

Global co-operation and competition in science, technology and innovation in times of uncertainty

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Outline

- ❑ Benefits and challenges of international STI cooperation
- ❑ Internationalisation in STI – selected trends
- ❑ Selected OECD actions to support countries in their STI internationalization efforts
- ❑ Concluding remarks



The benefits of international STI cooperation are well-established

- ❑ **Global challenges**, such as climate change, food security, and global health issues, are increasingly targeted in international STI cooperation, which can accelerate understanding and innovation, enhance economies of scale, strengthen incentives for investment, and foster a level playing field.
- ❑ **Sharing experiences** between countries and industries can reduce individual risks, unlock synergies and efficiencies, and accelerate progress, for example, towards viable low-carbon solutions as part of sustainability transitions.



Differing national contexts and competing interests often frustrate attempts at global collective action

- With most public R&D funding allocated within national boundaries, international alignment between national strategies and programmes is notoriously difficult to achieve.
- National interests like domestic growth can be in tension with transnational priorities, such as protecting global common pool resources.



The global context for science, technology, and innovation is changing

- ❑ **Changing geopolitics:** growing S&T capabilities in emerging economies. In particular, growing ascendancy of China in frontier technologies has ushered in a new era of intensified strategic competition and raises concerns for liberal market economies.
- ❑ **New and emerging technologies,** such as Artificial Intelligence and Neurotechnology offer great opportunities for economic and societal development but create new risks, disruptions and anxieties that must be effectively governed.

A KEY CHALLENGE FOR MULTILATERALISM WILL BE TO RECONCILE GROWING STRATEGIC COMPETITION WITH THE NEED FOR GLOBAL ACTION TO TACKLE GRAND CHALLENGES, LIKE CLIMATE CHANGE, AND TO EFFECTIVELY GOVERN NEW AND EMERGING TECHNOLOGIES



International STI cooperation is mediated through a range of channels

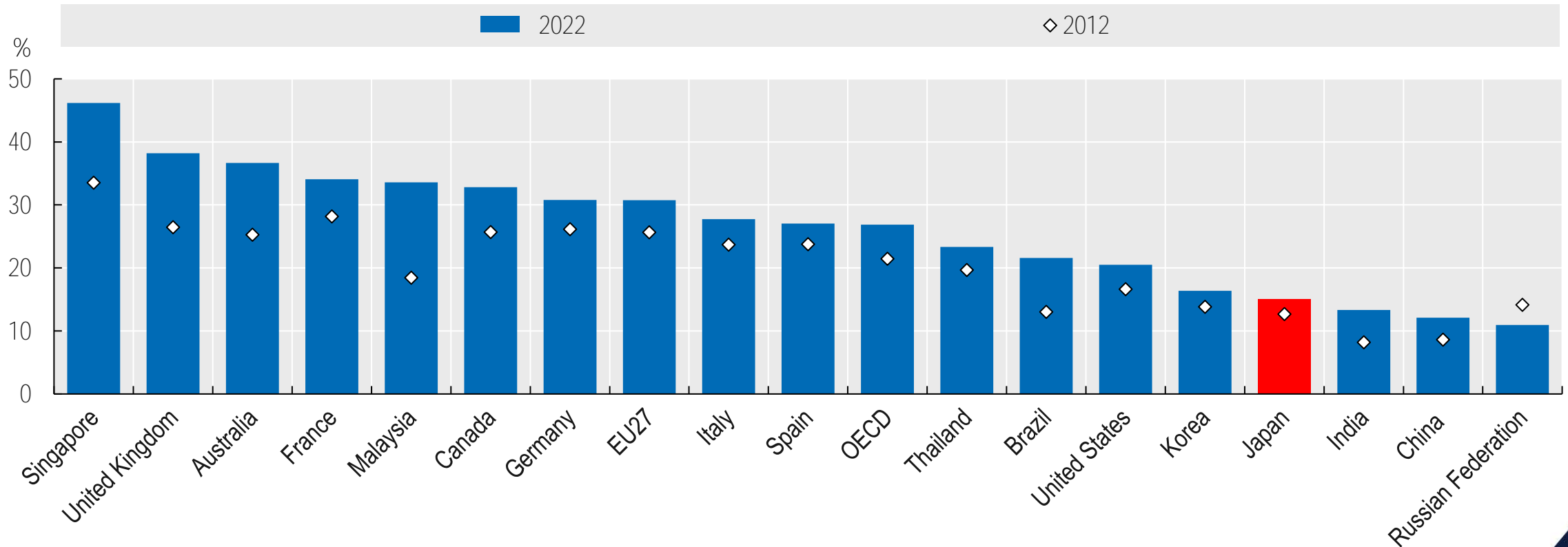
- International research collaboration
- International mobility of human resources in science and technology
- International trade and investment by innovative firms
- International research and technology assistance to low- and middle-income countries
- Efforts to establish global norms for promoting responsible innovation

INTERNATIONALISATION IN STI - SELECTED TRENDS



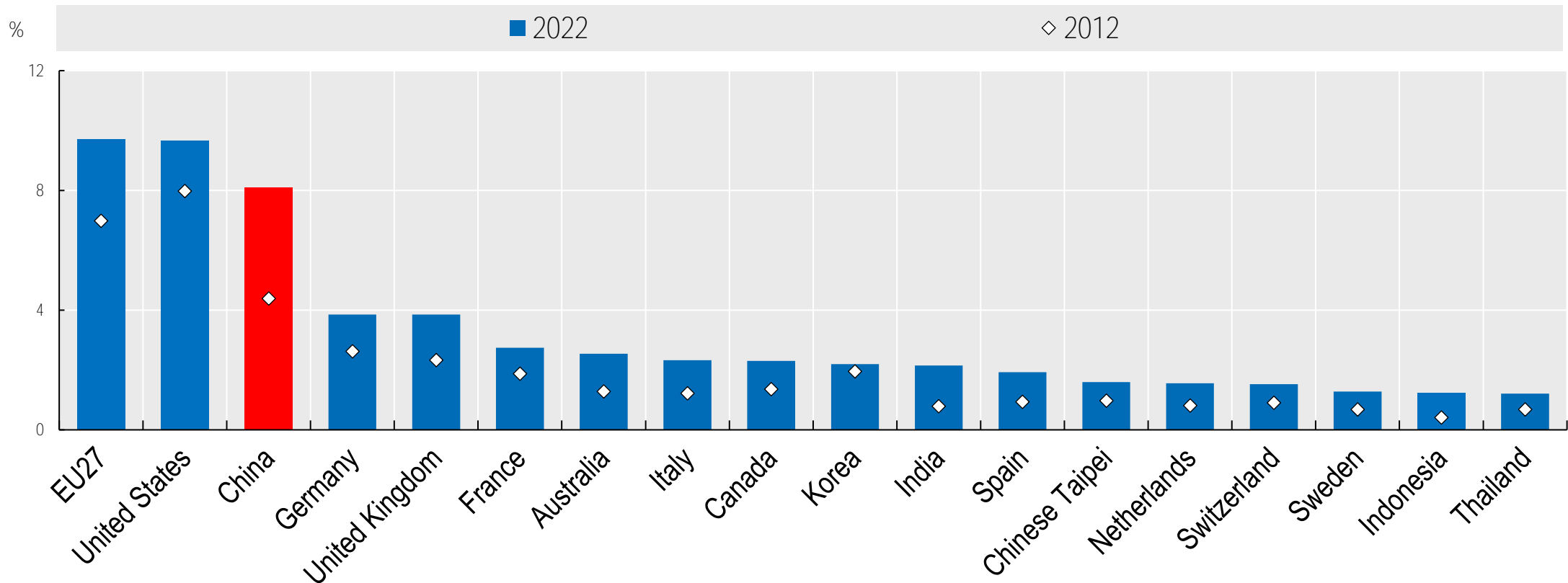
International research collaboration has grown significantly over the last 25 years

