

Promoting social cohesion and convergence

Role of human capital inequalities in social cohesion and convergence



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Abbreviations in this report

ANI	National Innovation Agency (Portugal)
CEEC	Competition to Stimulate Scientific Employment (Concurso Estímulo ao Emprego Científico) (Portugal)
CoLAB	Collaborative Laboratory
EEA	European Economic Area
EU-LFS	European Union Labour Force Survey
EU-SILC	European statistics on income and living conditions
FCT	Foundation for Science and Technology (Portugal)
GBARD	government budget allocations for research and development
GERD	gross domestic expenditure on research and development
GDP	gross domestic product
HSMP	Highly Skilled Migrant Programme
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
NEET	not in employment, education or training
NFQ	National Framework of Qualifications (Ireland)
NUTS	Nomenclature des unités territoriales statistiques (Nomenclature of Territorial Units for Statistics)
OECD	Organisation for Economic Co-operation and Development
PEEC	Scientific Employment Incentive Programme (Programa de Estímulo ao Emprego Científico) (Portugal)
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
R&D	research and development
SDG	Sustainable Development Goal
STEM	science, technology, engineering and mathematics
TFEU	Treaty on the Functioning of the European Union

Executive summary

Introduction

Human capital – defined as the knowledge, skills and other attributes that enable people to be productive – is a key driver of dynamism and growth in the EU economy. This report assesses the success of the EU in developing and using human capital to support economic and social progress.

The report begins with an examination of differences in human capital among the Member States in terms of its creation, utilisation in the labour market and mobility. Through an analysis of 16 indicators, it investigates whether there is upward convergence among the Member States – in other words, whether performance in the creation and utilisation of human capital is improving and whether dissimilarities between them are reducing. The analysis goes on to quantify the impact of tertiary education on convergence in national income across the Member States. Focusing on human capital mobility, the cost to Member States of emigration of talent is calculated. Finally, lessons for policy development to attract and retain highly skilled graduates are derived from case studies of policies in five Member States.

Policy context

According to a 2023 European Commission communication on harnessing talent in Europe's regions, attracting and retaining talent should be at the forefront of regions' strategies to ensure their prosperity and narrow disparities between them. It highlights the double challenge for regions that face a shrinking population due to demographic change and the consistent outflows of citizens with tertiary education due to poor economic growth prospects in the area.

Intra-EU mobility is an important pillar of the EU single market. However, the continuous outflow of people from a region or a country may hurt the convergence of Member States by leaving some territories ill-equipped to meet labour market demands and the challenges of the twin transition. Understanding these flows and the underlying reasons could help the EU to reduce disparities across its Member States and improve cohesion while keeping human capital circulation a two-way exchange that favours sharing of knowledge and economic growth.

While the need for economic growth and innovation is a powerful argument for the formation of a workforce with the knowledge and skills to support a major world

economy, it is not the only reason to develop human capital. The impact of education goes beyond economic effects, as educated citizens are more likely to actively participate in the social and civic arenas, contributing to the functioning of democratic institutions.

Key findings

- On indicators of human capital creation, Member States are converging upwards. The share of gross domestic product (GDP) dedicated to tertiary education, the percentage of early school-leavers, tertiary education attainment, and participation in on-the-job training all moved towards achieving policy targets.
- There are differences between Member States in the way human capital is utilised, with some better absorbing human capital in the labour market than others. This has translated into an increase in disparities between the Member States in respect of the employment rate of graduates and investment in research and development. On the positive side, the rates of graduates who are not in employment, education or training (NEET) or are overqualified for their jobs have fallen; however, at regional level, especially in Greece, Italy and Spain, the EU averages on both indicators remain high.
- Human capital played a role in EU convergence in respect of national income over 2014–2021. The analysis suggests that highly educated individuals have helped central and eastern European Member States and regions to catch up with their western European counterparts in terms of the GDP per capita.
- Balanced circulation of human capital – also known as brain circulation in the literature – has not yet been achieved across the EU: some countries and regions are 'star' attractors of talent, while others struggle to absorb the human capital they invested in. These latter lose their human capital, and the incoming foreign talent does not compensate for this loss. A conservative cost estimate is that for Belgium and Italy (two countries for which a full calculation was possible), this cost may exceed €10 billion over a decade.
- The Member States that are net receiving countries for graduates – with a net gain of talent with respect to other Member States – may still suffer from brain drain in specific areas or regions and therefore need local initiatives to address it.

- Policies perceived as successful in attracting human capital generally target a specific type of talent. This implies that tailored policies better meet the needs or expectations of the talented individuals being targeted (degree students, graduates, scientists, researchers and professionals) than broad policies.
- Salary is the most relevant factor in policies that target foreign talent. Other factors such as the provision of support and an offer of housing are also important, but they are rarely included in policies to attract individuals and, rather, are left to ancillary or local initiatives. However, in the case of nationals who previously emigrated, cultural aspects or personal reasons may also play a role in their decision to return.
- Ideally, an EU-wide aim would be to incentivise the circulation of human capital around the EU rather than retention of talent in the home country, replacing the current situation where national policies compete with each other.
- The evidence that human capital has helped drive economic convergence in the EU implies that initiatives to create human capital and attract it should stay on the policy agenda.
- Monitoring talent stocks and dynamics would provide insights to design policies tailored to attracting specific categories of talent. Granular data at regional level, which EU institutions at various levels have started to collect, are required for this type of analysis.
- While the EU can benefit from human capital flows that reallocate resources at Member State level, when the outbound flow of tertiary graduates is too high, there is a risk of a negative feedback loop weakening both the education system and the labour market at national and regional levels. If this scenario is not counteracted with policies to stimulate talent circulation, it might cause convergence to slow down or halt.
- The role of the social partners in maintaining and creating desirable working conditions for highly educated workers should not be underestimated, not just in relation to salary but also in relation to issues ranging from on-the-job training opportunities to the availability of state-of-the-art tools for research and development.

Policy pointers

- The implementation of policies to attract and retain talent relies on a wide range of funding options (derived from budget allocations) and fiscal incentives (such as income tax exemptions). Combined approaches can be used to improve the sustainability of such policies over time.
- Brain drain translates into an economic loss deriving from missing returns on educational investment. Solutions aiming to recover such cost from emigrants would only limit talent circulation. Instead, policies that attract talent or encourage talent circulation would balance out the loss of graduates by stimulating an inflow of highly educated individuals (both nationals who emigrated and non-nationals).

Introduction

The importance of human capital in knowledge economies has never been more central to the EU. Innovation and a talented workforce are paramount to maintaining competitiveness and ensuring a successful green and digital transition. One of the factors determining the economic growth of a geographical area is its available pool of talented people. Similar to companies that want to attract talent to maintain competitiveness, countries and regions want to nurture and utilise the skills of their citizens. The EU and Member States have policies to develop human capital while ensuring that the policy outcomes are fair and equitable. The EU Cohesion Policy 2021–2027, stemming from Article 174 of the Treaty on the Functioning of the European Union (TFEU), is a long-term investment policy for all regions, focused on overcoming the economic, social and territorial divides, with the aim that Member States and regions grow together.¹

Moreover, Article 45 of the TFEU states that free movement is a right of EU citizens. Citizens are entitled to look for a job in another EU Member State, work there without a work permit and reside there for that purpose. Such workers enjoy equal treatment with nationals in access to employment, working conditions, and all other social and tax advantages. They are also allowed to stay in the country where they moved after employment has finished.

According to the 2022 intra-EU labour mobility report, approximately 10 million EU citizens lived in a country other than the one of their citizenship in 2022 (European Commission, 2023a). The figure decreased by only 1% compared with 2021. In 2022, 32% of EU movers (EU citizens who live and work in a country other than the one of their citizenship) had a high level of educational achievement, a slight increase from 29% in 2017, matching the levels seen among nationals. In the same year, the educational attainment of non-EU nationals grew too, with 25% having a tertiary education. In contrast, 29% of EU movers have a low level of educational achievement, compared with 18% of nationals and a significantly higher 45% of third-country nationals (European Commission, 2024a). In 2016–2021, EU movers holding a medium level of education moved less than those with a high or low level of education.

The education system is the primary factor in the creation of human capital, and it is linked tightly to the labour market; the availability of highly educated individuals shapes the labour market, and the demands of the labour market can shape educational paths. The EU labour market allows EU citizens to move easily across Member States. The 2022 intra-EU mobility report examines the implications of mobility for the labour market and finds that there are ‘notable differences across EU countries, both in terms of employment levels and growth’ (European Commission, 2023a, p. 143). The literature shows that countries or regions that lose too many graduates (known informally as brain drain) experience a weakening of their education systems and labour markets (Nifo et al, 2020).

Whereas the European Commission’s report focuses on the mitigating role of mobility on labour shortages, this study focuses on the implications of the mobility of tertiary graduates and on the potentially permanent loss of human capital at national and local levels. It investigates the link between economic and social convergence and human capital, the stock of human capital available across Member States, the flows among countries and regions and their dynamics across time, including the financial losses or gains of migration, and local and national policies to address brain drain and foster its opposite, brain gain.

Definition of human capital

In this report, human capital is defined as the ‘the stock of knowledge, skills and other personal characteristics embodied in people that helps them to be productive. Pursuing formal education (early childhood, formal school system, adult training programmes) but also informal and on-the-job learning and work experience all represent investment in human capital’ (OECD, undated). The higher the level of education and training, the greater the human capital, meaning that highly educated people constitute the top share of human capital in a territory. Access to early years education and education policies is an area that Eurofound and others have explored extensively in recent years (Eurofound, 2022, 2023; Molinuevo and Consolini, 2022). Although human capital is created

¹ ‘In order to promote its overall harmonious development, the Union shall develop and pursue its actions leading to the strengthening of its economic, social and territorial cohesion.

In particular, the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions.

Among the regions concerned, particular attention shall be paid to rural areas, areas affected by industrial transition, and regions which suffer from severe and permanent natural or demographic handicaps such as the northernmost regions with very low population density and island, cross-border and mountain regions’ (TFEU, Article 174).

over the entirety of a person's education, this report focuses on tertiary graduates (International Standard Classification of Education (ISCED) levels 5–8) in order not to replicate previous work.

Human capital is a resource that was first identified, together with labour and capital, as an input to production output (Manny, 1932). The role of education in the specialisation of tasks was noted in the work of Adam Smith (Blair, 2011). The concept, which now underpins human capital theory, was first formalised by Schultz (1961), who listed the factors determining human capital as education, on-the-job-training, general health (both people's physical condition and the availability of health services and facilities) and individuals' willingness to move to achieve better living conditions. The concept was subsequently refined in the work of Becker (1964), where educational achievement helped to explain wage differences. Becker demonstrated that individuals' choice is the basis of human capital development. The choice to pursue one's education and skills stems from the trade-off between spending time learning for future gain instead of working, but forfeiting potential earnings that could derive from increased knowledge (Becker in Vignolles, 2012).

When human capital migrates, knowledge is transferred. Reasons behind individuals' migration, excluding war or other catastrophic situations, stem from the search for better working and living conditions, usually found in areas with higher gross domestic product (GDP) per capita. In this context, the brain drain entails a loss of resources that could otherwise contribute to the economic growth of a geographical area (Cavallini et al, 2018), and a loss in return on investment if the migrating person was educated or trained in the place they have left. As indicated in one study of Italian regions, 'a larger probability of after-graduation migration is shown to affect educational choices by both reducing the rate of enrolment at home and favoring pre-graduation migration (i.e., enrolment at universities outside the residence region)' (Nifo et al, 2020, p. 1).

Fortunately, the wider picture is less bleak. Despite being an economic loss, migration outflows can have positive consequences. First, some countries might not have the skills demand equal to their numbers of highly skilled workers, inducing a brain overflow (Galgóczy et al, 2012). Thus, workers have to migrate to find employment to match their skills. Second, people in sending countries might pursue higher education and skills as they see many nationals leaving for places where they will be better remunerated and they wish to follow. This may foster the creation of local human capital and innovation since only a small proportion of those pursuing education will actually move (Bardak, 2005; Mayr and Peri, 2009). When labour supply leaves, pockets of demand can arise, hence stimulating existing

workers to upskill and fill the gaps (Beine et al, 2003). Finally, when young skilled migrants return to their home country (brain regain), they contribute to the increase of human capital and entrepreneurial and technological skills (Bardak, 2005; Chen et al, 2022).

On the flipside, universities that attract more students are likely to benefit from receiving more funds both from tuition fees and from national education funds. These institutions are then able to hire better professors and build better infrastructure. This creates a positive feedback loop and increases the attractiveness of these universities to highly qualified international students. This could also lead to the attraction of foreign students who can afford to undertake international education and who would expect higher quality in return for the higher investment required to be educated abroad (Szelényi, 2006; Van Bouwel and Veugelers, 2013). Brain gain means that areas that experience an influx of human capital, both students and workers, benefit from a boost in their talent pool. This has spillover effects on economic growth and on innovation in companies (Glawe and Mendez, 2022; OECD, 2023a). Large inflows of highly skilled migrants enrich destination areas without them having to invest in human capital formation, contributing to economic growth and attractiveness, especially for science, technology, engineering and mathematics (STEM) graduates and start-ups (OECD, 2023a).

Human capital phases: Creation, labour market utilisation and mobility

Human capital can be studied from different angles: how it is created, how it is used and how it eventually moves within or among territories. The report structure mirrors these phases by looking at indicators that characterise each of these aspects and determining whether Member States are converging – in other words, becoming more similar and improving in terms of their performance in respect of these indicators.

Human capital is created primarily through education and subsequently by the further acquisition of knowledge through on-the-job training and participation in lifelong learning. The report analyses the creation of human capital, including the resources that each country allocates to it. Countries and regions that nourish their human capital by investing in education can grow faster and ultimately contribute to the reduction of disparities between Member States (Crescenzi and Rodríguez-Pose, 2011; Rodríguez-Pose and Comptour, 2012).

In terms of labour demand, the report looks at **how human capital is utilised** once highly educated individuals enter the labour market, with a regional focus on graduates who are not in employment,

education or training (NEET) and who are overqualified for the jobs they occupy. But education and training opportunities alone are not enough to transform regions into attractive locations where human capital is retained. Individuals seek not only education but also opportunities where their investment in their own education, in terms of cost, effort and time, is financially well rewarded (Schultz, 1961; Becker, 1964). Indeed, labour markets do not always satisfy the expectations of individuals, prompting them to move elsewhere. Where human capital levels are high, people have better chances of being employed in higher-paid jobs or undertaking entrepreneurial trajectories, contributing to the economic growth of the region where they work (OECD, 2023a).

The circulation and mobility of human capital is inherently tied to the creation of human capital and the capacity of the labour market to absorb it. Like many socioeconomic characteristics, human capital is spatially bound. Richer countries, regions and cities are more attractive to those who aim to improve their education and their wages. One of the main concerns regarding east–west European integration was the exodus of highly educated people from the eastern European Member States to the richer and industrialised Member States of the west (Landesmann and Székely, 2021).

Mayr and Peri (2009) found that although some migrants settle in the host country, around 30% of them return to their home country within 20 years, due to the benefits of a return wage premium. In their model for eastern Europe, they find that more than 50% of emigrated graduates might decide to return to benefit from return premiums. This happens both with intra-EU mobility and with non-EU migrants (Mayr and Peri, 2009; de Haas et al, 2015; Cebolla-Boado and Miyar-Busto, 2019).

Geographical disparities grow not only when individuals move to a different country: to accumulate human capital, individuals might consider moving to bigger cities, leaving the peripheral regions for core ones (Pasca and Rouby, 2012). Not all peripheral regions experience the same outflow, and for some there is even a seasonal inflow thanks to tourism, even though this industry employs mostly low-skilled workers. Low education expenditure is a notable factor driving migration. Rural areas are often unable to offer the same quality of education, causing more highly skilled citizens to leave. This could lead to a substantial increase in disparities in those areas (European Commission, 2002a). A case study of several mountain areas in Greece found that peripheral areas have older populations and lower levels of education, even when same-age groups are compared across spatial dimensions (Giannakopoulou et al, 2020). A study on the southern Italian region of Basilicata obtained similar results. People living in bigger towns have less

propensity to migrate than people in rural areas. Similarly, employment and training opportunities are factors that make people remain in the region.

The impact of climate change on both intra- and extra-EU migration will be increasingly visible in the coming years. Due to increased temperatures, lengthening heatwaves and extreme weather events, a higher number of highly skilled migrants may decide to relocate to safer places for themselves and their families. This would further increase the socioeconomic divide in affected regions. Several studies on natural disasters and migration in the Global South have been conducted: in Bangladesh (Schwerdtle et al, 2021), Mexico (Nawrotzki et al, 2015) and across eastern Africa (Mueller et al, 2020). In the case of Europe, the focus has mainly been the potential consequences of non-EU immigration due to economic reasons or asylum-seeking (Scheffran and Brauch, 2014).

This report looks at human capital circulation in the EU to understand how highly educated individuals, both students and graduates at tertiary level, move across countries and which countries attract the most talent. Individuals' reasons for migrating vary by country and by status: students move in the context of education programmes such as Erasmus+, whereas graduates follow different patterns according to field of study and labour demand.

Countries that are net senders of graduates seem to lose twice over, in capital spent and the lack of capital generated. First, they do not reap the fruits of education expenditure, as citizens who spent a considerable amount of time in education leave for better tertiary education. Second, they lose a highly skilled workforce that would increase the economic performance of the country.

Even though migrating to improve one's education is made easy by intra-EU mobility and international mobility, barriers to long-term apprentice mobility remain. In a recent report, Cedefop (2021) highlighted the tripartite effort needed to implement such mobility. All labour market actors and governments of sending and receiving countries have to be in agreement. Other issues include difficulties in having skills formally recognised upon return, the training and human resources capacity in the receiving company, and skills shortages in potential movers' countries of origin. Some countries and companies could be reluctant to send their apprentices abroad and lose human capital, and young workers might be reluctant to leave and lose their home country benefits. Moreover, not all sectors benefit from such mobility.

In light of these issues, the report looks at the impact of tertiary education on convergence of Member States in terms of national income. Indeed, competitive salaries and innovation, especially in tech industries, cannot develop in regions where human capital levels are

lower. It is then important to look at regional differences to capture a more detailed picture of the struggling areas.

Countries are likely to experience downward trends where economic and social capital diminishes due to emigration, and they find themselves left behind, at the periphery of the convergence machine. From a social perspective, a scarcity of highly educated individuals could pose challenges in providing essential services such as education and healthcare (Docquier and Rapoport, 2012; Kerr et al, 2016; Bassetto and Ippedico, 2023). An uneven distribution of expertise could also impact policy implementation in regions where an ill-equipped workforce struggles to deal with complex strategies (Rodríguez-Pose and Bartalucci, 2023).

The report addresses this issue in a twofold way. First, it aims to give a conservative estimate of the cost of migration of tertiary graduates for Member States, seen as financial losses or gains, excluding spillover effects. Second, it provides case studies of policies addressing brain drain and brain gain in five Member States. The main intra-EU flows of human capital up to the onset of the COVID-19 pandemic are well documented and entail a movement from southern to northern Europe and from eastern to western Europe. Several countries and regions put in place policies to increase retention and attractiveness, by connecting education and business demands more efficiently.

Structure of the report

The report begins by looking at 16 indicators that capture the three human capital phases – creation, utilisation and mobility – and examining whether Member States are converging in respect of these indicators. It then complements the convergence analysis with further quantitative and qualitative analysis. On the quantitative side, the report digs deeper into human capital mobility, especially the impact of movement on GDP, and estimates the cost of

migration for countries. On the qualitative side, case studies are provided to examine the national and local policies that address brain gain and brain drain. The chapters are structured as follows.

