Research and Innovation Careers Observatory 2026

Key Indicators on Talent, Mobility and Working Conditions

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KEY INDICATORS ON TALENT, MOBILITY AND WORKING CONDITIONS

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Foreword

Research and innovation begin with people. Researchers, engineers, inventors, technicians, entrepreneurs and a range of other specialised professionals are the individuals who create new knowledge, develop technologies and translate ideas into solutions that improve lives and drive economic and social progress. Their skills, creativity, mobility and working conditions shape not only the performance of research and innovation systems, but also countries' capacity to respond to major challenges, seize new opportunities and build resilience in an increasingly complex world.

For this reason, the human dimension of science, technology and innovation is a policy priority across the OECD, with many countries taking new steps to attract, develop and retain research and innovation talent. Yet the evidence base has not kept pace with the growing importance of these issues. Governments are increasingly called upon to make consequential decisions on education, research funding, migration, skills, competitiveness and economic security, all of which shape the future of research and innovation systems. Too often, however, such decisions are made with only a partial understanding of the talented individuals on which these systems depend, how their talent is developed, mobilised and retained, or of the factors that will weigh on their future supply.

The Research and Innovation Careers Observatory (ReICO) was established to help address this challenge. Developed as a joint initiative of the OECD and the European Union, ReICO brings together data, indicators, analysis and methodological innovation to strengthen understanding of research and innovation talent across countries. It reflects a shared recognition that people are at the heart of science, technology and innovation systems and that better evidence on their careers, opportunities and challenges is essential for effective policymaking.

This report presents the first comprehensive findings from ReICO. It highlights many encouraging developments, including the continued expansion of highly educated talent and growing and diversifying career opportunities in research and innovation. At the same time, it identifies emerging challenges related to the future talent pipeline - demographic change, limited expansion of the talent pool in strategically important knowledge domains, career sustainability and countries' differing capacities to benefit from the international circulation of knowledge, skills and ideas.

This publication, the first in a new series of periodic ReICO reports, complements the OECD's Measuring Science, Technology and Innovation monographs, internationally recognised vehicles for advancing understanding of key and novel aspects of science and innovation. ReICO contributes a dedicated focus on research and innovation talent, bringing together evidence on how people enter, navigate and contribute to R&I systems throughout their careers. As ReICO expands its data, methods and analytical capabilities in the coming years, it will progressively strengthen the international evidence base on R&I careers, supporting better policies and deepening understanding of the vital human dimension of research and innovation systems.

Acknowledgements

The report was developed by the Research and Innovation Careers Observatory (ReICO) team, which forms part of the Secretariat to the OECD Working Party of National Experts on Science and Technology Indicators (NESTI) within the Science and Technology Policy (STP) Division of the OECD Directorate for Science, Technology and Innovation (DSTI).

The report was prepared by Gillian Golden and Choyi Whang under the guidance of Fernando Galindo-Rueda, Head of the NESTI Secretariat, with substantive contributions from Kazuhito Oyamada, Brigitte van Beuzekom and Hyunkyeong Yun. The report development was overseen by Alessandra Colecchia, Head of the STP Division, and benefited from comments by Michael Keenan (STP), David Winickoff (STP) and Simon Roy (Head of Higher Education Policy in the OECD Directorate for Education and Skills). Alice Holt and Maximilian Reisch, Counsellors in DSTI, and Jerry Sheehan, Director of DSTI, provided valuable advice and feedback.

The ReICO project benefits from the collective effort of numerous OECD colleagues. Sylvain Fraccola, Daniel Sanchez-Serra, Blandine Serve and Choyi Whang developed the ReICO online hub, dashboards and databases that serve as the primary evidence base for this report. Fabien Verger and Guillaume Kpodar provided advice and support on indicators derived from the OECD Research and Development Statistics (RDS) database, while Vincent Finat-Duclos and Keira Wilson led the development of the ReICO country dashboard. Emily Acas and Kyriakos Vogiatzis provided administrative assistance and Sylvain Fraccola, Joseph Loux and Sebastien Ordelheide provided communication and publication support.

The report also benefited from contributions of data and ongoing collaboration of colleagues from the OECD Education at a Glance team, the OECD International Migration Division, Eurostat and the International Labour Organisation, as well as from data and evidence that were kindly provided by, or sourced through, LinkedIn and the European Centre for the Development of Vocational Training CEDEFOP.

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Finally, this work benefited from extensive support of the ReICO National Contact Points, without whom the project would not be possible and who are dedicated to monitoring research and innovation careers within their own national contexts, along with the ReICO Expert Advisory Group who contribute ongoing guidance and expertise to all ReICO activities.

Table of contents

Tables

Figures

Boxes

Reader's Guide

Country coverage

This report presents, where available, indicators from the ReICO evidence base for 51 countries, comprising:

- OECD and EU member countries (Australia, Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States).
- OECD accession candidate countries that are not EU members and OECD key partner countries (Argentina, Brazil, China, India, Indonesia, Peru, South Africa and Thailand).

Across these countries and ReICO indicators, data reliability and availability vary. To ensure methodological consistency and clarity of interpretation, restrictions were applied in the selection of countries included in each figure of this report, compared to what is available in the ReICO database. Figures in this report do not include countries with indicator values labelled “unreliable” (due to, for example, high sampling error or low response numbers) or those with values requiring caution in interpretation. Furthermore, figures presenting more than one indicator do not generally include countries with only partial data available.

Consequently, the set of countries included in figures, tables and charts across the publication differs depending on the indicator presented. Comparisons should be interpreted in the context of the countries included for each measure.

International classifications

Educational attainment categories are based on the International Standard Classification of Education (ISCED 2011). The analysis focuses on advanced qualifications, namely master’s or equivalent level (ISCED level 7) and doctoral or equivalent level (ISCED level 8) and refers where relevant to short-cycle tertiary (level 5) and bachelor’s or equivalent (level 6).

Fields of study discussed in the report are based on the ISCED Fields of Education and Training classification (ISCED-F 2013). The “STEM” grouping discussed in this report refers to ISCED-F fields 05 (natural sciences, mathematics and statistics), 06 (information and communication technologies), 07 (engineering, manufacturing and construction) and 08 (agriculture, forestry, fisheries and veterinary). This STEM grouping can differ from national definitions (see Box 2.1).

Occupations follow the International Standard Classification of Occupations (ISCO-08). The population qualified to work in science and technology is delineated in part using ISCO major groups 2 and 3, following the OECD-Eurostat *Canberra Manual*, while the science, engineering and technology workforce analysed in Chapter 3 comprises science and engineering professionals (ISCO 21) and information and communication technology professionals (ISCO 25). The functional categories of R&D personnel are based on the OECD *Frascati Manual.* Further detail is provided in Box 3.1.

Economic activities are classified according to the International Standard Industrial Classification (ISIC Rev.4) or its European equivalent (NACE).

Calculation of international means and totals

OECD and EU27 averages

Where possible to do so OECD and EU27 averages are calculated and displayed alongside national values for indicators presented in this report. OECD and EU averages are included only where at least 60% of countries in the relevant group have data available, that is, 23 countries for the OECD average and 17 countries for the EU27 average.

Averages are computed as either an unweighted (arithmetic) average or a weighted average of the countries in each group. The type of average depends on the usage and the original data source. Unweighted averages assume that each country contributes equally to the average. The OECD average therefore refers to an average of data values at the country level and can be used to answer the question of how an indicator value for a given country compares with the value for a typical or average country. It does not take into account the absolute size of each country or any other weighting factors. OECD averages presented in this report refer to the unweighted average, unless specifically stated otherwise. The EU-27 average refers throughout the report to the unweighted average.

OECD and EU27 totals

OECD and EU27 totals are calculated by summing up all the components as if these countries are one theoretical country. These aggregates are used only for the indicators on international mobility of academic authors presented in Chapter 4.

Data sources, metadata and further information on the ReICO databases

The full set of national and international data sources underlying the content of this report are presented in Annex A. Metadata relating to the data sources, data series and indicators included in the ReICO databases can be found in the OECD data explorer (OECD, 2026[1]). The 2026 ReICO methodology document also provides comprehensive information on the data sources, data validation processes, methodologies and important quality considerations to take into account relating to the ReICO evidence base (OECD, 2026[2]).

References

OECD (2026), *Methodology document on ReICO Data*, https://raw.githubusercontent.com/STIScoreboard/STIREICO/main/ReICO%20database%20notes%20and%20methodology%20for%20data%20users.pdf. [2]

OECD (2026), *ReICO database - full dataset*, https://data-explorer.oecd.org/vis?lc=en&df[ds]=DisseminateFinalDMZ&df[id]=DSD_REICO_FULL%40DF_ALL&df[ag]=OECD.STI.STP&df[vs]=1.0&dq=...&lom=LASTNPERIODS&lo=5&to[TIME_PERIOD]=false. [1]

Abbreviations and acronyms

Acronym	Definition
AI	Artificial Intelligence
ANR	National Research Agency (France)
CDH	Careers of Doctorate Holders
CEDEFOP	European Centre for the Development of Vocational Training
CFEE	Centre for Management and Strategic Studies (Brazil)
CSTP	Committee for Scientific and Technological Policy (OECD)
DAAD	German Academic Exchange Service
DBH	National higher education statistics database (Norway)
DDP	Development Data Partnership
DFG	German Research Foundation
DSTI	Directorate for Science, Technology and Innovation (OECD)
DZHW	German Centre for Higher Education Research and Science Studies
EAG	Expert Advisory Group (RelCO)
EC	European Commission
EHESO	European Higher Education Sector Observatory
ELMLP	Education and Labour Market Longitudinal Platform (Canada)
EPO	European Patent Office
ERA	European Research Area
ERC	European Research Council
EU	European Union
EU-SILC	EU Statistics of Income and Living Conditions
Eurostat	Statistical Office of the European Union
GERD	Gross domestic expenditure on R&D
ICT	Information and communication technology
INES	Indicators of Education Systems (OECD)
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification of all Economic activities
MORE	Mobility and career paths of Researchers in Europe (survey)
NACAPS	National Academics Panel Study (Germany)
NACE	Statistical Classification of Economic Activities in the European Community
NCSES	National Center for Science and Engineering Statistics, National Science Foundation (United States)
NIFU	Nordic Institute for Studies in Innovation, Research and Education
NOW	Dutch Research Council
PIAAC	OECD Programme for the International Assessment of Adult Competencies
PISA	OECD Programme for International Student Assessment
R&D	Research and Development
R&I	Research and Innovation
RelCO	Research and Innovation Careers Observatory
STEM	Science, technology, engineering and mathematics
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UOE	UNESCO-OECD-Eurostat joint data collection on education

Executive summary

A changing policy landscape for research and innovation careers

Research and innovation (R&I) systems are undergoing profound change, shaped by fiscal pressures, geopolitical force, technological transformation and shifting labour market needs. Meeting demand for R&I talent presents a strategic challenge for countries seeking to sustain scientific excellence and innovation, while the R&I workforce itself is increasingly heterogeneous. Policymakers need stronger evidence to map profiles and career pathways of R&I personnel.

Responding to this need and drawing on the evidence base of the Research and Innovation Careers Observatory (ReICO), this report brings together new insights on talent development, labour market outcomes and talent circulation in R&I systems. The findings reveal both the strengths of current approaches to developing and attracting R&I talent and some emerging vulnerabilities that could affect their future performance.

R&I career opportunities are expanding but future supply is not guaranteed

Opportunities for highly skilled individuals to participate in R&I have grown considerably in recent years. Research and development personnel made up almost 1.6% of employment across OECD countries in 2024, up from around 1.3% in 2015. In tandem, most countries continue to expand their pool of highly qualified R&I talent. OECD countries awarded more than 300 000 doctoral degrees and over 3.9 million master's degrees in 2023, numbers that have grown steadily over time. More than 1% of the OECD working-age population now holds a doctorate, with shares increasing in recent years in many countries, indicating overall a growing pool of individuals with advanced formal research training.

At the same time, this overall trend masks some emerging vulnerabilities. In several countries, the number of doctoral graduates declined between 2015 and 2023, in some cases from an already small base. These trends coincide with ageing populations and an older stock of highly qualified workers in some countries, raising further concerns about capacity to renew and expand the future talent pool.

Shares of advanced degrees in STEM fields are static, even as STEM employment grows

Employment in STEM professional occupations, defined to comprise science, engineering and ICT professionals, has grown rapidly, driven in particular by the diffusion of digital technologies. ICT professionals accounted for 3.1% of OECD employment in 2024, up from 1.8% in 2015. A further 3.7% of employment was based in science and engineering occupations in 2024, increasing from 3.2% in 2015. Yet, despite evidence of growing demand for advanced STEM skills, and countries' efforts to increase their supply, the broad field composition of advanced qualifications has remained remarkably stable across OECD countries over time. While absolute numbers have risen, the share of doctoral graduates in STEM fell from 48% to 46% between 2015 and 2023, and the share among master's graduates rose by under a percentage point, to 24%. These trends signal that current efforts to expand the supply of advanced STEM skills may not address increasing and shifting needs, although further analysis is needed to establish how

the composition of graduates is shifting between STEM subfields. Part of the explanation lies further upstream. Just over 10% of 15-year-olds across OECD countries aspire to a science career, a share that has remained largely unchanged over time. Gaps between men and women in participation in STEM education and careers also constrain the talent pool, although these are narrowing in some countries and STEM subfields.

Career outcomes for doctorate holders are generally positive but employment stability and rewards can vary

For individuals, doctoral education generally delivers strong labour market outcomes. Employment rates for doctorate holders exceed those of master's degree holders in most countries and are typically above 90%. Doctorate holders also earn more on average: the OECD-wide earnings premium relative to master's degree holders is 24%, although the size of this advantage differs markedly across countries. In addition, doctorate holders are slightly more likely to work full-time, with 90% of employed doctorate holders in full-time jobs on average across the OECD. Evidence also suggests that doctorate holders are generally more satisfied with their financial situation than master's degree holders, consistent with their favourable earnings and employment outcomes. At the same time, employment stability remains a concern for some doctorate holders who are, on average, slightly less likely than master's degree holders to hold indefinite contracts, reflecting the prevalence of fixed-term postdoctoral positions in early stages of many research careers.

R&I systems benefit from international talent, but mobility remains uneven across countries

International mobility has become an increasingly important source of research and innovation talent. Across the OECD, internationally mobile graduates accounted for 19% of master's graduates and 29% of doctoral graduates in 2023. However, mobility patterns remain uneven across countries, fields and demographic groups. The foreign-born share of doctorate holders, for example, ranges from 5% to 70% across countries, revealing sizeable differences in the attractiveness of R&I systems for internationally mobile talent.

Facilitating mobility across borders can strengthen international research linkages and support the circulation of knowledge within and between R&I systems. Around 10% of scientific authors with affiliations in OECD countries in 2024 showed evidence of prior international mobility, while mobile researchers are disproportionately concentrated in more internationally connected research systems.

A new generation of evidence on R&I careers is needed

Meeting today's talent challenges and expanding opportunities for attractive and sustainable R&I careers requires moving beyond fragmented data towards an evidence base rich and robust enough to inform policy and career decisions in a fast-changing R&I landscape. Future efforts must go beyond counting people to better understand their profiles, capabilities, motivations, mobility, working conditions and long-term career trajectories. This will require greater integration of data across policy domains, stronger international cooperation, and new data sources and methods to complement official statistics, including administrative records, labour market data, and digital traces of scientific and inventive activity. Priorities for strengthening the evidence base include tracking career moves across sectors and borders, identifying emerging occupations linked to critical technologies, and building a more detailed profile of the R&I workforce. ReICO provides a platform to coordinate these efforts and scale them internationally.

1 Monitoring research and innovation careers through ReICO

This chapter introduces the Research and Innovation Careers Observatory (ReICO), a joint OECD-EU initiative designed to strengthen international evidence on research and innovation talent, careers, mobility and working conditions.

In Brief

A joint OECD-EU initiative to close persistent gaps in evidence on research and innovation careers

Talent is central to research and innovation (R&I) systems, yet policy responsibility for the R&I workforce is fragmented across ministries responsible for science, education, employment and migration — and so is the evidence base. National data on R&I careers are often siloed, disconnected from policy initiatives, and spread across multiple sources, leaving policymakers to make high-stakes decisions on STI investment and reform with only a partial picture of the workforce these choices affect.

The Research and Innovation Careers Observatory (ReICO), launched jointly by the OECD and the European Union in 2024, addresses this gap. It brings together existing national and international data sources, identifies evidence gaps, and sets an agenda for the future measurement of R&I personnel and their careers. The Observatory already covers more than 50 countries across three core themes - talent development, labour market perspectives and talent circulation - and includes a statistical dashboard of internationally comparable indicators, country-level dashboards, detailed databases for each theme, alongside new surveys, microdata pilots and outputs containing thematic analysis.

Measuring the R&I workforce, however, remains inherently difficult. Traditional approaches — counting R&D personnel under the Frascati Manual, or mapping qualifications and occupations under the Canberra Manual — struggle to capture innovation-related roles, emerging technology fields, and the wider pool of qualified individuals who could contribute to R&I but currently do not. Closing these measurement gaps, particularly for fast-evolving fields where standard classifications fall short, will be essential for giving governments and other stakeholders a fuller, more comparable picture of the R&I talent they depend on.

Understanding research and innovation careers in a changing environment

The growing need for evidence

Science, technology and innovation (STI) is a key driver of economic opportunity and human progress. At the heart of STI systems are the people who generate new knowledge, develop technologies and translate ideas into innovation. The research and innovation (R&I) workforce is vital to achieving national objectives on science, technology and innovation. Developing, attracting and retaining talent is thus a strategic priority for governments, and strengthening the talent base available for R&I activities is central to national reform agendas in many countries.

Governments are working to address talent needs in several ways: developing or updating STI human resources strategies, aligning research training more closely with labour market requirements, renewing efforts to attract talent from abroad and seeking to make R&I careers more stable and rewarding (EC-OECD, 2026[1]). These reforms take place in an increasingly dynamic global labour market. Competition is especially intense in emerging and critical technology domains, where demand for specialised expertise outstrips supply and workforce capacity is increasingly viewed through a lens of economic security. Beyond specialised knowledge, effective innovation systems depend on a broader set of advanced digital, interdisciplinary, entrepreneurial and collaborative competencies which enable organisations and researchers to adapt to rapid technological and societal change.

At the same time, mounting pressures and imbalances may be eroding the capacity of many countries to nurture, retain and attract the R&I talent they need. Public R&D budgets in the OECD area declined overall in 2024 and show signs of rebalancing across socioeconomic objectives, particularly towards defence (OECD, 2026[2]). International mobility, long a defining feature of research careers, is being reshaped by policy reorientations, geopolitical tensions and research security concerns. In some systems, the supply of qualified early-career researchers has outgrown absorptive capacity within academia, while their knowledge, skillsets and career expectations do not always align with opportunities available in other sectors. AI is also transforming R&I careers in several ways, changing the nature of many R&I-related tasks while increasing pressure on the peer review, publication and assessment systems used to recognise the career contributions of many researchers (OECD, 2026[3]). The R&I workforce is itself also transforming to include new roles that may not be adequately recognised in traditional national and international classifications used to measure the R&I workforce, including the Frascati family of manuals (OECD/Eurostat, 2018[4]; OECD/Eurostat, 1995[5]; OECD, 2015[6]).

While each of these trends warrants - and receives - policy attention in many countries, no central function typically owns policy responsibility for all facets of R&I careers. Instead, policy instruments are developed across ministries responsible for science, education, employment, migration, and industrial policy. This fragmentation splits not only the policy space but also the evidence space. Where they exist, national data, statistics, and indicators on R&I careers are often disconnected from policy initiatives, siloed, and spread across multiple sources. Moreover, cohesive evidence agendas and associated measurement strategies within countries and international organisations are limited or non-existent. In practice, this means that national policymakers need to make high-stakes decisions about science, technology, and innovation reform and investment with only a fragmented and partial understanding of the R&I workforce who will be impacted by and tasked with implementing these policies.

To effectively address the challenges arising from this evolving policy context, countries need comprehensive and up-to-date data and evidence about their R&I workforce: its composition, capabilities to tackle current and future challenges, conditions in place to nurture and attract the most skilled and talented people, and career trajectories and outcomes.

A coordinated response through the Research and Innovation Careers Observatory

The human resources related challenges outlined above are shared, to varying degrees, across R&I systems worldwide, offering scope for comparison of conditions and mutual learning among countries on R&I workforce issues.

The Research and Innovation Careers Observatory (ReICO) is a joint initiative of the OECD and the European Union that addresses the challenges and systematic gaps in evidence on R&I careers. (OECD, 2026[7]). Commenced in 2024, ReICO is working to gather, connect enrich and expand data on R&I talent across OECD and EU countries, partner countries and other major global economies, aiming to bring together existing national and international data sources, identify evidence gaps, and set an agenda for the future measurement of research and innovation personnel and their careers. The Observatory currently provides data and evidence for more than 50 countries, organised around three core themes: talent development, labour market perspectives and talent circulation.

ReICO contributes to the international evidence base on research and innovation careers through the development of a diverse set of resources:

- **Common language and conceptual framework** on R&I talent and careers, establishing key concepts, definitions and classifications, which are further elaborated below and throughout this report.
- **ReICO hub** (OECD, 2026[8]), a user-friendly digital platform accessible via the OECD website and the EU's ERA Talent Platform, comprising the core ReICO statistical dashboard (over 200 internationally comparable indicators across the three ReICO themes), the ReICO themes portal, and ReICO country pages and country dashboard (OECD, 2026[9]) for country-level exploration and comparison.
- **New data collections and surveys**, including the newly launched 2026 OECD-EU Research and Development Careers Survey, gathering evidence directly from individuals on their careers, working conditions and mobility, and dedicated indicators monitoring the careers and working conditions of participants in Horizon Europe, benchmarked against the wider researcher population.
- **Microdata analysis and measurement pilots**, exploiting administrative, commercial and other novel data sources (e.g. funding-agency records, job postings, bibliometric and researcher-identifier data) and piloting new internationally co-ordinated data collections.
- **Policy evidence and analysis**, including a repository of policy initiatives on R&I talent and careers drawing on the EC-OECD STIP Compass database, analytical reports and an annual ReICO publication presenting the latest indicators and highlights.
- **An evaluation of measurement capacity and a forward-looking measurement agenda**, taking stock of data availability across countries and driving consensus on priorities for closing evidence gaps. recommendations for improving international guidelines on collecting, reporting and interpreting data on R&I careers.

Facilitating such comparison and mutual learning calls for bringing together fragmented data and system-level information across countries to support governments in comparing and improving their policies. ReICO can help identify national best practices for understanding the current state of R&I workforce and its future potential. Comparable international data and information on R&I careers also serves R&I workers themselves, a highly mobile group whose career decisions are often made at an international rather than national level, along with many other stakeholders (Box 1.1).

Box 1.1. Who can benefit from improving the evidence base on R&I careers?

Information and data on R&I workforce and careers are valued and used by a wide range of stakeholders for many purposes, including policy design, organisation management, career development and scientific research. Different users require different levels of granularity, timeliness, and coverage, reflecting their specific objectives.

Governments and policymakers

National governments, ministries, and public agencies are among the primary intended users of data on R&I careers. They require such information to monitor the size, composition, and evolution of the R&I workforce; assess the effectiveness of investments; identify skills shortages; and evaluate policies related to talent attraction, retention, mobility, and diversity. Given the fragmented policy responsibility for R&I workforce issues, high-quality, timely, and relevant data on R&I careers is especially crucial to support STI ministries proposing workforce-related policies that fall under the purview of other government ministries, such as those with responsibility for spending, tax, employment legislation, migration, or pensions.

Internationally comparable data is also particularly important for governments and policymakers. It serves the purpose of supporting international benchmarking of framework conditions for and relative attractiveness of R&I careers. It can also help inform cross-country policy coordination and collaboration.

R&I funding and economic development organisations

Public and private funders, alongside innovation and economic development agencies, need workforce data to assess the outcomes and longer-term impacts of funding programmes. Tracking the career trajectories of grant recipients, for example, can reveal whether funding supports career progression, interdisciplinary collaboration, international mobility, or contributions to innovation-oriented activities. Information on talent mobility between universities, firms, start-ups, and government laboratories can provide further insights into knowledge diffusion, entrepreneurship, and regional innovation capacity.

Higher education institutions and public research organisations

Higher education institutions and public research organisations require data on the profiles and outcomes of R&D personnel at all career stages to understand recruitment patterns, retention rates, and the subsequent careers of graduates and researchers. Such information serves a range of purposes: strategic planning, workforce management, staff mentoring and performance assessment, as well as demonstrating the societal value of research training.

Individual R&I personnel

Individual researchers and other R&I personnel, as well as those considering an R&I career, can use career data to benchmark their own trajectories against those of peers, identify opportunities, explore mobility patterns, and understand the skills and experiences associated with different career paths. Professional associations and research support offices can draw on the same information to provide career guidance and professional development services.

Employers, in both private and public sectors

R&I career information can be very valuable to businesses, especially those operating in knowledge-intensive sectors, helping them understand the supply of highly skilled talent, identify emerging competencies important for their R&I work, and analyse labour market conditions. It can also help firms

identify where relevant expertise sits across universities, public labs and other companies, and how readily people move between them.

Civil society and the general public

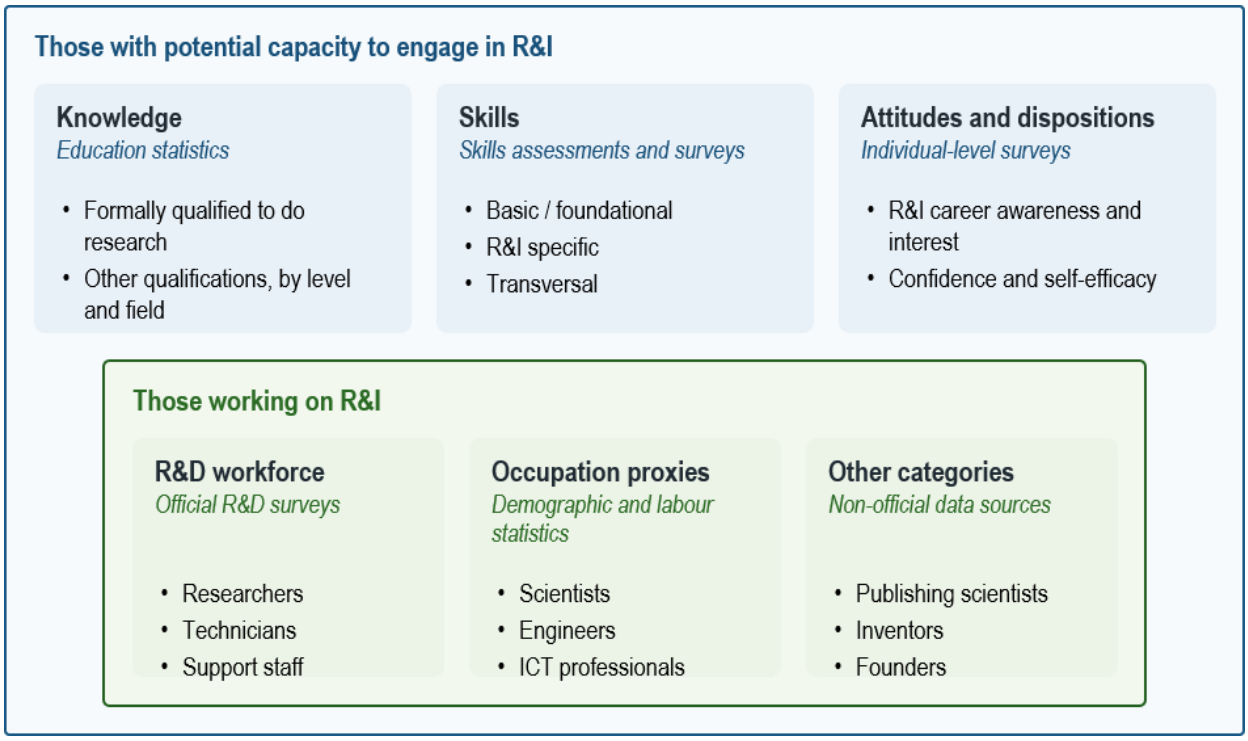
Civil society organisations, journalists and the public can use aggregated career data to scrutinise the returns to public investment in research and higher education - whether it produces the right mix of skills and competencies, whether opportunities are open across society, and what working conditions and prospects it promotes. Such evidence informs public debate on precarity, diversity and inclusion, opportunities for early-career researchers, and the wider contributions of R&I systems to the good of society.

ReICO, as a joint endeavour between the OECD and the European Union, also supports policy development and monitoring of policy initiatives relating to human capital for R&I ecosystems - a core pillar of the European Research Area (ERA), the EU's single market for research, innovation and technology. The ERA Policy Agenda 2025-2027 addresses research careers through a dedicated structural policy aimed at making them more attractive and sustainable and at supporting mobility of researchers, building on the 2023 Council Recommendation on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe. ReICO complements several EU-level initiatives supporting implementation of this framework (European Commission, n.d.[10]; Council of the European Union, 2023[11]), including information-oriented and awareness raising initiatives such as the ERA Talent Platform a one-stop-shop for researchers and innovators in Europe and beyond (European Commission, n.d.[12]), and EURAXESS, a portal providing information and job opportunities for researchers and research-performing organisations (EURAXESS, n.d.[13]).

ReICO's approach to identifying and measuring the R&I workforce

When developing, implementing and evaluating policies, countries are interested in understanding both the actual and potential human resources available to R&I ecosystems. This requires assessing not only those already working in R&I, but also those who could do so, given their qualifications, experience and skills. ReICO adopts this broad perspective, combining information on current R&I workers and the wider pool of potential talent to monitor workforce dynamics. Moreover, interest lies not only in understanding the broad talent pool but specific groups within it, such as those with ability or potential to work on specialised technologies and sectors. Depending on the policy objective, the level of granularity required and the available data sources, different approaches to identifying human capital for R&I can be applied (Figure 1.1).

Figure 1.1. Identifying the research and innovation workforce



Note: Text in italics indicates the source of information most used for each category. Bullet points show example sub-categories.
Source: Authors' elaboration.

Identifying those currently working in research and innovation

ReICO draws on two longstanding traditions used within national and international statistical infrastructures to identify and collate data on those working in research, development and other scientific, technological or innovation activities. A first delineates human resources devoted to research and development (R&D) and innovation. A complementary approach identifies and groups occupations from standard classifications to approximate personnel working on science, technology and innovation.

Research, development and innovation personnel

The OECD's Frascati Manual, most recently updated in 2015, provides the set of definitions and guidance that informs international data collection on research and experimental development (R&D) activities. The Frascati Manual defines R&D as:

> *"creative and systematic work undertaken to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge".*

To be classified as R&D, an activity must jointly satisfy five core criteria: it must be novel, creative, uncertain, systematic, and transferable and/or reproducible (OECD, 2015[6]).

The Frascati Manual also defines the personnel who carry out these activities: R&D personnel comprise all persons engaged directly in R&D, as well as those providing direct services to R&D activities, and are classified by function into researchers – not just scientific researchers but also research professionals like engineers engaged in the conception or creation of new knowledge – technicians and equivalent staff, and other supporting staff (OECD, 2015[6]). This classification is implemented in surveys of organisations (such as business, universities, government institutes), where respondents provide information on their R&D

workforce for the entire organisation. With few exceptions, R&D surveys rarely collect personal data. As a result, it is difficult for countries to compile and report multidimensional profiles of R&D personnel combining characteristics like R&D function, sex, age and educational attainment, highlighting the need for initiatives such as ReICO to strengthen person-level evidence on R&I careers (see Chapter 5).

While measures of the R&D workforce are key for indicating capacity to add to frontier knowledge and its applications, across all sectors they are insufficient for monitoring innovation. The Oslo Manual (OECD/Eurostat, 2018[4]) defines innovation activities to "*include all developmental, financial and commercial activities undertaken by a firm that are intended to result in an innovation for the firm*". In contrast to R&D personnel, the measurement of human resources devoted to innovation activities remains significantly less developed and is largely missing from international comparisons[1]. Addressing this gap will require further efforts to develop concepts, data sources and statistical approaches capable of capturing the skills, occupations and career pathways that contribute to innovation beyond formal R&D activities.

R&I-related employment identified through occupational classifications

The OECD/Eurostat Canberra Manual (OECD/Eurostat, 1995[5]) developed a framework combining educational qualification level with occupational category to identify the stock of workers who work, or who are qualified to work, in science and technology, based on standard international classifications. The education criterion applies to those with qualifications achieved at tertiary level - International Standard Classification of Education (ISCED) levels 5 (short-cycle tertiary education) to 8 (doctoral or equivalent education) while the employment criterion applies to those working in occupations classified in the International Standard Classification of Occupations (ISCO) major groups 2 (professionals) and 3 (technicians and associate professionals). Within this framework, ReICO delineates the subgroup of science and engineering, health and ICT professionals, to identify those working most directly in highly skilled science, engineering and technology roles (see Chapter 3).

While ReICO builds primarily on the Canberra Manual framework, it also reviews and takes into account other national and international approaches to identifying R&I occupations, drawing on their insights while recognising the limitations of standard occupational classifications for accurately identifying R&I personnel. For example, while ISCO refers to research in the titles and definitions of many occupations, it cannot systematically identify R&D-performing occupations. Occupations are primarily classified by field and level of expertise rather than by activity, so individuals conducting research are classed within discipline-based professional categories alongside others performing non-research work in the same fields. Compounding this, the Frascati R&D personnel categories do not align clearly with occupational levels in standard classifications, complicating linkages between labour force and employment data.

These limitations become even more acute when it comes to identifying personnel working in frontier research and technology areas, where the range of relevant roles is considerably narrower and the required skill profiles more specialised. For example, quantum technologies is recognised as a field that is strongly science-driven and requires a highly qualified workforce mainly comprising technical and research roles, with recent OECD analysis indicating that, as of now, there is relatively little requirement for the broader set of roles associated with application and commercialisation of more advanced technologies (EPO/OECD, 2025[14]). In such fields, the workforce of interest may constitute only a small fraction of any standard occupational category, and in the case of the newest roles, may not be included in classifications at all, calling for other methods and data sources that might allow for identification at a much finer grain than standard classifications.

Recognising these limitations, ReICO provides a platform for collaboration among international organisations, national authorities and experts to address these measurement challenges and develop and test improved concepts, methods and data sources for identifying and monitoring R&I talent, particularly in emerging fields and roles not yet captured by existing statistical frameworks.

Identifying the wider R&I talent pool

ReICO defines the wider research and innovation workforce as all those with the mix of knowledge, skills and attributes needed to contribute to R&I. Competencies for R&I may be cultivated separately or in tandem through different talent development processes (as discussed in Chapter 2). Ideal combinations of technical and disciplinary knowledge and "soft" competencies will vary across R&I contexts, roles and organisations. For this reason, the potential R&I workforce is broad and indistinct, unable to be captured fully through credentials or occupational classifications. Such a wide and open-ended definition complicates measurement, but efforts to measure the R&I workforce are essential for policy purposes, as evidence on the wider talent pool indicates the extent to which existing populations could potentially be engaged in R&I activities. ReICO aims to approximate this workforce through novel aggregations of available data on individuals or designing new data with the potential to improve existing approaches to delineating R&I talent.

Individuals with qualifications to work in R&I

Although formal qualifications are not required to engage in R&I activities, employers place emphasis on educational attainment as an important indicator of the knowledge and disciplinary skills needed to engage in R&I activities at any level. Some form of tertiary degree is often required, or at least valued as a credential, when accessing a career in R&I.

Doctorate holders occupy a specific position among those recognised as qualified to engage in research and innovation. They have attained the highest level of formal education (ISCED level 8) and, unlike most other qualifications, the formal requirements for an award of a doctorate include a substantial output of original research, which contributes new knowledge to a particular field of study. Doctoral training is therefore the most direct formal preparation for conducting original research and generating new scientific knowledge, and the population with doctoral education attainment is a key focal group to monitor within ReICO. Available data indicates that doctorate holders comprise a large share of R&D personnel, particularly in the higher education sector (see Chapter 3).

Master's graduates, at ISCED level 7, are also important potential and actual contributors to R&I. Master's programmes provide participants with advanced academic and/or professional knowledge, skills and competencies and often contain a direct research component, while curricular content tends to be informed by state-of-the-art research and or cutting-edge professional practice (OECD/Eurostat/UNESCO Institute for Statistics, 2015[15]). Graduates with master's degrees considerably outnumber doctorate holders and so constitute a more substantial share of human resources available for science, technology and innovation. Moreover, a master's-level qualification is the standard entry requirement for doctoral education in most OECD countries, although a minority of systems – including Australia, the United Kingdom and the United States – allow direct access to doctoral programmes on the basis of bachelor's-level qualifications (UNESCO Institute for Statistics, 2025[16]).

Together, master's and doctoral graduates are key populations of analytical interest for ReICO, as groups with the formal qualification levels closely associated with supplying advanced knowledge and skills for R&I work.

Skills to work in R&I

Beyond formal qualifications, the capacity to contribute to R&I also rests on a broader set of technical, discipline-specific and transversal competencies needed to conduct research and develop and/or implement innovations. Such competencies can be developed within formal study programmes or outside them, through professional experience or employer-provided training. Indeed, in some industries, relevant experience and demonstrable skills are valued as highly as formal credentials. In the creative industries, software development and skilled trades, for instance, a strong portfolio, a proven track record or sought-

after technical competencies can carry as much weight as a formal degree, or more (European Commission, n.d.[17]).

Several competency frameworks have been developed to identify and describe the skills most important for research and innovation, for example, the European Competence Framework for Researchers (ResearchComp) (European Commission, n.d.[17]). As another example, the United States' National Postdoctoral Association maintains a set of six core competencies for postdoctoral scholars: discipline-specific conceptual knowledge; research skills; communication skills; professionalism; leadership and management skills; and responsible conduct of research. These core competencies are used by scholars, mentors and institutions to structure training and professional development (National Postdoctoral Association, n.d.[18]).

Measuring skills prevalence and level among current and potential R&I personnel and quantifying their relative importance across different R&I jobs, remains inherently difficult. Nevertheless, the ability to develop, update and signal competencies beyond formal qualifications is now widely recognised as fundamental in a rapidly changing labour market. Efforts to measure the demand for and supply of skills are therefore likely to become an increasingly important complement to qualification-based measures of the R&I talent pool and constitute a key area of future focus for ReICO (see Chapter 5).

Attitudes and disposition to engage in R&I

Finally, knowledge, skills and qualifications are necessary but not sufficient conditions for contributing to R&I. Research and innovation are ultimately sustained by an intrinsic drive to explore and create, and by a positive disposition towards a career devoted to these pursuits – it has long been recognised that the capacities relevant to innovation extend beyond technical proficiency to encompass attributes and dispositions (OECD, 2011[19]). Individuals who possess all the requisite competencies but are not inclined to apply them to R&I, preferring careers in fields such as, for example, finance, law or management, remain outside the effective talent pool, however qualified they may be in terms of knowledge and skills. Measuring such attitudes among current and potential R&I personnel is challenging given that such dispositions are self-reported, context-dependent and liable to change over a career. Improving abilities to capture attitudes and disposition to engage in R&I therefore also forms part of the future agenda for ReICO.

Outline of this report

The remainder of the report sets out key findings from the ReICO project to date. Each of the next three chapters of the report is devoted to one of the focal themes of ReICO. Chapter 2 presents evidence on how countries are building their talent pipelines for R&I systems. Chapter 3 examines the R&I workforce, including employment trends and outcomes. Chapter 4 assesses the role of international mobility of R&I talent across countries. Each chapter addresses key questions related to the theme, drawing on the indicators contained in the ReICO evidence base and, in some cases, complementary data sources, providing in-depth analysis of issues of policy relevance. The final chapter shares some reflections on the current state of efforts to measure R&I personnel and their careers, drawing on the experience of ReICO's first two years of operation. It highlights the most significant data gaps and sets out options and priorities for improving measurement through internationally coordinated action, informed by emerging and existing practices across countries contributing to ReICO.