International scientific collaboration intensity, selected economies, 2012 and 2022
As a percentage of domestically-authored publications, based on fractional counts



Japan has also deepened its research collaboration with a range of countries, particularly China

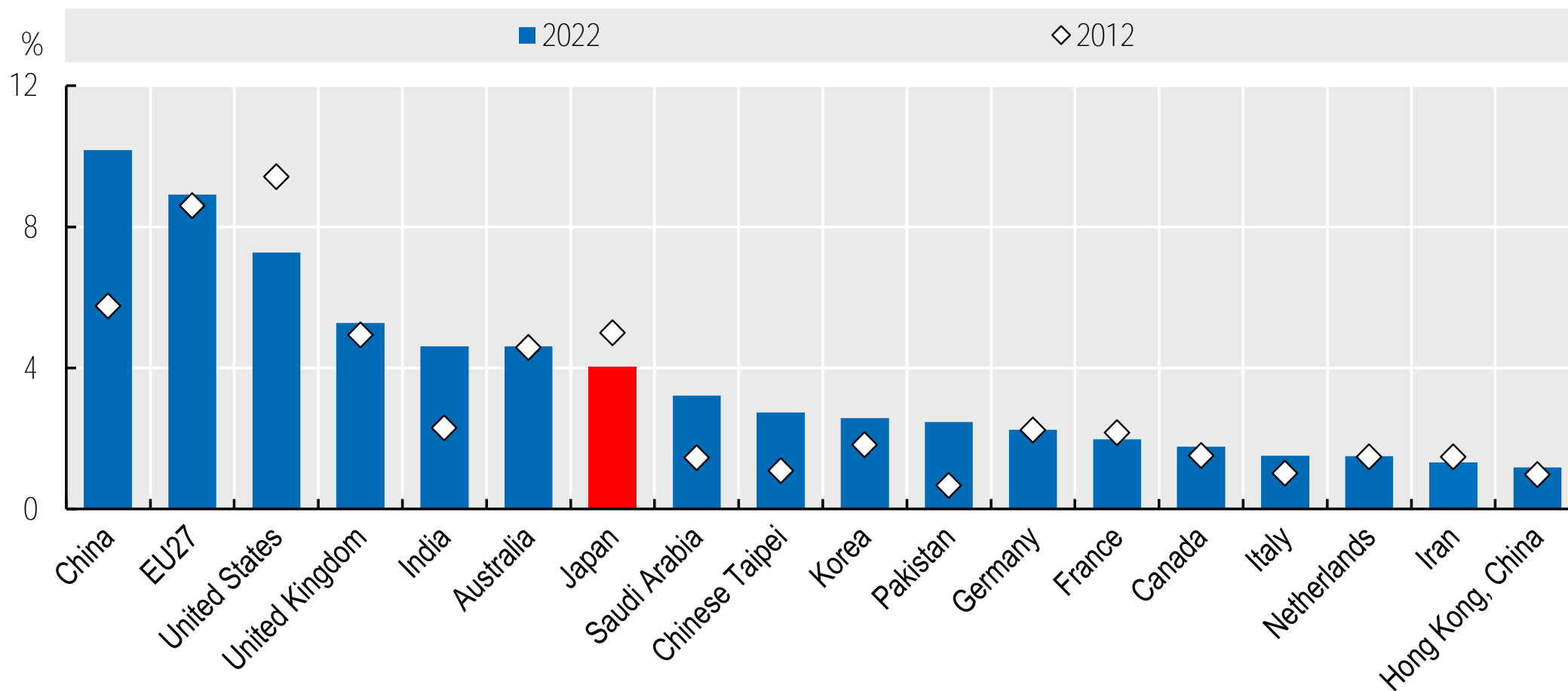
Japan's main scientific collaboration partners, 2012 and 2022
Joint scientific publications as a percentage of all domestic publications, whole counts





International research co-operation in the ASEAN region is generally at lower levels than in OECD countries and patterns of partnership are changing.