Chapter 1 introduces the convergence methodology and the indicators used in the analysis. These indicators were selected based on the literature and, in many cases, are associated with a concrete and measurable EU policy target.

Chapter 2 investigates convergence in the three phases of human capital – creation, utilisation and mobility – across the selected indicators. It reports trends in the EU averages and on the performance of individual Member States. A regional analysis of convergence is performed for a subset of indicators.

Chapter 3 presents an econometric investigation of the role of human capital in fuelling economic growth and convergence in GDP per capita across the EU Member States.

Chapter 4 delves deeper into several aspects of human capital mobility and the circulation of human capital in terms of inflows and outflows of skilled graduates in the Member States. An exercise is conducted to calculate the economic loss resulting from the migration of these graduates for six Member States.

Chapter 5 describes policies addressing brain drain and brain gain. It presents five case studies in which national and local policies have been deployed to attract talent (in Ireland and the Netherlands) or to retain talent (in Italy, Lithuania and Portugal). Similar policies and best practices are then suggested to provide a better picture of the underlying mechanisms that mediate the brain gain and brain drain phenomena.

The conclusions chapter weaves together the findings from the previous chapters and suggests that convergence may be hindered if human capital imbalances are not addressed.

1 Human capital indicators

This chapter describes the indicators selected to analyse the convergence of EU Member States in respect of human capital. For each of the human capital phases – creation, utilisation in the labour market and mobility – a selection of indicators supports the analysis. The selection criteria are:

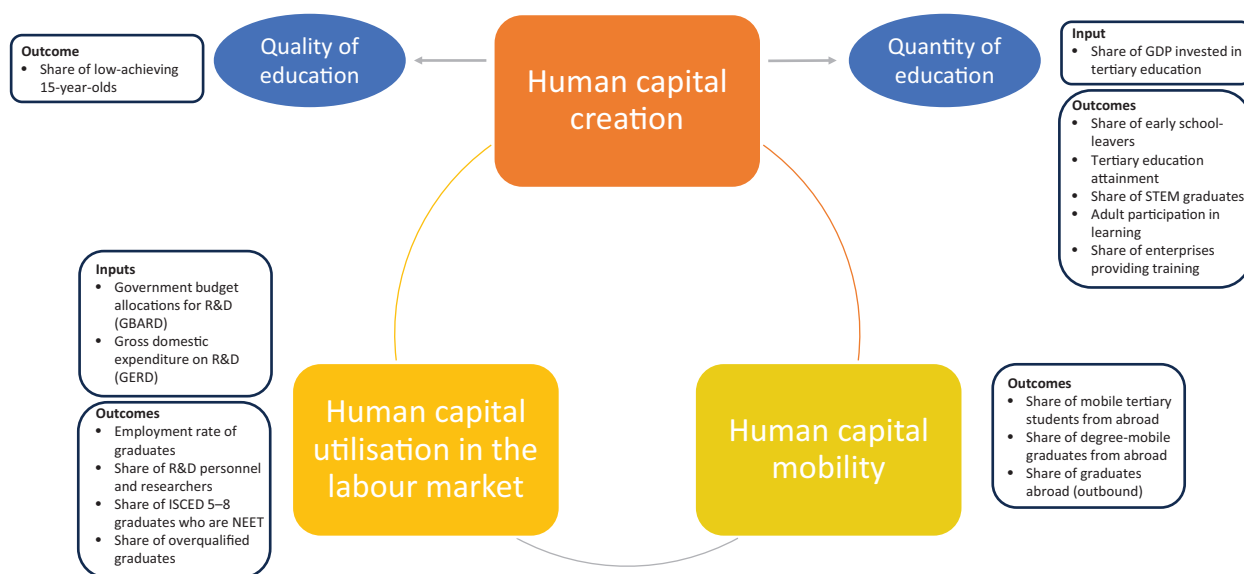
- the indicator is either an input or an outcome
- the indicator is linked to human capital in one of the three phases
- the indicator is or can be considered a proxy for an EU policy target

Convergence analysis requires several years of data to be computed, so indicators with a limited time span have not been included. Figure 1 displays the three phases of human capital and the selected indicators. The sections that follow describe the indicators, providing the rationale for the choice of each. A summary table (Table 1) is available at the end of the chapter.

Indicators of human capital creation

The importance of the education system for the prosperity of a country has long been established. Quantity and quality of education are fundamentally linked to working and living standards. In the EU, the European Education Area initiative aims to foster an inclusive learning environment for all stages of learning and, while progress has been made in most areas, adult learning and quality of education for 15-year-olds still need improvements (European Commission, undated-a). For this reason, the EU has set several educational targets, such as 45% of 25- to 34-year-olds completing tertiary education by 2030 (Council of the European Union, 2021).²

Figure 1: Human capital indicators in three phases – creation, labour market utilisation and mobility



Source: Authors

² The focus of this report is on convergence in tertiary education, so earlier education – early childhood, primary school and secondary school outputs – are outside its scope. Previous Eurofound work has already looked at convergence in early childhood education.

Quality of education

The latest studies on education show that quantity of education – measured in years of schooling – should not be the only measure of the success of an education system. Quality of education has taken centre stage, and the scores in literacy, numeracy and digital skills, as measured in the OECD Programme for International Student Assessment (PISA) and Programme for the International Assessment of Adult Competencies (PIAAC) surveys, are used to compare quality of education at international level. Glawe and Mendez (2022) focused on both education quantity and education quality and found that education quality, based on the international rankings of the PISA survey, is increasingly more important in determining convergence in the EU27 than quantity. They identify four convergence ‘clubs’ that point to an east–west disparity (with the exception of Estonia and Poland, which reformed their education systems). A north–south divide was not found as countries that usually perform poorly in economic terms are placed in the first or second club for quality of education (Italy, Portugal and Spain).

Outcomes

Share of low-achieving 15-year-olds

The indicator used for the convergence analysis measures the share of 15-year-old students failing to reach level 2 (‘basic skills level’) on the PISA scale for the three core school subjects of reading, mathematics and science.³ This indicator is closely monitored as part of the EU Youth Strategy, which set a target to reduce the share of low achievers to less than 15% by 2020. Although this indicator measures secondary school performance, a share of the students will later access higher education, impacting quality – similarly to how the share of early school-leavers might impact the quantity of students reaching top education levels.

When looking at human capital, it is also important to take into consideration skills among the adult population, since human capital does not stop accumulating when formal education ends (Schultz, 1961); in fact, if not nurtured, skills can deteriorate over time. The PIAAC survey measures literacy, numeracy and problem-solving in technology-rich environments for the adult population, aged 16 to 65 years. The results are due at the end of 2024; it will be important to include those values in future convergence analysis of human capital to understand if and where education and age gaps have reduced.

Quantity of education

More indicators are available for quantity of education than for quality of education. These indicators focus on the formal creation of human capital – that is, through school and university attendance and its financing – which can also be defined as the schooling system output. Based on the literature and on data availability, one input and five outcome indicators were selected.

Input

Share of GDP invested in tertiary education

The share of GDP invested in tertiary education is the one input indicator analysed for human capital creation, and it allows the different expenditures by Member States to be compared. The indicator measures public expenditure on tertiary education as a percentage of GDP. Tertiary education refers to ISCED levels 5–8, encompassing short-cycle bachelor’s degrees, first-cycle bachelor’s degrees, master’s degrees and doctoral degrees.⁴ The main source of data is the joint Unesco Institute for Statistics/OECD/Eurostat questionnaires on education statistics. Data for the indicator are available for 2012–2020. Although the European Education Area supports larger investments in education, a well-defined policy target is not set (European Commission, 2023b).

The level of investment by governments in education is a clear indication of the importance given to the sector. Across Europe, higher education expenditure and higher international ranking have been found to predict higher inflows of students into tertiary education, mostly directed towards British and German universities (Van Bouwel and Veugelers, 2013). Interestingly, Czechia and Hungary were found to be educational hubs for eastern European students, thus signalling the importance of proximity to one’s home country (Kondakci, 2010).

Outcomes

Share of early school-leavers

Early school-leavers are an important indication of early interruptions in the education pipeline. This indicator measures the share of the population aged 18–24 with lower secondary education at most who were not involved in any education or training during the four weeks preceding the survey. The share of early school-leavers is one of the main indicators in the Social Scoreboard of the European Pillar of Social Rights. This indicator is included in the European Union Labour Force Survey (EU-LFS) to monitor the development of quality education and gender equality

³ Data are available from 2000, but the analysis starts in 2006 due to missing values in the previous two waves. Due to the COVID-19 pandemic, the 2022 wave was carried out four years after the previous one, in 2018.

⁴ ISCED levels break down as follows: ISCED levels 0–2 refer to early childhood education, primary education and lower secondary education; ISCED levels 3 and 4 refer to upper secondary education and post-secondary non-tertiary education; and ISCED levels 5–8 refer to all tertiary degrees.

in the EU. The indicator is also used to monitor progress towards Sustainable Development Goals (SDGs) 4 and 5, on ensuring access to equitable and quality education through all stages of life. The EU Youth Strategy has set an EU-level target of less than 9% of pupils leaving school early by 2030.

Tertiary education attainment

For tertiary attainment, the policy target set by the EU is to reach a share of at least 45% of 25- to 34-year-olds attaining tertiary education by 2030 (Council of the European Union, 2021). The indicator measures the share of the population aged 25–34 who have successfully completed tertiary studies (at, for example, a university or higher technical institution). The levels of educational attainment included are ISCED levels 5–8, and the data source is the EU-LFS. This indicator is also part of SDG 4, and it features as a secondary indicator in the Social Scoreboard. The total share of graduates in a country, in line with lifelong learning considerations discussed earlier, is also an important indicator; therefore, the share of graduates aged 15–64 is analysed too.

Share of STEM graduates

Increasing the number of STEM graduates is at the heart of the European Skills Agenda, which aims to equip 70% of adults aged 16–74 with basic digital skills by 2025 (European Commission, undated-b). The indicator measures the share of STEM graduates out of all graduates in the country. The main source of data is the joint Unesco Institute for Statistics/OECD/Eurostat questionnaires on education statistics.

Adult participation in learning

Learning does not stop at graduation, so the list of indicators includes one that measures adult participation in learning. The policy goal is to ensure lifelong learning and higher education and training fit for the green and digital transition. The selected indicator measures the share of people aged 25–64 who stated that they received formal or non-formal education and training in the four weeks preceding the EU-LFS survey out of the total population of that age group. It features as a secondary indicator in the Social Scoreboard, and the associated target is to have 60% of all adults participating in adult learning yearly by 2030 (European Commission, undated-c).

Share of enterprises providing training

Eurostat defines continuing vocational training as ‘training measures or activities which have as their primary objectives the acquisition of new competences and improvement of existing ones.’ Although on-the-job vocational training is included in the survey question of the adult participation learning indicator presented

above, when considered on its own it gives a picture of the type of human capital creation taking place in companies. Furthermore, individuals value on-the-job training, so it can be a way for enterprises to attract workers. The indicator measures whether a company offered one or more continuous vocational training courses during the reference year.

Indicators of human capital utilisation in the labour market

These indicators describe how human capital is utilised, for instance by measuring the employment rate of graduates. To capture competitiveness, innovation inputs and outputs such as public investment in and gross expenditure on research and development (R&D) and the share of R&D researchers are also included in this section. Similarly, the underutilisation of human capital is reflected by the NEET rate among graduates and level of overqualification for jobs. Regional breakdowns are also investigated for some indicators to better identify struggling areas.

Inputs

Government budget allocations for R&D

Government budget allocations for R&D (GBARD) covers all the allocations distributed to R&D by central (federal) government, regional (state) and local (municipal) government. The indicator represents a funder-based approach to measuring R&D. GBARD includes both current costs and capital expenditure. It captures government-financed R&D performed both by government establishments and by business enterprises, private non-profit sectors and higher education sectors, and includes territories outside the EU. The data cover all public budget spending related to R&D and are linked to governmental policy issues through a classification by objectives or goals.

Gross domestic expenditure on R&D

R&D comprises 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 (OECD, 2015). The statistical units used to compile R&D statistics are enterprises for the business enterprise sector and institutional units for the governmental sector, the higher education sector and the private non-profit sector. Gross domestic expenditure on R&D (GERD) differs from GBARD in that it uses a performer-based approach. Targets for R&D expenditure were set in 2002 by the Barcelona European Council and confirmed in the Europe 2020 Strategy. The target of 3% of GDP was re-affirmed for 2030 (European Commission, 2021).

Outcomes

Employment rate of ISCED 5–8 graduates

The employment rate is one of the key performance indicators of the European Pillar of Social Rights. The overall employment rate target for 2030 is set at 78% for all workers aged 20–64 (European Commission, 2021).

Share of R&D personnel and researchers

This indicator captures the share of R&D personnel and researchers in the total active population. It includes all people engaged directly in R&D, whether employees or external contributors fully integrated into R&D activities, as well as those providing direct services. The analysis focuses on the subcategory of researchers who are ‘professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned’ (OECD, 2015, p. 162).

Share of ISCED 5–8 graduates who are NEET

The NEET indicator measures the share of the population aged 15–29 who are not employed and have not received any education or training (formal or non-formal) in the four weeks before being surveyed. It is used to monitor progress towards SDG 8, on decent work and economic growth, and is a headline indicator of the European Pillar of Social Rights, with a target to lower the rate below 9% by 2030. For the convergence analysis, the indicator is further broken down into the respondents’ educational attainment, for which only ISCED 5–8 graduates are considered. The aim is to glean the extent to which the top tier of human capital is underutilised in the labour market. The data for this indicator are available for 2007–2022.

Share of overqualified graduates

The indicator measuring the share of overqualified graduates is derived from the EU-LFS and matches the ISCED education level of respondents with the International Standard Classification of Occupations (ISCO). ISCED 5–8 is matched with ISCO 4–9, representing the jobs for which tertiary education is not required. The denominator is all respondents who indicated that they have an ISCED 5–8 qualification and are employed. Data are available for 2008, 2014 and 2021 (ad hoc EU-LFS modules), which means detailed patterns cannot be deciphered. Ireland is not included in the analysis because of unreliably high values.

Although not explicitly translated into a policy target, reducing overqualification and skills mismatch is a core objective of the European Education Area and a key element of improving digital skills (European Commission, 2023c).

Indicators of human capital mobility

Human capital mobility can be captured, for education purposes, by the share of students and mobile graduates that EU Member States are able to attract to their shores. The attractiveness of a country for living and working can be measured by the inflow and outflow of graduates living and working in the country. Three outcome indicators have been selected to capture human capital mobility.

Outcomes

Share of mobile tertiary students from abroad

International education significantly increases an individual’s human capital, allowing for faster and better employment both in the host country and in the home country. Moreover, students are exposed to different languages and cultures, fulfilling the need for adventure and the need to challenge themselves. Tertiary students are ‘mobile’ if they have completed secondary education somewhere other than the EU Member State where they are studying. This indicator measures the share of mobile tertiary students from abroad as a percentage of all the enrolled upper secondary graduates in the host country each year. The standards on international statistics on education and training systems are set by the three international organisations jointly administering the annual Unesco Institute for Statistics/OECD/Eurostat data collection.

Share of degree-mobile graduates from abroad

This indicator measures the share of mobile graduates from abroad as a percentage of all graduates in the host country each year. Graduates are ‘degree mobile’ if they are from abroad and are enrolled as a standard student with the intention of graduating from a course or studies in the destination country. Several funds are available to students to move abroad to study, such as the Erasmus+ programme, to broaden their education and improve their competitive advantage. The EU-wide programme, which fosters mobility and cooperation opportunities in several education areas, reported that a total of 372,000 students moved abroad under the programme in 2022 (OECD, 2023b).

Share of graduates abroad (outbound)

This indicator, measuring the share of graduates abroad as a percentage of graduates with the same country of citizenship, is the combination of two Eurostat indicators. It calculates the percentage of EU citizens of working age (15–64 years) holding an ISCED 5–8 qualification residing in another EU Member State based on the country population with the same citizenship and of the same age cohort also with an ISCED 5–8 education. Therefore, the indicator measures

the share of national graduates aged 15–64 years who moved abroad compared with the overall population of graduates in that country.⁵ The data come from the EU-LFS and are available for 2007–2022.

Overview of selected indicators

Table 1 lists the indicators described in this chapter, arranged by phase – creation, utilisation and mobility. For each, it indicates the current policy target (as of April 2024) and the latest recorded score.

Table 1: List of indicators, policy targets and latest scores

Indicator	Policy target	Most recent EU average (unweighted)
Human capital creation		
Quality of education		
Share of low-achieving 15-year-olds	Less than 15% (2020)	27.7% (2022)
Quantity of education		
Share of GDP invested in tertiary education	No fixed EU target	4.8% (2022)
Share of early school-leavers	Less than 9% (2030)	8.1% (2022)
Tertiary education attainment	At least 45% (2030)	44.8% (2022)
Share of STEM graduates	No fixed EU target	25.7% (2021)
Adult participation in learning	At least 60% (2030)	13.7% (2022)
Share of enterprises providing training	No fixed EU target	64.6% (2020)
Human capital utilisation in the labour market		
GBARD	At least 3% (2020)	1.2% (2022)
GERD	At least 3%	1.7% (2022)
Employment rate of ISCED 5–8 graduates	At least 78% (2030)*	86.9% (2022)
Share of R&D personnel and researchers	No fixed EU target	1.0% (2022)
Share of ISCED 5–8 graduates who are NEET	Less than 9% (2030)**	7.9% (2022)
Share of overqualified graduates	No fixed EU target	21.7% (2021)
Human capital mobility		
Share of mobile tertiary students from abroad	No fixed EU target	4.8% (2021)
Share of degree-mobile graduates from abroad	No fixed EU target	3.5% (2021)
Share of graduates abroad (outbound)	No fixed EU target	5.3% (2022)

* This target is for the overall employed population; it does not distinguish by ISCED level. ** This target is for the overall NEET population; it does not distinguish by ISCED level.

Source: Eurofound

⁵ In some countries, a tertiary education qualification can be reached at the age of 19, so the age range selected is 15–64.

2 Convergence of human capital in the EU

Measures and definitions

Human capital and economic convergence

While several economic models highlight the pivotal role of human capital in driving growth – both in neoclassical growth theory (for example, Mankiw et al, 1992) and in endogenous growth theory (for example, Lucas, 1988) – only a handful of studies have empirically explored the importance of growth determinants for economic growth and income convergence in the EU (Beyaert et al, 2019; Glawe and Wagner, 2021; Glawe and Mendez, 2022). One of the most significant determinants is human capital. In a recent study, convergence in human capital was found to significantly speed up convergence in income per capita across countries (Castelló-Climent and Domenech, 2022). The analysis found that human capital may have been a determinant of the convergence and speed of convergence in income per capita, while institutional convergence seemed to play a negligible part.