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Notes

[1] The Oslo Manual's 2018 edition nonetheless recommends that business surveys collect data on the human resources devoted to innovation activities in terms of person-months, particularly for activities where financial amounts are difficult to report, and draws attention to the potential of household and individual surveys as sources of information on innovation across all sectors, including the contributions of employees and the self-employed

2 Developing knowledge and skills for research and innovation

What does it take to build the talent base for research and innovation? Drawing on the ReICO evidence base, this chapter compares how countries are developing the competencies their research and innovation systems need most. It analyses the supply and mix of advanced qualifications, assesses countries' capacity to sustain and expand the talent pipeline, and profiles the foundational skills and attitudes that underpin successful careers in research and innovation.

In Brief

Progress on R&I talent development but shortages and imbalances persist across countries

The talent base underpinning research and innovation systems is expanding in most OECD countries. More than 1% of the working-age population in OECD countries now holds a doctorate, while the number of new doctoral graduates is increasing in most countries and exceeded 300 000 in the OECD area alone in 2023. Yet this positive trend masks emerging vulnerabilities. In some countries, the age profile of highly qualified workers combined with declining population may make it increasingly difficult to replenish the future talent pipeline.

Talent is not only about quantity but also about composition. Persistent shortages in specific fields can limit research and innovation performance even where the overall supply of qualified workers is strong. Across the OECD, the disciplinary profile of advanced graduates has changed little over time: STEM fields continue to account for nearly half of all doctoral graduates (46% in 2023), while social science and business fields dominate master's degrees (41% in 2023). Disparities between men and women also remain pronounced. Women continue to be more highly represented in non-STEM than STEM disciplines at both master's and doctoral levels, although many countries are seeing growing shares of women's participation in fields such as engineering and ICT.

Sustaining research and innovation capacity will also depend on the aspirations and capabilities of future generations. Countries differ markedly in the share of 15-year-old students who expect to pursue careers in science and technology, and in some cases these ambitions are weakly aligned with countries' capacities for science-related careers. Closing this gap will be critical for strengthening tomorrow's research and innovation workforce.

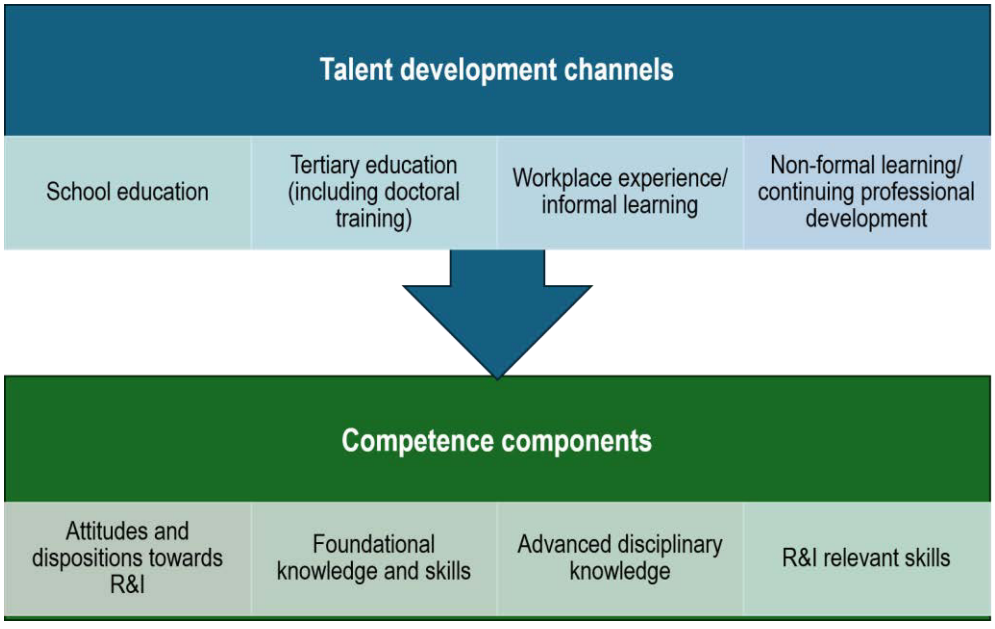
Introduction

Countries have two main routes available to build their research and innovation (R&I) workforce: 1) cultivating the necessary knowledge and skills within their own populations; and 2) attracting talented people from abroad. This chapter uses the ReICO evidence base to examine the first of these routes: how R&I talent is formed within countries through acquisition of the qualifications, skills and dispositions that R&I careers demand. The second route - the capacity of countries to attract talented individuals from abroad - is addressed more fully in Chapter 4 as part of the analysis of R&I talent mobility.

As the previous chapter outlined, the potential R&I workforce comprises individuals with advanced knowledge, strong foundational and R&I-specific skills, and favourable attitudes and dispositions to engage in R&I activities. These competencies can be developed through several channels, beginning with school-level education and continuing through higher education, the workplace, continuous professional development and informal learning (Figure 2.1).

While evidence on the extent and depth of R&I competencies developed in the workplace and through informal learning remains scarce, ReICO indicators provide a signal of what formal schooling and tertiary education contribute to R&I talent, in terms of knowledge, skills and attitudes. Using these data, this chapter examines talent development across countries through several lenses: the current stock of highly qualified people, the inflow of newly qualified graduates to the labour market and composition of their fields of study, and young people's foundational skills and their motivation to pursue R&I careers. Taken together, these perspectives provide an indication of how well-placed countries are to renew their potential R&I workforce over the longer term.

Figure 2.1. R&I talent development channels



Source: Authors' elaboration.

To what extent can countries develop highly qualified talent for research and innovation?

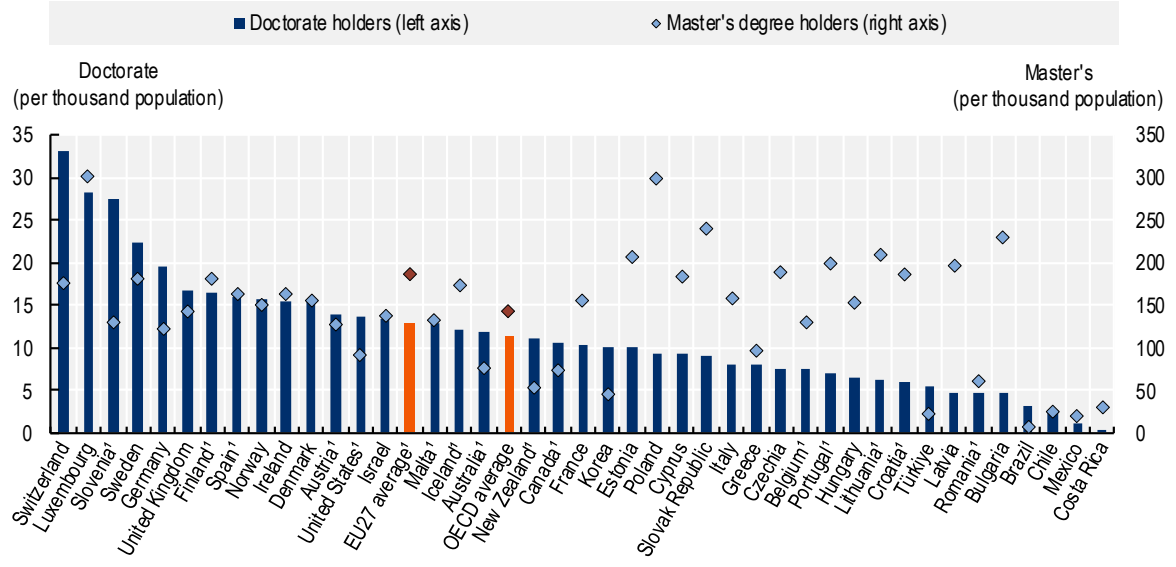
Working at the frontier of research and innovation often requires advanced disciplinary expertise and ability to generate and apply new knowledge - competencies cultivated and certified through advanced degree programmes. As Chapter 1 noted, graduates from master's and doctoral programmes provide a key source of talent for R&I systems and therefore warrant close monitoring by policymakers. Public interest is reinforced by the scale of public investment involved. Governments in most OECD countries finance a large share of the cost of advanced degrees, whether through block grants to higher education institutions or through research funding (OECD, 2025[1]). These considerations highlight the importance of understanding the current availability of advanced degree holders for R&I systems and the outlook for renewal of this segment of the workforce in the years to come.

Doctorate holders have grown to over 1% of the OECD working age population

Across OECD countries, in 2024, just over 1% (11 out of every 1 000) of the working age population held a doctorate degree, and 14% (144 out of 1 000) held a master's degree, although shares vary sharply across countries (Figure 2.2). European countries have the highest shares of doctorates: in Switzerland, the share of 25-64 year-olds with a doctorate reached 33 per 1000, followed by Luxembourg (28), Slovenia (27), Sweden (22) and Germany (19). At the lower end of the scale, Mexico and Costa Rica have one or fewer doctorate holders per 1 000 of their working age population.

Figure 2.2. Share of doctorate and master's degree holders in the working age population, 2024

Per thousand of the working age population aged 25-64



Notes: Data for more countries are available on the database. 1. Reference year differs: 2021 for Australia, Belgium, Canada, Croatia, Lithuania, Malta (doctorate) and Romania, 2022 for Austria, 2023 for EU27 average (doctorate), Finland, Iceland, New Zealand, Portugal (doctorate), Slovenia, Spain and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

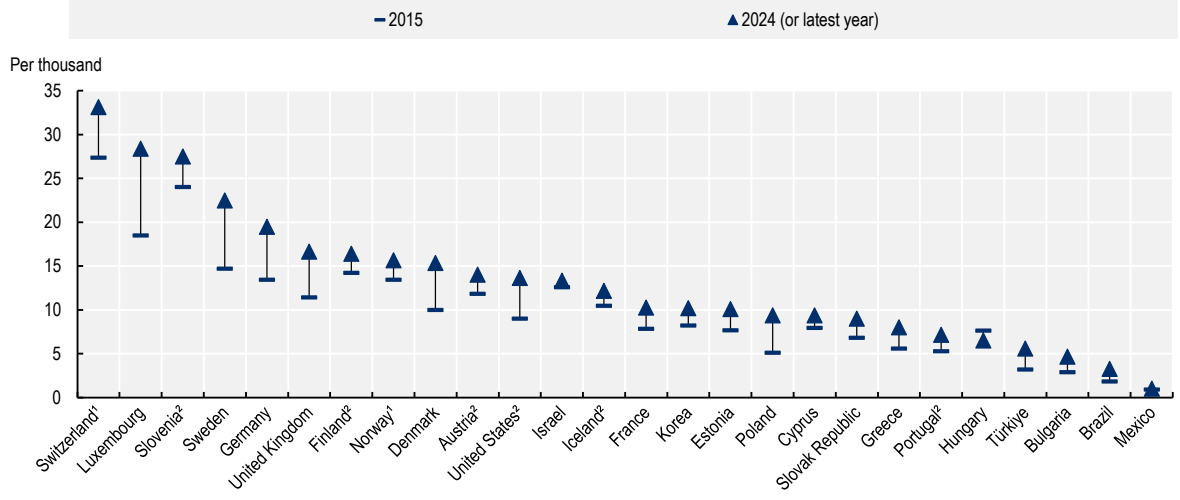
StatLink https://stat.link/rhxob9

Relative shares of master's degree holders in the working age population follow a considerably different pattern than those of doctorate holders. For example, several European Union countries with relatively low shares of doctorate holders, such as Bulgaria, Latvia, Lithuania, Poland and the Slovak Republic, have among the highest shares of master's degree holders. This may reflect, to some extent, a traditional approach in some national education systems of integrating undergraduate and postgraduate education stages into a single "long first degree" programme which awards a master's degree upon completion rather than a bachelor's degree (OECD, 2025[2]). In other cases, countries with average shares of doctorate holders, such as Australia, Canada and Korea, have shares of master's degree holders below the OECD average. In these countries, short-cycle and bachelor's degrees are more prevalent as the standard entry qualification for the labour market (OECD, 2025[2]) which may limit demand among learners for master's-level credentials.

Comparing shares of doctorate holders in the working age population over time is challenging, due to gaps in time series data for individual countries and, therefore, the OECD as a whole. Countries with available data, however, tend to show an increasing trend since 2015. For instance, in Denmark the number of doctorate holders per 1 000 of the working-age population has increased by 54% since 2015, reaching 15 per 1 000 in 2024. In the United Kingdom the number reached almost 17 per 1 000 in 2024 – an increase of 45% since 2015 (Figure 2.3).

Figure 2.3. Change in share of doctorate holders, 2015-2024

Per thousand of the working age population aged 25-64



Notes: 1. Break in series. 2. Latest year is not 2024: 2022 for Austria, 2023 for Finland, Iceland, Portugal, Slovenia and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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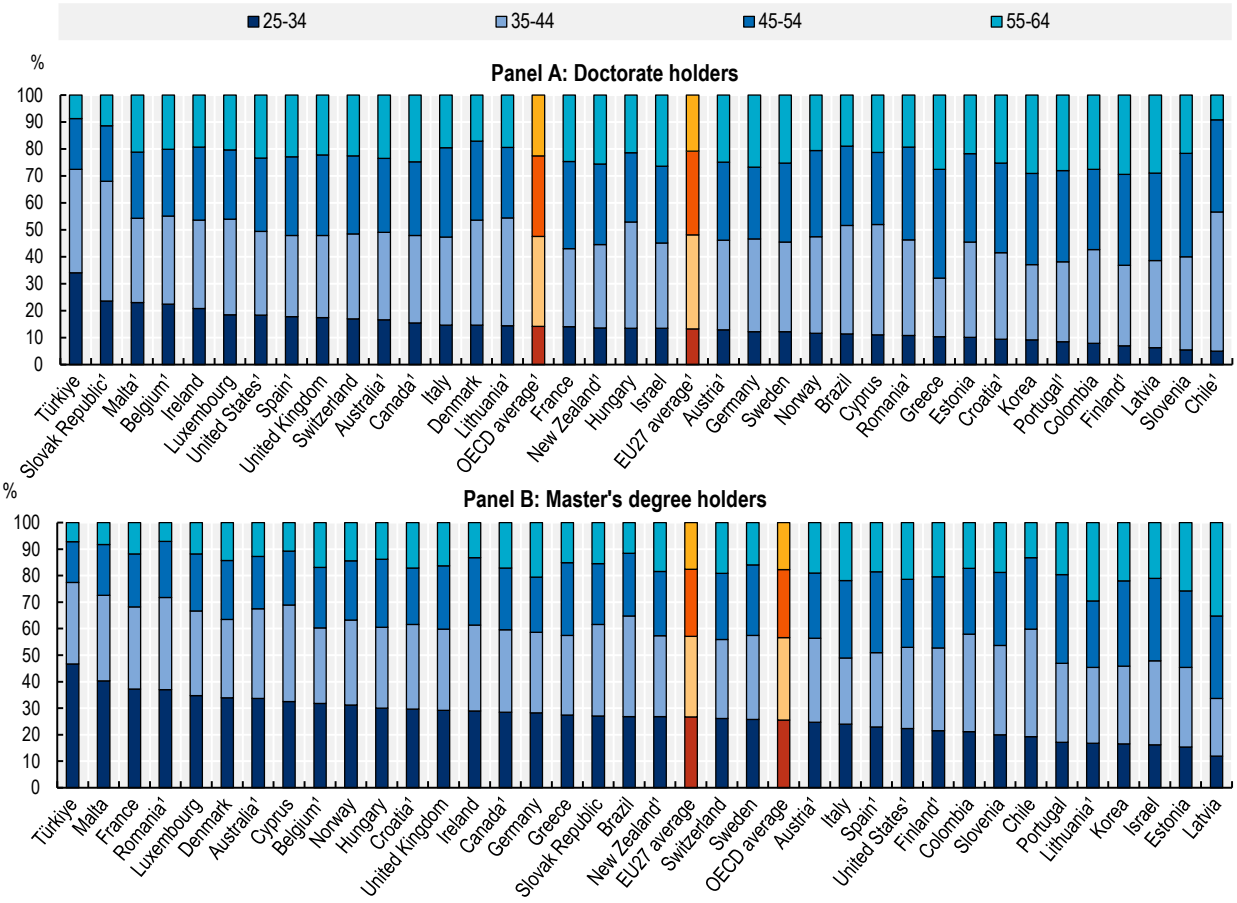
In several countries, advanced qualifications are concentrated in older age groups

The share of the working age population holding a doctorate or master's degree indicates how large a country's research and innovation talent base is at a point in time but not how it is likely to evolve in the coming years. Two countries having identical shares of workforce with advanced qualifications may be on distinctly different pathways in terms of turnover and renewal of that workforce, as can be seen when comparing age profiles of doctorate and master's degree holders.

Unsurprisingly, given differences in programme duration and age of entry, master's holders on average have a markedly younger age profile than doctorate holders (Figure 2.4). Across the OECD, on average, 26% of all master's degree holders are aged 25-34, compared to 14% of doctorate holders. On the other end of the age scale, an average of 23% of doctorate holders in OECD countries are aged 55-64, compared to 18% of master's holders. Some countries, including several with comparatively high shares of doctorate holders among the working age population today, display still older age profiles. The share of doctorate holders aged 55-64 reaches 29% in Finland, Korea and Latvia, and exceeds 25% in a further eight countries including Germany and Sweden.

Figure 2.4. Age distribution of doctorate and master's degree holders, 2024

Percentage of doctorate or master's degree holders aged 25-64



Note: 1. Reference year differs: 2021 for Australia, Austria, Belgium, Canada, Chile (doctorate), Croatia, Malta (doctorate) and Romania, and 2023 for EU27 average (doctorate), Finland, New Zealand, OECD average (doctorate), Portugal (doctorate), the Slovak Republic (doctorate), Spain, and the United States.

Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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At master's level, the picture is quite different. In most countries, more than 50% of master's graduates are aged under 45, while shares exceed 60% in fifteen countries including the Republic of Türkiye (here after Türkiye) (77%) and France (68%). This much younger profile can reflect recent expansion of higher

education provision (as in Türkiye) or, in some countries, an earlier loss of older qualified workers through emigration.

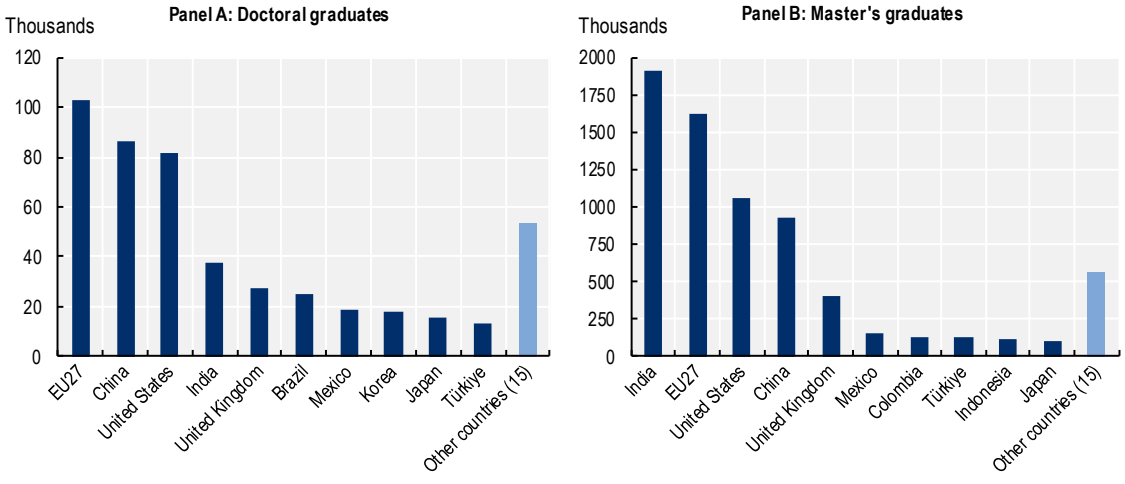
These age profiles of doctorate and master's holders provide an indication of R&I workforces where renewal pressures are building. Countries with ageing populations of advanced degree holders may need a multi-faceted response, part of which includes increasing the flow of new graduates at master's and doctoral level entering the workforce.

How are graduate trends shaping the future supply of talent?

Over 300 000 new doctorates were awarded across OECD countries in 2023

A key aspect of talent development is the extent to which countries can sustain and expand current talent supplies through new cohorts of graduates. In 2023, OECD countries alone awarded over 300 000 new doctoral degrees and over 3.9 million master's degrees. The broader group of OECD and EU Member countries, OECD accession candidates and Key Partner countries together awarded almost half a million (about 480 000) new doctoral degrees and more than 7 million master's degrees. As Figure 2.5 shows, graduates with advanced qualifications are heavily concentrated in a few regions, in particular the European Union, the People's Republic of China (hereafter, China), India, the United Kingdom, and the United States. Together, these five areas accounted for 70% of doctoral graduates and over 80% of master's graduates across OECD and EU member, accession and partner countries in 2023.

Figure 2.5. Doctoral and master's graduate cohort sizes, selected countries and regions, 2023



Note: A total of 51 countries are included in the analysis, comprising all OECD and European Union member countries, along with OECD key partners and accession candidate countries (OECD, n.d.[3]). For each panel, countries/aggregates with the ten largest values are shown, with the remaining countries aggregated in the "Other" category. Please refer to the StatLink for data and data source by individual country.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026, complemented by data from various national sources.

StatLink https://stat.link/gv36nk

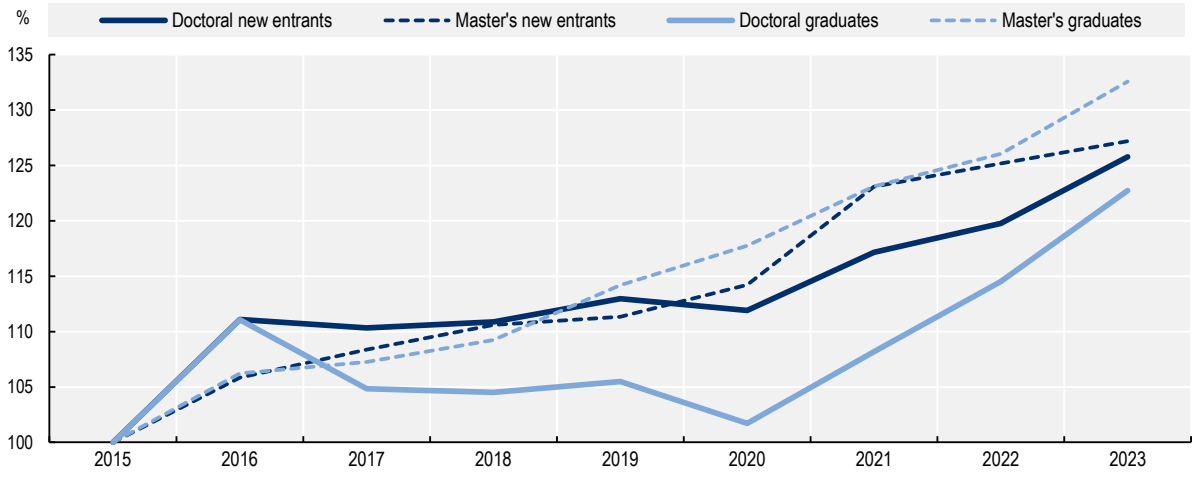
On average, advanced graduate numbers are on the rise, but there are considerable differences across countries…

Across the OECD, on average, both entrants to and graduates from master's programmes rose steadily between 2015 and 2023. Overall, over this period, doctoral graduations across the OECD increased by 23% and master's graduations by 33% (Figure 2.6). New entrants to advanced programmes also increased over the same period by 26% at doctoral level and 27% at master's level. As entrant numbers are a leading indicator of future graduate output, these trends point to continued growth in graduate numbers beyond 2023, provided that entrants complete their programmes at similar rates to previous cohorts.

Both master's entrants and master's graduates show a steady upwards trend between 2015 and 2023. Doctoral entrants follow a less consistent pattern, remaining broadly stable between 2016 and 2020 before increasing steadily thereafter. Doctoral graduations are the only trend showing a decline over the period, with numbers decreasing or plateauing after 2016 and reaching their lowest point in 2020, coinciding with the postponement of many thesis defences during the COVID-19 pandemic. As with doctoral entrants, however, doctoral graduations resumed an upward trend from 2020 onwards.

Figure 2.6. Index of change: entry to and graduation from programmes leading to advanced qualifications

OECD average (2015 =100)



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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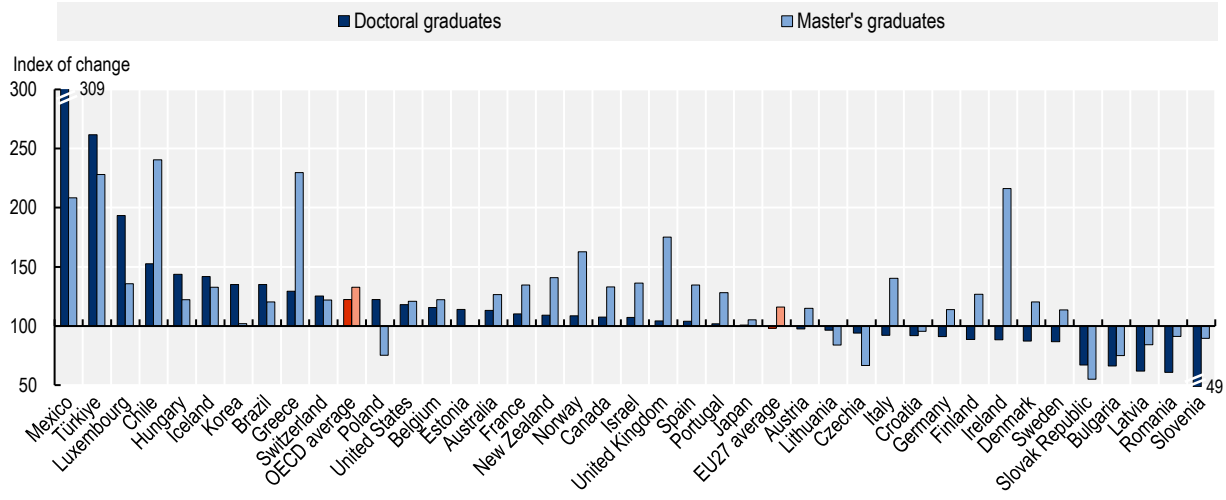
The OECD average masks considerable differences in the situation of talent pipelines across individual countries. While most countries have increased flows of graduates from master's programmes in recent years, for doctoral education, the situation is more mixed (Figure 2.7). In general, graduate output from master's programmes has been increasing at a faster rate than doctoral output, although there are some examples of countries that have substantially increased numbers of both doctoral and master's graduates. Mexico shows the highest relative increases over the period, with doctoral graduates more than tripling and master's graduates more than doubling, followed closely by Türkiye, with respective increases of 262% and 228%, albeit from a small base.

On the other end of the scale, many European countries recorded overall declines in the numbers of doctoral graduates between 2015 and 2023. Indeed, on average across the EU-27 countries, the number of doctoral graduates fell by approximately 2% over the period, compared to an average increase of 16%

in the number of master's graduates. Several Central and Eastern Europe (Bulgaria, Croatia, Czechia, Latvia, Lithuania, Romania, the Slovak Republic and Slovenia), show important declines in both doctoral and master's graduates over this period. Another group of European countries (Denmark, Finland, Germany, Italy, Ireland and Sweden) combine decreasing numbers of doctoral graduates with increasing numbers of master's graduates. Among this group, Ireland shows the largest difference in changes of graduates between doctoral and master's graduates, driven by a substantial increase in master's graduates between 2015 and 2023 (216%), reflecting major public investment in recent years to increase postgraduate throughput through dedicated upskilling, reskilling and skills conversion programmes (Higher Education Authority, n.d.[4]).

Figure 2.7. Changes in the number of doctoral and master's graduates, 2015-2023

Index of change (2015=100)



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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…..with implications for future supplies of R&I talent

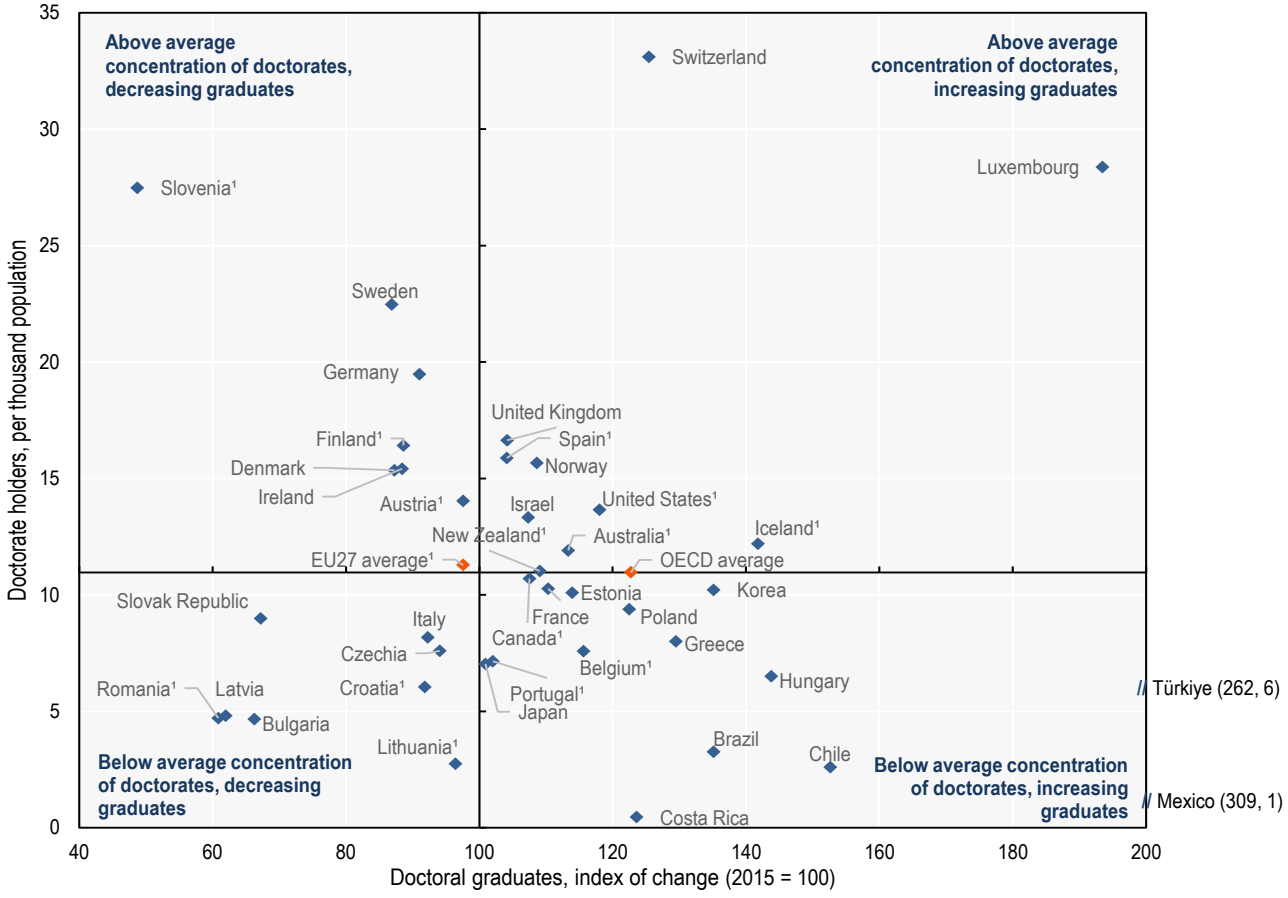
Concerningly, several countries showing shrinking pools of graduates from doctoral programmes between 2015 and 2023 are already starting from a low base of population with qualifications at this level. Eight countries fall into this category, all located in Europe (Figure 2.8). Much of the contraction reflects underlying demographic decline, particularly acute across Central and Eastern Europe, which constrains countries' capacity to provide talent for, and expand, local research and innovation ecosystems. Countries in this situation are pursuing multipronged policy responses to mitigate the risks associated with the loss of talent, including stepping up efforts to attract and retain new and returning talent from abroad, raising participation in education and training within their own populations, and addressing underrepresentation where it exists (Bruegel, 2025[5]).

In other regions, countries starting from similar low shares of population with doctoral level qualifications have been more successful in expanding numbers of doctoral graduates in recent years (Figure 2.8). Chile and Mexico fall into this category, which may reflect the impact of policy initiatives seeking to expand highly-qualified human capital in the region, for example, national initiatives to increase the numbers of higher education staff holding doctorates in Mexico (EC-OECD, 2025[6]; EC-OECD, 2025[7]) and

scholarships supporting study abroad to obtain advanced qualifications in both Mexico and Chile (EC-OECD, 2026[8]; Secretaría de Ciencia, Humanidades, Tecnología e Innovación, n.d.[9]).

Few countries combine above-average shares of doctorate holders in the population with substantial increases in doctoral graduates over the period 2015-2023 (Figure 2.8). Seven countries fall into this category, while a further seven countries with higher-than-average shares of doctorate holders have seen a decline in graduates over this period. Switzerland is an outlier, combining the highest share of doctoral holders (3.3% of the working-age population in 2023) with an increase of 25% in graduate numbers between 2015 and 2023. Such changes may be driven by underlying demographics, evolving attitudes towards undertaking a doctoral degree or changing policy framework conditions underpinning doctoral education.

Figure 2.8. Share of doctorate holders in the population (2023) and index of change in doctoral graduates (2024)



Notes: Data for more countries are available on the database. 1. Reference year differs for share of doctorate holders: 2021 for Australia, Belgium, Canada, Croatia, Lithuania and Romania, 2022 for Austria, 2023 for EU average, Finland, Iceland, New Zealand, Portugal, Slovenia, Spain, and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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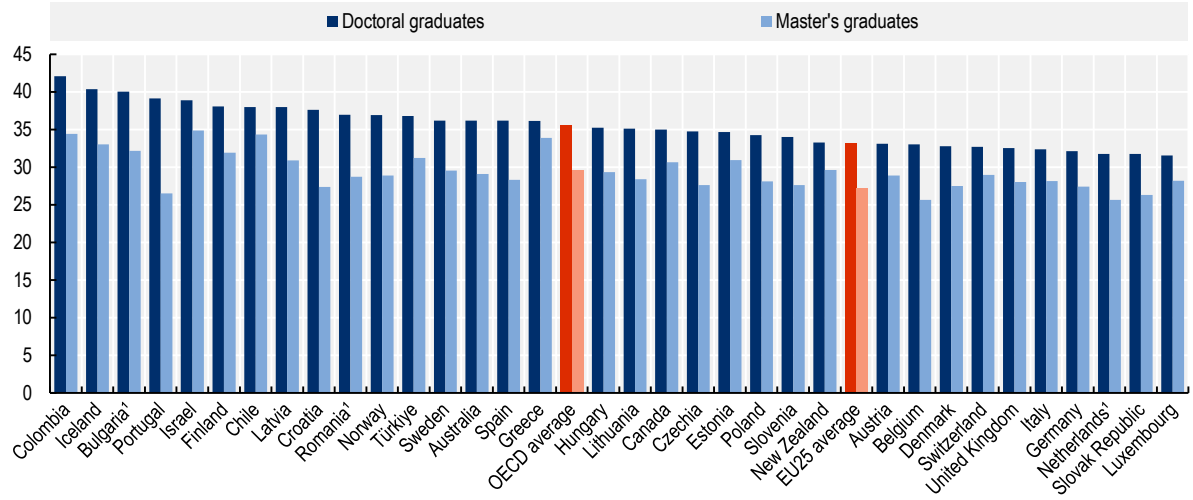
An ageing highly qualified population coinciding with a shrinking inflow of new graduates to the labour market risks creating a structural problem that is difficult to correct quickly. Efforts to grow the domestic

pipeline take effect only with a long lag, especially for doctoral training which requires a comprehensive financial and time investment from governments, training organisations and the doctoral candidates themselves. For example, in Portugal, where the share of doctorate holders aged 55-64 reaches close to 30%, doctoral trainees on average reach graduation only at age 39. On the other hand, some other countries - such as Belgium and Denmark - combine a relatively young age profile of doctoral candidates with a typical age of 33 at graduation (Figure 2.9). Fewer doctoral graduates today imply a weaker future academic and research workforce, which in turn reduces the institutional capacity to supervise and train the next generation of doctoral students - a contraction cycle that is difficult to reverse without deliberate and sustained policy intervention.

Figure 2.9. Typical age at graduation from doctoral and master's programmes, 2023



Notes: Data for more countries are available on the database. 1. Reference year differs: 2021 for the Netherlands (doctorate only), 2022 for Bulgaria and Romania.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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Timely and granular indicators relating to talent for R&I within countries are particularly important in contexts of demographic decline, not least for assessing whether expansion, retention and attraction policies are delivering results. Traditionally, few countries or higher education institutions systematically measure and monitor stocks, flows and outcomes of individuals with doctoral level qualifications. While some countries have rolled out new initiatives in recent years (see Chapter 5), there is still considerable room for progress. In Europe, for example, a recent study showed that graduate tracking (overall, for both vocational and higher education) is an established national practice in just 18 of the 31 reviewed countries, while doctoral graduates remain much less likely to be included in any form of graduate tracking initiatives conducted by higher education institutions (European Commission, 2020[10]).

What is the field breakdown of graduates with advanced qualifications and how is it evolving over time?

Aggregate numbers of advanced qualification holders cannot on their own indicate whether R&I systems can access the specific knowledge and skills they require. National research and innovation priorities, formulated for example in terms of seizing on the opportunities of key emerging technologies or the aim to address defined societal goals, draw on particular fields of knowledge and skillsets. Shortages in these

fields can constrain research and innovation capacity even where the overall supply of highly qualified workforce is adequate (OECD, 2025[11]).

In most countries, social sciences and business account for the largest shares of master's graduates, while STEM dominates doctoral education

Field-of-study patterns differ markedly between master's and doctoral education. Social sciences and business account for the largest share of master's graduates in most OECD countries, standing at 41% of all graduates on average. At doctoral level, however, STEM fields, as defined in ReICO (Box 2.1) account for the largest share of graduates, making up 46% of graduates on average in the OECD area and reaching or surpassing 60% in France, Italy and Luxembourg (Figure 2.10).

Box 2.1. Delineating STEM fields in ReICO

STEM (Science, Technology, Engineering and Mathematics) is an umbrella term used by many governments and researchers to group knowledge and skills considered especially relevant for technological innovation, economic productivity and solving complex scientific and societal problems. Given their importance governments often prioritise the improvement of STEM skills in education and workforce policy (EC-OECD, 2026[12]).

Generally, STEM refers to an aggregation of fields of education and training, commonly including natural sciences, mathematics and statistics; information and communication technologies and engineering, manufacturing and construction. It should be noted that this is a broad aggregate that groups fields with quite different knowledge bases and labour markets together and can lead to differing conceptualisations across countries and organisations. Despite these complexities, however, STEM remains a valuable and widely applied aggregate for comparing countries and providing a focus for education and skills policy.

In ReICO, the categorisation of STEM comprises ISCED-F fields 05 (Natural sciences, mathematics and statistics), 06 (Information and Communication Technologies), and 07 (Engineering, manufacturing and construction) and 08 (Agricultural sciences), are used to denote the STEM category throughout. This definition can vary from some national definitions. For example, it excludes ISCED-F field 09 (health sciences) which some national definitions include. Countries with large medical doctoral programmes (notably several Southern European systems) may appear to have lower STEM shares than a broader definition would produce. Comparison across countries should be read with this boundary condition in mind.

Several countries, including France, Finland, Sweden and Estonia, show relatively high percentages of STEM graduates from both master’s and doctoral education, indicating a strong orientation of tertiary education towards technical fields (Figure 2.10). At the other end of the distribution, STEM accounts for less than one-quarter of doctoral graduates and less than 10% of master’s graduates in Costa Rica and Mexico. While these are important differences, indicators of STEM output should be interpreted with caution - high shares of doctorates graduating from STEM fields does not in itself guarantee alignment to the needs of R&I systems. Demand for individual fields within the STEM categorisation varies considerably, across R&I-intensive sectors and enterprises and in the labour market as a whole (Stephan, 2012[13]).