Scientific co-publishing with ASEAN countries: main partners

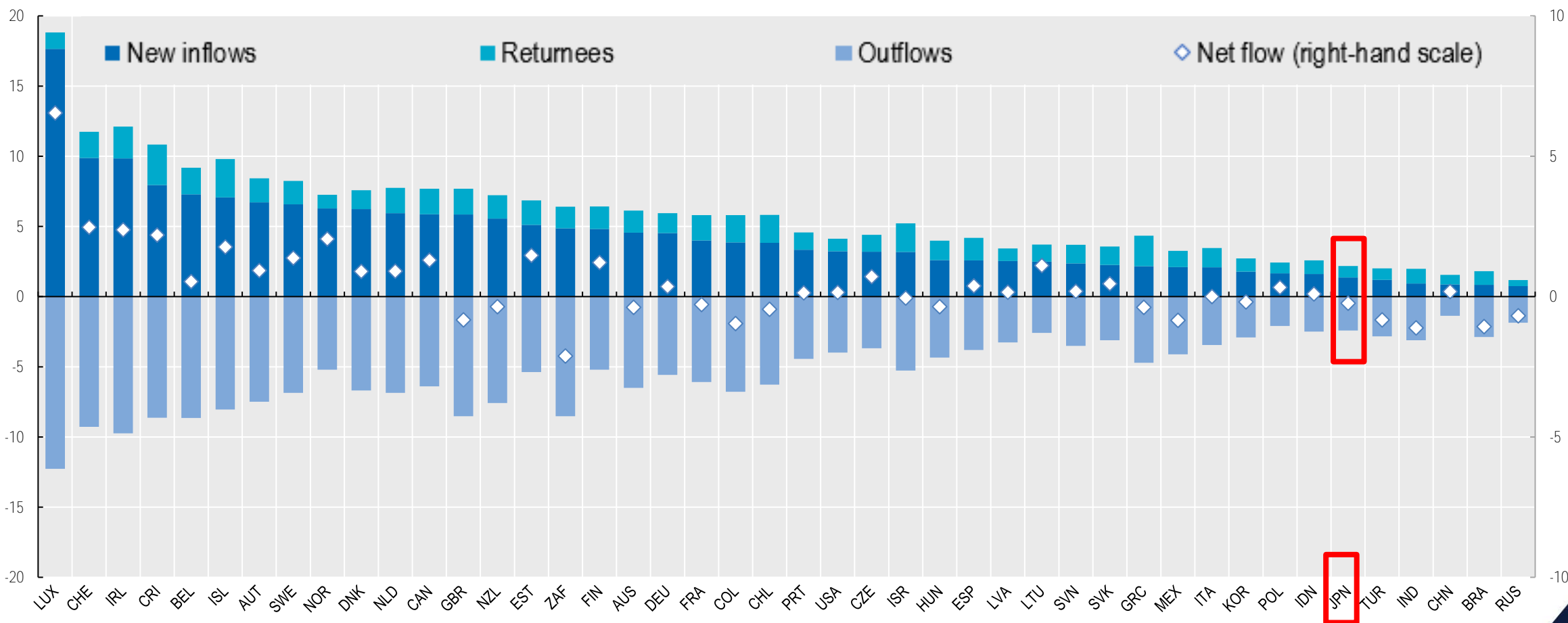


Source: OECD calculations based on Scopus Custom Data, Elsevier, Version 1.2024, January 2025. See also <http://oe.cd/scientometrics>. Note: The indicator in this figure has been computed on a whole count basis, namely numbers of institutional affiliation-implied collaborations between the reference economy and its main partners in numerator and the total reference economy's publications in denominator. Single authored publications with more than one institutional affiliation count as collaborations.



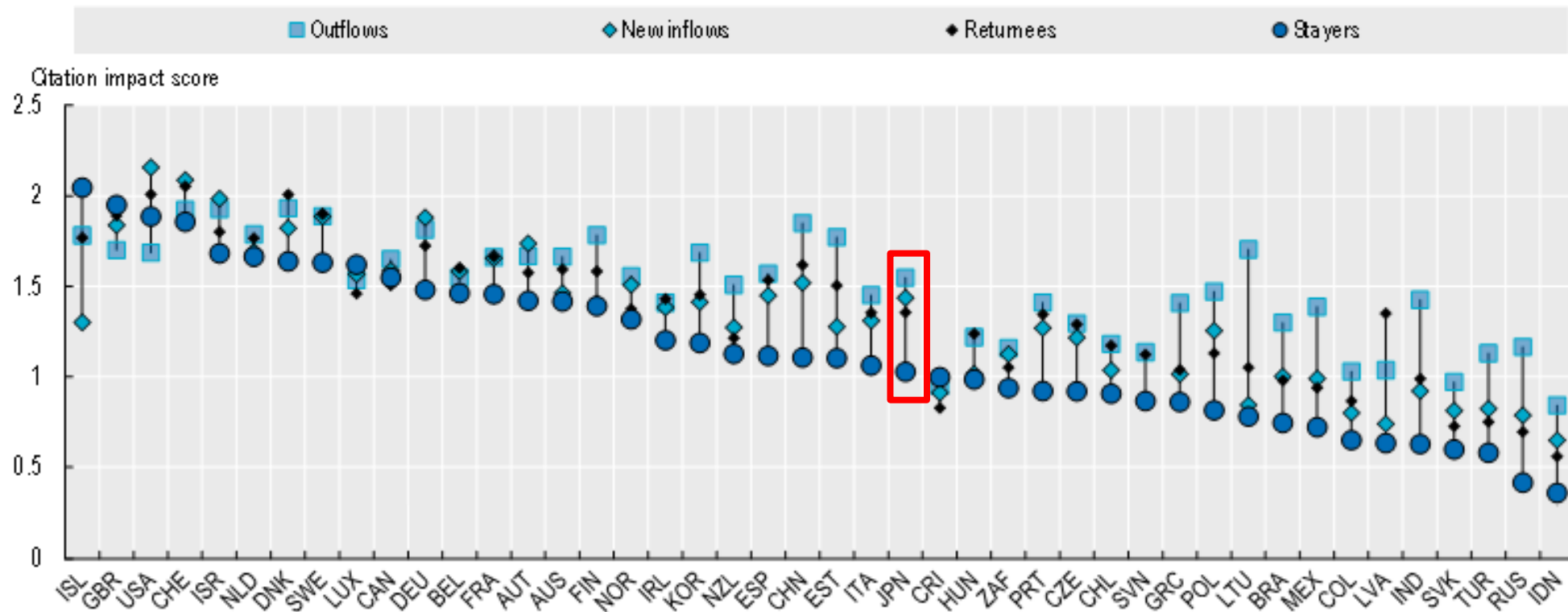
International mobility of researchers drives knowledge flows, but it has been persistently low in Japan

International mobility of scientific authors, as % of authors 2022



Those who go abroad tend to have higher rated publications than their staying or returning counterparts

International mobility profiles and differences in expected citation impact, 2022



Note: The expected citation impact is based on an average of the relevant authors' publications' Scimago Journal Rank 2022 scores, a measure of scientific influence of scholarly journals that accounts for the number and centrality of citations received.