Intuitively, strengthening human capital endowment by investing in education fosters regional and local economic development; this proves true for Member States and their regions in the beta-convergence conditional model described later in this chapter. In regions with high levels of human capital, people have better chances of being employed in higher-paid jobs or undertaking entrepreneurial trajectories (Crescenzi and Rodríguez-Pose, 2011; Rodríguez-Pose and Comptour, 2012; Anelli et al, 2023). Knowledge and skills fuel innovation and entrepreneurship, which are key factors in determining economic growth and convergence (Barro, 2001; Aghion et al, 2005; Lucas, 2009). Well-educated and skilled individuals are more likely to engage in entrepreneurial activities, start businesses, and contribute to the development of new technologies and industries. Fostering an environment that encourages innovation and entrepreneurship through human capital development enhances the EU's competitiveness, creates high-quality jobs and drives convergence among the Member States. Convergence is also fostered through access to quality education and lifelong learning and training options that provide equal opportunities for individuals from all socioeconomic backgrounds. When individuals can develop their potential and feel included, inequalities are reduced and the sense of identity and belonging within the EU is strengthened, promoting social cohesion.

Measuring upward convergence

Upward convergence has always been an EU aspiration; the implied hope of the Treaty of Rome (1957) was that social convergence would follow economic harmonisation and growth. The concept of upward convergence was consolidated in 2017 and centred around the European Pillar of Social Rights (Eurofound, 2021). Upward convergence combines two concepts: improving performance and reducing disparities.

Improving performance refers to Member States progressing in a desired policy direction (for instance, increasing employment rates or decreasing the numbers of early school-leavers). Performance is generally measured by means of averages. Within the framework of convergence, the EU average is measured as the unweighted average of the Member States. An improvement in performance towards a policy target is referred to as an upward trend (this means, for instance, that a decreasing rate of young people who are NEET would be an upward trend, as this is considered an improvement in performance). The opposite is a downward trend, which signals worsening performance (such as an increasing NEET rate).

Reducing disparities refers to convergence of Member States. The opposite is divergence – that is, an increase in disparities. For example, if two Member States' employment rates become more similar, they are said to have converged with regard to their employment rate. By the same logic, if the difference between Member States' performance has increased, they have diverged.

Based on the two concepts, three more scenarios can be observed in addition to upward convergence. Downward convergence occurs when performance worsens and disparities decrease. Upward divergence happens when performance improves and disparities increase. Finally, worsening performance and increasing disparities characterise downward divergence.

Convergence is measured in three ways in this report: beta-, sigma- and delta-convergence. Each of these measures presents a slightly different perspective on convergence, which can give a more comprehensive picture of the convergence process. The methodology behind each measure is explained next.

Beta-convergence

Beta-convergence is a process by which the poorest performers develop faster than the leading performers and therefore catch up with them. It is linked to the empirical definition of convergence postulated by growth models (Sala-i-Martin, 1996) and is used to measure whether regions starting with poor performance develop faster than high-performing regions. Absolute (or unconditional) beta-convergence is estimated with the following regression model:

$$\Delta \ln y_{i,t} = \alpha + \beta \ln(y_{i,t-1}) + \varepsilon_{i,t}$$

where $y_{i,t}$ is the value of indicator y in country i at time t ; Δ is the growth rate of indicator y in country i at time t ; α and β are the parameters to be estimated; and $\varepsilon_{i,t}$ is the error term. This equation analyses the relationship between the growth of an indicator over a certain period and its initial value. Beta-convergence exists if the relationship is statistically significant and negative; therefore, countries in which the initial level is higher see a slower pace of growth. The magnitude of parameter β indicates the speed of the convergence process.

This chapter also includes the analysis of ‘conditional’ beta-convergence. Conditional beta-convergence models analyse the relationship between the growth of an indicator over a certain period and its initial value, while controlling for certain explanatory factors. It differs from absolute beta-convergence in that it implies that countries tend to reach their own steady state instead of a common one. The regression model for conditional beta-convergence is as follows:

$$\Delta \ln y_{i,t} = \alpha + \beta \ln(y_{i,t-1}) + \lambda(\ln(z_{i,t})) + \varepsilon_{i,t}$$

It includes $z_{i,t}$, which is a vector of explanatory factors.

A compromise between conditional and unconditional beta-convergence is the convergence clubs hypothesis. The hypothesis states that regions or countries with similar initial conditions will converge to have similar growth trajectories. With this approach, countries with similar levels in a set of covariates, such as educational attainment, employment rate or other measurable factors, are classified into clusters (the ‘clubs’).

Sigma-convergence

Sigma-convergence is characterised by an overall reduction in disparities among countries or regions over time. In this report, it is measured by the standard deviation and the coefficient of variation. The standard deviation is a measure of the dispersion of a set of data values. A low standard deviation for an indicator indicates that the values recorded by Member States are close to the EU mean, while a high standard deviation indicates that they are spread out over a wider range. To have sigma-convergence, the standard deviation needs to have decreased. The coefficient of variation is a standardised measure of dispersion. It is defined as the ratio of the standard deviation to the mean and is often expressed as a percentage:

$$CV_t = \frac{\sigma_t}{\mu_t}$$

where $\sigma_t = \sqrt{\frac{\sum_{i=1}^n (x_{i,t} - \mu_t)^2}{N}}$ and $\mu_t = \frac{1}{N} \sum_{i=1}^n x_{i,t}$

Delta-convergence

The term delta-convergence was coined by Heichel et al (2005) to describe the analysis of countries’ distance from an exemplary model, for example the best performer or a set of best performers. Delta-convergence is measured through the sum of the distances between values for the top performers and the other countries:

$$\delta_{i,t} = \sum_{i=1}^N (MAX(x_{i,t}) - x_{i,t})$$

where $\delta_{i,t}$ is delta-convergence and $x_{i,t}$ is the value of indicator x in country i at time t . A reduction in the distance from the frontrunner over time implies convergence. If the sum of the distances decreases over time, delta-convergence can be identified, while an increase in the sum of the distances means that countries are diverging. Delta-convergence is a measure of how similar countries or other units are becoming to the top performer. While the presence of outliers can skew the data, it is a good quantitative measure of whether convergence towards a certain policy target has occurred.

Box 1: Convergence in brief

There are two aspects to convergence analysis: performance and convergence.

Performance concerns the improvement of an indicator in the direction of a desired policy target, for example reducing unemployment rates. If performance improves, we talk of an upward trend. If performance worsens, we talk of a downward trend.

Convergence is observed when there is a reduction in disparities. It is measured in one of the following three ways.

- **Beta-convergence** measures whether the worst-performing countries improve faster than the best-performing ones. This can be described as a catching-up process. However, when the worst-performing countries improve more slowly than the best-performing ones, it implies divergence.
- **Sigma-convergence** entails a reduction in disparities among countries, measured by the standard deviation or the coefficient of variation. If the two measures of disparity decrease over time and differences among Member States become smaller, it signifies convergence. An increase in disparities therefore signals divergence. Sigma-convergence is a precondition for beta, but the reverse is not true.
- **Delta-convergence** measures the distance of countries from the best performer(s). It is measured as the sum of the distances between the values for these countries. A reduction in distance signals convergence, whereas an increase shows divergence.

Convergence methodology compares the performance of countries, and for this reason the unweighted average (that is, not weighted to the population of Member States) of indicators is reported when describing the results of the convergence analyses.

The following sections present a convergence analysis of the indicators described in Chapter 1.

Convergence in human capital creation

Quality of education

Outcome

Share of low-achieving 15-year-olds

Over 2006–2022, the share of low-achieving 15-year-olds in the EU increased, with the largest increment between 2018 and 2022. Disparities among Member States decreased between 2015 and 2018, before returning to initial levels in 2022. Boys performed worse than girls, although a similar deterioration in scores was seen among both groups in 2022.

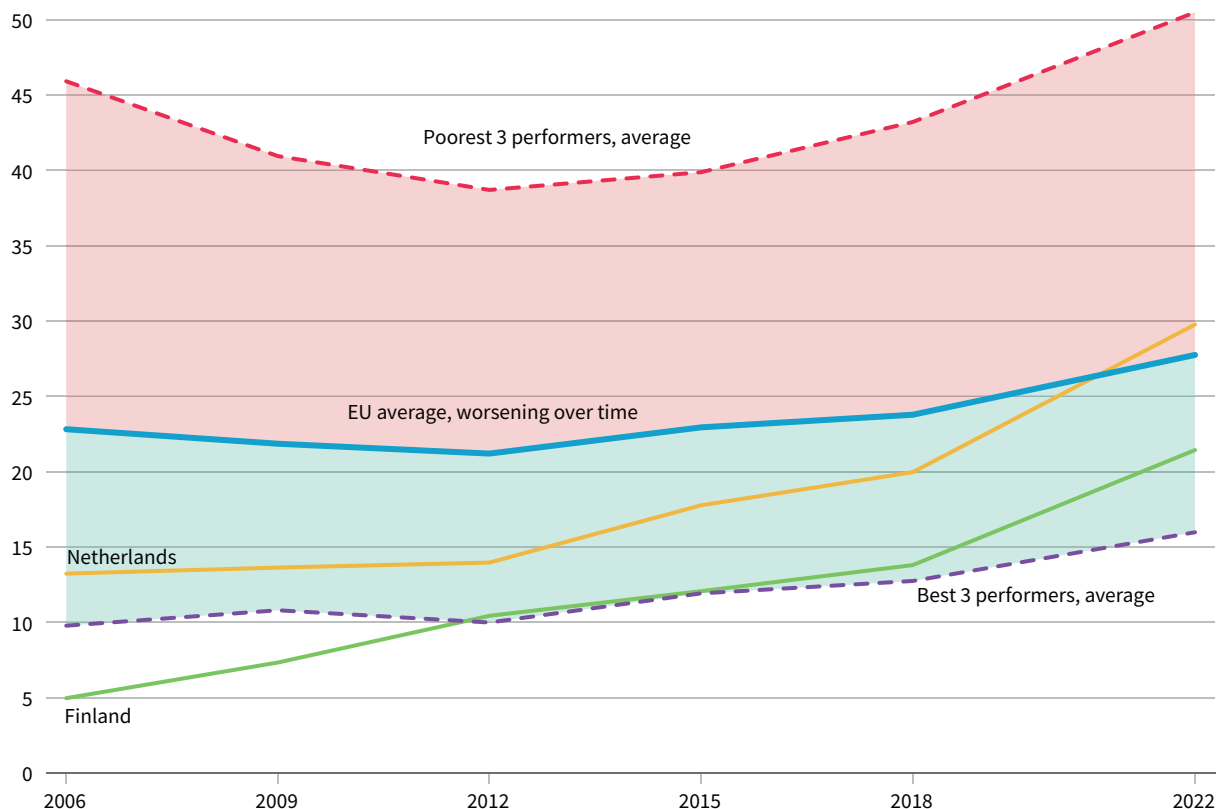
In the 2022 PISA round, the average scores for reading, mathematics and science declined by approximately 2 percentage points each. And the Member States' ranking shifted – in particular, Finland lost its position among the top-performing countries, with an increase in the share of low-performing students of almost 8 percentage points in the combined score, from 13.8% in 2018 to 21.4% in 2022 (Figure 2). Germany, the Netherlands and Poland registered a drop of 25 score points or more in mathematics between 2018 and 2022 (OECD, 2023b). The lowest shares of poor-performing students (combined scores) were found in Estonia (13.0%), Ireland (15.5%) and Denmark (19.6%).

Cyprus (55.2%), Bulgaria (51.5%), Romania (44.8%) and Greece (40.7%) all reported more than 40% of students with low scores, a worsening average compared with 2015 and 2018. Among the high achievers, boys performed better than girls in the three dimensions (European Commission, 2024b), but the gaps are much smaller than those between students with different socioeconomic backgrounds, with a disadvantaged background being a strong predictor of low performance.

The unweighted EU average of low-achieving 15-year-olds increased by 4.9 percentage points between 2006 and 2022, peaking at 27.7% in 2022 (Figure 2). The largest drop in performance occurred between 2018 and 2022 (+4.0 percentage points). Although scores were already deteriorating in 2018, the COVID-19 pandemic affected schooling quality for a considerable number of students. In fact, the four countries that improved their performance (Italy, Malta, Portugal and Romania) reduced their shares of low achievers by 2 percentage points at most, whereas performance fell in all the other Member States. Finland and the Netherlands, two of the best-performing countries in 2006, increased their shares by 16.5 percentage points. Cyprus's performance deteriorated dramatically, and in 2022 one in two students was a low achiever.

Notwithstanding, disparities between the Member States reduced slightly over time, confirming that the impact of the pandemic on education was widespread and affected more than a handful of Member States. Unfortunately, the main reason for convergence is the

Figure 2: Low-achieving 15-year-olds, EU and other averages, 2006–2022 (%)



Notes: The red area indicates the distance of the three poorest-performing countries from the EU average for each year, and the green area indicates the distance of the three best-performing countries. The three scores for reading, mathematics and science were evenly averaged to obtain a single indicator measuring performance.

Source: Eurostat [educ_outc_pisa]; authors' calculations

deterioration in the performance of the best-performing countries rather than improving performance in the poor-performing countries.

The impact of the pandemic did not seem to be uneven by gender. Although male students scored worse than their female counterparts, both were equally affected by the 2022 deterioration in scores.

Quantity of education

Input

Share of GDP invested in tertiary education

During 2012–2022, public expenditure on tertiary education in the EU was largely stable; it dropped slightly in the aftermath of the economic crisis of 2008–2012 but returned to previous levels in 2020. Disparities between the Member States fell until 2019, before increasing slightly in 2020–2022. This was possibly due to the redirection of funds in some countries to support essential services during and after the COVID-19 crisis.

The EU unweighted average for this indicator was quite stable over 2012–2022, at around 4.8–5% of GDP. The Member States spending less were Ireland (3.0%), Romania (3.2%), Italy (4.1%), Greece (4.1%), Slovakia (4.3%) and Bulgaria (4.3%). During 2009–2010, many Member States increased the budget share dedicated to education, probably to strengthen education opportunities after the economic crisis.

The unweighted EU average dropped by almost 0.5 percentage points between 2012 and 2017. It then increased, rising to 4.9% in 2020 and decreasing slightly to 4.8% in 2022. Similarly, disparities fell until 2019 and then increased again in 2020. A likely explanation is that some countries invested more in their education system to strengthen online learning, while others froze or decreased funding, diverting spending elsewhere to better cope with the COVID-19 pandemic. Among the top performers, Sweden (7.1%), Denmark (5.3%) and Belgium (6.3%) led the way in 2022. Their performance remained constant over 2012–2017 and even improved in 2020. Among the poor-performing countries, Romania increased its expenditure by half a percentage point over the period but still remained quite far from the EU average (3.2% in 2022). Greece's public expenditure stayed stable over time, at around 4%.

Ireland and Portugal showed the biggest drop in performance (minus 1.6 percentage points each), followed by Poland (minus 1.1 percentage points). Budget reductions in Poland and Portugal brought these two countries under the 2022 EU average, while the reduction in Ireland makes the country the one with the smallest share of GDP dedicated to education expenditure. A possible reason why public expenditure in Ireland dropped significantly is the growth in private educational institutions (OECD, 2022a). Due to a reduction in the public budget, private universities might take the lead in providing tertiary education, which is more expensive than primary and secondary education. Therefore, most of the economic burden will be on the students and not on the public budget.

In terms of convergence, the beta coefficient is significant, signalling that poor-performing countries have been catching up with the best performers. In 2020–2022, however, this catch-up was due to a decrease in all countries' budgets except for Hungary and Slovakia. There was a small increase in the sum of distances from the frontrunners, hence showing a diverging trend.

Outcomes

Share of early school-leavers

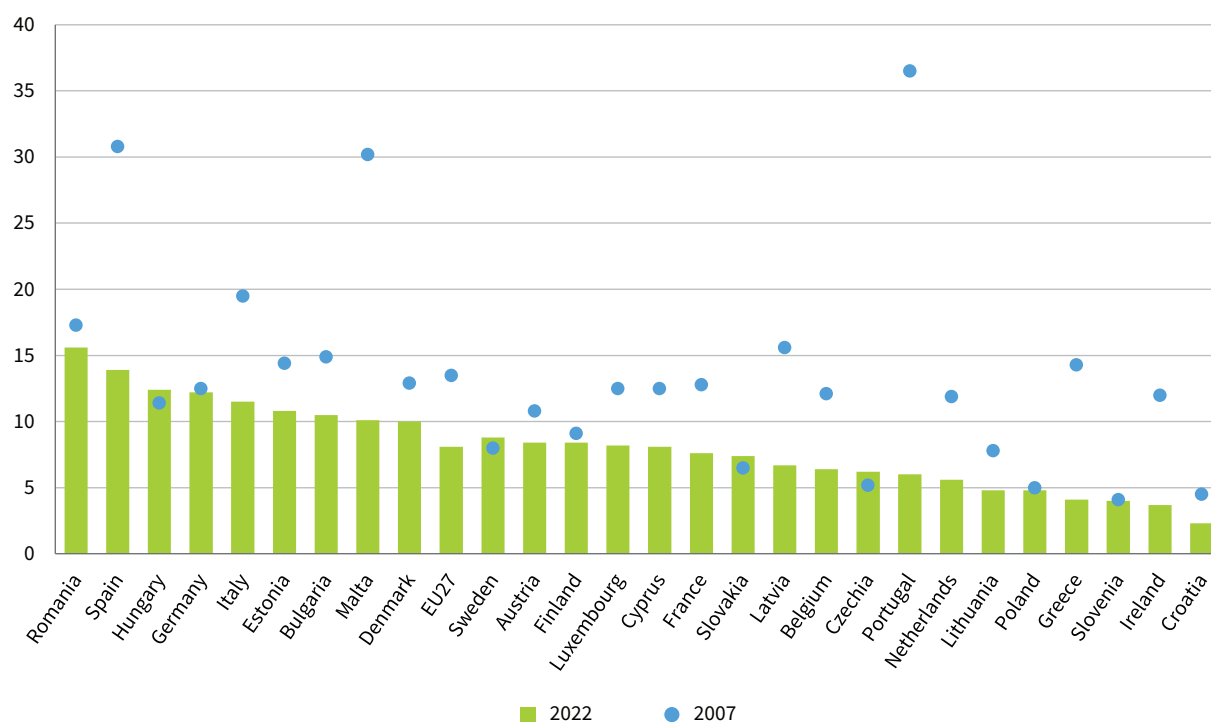
The share of early school-leavers in the EU steadily decreased over 2007–2022. Similarly, disparities among Member States narrowed despite the economic crisis and the COVID-19 crisis.

The lowest share of early school-leavers in 2022 was reported by Croatia (2.3%), followed by Ireland, Slovenia and Greece (all around 4.0%) (Figure 3). Only nine Member States had percentages above the 9% EU policy target: Romania (15.6%); Spain (13.9%); Hungary, Germany and Italy (all around 12.0%); and Estonia, Bulgaria, Malta and Denmark (all 10–11%) (Eurostat, 2023). In 2022, as in the past, the share of boys leaving education early was higher than that of girls (11% and 8%, respectively) (Eurostat, 2024).

The unweighted EU average fell between 2007 and 2022 to reach the lowest value ever recorded at 8.1%. The policy target of less than 9% has been achieved since 2018. Disparities decreased evenly over time, due to the relatively fast improvement in performance of Portugal and Spain, which reduced their shares of early school-leavers by 29% and 17%, respectively. Best-performing countries such as Croatia and Slovenia held their share constant over time, fluctuating between 3% and 6%. The beta coefficient is significant, indicating that poor-performing countries have been catching up with the best performers.