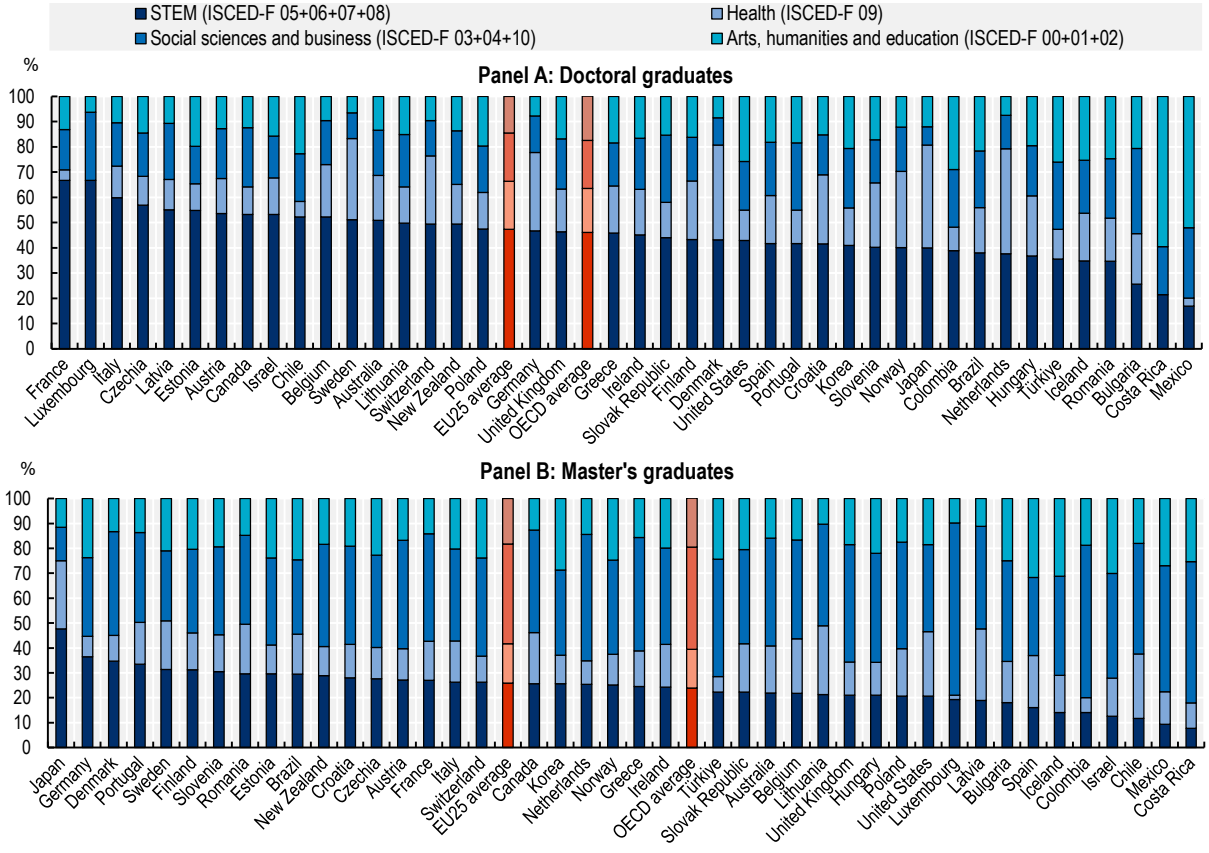
Nevertheless, graduates in certain STEM fields, such as engineering and ICT, are in particularly strong demand across the labour market, including in R&D-intensive sectors and enterprises. Some evidence indicates that countries expanding public investment in education in these fields can reap dividends in terms of innovation capacity (Biasi, Deming and Moser, 2021[14]). For this reason, increasing the supply of

STEM skills is a frequent policy target for national governments, with several implementing new initiatives to increase supply of STEM skills in recent years (EC-OECD, 2026[15]).

Differences across countries in shares of arts, humanities and education graduates are equally substantial. At doctoral level, this field group accounts for roughly half of graduates in Costa Rica and Mexico (largely driven by high throughput of doctorates in education), compared to less than 10% in Denmark, Germany, the Netherlands and Sweden. Other countries with relatively high shares of arts, humanities and education graduates at both doctoral and master's level include Türkiye (with 26% of doctoral graduates and 24% of master's graduates from these fields) and Korea (21% of both doctoral graduates and 29% of master's graduates).

Figure 2.10. Field of study distribution of doctoral and master's graduates, 2023

Percentage of doctoral or master's graduates in all fields of study



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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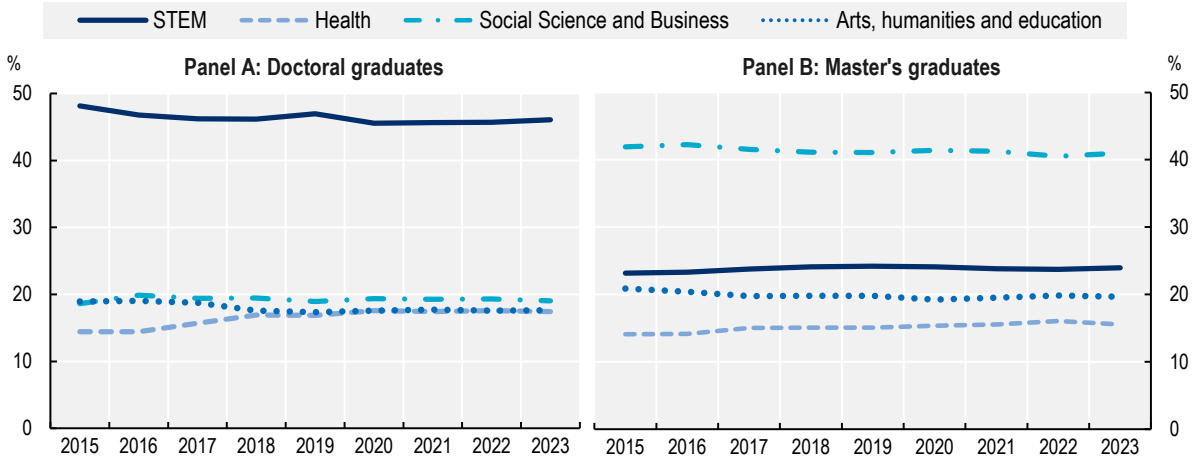
These differences across fields partly reflect the structure of national economies, education, research and innovation systems, but they also may carry policy implications: countries whose graduate output is concentrated in fields misaligned with their research and innovation priorities may face greater difficulty in providing highly qualified staff with attractive career opportunities. Chapter 3 examines indicators of employment opportunities and outcomes for highly qualified graduates in more depth.

Field distribution of graduates has overall changed little over time….

Overall, in the OECD area, the field distribution of graduates has remained remarkably stable. Between 2015 and 2023, the shares of graduates from each field group changed by at most 3 percentage points, and in most cases by much less. The greatest changes can be observed in the shares of doctoral graduates in health, which increased from 14.4% in 2015 to 17.4% in 2023. Over the same period, doctoral graduates from STEM fields reduced from 48.1% to 46.1%, while master's STEM graduates increased by less than a percentage point, from 23.2% to 23.9% (Figure 2.11). In arts, humanities and education, smaller changes over time can be observed, by 1.4 percentage points for doctorates (from 19% to 17.6%), while the master's share moved in the opposite direction, rising by 1.4 percentage points (14.1% to 15.5%). Shares of graduates in social sciences and businesses have changed the least over the period, from 18.6% in 2015 to 19.0% in 2023 for graduates from master's programmes and 18.6% to 19.0% for graduates from doctoral programmes.

Figure 2.11. Doctoral and master's graduates by field of study, 2015-2023

OECD average, percentage of doctoral or master's graduates in all fields of study



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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….though most countries have increased graduate numbers in absolute terms

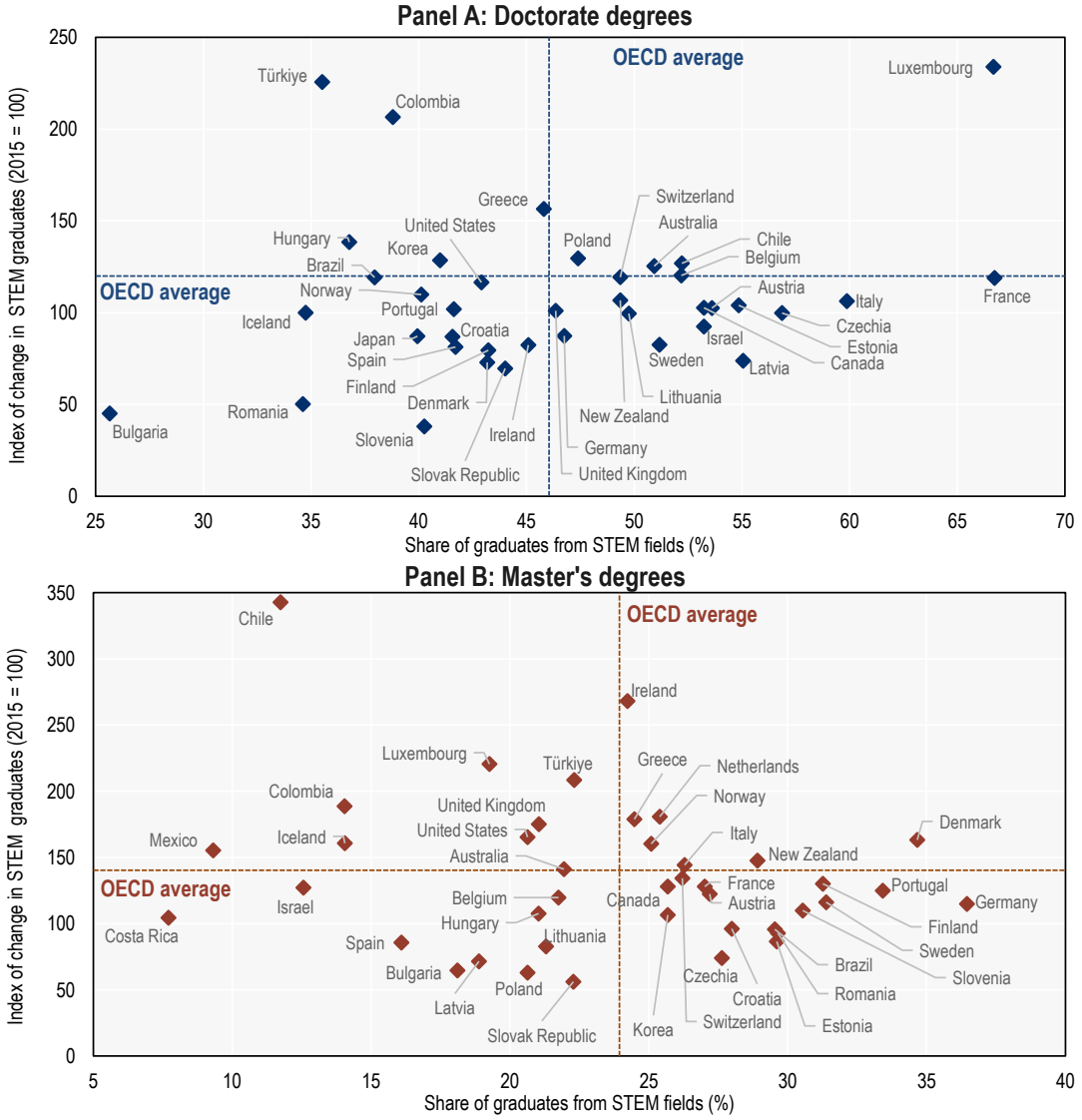
The stability observed in distribution of graduates over time at the level of the OECD area masks pronounced changes in some countries in terms of supply of advanced degree holders across fields. Changes in the flow of STEM-qualified graduates over time exemplify this. Stability or even slight reduction in field distribution over time, as shown in Figure 2.11, does not imply stagnation in supply of STEM talent for research and innovation systems. As highlighted above, most countries have expanded annual outflows of master's and doctoral graduates in recent years, which in turn leads to increases in STEM graduates in absolute terms. Examining these changes across countries and situating them with respect to shares of graduates from STEM fields, provides an indication of how absolute supply of STEM talent feeding into research and innovation systems is changing, and how this relates to the STEM orientation of each country's graduate output (Figure 2.12).

At doctoral level (Panel A of Figure 2.12), the upper-right quadrant indicates countries with relatively high shares of graduates from STEM fields combined with higher-than-average growth in numbers of STEM graduates. Few countries (Australia, Chile, Luxembourg and Poland) fall into this category. A more

common pattern among countries with high STEM shares is for lower-than-average growth or even net decline in the numbers of STEM graduates between 2015 and 2023, as is the case in Germany, Israel, Latvia and Sweden. Colombia and Türkiye are prominent examples of countries with lower-than-average shares of STEM graduates at the doctoral level and among the highest growth rates in absolute terms between 2015 and 2023.

Panel B of Figure 2.12 shows even more pronounced volume growth of graduates with STEM degrees at master's level between 2015 and 2023, exceeding 200% in Chile, Ireland, Luxembourg and Türkiye. The upper-right quadrant (above-average share and above-average growth in absolute numbers) includes Denmark, Ireland, Greece, the Netherlands, New Zealand and Norway, while a cluster of European countries, including Czechia, Estonia, Germany, Sweden and Switzerland, also have high shares but show more subdued or declining growth.

Figure 2.12. Share of STEM graduates (2023) and change in STEM graduates (2015-2023)



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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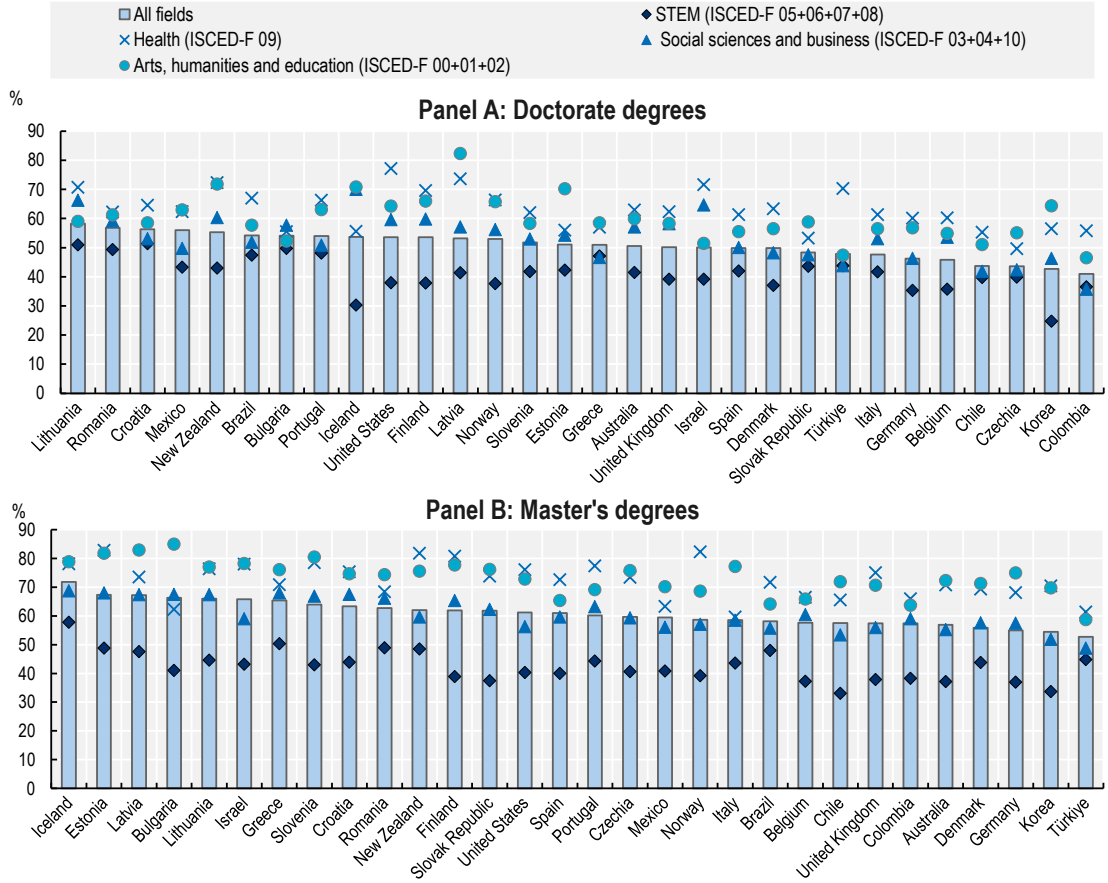
Conversely, several countries with below-average shares of STEM master's graduates, such as Chile Colombia, Türkiye, the United Kingdom and the United States, show strong expansion in absolute numbers, showing that STEM talent pools can expand in absolute terms even without major changes in field composition. Whether these increases are sufficient to meet the needs of R&I systems depends on the scale and growth of each country's system, the share of graduates choosing R&I careers research, and demand for advanced skills driven by technological change, industrial policy, and competition from other sectors.

Women graduates continue to be highly concentrated in non-STEM fields at both master's and doctoral level

Across OECD countries, women now account for the majority of graduates with advanced degrees. Among countries with available data, the average share of women graduates at doctoral level was 49% in 2023 and 59% at master's level. However, as Figure 2.13 shows, shares of women graduates continue to diverge sharply across fields. In all countries with available data, the vast majority of arts, humanities and education graduates are women, with shares surpassing 80% of doctoral graduates in Latvia and master's graduates in three countries (Bulgaria, Estonia and Latvia).

Figure 2.13. Share of women among doctoral and master's graduates by field, 2023

Percentage of doctoral or master's graduates in the same field



Note: Data for more countries are available on the database.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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Similarly high shares of women graduates are evident across health fields at doctorate and master's level in most countries. Social sciences and business fields show a more mixed profile - women make up the majority share of graduates at master's level in all countries except Türkiye but make up less than half of doctoral graduates in ten countries.

Conversely, women graduates continue to be less prevalent in STEM fields at both doctorate and master's level. At master's level, only two countries (Greece and Iceland) have shares of women exceeding 50% in STEM, with a particularly high share of women graduates in Iceland (58%). At doctoral level a larger group of countries are closer to having equal shares of women and men STEM graduates, particularly in countries where the overall share of women among graduates is highest, such as Croatia, where women comprise 51% of STEM graduates, Romania (49%) and Lithuania (51%).

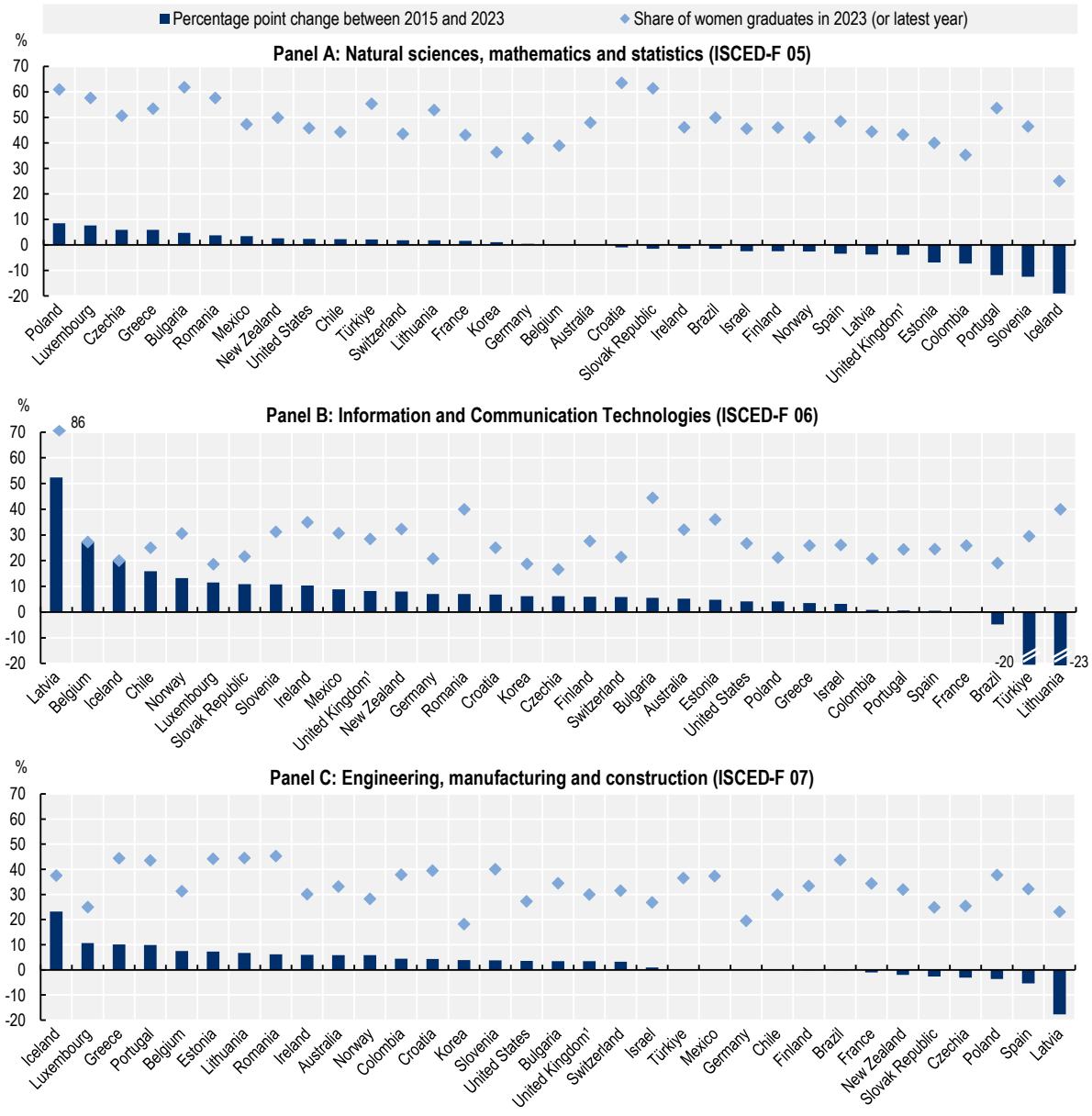
Thus, persistent gender gaps remain across broad field groupings, reflecting cultural norms, patterns of prior achievement, and the choices made during earlier phases of education (OECD/Eurostat/UNESCO Institute for Statistics, 2015[16]). These broad categories, however, mask substantial variation within them. In STEM, for instance, women's share of enrolment varies considerably from one subfield to another - often greater than the share of men in areas such as the biological and life sciences, while remaining markedly lower in fields like computing and engineering.

Disaggregating STEM into its constituents illustrates the differences in women's share of graduates across different fields (Figure 2.14). In 2023, in natural sciences, mathematics and statistics, shares of women graduates sit closest to, and in several cases exceeded, 50%. Women account for at least 40% of graduates in these fields in most countries and make up more than 60% of graduates in Bulgaria, Croatia, Poland and the Slovak Republic. Engineering and ICT, by contrast, have considerably higher shares of male graduates. In engineering, no country had a share of women graduates exceeding 50%, although six countries (Brazil, Estonia, Greece, Lithuania, Portugal and Romania) had shares exceeding 40%. However, most countries show substantially lower shares, with the lowest values in Korea (18%) and Germany (20%). ICT presents a broadly similar profile to engineering, with women's shares of graduates meeting or exceeding 40% in just four countries (Bulgaria, Latvia, Lithuania and Romania).

However, Figure 2.14 also highlights some evolution happening over time in several countries in the share of women graduates in ICT and Engineering fields, although changes are, for the most part, relatively modest. Between 2015 and 2023, several countries recorded an increase of more than 5 percentage points in the share of women engineering graduates, of which four countries (Greece, Iceland, Luxembourg and Portugal) increased the share by 10 percentage points or more. Increases were even more pronounced in ICT fields, where 21 countries increased their share of women graduates by at least 5 percentage points, and Belgium, Iceland and Latvia increased shares by 20 percentage points or more.

Figure 2.14. Share of women among doctoral graduates by STEM subfields (2023) and change in share (2015-2023)

Percentage of doctoral graduates in the same STEM subfield



Note: Data for more countries are available on the database. 1. Latest year is 2022.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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What do we know about the development of skills and attitudes for careers in research and innovation?

Many countries have progressively improved their ability to identify and profile individuals with advanced qualifications, with labour force surveys increasingly able to distinguish holders of master's and doctoral degrees and support internationally comparable indicators on outcomes such as employment conditions and quality of life (as shown in Chapter 3). By contrast, statistical information on the population with other dimensions of competency for R&I careers, such as skills most relevant to R&I and positive attitudes towards R&I work, remains limited and largely relies on international skills surveys such as the OECD's Programme for International Student Assessment (PISA) and the OECD Programme for International Assessment of Adult Skills (PIAAC). This section summarises some key insights from PISA and PIAAC relevant for R&I talent development. Considerable information gaps remain in measurement of skills and viewpoints on R&I careers on both the demand and supply sides, that will require complementary approaches, including individual-level surveys and alternative data sources (see Chapter 5).

Anticipation of successful careers in science and technology starts during youth

Longitudinal analyses of national and international data consistently show that early attention and exposure to career guidance and preparation activities is associated with better labour market outcomes for individuals (OECD, 2025[17]). From the perspective of policymakers, the perceived attractiveness and accessibility of R&I-related careers also influence future workforce supply, which motivates policy attention on teenage career readiness.

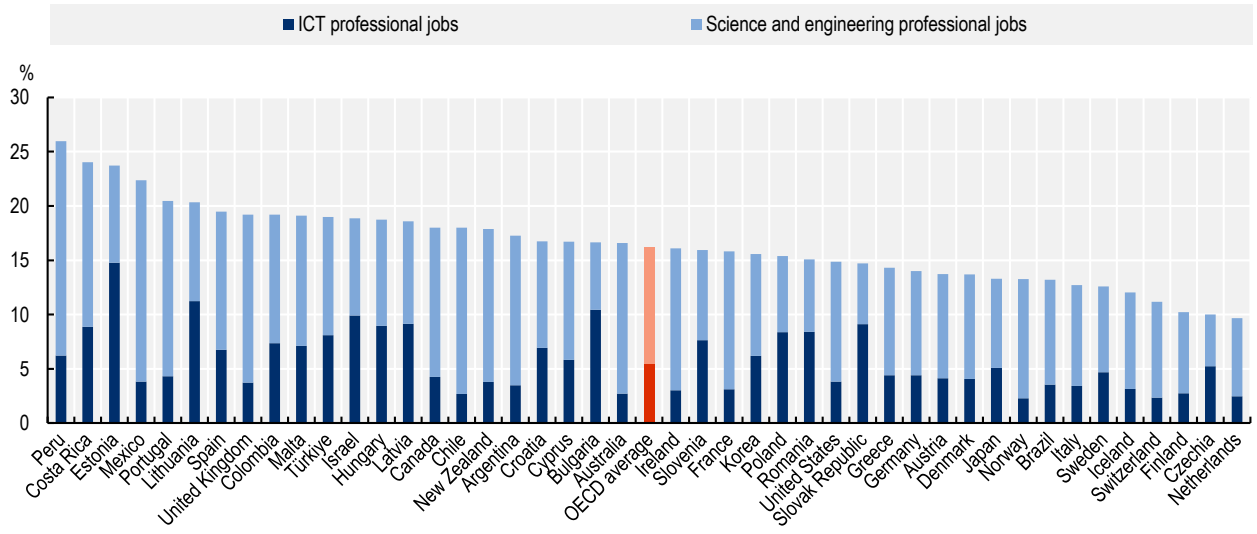
International comparisons on the career aspirations of young people are limited. PISA, the OECD's assessment of the skills of 15-16 year-olds that has taken place at three-year intervals since 2001, provides one viewpoint. The PISA questionnaire asks students undergoing the assessment to specify the type of occupation they expect to have at around the age of 30. While the occupation classification does not allow the specific identification of R&I careers, it allows for the assessment of career aspirations in closely related and overlapping roles, notably science, engineering and ICT professionals. PISA data shows considerable gaps across countries in expectations to work as professionals in these fields, ranging from below 10% in the Netherlands to more than 25% in Peru (Figure 2.15).

In 2022, on average across OECD countries, 10.7% of students indicated that they expected to work as science and engineering professionals, a share that has remained largely unchanged in recent years (11.1% in PISA 2018 and 10.8% in PISA 2015). By contrast, average shares of students expecting to work in ICT professions, though lower in general than those expecting to work in science and engineering, are increasing over time, going from 3.4% in PISA 2015 to 5.5% in PISA 2022 (OECD, 2026[18]).

In most countries, students expecting to work in science and engineering professions outnumber those expecting to work in ICT, with career expectations in ICT typically accounting for well under half of the combined share. However, expectations for ICT careers are notably stronger in several European countries, such as Bulgaria, Estonia, Lithuania and the Slovak Republic. Signals from the labour market on employment and wage premia for these roles may influence career decisions in these countries – many of which have relatively high-wage premia for jobs in ICT (Eurostat, 2026[19]). Policy actions may also play a role. For example, in Estonia, where there has been prominent and sustained policy commitment to digital-first public and business services and where successive governments have heavily invested in ICT skills in the population, almost 15% of students expect to work in ICT professional jobs, the highest among all countries with available data. While no direct link can be drawn, the available evidence suggests that aspirations to work in science and technology may be shaped not only by career guidance programmes within schools, but by wider policy interventions and the broader economic and social context within individual countries.

Figure 2.15. Occupational expectations of 15 year-olds participating in the PISA assessment, 2022

Share of students expecting to be employed in occupations by age 30



Notes: Data for more countries are available on the database. 1. Data did not meet the PISA technical standards but were accepted as largely comparable.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on PISA 2022, June 2026.

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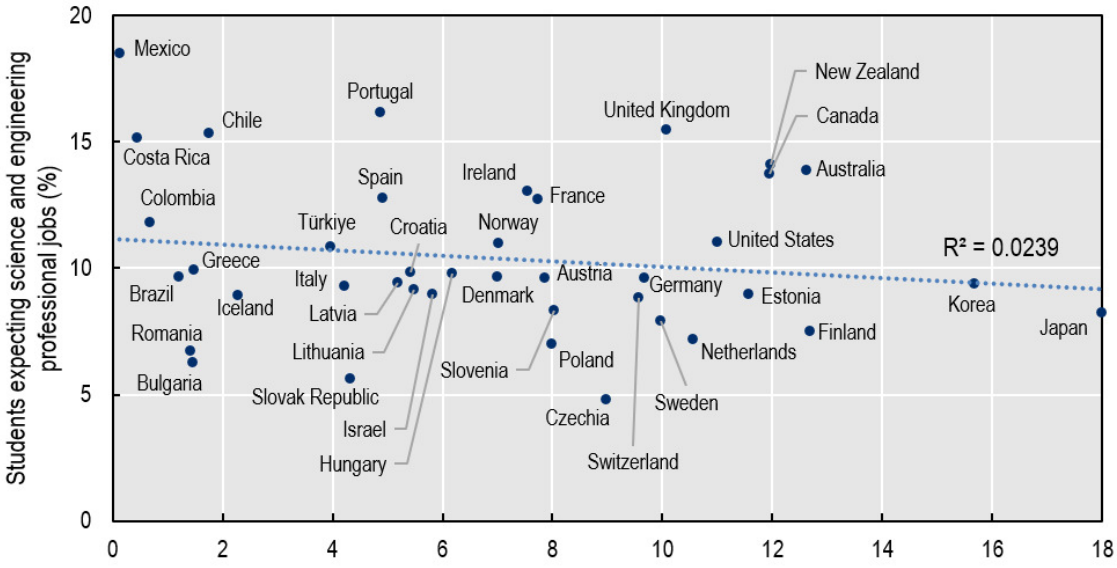
Aspirations and capacity for science careers may not always align

PISA data also enables comparison across countries of the shares of students with aspirations for careers as science and engineering professionals and shares of top performing students in the PISA science assessment. As Figure 2.16 shows, there is no relationship across countries between these respective shares. Indeed, some countries where the largest shares of students anticipate careers as science and engineering professionals also have some of the smallest shares of top performers in science, Conversely, several countries with high shares of top-performing students appear not to have especially high shares of students with career aspirations in science and engineering, indicating a potential disconnect between careers aspirations and the skills needed to realise them.

These findings, based on aggregate country-level shares, provide only a rough indication of trends and do not reveal how these variables relate at individual student level. Future ReICO work could explore this relationship more directly through analysis of PISA microdata.

Figure 2.16. PISA performance in science and aspirations of 15-16 year-olds for careers in science and engineering, 2022



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on PISA 2022, June 2026.

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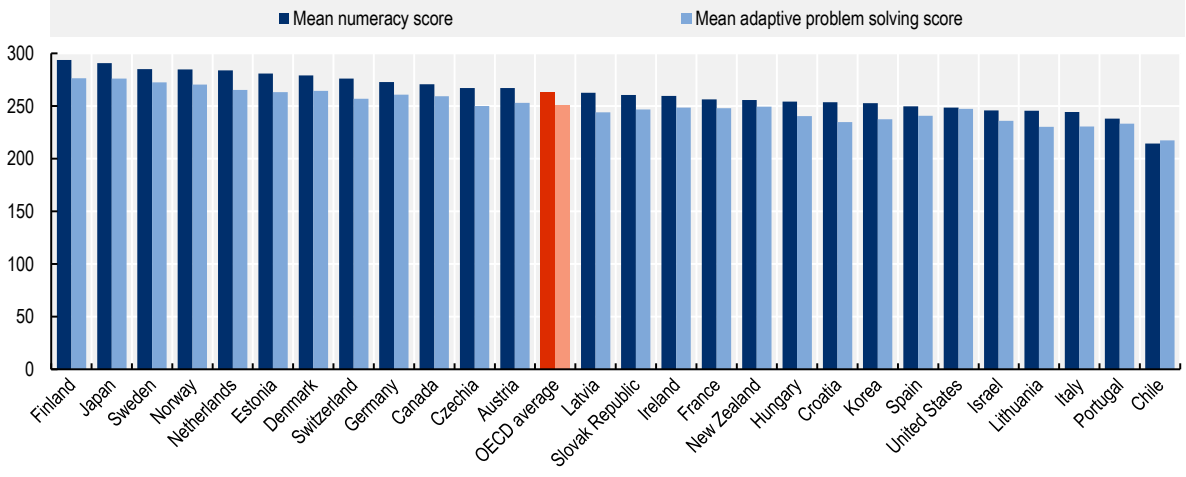
Adults' foundational skills for many R&I roles differ markedly across OECD countries

Quantitative and adaptive problem solving are core skills for several R&I occupations. Data from PIAAC, the OECD's adult skills survey, shows that across countries with available data, average scores for these two skills are highly correlated and that countries have diverse levels of access to these skills within their respective populations (Figure 2.17).

Figure 2.17. PIAAC numeracy and adaptive problem-solving scores, 2023



Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on the results of the OECD Survey of Adult Skills 2023, June 2026.

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Finland, Japan and Sweden lead on both measures, while Chile records the lowest scores. From a policy perspective, these variations indicate that measures to expand development of R&I talent within domestic populations may need to take account of the differing skill foundations on which they can build.

Conclusion

The evidence presented in this chapter highlights both progress and emerging challenges in the development of talent for research and innovation. Expanding stocks of highly qualified individuals provide an important foundation for research and innovation activities. At the same time, significant differences remain across countries in the size, age structure and field composition of highly qualified talent pools, with some systems facing growing challenges in renewing their research and innovation workforce. In this context, ensuring that education, skills and research systems can continue to develop, attract and retain the talent needed for research and innovation will remain an important policy priority. Policy responses will need not only to ensure adequate supply of relevant advanced qualifications, but also to foster the skills and aspirations that encourage younger generations to pursue research and innovation careers.

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3 Working in research and innovation

How are labour markets shaping research and innovation career opportunities? This chapter analyses key features of the people working at the heart of research and innovation systems. It examines trends in R&D personnel and employment in science-, technology- and ICT-related occupations across countries and how these workforces are evolving over time. It also presents the latest available comparative evidence on the employment outcomes and working conditions of doctorate holders. Together, these indicators offer insights into how R&I systems within and across countries employ and reward highly qualified talent.

In Brief

Expanding opportunities for research and innovation careers

Across the OECD, R&D personnel accounted for almost 1.6% of employment in 2024, up from around 1.3% in 2015. People are also the largest component of investment in R&D. The ensemble of R&D performing organisations in most OECD countries devoted more than half of their R&D expenditure to compensating their direct R&D workforce, without counting payments for external consultants or technical staff within goods and service providers. Researchers (the individuals responsible for creating new knowledge and develop new applications) account for the largest share of R&D personnel in most countries, more than technical and broader support roles. Across the OECD, businesses are their principal employer, highlighting the importance of business demand in shaping R&D career opportunities.

The broader workforce of science, technology, engineering and mathematics professionals has expanded even more rapidly. In 2024, science and engineering professionals represented 3.7% of employment across the OECD, while ICT professionals accounted for a further 3.1%. Growth has been particularly rapid in ICT occupations, whose share of employment increased from 1.8% in 2015 to 3.1% in 2024, underlining the increasing integration of digital technologies across economies. Despite this overall growth, important challenges remain. Across countries with available data, fewer women than men are working in STEM professions, with particularly low participation in ICT, the fastest-growing part of the professional STEM workforce.

For individuals, doctoral education generally delivers strong labour market outcomes. Employment rates for doctorate holders exceed those of master's degree holders in most countries and are typically above 90%. Doctorate holders also earn more on average: the OECD-wide earnings premium relative to master's degree holders is 25%, although the size of this advantage differs markedly across countries. At the same time, recent doctorate graduates are often more likely to be employed on temporary contracts, reflecting the continuing prevalence of fixed-term and project-based positions in research-intensive sectors.

Overall, the evidence points to expanding career opportunities for highly skilled workers in R&I systems but also highlights significant differences across countries in the scale of R&I employment, career conditions and the rewards associated with advanced research training. Ensuring that investments in skills and education translate into attractive, sustainable careers remains a central challenge for strengthening R&I systems.

Introduction

Research and innovation (R&I) intensive sectors, industries, and organisations can achieve their objectives only if they have access to a stable, and in many cases growing, supply of skilled and talented individuals willing to pursue R&I careers. At the same time, individuals considering R&I careers are likely to be attracted to environments that offer opportunities for professional development, intellectual fulfilment, and secure and rewarding employment. The strength and health of R&I ecosystems depend on how well these macro-level and individual ambitions align. Where they align well, organisations can access the skills needed to support their research, development and innovative activities, while individuals find rewarding careers worth their commitment. Where there is poor alignment, skills may be underutilised, reducing the returns on investments made by individuals and society in developing R&I competencies.

This chapter follows the previous chapter's examination of R&I talent development by examining the labour market for R&I personnel to build a combined view of labour market demand and supply for R&I talent, This is not only relevant for comparing R&I systems over time, illustrating for instance the growth in R&D and STEM employment, but also provides insights on R&I career pathways and potential prospects for different cohorts and population groups, Training for and establishing a career in R&I represents a substantial investment of time, effort, and resources by individuals, employing organisations and, often, governments. Yet, because many aspects of R&I career trajectories and outcomes remain poorly measured and understood, such investments are often made under considerable uncertainty. For example, academic researchers often start their careers with a long period of advanced education and undergo years of precarity post-graduation before becoming established in a stable career path (OECD, 2021[1]). Robust and reliable information on career pathways and employment outcomes is therefore critical to informed decision-making by individuals, institutions, and policymakers.

This chapter's analysis draws on multiple sources of evidence consolidated through ReICO. It first presents internationally comparable measures of R&D personnel and the professional science, technology, engineering and mathematics (STEM) workforce, exploring the relative size of these workforce segments across countries, their characteristics and the connections between them. Box 3.1 summarises the definitions of these workforce categories and the distinctions between them. The second part of the chapter adopts the perspective of individuals investing in doctoral education, one of the pathways into research careers. Drawing on longstanding international efforts to track the careers of doctorate holders beyond graduation, it provides a comparative overview of their employment outcomes, including the sectors in which they work and the conditions under which they are employed, benchmarked against master's degree holders. Although limited in scope and granularity, these indicators offer valuable insights into the labour market returns to doctoral training and the extent to which countries reward the substantial additional investment required to obtain a doctorate.

Box 3.1. Components of the R&I workforce

The main perspectives taken within national and international statistical infrastructures to identify and collate data on those working in R&I are the segment of the workforce whose *function* is performing R&D (i.e. R&D personnel, whose numbers and features are typically reported in surveys by the organisations they work for) and those whose *occupation* is likely to entail engagement in R&D and/or innovation activity (often reported at the level of individuals in labour force surveys or census).