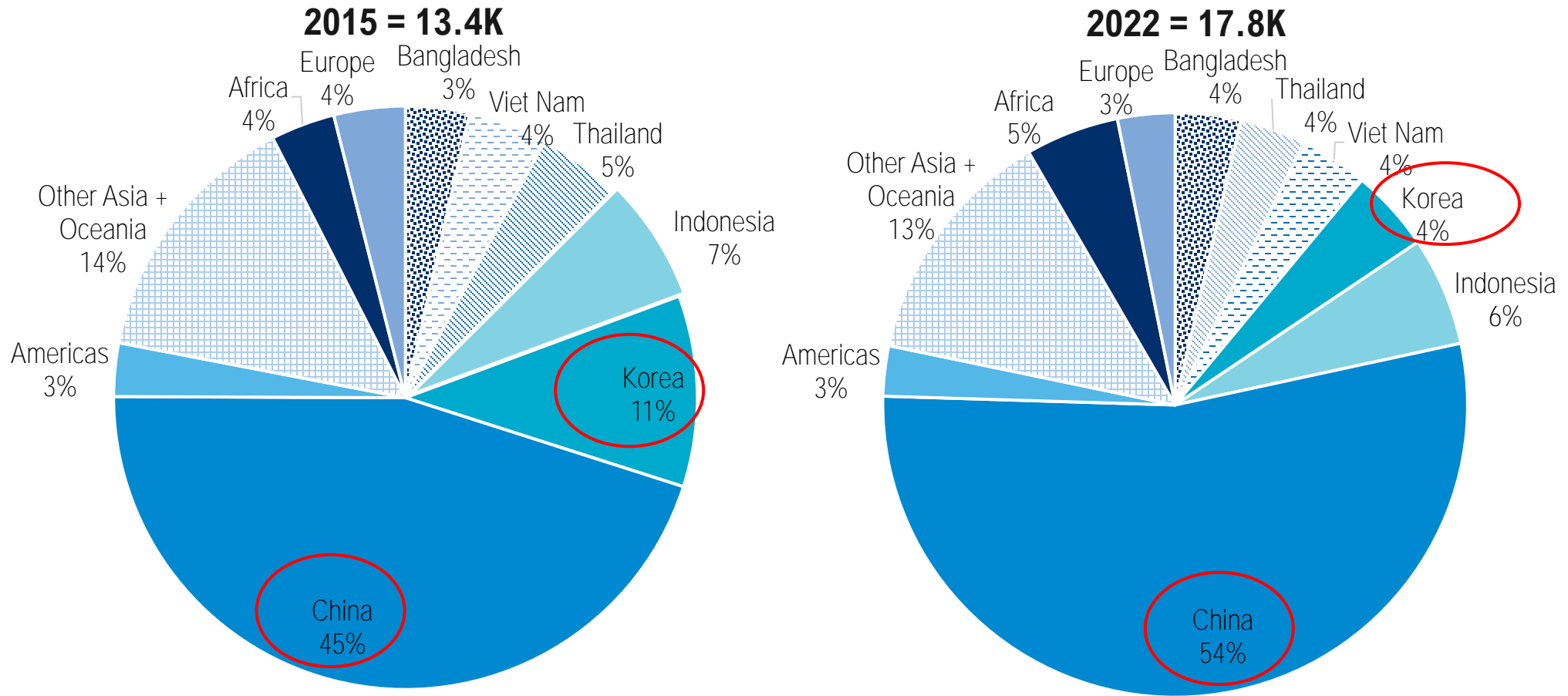
Source: [OECD calculations based on Scopus Custom Data, Elsevier, Version 1.2024, April 2024](#); and [Scimago Journal Rankings](#).





China now accounts for more than half of the mobile PhD students in Japan, with a decline in Korean students