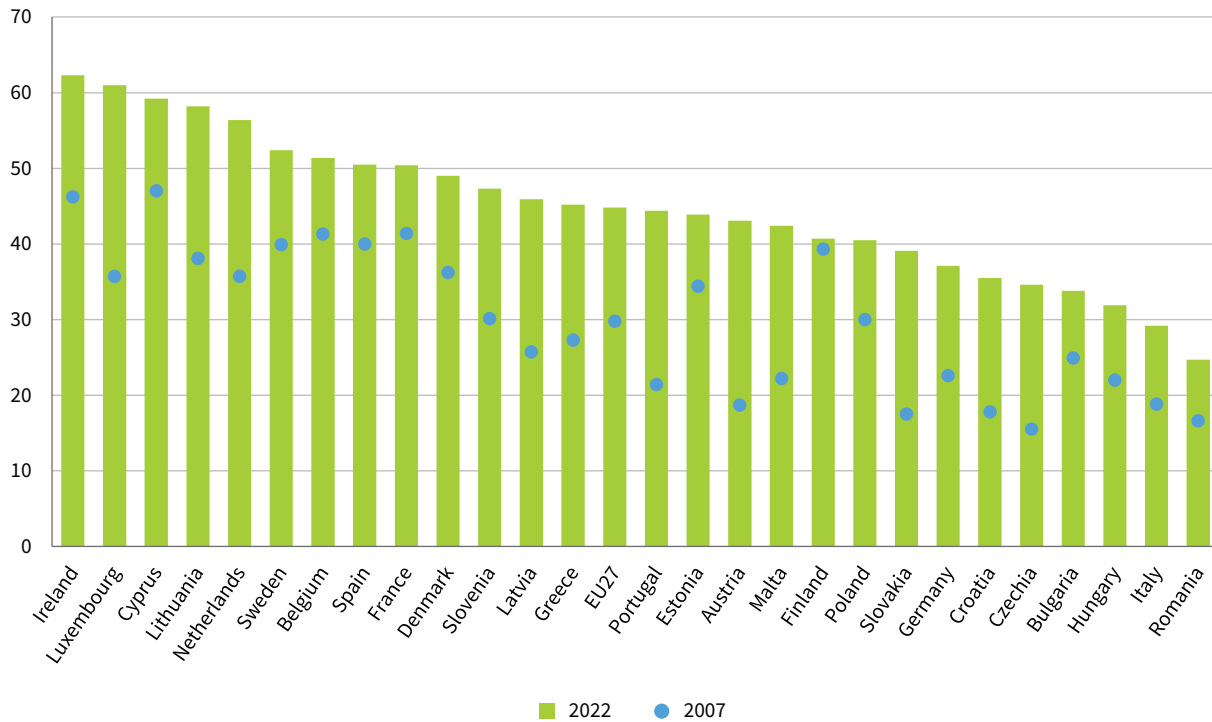
Portugal drastically reduced its share of early school-leavers by adopting several ad hoc policies. The compulsory school age was raised to 18 years, and prevention of school failure was taken seriously by increasing the retention rate. The latter measure was implemented from the bottom up, allowing institutes and local initiatives to deal with the problem as they saw best. Students at higher risk of dropping out were

Figure 3: Average share of early school-leavers, EU and Member States, 2007 and 2022 (%)



Source: Eurostat [sdg_04_10]; authors' calculations

Figure 4: Tertiary education attainment among 25- to 34-year-olds, EU and Member States, 2007 and 2022 (%)



Source: Eurostat [sdg_04_20]; authors' calculations

supported through preventive measures such as positive discrimination, counselling and specific tutorial support. Spain took a similar path and in recent years passed education laws allowing for a better alignment of Spanish degrees to the ISCED and a reshaping of vocational training to facilitate employability (European Commission/EACEA/Eurydice, 2021).

Tertiary education attainment

The share of the population aged 25–34 who have attained tertiary education rose steadily over 2007–2022. All Member States increased their shares, with both the economic crisis and the COVID-19 pandemic having only a limited impact. Disparities across Member States decreased until the pandemic when they increased to the initial levels. Southern and eastern European Member States lagged behind for the whole period. Notwithstanding, there was a significant catching-up process, with the poor-performing countries improving faster than the best-performing ones.

Over 2007–2022, the unweighted EU average for this indicator rose by 14.9 percentage points. In both 2021 and 2022, the policy target of 45% of the EU’s young population attaining tertiary education was almost met, even though country differences persisted. As of 2022, the share of tertiary education attainment was above 45% in 13 Member States, ranging from 45.2% in Greece to 62.3% in Ireland (Figure 4). Five countries – Romania, Italy, Hungary, Bulgaria and Czechia – were still below 35%.

Among the countries that improved the most are Czechia, Portugal and Slovakia, whose performances soared by more than 20 percentage points since 2007. A significant beta coefficient indicates that poor-performing countries are catching up, improving their performance faster than the best-performing ones. This was not sufficient, however, to reduce the disparities between Member States, which remained quite stable over time, despite the rapid improvement in the indicator. Indeed, the sum of the distances from the frontrunners increased, implying delta-divergence. In practice, all Member States improved alongside the EU average; however, after the pandemic, disparities returned to 2007 levels.

As regards gender dynamics, 51.9% of women aged 25–34 years in the EU held a tertiary degree in 2022, reaching the policy target, compared with 38% of men (Figure 5). The top three countries where the gap in attainment between women and men was highest were Slovenia (23.8 percentage points), Slovakia (22.8 percentage points) and Latvia (21.9 percentage points). The smallest difference in share of graduates was in Germany (4.6 percentage points), Ireland (6.2 percentage points), and Romania (7.2 percentage points).

Figure 5: Tertiary educational attainment by gender, EU and Member States, 2022 (%)



Source: Eurostat [sdg_04_20]; authors' calculations

Regional analysis

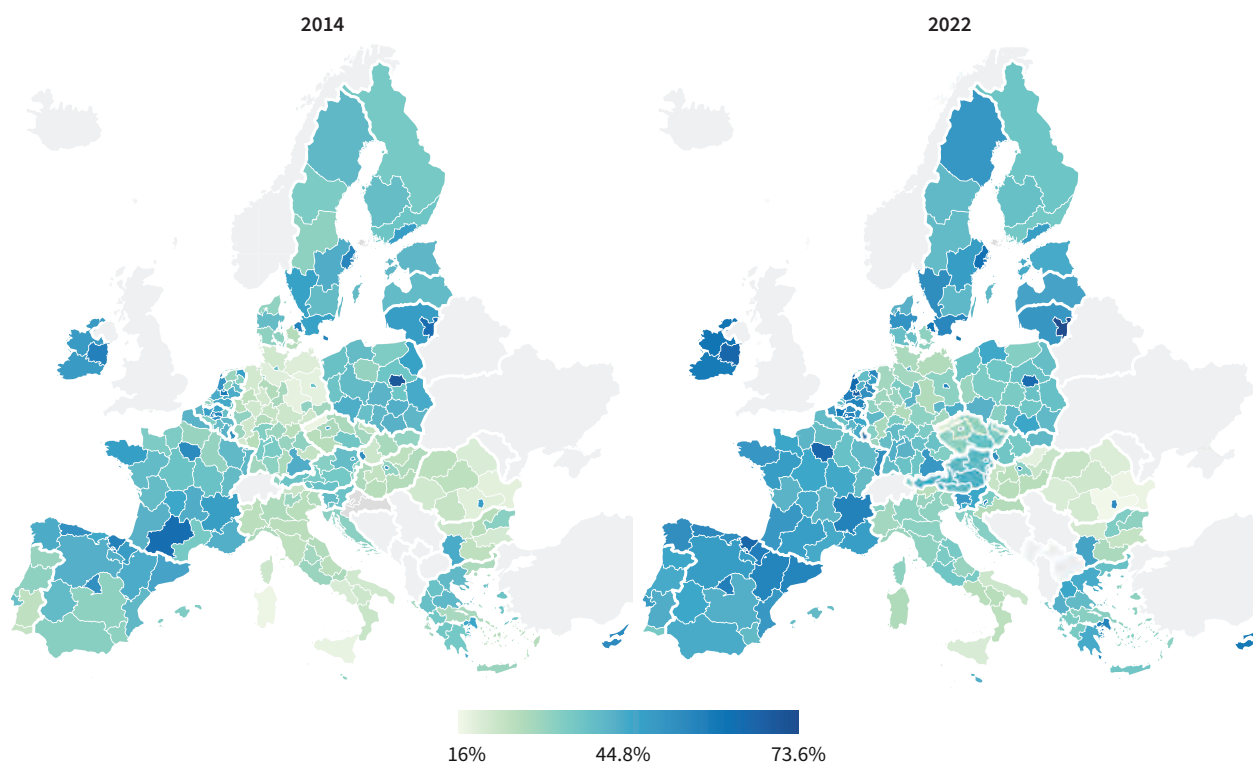
Regional differences are apparent in most Member States. Figure 6 shows the breakdown of performance by region using the Nomenclature of Territorial Units for Statistics (NUTS) level 2 for 2014 and 2022. The south of Italy, Romania (except Bucharest) and the northern regions of Bulgaria have the lowest shares of graduates in the EU. Moreover, northern and eastern German regions saw a slow decline in the share of graduates between 2014 and 2022, while some regions in Poland and the Baltic states improved notably.

Italy struggles to improve its share of young graduates for several reasons. As outlined in a recent OECD report (OECD, 2019), Italian students who graduate from technical and vocational education and training have similar employment prospects to those with tertiary

education. The main fields of tertiary education are the humanities, for which low employment rates are expected, followed by STEM. For this reason, tertiary education does not have high returns compared with other types of short-cycle tertiary and post-secondary education. Moreover, many Italian students migrate to other Member States to achieve better higher education, depressing the home-country statistics (European Commission, 2020).

Portugal has followed a different trajectory. Over time, the country increased its expenditure on tertiary education and facilitated access to higher education (OECD, 2022b). This resulted in an increase in the share of graduates, especially in urban areas such as Lisbon, whereas less urbanised areas such as the Azores and the north of Portugal lag behind.

Figure 6: Share of graduates by EU NUTS 2 regions, 2014 and 2022 (%)



Source: Eurostat [edat_lfse_04]; authors' calculations

Convergence in the share of graduates took place across regions in the whole sample of countries, including between north-western, southern and central eastern European Member States. There is also convergence across regions within countries; except for Austria, Czechia and Hungary, all countries show convergence in tertiary education across their regions.

Share of STEM graduates

Over 2015–2021, the STEM graduates rate in the EU was relatively constant. Performance and disparities varied across Member States, with a few countries improving but performance declining in southern Europe.

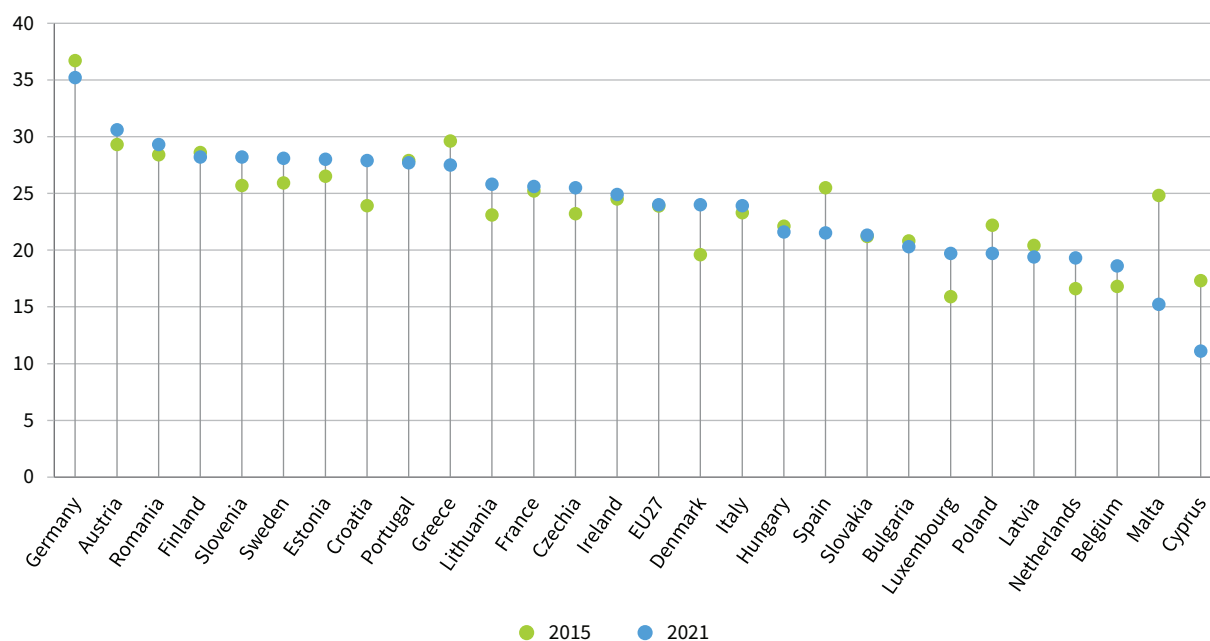
The share of STEM graduates in the EU remained quite stable over the seven years considered in the analysis. In 2021, the figure was 24.0%, up a mere 0.1 percentage points from 2015 (Figure 7). Germany gained the top spot with 35.2%, a distance of 4.6 percentage points from the second position, which was occupied by Austria with 30.6%, followed by Romania (29.3%), Finland (28.2%), Slovenia (28.2%) and Sweden (28.1%) (Figure 7). The Member States with the lowest rates of STEM graduates were Cyprus (11.1%), Malta (15.2%) and Belgium (18.6%). The picture is less rosy when looking at STEM graduates by gender. In all Member States, the share of women graduating in STEM was lower than that

of men, although the women's share has grown since 2015. The EU unweighted average by gender in 2021 was 15.9% for men and 8.1% for women.

There was no convergence in the indicator, with disparities between Member States increasing slightly and rates in poor-performing countries failing to grow faster than in leading countries. The distance of the poor performers from the frontrunners decreased somewhat. The best-performing countries were Germany, Austria, Romania, Slovenia and Finland. Some southern European countries – Spain and Greece – saw decreases in the proportions of STEM graduates, while the performance of Denmark, Austria, Lithuania, Slovenia and Croatia improved.

In the early 2000s, Germany adopted a strategy to increase the percentage of STEM students. It created a STEM education chain involving the government, teachers, students and the social partners. Teachers were trained in STEM subjects (Li, 2022), and policies were geared towards a concrete use of the STEM skills developed at universities, including establishing school laboratories and partnering with companies and foundations (Siemens Stiftung, undated). In recent years, the German government tried to reduce the gender gap and increase interest in STEM among young people. The MINT action plan earmarked €55 million in investments for 2019–2022 (Bundesregierung, 2019). It

Figure 7: STEM graduates, EU and Member States, 2015 and 2021 (%)



Source: Eurostat [educ_uoe_grad03]; authors' calculations

promoted STEM learning among children and young people and offered job opportunities in STEM for women.

Adult participation in learning

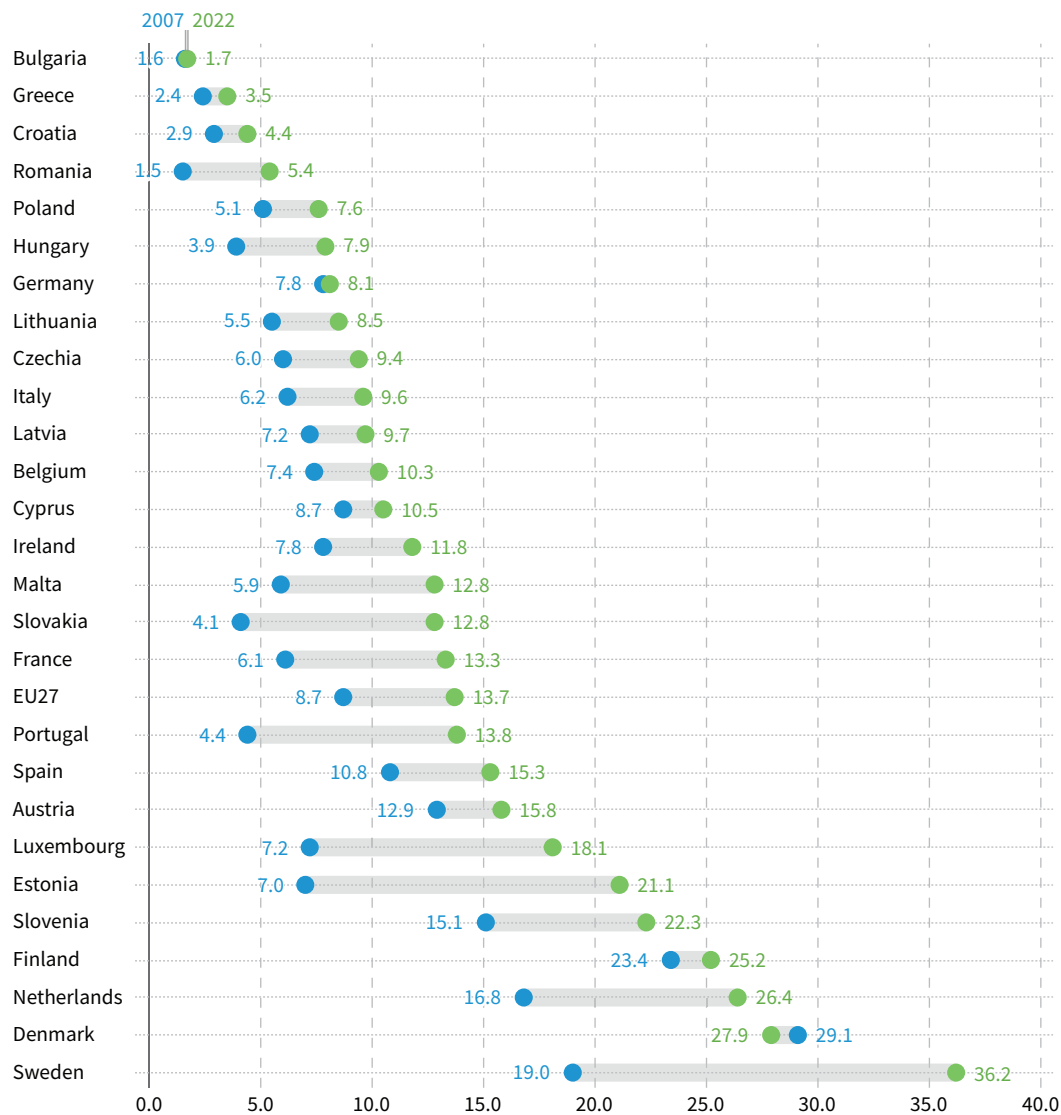
The share of adults participating in learning in the EU increased steadily over 2007–2022. Disparities among Member States also increased, signalling a diverging trend. The performance of the Nordic Member States improved, while eastern European Member States tended to lag behind. There was a notable dip in 2020 due to the COVID-19 pandemic, but performance quickly rebounded the following year.

The unweighted EU average share of adults who participated in education or training in the four weeks prior to being surveyed grew steadily from 2007 and then dipped in 2020; growth resumed in 2021. The overall share increased by 5 percentage points over the period, peaking at 13.7% in 2022 (Figure 8). The top performers were Sweden and Denmark, with around one adult in three attending some education or training in 2022, followed by the Netherlands and Finland, which had participation rates of more than 25%. In comparison, Bulgaria and Greece reported adult learning rates of less than 4%. Within the EU, a higher share of women than men in the adult population participated in learning and training activities in 2022 (Eurostat, 2022a).

Disparities across Member States increased, with an expanding divide between the Nordic and eastern European Member States. Among the countries that improved their performance the most, France tripled its share of adult participation in learning, to then slightly drop at the time of the COVID-19 pandemic. Poor-performing Member States have been catching up with the best-performing ones, however, as demonstrated by a significant beta coefficient.