As described in Chapter 1, international statistics group those whose function involves R&D into three categories – researchers (encompassing not only those engaged in basic or applied research but R&D managers, engineers, scientists, programmers and designers), technicians and equivalent staff, and other supporting staff. The limitation of this perspective is that it does not cover everyone with the

potential to contribute to R&D, and misses out on those contributing to innovation beyond R&D. From a generic occupational classification perspective, the categories of science and engineering (ISCO 21) and ICT (ISCO 25) professionals (hereafter, the "professional STEM workforce" or "STEM professionals") are afforded particular importance in national and international data collections such as labour force surveys, as professions with high levels of scientific and technical expertise contributing to economies' capacity to develop, adopt, apply and diffuse new knowledge and innovations (OECD, 2026[2]). The limitation in this case is the lack of data on whether they actually work on R&D or innovation.

Beyond R&D personnel and the professional STEM workforces lies a wider, less standardised group of innovation workers who do not necessarily perform R&D or work as STEM professionals, but contribute to developmental, financial and commercial activities that are intended to result in innovation, for example, those engaged in design and other creative work, marketing, intellectual property management, training, software development and innovation management. Methodologies for defining and measuring this group within national and international statistical activities are far less advanced (OECD/Eurostat, 2018[3]).

As Figure 3.1 shows, these workforce groups overlap but do not encompass each other. The respective sizes of the groups and the extent to which they overlap also cannot be fully ascertained from existing statistical data.

Figure 3.1.Components of the R&I workforce

Source: Authors' elaboration

How large is the R&D workforce and how much is invested in it?

On average across the OECD, R&D personnel made up 1.6% of employment

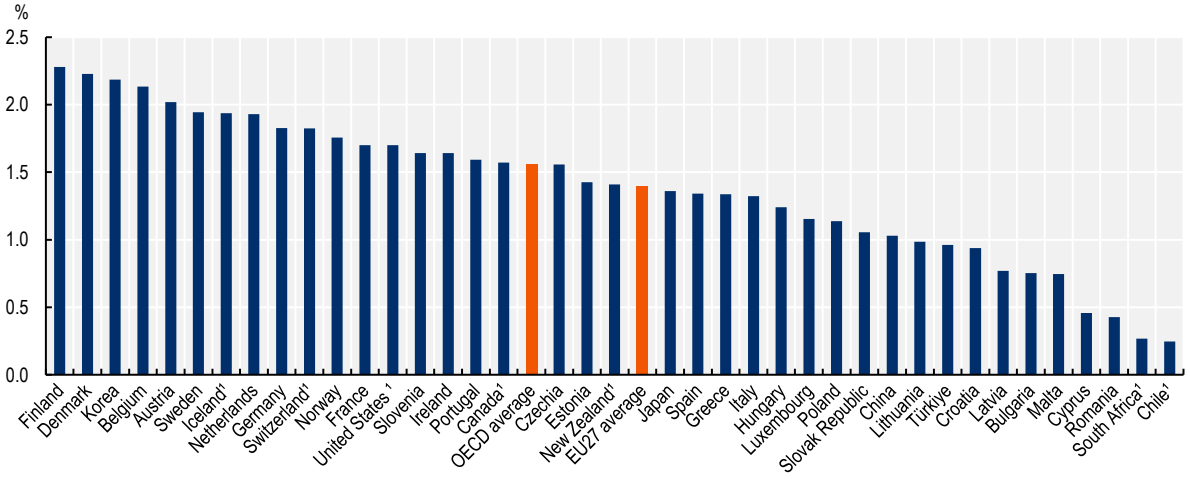
R&D personnel are one of the core measures of R&D inputs (OECD, 2015[4]) and indicate the stock of accumulated capability and expertise being effectively employed to conduct and support R&D within countries. At the national level, the share of R&D personnel within total employment provides a human-focused signal of the R&D intensity of the economy, as well as the scale and depth of its labour market for R&D activities, although it falls short of providing a complete picture of total resources dedicated to R&D and innovation.

According to the established practice laid out in the Frascati Manual, R&D personnel are reported in international statistical data collections both as headcounts and in full-time equivalents. This distinction is important because a great deal of R&D is performed on a part-time basis alongside teaching (for example, in higher education institutions) or other tasks, such as general management, production and commercialisation activities, to name a few. Full-time equivalents adjust for proportions of time R&D personnel spend outside R&D work or on other tasks and are therefore used to compare not only across countries but with other measures of R&D input and output within countries.

Figure 3.2 shows the high dispersion in R&D personnel intensity across countries and economies covered in RelCO. Among countries with data available, only five countries (Austria, Belgium, Denmark, Finland and Korea) report R&D personnel intensities above 2% of employment. At the other end of the distribution, four countries (Chile, Cyprus, Romania and South Africa) report intensities lower than 0.5%. Across the OECD area, full-time equivalent R&D personnel accounted, on an unweighted average basis, for almost 1.6% of employed persons in 2024 (OECD, 2026[5]), while across the EU, the average (unweighted) value was only slightly lower at just under 1.4%.

Figure 3.2. R&D personnel in employment, 2024

Percentage of employment



Note: 1. Reference year differs: 2022 for Chile and the United States, and 2023 for Canada, Iceland, New Zealand, South Africa and Switzerland.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on Main Science and Technology Indicators (MSTI), June 2026.

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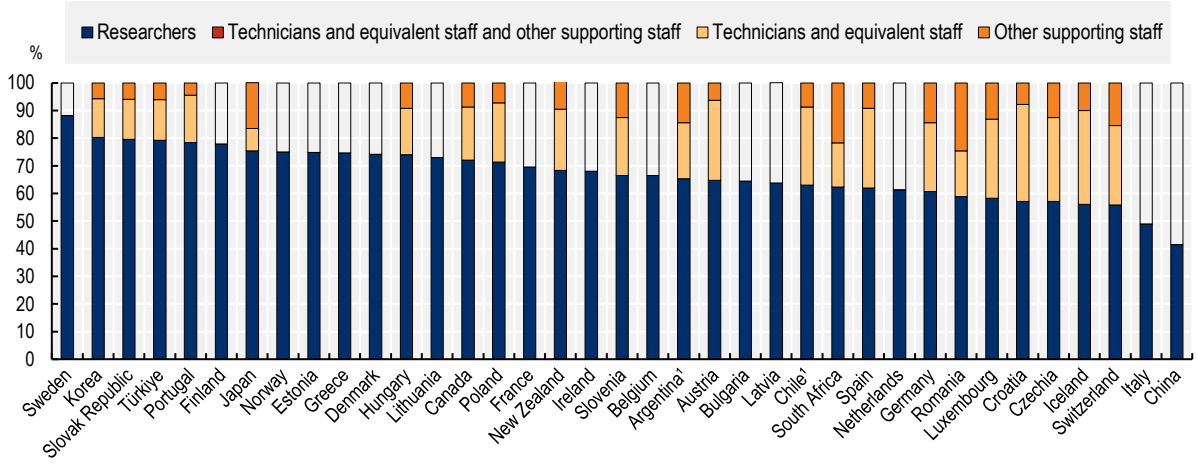
Most R&D personnel are working as researchers

Equally important to the intensity of R&D personnel within employment are the types of functions in which these personnel are engaged. As discussed in Box 3.1, R&D personnel comprise a range of roles, which are grouped for statistical purposes into the functional categories of researchers (a category which as previously explained in Box 3.1 not only includes scientific researchers but also engineers and managers involved in the oversight of R&D projects); technicians and other equivalent staff involved in the implementation of R&D; and other support staff. Looking at differences in the balance of these roles provides insights into the nature of R&D activities across countries and sectors and the organisation or division of labour within them.

Figure 3.3 shows that the breakdown of personnel by function varies substantially across countries included in the ReICO database. Reflecting the concept's broad definition, researchers make up the majority of R&D personnel in most countries with available data, with shares exceeding three-quarters of all personnel in seven countries (Finland, Japan, Korea, Portugal, the Slovak Republic, Sweden and Türkiye). Exact definitions used across countries may have some bearing on the comparability of these figures. Business respondents, for example, often find it difficult to identify their R&D engineering workforce as researchers because they associate that concept to the conduct of basic research and not necessarily new product or process development. Furthermore, not all countries can distinguish between technicians and other supporting staff, but among those that can, shares of technicians tend to be substantially higher than shares of supporting staff. Tracing other supporting stuff can be challenging because this may correspond to outsourced services such as facility management, impeding the tracking of personnel data beyond the organisations that report on their R&D. The highest shares of technicians among R&D personnel are reported in Croatia (35%), Iceland (34%) and Czechia (30%), while the smallest share of technicians can be found in Japan (8%).

Figure 3.3. R&D personnel by function, 2023

Percentage of R&D personnel, full-time equivalent



Note: Fifteen countries cannot disaggregate between technicians and equivalent staff and other supporting staff. 1. Reference year 2022.
Source: OECD, Research and Development Statistics, July 2026.

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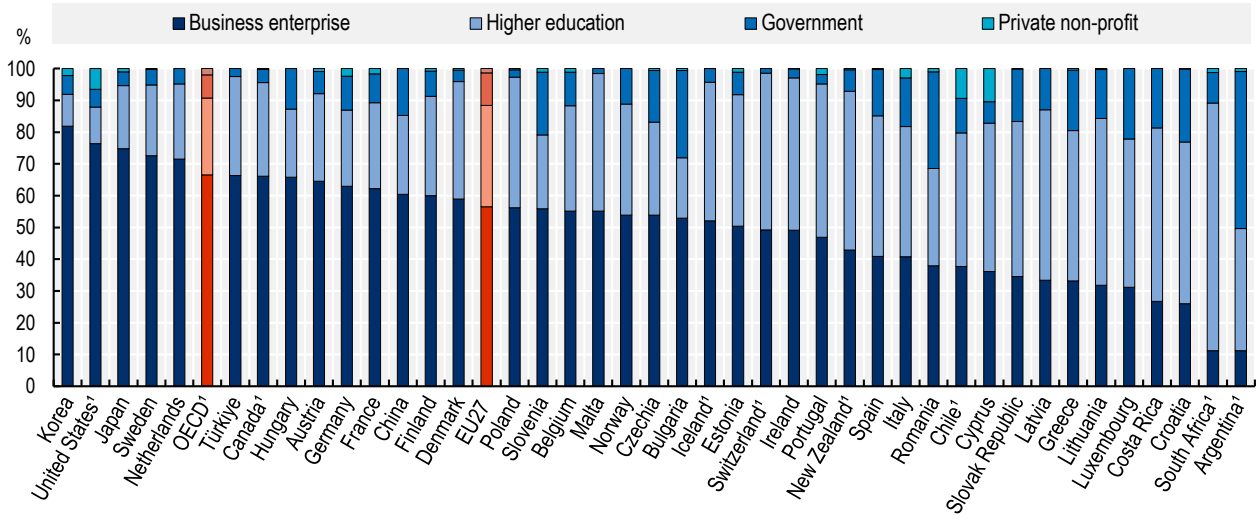
The business sector is the main employer of researchers, but with major differences across countries

The business enterprise sector is the single largest employer of researchers in the majority of countries covered in ReICO. Shares of researchers in the business sector are highest in Japan, Korea, the Netherlands, Sweden and the United States, where seven in ten researchers or more work in business enterprises (Figure 3.4). There is, however, considerable variation across countries: at the other end of the distribution, in several countries including Costa Rica, Croatia, Lithuania and Luxembourg, fewer than one third of researchers are employed in business, and the higher education sector instead employs the largest share. On a weighted average basis, the business sector accounted for close to two-thirds of all researchers (in full-time equivalents) across the entire OECD area in 2024. This substantial share principally reflects the share of the business sector in terms of total R&D expenditure. It also highlights the

broad and diverse range of roles included in the category of "researcher" as defined in international statistics (see Box 3.1).

Figure 3.4. Distribution of researchers across sectors, 2024

Percentage of researchers, full-time equivalent



Note: Estimates for OECD and EU refer to weighted averages for the respective area. 1. Reference year differs: 2022 for Chile, and 2023 for Argentina, Canada, Iceland, New Zealand, OECD, South Africa, Switzerland and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on Main Science and Technology Indicators (MSTI) and Science, Technology and Innovation Scoreboard, June 2026.

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Higher education is the second-largest employer of researchers in almost all countries, and, as mentioned, in a substantial group of mainly smaller and lower R&D-intensity economies it is the dominant one. The government sector plays a comparatively modest role as an employer in most R&D systems, though it remains sizeable in several economies, employing at least 20% of researchers in Argentina, Bulgaria, Croatia, Luxembourg and Romania. Finally, as Figure 3.4 shows, the private non-profit sector employs only a marginal share of researchers in virtually all countries, exceeding 10% of employment only in Cyprus.

The R&D workforce has been rapidly expanding

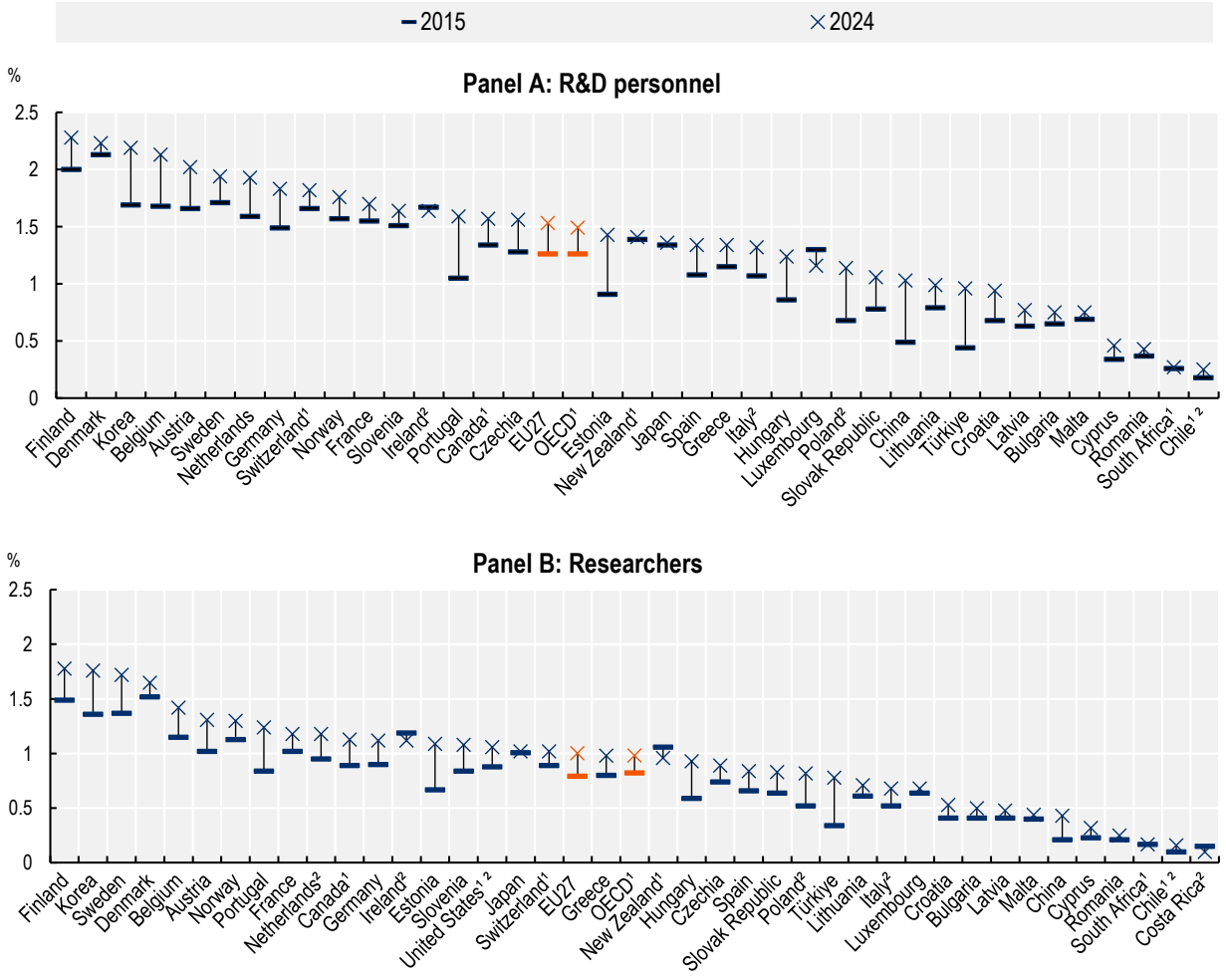
Most countries have witnessed a steady increase in their R&D workforce, which continued over recent years both in absolute terms and as a proportion of total employment. Across the entire OECD area, R&D personnel as a percentage of all persons employed increased from an average of 1.3% in 2015 to 1.6% in 2024, a relatively short period for such a change (OECD, 2026[2]). A similar pattern holds for researchers with increases recorded across most OECD countries.

Over time, several countries have narrowed gaps with those exhibiting the highest shares of R&D personnel over total employment, as shown in Figure 3.5. China, Estonia, Portugal and Türkiye show the largest increases in R&D personnel intensity over the period, with shares increasing by more than half a percentage point in each case, followed by Belgium, Korea and Poland. Only two countries recorded minor decreases in R&D personnel shares over the same period: Ireland and Luxembourg. Costa Rica, Ireland

and New Zealand also recorded minor reductions in their workforce share of researchers between 2015 and 2024.

Figure 3.5. Change in R&D personnel and researcher intensity, 2015-2024

Percentage of employment



Notes: Estimates for OECD and EU refer to weighted averages for the respective area. For Costa Rica and the United States, data is only available on researchers. 1. Latest reference year differs: 2022 for Chile and OECD (R&D personnel), and 2023 for Canada, New Zealand, OECD (researchers), South Africa, Switzerland and the United States (researchers). 2. Break in series.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on Main Science and Technology Indicators (MSTI) and Science, Technology and Innovation Scoreboard, June 2026.

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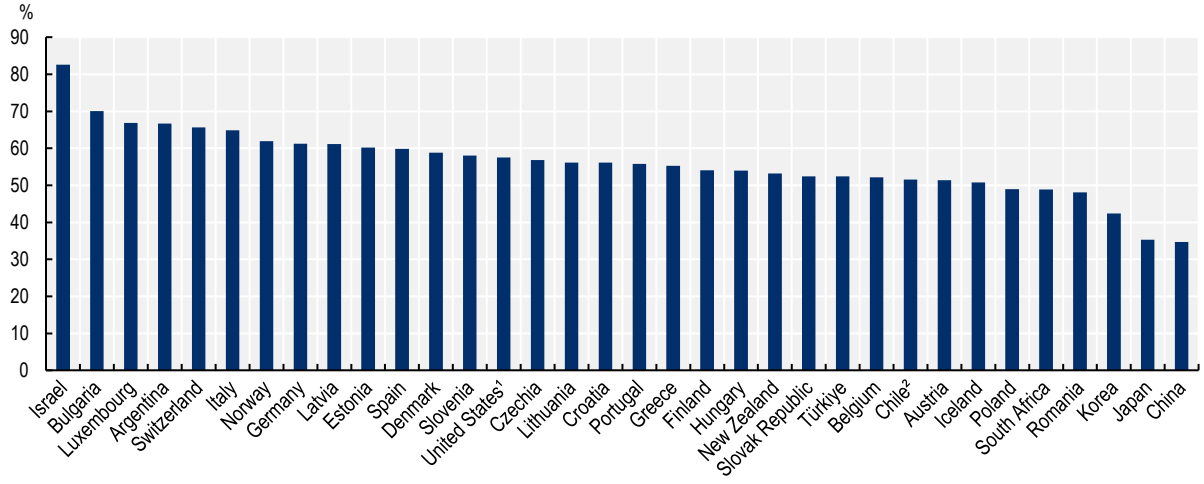
The underlying drivers of these changes are likely to vary across countries and R&D-performing sectors, reflecting a combination of structural, economic and policy factors. While changes in R&D investment may help explain some of these patterns, the relative importance of different influences is likely to differ across national contexts. Further analysis could help to further unpack these patterns. Notably, the R&D-specific expansion is occurring alongside a broader growth of the science, engineering and technology workforce, as discussed later in this chapter.

A considerable share of global expenditure on R&D goes on labour costs

An important complementary perspective to the scale and composition of R&D workforces across countries is the financial resources devoted to supporting this workforce. Globally, an estimated USD 3.8 trillion (in purchasing power parity terms) was spent on R&D in 2024, with an estimated USD 2.3 trillion of that coming from OECD economies alone (OECD, 2026[6]). A considerable proportion of this expenditure goes towards labour costs for internal R&D personnel. In most countries with available data, these costs account for at least 50% of gross domestic expenditure on research and development (GERD) although there is substantial variation (OECD, 2026[7]). Figure 3.6 highlights the central role of personnel costs in R&D activities across countries. In most economies, labour costs for internal R&D personnel account for between one-half to two-thirds of GERD, underlining the point that countries' investment in R&D is, to a large extent, investment in people.

Figure 3.6. R&D labour cost for internal R&D personnel as share of R&D expenditure, 2023

Percentage of gross domestic expenditure on R&D (GERD)



Notes: 1. OECD estimate excluding private non-profit sector. 2. Reference year 2022.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on Research and Development Statistics, June 2026.

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The observed variation across countries in shares of R&D expenditure on internal R&D personnel likely reflects differences in sectoral R&D structures, seniority profiles of R&D workers, wage levels, and the relative importance of capital-intensive forms of R&D within countries. Countries with lower labour cost shares may have a greater prevalence of R&D activities requiring specialised equipment, facilities or other non-labour inputs, or rely more heavily on external contracting and offshoring. By contrast, a higher labour cost share could indicate a stronger concentration of R&D expenditure in areas and industries like software development, design and scientific and technical services.

There are major differences in R&D spending per R&D personnel across countries and sectors

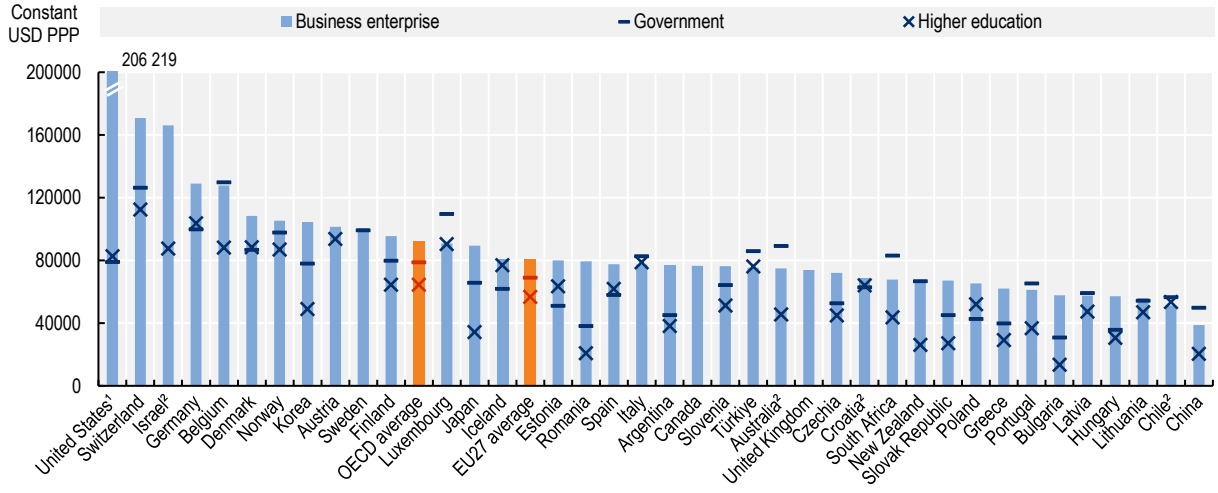
The share of labour costs in GERD provides an indication of the importance of personnel within R&D activities and reflects the extent to which R&D expenditure is devoted to internal personnel rather than external human resources, equipment, buildings, or other inputs. However, labour cost shares may reflect

the size of the R&D workforce or compensation levels to different degrees - two countries with similar shares of GERD devoted to labour costs may be spending it in very different ways. For this reason, unit labour costs, measured as labour costs for internal R&D personnel per full-time equivalent (FTE) R&D personnel, provide a more illuminating view of the average level of resources available per individual worker and facilitate clearer comparisons across countries.

Figure 3.7 shows considerable differences in unit expenditure for internal R&D personnel across countries and research-performing sectors with available data, which take account of cost-of-living differences across countries by applying purchasing power parities (PPPs) and price changes across years. Within countries, the business sector in general shows the highest levels of unit expenditure, surpassing the higher education sector in 34 out of 37 countries with available data, and that of the government sector in 26 out of 36 countries with available data. Remuneration for R&D personnel may include where available stock-based compensation, which some countries separately itemise in their national publications. In the business sector, Israel, Switzerland and the United States spent the most per FTE R&D personnel, over USD 160 000, with the United States showing the highest by a substantial margin, reaching USD 206 219 in 2023. Within the ReICO database, China has the lowest levels of unit expenditure for business R&D personnel (USD 38 636 per FTE personnel) followed by Chile (USD 51 116) and Lithuania (USD 55 875).

Figure 3.7. R&D labour costs per internal R&D personnel, by sector, 2023

USD PPP per full-time equivalent internal R&D personnel (2020 prices)



Note: For Austria, Canada, Israel, Sweden and the United Kingdom, data is missing in one or more sectors. 1. OECD estimate for data on government sector. 2. Reference year differs: 2022 for Australia (government and higher education), Chile, Croatia (government) and Israel (higher education).
Source: OECD, Research and Innovation Career Observatory (ReICO) Database, June 2026.

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The highest levels of R&D costs per personnel in the higher education sector are found in Austria, Germany and Switzerland, while for the government sector Belgium, Luxembourg and Switzerland exhibit the highest R&D labour costs per personnel.

Because the indicators in Figure 3.7 are computed based on labour costs, they provide a strong signal of differences across countries and sectors in direct spending on remuneration and other costs such as taxes, which can be directly or indirectly associated to benefits (e.g. pensions, social contributions, health insurance and other ancillary benefits, such as stock options, which in some cases can be quite significant)

for R&D personnel. Getting a clear picture of remuneration and benefits at the individual level requires alternative approaches, such as surveys of R&I or STEM personnel. International comparisons of unit R&D labour costs are however useful indicators of potential incentives to move across sectors and borders.

Comparing sectors across the OECD, the business sector spent USD 92 106 per R&D personnel on average, compared to USD 78 613 in the government sector and USD 64 313 in the higher education sector. In Bulgaria, Japan, New Zealand and Romania, expenditure per person in R&D in higher education is below 40% of the level in the business sector. As mentioned, these indicators can provide a picture of potential incentives to move across sectors. However, such mobility may be constrained by several supply and demand factors, including skill mismatches. Indeed, these sectoral differences partly reflect disciplinary composition, with businesses more likely to concentrate R&D personnel within fields with generally higher prevailing salaries, such as engineering, computing and life sciences, while higher education R&D spans all fields of research.

Differences in expenditure per R&D person also reflect variation in the occupational composition of the R&D workforce across sectors. For example, some R&D-performing organisations within business sectors employ large numbers of specialised engineers, software developers, data scientists, project managers and other highly qualified professionals whose skills command relatively high salaries and benefits. Conversely, doctoral candidates, who as trainee researchers receive relatively low salaries and stipends, are also often included in counts of R&D personnel in the higher education sector.

How is the professional STEM workforce evolving?

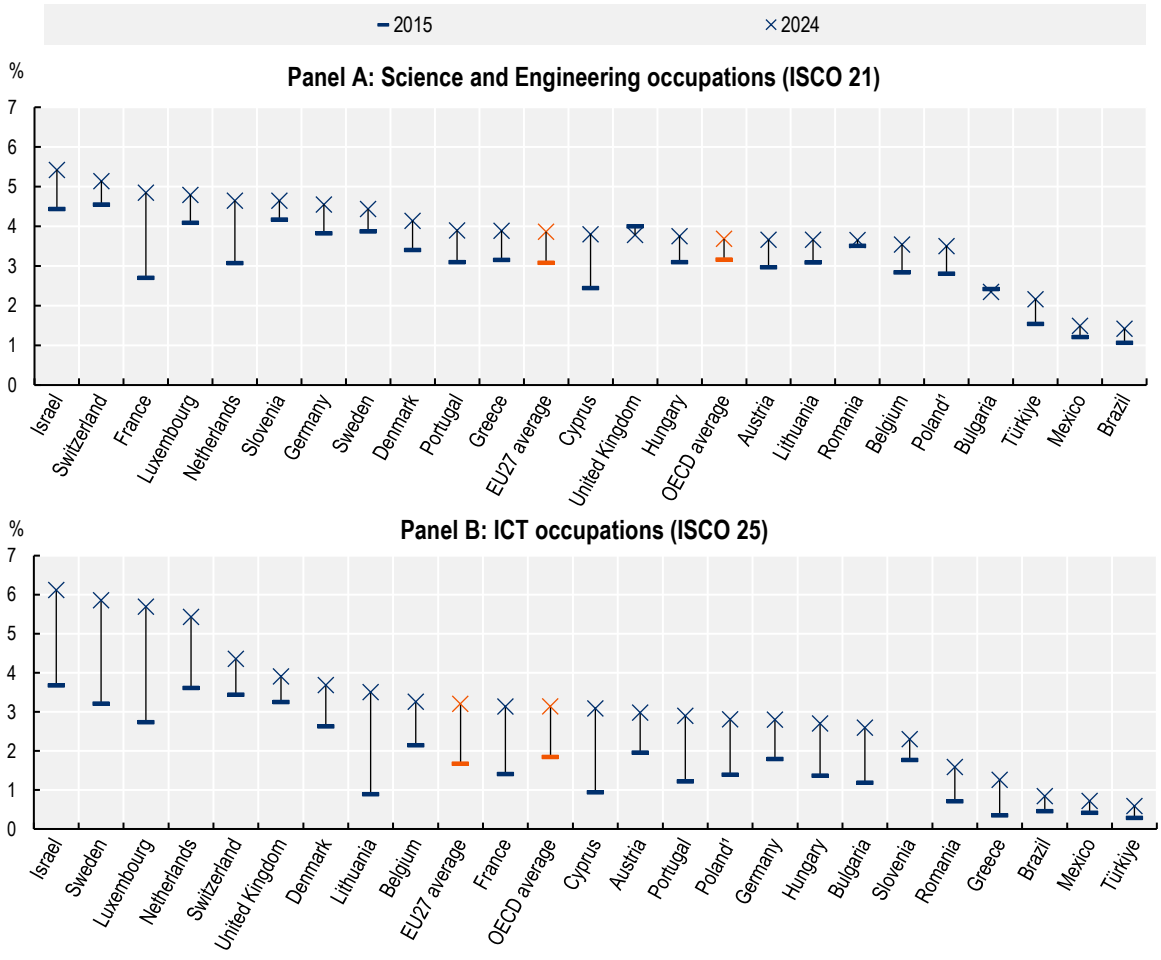
Science, engineering and ICT professionals together make up a considerably higher share of employment than R&D personnel

Analysis of R&D personnel totals, composition and trends provides only a partial view of the R&I workforce (Figure 3.8). Occupation-based measures of the professional STEM workforce offer a complementary perspective, broadening the focus to the wider pool of scientific and technical talent available within R&I systems. This different and complementary view encompasses a substantially larger workforce than that captured by R&D personnel statistics alone but is still likely to exclude many other occupations with individuals contributing to R&I, e.g. individuals with managerial, teaching or design occupations.

In 2024, on average across OECD countries, science and engineering professionals (ISCO 21) accounted for 3.7% of total employment and ICT professionals (ISCO 25) for a further 3.1% (Figure 3.8). Employment shares of the professional STEM workforce in OECD countries and other economies covered in the ReICO database on display in this figure are well above the corresponding shares of R&D personnel, with many in STEM professions potentially contributing to innovation through activities such as technology development, implementation, production, technical services and knowledge diffusion, rather than through formal R&D (OECD, 2026[5]).

Figure 3.8. Change in workforce in science, engineering and ICT occupations, 2015-2024

Percentage of employed population aged 25-64



Notes: Data for more countries are available on the database. 1. Break in series.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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Figure 3.8 shows (combining Panels A and B) four countries (Israel, Luxembourg, the Netherlands and Sweden), where the professional STEM workforce now surpasses 10% of employment. In these countries, the share of ICT professionals is slightly bigger than that of science and engineering professionals. However, in most countries, the proportion of professionals in science and engineering is higher than that of professionals in ICT (e.g. Denmark, France and Germany). Among the countries covered by RelCO, the lowest shares of professional STEM workforce are found in Brazil and Mexico, each with shares under 1.5% of science and engineering and less than 1% of employees working in ICT.

Both occupational groups have expanded in nearly all countries with available data, albeit at different paces. While the share of science and engineering professionals rose comparatively modestly across the OECD area between 2015 and 2024, from about 3.2% to 3.7% of employment, ICT professionals grew far faster over the same period from roughly 1.8% of employment in 2015 to 3.1% in 2024, on average across the OECD. Growth in ICT occupations was also more uniformly distributed across countries, with increases

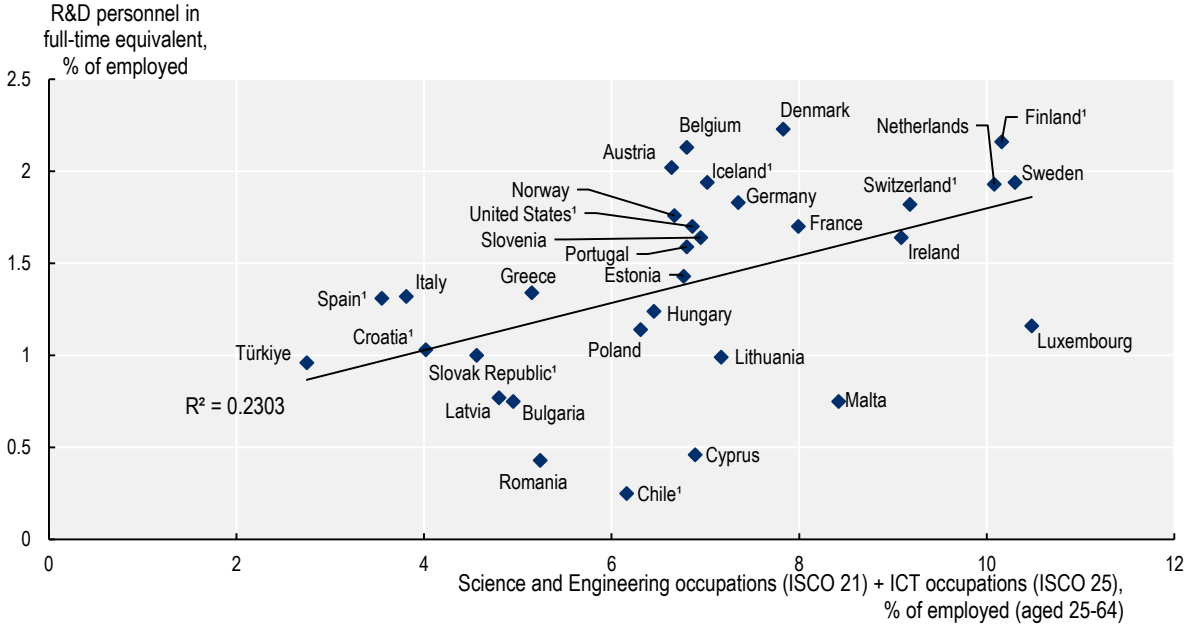
visible in all country in Figure 3.8 (Panel B), whereas in science and engineering (Panel A) Bulgaria and the United Kingdom recorded flat or slightly declining shares.

Taken together, STEM professional groups have expanded faster than R&D personnel between 2015 and 2024 and particularly so for ICT professionals. This highlights the broader diffusion of digital technologies across economies. It also points to increasingly diverse career pathways for individuals with advanced technical skills, many of whom contribute to innovation through technology development, implementation, data-intensive activities and other knowledge-intensive functions outside formal R&D.

R&D personnel and STEM workforce shares are positively related

Figure 3.9 shows a positive correlation across countries covered in ReICO between R&D personnel as a share of employment and the combined share of STEM professionals, for countries with data on both measures. Countries with larger shares of employment in professional STEM occupations tend to have larger shares of their employees engaged in R&D, and vice versa. While several countries, including Finland, Sweden and the Netherlands, combine relatively high values on both measures, others, such as Cyprus, Lithuania, Malta, and Luxembourg, have among the highest shares of employment in STEM professions but below average shares of R&D personnel. Austria and Belgium are among the few countries that combine relatively high R&D personnel intensity with unexceptional shares of STEM employment.

Figure 3.9. R&D personnel and science, engineering and ICT occupations, 2024



Note: 1. Reference year differs: 2021 for Croatia, 2022 for Chile and the United States, and 2023 for Finland, Iceland, the Slovak Republic, Spain and Switzerland.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on Main Science and Technology Indicators (R&D personnel) and multiple data sources (science, engineering and ICT occupations), June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the ReICO database.

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Figure 3.9 highlights that having a large pool of professional STEM workers within a given country does not translate automatically into heightened R&D activity and vice-versa. The composition of a country's industrial and service structure mediates the relationship. Different patterns can arise depending on the

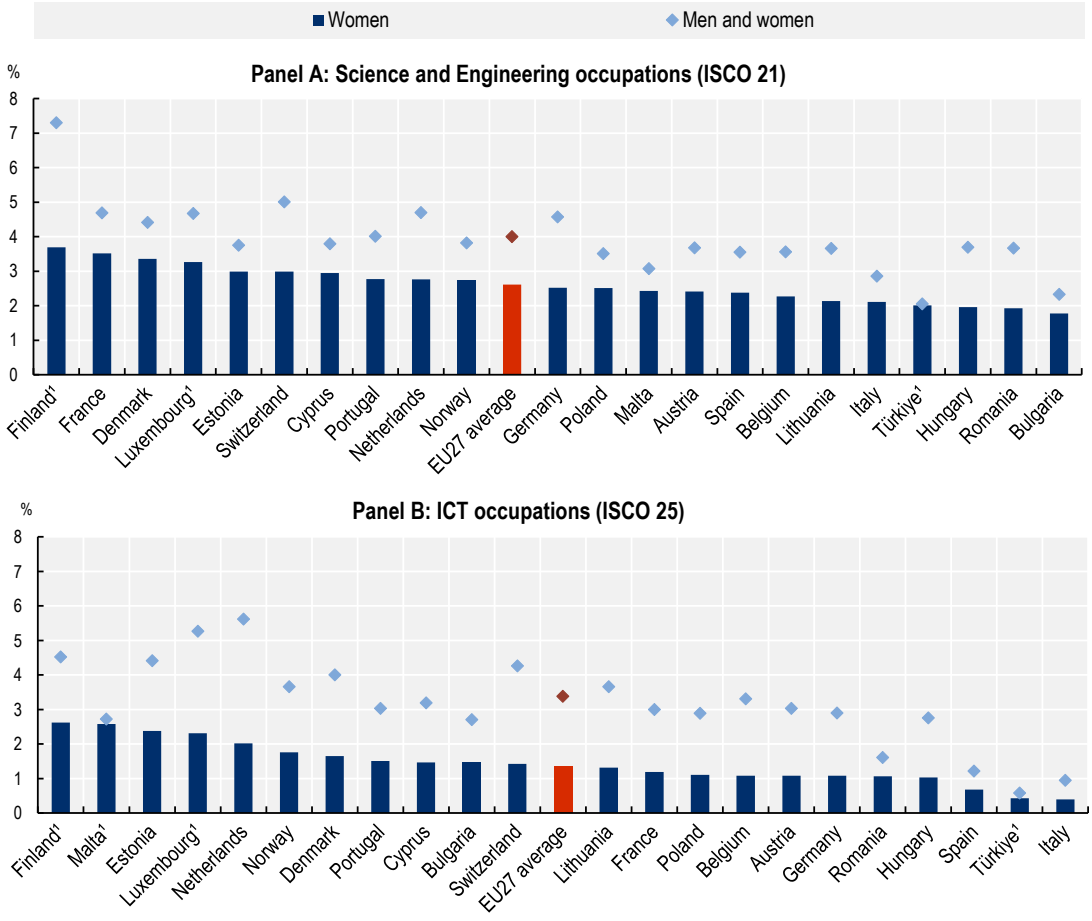
industrial structure of national economies and the extent to which they give rise to demand for R&D-intensive roles or other types of scientific or technological activities. Data from job advertisements can potentially shed light on how demand for different types of research, ICT and technician occupations is distributed within, and evolving, across countries, as discussed in Chapter 5.

Women are present in smaller numbers than men in STEM professions in most countries

Even as STEM professionals become a more important share of employment, their sex composition remains markedly unbalanced. Currently available data within ReICO for these indicators is limited to data sourced from Eurostat corresponding to members and associates of the European Statistical System (ESS). Figure 3.10 illustrates the extent to which percentages of women remain lower than overall percentages employed in both science and engineering occupations (Panel A) and ICT occupations (Panel B), in almost every ESS country.