Share of mobile PhDs enrolled in Japan

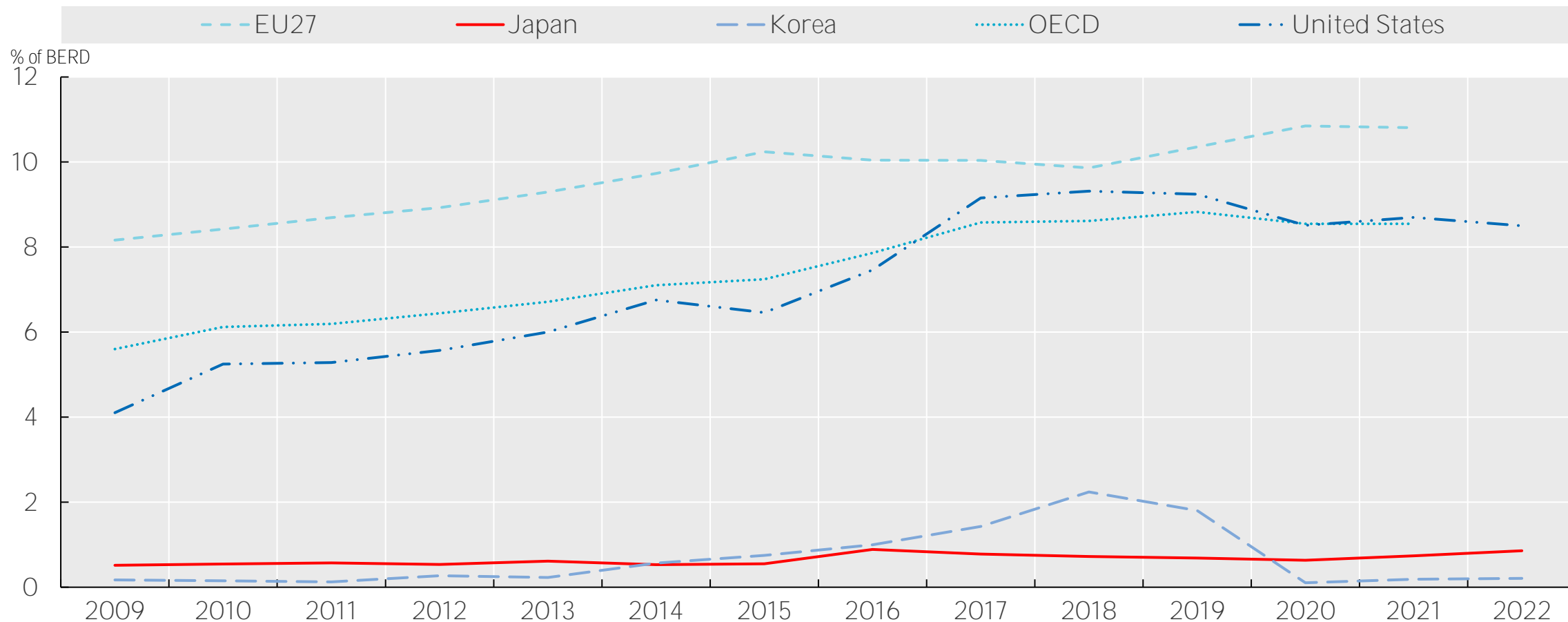


Source: OECD Education statistics database, accessed on 14 January 2025



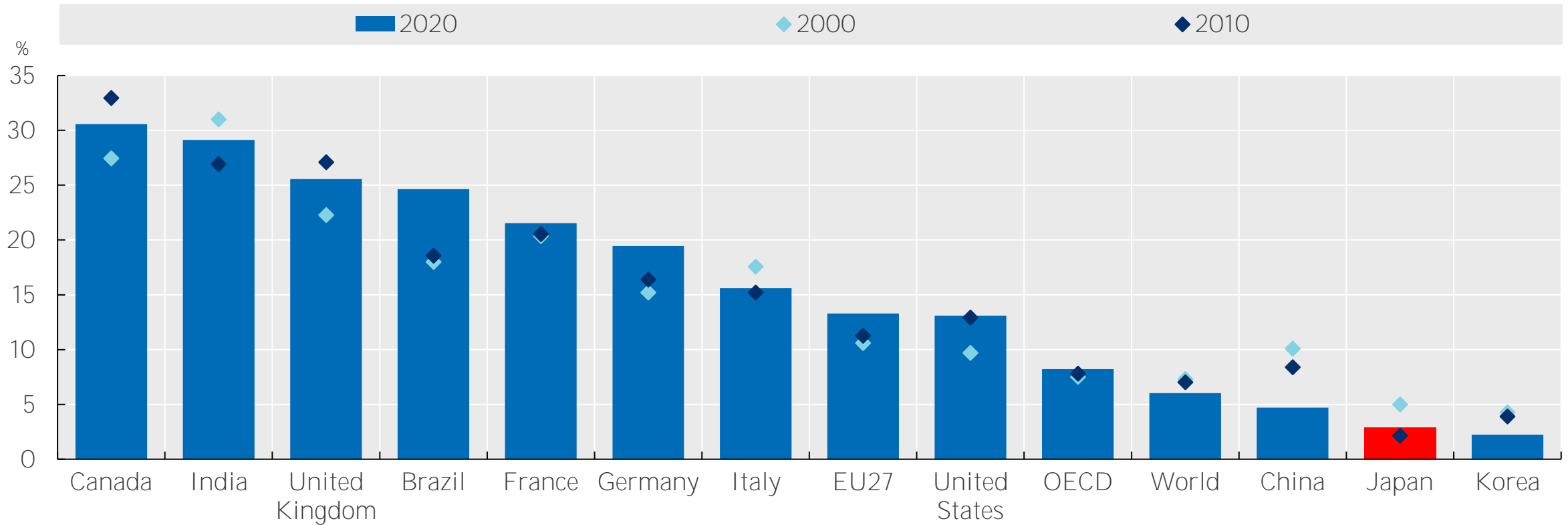
Business expenditures on R&D have also become increasingly internationalised, though less so in Japan

BERD financed by the rest of the World



Similarly, Japanese firms co-patent internationally much less frequently than their OECD counterparts

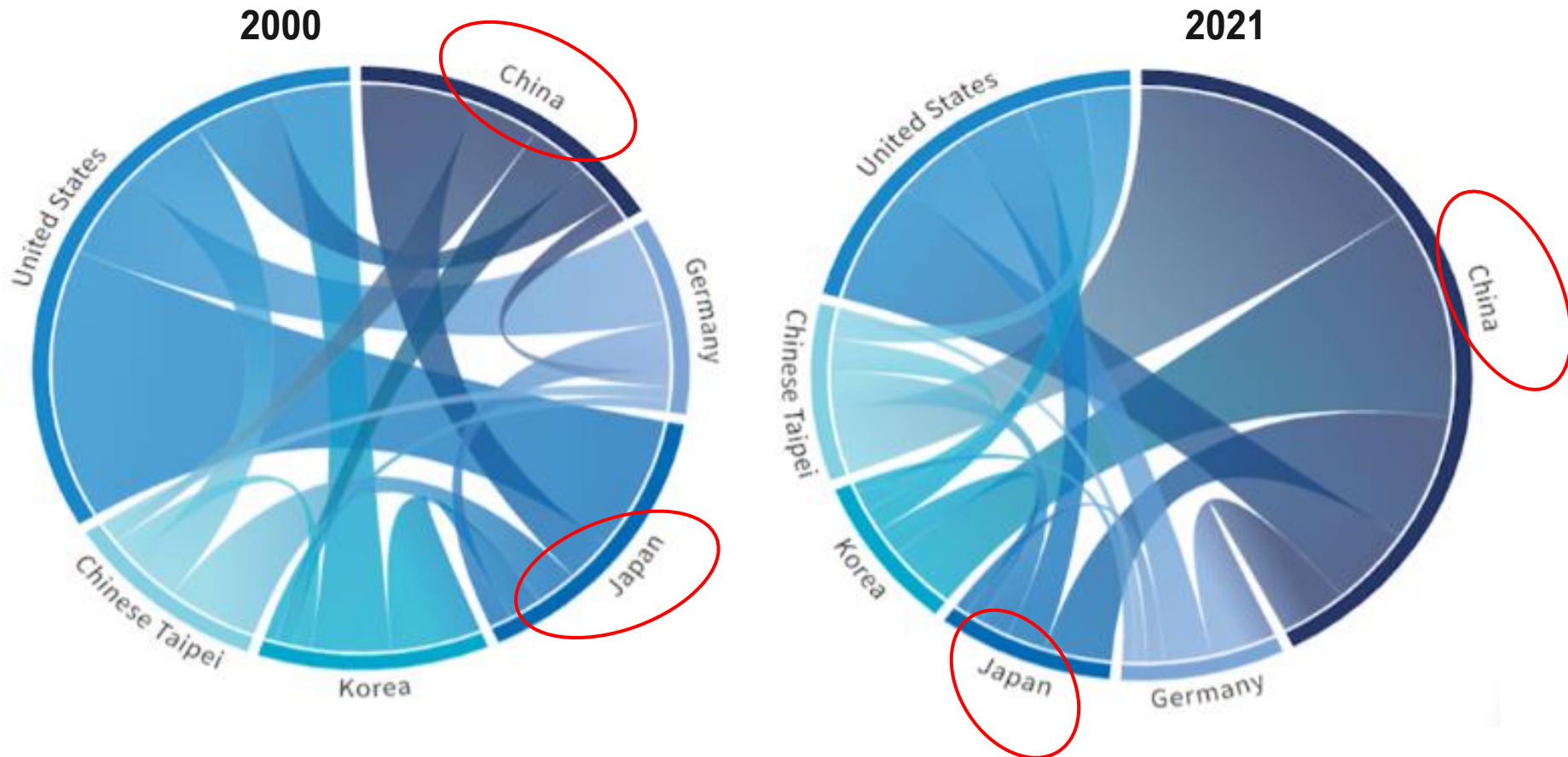
Percentage of patents with foreign co-inventor(s)