Sweden has a long tradition of adult learning, which was formally introduced in policy and managed by municipalities in the 1970s. Very similar to the current objectives of national and EU policy, the legislation introduced at that time aimed to reduce educational inequality and establish a well-educated workforce. Municipalities were obliged to provide learning opportunities for adults aged 20 years or older who did not finish secondary school. Over time, policies shifted to focus on those most in need of education and those with a migrant background. France took a similar policy direction after 2010, empowering regions to provide learning activities and vocational training. A small portion of wages were dedicated to lifelong learning; the money was to be retained by employers to offer on-the-job training and other types of education activities.

Figure 8: Adult participation in learning, EU and Member States, 2007 and 2022 (%)



Source: Eurostat [sdg_04_60]; authors' calculations

Share of enterprises providing training

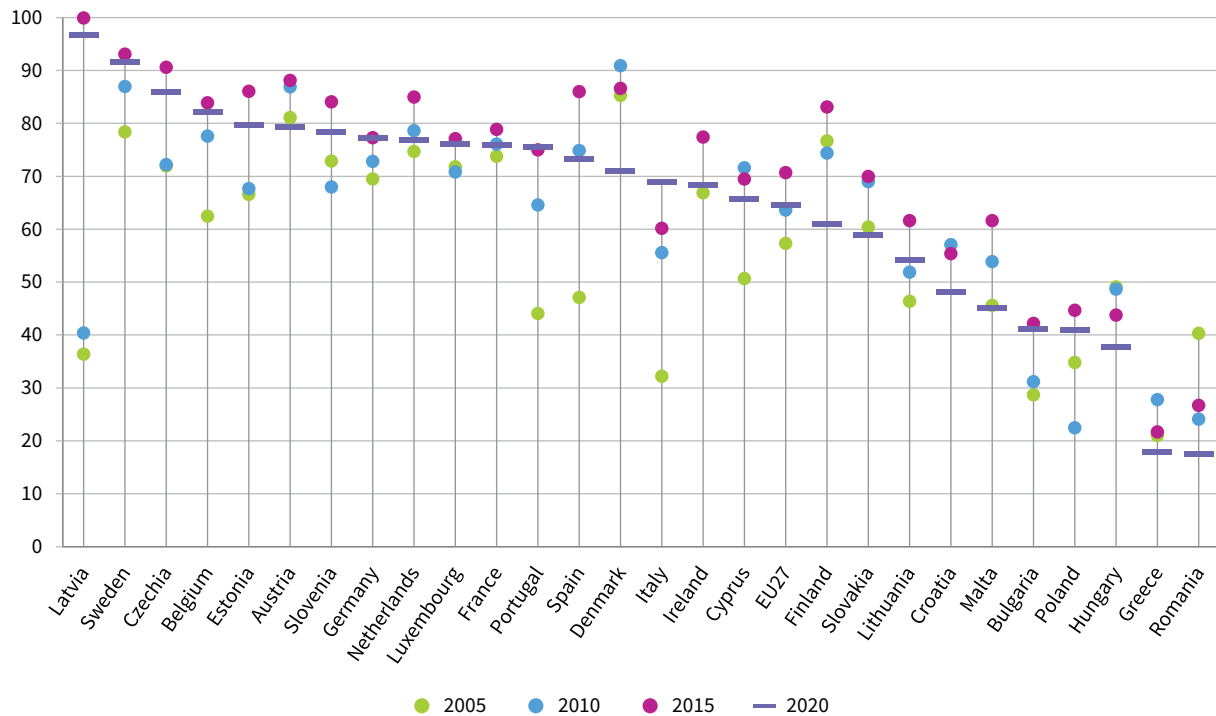
The share of enterprises providing training in the EU grew over 15 years since 2005, but this figure peaked in 2015. Disparities between Member States remained over the period, despite rising shares in the poorest performers.

The EU unweighted average share of enterprises providing training improved from approximately half (57.3%) in 2005 to 64.6% in 2020 (Figure 9). It was higher in 2015 (70.7%), and the subsequent decrease could be attributed to disruption of workplace activities by the COVID-19 pandemic in 2020. In Romania and Greece, less than 20% of enterprises provided on-the-job training, with shares of 17–18%. Hungary also had a low share, at 37.7%, and Poland and Bulgaria were around 40%. Latvia (96.8%) and Sweden (91.5%) had the

highest share of enterprises providing on-the-job training, followed by Czechia (85.9%) and Belgium (82.2%).

There are stark differences among Member States in the share of enterprises providing training. Disparities did not reduce between 2005 and 2020. There was an apparent decrease in disparities between 2015 and 2020, but this is explained by a decrease in all countries in 2020, probably due to the COVID-19 pandemic. There is no visible catching-up of poor performers, although shares in Croatia, Italy, Latvia and Portugal grew by more than 30 percentage points. The shares of enterprises providing training in Denmark, Finland and Romania dropped by more than 10 percentage points; while Denmark and Finland maintained a share of over 60% despite the drop, Romania's share fell to 17.5%. It will be important to revisit this indicator using 2025 data to better contextualise what happened in 2020.

Figure 9: Enterprises providing on-the-job training, EU and Member States, 2005–2020 (%)



Note: Missing data for Croatia (2005) and Ireland (2010). Linear input used.
Source: Eurostat [trng_cvt_01s__custom_10080033]

Convergence in human capital utilisation in the labour market

Once human capital is created by countries through social investments, it is ready to be absorbed by the labour market and to contribute to economic growth and innovation.

The indicators analysed in this section aim to capture the capacity of countries and regions to absorb their stock of graduates in terms of participation in employment and contribution to R&D. This section also seeks to understand the convergence trends in underutilisation of human capital whereby graduates are unemployed or do not find employment in line with their education level (indicating overqualification for their jobs).

Inputs

GBARD

Budget allocation by governments to R&D as a share of GDP remained constant throughout 2007–2022.

Disparities between Member States increased during the economic crisis followed by a swift reduction in its aftermath. There was a significant catch-up of poor-performing Member States.

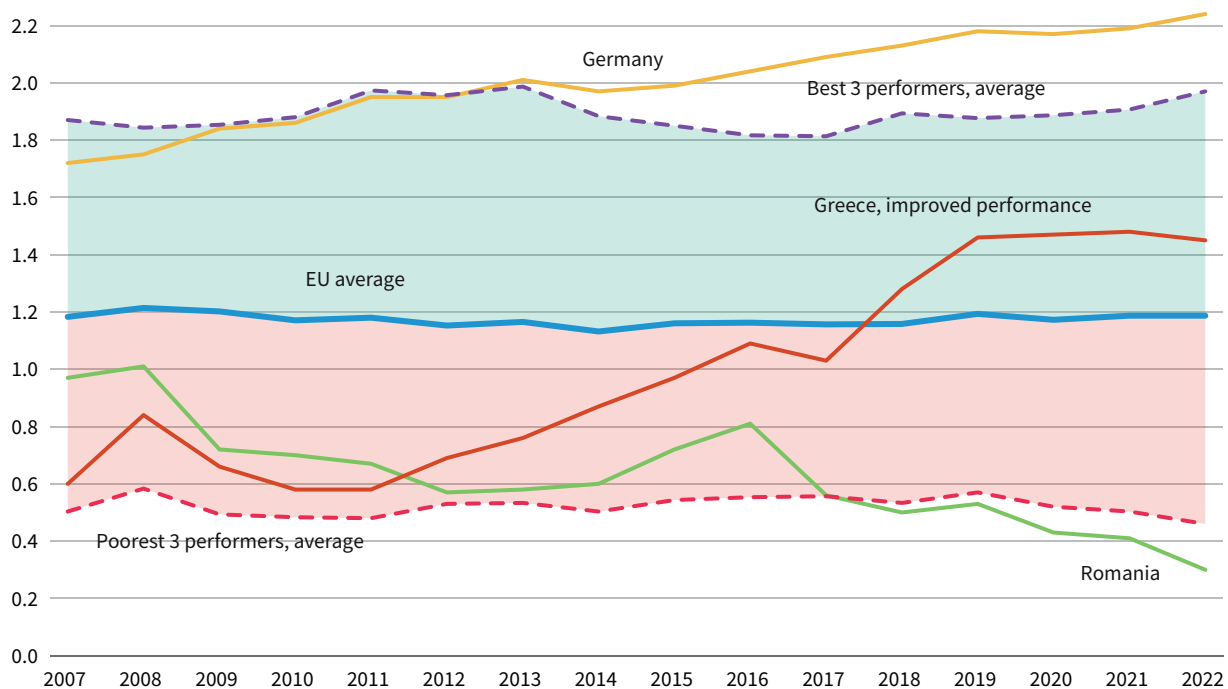
The unweighted EU average share of R&D allocation increased ever so slightly between 2007 and 2022 (+0.004 percentage points) (Figure 10). In 2022, 12 Member States dedicated shares of GDP to R&D equal

to or greater than the EU average of 1.2%: Germany (2.2%), Denmark (1.8%), Estonia (1.8%), the Netherlands (1.8%), Finland (1.7%), Austria (1.6%), Sweden (1.5%), Croatia (1.5%), Greece (1.5%), Czechia (1.3%), Luxembourg (1.3%) and Spain (1.2%). The Member States that allocated the lowest budget shares were Romania (0.3%), Malta (0.5%) and Bulgaria (0.5%).

Among the best-performing countries, Germany and Denmark recorded the most solid improvements, with shares steadily growing during both the economic crisis and the COVID-19 pandemic. While Germany was the frontrunner Member State in 2022, followed by Denmark, Finland, once the best performer in the pre-crisis years, lost almost half a percentage point over the period. Among the poor-performing countries, Latvia and Romania struggled during the economic crisis, both reducing spending by almost half a percentage point, and have not managed to bounce back completely. The recovery was slow for Latvia, while expenditure in Romania dipped again just before the COVID-19 pandemic.

As was the case with other economic indicators, disparities grew during the economic crisis and then reduced until 2022. The COVID-19 pandemic seemed to have impacted all countries equally, leading to a brief downward convergence pattern that reversed in 2021. A significant beta coefficient indicates that poor-performing countries have been catching up with the best-performing ones. This has probably been driven by the exceptional performance of Greece, jumping from

Figure 10: GBARD trends, EU and other averages, 2007–2022 (%)



Note: The red area indicates the distance of the three poorest-performing countries from the EU average for each year, and the green area indicates the distance of the three best-performing countries.

Source: Eurostat [gba_nabste]; authors' calculations

the second worst performer in 2007 to the seventh best in 2022. Finally, the sum of the distances from the frontrunners increased slightly in 2022 after a converging pattern until 2020, showing a diverging trend for delta-convergence.

Germany has a strong R&D policy framework to promote innovation. The country's goal is to spend 3.5% of GDP on R&D by 2025 (Research in Germany, undated). To achieve this, high-tech companies and start-ups are funded alongside the pursuit of higher education policies focused on STEM and the support of applied science universities (*Hochschulen*).

The steady growth of Greece can be attributed to policies implemented since the start of the economic crisis. Greece used mostly public funds (both national and EU) to boost its R&D budget allocation. While private investment is still lacking (Eliamep, 2023), to stimulate it, a 2020 law gives private companies 100% tax relief on their R&D budget, as opposed to the 30% previously in place (OECD, 2021).

GERD

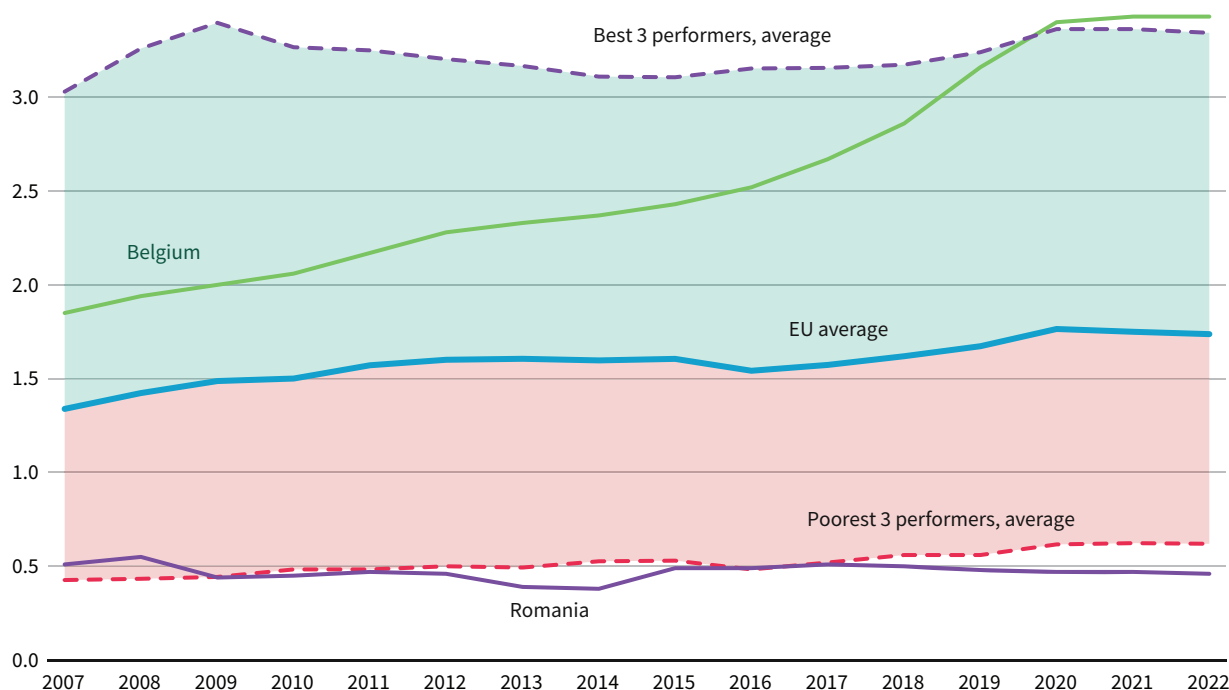
Expenditure on R&D as a share of GDP increased over 2007–2022, even during the years of the economic crisis. Rather than R&D expenditure increasing, it is probable that GDP decreased during those years. Disparities remained stable over time. Nonetheless, a catching-up of poor-performing Member States was evident, and distances from the frontrunners decreased.

In 2022, only four countries had reached the policy target of at least 3% of domestic expenditure directed towards R&D: Belgium (3.4%), Sweden (3.4%), Austria (3.2%) and Germany (3.1%). Eight countries were below 1%: Bulgaria, Cyprus, Ireland, Latvia, Luxembourg, Malta, Romania and Slovakia.

The unweighted average rose to 1.7% in 2022, up 0.4 percentage points from 2007 (Figure 11). Among the best-performing countries, Finland and Sweden spent above the 3% threshold throughout the whole period, with Finland decreasing its share in the aftermath of the economic crisis. In several countries, such as Estonia, Finland and Slovenia, expenditure followed an inverted-U pattern between 2008 and 2013, meaning that the indicator increased notably compared with previous periods. This might have happened because the economic crisis reduced the national GDP, hence the slice dedicated to R&D increased as the pie got smaller. Belgium performed remarkably, almost doubling its share in 15 years, to become the best-performing country in 2021 and 2022. As with government budget allocations for R&D, Greece increased its share of expenditure on R&D (+0.9%), climbing up the ladder considerably. Among the poor-performing countries, Romania and Malta struggled to reach the 1% share, with shares around 0.5% and 0.7%, while Cyprus doubled its share, reaching 0.8% in 2022.

Disparities among Member States remained constant over time, while many countries improved their shares.

Figure 11: GERD trends, EU and other averages, 2007–2022 (%)



Note: The red area indicates the distance of the three poorest-performing countries from the EU average for each year, and the green area indicates the distance of the three best-performing countries.

Source: Eurostat [tipsst10]; authors' calculations

For this reason, there was both a significant catching-up of poor-performing Member States and a reduction in the distance from the frontrunners, showing convergence.

Outcomes

Employment rate of ISCED 5–8 graduates

Member States' performance on this indicator was deeply affected by the economic crisis and, to a smaller extent, by the COVID-19 pandemic. The EU employment rate dropped in most Member States after 2008, to then recover in the aftermath of the economic crisis. A small dip in 2020 was followed by a swift recovery afterwards. Due to the drastic drop in employment in Greece, disparities across Member States had not returned to pre-crisis levels.

In 2022, 23 Member States had reached the EU employment target of 70% among the working age population. Four countries reported an employment rate below 70%: Italy (64%), Greece (66.6%), Romania (68.5%) and Croatia (69.7%) (Eurostat [lfsa_ergan]).

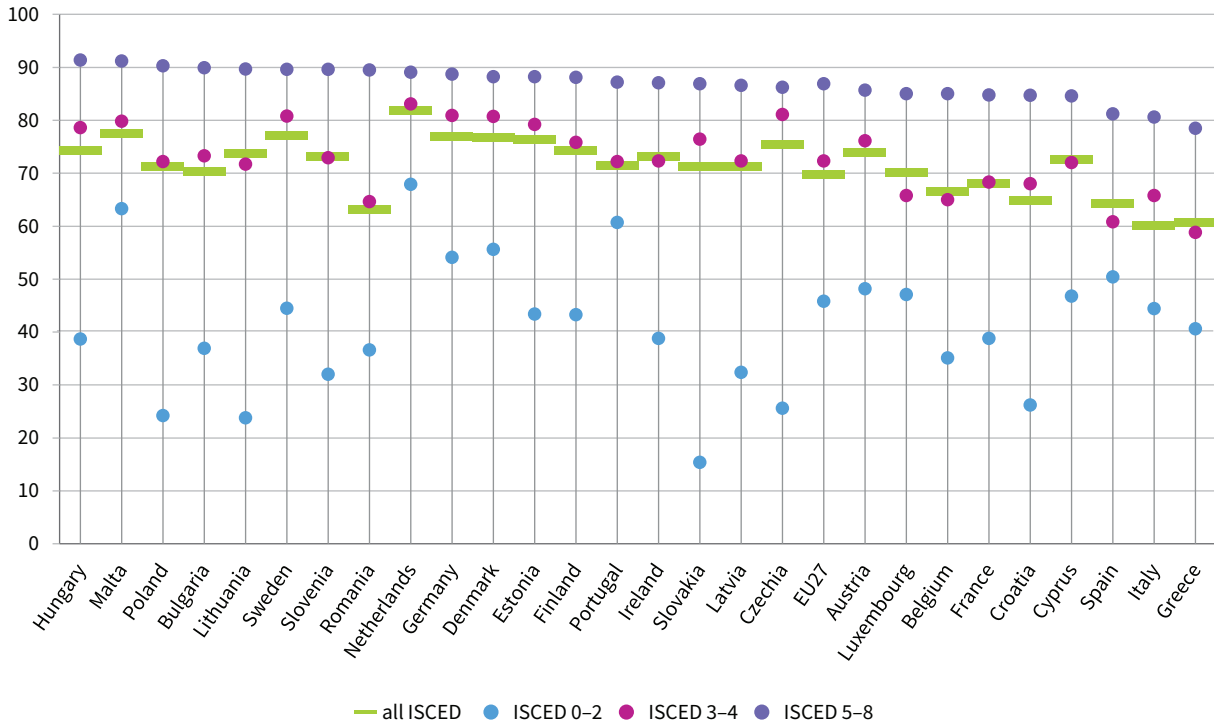
Because employment rates are closely linked to educational level, employment for the population at ISCED levels 5–8 is higher than for groups with lower educational attainment. All Member States had an employment rate of graduates above 78% in 2022 (Figure 12). Greece, with 78.5%, reported the lowest value, and Italy and Spain were just above that with 80.6% and 81.2%, respectively. The top three employment

rates of ISCED 5–8 graduates were recorded by Hungary (91.4%), Malta (91.2%) and Poland (90.3%). For those with an education level below ISCED 5, noticeable differences can be observed among Member States: the highest employment rate was in the Netherlands with 76.8%, while the lowest was in Greece at 40.6%.