Figure 3.10. Women in science, engineering and ICT occupations, 2024

Percentage of same sex group



Notes: Data currently available only for members and associated countries of the European Statistical System (ESS). 1. Reference year differs: 2021 for Malta, 2022 for Finland and Luxembourg, and 2023 for Türkiye.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on EU Labour Force Survey, June 2026.

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The participation gap is far wider for ICT professionals than for those working in science and engineering, a concerning pattern given that ICT is the fastest-growing component of the STEM workforce. The magnitude of the gap varies substantially according to the country and occupation category. Türkiye, for example, shows almost identical shares for women and men in both sets of occupations, while the Netherlands combines an above-average overall share of employment in ICT occupations with one of the largest gaps between men and women. Overall, these patterns suggest that challenges remain in attracting, retaining and advancing talent across the full spectrum of scientific and technical careers.

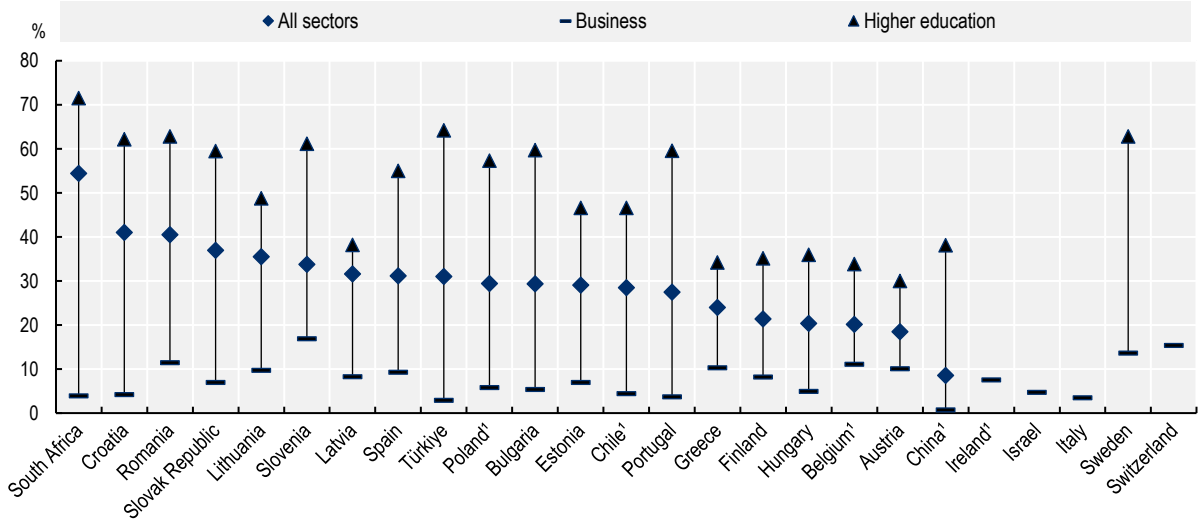
The final section of this chapter shifts to a qualification-based perspective, examining the career outcomes of doctorate holders and the roles they play within science, research and innovation systems.

How do doctorate holders fare in the labour market?

Doctorate holders constitute an important segment of the R&I workforce from the perspective of governments and many R&D-performing organisations, as the group of the population formally trained to conduct original research. Available data on R&D personnel by qualification level for 25 countries highlight the relative prevalence of doctoral qualifications across R&D systems and sectors. As Figure 3.11 shows, overall shares of R&D personnel with a doctorate range from 8.5% in China to 54.5% in South Africa. While shares of personnel with a doctorate are notably smaller in the business sector, compared to higher education, nevertheless, they still tend to reach multiples of the share within the working-age population. For example, in Switzerland, where doctorate holders make up 3% of the working-age population (see Chapter 2), 15.4% of personnel working in business R&D hold a doctorate. In several other countries with available data (Austria, Belgium, Greece, Romania, Slovenia and Sweden), the share of all R&D personnel in the business sector with a doctorate exceeds 10% (Figure 3.11).

Figure 3.11. R&D personnel with a doctorate, 2023

Percentage of all R&D personnel in the sector



Notes: For Ireland, Israel, Italy, Sweden and Switzerland, data is missing in some sectors. 1. Reference year differs: 2021 for Belgium, China and Ireland, and 2022 for Chile and Poland.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on Research and Development Statistics, June 2026.

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As discussed in Chapter 2, doctoral training represents a substantial additional investment over master's level education for individuals, and, often, for governments. Across OECD countries, the average age of graduation from doctoral programmes is 35 - a later transition from the training phase of their careers to the labour market than workers in most other professions. Recognising the importance of this highly skilled group, the OECD has long sought to develop internationally comparable evidence on their careers and working conditions, establishing, together with Eurostat and UNESCO Institute for Statistics, the Careers of Doctorate Holders (CDH) project in the mid-2000s, to address the lack of comparable information on the employment, mobility and career paths of doctorate holders (Auriol, Misu and Freeman, 2013[8]).

Tracking doctorate holders and establishing comparability across countries on indicators relating to their careers comes with several challenges. Doctorate holders make up a relatively small share of the population, making it difficult to obtain sufficiently large and representative samples for statistical analysis. Tracking career trajectories over time is also complex, particularly given the high levels of international mobility among doctorate holders and the growing prevalence of non-linear career paths spanning academia, government and industry. However, as the number of doctorate holders expand and statistical capacity improves, an increasing number of countries are able to identify this group separately and report in greater detail on their profiles and labour market outcomes. This section draws on the most recent data available to present a comparative view of how doctorate holders fare in the labour market.

Employment premia for doctorate holders vary across countries

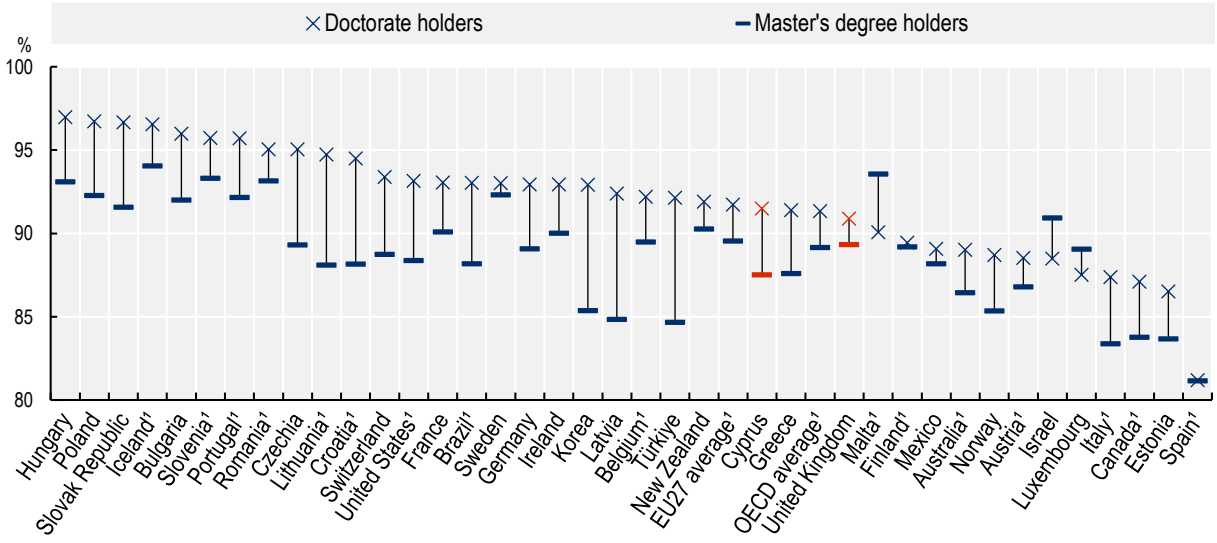
Figure 3.12 shows that employment rates among the full population of doctorate holders exceed those observed for master's degree holders in nearly all countries. Employment rates for doctorate holders are generally above 90% and exceed 95% in seven countries. Overall, on average, Figure 3.12 indicates a modest employment advantage for doctorate holders relative to those holding a master's degree, suggesting that acquiring a doctoral level qualification in general provides some advantage in the labour market, compared to master's degree holders.

Both doctorate and master's degree holders experience substantially higher employment rates than the general population (OECD, 2025[9]), underlining the overall strong labour market returns associated with tertiary education at advanced levels. Despite the overall positive picture, important differences are evident across countries covered in ReICO, even if the small sample sizes warrant some caution in interpretation. In some countries, such as Finland, Mexico, New Zealand, Spain and Sweden, the employment rate gap between doctorate and master's degree holders is particularly small or negative, while in other countries, such as Korea, Latvia and Türkiye, doctorate holders enjoy a more pronounced advantage. These differences in employment rates across countries likely reflect underlying differences in labour market demand for advanced qualifications as well as the sectoral composition of employment.

The overall good performance of doctorate holders in terms of employment should not be a cause for complacency. Aggregate statistics for the entire population do not reflect the outcomes of doctorate holders at different stages of their careers and may not fully capture the experiences of the most recent graduates, as Box 3.2 shows.

Figure 3.12. Employment rates of doctorate and master's degree holders, 2024

Employment rate for degree holders aged 25-64



Notes: Data for more countries are available on the database. 1. Reference year differs: 2021 for Australia, Belgium, Canada, Croatia, Lithuania, Malta and Romania, 2022 for Indonesia and Slovenia, and 2023 for Austria, Brazil, EU27 average, Finland, Iceland, Italy, OECD average, Portugal, Spain and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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Box 3.2. Employment prospects of recently graduated doctorate holders

To understand the employment prospects of early-career professionals, the RelCO National Contact Points annual data collection on doctorate and master's degree holders distinguishes between two groups based on graduation year: recently graduated doctorate holders who completed their degrees within the past five years (hereafter, "recent doctorate holders"), and other doctorate holders who have had degrees longer. Although only a few countries are able to report data on the employment characteristics of recent doctorate holders, the information collected provides a unique perspective on the initial transition from doctoral education to the labour market. The available data shed light on employment rates, full-time employment patterns, and contractual arrangements, offering valuable insights into the employment prospects of early-career doctorate holders who stay in the R&I workforce in the coming years.

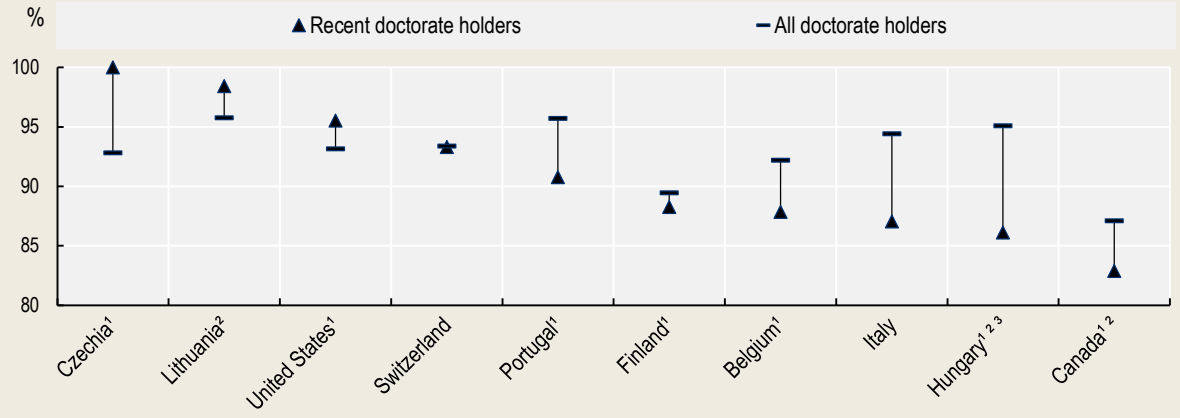
What age are recent doctorate holders?

In all reporting countries, more than three-quarters of recent doctorate holders are under the age of 45. However, the age composition of recent doctorate holders varies considerably across countries. Individuals aged 25-34 account for more than 60% of recent doctorate holders in Italy and Switzerland, compared with less than 30% in Brazil and Finland. These differences may reflect variation across countries in the age at entry to and graduation from doctoral programmes (see Chapter 2), and the extent to which individuals accumulate professional experience before undertaking doctoral studies.

How do recent doctorate holders fare in terms of employment?

Figure 3.13 shows mixed employment outcomes for recent doctorate holders across countries. In Czechia, Lithuania and the United States, the employment rate of recent doctorate holders exceeds that of doctorate holders overall by at least 2 percentage points. By contrast, in Hungary and Portugal, recent doctorate holders appear less likely to be employed, with employment rates approximately 8 percentage points lower than those observed for all doctorate holders. These differences may reflect the varying opportunities with countries for recent graduates transitioning into the labour market.

Figure 3.13. Employment rate of doctorate holders and recent doctorate holders, 2024



Notes: 1. Reference year differs: 2021 for Belgium and Canada, and 2023 for Czechia, Finland, Hungary, Portugal and the United States. 2. Different data source used for employment rate of all doctorate holders. 3. Recent doctorate holders cover graduates within the last four years only.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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What are employment conditions of recent doctorate holders?

In six countries with comparable data (Brazil, Czechia, Denmark, Finland, Italy and Switzerland), employed recent doctorate holders were just as likely to work full-time as employed doctorate holders overall and employed recent master's degree holders. However, differences emerge with respect to contractual arrangements. In four countries with latest data (Czechia, Italy, Portugal and Switzerland), the percentages of employed doctorate holders holding indefinite contracts are 16 to 26 percentage points below that of employed doctorate holders overall. Moreover, the gap in each country larger than that among master's degree holders. These findings suggest that recent doctorate holders are more likely to be employed under temporary contractual arrangements during the early stages of their careers.

What are the current limitations and prospects for tracking recent doctorate holders?

The analysis of recent doctorate holders remains constrained by limited country coverage. Alternative data sources, such as the European Union Labour Force Survey, also provide limited data on recent doctorate holders. However, indicators from these sources were not included in this analysis as recent doctorate holders represent a relatively small population group, thus the values are less reliable. Nevertheless, progress is being made. Countries such as Brazil and Canada have established national initiatives that link doctorate graduate records with employment data (see Chapter 5). As data availability improves and

time series become established, these efforts will provide a stronger evidence base on the labour market transition and early-career outcomes of recent doctorate holders.

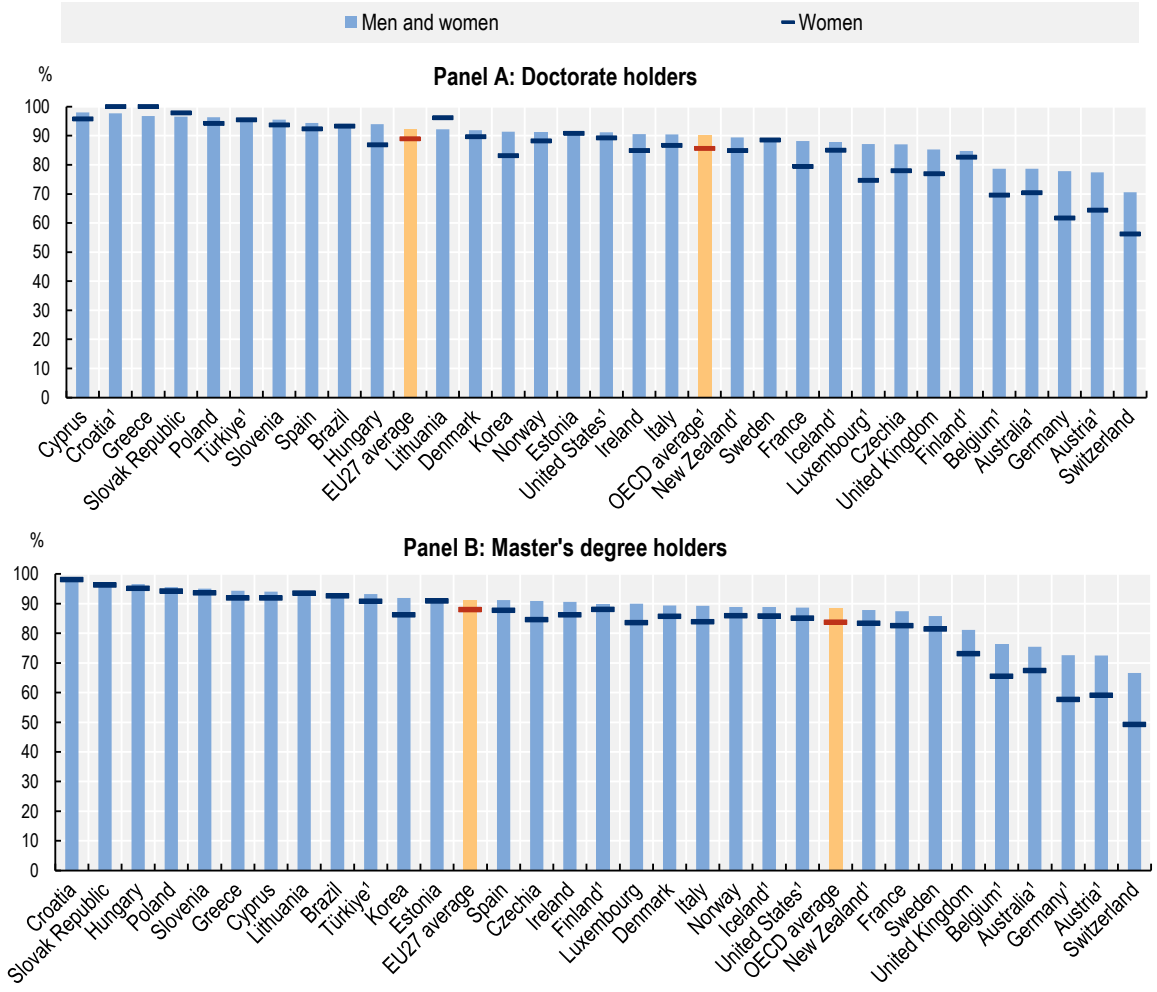
Note: Some data presented in this box are not available on the public version of the RelCO database given the limited country coverage.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database, June 2026, and internal database.

Full-time work remains the norm among doctorates, although at lower rates for women

Full-time work is the norm for those with advanced qualifications in most countries, as Figure 3.14 shows. Across the OECD, doctorate holders are slightly more likely than master's degree holders to hold full-time employment contracts, with 90.1% of employed doctorate holders working full time on average across OECD countries, compared with 88.5% of master's degree holders.

Figure 3.14. Doctorate and master's degree holders working full-time, 2024

Percentage of employed doctorate or master's degree holders aged 25-64 in the same sex group



Notes: Data for more countries are available on the database. 1. Reference year differs: 2021 for Australia and Belgium, 2022 for Austria and Luxembourg (master's degree), and 2023 for Finland, Iceland, New Zealand, OECD average (doctorate), Türkiye and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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However, there is wide divergence in full time employment rates across countries and different groups. These reflect the overall greater prevalence of part-time working arrangements in some countries, such as Austria, Germany and Switzerland, where shares of employees working full-time are below 80% for both doctorate and master's degree holders. Conversely, in several countries, including Croatia, Poland, Slovenia and the Slovak Republic, full-time employment rates exceed 95% for both qualification groups.

On average in OECD countries, 85.6% of employed women holding a doctorate worked full time in 2024, compared with 90.1% for doctorate holders overall, while the corresponding figures for master's degree holders were 83.6% and 88.5%. Gaps in full-time employment rates are particularly large in Austria, Belgium, Germany and Switzerland, whereas women doctorate holders continue to display relatively high rates of full-time employment in several other countries, exceeding 95% in Croatia, Cyprus, Greece, Lithuania, the Slovak Republic and Türkiye.

Overall, Figure 3.14 indicates that, although employment rates among doctorate and master's holders are generally high across OECD countries, the extent of their labour market integration and the intensity of participation, as reflected in full-time employment, varies across countries and population groups, providing a more nuanced picture of their effective availability to participate in R&I activities.

Doctorate holders are less likely to hold indefinite duration contracts in some countries

Patterns of employment stability among doctorate holders, as shown in Figure 3.15, differ somewhat from the patterns shown above for full-time employment. Contractual employment terms provide potential indicators of job stability, separating between indefinite duration contracts and fixed term ones typically associated with timebound projects. Indefinite duration contracts, however, may also differ in terms of job security, from academic tenure and civil service-like appointments to contracts that may be terminated at short notice with limited justification and/or compensation by the employer. Unfortunately, official labour market statistics do not typically distinguish between different types of indefinite employment contracts. They also do not provide information on whether fixed term contracts are part of a formal track towards indefinite employment, which would be relevant, for example, for distinguishing between tenure track and post-doctoral jobs.

On average across OECD countries, doctorate holders are slightly less likely than master's degree holders to hold an indefinite duration contract, with corresponding shares of 87.7% and 91.7%, respectively. This gap may reflect the greater prevalence of fixed-term positions among doctorate holders in research-intensive careers, particularly in the early stages of careers in higher education and public research, where postdoctoral and project-based appointments are common. Overall, however, indefinite employment remains the norm for doctorate holders in all countries, and in some countries (Estonia, Hungary, Lithuania, the Slovak Republic, Slovenia and Türkiye) shares with indefinite contracts exceed 95%. This likely reflects the weight of established doctoral holders in relation to early career staff.

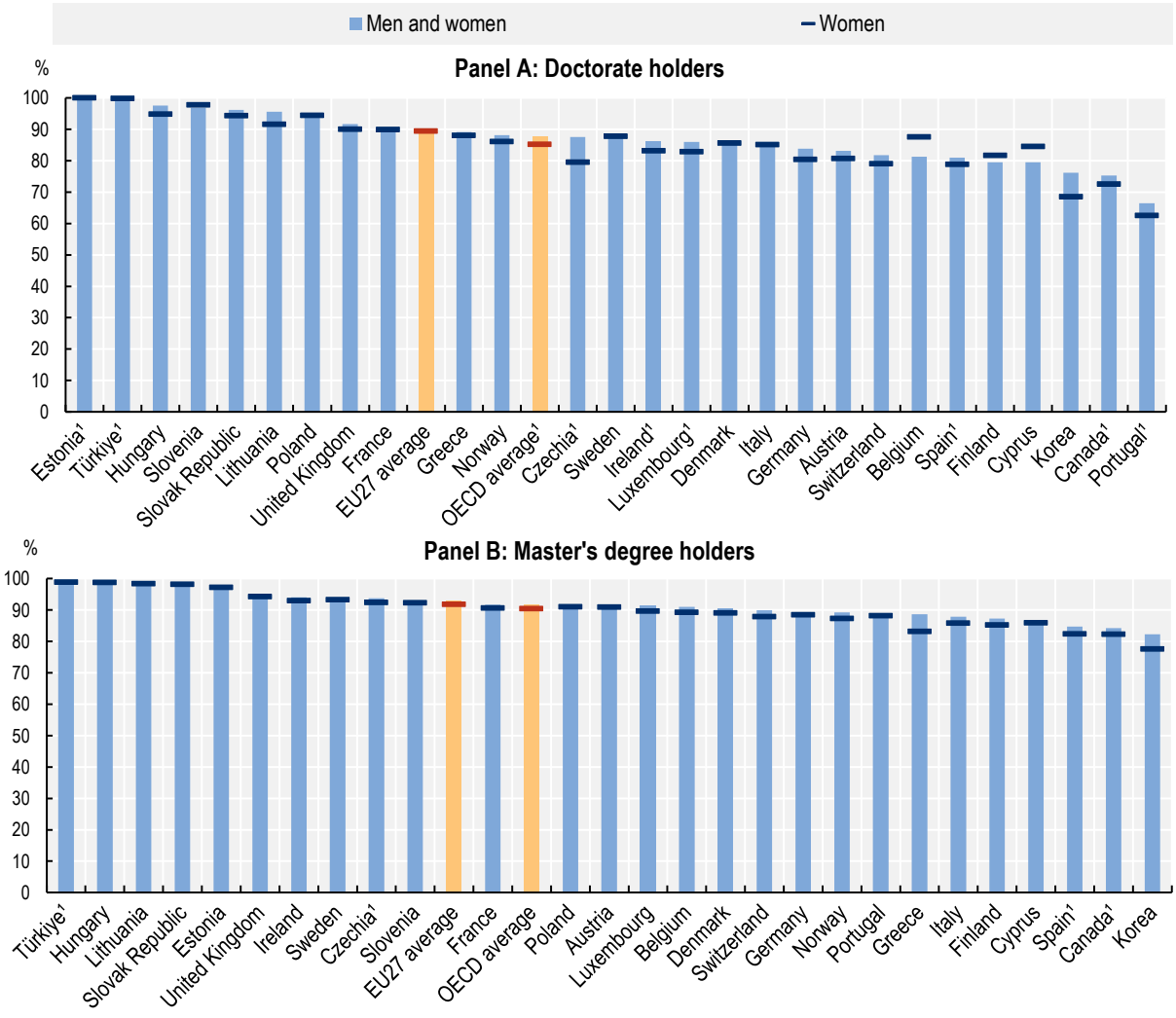
Doctorate holders exhibit considerably greater cross-country variation in shares with indefinite employment than master's degree holders (Figure 3.15), spanning as much as 34 percentage points (between Estonia and Portugal) compared to just under 17 percentage point range for master's degree holders (between Türkiye and Korea), indicating that the employment advantage associated with a doctorate in some countries does not always translate into greater employment stability relative to individuals holding a master's degree.

Women doctorate holders generally record slightly lower rates of indefinite employment than doctorate holders, although the magnitude of the gap varies considerably across countries. The difference exceeds 7 percentage points in Korea and 8 percentage points in Czechia, while little or no gap is observed in countries such as Denmark, Estonia and Türkiye. In a small number of countries, including Belgium, Cyprus, and Finland, women doctorate holders are marginally more likely than the overall population of doctorate holders to hold indefinite contracts. Overall, differences between women and men doctorate

holders in prevalence of permanent employment tend to be smaller than those found for full-time employment, as presented in Figure 3.14.

Figure 3.15. Doctorate and master's degree holders with an indefinite duration contract, 2024

Percentage of employed doctorate or master's degree holders aged 25-64 in the same sex group



Notes: Data for more countries are available on the database. 1. Reference year differs: 2021 for Canada, 2022 for Estonia (doctorate) and Luxembourg (doctorate), and 2023 for Czechia, Ireland (doctorate), OECD average (doctorate), Portugal (doctorate), Spain and Türkiye.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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Industry destinations differ for doctorate holders and master's degree holders

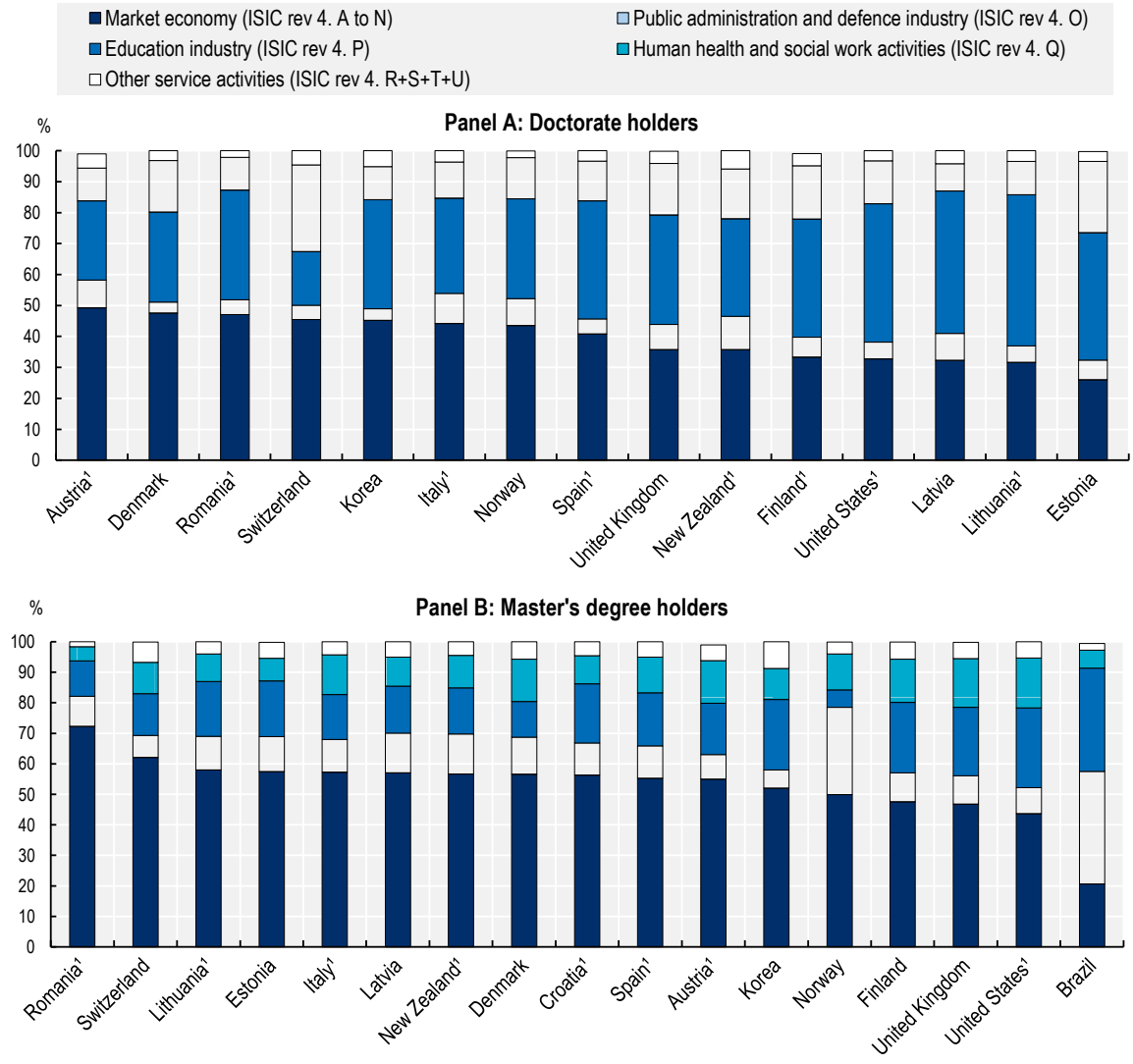
While the labour market outcomes of doctorate holders are often assessed in terms of employment rates, earnings or contract stability, the sectors in which they work are also relevant, indicating the extent to which highly trained personnel contribute to knowledge creation, innovation and the application of scientific expertise. Although employment in a given industry does not necessarily imply direct involvement in R&D,

a higher concentration of doctorate holders in more R&D-intensive industries may signal stronger links between advanced research training and innovation-driven economic activity.

While industries typically associated with the business sector such as manufacturing, utilities, trade and business services (namely ISIC industry groups A to N, a group often described in official statistics as the Market Economy) remains the largest employer of both doctorate and master's degree holders in many countries, doctorate holders are substantially more likely to be found in other industries such as education and public administration than master's degree holders (Figure 3.16).

Figure 3.16. Distribution of industries employing doctorate and master's degree holders, 2024

Percentage of employed doctorate or master's degree holders aged 25-64



Notes: Data for more countries are available on the database. 1. Reference year differs: 2020 for Austria (doctorate), 2021 for Austria (master's degree), Croatia, Finland (doctorate), Italy, Lithuania and Romania, and 2023 for Brazil (doctorate), New Zealand, Spain and the United States.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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On average across the countries covered by ReICO with available data, education accounts for around one-third of employment among doctorate holders and reaches almost 68% in Brazil, 61% in Croatia and over 40% in Estonia, Latvia, Lithuania and the United States, compared with typical shares of 12-34% among master's degree holders, reflecting the importance of higher education institutions as employers of researchers. In contrast, master's degree holders are more frequently employed in the market economy, with employed shares reaching over 70% in Romania and 62% in Switzerland.

The distribution of doctorate holders across sectors other than education or market sectors also varies considerably across countries. Public administration and defence accounts for 17% of employed doctorate holders in Brazil and around 10% in Italy and New Zealand, reflecting an important role for doctorate-qualified personnel in government agencies, public research organisations and policy-related activities in these countries. Substantial shares of doctorate holders are also employed in human health and social work activities account in several countries, accounting for 28% of employment among doctorate holders in Switzerland and 23% in Estonia (Figure 3.16).

Compared with doctorate holders, master's degree holders generally display a more homogeneous employment profile across countries. As mentioned, the market economy is consistently the dominant employer, while education plays a comparatively smaller role in their employment than it does for doctorate holders. Employment is also more evenly distributed across other sectors, including public administration and health. Thus, Figure 3.16 suggests that master's degree holders tend to be spread more broadly across economic activities, whereas doctorate holders are more concentrated in a smaller number of sectors, particularly education and, in some countries, health-related activities.

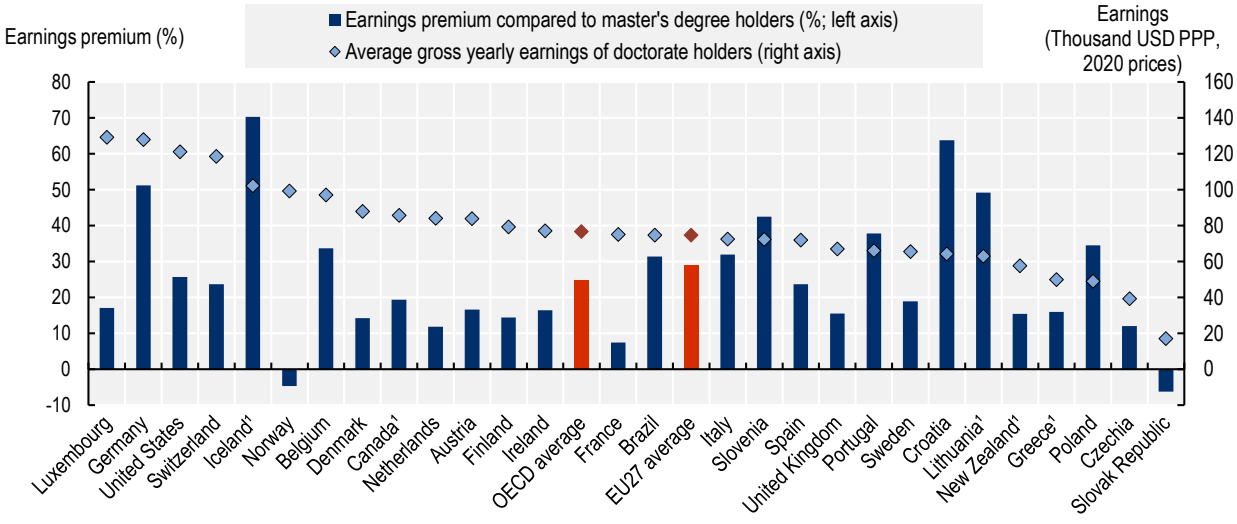
On average, doctorate holders enjoy an earnings premium compared with master's degree holders

On average across the OECD, doctorate holders earned approximately USD 76 501 per year in 2024, adjusted for cost-of-living using purchasing power parities and in constant prices, with average salaries in individual countries ranging from nearly USD 130 000 in Luxembourg to below USD 20 000 in the Slovak Republic (Figure 3.17). Beyond differences in earnings levels, available data indicates that doctorate holders enjoy a substantial earnings advantage over master's degree holders in many countries. The OECD average doctorate earnings premium stands at 25%, but reaches 70% in Iceland, while average premia are lower than 10% in France and slightly negative in Norway and the Slovak Republic.

While earnings are an important indicator of the private returns to doctoral education, they provide only a partial picture of the experiences and career outcomes associated with doctoral training. In recent years, there has been growing attention among policymakers not only to the labour market outcomes of doctoral education, but to the overall quality and sustainability of research careers. Early-career research positions are often characterised by fixed term contracts, uncertain career prospects and intense competition for permanent posts. Such conditions undermine incentives to pursue or continue with research and closely related careers and hinder retention of highly skilled talent within R&I systems, with implications for the returns from substantial private and public investments in this talent.

Figure 3.17.Earnings of doctorate holders relative to master's degree holders, 2024

Doctorate earnings premium (% of master's- left axis) and doctorates' average gross yearly earnings (right axis)



Notes: Individuals aged 25-64. Data for more countries are available on the database. 1. Reference year differs: 2021 for Canada, Greece and Iceland, and 2023 for Lithuania and New Zealand.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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Employment conditions and the quality of research jobs may also shape wider aspects of individual well-being of doctorate holders not covered by conventional labour market indicators. While, as highlighted in this chapter, doctorate holders generally enjoy positive labour market outcomes, questions remain about how these outcomes translate into broader measures of their quality of life and how these measures compare to other population groups. Box 3.3 broadens the analysis presented in this chapter thus far by examining comparative indicators of well-being and living conditions among doctorate holders and other highly educated individuals.

Box 3.3. Quality of life for doctorate holders in European countries

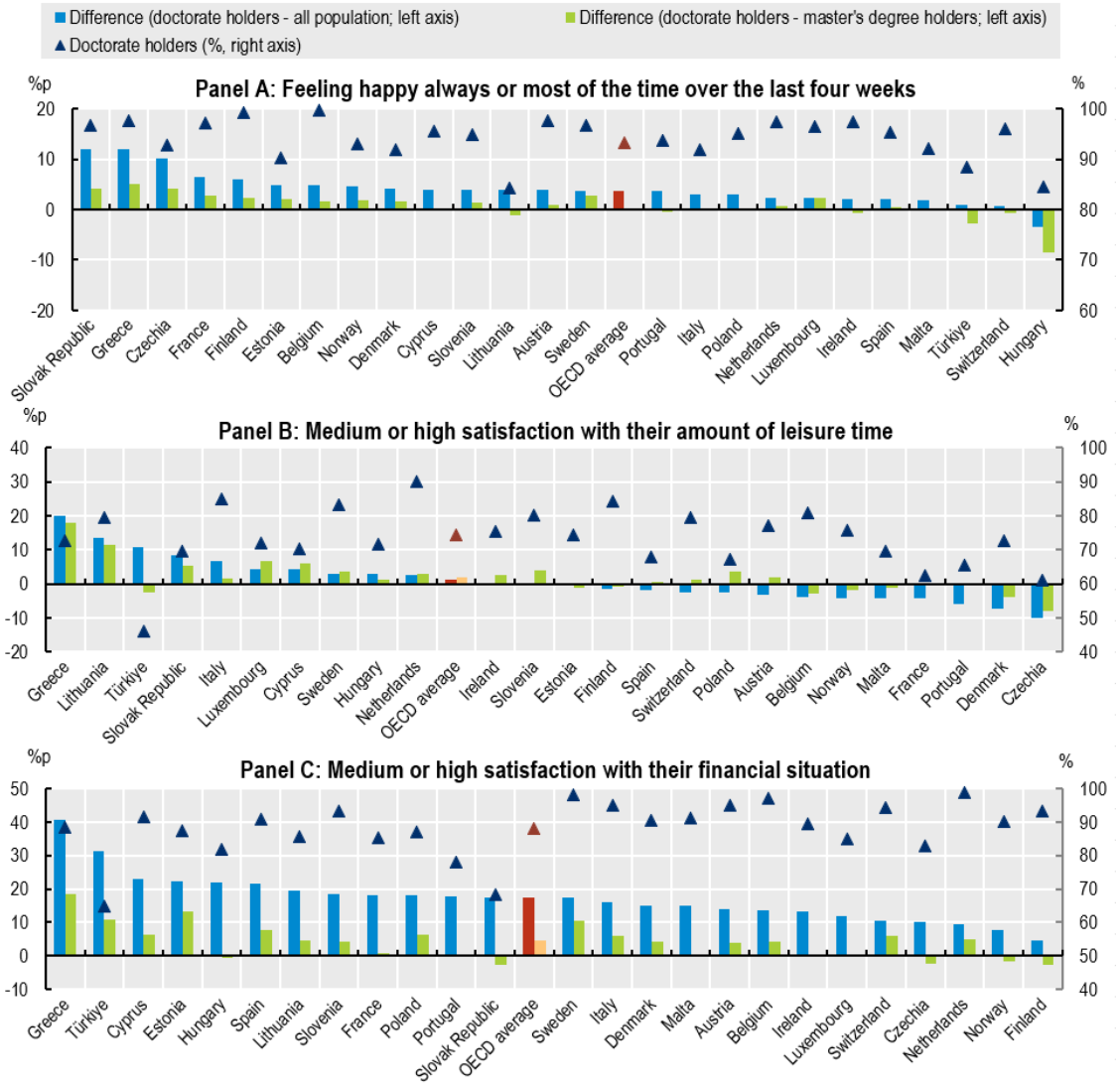
Earnings provide an important indicator of the returns to doctoral education, but capture only one dimension of the outcomes associated with R&I careers. Examining quality-of-life outcomes alongside earnings provides a fuller picture of outcomes of individuals with doctoral training. Evidence for European countries shows that doctorate holders are generally more likely to report feeling happy than the population as a whole, as measured by respective shares reporting feeling happy most of the time over the past four weeks in the EU Survey of Income and Living Conditions (EU-SILC) (Figure 3.18). Differences between doctorate and master's holders in reported happiness are more modest in most countries (Figure 3.18. Panel A).