Trade in high R&D-intensive sectors is highly interdependent, with China now assuming a prominent role

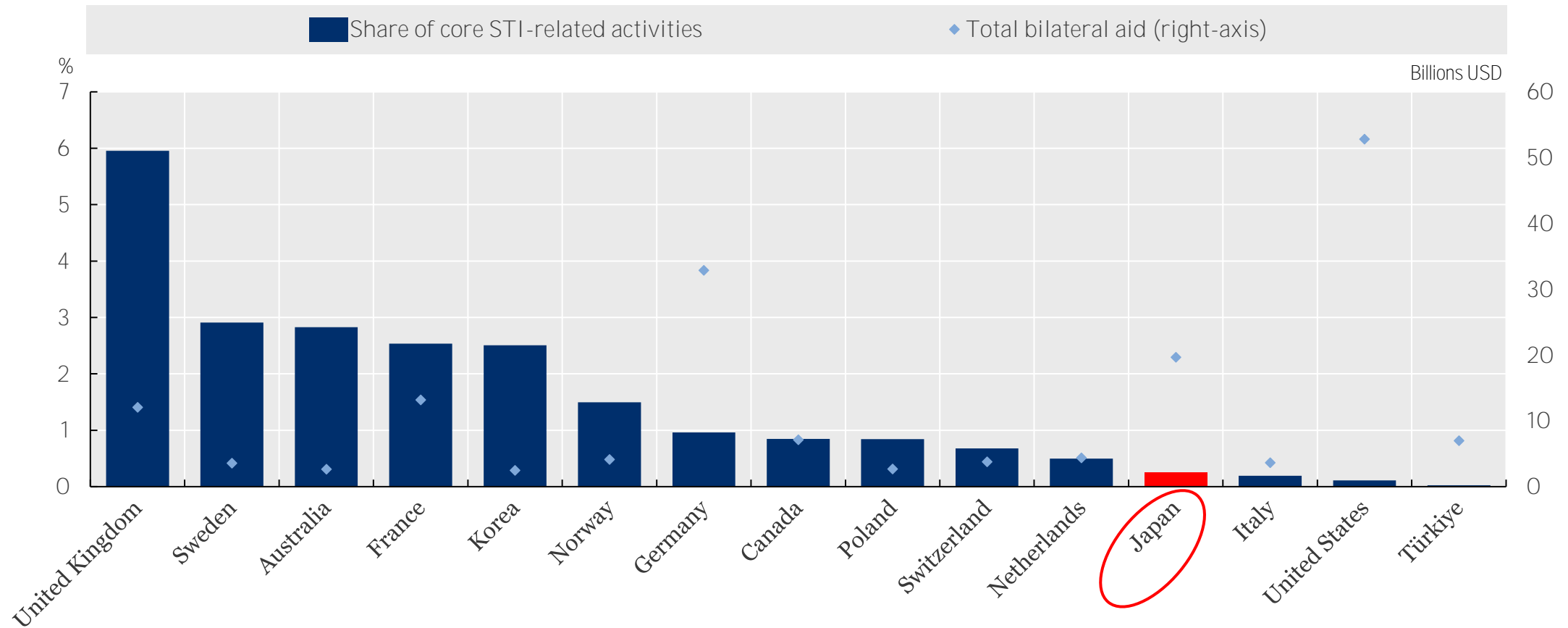
R&D-intensive intermediate goods

Import flows, in USD current prices, selected economies



On international research and technology assistance to low- and middle-income countries, Official Development Aid for STI remains low

Share of core Official Development Aid activities with the main focus to support research and/or ICT among total bilateral aid, top 15 OECD donors, 2022



Source: OECD CRS database, accessed on 15 January 2025



The OECD supports countries in responding to changes and challenges around STI internationalisation

Declaration on Transformative Science, Technology and Innovation Policies for a Sustainable and Inclusive Future

OECD Science and Technology Policy Ministerial

23-24 April 2024, OECD, Paris



Déclaration sur des politiques de science, de technologie et d'innovation transformatives au service d'un avenir durable et inclusif

Réunion ministérielle sur les politiques de science et de technologie

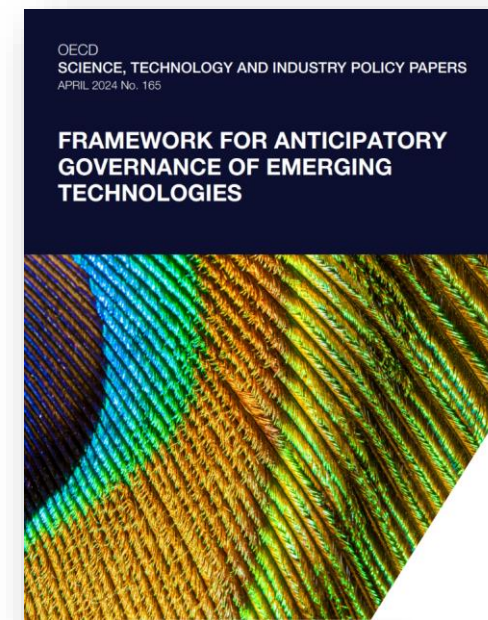
23-24 avril 2024, OCDE, Paris

[OECD/LEGAL/0501](#)