During the economic crisis, the unweighted EU average dropped by 3.2 percentage points compared with the 2008 level (Figure 13). Much larger drops in performance were recorded in some Member States. In particular, Greece saw the graduate employment rate plummet until 2014, with a loss of 13.8 percentage points in just six years. Cyprus (-10.2 percentage points), Slovakia (-9.1 percentage points) and Spain (-7.8 percentage points) had similar difficulties in those years but bounced back quicker than Greece. Conversely, the best-performing countries registered a stable graduate employment rate throughout the period, in some cases – Germany and Malta, for instance – even increasing the rate. During the recovery of 2014–2019, the employment rate of graduates grew substantially in Greece (+7.6 percentage points) and in other poorer-performing countries, nearing pre-crisis levels in 2019.

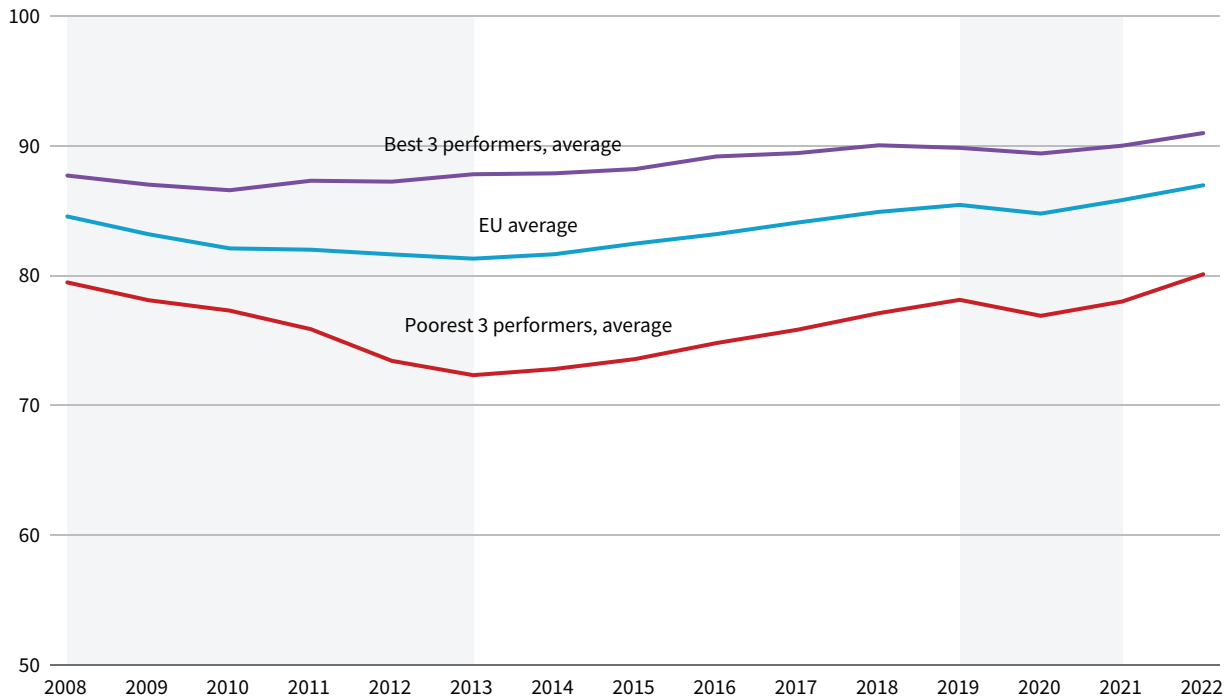
The COVID-19 pandemic had an overall negative effect on employment rates of graduates across the EU, but it lasted only for 2020 (falling by -0.7 percentage points), with some differences across countries. The EU average bounced back in 2021 and continued to increase in 2022 to 87%, the highest rate of the period.

Figure 12: Employment rates of 15- to 64-year-olds, by educational attainment, EU and Member States, 2022 (%)



Source: Eurostat [lfsa_ergaed]

Figure 13: Employment rate of graduates, comparing best three performers, poorest three performers and EU average, 2008–2022 (%)



Notes: Shaded periods indicate the economic crisis and the COVID-19 pandemic.
Sources: Eurostat, EU-LFS data; authors' calculations

Disparities between the Member States followed an inverted U-shaped pattern, increasing during the economic crisis, peaking in 2013, then quickly reducing until 2019, before rising again in 2020 and then falling until 2022. Notwithstanding the reduction in disparities, the analysis shows divergence in the sigma and delta measures. The beta coefficient is non-significant but moving in the right direction, and, considering that all countries registered an ISCED 5–8 employment rate of more than 78% in 2022, this indicator across the EU is on target.

Share of R&D personnel and researchers

The share of R&D researchers steadily increased, almost doubling, over 2007–2022. Disparities increased among Member States, mostly due to large improvements in Austria and Sweden. Poor-performing Member States caught up significantly with better performers.

The total number of full-time equivalent researchers in the EU stood at 1.89 million in 2020 and rose to over 2 million two years later. The highest absolute number was recorded in Germany, with approximately 480,000 researchers, followed at a distance by France (approximately 345,000) and by Italy (approximately 160,000).

In terms of the share of R&D researchers in the total active population, the Nordic countries (Denmark, Finland and Sweden) led the way in 2022, with shares between 1.6% and 1.9%. The EU unweighted average was 1%, and 12 countries were above it. The lowest shares, below 0.5%, were found in Cyprus, Latvia, Malta and Romania. Despite being closely linked to R&D expenditure as a share of GDP, the share of R&D researchers does not have an explicit target, but programmes such as Horizon 2020 (now Horizon Europe), which has invested more than €80 billion in R&D activities, point to its importance.

The unweighted EU average almost doubled over 15 years, jumping from 0.6% in 2007 to 1% in 2022. Among the best-performing countries, Denmark and Finland had a head start compared with the rest of the EU (achieving around 1.5% throughout the period), whereas Austria and Sweden witnessed large improvements. Disparities increased due to the steep increases in individual Member States over time, leading to divergence. Among the countries that struggled the most with increasing their shares of personnel in R&D were Cyprus and Romania, which had very low shares throughout the period (0.3% and 0.2%, respectively). It is interesting to note that both the economic crisis and the COVID-19 pandemic did not halt the trends, with a growing performance on this indicator even in tough times. The beta coefficient is negative and significant, signalling a catching-up of the poorest-performing countries with the best-performing ones. However, there was a steady increase in the sum

of the distances from the frontrunner, implying a diverging pattern over time.

In Sweden, large investments in the non-financial corporate sector were the main driver of increased R&D capacity (Swedish Research Council, 2021). A report from the Swedish statistical office shows that in 2022 there was an increase of 6,329 full-time equivalent personnel in R&D compared with 2021 (SCB, 2023). This increase was seen not only in the business sector, but also in the public one. In the public sector, the Swedish government has an agreement with regions to promote R&D in the medical sector (*Avtal om läkarutbildning och forskning*) and to directly invest in knowledge (public research funding through the General University Funds covers 50% of the country's R&D expenditure). A similar trend is seen in Austria, with the business sector being the main driver, accounting for 70% of R&D investments and increases in personnel, while the public sector accounts for the remaining third (Austrian Embassy Washington, undated). Several incentives were put in place, from tax credits to general grant programmes (such as the FFG Basisprogramm), covering personnel costs, training, equipment and activities (Deloitte, 2020).

Share of ISCED 5–8 graduates who are NEET

The share of graduates who are NEET rose during the economic crisis but quickly decreased in its aftermath, and, besides a small setback in 2020, an upward trend is clear. Disparities follow a similar trend, dropping to pre-crisis levels in 2022. The convergence analysis found a significant catching-up of poor-performing Member States.

In 2022, 11.7% of the population in the 15–29 age group across the EU was NEET, with women being more likely to have this status. Examining individual Member States shows a high degree of heterogeneity. Some countries (Denmark, Germany, Ireland, Luxembourg, Malta, Netherlands, Portugal, Slovenia and Sweden) had NEET rates close to the policy target of 9% or even below it, whereas others such as Italy and Romania reported rates of 19% or above.

Breaking down the numbers by education level, the EU-wide NEET rate for graduates stood at 7.9%, compared with 13.6% among those with a low level of education (ISCED levels 0–2) and 12.0% for those with medium educational attainment (ISCED levels 3 and 4). The majority of countries reported a lower NEET rate for young people with a tertiary degree than for those with low or medium educational attainment. In 2022, Sweden had the lowest NEET rate for graduates, with 3%, followed by Malta (3.1%) and the Netherlands (3.3%); the highest rates were observed in Greece, with 20.9%, followed by Cyprus (14.0%) and Italy (14.0%). In contrast, in Spain, the lowest NEET rate was observed for individuals with medium educational attainment.

For a further five countries (Croatia, Cyprus, Czechia, Greece and Latvia), the lowest rate was among young people with low educational attainment.

The unweighted EU average rose by 1.7% from 2009 to 2013, reaching the highest value recorded over the period, at 13.8% (Figure 14). In that year, four countries (Bulgaria, Greece, Italy and Romania) had more than one young graduate in four not in employment or training. But while rates in Bulgaria (9.2%) and Romania (8.5%) had fallen substantially by 2022, Greece (20.9%) and Italy (14%) were still distant from the EU average. Among the best-performing countries, Luxembourg, the Netherlands and Sweden kept their shares of graduates who are NEET very low, with Sweden outperforming all other Member States, with 3%, in 2022. Ireland and Lithuania halved their shares of graduates who are NEET in the 13-year period, going from around 20% to below the EU average. During the peak of the COVID-19 pandemic in 2020, most countries recorded an increase in NEET graduates, but the downward trend was soon reversed in both 2021 and 2022.

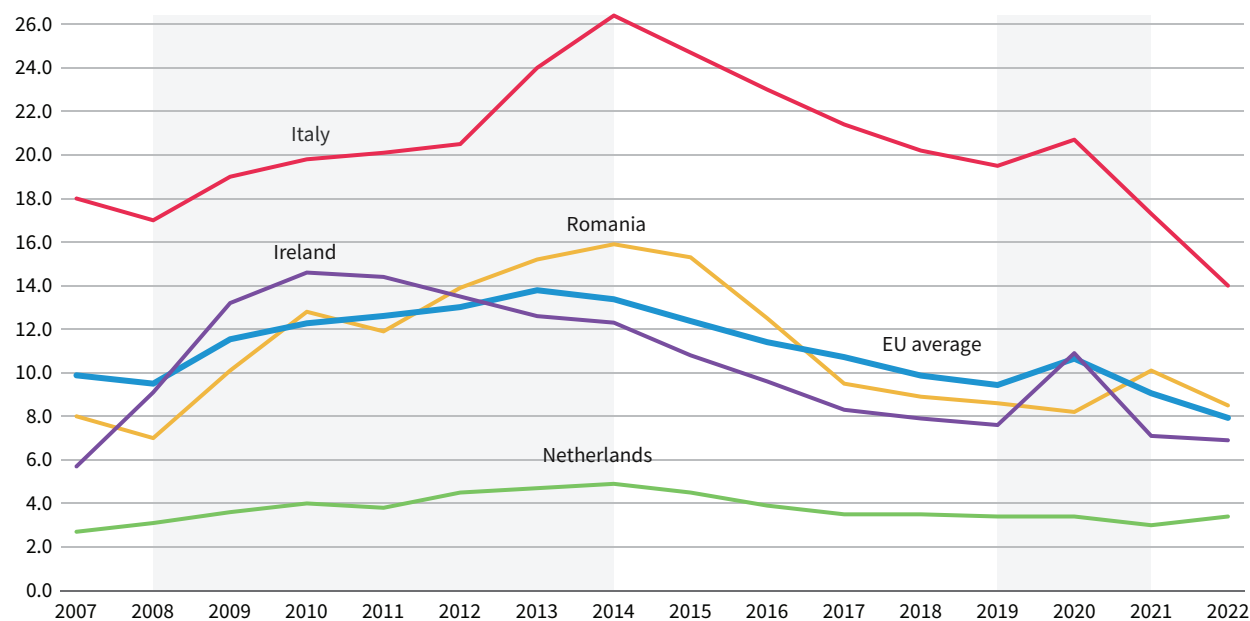
As was seen for other economic indicators, disparities followed an inverted-U trend, with an increase in NEET graduates during the economic crisis and a quick recovery afterwards. A catching-up of poor-performing countries with best-performing ones is evident. There was also a reduction in distances between Member States and from the frontrunners, signalling delta-convergence.

Latvia notably reduced the share by enforcing a rigorous Youth Guarantee Implementation Plan from 2014 to 2018. The intervention was focused on boosting education and vocational education and training to increase youth employment. Vocational colleges provided free training in more than 70 professions (European Commission, 2018).

The share of graduates who are NEET touches upon the issue of skills mismatch. For example, in Italy there was an oversupply of humanities graduates in contrast to a lower number of STEM graduates in 2021, a trend also reported in the literature (Anelli and Peri, 2013). This differentiates Italy from countries with similar structural characteristics, such as Germany, where the stock of STEM graduates is higher. Field of study is not the only factor determining a higher share of NEET graduates, however; regions with lower employment rates, meaning a weaker labour market overall, are less able to absorb graduates, regardless of their qualifications.

One of the reasons why the Netherlands maintained such a low share of graduates who are NEET could be the widespread use of temporary employment contracts (Bekker and Mailand, 2019). Temporary contracts were used by employers as an easy hiring tool, meaning that young workers were seldom out of work. The flip side, however, was that young workers who could not find stable and long-term employment resorted to taking temporary jobs. Although a low share of NEET graduates is positive overall, it does not necessarily imply employment security for young

Figure 14: Share of graduates who are NEET, EU and other averages, 2007–2022 (%)



Note: Shaded periods indicate the economic crisis and the COVID-19 pandemic.
Sources: Eurostat, EU-LFS data; authors' calculations

workers (Eurofound, 2015). To guarantee more employment security, the old Dutch ‘flexicurity’ system was replaced in 2015 by the updated Work and Security Act, aimed at reducing unemployment and strengthening the link with learning activities to transition to a new job. A lifelong learning credit to pay for study fees was introduced in 2017.

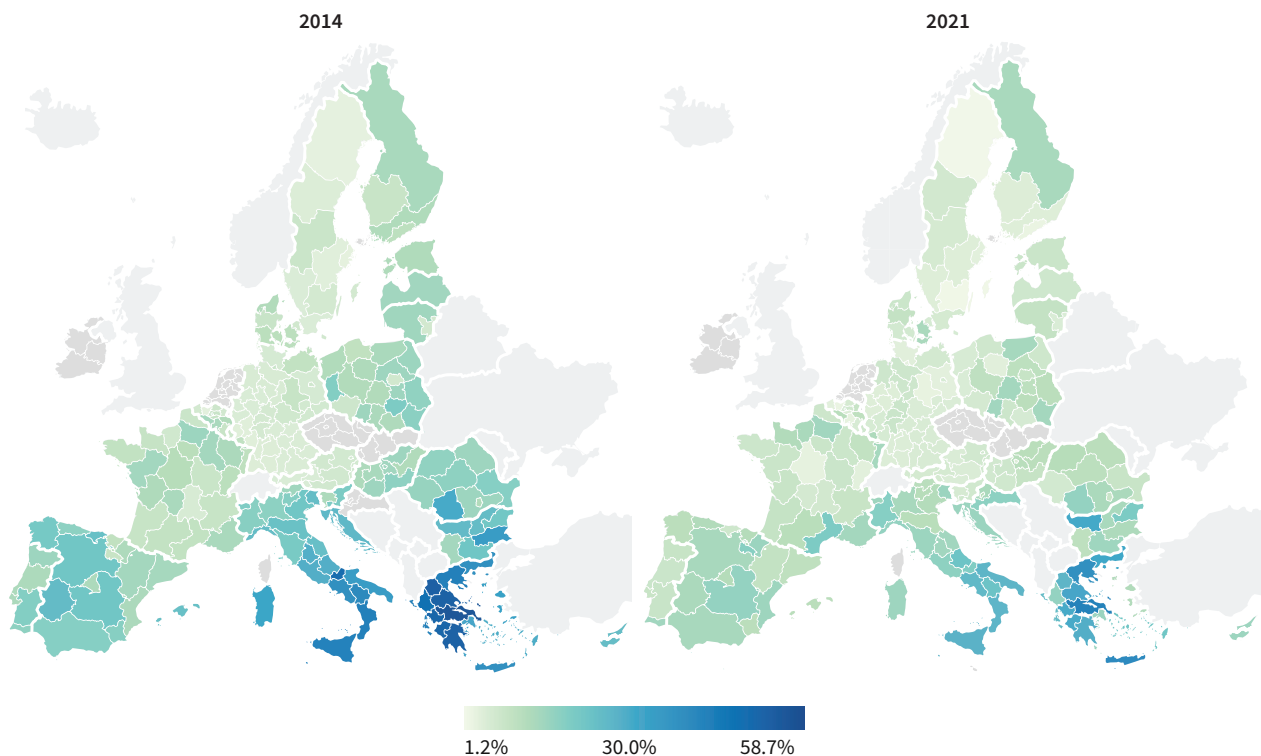
Regional analysis

Figure 15 gives an overview of the regional distribution of graduates who are NEET. The share of these graduates fell between 2014 (during a period of

expansion after the economic crisis) and 2021 (the first year after the peak of the COVID-19 pandemic), especially in regions of Spain, southern Italy and eastern European Member States.

Trends similar to those at national level are found when looking at regional data for 2014 and 2021. Upward convergence can be seen, as can a catching-up process. Southern regions, especially in Greece and Italy, had the highest rates for both years, and their rates are far from the EU average, with peaks of almost 50% in central Greece and Calabria (Figure 15).

Figure 15: Graduates who are NEET by EU NUTS 2 region, 2014 and 2021 (%)



Notes: No data available for Czechia, Ireland, the Netherlands and Slovakia.

Sources: Eurostat, EU-LFS data; authors' calculations

Share of overqualified graduates

Graduate overqualification increased slightly in the EU between 2008 and 2021, especially during the economic crisis. Disparities between Member States decreased over time, driven especially by the improved performance of Malta. Poor-performing Member States have been catching up with better-performing ones in respect of this indicator.

Over 2008–2021, the unweighted EU average of this indicator increased by 1 percentage point, reaching 21.7% in 2021.⁶ Just over 10% of graduates in Luxembourg, Hungary and Sweden were overqualified for their jobs in that year, a share that has been relatively stable over the past 14 years. Greece, Italy, Romania and Slovenia experienced the largest increases in graduate overqualification. Slovenia and Romania doubled their shares of overqualified graduates between 2008 and 2021 (by 11 percentage points and 7 percentage points, respectively). While most countries slowed the downward trend in 2021, Greece steadily increased its share.