Patterns for the shares reporting satisfaction with leisure time are less uniform, with differences between doctorate and master's holders varying more in magnitude and direction across countries (Figure 3.18. Panel B). However, in several countries doctorate holders do report stronger satisfaction with their financial situation, consistent with their generally favourable earnings and employment outcomes. For this latter indicator, the OECD average gap reaches almost 5 percentage points compared to master's degree holders (Figure 3.18. Panel C).

Expanding the evidence base on these dimensions, including their extension to a wider and more relevant range of indicators and countries, could help provide a richer understanding of the experiences of doctorate holders and other highly skilled individuals, complementing established indicators of employment, earnings and career progression within research and innovation systems.

Figure 3.18. Quality of life indicators for doctorate degree holders, 2022

Percentage point difference between two groups (left axis) and percentage of doctorate holders (right axis)



Note: Data for more countries are available on the database.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on EU Statistics on Income and Living Conditions, June 2026.

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Conclusion

This chapter shows that R&I systems across the OECD are creating growing opportunities for highly skilled workers. The high shares of R&D expenditure on labour costs, along with the expansion of shares of R&D personnel and STEM workforce, show that R&D remains a people-intensive activity. Differences in expenditure across different R&D-performing sectors indicate, however, that rewards and conditions for R&D work vary considerably. The chapter also shows that doctorate holders generally experience strong labour market outcomes, including high employment rates and earnings premia, although important differences remain across countries and career stages, particularly relating to employment stability. As R&I workforces continue to expand, the quality, stability and rewards available within R&I careers will remain central to attracting highly skilled talent, including talent from abroad, as discussed in the next chapter.

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4 Mapping Mobility in Research and Innovation Careers

Knowledge moves with people. What role does international mobility play in research and innovation systems? This chapter examines the evidence conveyed through ReICO data and indicators on the role of international talent in shaping national research and innovation capacities. It explores mobility during doctoral and master's degree programmes, the contribution of foreign-born individuals to the highly qualified workforce and mobility patterns revealed through data on scientific publications.

In Brief

International mobility expands talent pools and strengthens knowledge exchange

International mobility for the purpose of enrolling in advanced degree programmes has become an important source of talent for research and innovation systems. Across the OECD, 19% of master's graduates and 29% of doctoral graduates in 2023 were internationally mobile, meaning that they had crossed an international border for the purpose of study. The share of internationally mobile doctoral graduates has increased over time, rising from around 24% in 2015.

However, international mobility remains uneven across countries, fields of study and demographic groups. There are also considerable differences across countries in the share of foreign-born individuals holding advanced qualifications, particularly at doctoral level, where shares range from below 5% to more than 70%. Although countries with higher shares of internationally mobile graduates generally also have larger shares of foreign-born advanced degree holders, the relationship is far from uniform. This suggests that countries rely on different combinations of student mobility, skilled migration and graduate retention to build their talent base.

International mobility also shapes the global networks through which knowledge is created and exchanged. Bibliometric evidence shows that the mobility of scientific authors is closely associated with cross-border scientific collaboration. Around 10% of scientific authors with affiliations in OECD countries in 2024 showed evidence of previous international mobility. Mobile researchers are also disproportionately concentrated in internationally connected research systems.

Together, these patterns suggest that mobility contributes not only to expanding the supply of highly qualified people, but also to strengthening collaborations, knowledge flows and international networks that underpin the performance of research and innovation systems.

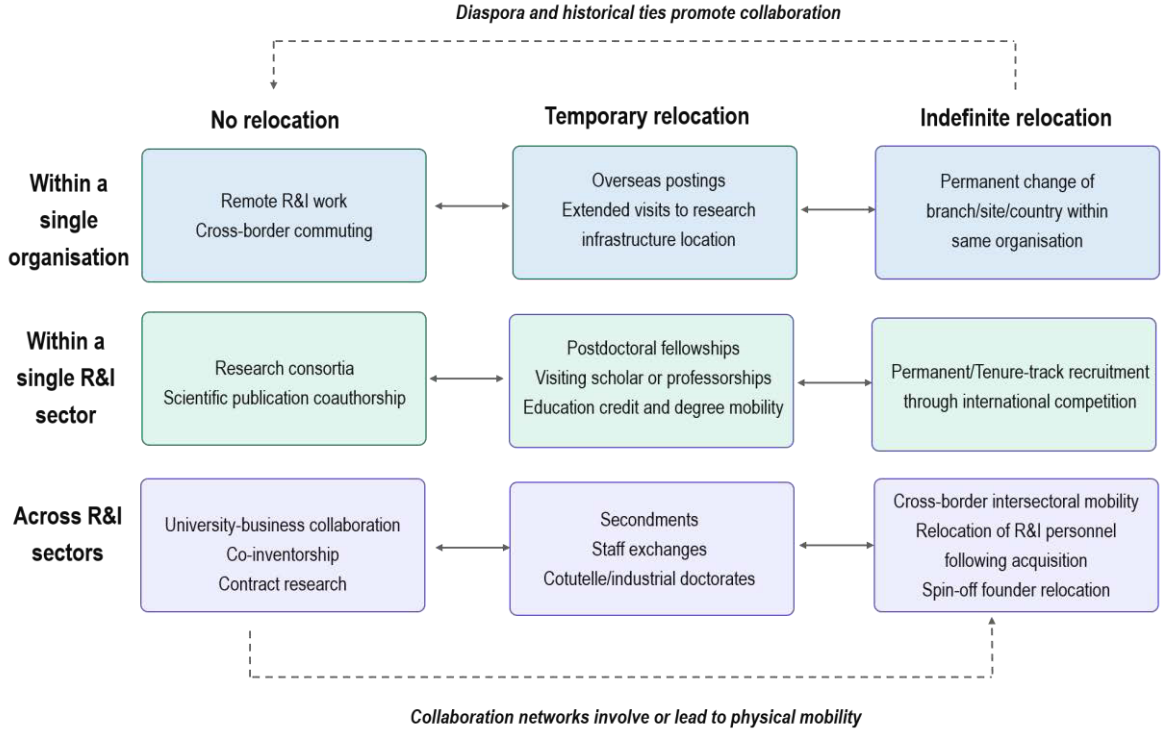
Introduction

Much of what makes research and innovation productive lies within individuals, through their knowledge, their practical skills, and their engagement with others working on similar tasks and challenges (OECD, 2013[1]). The movement of people is therefore one of the principal channels through which knowledge diffuses across research and innovation ecosystems. The R&I workforce is characterised by high levels of mobility, within and between countries, employing or affiliated organisations and often across different economic sectors.

Mobility in R&I careers takes many more forms than moving geographies. These forms can be distinguished by the degree of physical relocation involved, as well as the nature and duration of movement (Figure 2.1). At one end of the spectrum are forms of engagement that do not involve physical relocation, such as cross-border collaboration and co-authorship of scientific publications, participation in international projects and networks, and remote work with organisations in other countries. At the other end are long-term moves involving relocation, including permanent migration, intersectoral mobility and changes of employer. Between these extremes are temporary forms of mobility, such as secondments, short research visits, and degree mobility during higher education and doctoral training. These time-bound moves may occur within or between countries, sectors or employers.

Figure 4.1. Forms and examples of R&I talent mobility

Within and across R&I sectors, by degree of relocation



Source: Authors' elaboration

A considerable amount of connectedness and reinforcement can take place across different forms of mobility within the same career trajectory. For instance, collaboration without relocation at one point in a career might later lead to physical mobility on a short- or long-term basis or may influence the destination of choice for subsequent physical mobility (Rottenkolber et al., 2026[2]). Conversely, diaspora communities

and historical institutional ties to a location of origin may promote subsequent collaboration or knowledge transfer between mobile R&I personnel and non-mobile counterparts within their origin countries (Ito et al., 2025[3]; Batista et al., 2025[4]). As studies have highlighted these beneficial connections, the framing of policy debates on mobility has shifted from solely treating the outflow of highly skilled people as an irrevocable national loss ("brain drain") towards a broader view of mobility as "talent circulation", which under specific conditions can benefit all parties involved.

The ReICO project's work on mobility is informed by several operational definitions used across international data collections and research projects. These definitions vary from narrow measures based on physical relocation to broader concepts that include virtual mobility and international engagement (Box 4.1). Choices of definition and associated data collection instruments determine which forms of mobility can be observed and monitored by policymakers and other interested parties.

Box 4.1. Key definitions and classifications of mobility relevant for ReICO

ReICO directly uses, or takes into account, several mobility concepts used across international data projects.

International student mobility in the UNESCO/OECD/EUROSTAT (UOE) education data collection

The UOE data collection, a joint initiative across international organisations to collect data on formal education systems, defined international (or mobile) students as those who have crossed a border for the purpose of study, identified by prior education or residence abroad. International mobility is further classified into *degree mobility* (enrolment abroad leading to a foreign qualification) and *credit mobility* (shorter exchange or study-abroad periods undertaken while remaining enrolled at home). The UOE data collection captures degree mobility only (UNESCO-UIS / OECD / EUROSTAT, 2026[5]).

OECD migration data collections

The OECD's Database on Immigrants in OECD Countries (DIOC) identifies migrant stocks on the basis of country of birth. These statistics (applicable to wider workforce migration, not just R&I) distinguish between *permanent-type migration* (inflows granting, or capable of leading to, indefinite residence) from *temporary migration*, which covers time-limited categories such as work permits, seasonal and working-holiday schemes, and international students (OECD, 2026[6]).

Classifications of mobility of R&I workforce – the MORE studies

There are no internationally agreed definitions of mobility for R&I personnel. Instead, mobility concepts are commonly developed at project level. For example, the European Commission's series of studies on Mobility and career paths Of Researchers in Europe (MORE) studies distinguish between *long-term international mobility* (stays abroad of more than three months), *short-term international mobility* (less than three months), *PhD mobility* (obtaining a doctorate abroad), *intersectoral mobility* (movement between higher education, government, private non-profit and business sectors), and *interdisciplinary mobility* (movement between research fields). The most recent study (MORE4) also includes *virtual mobility, dual positions and international collaboration and networks* - forms of international engagement that do not require relocation (European Commission, n.d.[7]).

Understanding these mobility patterns, and what drives them, is of interest to policymakers working to expand and diversify the available talent within their R&I systems. Data availability varies across different forms of mobility. Some are well captured through official statistics or established proxies, such as degree mobility, permanent migration and international co-authorship, while others remain poorly measured, including short-term mobility in the business sector and cross-border work arrangements. Most available

evidence relates to longer-term international relocation, drawing on administrative records, surveys of science professionals and, increasingly, digital traces generated through R&I activities.

Public policies relating to mobility often focus on attracting and retaining skilled R&I talent from abroad. Attracting international talent can be a fast and efficient means of boosting the domestic workforce, compared with the timeframes and investment required to train home-grown talent, but it also has implications for other countries' policies and R&I systems. R&I systems and employing organisations like firms or universities compete for a relatively small global pool of highly skilled R&I talent, and thus national policy design in this area is often informed and shaped by which opportunities are on offer elsewhere. Specific policy instruments chosen nonetheless vary considerably across countries, reflecting differences in the structure of their R&I systems and the levers available to governments, as illustrated in Box 4.2.

Governments need evidence to judge whether these measures work, to understand not only who arrives as a result of these policies, but whether they stay, and the underlying drivers of their subsequent career decisions. This calls for drawing together the evidence that already exists, establishing what other data is needed to evaluate policy, and improving its availability over time.

This chapter examines three questions that can be addressed using ReICO and related data sources. A first question concerns advanced education and training: what share of master's and doctoral qualifications are earned by internationally mobile graduates, how that share has changed over the past decade, and how it varies across countries, fields and sex. A second question addresses the extent to which national R&I systems draw on highly qualified people from abroad. Finally, the chapter examines international mobility patterns of scientific authors, as revealed through bibliometric data.

Box 4.2. Attracting and retaining highly skilled talent from abroad – recent policy examples

Attracting and retaining highly skilled talent from abroad is an explicit policy objective in many countries, with governments targeting occupations and sectors of strategic economic or social importance, where domestic supply is constrained by demography or otherwise not sufficient to meet needs (OECD, 2025[8]). Within R&I systems, for example, acute skills shortages in critical sectors such as semiconductors and quantum computing risk constraining the rate at which technology can progress and diffuse in these areas (OECD, 2025[9]).

In response, governments deploy a broad mix of policy instruments, spanning immigration legislation and quotas, financial incentives such as salary subsidies for employers or tax breaks, and information and support services for new arrivals. Research-specific instruments include reforms to researcher recruitment and public sector employment rules, improved pension portability, and fellowships targeted at researchers based overseas (EC-OECD, 2026[10]) Though policy instruments across countries are often familiar in their objectives, they differ in the levers they use (funding, immigration, or active recruitment), whom they target (researchers abroad, returning nationals, or graduates already in the country), and how support is structured and financed, as illustrated in the examples below.

Selected recent initiatives for attracting international talent in OECD countries and the European Union

France – Choose France for Science (2025): A platform operated by the National Research Agency (ANR) under France 2030, through which universities and research organisations apply for state co-funding (up to 50% of a project's total cost) to host international researchers in priority fields such as health, climate, artificial intelligence and low-carbon energy.

Germany – Global Minds Initiative Germany (2025): A federal initiative offering international researchers career prospects at all post-doctoral stages, channelling additional funding through established Humboldt Foundation and German Research Foundation (DFG) programmes, with German

Academic Exchange Service (DAAD) measures for international students and doctoral candidates and integration support including for family members.

Japan – J-RISE Initiative (2025): A cross-ministerial package of around JPY 100 billion (USD 620 million), drawing on proceeds of the Japan University Fund, to promote international "brain circulation", with recruitment support programmes enabling top universities to host outstanding early-career researchers from overseas, including Japanese nationals abroad, under globally competitive conditions. In addition, **a Startup Visa programme (2025)** allows foreign entrepreneurs to live in Japan for up to two years while they establish their business before they must meet the stricter requirements of the standard "Business Manager" visa requirements.

Korea – K-STAR Visa Track (2025): A Ministry of Justice scheme expanding a fast-track residency pathway from a few science and technology institutes to international graduates of 32 designated universities (from January 2026). Graduates recommended by their university president obtain resident status immediately upon graduation without an employment requirement, with permanent residency possible in three years instead of six and special naturalisation open to exceptional researchers regardless of length of stay.

Netherlands – Fund to Accommodate Excellent International Scientists (2025): The Dutch Research Council (NWO) runs a EUR 50 million (USD 57 million) fund (the "Tulip Fund") through which research organisations nominate leading scientists working outside the EU/EEA and Switzerland, receiving up to EUR 1 million (USD 1.1 million) per recruited researcher, across all disciplines.

United Kingdom – Global Talent Network (2024): A Department for Business and Trade network building a pipeline of international professionals for priority science and technology roles (artificial intelligence, quantum, life sciences), reinforced in 2025 by a Global Talent Taskforce and a GBP 54 million (USD 72 million) Global Talent Fund covering relocation and research costs of world-class researchers and their teams.

European Union – Choose Europe (2025): A European Commission package of EUR 500 million (USD 573 million) for 2025-27 to make Europe "a magnet for researchers", including European Research Council (ERC) relocation top-ups of up to EUR 2 million (USD 2.3 million), a planned seven-year ERC "super grant", extended Marie Skłodowska-Curie Actions postdoctoral fellowships, streamlined entry procedures, and a forthcoming European Research Area Act enshrining freedom of scientific research in EU law.

Note: Information for France, Germany and the United Kingdom is drawn from the EC-OECD STIP Compass database, 2025 edition.
Source: European Commission/OECD (2026[10]) European Commission (2025[11]), Cabinet Office, Government of Japan (2025[12]) Ministry of Economy, Trade and Industry, Japan (2026[13]), Dutch Research Council (NWO) (2025[14]), Ministry of Justice, Republic of Korea (2025[15])

Who earns advanced qualifications abroad, and where?

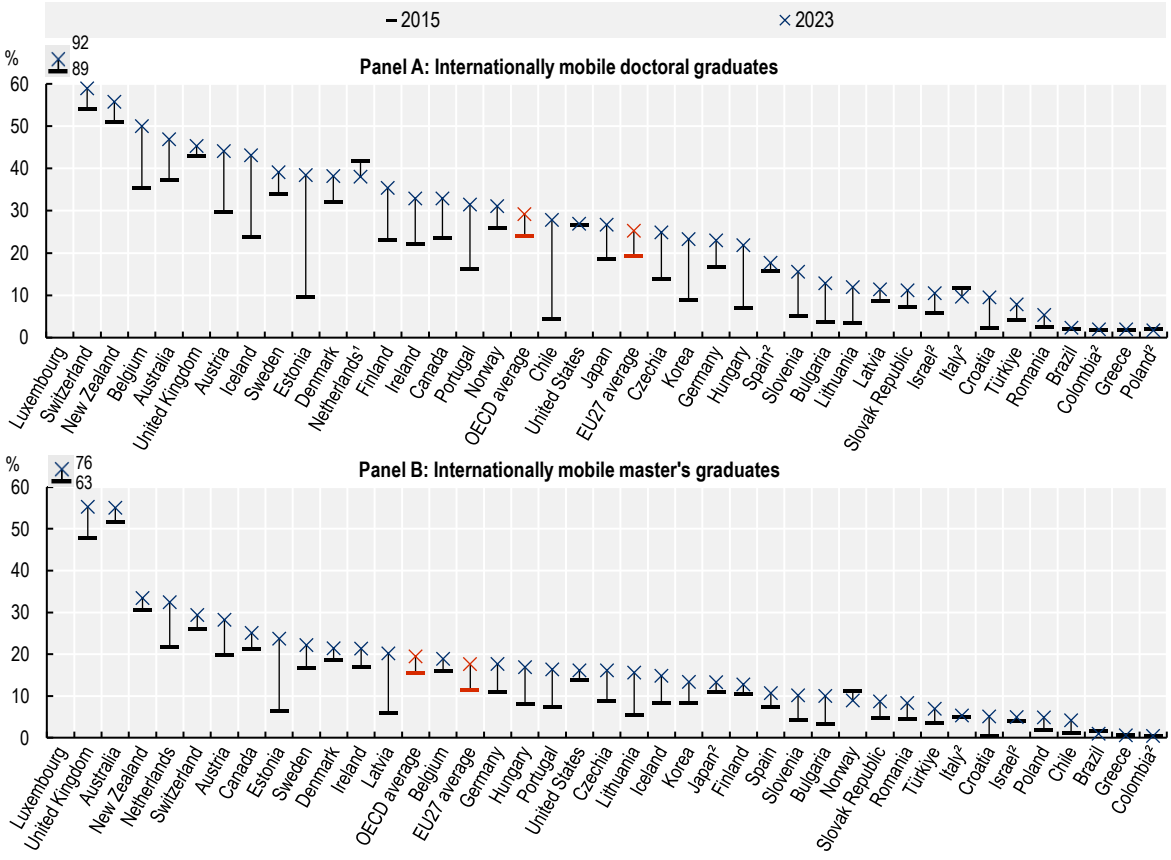
Shares of internationally mobile graduates in doctoral education in the OECD area are increasing

R&I careers often begin with acquiring an advanced degree, and research careers often commence with doctoral training. These stages of education also provide a first international mobility experience for many R&I personnel. Internationally mobile graduates accounted for a considerable proportion of graduates from master's and doctoral programmes across the OECD in 2023, accounting for 19.4% of master's graduates and 29.2% of doctoral graduates on average (Figure 4.2). The shares of mobile doctoral graduates were

particularly high in Belgium, Luxembourg, New Zealand and Switzerland, each reaching or exceeding 50% of all graduates, while Australia, Austria, Iceland and the United Kingdom had shares greater than 40%.

Figure 4.2. Internationally mobile doctoral and master's graduates, 2015-2023

Percentage of doctoral or master's graduates



Notes: 1. Latest reference year differs: 2021 for the Netherlands (doctorate). 2. Earliest reference year differs: 2016 for Colombia and Italy, 2017 for Japan (master's), 2018 for Israel and Poland (doctorate), and 2019 for Spain (doctorate).
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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Across countries, shares of internationally mobile students are in general higher at master's and doctoral level than at lower levels of tertiary education, underlining that mobility becomes more common as training becomes more specialised (OECD, 2023[16]). At the same time, international mobility was typically more prevalent among doctoral graduates than master's graduates in 2023, although the reverse was true in Australia, Latvia, Lithuania, Poland, Romania and the United Kingdom. The underlying reasons for these exceptions may vary across specific countries. For example, in some countries it is common for universities to actively offer English-language training to students from abroad for specialised "long first degrees" of five-year programmes leading to master's, particularly in health fields. In others, the prestige of the higher education system or strong post-graduation career prospects may make master's-level study especially attractive to students from abroad.

While not all mobile graduates remain in their host countries, evidence from some countries shows reasonably high retention rates (for example, a recent study in Finland found that 63% of doctoral

graduates remained resident in Finland three years after graduation), especially when countries offer post-study schemes to graduates (OECD, 2026[17]).

Overall student mobility at advanced tertiary levels has grown substantially between 2015 and 2023, despite the challenging period of the Covid-19 pandemic which severely curtailed international travel from 2020-2022 (OECD, 2025[18]; OECD, 2026[17]). Across the OECD, the share of internationally mobile doctorate graduates rose from around 24% in 2015 to 29% in 2023. The corresponding EU27 share increased from 19% to 25%. At master's level, the OECD average share rose from 15% to 19% between 2015 and 2023, while the EU27 share increased from around 11% to just under 18%.

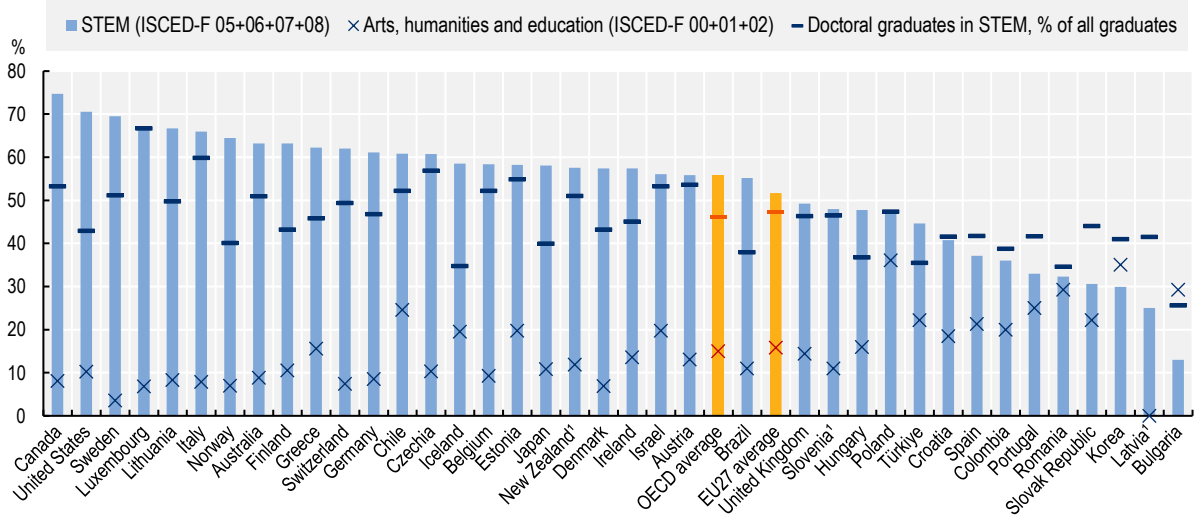
These patterns highlight that international mobility to engage in advanced degree programmes has overall continued to expand, and that it is most pronounced at the level closest to entry into research careers. Several implications can be drawn from these patterns. Rising shares of mobile graduates, alongside overall growth in graduate numbers (see Chapter 2), expand the supply of highly qualified talent available to R&I labour markets. At the same time, they indicate that international mobility plays an increasingly important role in supporting national R&I systems. This can create opportunities through access to a broader talent pool may also make some systems more sensitive to changes in geopolitical conditions or policies affecting international mobility, reducing access to skilled R&I personnel on which some systems have come to rely (OECD, 2025[9]).

Most internationally mobile doctoral graduates are in STEM fields

STEM accounts for the majority of mobile doctoral graduates in almost every country shown in Figure 4.3. The OECD average is just under 56% and the share exceeds 60% in a large group of countries. In contrast, arts, humanities and education account for a much smaller share of mobile doctoral graduates in almost all countries, typically amounting to between 5% and 25% of all mobile doctoral graduates.

Figure 4.3. Internationally mobile doctoral graduates in selected fields of study, 2023

Percentage of internationally mobile doctoral graduates in all fields of study



Note: 1. Reference year 2022 for Latvia, New Zealand and Slovenia.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on OECD Education database, June 2026.

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There are only two countries (Bulgaria and Korea) where the arts, humanities and education field grouping accounts for a larger share of mobile doctoral graduates than from STEM fields.

The STEM share among mobile graduates reflects overall field composition within doctoral training as well as the specific choice patterns of internationally mobile students. As discussed in Chapter 2, STEM is the main combined field of award of doctorates in a majority of OECD countries. Nevertheless, Figure 4.3 shows that mobile doctoral graduates are often more concentrated in STEM fields than doctoral graduates overall. In countries such as Canada, Iceland, Japan, Norway, Sweden and the United States, STEM fields account for a substantially larger share of mobile doctoral graduates than of doctoral graduates overall, suggesting that international mobility plays a particularly important role in the supply of doctoral talent in STEM fields in many countries compared with other fields of study.

Aggregate STEM field shares mask concentrations of mobile graduates within individual component fields. Available national data shows that graduates from abroad account for a majority of doctorates in high-demand fields in some countries. The United States provides an illustrative example - in 2024, the majority of doctorates in computer and information sciences (61%), engineering (54%) and mathematics and statistics (51%) were awarded to temporary visa holders[1] (National Center for Science and Engineering Statistics (NCSES), 2026[19]).

In all countries, women have lower mobility rates at doctoral level compared to master's

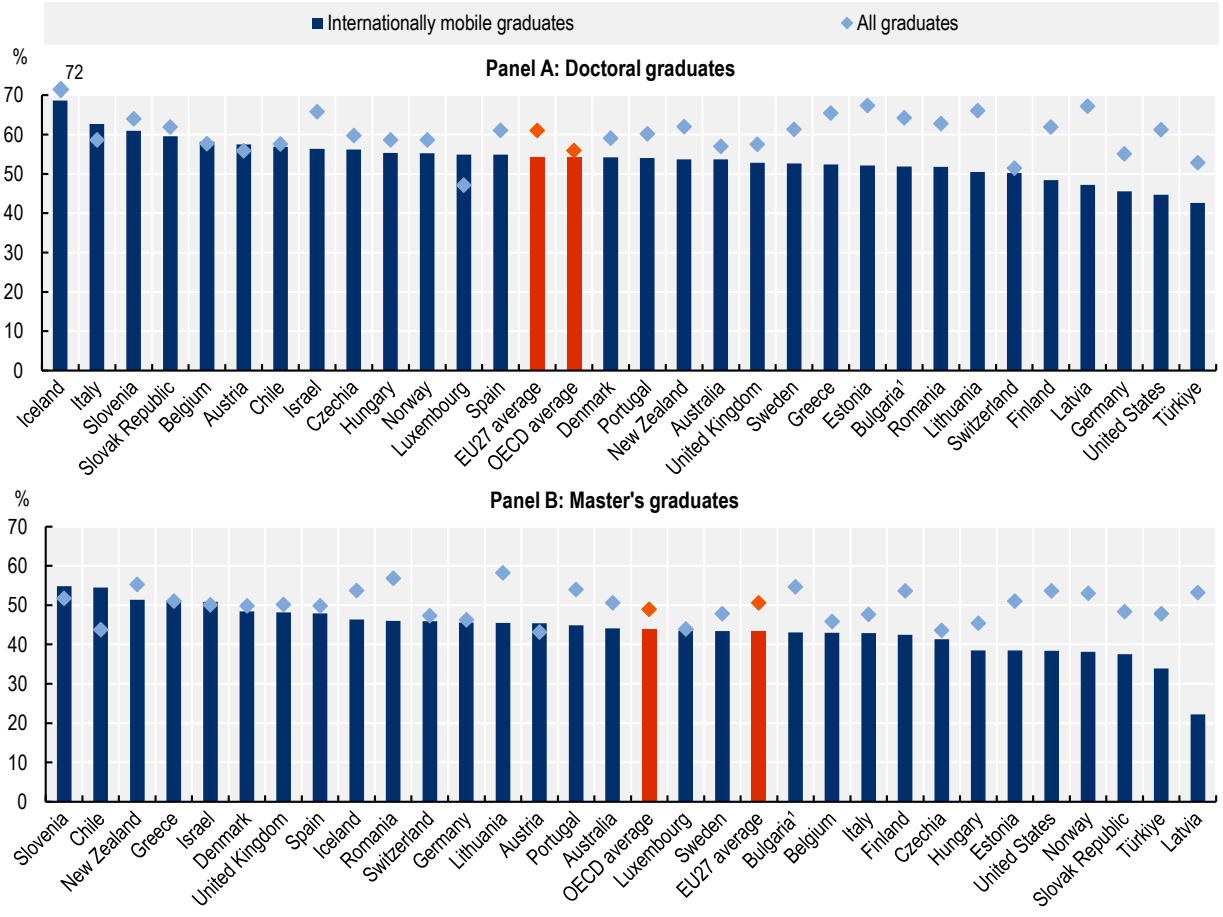
Women make up a smaller share of internationally mobile graduates at doctoral level than at master's level in every country, as Figure 4.4 shows. At doctoral level, women make up a minority of mobile graduates in most countries: their share exceeds 50% only in Chile, Greece, Israel, New Zealand and Slovenia, and falls below 40% in Estonia, Hungary, Latvia, Norway, the Slovak Republic, Türkiye and the United States. At master's level, however, women account for more than half of mobile graduates in most countries and more than 60% in Iceland, Italy and Slovenia.

In the large majority of countries, at both doctorate and master's level, the share of women among internationally mobile graduates falls below their share among graduates overall (Figure 4.4). This pattern suggests that, overall, women are less likely than men to undertake international mobility for advanced studies. This may reflect the design of talent attraction policies, which are often directed to STEM fields where women are less likely to enrol in advanced degree programmes, or other constraints and incentives bearing on women's decision to move abroad rather than on entry into graduate study. Future analysis drawing on sex- and field-disaggregated data could help establish how much of the gap is accounted for by different factors.

Governments often hope to retain highly qualified graduates in their labour markets following their graduation, including within research and innovation systems, often putting in place specific schemes to retain such graduates, although the specifics and conditions can vary considerably across countries (OECD, 2026[17]). Many of these specific post-graduation schemes are designed to be temporary in nature, making it incumbent on the recent graduates to find more permanent opportunities that provide a long-term right to remain in the country or a path towards permanent residency. International graduates are often at an initial disadvantage in the job market compared to native-born graduates, which creates barriers to long-term retention of talent, although evidence from some countries suggests that this disadvantage lessens over time (OECD, 2026[17]).

Figure 4.4. Women doctoral and master's graduates by international mobility status, 2023

Percentage of women among internationally mobile or all graduates



Note: 1. Reference year 2022 for Bulgaria.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on OECD Education database, June 2026.

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To what extent have countries accumulated talent from abroad for R&I systems?

Foreign-born advanced degree holders are a major component of the R&I workforce in several systems

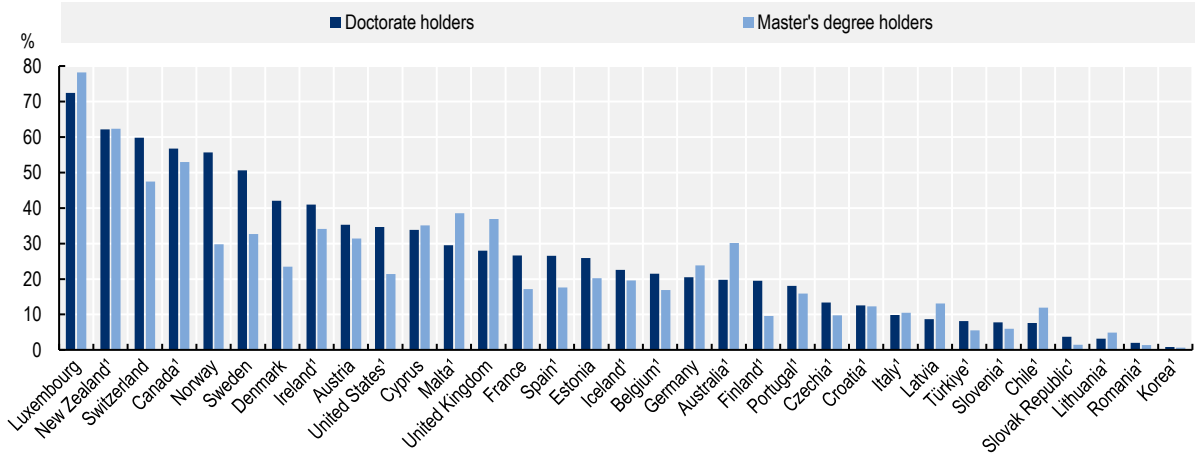
In the absence of data linking individuals from study to employment, the resident foreign-born population with advanced degrees offers the most widely available approximation of the extent to which international talent is integrated into R&I workforces. Place of birth is the most widely collected marker of international origin in official statistics (Box 4.1). Foreign-born status is, however, an imperfect proxy for mobility. Unlike internationally mobile graduates, it includes not only those who moved abroad to study and stayed, but also people who migrated after completing their education or who were educated in the destination country. As a result, foreign-born indicators are best interpreted as a measure of countries' long-term accumulation of human capital from abroad rather than recent mobility or graduate retention.

Foreign-born advanced degree holders make up an important share of the highly qualified working-age population in many countries (Figure 4.5). Foreign-born account for close to three-quarters of all doctorate holders in Luxembourg and around 60% in New Zealand and Switzerland but make up less than 5% of all doctorate holders in Korea, Lithuania, Romania and the Slovak Republic. Many of the countries with higher shares have strong traditions of inward migration and settlement, such as Canada and New Zealand, or economies that invest heavily in research and development, such as Denmark, Sweden and Switzerland.

In most countries the foreign-born share is higher at doctoral than at master's level, and in several the gap between degree levels is substantial: in Denmark, Norway and Sweden, for example, the foreign-born share of doctorate holders exceeds that of master's degree holders by 15 percentage points or more, and sizeable gaps are also evident in Finland, France, Spain and the United States. This is reflective of the strongly international character of doctoral training and of research careers more generally, where post-doctoral mobility is embedded as a norm in career paths. A minority of countries, Australia, Chile, Germany, and the United Kingdom among them, show the opposite pattern, with the foreign-born more prevalent among master's degree holders than doctorate holders. Several of these countries also attract large numbers of international students at master's level (as shown in Figure 4.2). High shares of foreign-born advanced degree holders may reflect the retention of these graduates following their studies or indicate countries with migration channels that select on advanced qualifications obtained abroad. Future ReICO work will examine the alignment of policy contexts with international mobility indicators in more detail.

Figure 4.5. Foreign-born doctorate and master's degree holders, 2024

Percentage of doctorate or master's degree holders aged 25-64



Note: Data for more countries are available on the database. 1. Reference year differs: 2020 for Korea, Slovenia (doctorate) and the Slovak Republic (doctorate), 2021 for Australia, Belgium, Canada, Chile (doctorate), Croatia, Czechia, Lithuania, Malta, Romania and Slovenia (master's degree), 2022 for Ireland, 2023 for Finland, Iceland, Italy, New Zealand, Portugal (doctorate), Spain, Türkiye and the United States. 2. Definition of foreign-born differs: refers to foreign citizenship.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the ReICO database.

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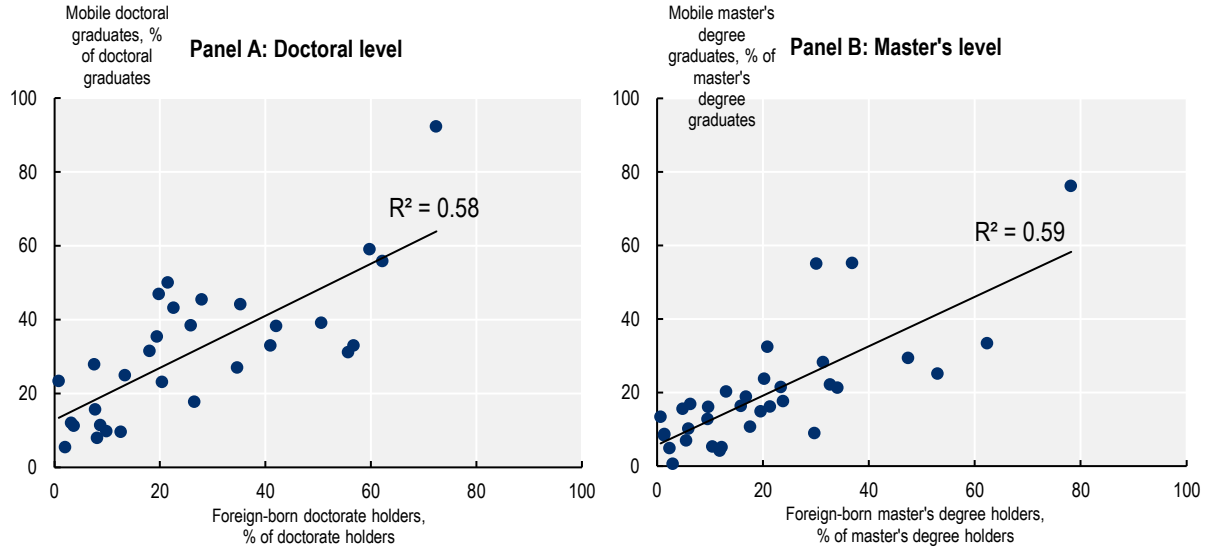
Shares of internationally mobile graduates and shares of foreign-born advanced degree holders are positively related

The two lenses used so far in this chapter - where students move to complete their studies, and where advanced degree holders were born - describe different populations. However, as Figure 4.6 shows, the

share of graduates who are internationally mobile and the share of advanced degree holders who are foreign-born are positively related across countries, at doctorate level (Panel A) as well as master's level (Panel B). The association is of similar strength in both cases, with variation in one measure accounting for more than half the cross-country variation in the other (R^2 = 0.58 and 0.59 for doctorate and master's respectively). Nonetheless, dispersion around the line is considerable for both doctorate and master's degree holders. Variations of this size indicate that stocks of foreign-born degree holders are built by quite different routes across countries. Countries above the line may be building stocks through retention of mobile graduates trained in the domestic education system, while those below the line more strongly cultivating arrivals of people who qualified in another country.

Figure 4.6. Foreign-born degree holders (2024) and internationally mobile graduates at master's and doctoral level (2023)

Share of foreign-born degree holders aged 25-64 and share of internationally mobile graduates among all graduates at the level



Note: Reference year may differ for some countries.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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Overall, Figure 4.6 shows that foreign-born advanced degree holders and internationally mobile graduates together make a sizeable contribution to the talent base of many R&I systems. Mobility provides considerable strength to these countries' R&I systems, raising the size of the potential R&I workforce far above what native-born supply alone would allow, and supporting the building of beneficial collaborative ties and international networks. At the same time, it is a strength that partly rests on continued attractiveness of R&I careers within countries and may be vulnerable to changes in immigration policy, visa and settlement conditions, research funding availability, or competing destinations increasing in relative attractiveness, all of which can rapidly affect the human resource base for R&I in countries with large shares of mobile or foreign talent. The countries at the other end of the distribution, however, face an opposing challenge, with low foreign-born shares and low inward mobility leaving R&I systems more reliant on maintaining a domestic talent pipeline and/or increasing efforts to attract talent from abroad.