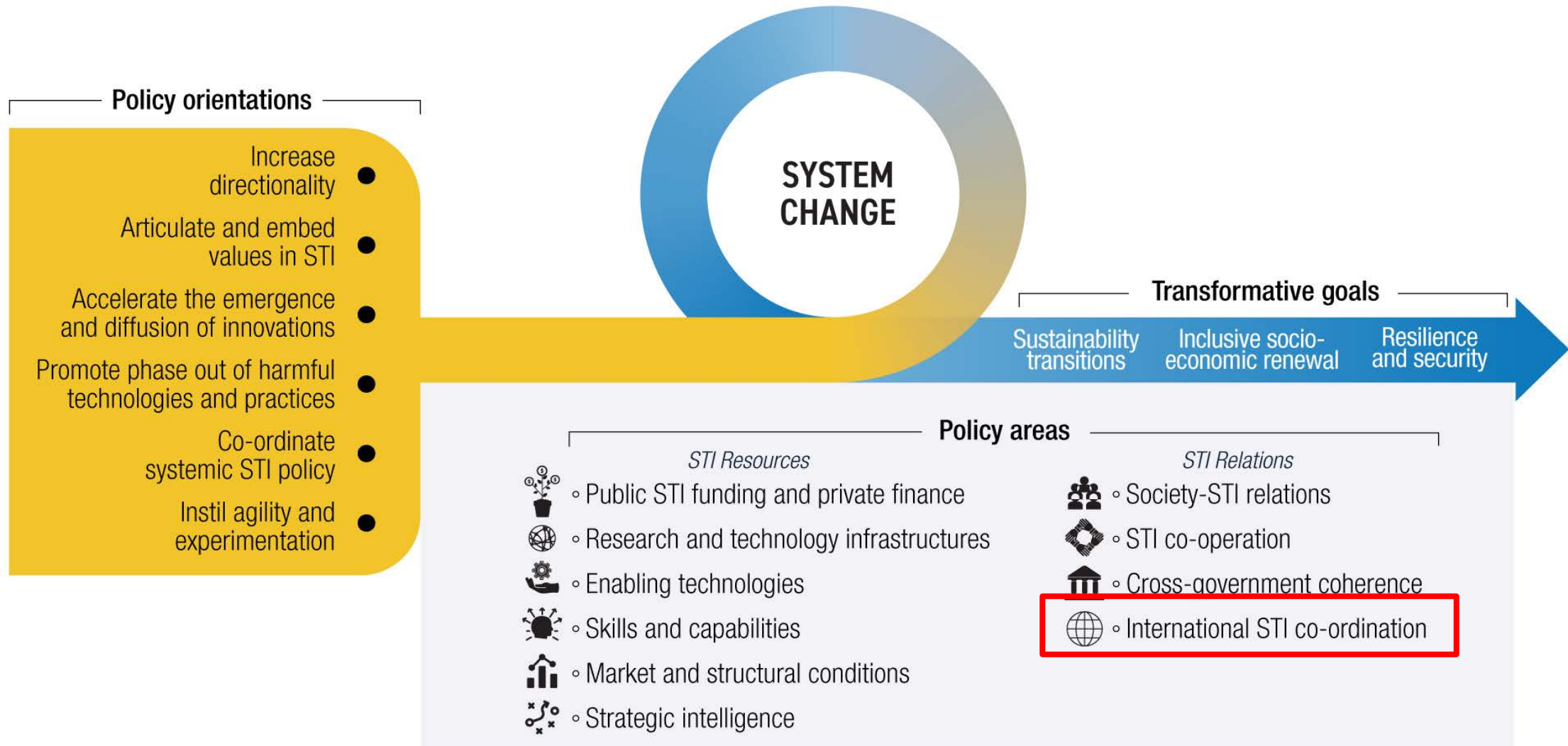
[Transformative Agenda](#)

DESIGNING AND IMPLEMENTING TRANSFORMATIVE SCIENCE, TECHNOLOGY, AND INNOVATION POLICIES	REINFORCING SHARED VALUES IN INTERNATIONAL CO-OPERATION AND TECHNOLOGY GOVERNANCE
MAKING SCIENCE, TECHNOLOGY, AND INNOVATION MORE INCLUSIVE	STRENGTHENING THE EVIDENCE BASE FOR STI STRATEGIES AND POLICY MAKING



[Framework for the Anticipatory Governance of Emerging Technologies](#)

The Transformative Agenda calls for more directed, inclusive, agile and values-based STI policies across the board





On International STI coordination, the Transformative Agenda proposes several policy actions

- ❑ Align national transformative STI priorities and co-ordinate funding for research and innovation activities to address **global challenges**
- ❑ Strengthen **Open Science** and knowledge sharing to improve global resilience and scale up efforts to address collective challenges
- ❑ Safeguard **research integrity and security** of the global research system
- ❑ Scale up **inclusive multilateral partnerships** to respond effectively and equitably to global challenges
- ❑ Foster **international market conditions** that enhance competitiveness and equitable access to emerging STI-based solutions





The OECD is ready to help countries implement the recommendations of the Transformative Agenda

- ❑ The OECD is preparing a series of guides covering the ten STI policy areas in 2025-26
- ❑ In addition, several other activities are planned, including country-specific support and policy toolkits

- Step-by-step interactive online tools and other resources to translate guidance to the local context.
- Aid systematic consideration of key challenges and actions needed to implement transformative STI policy.

Policy Toolkits



- Engagement of policy practitioners in interactive groups related to specific policy challenges of common interest.
- Peer learning groups to supplement and inform wider project activities.

Peer Learning support



- To-be-specified workshops to discuss emerging issues of importance to STI policy.
- Intended to improve the agility of CSTP to integrate evolving topics or challenges into its work. May relate to peer learning or toolkits.

Emerging Issues Workshops



- A new reference framework to review the transformation fit or readiness of country STI systems and policy.
- The review process will place greater emphasis on international peer review and learning between countries.