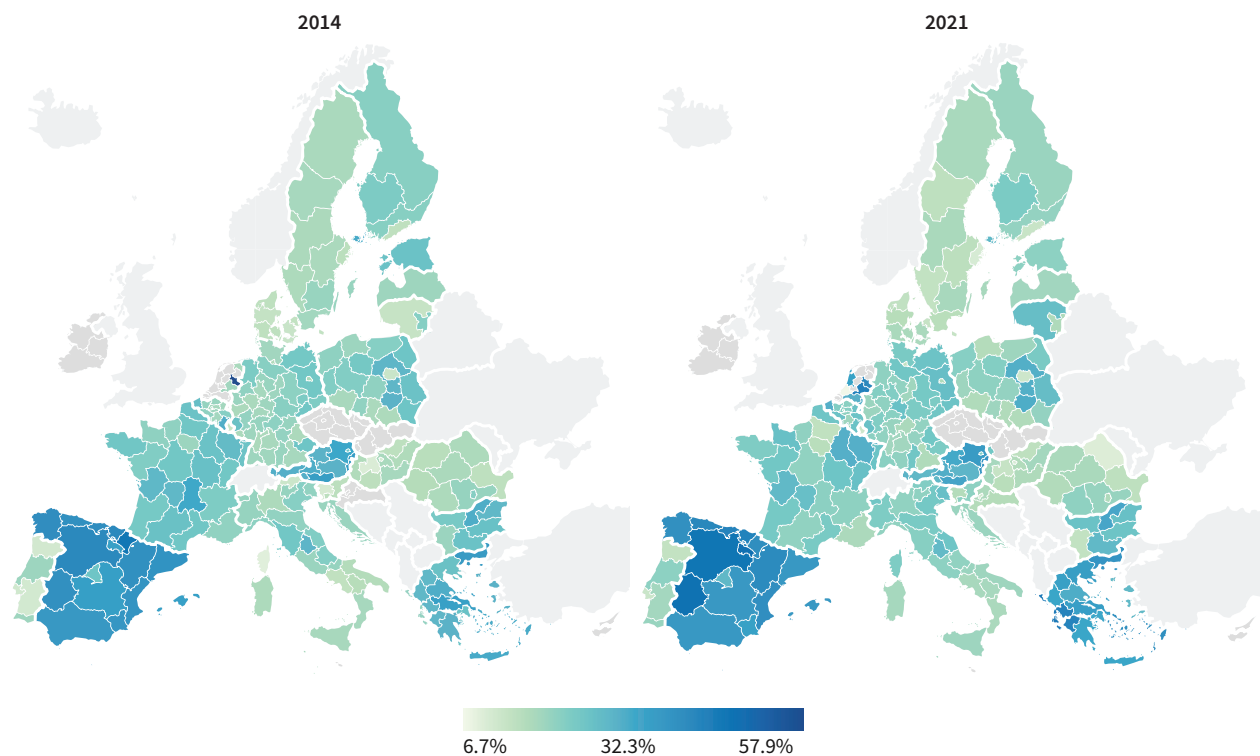
Disparities between the Member States decreased, especially as a result of Malta reducing its share of overqualified graduates by 18 percentage points. Poor-performing countries have been catching up with the best-performing ones, and the distance from the frontrunners reduced over time.

Regional analysis

The regional analysis is in line with the national one, with a slight increase in the share of overqualified graduates and a slight drop in disparities. Moreover, country differences seem to prevail over the regional ones, as there seems to be no regional clusters across Member States.

Taking a closer look at regional level (Figure 16), an increase in overqualification rates between 2014 and 2021 is visible in regions located in central and northern Spain, in parts of Germany, and in Greece and the Netherlands. Furthermore, in Lithuania, the share of overqualified graduates outside the capital region doubled from 13.1% to 26.3%.

Figure 16: Overqualified graduates by EU NUTS 2 region, 2014 and 2021 (%)



Notes: No data available for Czechia, Ireland, the Netherlands and Slovakia.

Sources: Eurostat, EU-LFS data; authors' calculations

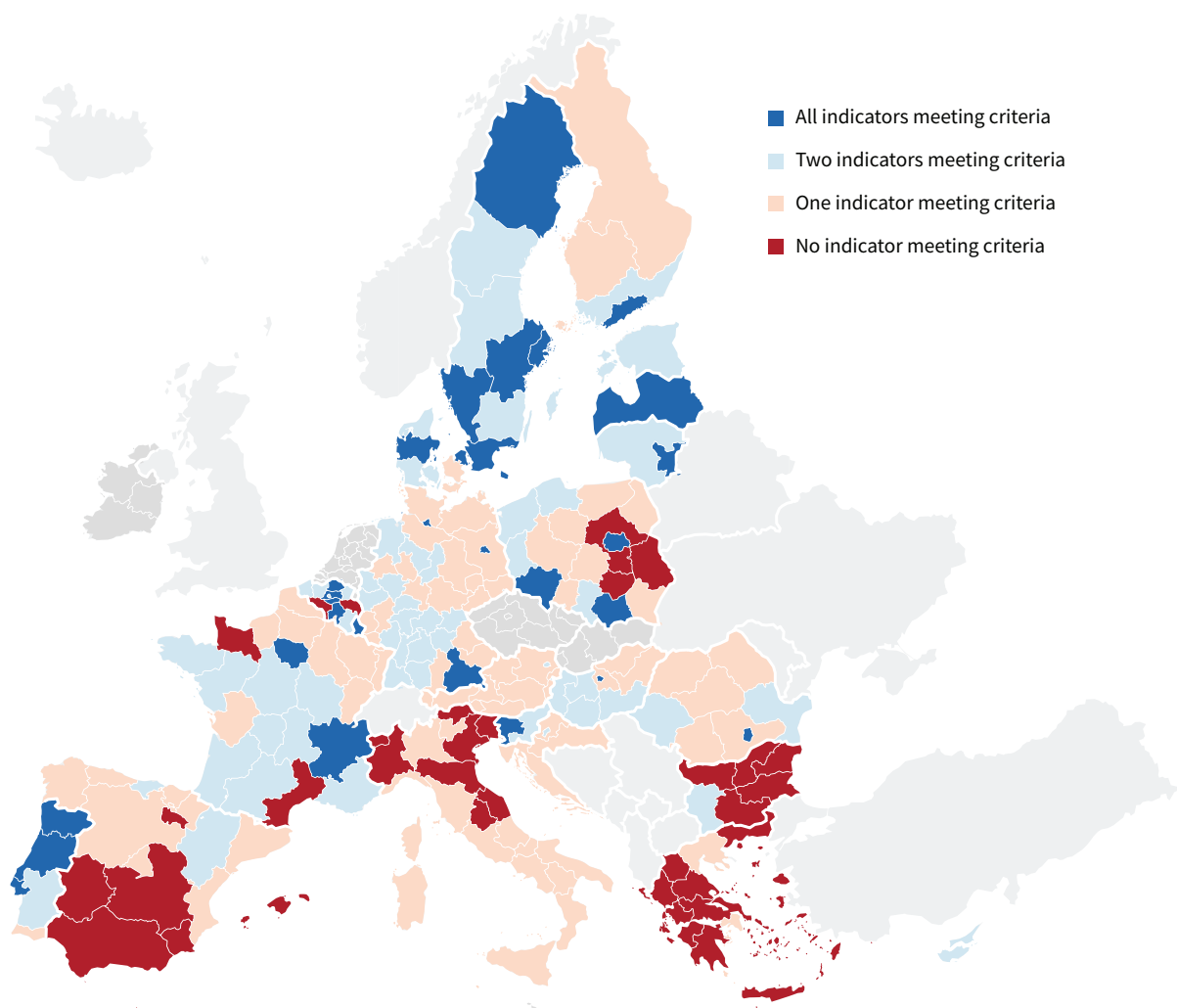
⁶ Data on Ireland were removed from the calculation as this country is an outlier.

Several reports have highlighted the dire situation regarding graduate overqualification in Greece and Spain (for example, Katsikas (2021)). The employment recovery in the aftermath of the economic crisis mostly concerned low-skilled jobs such as those in retail, tourism, and the food and drink industry. Hence, many graduates found employment that did not match their skills in these sectors. On the employers' side, skills shortages are a common phenomenon, attributed not only to the labour supply, but also to poor wages and bogus self-employment (when direct subordinated employment is disguised as self-employment). Several policies have been implemented to address the skills mismatch, as reported by Cedefop (undated).

When the correlation between the regional indicators for number of graduates, the rate of overqualification and the NEET rate across NUTS 2 regions is analysed,

there is a weak but negative correlation among regions between graduates and the NEET rate, while there is a weak positive correlation between the level of overqualification and the NEET rate. To better visualise these relationships, Figure 17 categorises regions by the number of the following indicator criteria they meet: a graduate share of over 45%, a NEET rate of less than 9% and a percentage of overqualified graduates less than the EU average. Human capital is deemed to be underutilised in regions where none of these criteria are met, highlighted in red in the figure – mostly in southern Europe in regions of Spain, and in Bulgaria and Greece. Italy's northern regions and eastern Poland also face the challenge of not enough graduates and a low absorption capacity on the labour market side. Many Swedish regions, Latvia, the northern regions of Portugal and a few more regions in other countries perform very well on the three indicators.

Figure 17: Human capital underutilisation by EU NUTS 2 region, 2021



Notes: Underutilisation refers to underachievement in the graduate target rate and the NEET target rate, and a rate of overqualification above the EU average. No data available for Czechia, Ireland, the Netherlands and Slovakia.

Sources: Eurostat, EU-LFS data; authors' calculations

Convergence in human capital mobility

As highlighted by Schultz (1961), individuals will tend to move if they think that their knowledge and skills will be better rewarded elsewhere. The option to move also influences their choices on educational paths since studying abroad can burnish academic qualifications. This section explores indicators that measure intra-EU mobility in terms of the movement of students and graduates across borders and examines whether there is convergence among the Member States in respect of their citizens.

Outcomes

Share of mobile tertiary students from abroad

Over 2015–2021, the share of mobile tertiary students from abroad increased steadily until 2019, flattened out in 2020 and resumed growth in 2021. Disparities among Member States were reduced, but only slightly. There was a significant catching-up process, with countries that had an initial low share of mobile students quickly improving.

In 2021, 4.8% of EU27 tertiary students had completed their secondary education in a country other than the one in which they were studying. Luxembourg stands out with 33.1%, but this is probably due to the small size of its population. Austria had the second largest share at 13.1%, some distance from the Member States in third and fourth positions, which were Cyprus (8.6%) and Czechia (7.8%). The Member States with the lowest shares, below 1%, were Croatia (0.8%), Poland (0.5%) and Italy (0.5%). Although these three countries had similar results, the trends are different. Poland's share remained constant over the six years at around 0.4%, while Italy halved its share (from 1.1% in 2015). Among the countries that increased their share of mobile tertiary students, Malta is notable, with an increase of 5 percentage points in 2021.

The unweighted EU average rose by 0.6 percentage points between 2015 and 2021, when it reached the highest share, at 4.8%. This means that 1 in 20 European tertiary students chose to study abroad. The analysis points towards a catching-up process, with poorer-performing Member States tending to increase their shares of mobile students. These Member States diverged from the frontrunners after converging in 2020, possibly due to the uneven policies regarding online education during the COVID-19 pandemic.

Share of degree-mobile graduates from abroad

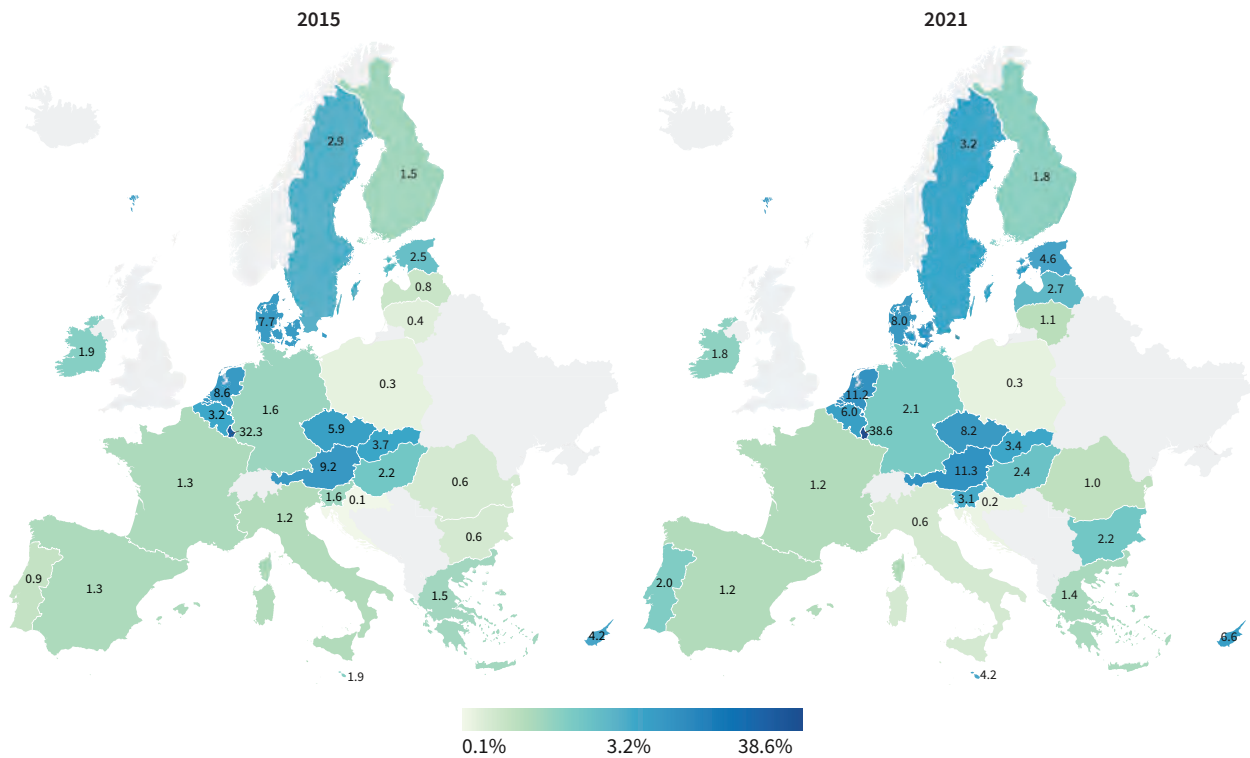
Over 2015–2021, the share of mobile graduates in the EU increased steadily. Disparities among Member States widened until 2020, but 2021 signalled a first hint of convergence. There was a significant catching-up process, with countries that initially attracted a low share of mobile graduates quickly improving.

The unweighted EU average for this indicator rose by 1.1 percentage points between 2015 and 2021, reaching 3.5%, the highest share of graduate mobility to date.⁷ In 2021, Luxembourg had the highest share among the Member States, with 38.6% (Figure 18). Austria (11.3%) and the Netherlands (11.2%) followed, while shares in Croatia, Poland and Italy were below 1%. The Netherlands has been so successful in attracting international students that it has now reduced its international offering by re-establishing courses taught in Dutch in an effort to reserve slots for Dutch students, as seen in the case study in this report (see Chapter 5).

Among the countries receiving the most graduates, Austria, Malta and the Netherlands saw their share grow by approximately 2 percentage points since 2015. Bulgaria's share grew too by almost 2 percentage points over the six-year period, although it started from a lower basis and did not reach the EU average. Disparities between the Member States increased over time and so did the distance from the frontrunners. Notwithstanding, the analysis shows that poor-performing countries improved faster than the best-performing ones, signalling a catching-up process.

⁷ Because Luxembourg's share was almost 10 times the EU average, it was excluded from the analysis as even small fluctuations in performance have a big impact on the convergence results for all Member States.

Figure 18: Share of degree-mobile graduates, EU Member States, 2015 and 2021 (%)



Sources: Eurostat [educ_uoe_mobg03]; authors' calculations

Box 2: Talent is worldwide – Attracting non-EU talent

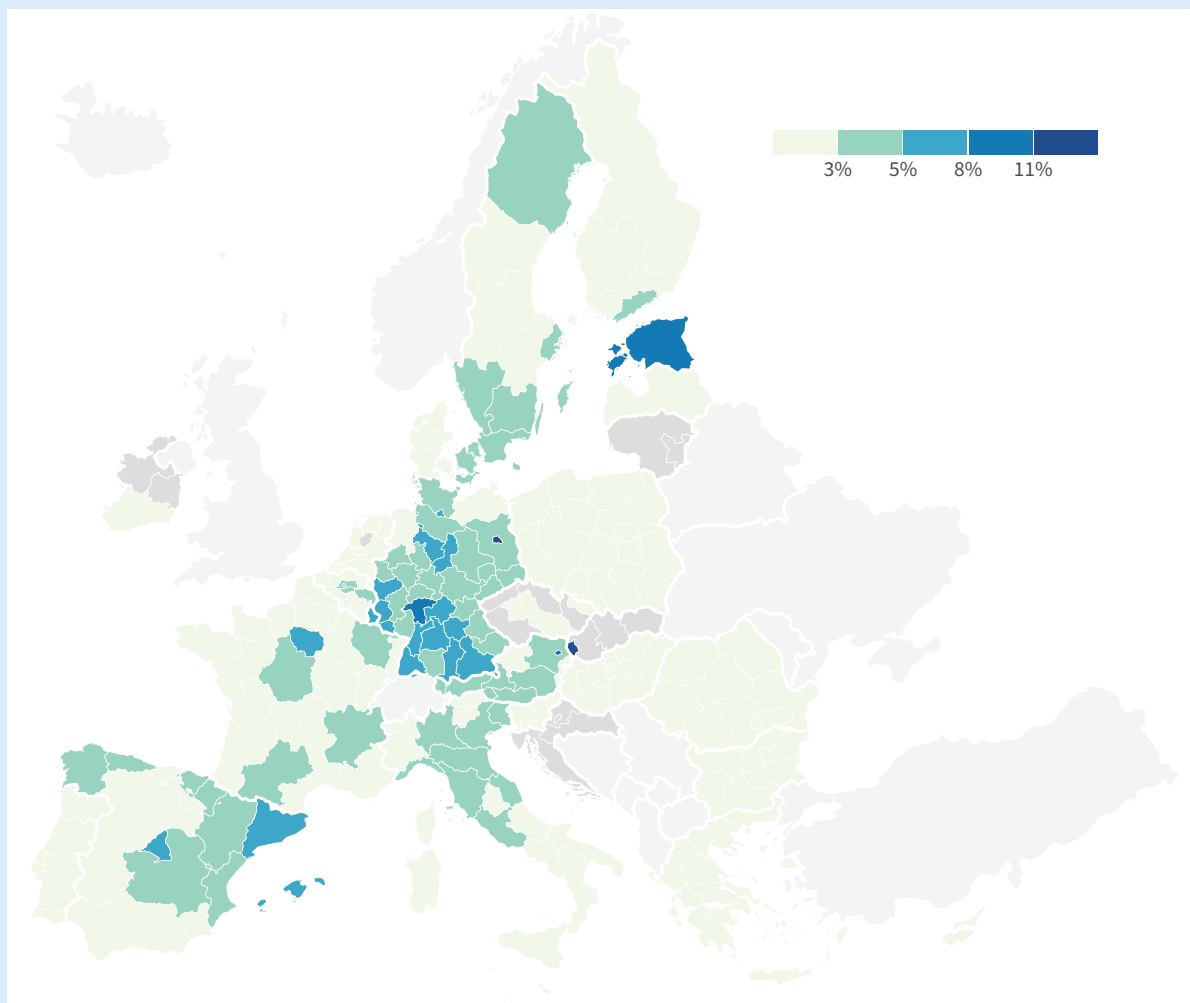
The main flows of human capital in the EU up to the onset of the COVID-19 pandemic are well documented and entail a movement from southern to northern Europe and from eastern to western Europe. The main outflow from the EU is towards the United States, while the inflow is from other Western countries and African and Asian countries.