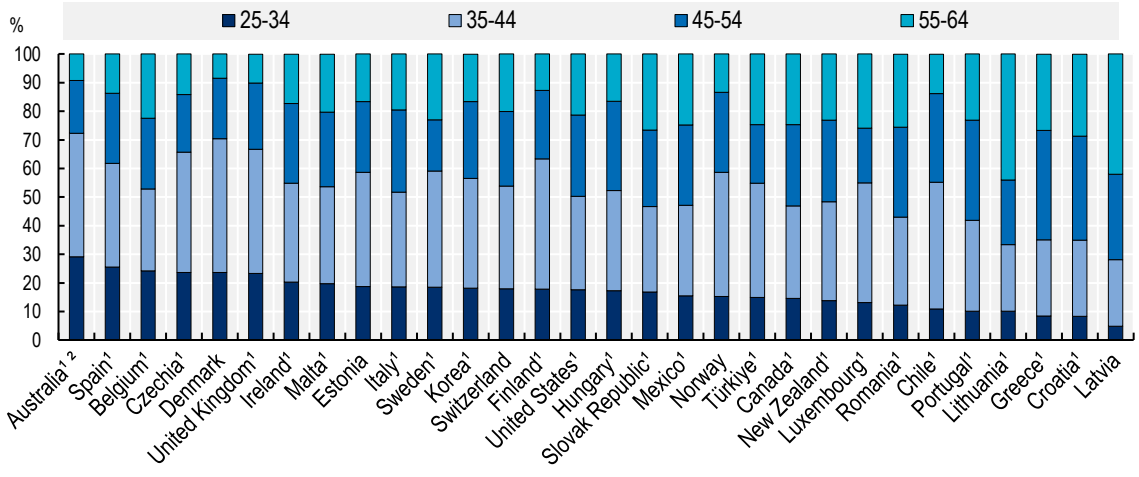
Age composition of foreign-born doctorate holders varies across countries, reflecting historical mobility patterns

As noted, the stock of foreign-born doctorate holders is the accumulation of decades of arrivals. Countries may have reached their current point through different routes - current stocks could be based on sustained policy efforts to recruit early-career workforce, for example or a legacy wave of migration from earlier years that has since diminished. The age distribution of foreign-born doctorate holders can help to indicate different cases across countries. For example, large shares of younger foreign-born doctorate holders is a reasonable indication that countries have successfully attracted or retained recent graduates or cultivated this talent among foreign-born already in the country. Concentration in older groups, on the other hand, might indicate a stock based on earlier migration waves migration not subsequently maintained.

As Figure 4.7 shows, countries exhibit very varied age profiles among doctorate holders. The age profile skews relatively young in Australia, Belgium, Czechia, Denmark, Spain and the United Kingdom. In these countries close to one-quarter or more of foreign-born doctorate holders are under 35, with the highest share (29%) in Australia. On the other hand, this younger group makes up less than 10% of foreign-born doctorate holders in Croatia, Greece and Latvia. These patterns also reflect to some extent the age of graduation of doctorate holders in different countries (see Chapter 2). Still, some countries exhibit notable younger age profiles. Overall, across the younger age bands, more than 70% of foreign-born doctorate holders are under 45 in Australia and Denmark, compared with less than 30% in Latvia.

Figure 4.7. Age distribution of foreign-born doctorate holders, 2024

Percentage of foreign-born doctorate holders aged 25-64



Notes: Data for more countries are available on the database. 1. Reference year differs: 2020 for Greece, Hungary, Korea, Mexico, and the Slovak Republic, 2021 for Australia, Belgium, Canada, Chile, Croatia, Czechia, Lithuania, Malta and Romania, 2022 for Ireland and Luxembourg, and 2023 for Finland, Italy, New Zealand, Portugal, Spain, Sweden, Türkiye, the United Kingdom and the United States. 2. Definition of foreign-born differs: refers to foreign citizenship.

Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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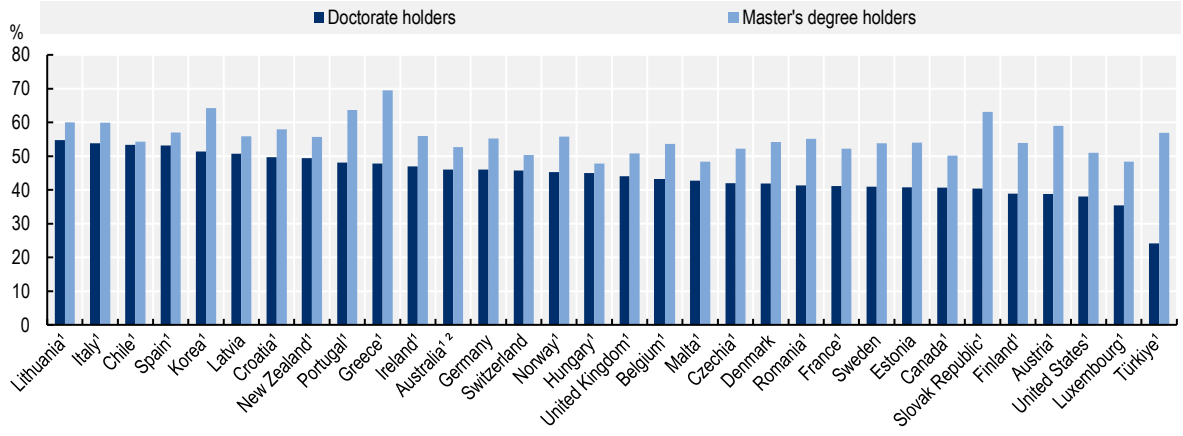
Conversely, 55-64 year-olds make up around a quarter or more of the foreign-born doctorate population in Croatia, Greece, Luxembourg, Romania and the Slovak Republic, and exceed 40% in Latvia and Lithuania. These age patterns, in which foreign-born doctorate holders are concentrated in the older age bands largely echo the patterns discussed in Chapter 2, with similar age profiles in foreign-born doctorates

in countries in which the doctoral population in general is ageing. This can indicate that migration is not currently offsetting ageing domestic highly skilled population in many countries and greater efforts are likely to be needed in the coming years to replenish and build workforces. Many countries are already working on such measures. In Latvia, for example, one of the countries most adversely affected by these trends, comprehensive reforms of doctoral education and the wider academic career framework are underway in efforts to increase supply of research and innovation workforce (OECD, 2026[20]).

A final element of interest when considering renewal of the foreign-born R&I workforce is the extent to which countries can recruit or retain foreign-born doctorate holders equally from across different groups of the available talent pool. Figure 4.8 shows that women consistently make up a larger share of foreign-born master's degree holders than doctorate holders. The share of women exceeds 50% in most countries and reaches 60% or more in Greece, Korea, Lithuania, Portugal and the Slovak Republic. At doctoral level, the picture differs. Women make up half of foreign-born doctorate holders in just six countries: Chile, Italy, Korea, Latvia, Lithuania and Spain, while the share falls below 40% in Austria, Finland, Luxembourg, Türkiye and the United States. While these patterns partly reflect differences in the composition of fields and qualifications, evidence suggests that women researchers have historically been less likely than men to engage in international mobility, although more recent studies indicate that this gap is narrowing (Zhao et al., 2023[21]).

Figure 4.8. Women foreign-born doctorate and master's degree holders, 2024

Percentage of foreign-born doctorate or master's degree holders aged 25-64



Notes: Data for more countries are available on the database. 1. Reference year differs: 2020 for Greece (doctorate), Hungary (doctorate), Korea and the Slovak Republic (doctorate), 2021 for Australia, Austria (doctorate), Belgium, Canada, Chile (doctorate), Croatia, Czechia, Lithuania, Malta and Romania, 2022 for Ireland and Luxembourg (doctorate), and 2023 for Finland, France (doctorate), Greece (master's), Italy, New Zealand, Norway (master's), Portugal (doctorate), Spain, Türkiye, the United Kingdom (doctorate) and the United States. 2. Definition of foreign-born differs: refers to foreign citizenship.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on multiple data sources, June 2026. Further information on the specific sources used to compute this indicator can be found in the metadata of the RelCO database.

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How mobile are scientific authors and where do they go?

Digital footprints of R&I activities can support monitoring of mobility

The indicators examined so far in this chapter describe mobility among graduates and the prevalence of foreign-born individuals in the wider population of advanced degree holders. As discussed in Chapter 1, advanced degree holders are an especially important group for R&I systems, since they supply vital knowledge and skills and given the importance of the doctorate as a principal formal entry requirement for many research career pathways. Data on the mobility of holders of advanced qualifications therefore provides important signals for policymakers. However, as highlighted, this group does not overlap exactly with the R&I workforce. As shown in Chapter 3, many doctorate holders work outside research, in public administration, management or professional services, while R&D is more often than not carried out by people without a doctorate. The extent to which the sector and industry of employment is associated with mobility patterns cannot be easily ascertained from existing official data, calling for consideration of a wider range of data sources and development of novel methodologies for working with them.

Digital traces generated through the professional activities of those working in R&I offer new opportunities to measure and analyse geographic mobility. Researchers, inventors, entrepreneurs and other R&I professionals leave digital traces across online records, including scientific publications, patent applications, professional networking platforms, conference participation records, and organisation websites. Despite their limitations, these data sources often contain information on institutional affiliations and locations that can be linked over time to reconstruct individual mobility trajectories (Box 4.3).

Box 4.3. Opportunities and limitations

Digital technologies generate flows of novel and timely information about people through the "footprints" they leave when engaging in online actions and activities (OECD, 2026[22]). Compared with traditional surveys and population censuses, digital footprint data offer several advantages. They can provide near real-time information, cover large populations of highly skilled workers, and enable the study of mobility patterns at a fine geographic and occupational level. For example, changes in author affiliations recorded in online repositories of scientific publications can reveal the mobility of scientific researchers between universities and research institutes, while patent records can be used to identify the relocation of inventors across firms, regions and national innovation systems. Professional networking platforms and online CV repositories also permit recording of occupations at a more granular level and can in some cases help identify transitions that are not visible in traditional administrative data, including temporary assignments, international migration, remote cross-border work, and movements between sectors (as further discussed in Chapter 5).

At the same time, the use of digital footprint data to track mobility and other elements of career trajectories of the R&I workforce presents important challenges. Not all R&I professionals have an equivalent online presence, and coverage may vary across countries, occupations and demographic groups. For example, inferences about careers and mobility of scientific authors are far less reliable for authors who publish infrequently and for those moving into or out of roles where publishing is not customary, as is typically the case in industry (Appelt et al., 2015[23]). Furthermore, changes in affiliation may not necessarily correspond to physical relocation, particularly in an era of hybrid and remote work. Furthermore, the use of personal-level digital traces requires careful attention to disambiguation of individuals with identical names and those with multiple online personas for the same individual, privacy, transparency and ethical standards. As a result, information gleaned from digital footprint measures are often most valuable when combined with established statistical and administrative sources.

Despite these limitations, digital footprint data present a promising complement to traditional approaches for understanding flows of talent across borders. Their increasing availability is expanding the capacity of researchers and policymakers to monitor the geographic mobility of some groups of R&I personnel and to assess its implications for innovation performance, human capital development and international scientific collaboration.

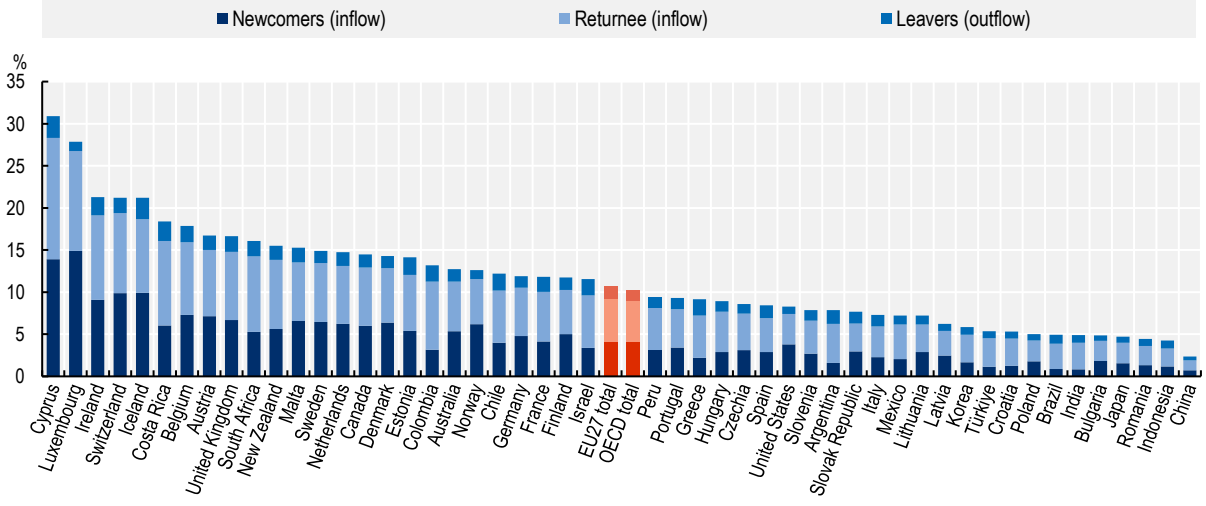
Indicators based on the analysis of scientific publication records (i.e. bibliometrics) can illuminate mobility patterns specifically for those working as researchers, particularly researchers in sectors where scientific publications are a primary output of research, such as higher education and government or other public research institutes. This section sets out the main recent trends and patterns across countries relating to mobility patterns, as indicated by available bibliometric data.

Bibliometric data implies considerable differences in mobility flows across countries

There are several possible approaches to measuring implied international mobility flows based on bibliometrics. One of the simplest approaches used by OECD categorises authors with two or more publications in relation to their past affiliation history. With respect to a reference country (or other geographical area): *new inflows* are authors first observed abroad who subsequently appear in the country, *returnees* are authors previously in the country who appear abroad before returning, and *outflows* are authors previously in the country who subsequently appear with a foreign affiliation (OECD, 2026[24]). Authors whose entire record lies within the reference country are classified as *stayers*. Figure 4.9 shows gross implied mobility flows for scientific authors as measured with reference to 2024, aggregating leavers, returnees and new inflows with respect to each country, relative to all authors found with an affiliation in the country in 2024.

Figure 4.9. Implied international mobility experience of scientific authors, 2024

Composition of gross flows, relative to all scientific authors with an affiliation recorded in 2024 with at least two publications



Note: OECD and EU27 totals refer to the aggregate value obtained by combining all Member countries into a single entity.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on the OECD Bibliometrics database, June 2026.

StatLink https://stat.link/0s7vdp

The measure sums inflows and outflows and therefore indicates the total implied volume of movement of scientific authors through a country. In total, in the OECD, this calculated rate stood at 10.2% (with

the EU27 at 10.7%) indicating that (and taking into account the caveats highlighted above) roughly one scientific author in ten recorded with an affiliation in 2024 had a mobility experience linked to an OECD or EU27 reference country. The spread of this measure across countries is very wide: the rate exceeds 30% in Cyprus and approaches 28% in Luxembourg, but stands at less than 5% in Brazil, Bulgaria, China, India, Indonesia, Japan, Poland and Romania. The lowest share of mobile authors found across the countries with available data is 2.4%, in China.

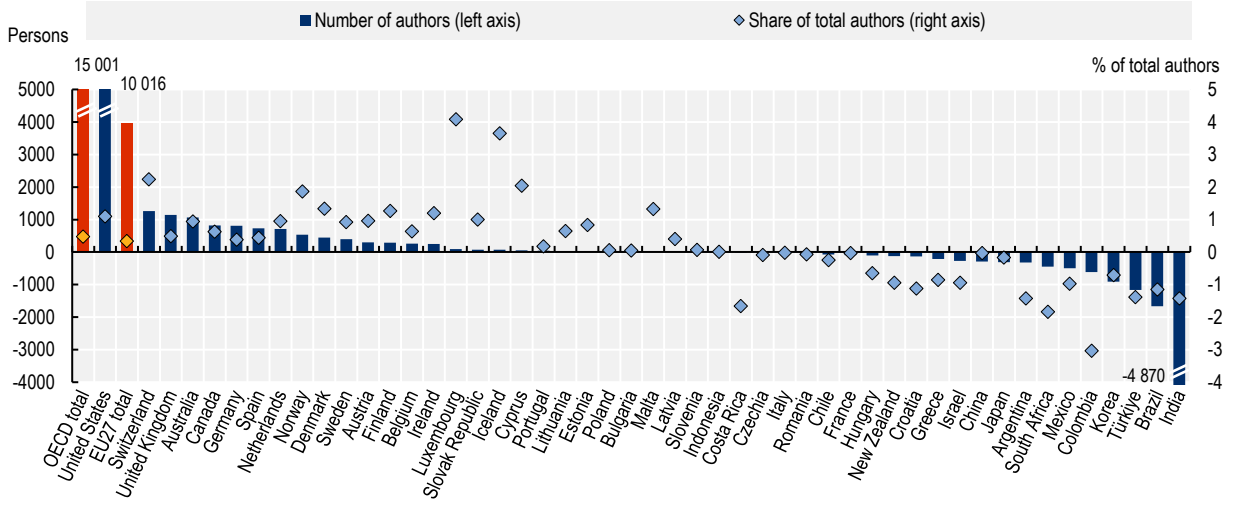
Figure 4.9 indicates that overall mobility flows tend to be largest, in percentage terms, in a selection of small- or medium-sized systems, such as Cyprus, Ireland, Luxembourg and Switzerland, and closer to- or below average in larger systems such as France, Germany and the United States. This might indicate that smaller economies may not maintain critical mass of research activity across the full range of scientific fields, so a larger proportion of its researchers must engage in mobility to develop their careers. It may also indicate the strength of international networks and connectedness to international collaboration within these larger countries, which can provide the benefits associated with internationalisation of R&I without the need for physical movement. On the other hand, it must be noted that lower gross mobility rates in the largest systems are still consistent with very substantial flows in and out, as detailed in the next section.

In most countries implied net flows broadly balance out over time, with some notable exceptions

While gross flows give an indication of the total extent of churn of scientific authors through a country's research system, net flows, as shown in Figure 4.10, indicate the overall direction of the movement. Net flows are calculated over a long timeframe to account for high year-on-year volatility in inflows and outflows, particularly in smaller systems.

Figure 4.10. Implied net flows of scientific authors, 2010-2024

Inflows minus outflows of scientific authors who changed affiliation to or from a country in the reference period



Note: OECD and EU27 totals refer to the aggregate value obtained by combining all Member countries into a single entity.
Source: OECD, Research and Innovation Career Observatory (RelCO) Database based on the OECD Bibliometrics database, June 2026.

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Implied net flows result from subtracting outflows from inflows, so a system with roughly equal inflows and outflows numbers will appear to have close to zero net flow regardless of the volume of flows. Conversely,

a system with modest overall mobility, as measured above by gross flows, can register a large net position if most of that mobility is one-directional. The United States illustrates this point: it recorded a relatively low gross mobility rate yet registers by far the largest net gain in scientific authors over time, as shown in Figure 4.10. The EU27 also shows an overall net gain over time, although the patterns vary across individual member countries. In absolute terms, most countries record net flows of less than 500 authors over the period 2010-2024, and only nine individual countries show net flows of more than 1 000 authors in either direction over the period.

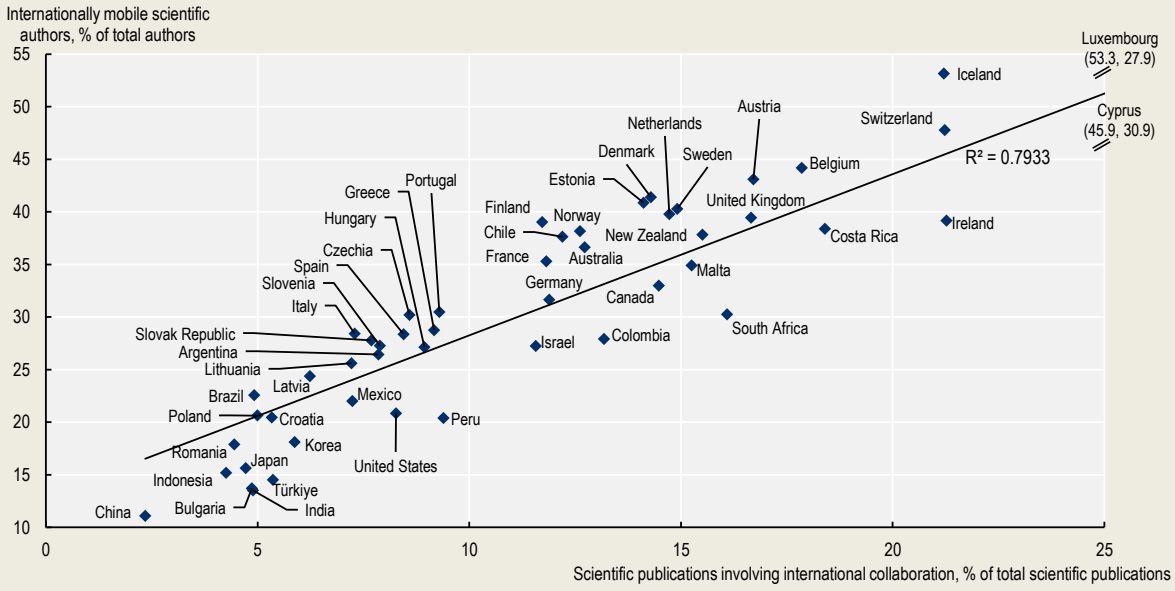
Flows of scientific authors can be notably volatile from one year to the next, and a figure aggregated over a long period may obscure whether a country's net position was established early on in a long reference period or acquired only recently. Some countries and regions nonetheless appear to emerge consistently as target destinations for geographically mobile scientific authors. Net flows to the United States were positive in almost every year (except 2011) between 2010 and 2024, while those to the EU27 turned positive in 2020 and have remained so since (OECD, 2026[24]).

As discussed earlier, mobility flows in and out of countries cannot be characterised fully as net gains or losses, in light of the likely beneficial impacts of mobility for both origin and destination countries. A country recording a persistent net outflow may nonetheless be an active participant in international science if its emigrant researchers continue to co-author with colleagues at home. Relationships between affiliation changes and extent of international collaboration can be potentially explored to some extent through analysis of bibliometric data. International co-authorship of publications is a standard bibliometric proxy for such collaborations and can give an indication of how its prevalence is related to mobility of scientific authors (Box 4.4).

Box 4.4. How is international collaboration on scientific publications related to international mobility of scientific authors?

Bibliometric data allows for the computation of country comparisons of the extent to which scientific publications involve international collaborations (i.e. papers where there is more than one scientific author and where authors are affiliated to institutions in different countries). Co-authorship may arise in relation to international mobility of the connected authors, or independently of it. Figure 4.11 shows that these two indicators are positively correlated at country level (R^2 = 0.79). Countries with high mobility rates are, with few exceptions, also those whose authors collaborate most widely across borders. At one end of the distribution, Bulgaria, China, India, Indonesia, Japan, Romania and Türkiye record low values on both measures. At the other, Austria, Belgium, Cyprus, Iceland, Ireland, Luxembourg and Switzerland combine high mobility with high collaboration. Considering shares of publications with international collaboration together with shares of authors engaging in international mobility can indicate whether countries whose scientific authors move frequently are also those where authors frequently collaborate across borders, or whether the two operate as substitutes, with collaboration serving as an alternative route to international engagement where physical relocation prospects are limited. The pattern shown in Figure 4.11 indicates that some modes of international engagement may reinforce rather than substitute for one another, and that international openness of R&I systems may be best analysed across multiple dimensions rather than assessed based on any one form of mobility.

Figure 4.11. Share of internationally mobile scientific authors and share of publications involving international collaboration, 2010-2024



Source: OECD, author's analysis using Science and bibliometric indicators database, May 2026.

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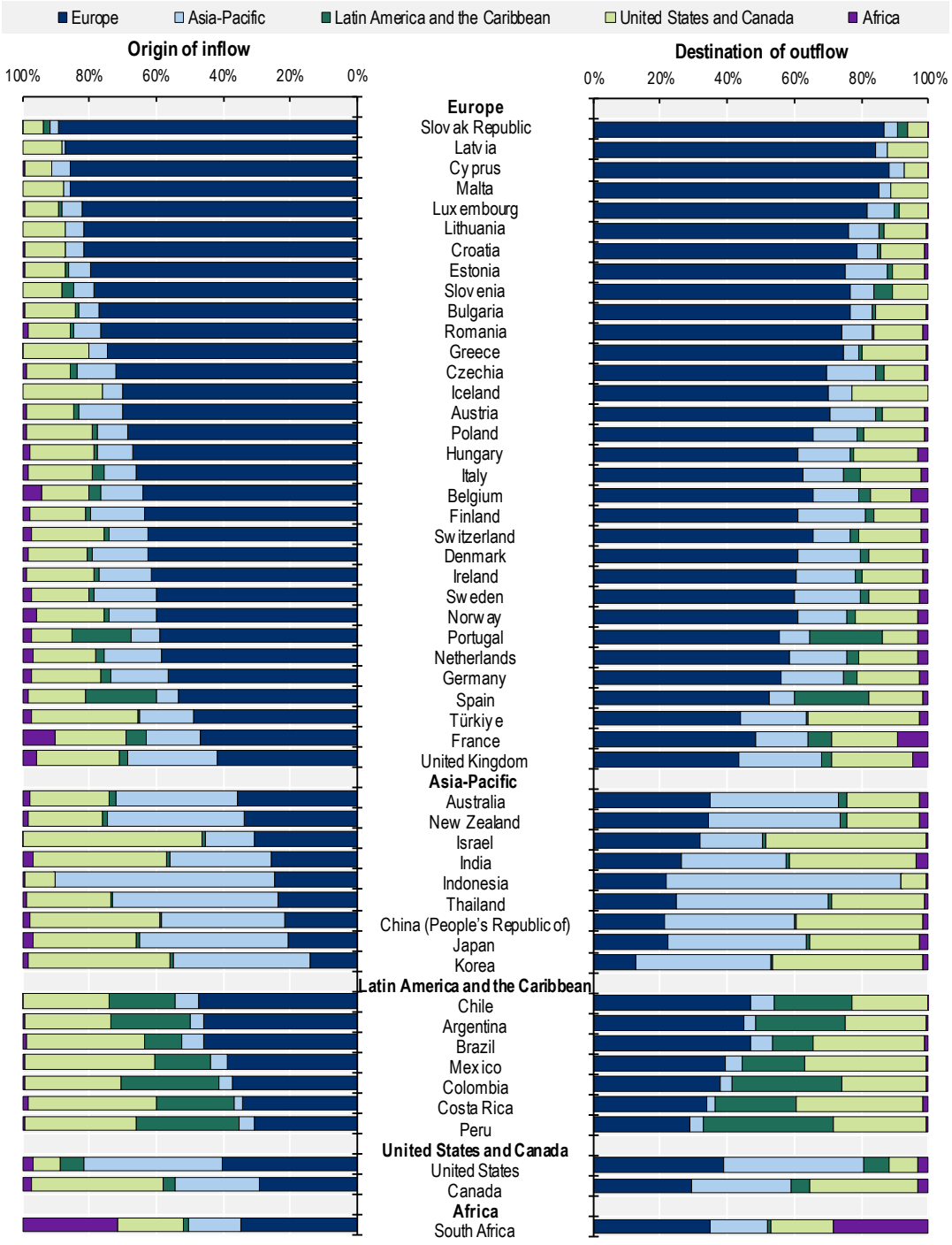
Most mobile scientific authors stay within their broad geographic region

National policymakers are interested not only in the size of mobility flows in and out of countries, but also in their source and destination. Measures to attract talent, such as bilateral agreements, scholarship schemes or recognition arrangements are typically directed at particular countries and are best designed informed by information on the origin of current inward flows. Conversely, schemes to encourage return from the diaspora depend on knowing the destinations of leavers. Geographic patterns of inflow origins and outflow destinations offer a broad indication of these relationships. Figure 4.12 shows these patterns for scientific authors over the period 2010-2024 based on bibliometric data, by aggregating individual country-to-country bilateral flows, showing that such flows are heavily shaped by regional proximity, but not exclusively so.

The figure shows that European countries exchange flows predominantly within Europe, with inflow and outflow shares from other European countries reaching as high as 86% and 88% respectively in Cyprus and 89% and 87% in the Slovak Republic, although patterns vary considerably within the European Union countries (Box 4.5). France and the United Kingdom are the least regionally concentrated European systems on this measure, each having under half their inflows and outflows from Europe and relatively high shares of flows to and from the United States, Canada and the Asia-Pacific region among European countries. Many other countries show broadly similar regionally based patterns of inflows and outflows of scientific authors. Among Asian countries, for example. Indonesia has the largest share of inflows and outflows within its region, with only 8% of authors engaging in outward mobility towards the United States and Canada. Other Asian countries show markedly different patterns of exchange with the United States and Canada, however. In both China and India, inflows of authors from and outflows to the United States and Canada made up the majority or close majority of all such flows between 2010 and 2024.

Figure 4.12. Inward and outward international mobility in selected economies, 2010-2024

Percentage of mobile scientific authors moving from or to each country



Note: A total of 51 countries are included in the analysis, comprising all OECD and European Union member countries, along with OECD key partners and accession candidate countries (OECD, n.d.[25]). Countries are grouped by geographic regions, ordered by the number of countries in the group. For each regional group, countries are in descending order based on the share of inflow from Europe.
Source: OECD, author's analysis using Science and bibliometric indicators database, May 2026.

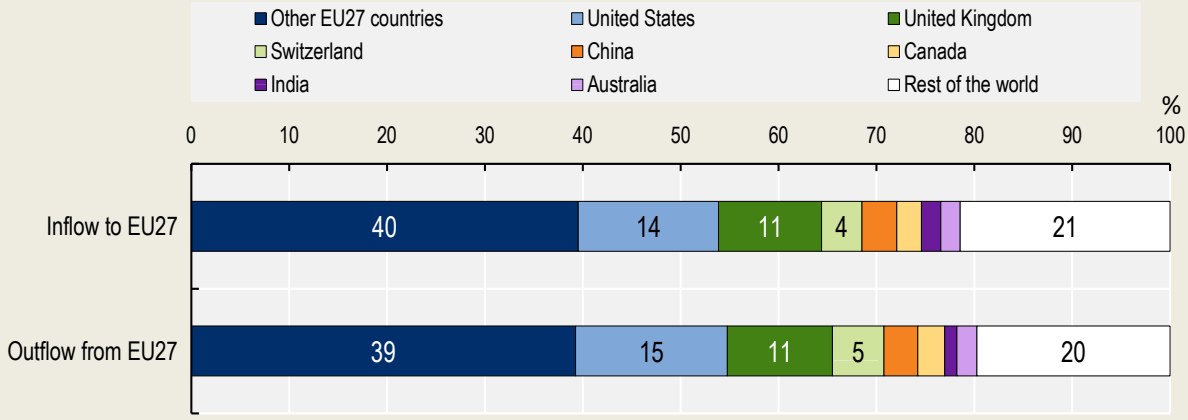
StatLink https://stat.link/3jm1bt

Box 4.5. Mobility patterns across country groups – the case of the European Union

Bibliometric data allow mobility to be analysed not only at country level but also from other geographic perspectives, including flows into and out of regional or country groupings with policy relevance. These groupings may be based on areas of free movement, reduced administrative barriers to mobility or initiatives where countries cooperate to encourage mobility or attract talent from further afield, complementing nationally based initiatives. In this context, it is of interest to examine how talent flows in and out of country groupings, as well as individual countries.

The European Union provides an example of such an entity, where member countries, in addition to developing national policies, collectively work to attract talented individuals to the EU27 area. Figure 4.13 shows where scientific authors moving into and out of the EU27 came from and went to over the period 2010-2014, with movement between Member States distinguished from movement involving countries outside the EU.

Figure 4.13. Inflows and outflows to EU27 countries by source and destination, 2010-2024



Note: Non-EU27 countries are selected based on top 10 countries for origin or for destination in flow in and out of EU27 countries, excluding other EU27 countries.
Source: OECD, author's analysis using Science and bibliometric indicators database, May 2026.

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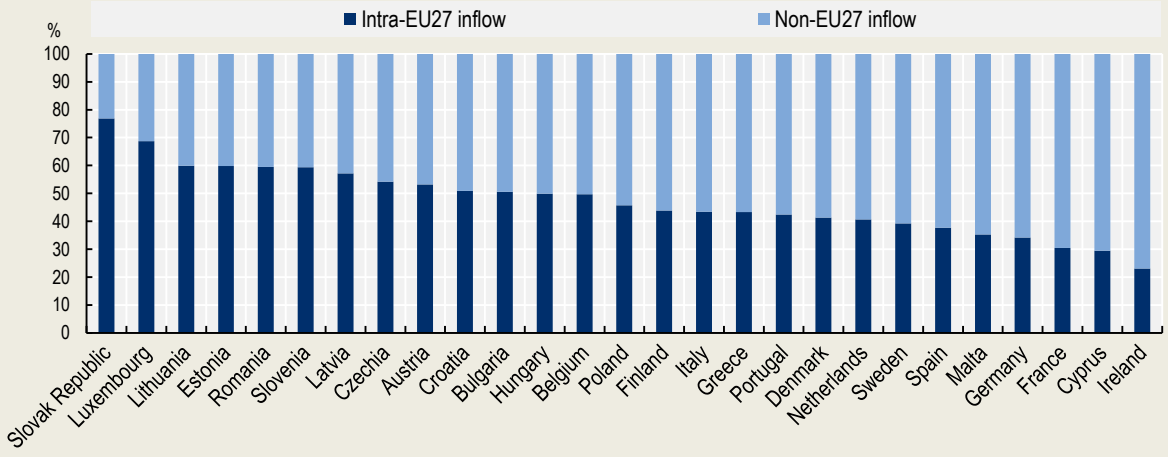
Mobility between EU member states accounts for 40% of inflows and 39% of outflows, with remaining shares involving origins and destinations outside the EU. The United States accounts for the largest single share of inflows (14%) and outflows (15%), followed by neighbouring countries the United Kingdom (11% each of inflows and outflows) and Switzerland (4% and 5% respectively) together account for a combined share that exceeds that of the United States for inflows. The rest of the world accounts for the remainder (21% of inflows and 20% of outflows), with no single other origin or destination accounting for more than 2% of total flows inward or outward. This indicates that, at EU level, mobility flows in and out of the EU from major origins and destinations largely converge over time to similar levels rather than flowing predominantly one way.

At the same time, as Figure 4.14 shows, mobility patterns vary considerably across EU countries. The share of total inflows originating from within the EU varies considerably across member states, ranging from under a quarter to more than three-quarters. Ireland has the lowest intra-EU share, at 23%, with the remaining three-quarters of its inflows originating outside the EU; it is followed by Cyprus (29%),

France (31%) and Germany (34%), each drawing close to two-thirds of its inflows from outside the EU. At the other end, Lithuania, Luxembourg and the Slovak Republic draw more than half of their inflows from other EU member states.

Figure 4.14. Implied inflows of scientific authors to EU27 countries, by source, 2010-2024



Source: OECD, author's analysis using Science and bibliometric indicators database, May 2026.

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Conclusion

The evidence presented in this chapter shows that international mobility contributes not only to the supply of highly qualified talent, but also to the networks and collaborations through which knowledge is created, shared and applied. Countries take diverse approaches to degree mobility, migration and talent retention to build their research and innovation capacity, resulting in markedly different mobility profiles. As mobility patterns continue to evolve in response to demographic, economic and geopolitical change, ensuring that national systems can both attract and effectively harness highly skilled talent will remain a key policy priority. A better understanding of how people move between countries, sectors and career stages will be essential for ensuring that mobility supports both individual career development and the long-term resilience of research and innovation systems. Chapter 5 outlines potential avenues to improve insights into mobility patterns, in the context of the ReICO project.

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Note

[1] The United States figures refer to doctorate recipients with temporary visas, as recorded in the Survey of Earned Doctorates. This is defined differently to mobile graduates, as it includes candidates on temporary visas whose previous qualifications were obtained in the United States.

5 Monitoring R&I careers - the future agenda for ReICO

ReICO is helping to improve the evidence base on research and innovation careers by bringing together previously fragmented data sources, revealing new insights and highlighting critical gaps that continue to limit monitoring and analysis. This chapter presents a forward-looking agenda for closing these gaps and improving the coverage, quality, and comparability of data on research and innovation careers.

In Brief

Towards a stronger evidence base on R&I careers

ReICO has shown the value of bringing together fragmented data to better understand research and innovation (R&I) careers, but it has also highlighted important gaps in what can currently be measured. Existing statistics often provide only partial views of the R&I workforce, struggle to track careers over time and across borders, and do not adequately capture the full range of people who contribute to research and innovation. Differences in the structure of national statistical systems, databases and reporting practices further limit international comparability.

Addressing these challenges requires a forward-looking measurement agenda centred on stronger international standards, improved use of administrative and register data, enhanced national data infrastructures, and new evidence sources such as workforce surveys, digital repositories, and data derived from professional networks and job advertisements. These efforts combined can support a more complete, timely and policy-relevant understanding of R&I careers, helping countries make better-informed decisions about developing, attracting and retaining talent.

Introduction

The previous chapters have presented the main indicator-based findings from the ReICO project to date, illustrating the new insights that can be generated by bringing together and analysing data on the R&I workforce that have in the past been fragmented across national and international repositories. The analysis demonstrates the value of breaking down these data silos and investing in dedicated monitoring of R&I talent and their careers. At the same time, work undertaken through ReICO has revealed important yet actionable gaps in the current national and international evidence base, with several dimensions of R&I careers remaining poorly measured or not measured at all, creating opportunities for new approaches.

This chapter summarises some of the main measurement challenges relating to R&I careers, based on knowledge gained during the first years of operation of the ReICO project. It then sets out future priorities and options for strengthening the measurement of R&I careers across national and international organisations and communities, and the role that ReICO can play in supporting this agenda.

Key measurement challenges for monitoring R&I careers

Defining and identifying the R&I workforce

As covered in Chapter 3, a fundamental requirement for monitoring R&I careers is determining who should be considered part of the R&I workforce. Research and innovation systems rely on a diverse range of individuals who contribute to the creation, diffusion and application of knowledge. These include not only researchers, but also engineers, technicians, data specialists, innovation professionals, research managers and various support staff. Many of these roles play an essential part in R&I activities yet are not easily identifiable within existing statistical systems.

Most current measurement approaches rely on educational qualifications, occupational classifications or employment in R&D-performing organisations as proxies for participation in R&I activities. While these approaches provide useful insights, they each capture only part of the workforce and may exclude individuals whose work contributes to innovation outside traditional research settings. Existing occupational classifications often lack the granularity needed to distinguish R&I-related functions consistently, making it difficult to measure the full breadth of talent supporting research and innovation. As a result, countries are better able to monitor specific groups, such as doctorate holders or researchers, than the wider population engaged in R&I activities.

Limited data availability and statistical coverage across countries

Available national data sources often provide only partial coverage of the R&I workforce. ReICO's evidence base relies primarily on international collections relating to education, labour markets and R&D personnel, complemented by dedicated annual data collection from National Contact Points (see Annex A). These sources were not developed specifically to monitor R&I careers and therefore offer only a partial view of the workforce. Some national labour force and education surveys also face limitations in capturing relatively small populations of interest, including doctorate holders, specialised occupations and workers in emerging technology fields. Sample sizes are frequently insufficient to support granular analysis of these groups, particularly in smaller countries.

As a result, the degree to which countries can populate the key indicators assembled through ReICO varies substantially. These differences reflect not only variation in reporting practices but also more fundamental differences in national statistical capacities, data infrastructures and availability of relevant information. Consequently, important policy questions relating to talent pipelines, skills development, diversity and workforce composition often cannot be adequately addressed using conventional statistical sources alone.

Difficulty tracking careers over time and across sectors

Understanding R&I careers requires more than a snapshot of individuals at a particular point in time. R&I personnel often move between sectors, institutions and countries over the course of their careers. Career mobility and transitions are central features of modern R&I systems, yet they remain difficult to monitor systematically. Most internationally comparable indicators are cross-sectional in nature, providing information about stocks, characteristics or outcomes observed at a given moment. They reveal comparatively little about how individuals move through education, research, innovation and employment systems, or how careers evolve. As a consequence, policymakers often lack information on key issues such as transitions between academia and industry, international mobility, retention of skilled personnel, or exits from research careers into other innovation-related activities.

