understand how power shape collective beliefs that delay necessary actions to avert catastrophes.

*A broader palette of requirements for science - Transcending conflicts:* The conflicts between norms that are seen in the science sector are increasing. Research organizations and researchers often have to work through significant tensions between goals (Möller, 2017). In the contemporary research landscape such tensions can be found between academic freedom and openness against national security; scientific novelty against ethics or; excellence against responsibility. The portfolio of considerations is growing wider and put at the fore the changing conditions for science.

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