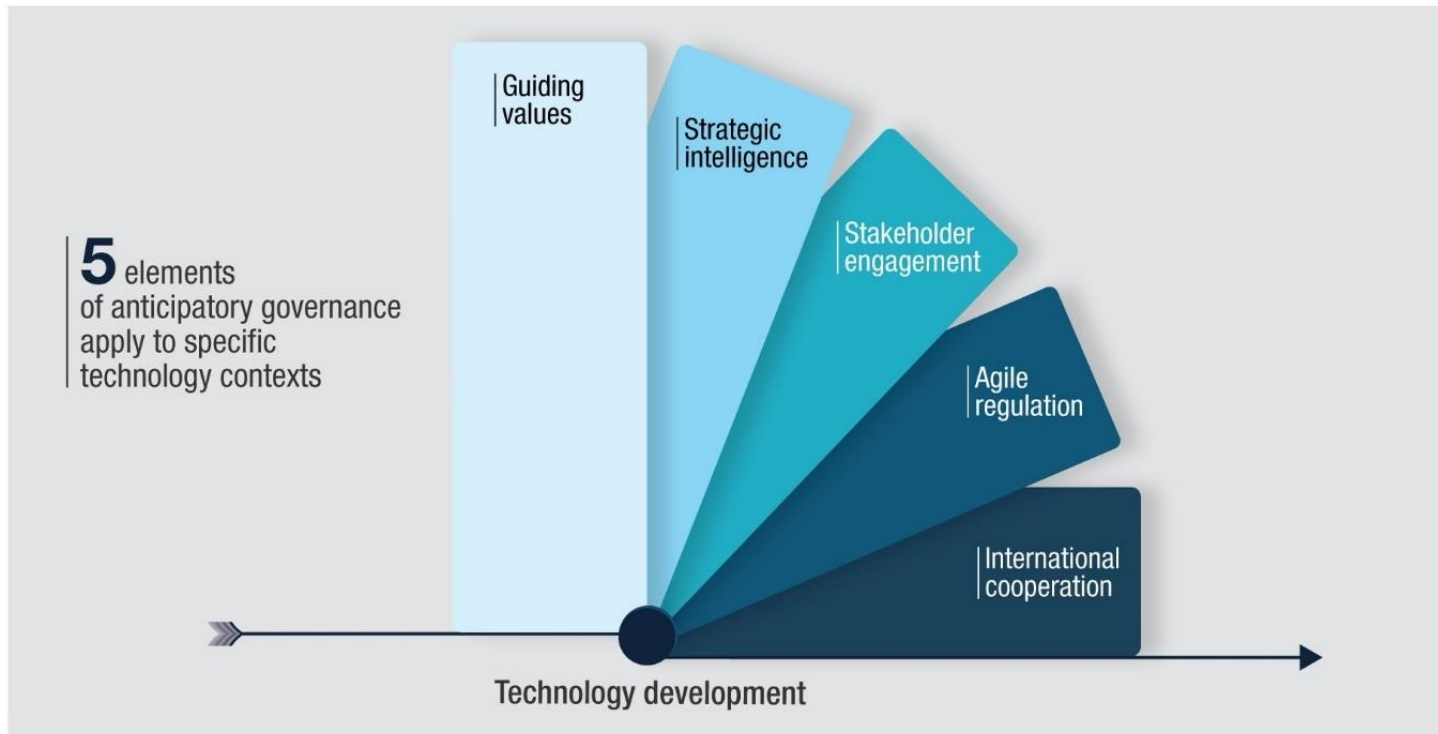
Country-specific support





OECD Framework for Anticipatory Governance of Emerging Technology advances responsible innovation

Welcomed by
Science & Technology
Ministers on
24 April 2024



<https://doi.org/10.1787/0248ead5-en>



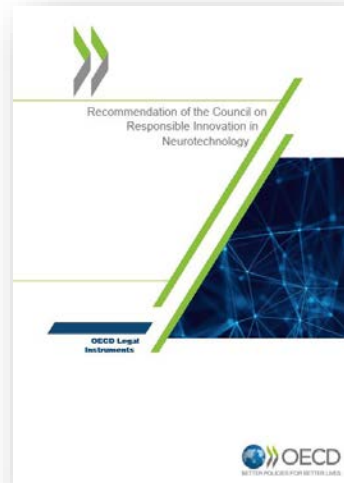


From the framework to its implementation

1. General framework

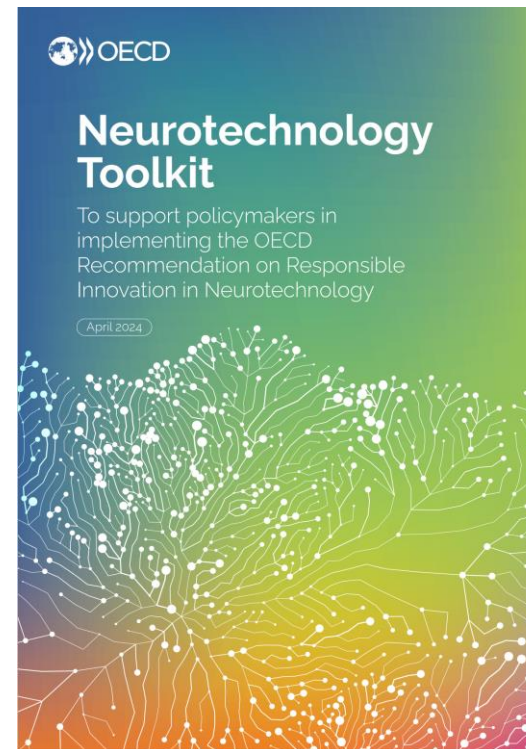


2. Tech specific principles and norms



3. More detailed guidance / toolkits

[The OECD Toolkit for Responsible Innovation in Neurotechnology](#)





Key Element: Anticipation and anticipatory governance

To manage crises, contribute to society's resiliency and address global challenges, STI policy need to be more anticipatory, systemic, inclusive and innovative. Good preparation calls for a strong capacity to identify, monitor and evaluate emerging risks and responses.

- From technology specific solutions to challenge-based technology solutions
- From individual technologies to convergence of technologies
- From technology policy to anticipatory governance of technology

- Identifying and addressing key emerging issues (e.g. convergence synbio and AI, human augmentation, Quantum)
- Implementing the Framework for anticipatory technology governance to develop recommendations
- Strengthening the work on strategic intelligence



Building our Biofuture

Policy issues and opportunities for next generation biotechnologies

Global Forum on Technology

- The OECD launched the GFTech in 2023 to provide a venue for regular in-depth dialogue to foresee and get ahead of long-term opportunities and risks presented by technology
- It covers three technology areas: Immersive technologies; Quantum technologies; and Synthetic Biology
- Its activities include:
 - Fostering strategic evidence-based dialogue and international cooperation
 - Exploring nascent approaches to policy challenges and opportunities posed by emerging technologies



OECD
Global Forum
on Technology





Research and Innovation Careers Observatory (ReICO)



Background: Launched to address evidence gaps in R&I careers, building on OECD's existing work on R&I workforce issues.



Objective: Provide robust data to inform policy-making, helping to shape a sustainable and inclusive R&I workforce.



Importance: Effective R&I talent management is key to tackling global challenges and advancing scientific progress.



Policy issues: Concerns over working conditions, issues of diversity and inclusion, and talent retention, mobility and international collaboration



Concluding remarks

- ❑ Strategic rivalry, rapid technological change, and global challenges are challenging the rules-based order and the landscape for STI internationalization
- ❑ Countries will need to navigate the new environment and can work through OECD to advance multilateral approaches and share best practices
- ❑ OECD can support country efforts through its Agenda for Transformative STI Policies, Framework for anticipatory governance of emerging technologies, Global Forum on Technology, and RelCO
- ❑ Japan can continue to benefit from strong participation in OECD activities, and OECD stands ready to assist with Japan's Seventh S&T Basic Plan