As discussed later in this chapter, some countries have begun to address these limitations through linked administrative datasets and longitudinal tracking systems that connect educational, employment and income records. Such approaches demonstrate the significant potential of administrative data for monitoring career trajectories, but their implementation remains uneven and extensive gaps persist within national evidence bases on career transitions and trajectories of R&I personnel.

Weak international comparability

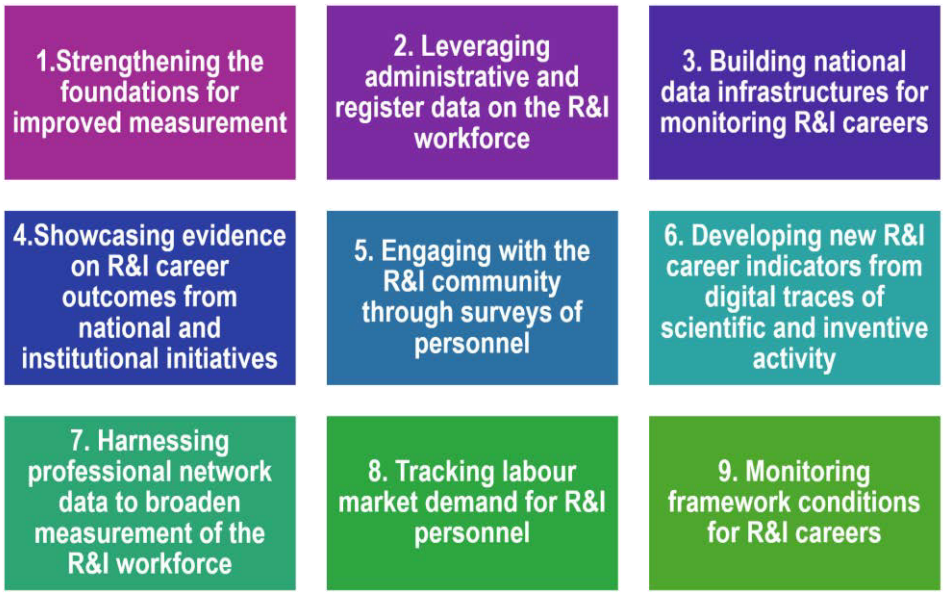
Differences in national definitions, classifications, institutional arrangements and reporting practices can affect both the availability and interpretation of international indicators related to R&I careers. International statistical collections can play a vital role in promoting comparability by providing common concepts and reporting frameworks. However, knowledge gathered through the ReICO project demonstrates that important challenges remain for countries to contribute data to such collections. In some areas, internationally comparable data are available for only a limited number of countries or cover only certain dimensions of R&I careers. Further information on ReICO key indicator coverage across countries is provided in Annex A.

The growing use of administrative records, digital data and other novel sources creates additional harmonisation challenges. Although these sources offer opportunities to improve timeliness, coverage and analytical depth, they also increase the need for common methodologies and reporting guidance. Strengthening international comparability will therefore require continued collaboration among national authorities, statistical agencies and international organisations to develop shared approaches that reflect the evolving nature of R&I careers and the expanding range of data sources available to monitor them.

Advancing the measurement agenda for R&I careers – future priorities for ReICO

Addressing the challenges outlined above through a new measurement agenda is a core objective of ReICO. Building on the findings presented throughout this report, as well as ongoing exchanges with National Contact Points, policymakers, researchers and other stakeholders, the project has identified a number of priority areas where improvements in measurement could generate substantial benefits (Figure 5.1). While some of these priorities concern strengthening existing official statistics, others require the development of novel methodologies, new streams of evidence and responsible use of non-official data sources.

Figure 5.1. Priorities for advancing the measurement agenda for R&I careers



Source: Authors' elaboration.

No single data source can satisfy all information needs relating to R&I careers. Different policy questions require different forms of evidence. Administrative data may be well suited to tracking labour market outcomes over time, while surveys can provide insights into experiences, perceptions and aspirations. Similarly, digital traces of scientific activity, professional networking platforms and online job advertisements can offer perspectives that are difficult to obtain from conventional statistical sources. The overarching objective of ReICO is to progressively develop a more coherent and complementary measurement ecosystem capable of addressing the wide range of policy and analytical questions that arise in relation to R&I careers. The priorities below highlight areas where national governments, international organisations, stakeholders and the wider R&I community can work collectively to improve the coverage, granularity, quality and timeliness of data needed to monitor R&I careers and inform policy.

Strengthening the foundations for improved measurement

Progress in measuring R&I careers depends on strengthening the case for investment in data and statistics within national administrations which in turn supports continued international collaboration to develop the shared concepts, methodologies, and reporting frameworks needed to produce meaningful and comparable evidence across countries. Although many science ministries have dedicated units responsible for R&I data and policy reporting, the value of investing in R&I workforce measurement across government, or of adopting regulatory frameworks that support it, is not always self-evident. Advancing measurement requires a strong and clear business case for both the production of data and statistics and their use in decision-making.

Statistical resources within national administrations are limited, and governments understandably tend to prioritise data on groups facing the most challenging social and labour market situations, such as the low-skilled or the unemployed. Highly qualified professionals working in high-demand fields may, by contrast, appear to need relatively little policy attention, and by extension little measurement effort. This view overlooks the substantial public investment made in the R&I workforce, both directly (for example, through funding for doctoral training, research, and researchers), and indirectly through policies and financial

incentives aimed at attracting and retaining talent for R&I systems. The effectiveness of these investments cannot be adequately assessed using data that are infrequent, highly aggregated, or insufficiently timely.

Yet, some countries' experience suggests that improving measurement need not always require major new investments. Information gathered in the ReICO project to date shows that many countries have been able to make progress on measurement at relatively modest cost. Through documenting and highlighting these experiences, ReICO can continue to support science ministries and public authorities in making the business case for strengthening measurement and monitoring of research careers.

At the same time, strengthening national measurement efforts requires a stronger international framework to support comparability and coherence. International statistical standards have played a central role in enabling comparable measurement of R&D activities for more than six decades, notably through the Frascati Manual. However, existing approaches define personnel categories for the purpose of measuring R&D activity, rather than focusing on their profile and careers within or beyond the confines of R&D activity. Moreover, the traditional classification of R&D personnel into researchers, technicians, and support staff is increasingly recognised as insufficient to capture the diversity and complexity of roles that make up today's R&I career ecosystem.

This situation calls for renewed attention from the international statistical community to co-developing new measurement approaches and associated guidance for national authorities on implementing data collections on R&I personnel. Priorities could include clearer identification of R&I occupations within national and international statistical classifications, common definitions and methods for register-based career tracking, and standardised survey modules on R&I personnel that countries can integrate into existing data collections.

Updating such guidance requires incremental co-development and testing with data producers and users in countries as it evolves, a process that typically requires some years of long-term and persistent coordination. The ReICO project can support this process by providing a platform for methodological experimentation, evidence gathering and international dialogue, helping to refine, test and operationalise new approaches to measuring R&I careers.

Leveraging administrative and register data on the R&I workforce

Administrative and register data offer significant opportunities to improve the measurement of R&I careers. In comparison to surveys, they can provide broader population coverage, support longitudinal analysis and reduce reporting burdens. They are also increasingly important for identifying and monitoring groups that are difficult to capture through traditional statistical sources. However, as discussed, few countries can provide detailed data on the R&I workforce, because of the limited precision of occupational classifications. A second barrier is practical: even if classifications were refined to the extent required to provide granular views of R&I personnel, occupation data must still be recorded accurately and consistently at source in national registers and surveys. In practice, such data is often self-reported or assigned by employers, coded at varying levels of detail, and updated irregularly, limiting its reliability for identifying R&I roles.

Norway provides one example of a country that has made progress on overcoming both barriers, with widespread implementation of occupational variables in national registers combined with the specific identification of researchers in its national occupational classification (Box 5.1). ReICO can support broader progress in this area by working with national authorities, statistical agencies and international organisations to improve the identification of R&I personnel within occupational and administrative data systems. This includes monitoring updates to national occupational classifications, facilitating exchanges on implementation practices, and highlighting country experiences in integrating occupational information into registers and other administrative sources, to support wider adoption of such practices.

Box 5.1. Identifying researchers in Norway's registers and occupational classification

Occupation data collected through registers

Norway is an example of a country where occupation data for the employed population are included in administrative registers. Employers report a seven-digit occupational code for each employee through the "a-melding", Norway's common digital reporting system to the tax, welfare and statistical authorities; Statistics Norway converts these detailed codes to the four-digit Norwegian Standard Classification of Occupations (STYRK-08), which is based on the ISCO-08 standard. The occupation code is determined by the employee's actual duties, regardless of their level of education, type of position, salary or industry. The STYRK-08 includes researcher and academic job titles, enabling a finer identification of research occupations than the four-digit international classification allows.

A dedicated Register of Research Personnel

Norway complements this with a dedicated instrument: the Register of Research Personnel (Forskerpersonalregisteret), an individual-level register of all persons participating in R&D at universities, university colleges, health trusts and institute-sector organisations. The register contains information on sex, age, educational background, position and workplace. For universities and university colleges, information is drawn from the national higher education statistics database (DBH); for other institutions it is collected directly from the R&D-performing unit.

Because Norwegian universities and university colleges share a common system of academic position codes ranging from professor, associate professor (førsteamanuensis), postdoctoral fellow, doctoral research fellow (stipendiat) and others, the register also enables analysis of career structures and stages across institutions, supporting the production of statistics on the academic workforce by seniority, gender and field.

Source: Statistics Norway (2026), "Number of employments and earnings", https://www.ssb.no/en/arbeid-og-lonn/sysselsetting/statistikk/antall-arbeidsforhold-og-lonn; Research Council of Norway (2024), "FoU-årsverk og FoU-personale", Indikatorrapporten, https://www.forskningsradet.no/indikatorrapporten.

Building national data infrastructures for monitoring R&I careers

The quality and scope of evidence available on R&I careers ultimately depend on the strength of national data infrastructures with potential to build on and combine the data resources available within national statistical systems, registers and administrative systems. While some countries have developed sophisticated infrastructures that facilitate linking information on education, employment, earnings and research activity, others continue to face significant constraints in developing the data resources needed to monitor workforce participation, career trajectories and employment outcomes.

Strengthening national data infrastructures to support monitoring of R&I careers requires not only investments in data systems and analytical capabilities, but the development of legal, institutional and governance frameworks that enable information from different sources to be linked and used responsibly. Linking education, employment, taxation and social security records often raises complex questions relating to privacy, confidentiality, data governance and access arrangements. The technical work involved in matching records, ensuring data quality and maintaining secure data environments can also require specialist expertise that is not universally available.

Experience across countries indicates, however, that national data infrastructures to monitor R&I careers can be established through a variety of approaches. Several initiatives collected through ReICO illustrate

how investments in data infrastructure can substantially improve understanding of educational pathways, labour market outcomes and career trajectories. For example:

- In **Germany**, the recently introduced National Academics Panel Study (NACAPS) surveys both doctoral candidates and doctorate holders at regular intervals, providing both cross-sectional and longitudinal data describing the conditions under which they pursue their doctorates, their completion or discontinuation of doctoral training, career goals and professional development, their general life situation and their outcomes. A first cohort was recruited in 2019 (German Centre for Higher Education Research and Science Studies (DZHW), n.d.[1]).
- In **Brazil**, the Centre for Management and Strategic Studies (CGEE) maintains a comprehensive database on the country's master's and doctorate holders, published periodically as the *Mestres e Doutores* study. The most recent edition covers over one million master's graduates and around 320 000 doctorate holders who obtained their degrees in Brazil between 1996 and 2021. Data on graduate programmes and degree recipients from the *Sucupira* Platform, maintained by the federal agency CAPES, are matched with formal employment records from the Annual Social Information Report (RAIS) of the Ministry of Labour and Employment, enabling detailed analysis of graduates' profiles, employment rates, earnings, sectors of activity and regional distribution (CGEE, 2024[7]).
- **Canada's** Education and Labour Market Longitudinal Platform (ELMLP), launched by Statistics Canada in 2018, takes a relational data approach, allowing anonymised education, apprenticeship and tax records to be combined by researchers, rather than constructing a single database a priori. The Canadian model provides a more flexible infrastructure for researchers and policy analysts to address their own questions on educational pathways and labour market outcomes, under strict confidentiality conditions (Statistics Canada, 2024[2]).

At the international level, the consolidation of graduate tracking within Europe under the European Higher Education Sector Observatory shows how survey-based and administrative approaches can be combined and progressively harmonised across countries (Box 5.2), highlighting the potential of combining national innovations with international collaboration to strengthen evidence on R&I career outcomes. ReICO also serves as a platform for sharing national approaches to addressing legal, technical and data governance challenges. Through this exchange, countries can develop a mutual understanding of the operational, institutional and governance arrangements that support the development of robust data infrastructures for monitoring R&I careers.

Finally, greater availability of dedicated national data infrastructures for tracking labour market outcomes, along with administrative and register data discussed above provides opportunities to modernise international reporting. Knowledge gathered through ReICO on national data systems and reporting arrangements can help streamline its international data collection, reduce reporting burdens and improve the use of official national sources. Looking ahead, ReICO can build on emerging practices across the international statistical community to support more flexible national reporting approaches that accommodate different national data environments and make greater use of multiple data sources where appropriate.

Box 5.2. Piloting expanded graduate tracking through Eurograduate and the European Higher Education Sector Observatory

Efforts to strengthen and consolidate graduate tracking are increasingly coordinated at the European level. The EUROGRADUATE survey has been integrated into the European Higher Education Sector Observatory (EHESO), creating opportunities to combine graduate survey evidence with other higher education data and indicators. In parallel, the European Network on Graduate Tracking supports

countries in developing more comparable and sustainable graduate-tracking systems through peer learning and methodological cooperation.

A pilot graduate tracking initiative, also part of EUROGRADUATE, exemplifies this new approach. Four countries (Ireland, Italy, Poland and Sweden) are participating in the pilot, which will report on graduate earnings for 1 year and 5 years after graduation, separately for ISCED 6, 7 and 8 graduates, field of education and training, industry sector, and, where possible, mobility status. Data are derived from administrative sources, including social security and education registers. Participating countries are working together to resolve the common challenges that limit international comparability of such data. These include misaligned reference periods, differing definitions of labour market participation, the treatment of multiple qualifications, the consistent identification of graduates across distinct registers, and the handling of graduates who have left the country.

Source: European Commission (2025[3]), *European Network of Graduate Tracking*, https://education.ec.europa.eu/education-levels/higher-education/relevant-and-high-quality-higher-education/about-relevant-high-quality-higher-education/european-network-of-graduate-tracking

Showcasing evidence on R&I career outcomes from national and institutional initiatives

Through its activities to date, ReICO has identified a diverse range of initiatives undertaken by national authorities, researchers and research-performing organisations to monitor R&I career pathways and outcomes. For example, many higher education institutions and R&D training and performing organisations use internal administrative data not only to track advanced degree graduates and early-career researchers, but also to anticipate future workforce needs, identify structural challenges in research careers, and inform strategic human resource planning. Box 5.3, which describes the case of Turin's Polytechnic University and its Permanent Observatory for Monitoring the Academic Career Pipeline, exemplifies such initiatives.

Box 5.3. Monitoring R&I careers within organisations: the case of Politecnico di Torino

In 2021, Politecnico di Torino established a Permanent Observatory for Monitoring the Academic Career Pipeline (Osservatorio permanente di Ateneo per il monitoraggio della filiera accademica) as part of its institutional strategy for workforce planning and research career development. A key purpose of the initiative is to promote a more transparent and sustainable research career structure. The Observatory systematically collects and analyses data on researchers employed under fixed-term arrangements, including research fellowships, research contracts, collaborative research positions, and fixed-term academic appointments. Its objective is to provide a comprehensive picture of the flow of researchers through the university's academic career system, beginning with doctoral training and extending through the early stages of research careers. Beyond descriptive monitoring, the Observatory develops forward-looking scenarios on the future distribution of research personnel. These projections take into account available institutional resources and changes in the regulatory framework, enabling university leadership and departments to make evidence-based decisions regarding academic staffing and recruitment.

Source: Politecnico di Torino (2026[4]), Percorsi e carriere di ricercar, https://www.polito.it/ateneo/lavora-e-collabora-con-noi/percorsi-e-carriere-di-ricerca

While these national, institutional and project-level initiatives generate valuable evidence, their findings are often dispersed across institutions and countries, limiting their visibility, comparability and potential contribution to policy learning and the wider evidence base on R&I careers. To help address this challenge, ReICO has initiated repositories of national and institutional studies, statistics and other resources on R&I

careers for participating countries, integrating them into the ReICO online hub. The ReICO repository will be expanded and curated over time to showcase evidence on career pathways and outcomes, providing insights for researchers, institutions, and individuals considering careers in R&I and making national data and project-level evidence on R&I careers more accessible across countries and organisations.

Engaging with the R&I community through surveys of personnel

Official statistics, as discussed earlier, are often too slow to capture emerging developments: by the time data are collected, processed and published, new issues affecting R&I careers may already be well established. Dedicated personnel surveys provide an important complement to official statistics, allowing for more regular pulse-reading of the R&I workforce and the early identification of emerging trends. They can also probe topics that administrative and statistical sources find difficult to cover, such as perceptions, intentions and working conditions. Given these benefits, several national authorities have supported or directly implemented such surveys in recent years.

Surveys of the R&I workforce also form a fundamental part of ReICO and will be carried out at two-yearly intervals over the course of the project. The first such survey, in the field during mid-late-2026, is focused on the R&D workforce and aims to assess respondents' perceptions of their job quality and working conditions, including contractual arrangements and job security, job satisfaction, career outlook and mobility plans, including intentions to move between countries. This first survey also gathers fine-grained information on job titles and content of R&D jobs, supporting a bottom-up approach to identifying the tasks and roles of R&D personnel rather than the top-down approach that relies on predefined qualification or occupational categories. Non-representative surveys that rely on crowdsourced data entail important methodological trade-offs and limitations. As a result, sustained engagement with the R&I community across countries will be essential to support participation, improve coverage, and demonstrate the usefulness of the resulting evidence for policy and practice.

Future iterations of the ReICO survey will build on lessons learned from previous rounds, as well as experiences gained from comparable national surveys. In turn, ReICO will share its own knowledge gained from running such surveys for the benefit of national authorities.

Developing new R&I career indicators from digital traces of scientific and inventive activity

The data consolidated through ReICO to date comprise snapshot views of the R&I workforce and their outcomes at particular points in time. However, R&I professionals and other highly qualified individuals are a segment of the workforce for which snapshot views may be least informative. Evidence indicates that the R&I workforce is more geographically mobile than other groups, with researchers among the most mobile of all. Indeed, mobility is built into the structure of research careers: researchers are often expected to move between institutions, countries and projects to gain experience and exposure to different research environments, especially at early career stages.

Career trajectories and transitions are therefore at least as important to monitor as stocks, flows and outcomes at a single point in time. Understanding how individuals move between positions, organisations and geographic locations, and how many leave R&I careers altogether, is essential for assessing the extent to which R&I systems are developing and retaining the talent they invest in. Longitudinal approaches, such as tracking individuals through national administrative registers, or panel surveys, can address this need and such approaches should be prioritised within future measurement strategies.

However, administrative registers or panel surveys cannot track R&I personnel moving across international borders and provide very limited data about their profiles and characteristics. Complementary approaches are therefore needed, particularly those capable of tracking individuals across borders. As discussed in Chapter 4, data based on digital traces of scientific and inventive activity offer new possibilities for building

up a richer view of career trajectories of some groups of R&I personnel, including tracking their international mobility, which extends such analysis to other inputs, outputs and features of science systems. There has been considerable progress by the STI research community in disambiguating the profiles of scientists and inventors, allowing for more accurate traceability and analysis of geographic mobility and international collaboration. Moreover, new data sources and methods are continuously expanding the possibilities for analysis of research careers using these sources.

A future priority for the ReICO project is to explore how data derived from scientific and inventive activity can be used to develop new international indicators on R&I careers by keeping abreast of developments in the field, engaging with experts and stakeholders on methodological issues and improving understanding of the coverage limitations and biases associated with these data sources.

Harnessing professional network data to broaden measurement of the R&I workforce

To capture the wider R&I workforce, including the technicians and research support staff who rarely appear in publication or patent records, additional sources of information on career trajectories are needed. Professional networking platforms offer opportunities to track the careers and skills of a much broader range of R&I personnel. As members maintain profiles listing their education, employment history, skills and locations, and, in theory, update them as their careers evolve, these platforms have the potential to capture much more timely and granular views of career transitions and international mobility.

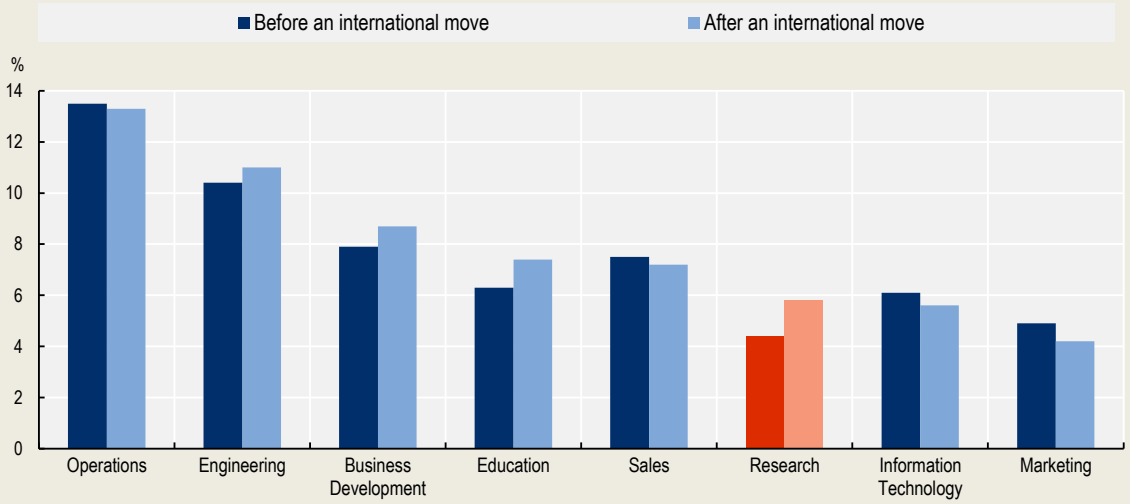
Like bibliometric and scientometric data, professional network data also comes with its own limitations. Data are self-reported by users and generally unverified except through, where required by the host platform, basic identity verification, and the broader community-based verification implied by displaying career details publicly and connections to professional contacts. Professional network data also exhibits uneven coverage across countries, sectors and seniority levels, with some countries and types of roles more heavily represented than others. Nevertheless, opportunities to use this data for policy and benchmarking against official sources of information are increasing, driven by more interactions between governments, international organisation and commercial companies through vehicles such as the Development Data Partnership and specific partnership programmes established by the companies themselves to engage with the public sector (Box 5.4).

Box 5.4. How can professional network data help trace R&I careers? The case of the Development Data Partnership and LinkedIn

LinkedIn Economic Graph and Data for Impact programme

The LinkedIn Economic Graph, a digital representation of the global labour market built from the platform's hundreds of millions of member profiles, provides aggregated insights into employment, skills and career flows. Access for research and policy purposes is facilitated through mechanisms such as LinkedIn's Data for Impact programme, which partners with governments and international organisations to support the provision of policy-relevant indicators based on LinkedIn data. While caveats and limitations must be taken into account, LinkedIn data shows potential to shed light on several aspects of R&I careers, such as the extent to which members move abroad to take up research functions. LinkedIn analysis indicates that members are more likely to move abroad to take up research roles than other types of roles (Figure 5.2)

Figure 5.2. Global Linked arrivals by job function before and after an international move, 2025



Source: Data provided by LinkedIn to the OECD Secretariat.

StatLink https://stat.link/6905ny

The Development Data Partnership

The Development Data Partnership (DDP), of which the OECD is a member, was established in 2018. It brings international organisations together with private sector companies to facilitate the responsible use of proprietary data for research and development purposes. Partners include the World Bank, the International Monetary Fund, the OECD, UNDP and several regional development banks, while its commercial partners include technology companies such as LinkedIn, Google, GitHub and Meta. The Partnership addresses practical barriers to using private sector data for public policy: rather than each organisation negotiating separate agreements with each company, a master data licence agreement, a shared proposal-management portal and centralised secure data infrastructure allow approved projects from member organisations to access data quickly and under consistent governance and ethical standards

Source: Development Data Partnership (n.d.[5]), *About,* https://datapartnership.org/

Tracking labour market demand for R&I personnel

The majority of information currently in ReICO is most relevant for policymakers rather than R&I professionals themselves seeking information on career prospects and outcomes, although (as presented in Chapter 3) the evidence base contains some internationally comparative data on employment outcomes, salaries and resources available across different sectors to support R&I personnel. In the rapidly evolving context of R&I systems, policymakers, along with existing and would-be R&I professionals can benefit from having information on emerging roles and skills required by employers of R&I personnel.

Job advertisement data offers one pathway to support such intelligence-gathering, providing timely, granular insights into the skills, qualifications and roles that employers are actively seeking. Online job advertisements provide one of the most comprehensive and timely sources for comparing labour market demand across countries but require several caveats to be taken into account. Online advertisements are not representative of all vacancies: coverage is skewed towards certain sectors, occupations and countries. Moreover, deduplication of advertisements posted across multiple platforms, extraction and classification of skills and occupations from unstructured text, and inconsistencies in how employers

describe similar roles all pose persistent methodological challenges, particularly when seeking to compare demand across countries. Such data should therefore be interpreted as a signal of the relative structure of labour demand, or to identify emerging roles and occupations, rather than as measures of absolute demand or of skill shortages.

Several national and international initiatives already demonstrate the potential of this approach, such as the Skills-OVATE tool developed by the European Centre for the Development of Vocational Training (CEDEFOP) (Box 5.5).

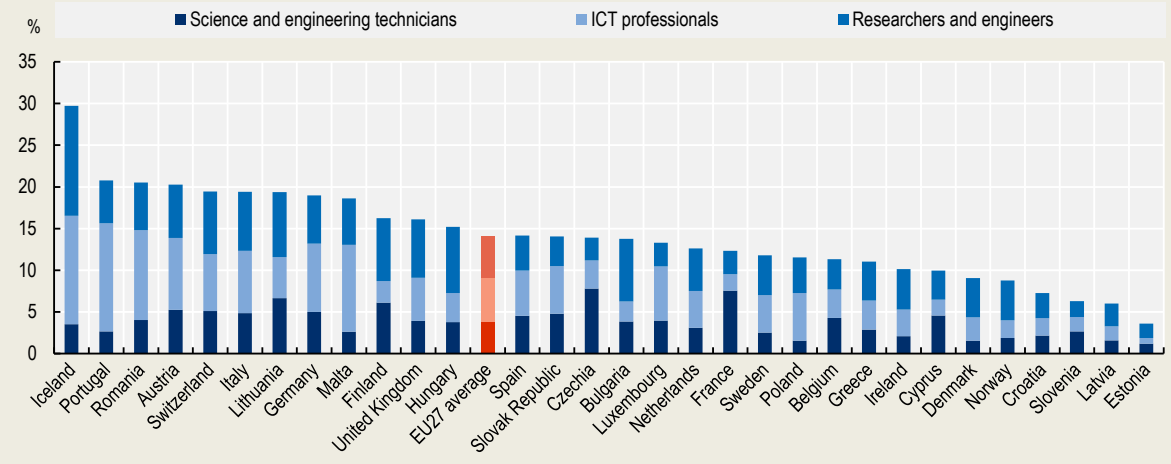
Box 5.5. Using job advertisements to assess relative demand for science, technology and ICT personnel in European countries

CEDEFOP's Skills-OVATE initiative, drawing on millions of online job advertisements across Europe, aims to provide near real-time intelligence on skills demand by occupation, sector and region. Figure 5.3, based on the Skills OVATE tool, compares relative shares of job advertisements for three groups of occupations particularly relevant for research and innovation systems: researchers and engineers, ICT professionals, and science and engineering technicians. In several countries, according to this data source, these occupations together account for more than one fifth of all advertised vacancies, whereas in others their combined share is considerably smaller. ICT professionals represent the largest component among the three groups in many countries, reflecting, as shown in Chapter 3, their growing importance within the science, engineering and technology workforce.

Still, the balance between occupational groups differs markedly across countries – some countries display a more even distribution between ICT specialists and the other occupation groups. Differences between groups, along with overall collective shares of demand, may reflect national variations in industrial structure as well as the prevalence of manufacturing and high-technology activities within national R&I systems. Future ReICO work could extend the analysis of online job advertisements to a broader range of countries, occupations and sectors, generating more timely and granular insights into evolving demand for research and innovation personnel.

Figure 5.3. Relative demand for science, research and technology roles across Europe

Job advertisements for each role as a share of overall job advertisements for the country, Q2 2025- Q1 2026



Source: Compiled by the authors based on CEDEFOP (2026[6]).

StatLink https://stat.link/r3bwn4

As another example, Jobs and Skills Australia's Internet Vacancy Index tracks shifts in employer demand and underpins national career guidance resources (Jobs and Skills Australia, 2026[7]). Extending vacancy analysis to R&I specific jobs offers promise for tracking emerging roles, assessing the balance of demand for transversal R&I skills with disciplinary expertise, and supporting individuals to benchmark their profiles against employer expectations across different roles and sectors.

Exploiting job advertisement data is therefore a priority for future development within ReICO. As with professional network data, however, addressing technical challenges will require careful methodological development and validation, and, potentially, partnering with organisations having specialist capabilities and expertise processing and analysing vacancy data.

Monitoring framework conditions for R&I careers

R&I career decisions and outcomes are strongly influenced by the characteristics of institutional and policy environments, or at least by perceptions of them. This warrants efforts to develop internationally comparative indicators on the policy framework conditions and contextual factors that shape R&I careers. Relevant dimensions that might potentially provide a focus for future ReICO measurement efforts include:

- comparative data on national public supports for R&I careers, such as the existence of fellowship and grant schemes at different career stages;
- national career frameworks and their provisions for progression, evaluation and permanent positions;
- qualification recognition and validation requirements, which affect the ease with which individuals can move between countries and sectors;
- the characteristics of national research funding programmes, including their duration, portability and eligibility conditions;
- access to social protection and employment benefits for R&I personnel, which can differ markedly between those on fixed-term and open-ended contracts, including pension arrangements, parental leave, unemployment insurance and health coverage.

Other indicators of relevance in this domain include wider viewpoints on relative talent attractiveness across countries, such as those produced by the OECD Indicators of Talent Attractiveness (ITA) initiative, which benchmark countries' capacity to attract and retain different types of talented migrants, illustrating how policy settings and broader contextual factors can be combined into internationally comparative indicators (OECD, 2023[8]; OECD, 2023[9]).

Conclusion

As R&I career paths become more diverse, mobile and interconnected, the evidence base must evolve accordingly. No single source or methodology can capture the full complexity of these trajectories, but by combining established statistical approaches with new forms of data and sustained international collaboration, countries can move towards a richer and more nuanced picture of R&I careers. The ReICO project is helping build the foundations for a longer-term international effort to make R&I careers more visible, better understood and ultimately better supported by policy.

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Annex A. Data sources used in RelCO

International data sources

Statistical data collected and published by international organisations guarantees, for many RelCO indicators, a minimum level of data reliability and comparability across countries. Table A.1 lists data sources from international organisations used in RelCO, including the OECD. Most of the countries in the RelCO database are covered at least to some extent by OECD databases on education, skills, research and development, and migration. Other international organisations also provide relevant data based on labour market surveys, where data can often be disaggregated by educational attainment.

Table A.1. Data from international organisations

Type	Data source(s)	Data categories covered	Minimum and maximum number of countries covered per indicator
Data from OECD databases	Science, technology and innovation databases • Main Science and Technology Indicators (MSTI) • Research & Development Statistics (RDS) • Scientometric and bibliometric indicators, Science, Technology and Innovation Scoreboard • OECD Business Innovation Database	R&D personnel by sector and function	24 to 46 countries
		Expenditure on labour costs	33 to 44 countries
		Mobility of scientific authors	49 to 52 countries
		Business innovation statistics	18 countries
	Education databases • UNESCO-OECD-Eurostat joint data collection • Indicators of Education Systems Programme (INES) Network for Data Development on Labour Market and Social Outcomes of Education (LSO))	Entrants	33 to 42 countries
		Enrolments	36 to 45 countries
		New graduates	24 to 44 countries
		Employment outcomes	22 to 48 countries
	International skills surveys • Programme for International Student Assessment (PISA) • Survey of Adult Skills (PIAAC)	Students' cognitive skills and scientific and technological career aspirations	42 to 47 countries
		Proficiency level of adults in basic skills	28 countries
	Database on Immigrants in OECD and non-OECD Countries (DIOC)	Foreign-born population and doctorate holders	6 to 37 countries
Data from other international organisations	International Labour Organisation • Labour Force Statistics • International Labour Migration Statistics • Education and Mismatch Indicators • Wages and Working Time Statistics	Employment outcomes and conditions of highly qualified population and occupation of employed	1 to 45 countries
	EU Labour Force Survey	Employment outcomes and conditions of highly qualified population (typically more detailed breakdowns) and occupation of employed	1 to 32 European countries
	EU statistics on income and living conditions (EU-SILC)	Earnings of highly qualified population	14 to 32 European countries
		Quality of life for highly qualified population	28 to 30 European countries

National data sources

ReICO complements international sources with a dedicated annual data collection from national statistical agencies and other national data providers. Countries return data based on several national sources, including administrative registers, population censuses and dedicated surveys such as surveys based on the Careers of Doctorate Holders (CDH) model (Auriol, Misu and Freeman, 2013[1]; OECD, 2019[2]). Table A2 provides an overview of national sources used by ReICO National Contact Points to provide data in the 2025-2026 annual national data collection.

Table A.2. National sources used to return data in the ReICO-NCP 2025-2026 data collection

Category	Collection method	Enumeration type	Target population	Example of countries	Note
Compiled administrative database based on population register	Register	Census	Resident population	Austria, Denmark, Estonia, Finland, Latvia, Norway	Links population register, education attainment data and employment data using individual identifier Has limited or incomplete information on degree holders who acquired their degrees abroad
Compiled administrative database based on graduate register	Register	Census	Graduates from institutions in the country	Brazil, Canada, Hungary, Lithuania	Links graduates register data with employment data using individual identifier Does not cover degree holders who acquired their degrees abroad
Graduate register	Register	Census	Graduates from institutions in the country	Colombia, Costa Rica, Croatia, Germany, Japan, Peru, Portugal, Romania, Spain	Provides accurate number on recent graduates with demographic breakdowns Cannot identify individuals who moved abroad
Population census	Survey	Sample (and where possible, register for some information)	Resident population	Australia, Belgium, Canada, Chile, Croatia, Czechia, Ireland, Italy, Korea, Lithuania, Malta, New Zealand, Portugal, Romania, Spain	Collects various information in detail for everyone in the household including demographics, highest education attainment and employment characteristics Generally conducted every 5-10 years
Household or population sample survey	Survey	Sample	Resident population	Costa Rica, the United Kingdom, the United States	Collects various information for everyone in the household including demographics, highest education attainment and employment characteristics Conducted every year
Labour force survey	Survey	Sample	Resident population	Colombia, Czechia, Ireland, Italy, Japan, Korea, Malta, the Netherlands, Switzerland, the United States	Focusses on employment-related information, categorised by educational attainment level
Graduate survey	Survey	Sample	Graduates from institutions in the country	the United States	Follows up on the career path of graduates Does not cover degree holders who acquired their degrees abroad
Careers of Doctorate Holders survey	Survey	Sample	Doctorate holders in the country	Chile, Germany, the Netherlands, Portugal	Follows up on the career path of doctorate holders Where possible, also covers doctorate holders living in the country who acquired their degrees abroad

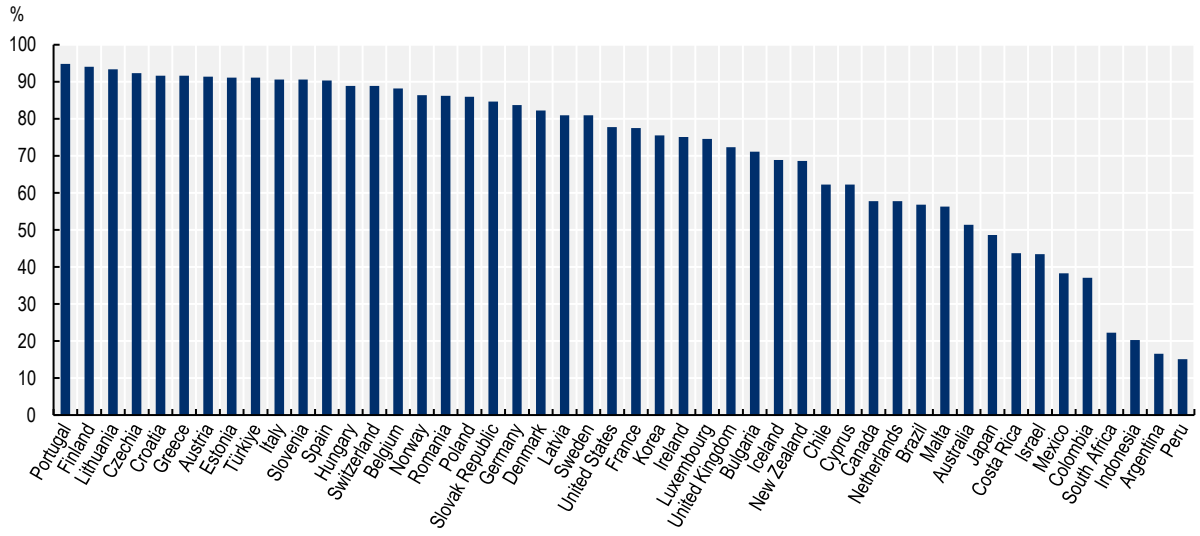
Source: 2025 and 2026 ReICO annual data collections.

Country coverage for ReICO key indicators

Figure A.1 shows the extent of country coverage of the 2026 edition of the ReICO key indicator database, which includes 405 indicators. Among 48 countries (OECD Member, accession candidate countries and non-Member EU Member States) included in the database, nearly two-thirds have more than 70% coverage of the key indicators. Nevertheless, the figure shows that no country populates the full set of key ReICO indicators - the highest coverage is found in Portugal at 95%.

Figure A.1. Indicator coverage for countries and economies included in 2026 ReICO database

Percentage out of 405 key indicators



Note: The share refers to the share of indicators with at least one value for the country available between the reference years 2020 and 2024.
Source: OECD, Research and Innovation Career Observatory (ReICO) Database, June 2026.

StatLink https://stat.link/hd8y7i

It should be noted that ReICO key indicators themselves are chosen partially based on country coverage, including coverage from international data collections. As a result, Figure A.1 should not be interpreted as a wider assessment of availability of data on R&I careers in general within countries. Beyond the key indicators, nearly 400 additional indicators are available in the thematic ReICO databases (OECD, 2026[3]; OECD, 2026[4]; OECD, 2026[5]). These were not selected as key indicators primarily for one of three reasons: lower country coverage, a high prevalence of unreliable data, or substantial overlap with measures already included among the key indicators. Such overlap arises because ReICO collects and harmonises data from multiple international sources, which may at times draw on the same underlying national source, such as labour force surveys.

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Research and Innovation Careers Observatory 2026

Key Indicators on Talent, Mobility and Working Conditions

Every scientific breakthrough and every new technology starts with people. The research and innovation workforce underpins countries' greatest ambitions in terms of economic prosperity and societal wellbeing. Yet the evidence on this workforce has long been scattered and incomplete.

This report offers a comprehensive account of research and innovation careers as they stand today. It draws on the evidence base of the Research and Innovation Careers Observatory (ReICO), a joint OECD-EU initiative designed to shed light on the supply, mobility and outcomes of the people who drive research and innovation forward. Comparative indicators describe the size and composition of the research and innovation workforce in each country, how it is being renewed, which parts of the labour market its members work in, and the conditions, outcomes and international mobility they experience. The findings provide a resource for policymakers, for the institutions that fund, employ and train research and innovation personnel, and for those working or considering working in the field.

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