Global challenges require Europe to attract outside talent. Its ageing and shrinking population puts structural pressure on the labour market, with skills shortages in different regions and sectors. As outlined in its new Pact on Migration and Asylum, the Commission aims to ensure that the EU legal migration framework benefits EU societies and economies by attracting talented individuals and facilitating the admission of workers of different skills levels that the EU needs (European Commission, undated-d). It also aims to facilitate the intra-EU mobility of non-EU workers already in the EU (European Commission, undated-e).

Looking at the overall non-EU talent pool in EU Member States, the highest share is reported in countries with smaller populations, such as Malta, with just below 20%, followed by Ireland, Estonia, Luxembourg and Cyprus. The Member States with the lowest shares are Croatia, Poland, Hungary and Greece. From a regional perspective, the capital cities Berlin, Bratislava and Vienna are successful in attracting highly qualified non-EU immigrants, with the top 10 shares of non-EU graduates within the total number of graduates ranging between 7.2% and 13.5%. In general, non-EU talent is concentrated in central Europe, northern Italy, northern and eastern regions of Spain, and selected regions of Scandinavia.

Figure 19 shows the share of non-EU citizens with tertiary education as a percentage of the total of similarly educated country nationals across NUTS 2 regions in the EU by educational attainment. The highest share is reported in the area in and around Berlin (DE30), with 34.8%. Other major centres of low-skilled immigration within Germany are Hamburg (DE60), Bremen (DE50), Düsseldorf (DEA1), Darmstadt (DE71) and Karlsruhe (DE12). Second comes Austria, where the concentration is highest around the capital city, Vienna (AT13), with 29.2%, followed by Salzburg (AT32) with 24.2%. Furthermore, Upper Norrland (SE33), Île-de-France (FR10) (which includes the metropolitan area of Paris) and Murcia (ES62) report comparably high shares of immigrants with low attainment, at around 25%.

Figure 19: Share of non-EU citizens with tertiary degrees, by EU NUTS 2 region, 2021 (%)



Notes: Data for Latvia not available; partial coverage for Croatia, Ireland and Slovakia.

Source: Eurostat, EU-LFS, authors' calculations

In contrast, the share of non-EU immigrants with secondary educational attainment (ISCED levels 3 and 4) out of all citizens with secondary educational attainment is evenly distributed across the EU. Estonia attracts a comparably high number of immigrants with this attainment level from non-EU countries, with a share of 15.4%. Furthermore, two regions in Spain stand out with relatively high shares (above 10%), namely the region around the capital of Madrid and the Balearic Islands.

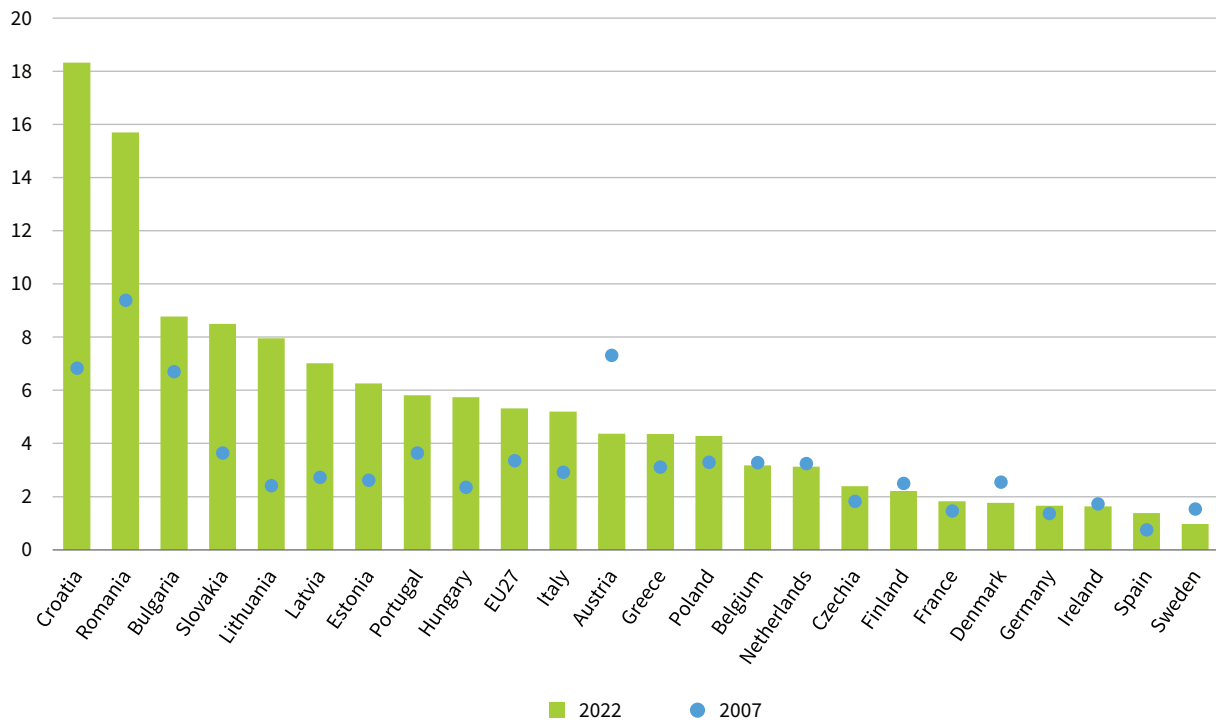
Share of graduates abroad (outbound)

Over 2007–2022, the share of national graduates living abroad (as a percentage of all national graduates) increased substantially, mostly driven by the strong outflows from Hungary and Romania. Only seven Member States reduced their numbers of graduates abroad, whereas the others saw an increase in highly educated nationals migrating to other Member States. As a result, disparities increased considerably. Moreover, the divergence between the poorest-performing and best-performing Member States widened.

The shares of graduates aged 15–64 years living abroad increased in 20 Member States from 2007 to 2022.

The Member States where the shares fell were: Austria (-3.0 percentage points), Denmark (-0.8), Sweden (-0.6), Finland (-0.3), the Netherlands (-0.1), Belgium (-0.1) and Ireland (-0.1). In 2022, the highest flow of outbound graduates took place in Croatia (18.3%), Romania (15.7%), Bulgaria (8.8%) and Slovakia (8.5%).

Figure 20: Graduates abroad as a percentage of graduates in the country of origin, EU and Member States, 2007 and 2022 (%)



Notes: Data refer to graduates aged 15–64 years. Data for Cyprus, Luxembourg, Malta and Slovenia are missing.
Sources: Eurostat, EU-LFS data [lfst_lmbpcited]; authors' calculations

The unweighted EU average climbed by 2 percentage points, from 3.4% in 2007 to 5.3% in 2022 (Figure 20). The average was pulled up by Croatia and Romania, which recorded increases of 11.5 and 6.3 percentage points, respectively, from the start of the period. The Baltic states also recorded an increase in outflow. Lithuania, Latvia and Estonia were among the countries with the largest increases in graduates living abroad (5.5, 4.3 and 3.6 percentage points, respectively). Croatia and Lithuania were the countries where the share of graduates abroad grew the fastest. Among the best performers, Spain and Sweden retained most of their graduates throughout the period, with less than 1.5% of graduates living abroad. Among the countries that attracted back some of their national graduates, Austria and Denmark lead the scoreboard, regaining 3% and 0.8%, respectively.

As a result of these developments, disparities increased across Member States, with eastern and southern European countries losing talent and Nordic countries retaining it. Poor performers did not make progress in catching up with the best-performing countries.

Ginnerskov-Dahlberg (2021) examined the reasons why eastern European students and graduates move westward and found that, besides better living and working conditions, parents have a strong influence. Positive narratives by parents who grew up in the Communist era and emigrated to western Europe to find better living and working conditions reinforce the importance of freedom of movement. Hence, many students and graduates leave their countries in the east to study and work in the west. After this initial period, most of them settle in the country in which they studied. Skills mismatch and overqualification are deciding factors for eastern Europeans with higher levels of education (IMF, 2016). By moving to countries where their degrees are likely to be better rewarded, they increase the gap between home and host countries, hence hindering the convergence efforts. But monitoring the outflow of graduates is not enough to determine a country's success; instead, this information should be read through the human capital circulation lens – that is, the balance between talent leaving and talent entering the country, with such graduates not necessarily born in, or citizens of, that country. This is investigated in the next chapter.

Right direction, but variable performance

Indicators reflecting human capital creation promisingly moved towards set policy targets or policy expectations; hence, overall performance improved, with the poorest-performing Member States growing faster than the best-performing ones (indicating beta-convergence). However, for adult participation in learning, share of GDP invested in tertiary education, tertiary education attainment, and share of enterprises providing training, this was not enough to reduce the distance from the frontrunners.

For the indicators that measure the utilisation of human capital in the labour market, there are disparities between Member States in respect of the two input

indicators capturing spending on R&D, as well as the output indicators capturing the employment rate of graduates and the share of R&D researchers.

Disparities grew especially among the human capital mobility indicators, signalling a growing divide between countries when it comes to mobile graduates and share of graduates abroad.

Moreover, the distance from the top performers increased for 9 out of 16 indicators, implying diverging trends in more than half of the indicators.

Table 2 shows the summary of the convergence results. The table is divided into three sections: human capital creation, human capital in the labour market and human capital mobility. Each block summarises the result for the selected indicators discussed in detail in the previous sections.

Table 2: Summary of findings on convergence indicators

Indicator	Period	Average change	Mean difference from expected policy direction		Change in disparities	Sigma-convergence	Beta-convergence	Distance from frontrunner	Delta-convergence
			Actual	Expected					
Human capital creation									
Share of low-achieving 15-year-olds	2006–2022					Convergence	482		Convergence
Share of GDP invested in tertiary education	2012–2022					Convergence	62.1		Convergence
Share of early schoolleavers	2007–2022					Convergence	254.4		Convergence
Tertiary education attainment	2007–2022					Convergence	462.7		Divergence
Share of STEM graduates	2015–2021					Convergence	345.9		Convergence
Adult participation in learning	2007–2022					Convergence	549.9		Divergence
Share of enterprises providing training	2005–2020					Divergence	757		Divergence

Indicator	Period	Average change	Mean difference from expected policy direction	Change in disparities	Sigma-convergence	Beta-convergence	Distance from frontrunner	Delta-convergence
Human capital in the labour market								
Employment rate of graduates	2008–2022							Divergence
Share of ISCED 5–8 graduates who are NEET	2007–2022					Convergence		Convergence
Share of overqualified graduates	2008–2014–2021					Convergence		Convergence
GBARD	2007–2022							Divergence
GERD	2007–2022					Convergence		Convergence
Share of R&D personnel and researchers	2007–2022							Divergence
Human capital mobility								
Share of mobile tertiary students from abroad	2015–2021					Convergence		Convergence
Share of degree-mobile graduates	2015–2021					Convergence		Divergence
Share of graduates abroad (outbound)	2007–2022							Divergence

Note: Blank cells in the beta convergence column indicate that no significant result was detected.

Source: Eurostat; authors' calculations

3 Human capital and economic growth in the EU

The focus of this chapter is on the role of human capital in the EU economies, examining whether the presence of human capital has had any effect on income (GDP per capita) convergence. The model used for the analysis of conditional beta-convergence includes GDP per capita, the share of graduates (aged 15–64) and the share of graduates abroad (aged 15–64) (outbound). The period of analysis includes the economic crisis, which allows the identification of differences in the rates of convergence during (2008–2014) and after (2014–2021) the crisis. For this analysis, it is important to underline that, similarly to the cohort aged 25 to 34 years, there is convergence in the EU in respect of the share of graduates aged 15 to 64 years, but there is divergence in the share of graduates abroad (as described in Chapter 2). The 15–64 years cohort is taken into account when measuring the current stock of human capital in a country and outside, because restricting the analysis to individuals aged 25–34 years provides information on only a slice of the talent pool, although the most mobile. The analysis of GDP per capita is carried out first at national level and then at regional level.

Absolute beta-convergence in three indicators

Before describing the calculation of conditional convergence, this section looks at each of the indicators used in the model to check where there was a catching-up process. Then conditional convergence in income is calculated.

Share of graduates (15–64 years)

Member States with a higher share of graduates in 2008 (such as Belgium, Cyprus, Estonia, Finland and Ireland) experienced, on average, lower growth rates in this share than Member States that started with relatively low levels (such as Czechia, Malta, Portugal and Slovakia). The analysis shows that there is strong evidence of absolute beta-convergence in tertiary education attainment in the EU. Moreover, convergence is not driven by the central and eastern European Member States. Even when these countries are removed from the sample, convergence holds.

There is also strong convergence in the share of graduates within geographical areas in the EU.⁸ The strongest convergence is found in north-western Member States. In this region, Finland had one of the highest shares of graduates in 2008 (30.2%) and the lowest rate of growth in graduate numbers between 2008 and 2021 (1.3%). At the other extreme, Austria had one of the lowest shares of graduates in 2008 (15%) and the highest growth rate (6.0%), with remarkable growth of about 10% during the first half of the period. In the southern area, Italy stands out with a relatively low share of graduates in 2008 (12.7%) and a relatively low growth rate (2.7%).

Share of graduates abroad (15–64 years) (outbound)

A lack of employment opportunities and low wages for university graduates in some countries have pushed highly skilled workers to seek professional opportunities in more favourable economies. Although mobility across the Member States is low, there has been an increase in the mobility of highly educated workers since the economic crisis (Cavallini et al, 2018). However, there is no evidence of absolute beta-convergence, as several countries with similar levels of graduates abroad in 2008 had widely differing growth rates. Nor is there any indication of convergence when the central and eastern European countries are removed from the sample.

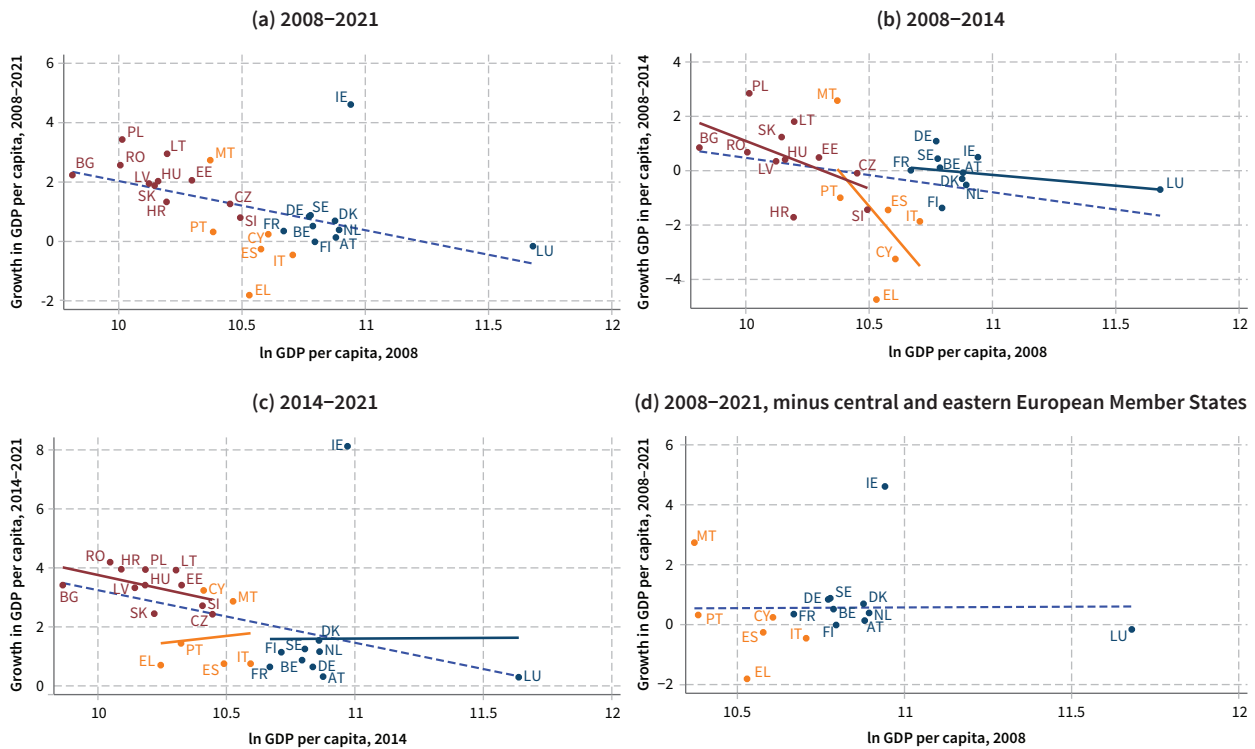
The share of female EU graduates in the younger cohort, aged 25–34, is higher than the share of male graduates in this age group for the whole period. Female graduates accounted for 36.1% in 2008, against 26.3% for male graduates. The divide continued until 2021, when women accounted for 51.9%, whereas men accounted for 38.0%. Moreover, disparities among Member States decreased in respect of women with a tertiary degree, but they increased for men.

GDP per capita at Member State level

Using data for the 27 Member States during 2008–2021, the analysis indicates a process of absolute beta-convergence in income levels, as poorer countries have been catching up with the richer economies (Figure 21 (a)). Figure 21 (b) shows that during 2008–2014 the

⁸ Member States are categorised into three groups: north-western (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands and Sweden); southern (Cyprus, Greece, Italy, Malta, Portugal and Spain); and central and eastern (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia).

Figure 21: Beta-convergence in GDP per capita in the EU27 in three periods, 2008–2021



Notes: The dashed blue line represents the regression line of beta-convergence. A downward slope indicates the beta coefficient is negative and significant, meaning there is convergence; a flat or almost flat slope indicates very weak or no convergence; and an upward slope indicates divergence. The continuous lines show convergence or divergence among the country clusters. Navy blue denotes north-western European countries, maroon denotes central and eastern European countries and orange denotes southern European countries.

Source: Eurofound, 2024a

consequences of the economic crisis were particularly acute in the southern European Member States. Except for Malta, all countries in this area experienced negative growth rates. The crisis was also more pronounced in Croatia and Slovenia – in the central and eastern Europe group – and in Denmark, Finland, Luxembourg and the Netherlands in the north-western group. During the post-crisis years, 2014–2021, all countries show positive growth rates in GDP per capita, and Figure 21 (c) displays a steeper convergence line, indicating a higher convergence rate. However, some southern European Member States grew less, preventing them from catching up with the richer economies.

It has been noted in the literature that low growth rates in total factor productivity are affecting the southern area of Europe. Ridaio-Cano and Bodewig (2019) show a decline in total factor productivity growth in all geographical regions in the EU, but most notably in southern European countries. By way of illustration, the authors plot the performance of EU Member States in opportunities for firms, measured by the Ease of Doing Business Index in 2017, and the opportunities for people, approximated by the percentage of students with basic competence in the PISA reading assessment in 2015. Compared with most north-western European countries, southern European countries – with the

exception of Portugal – have a higher share of students below basic competence level in reading, coupled with a business environment with more regulations and less support for innovation. As a result, north-western European economies are productivity leaders with a higher share of technology firms, whereas their southern European counterparts are lagging behind.

Figure 21 (a) also shows a clear pattern in the three different geographical areas. The countries in north-western Europe (navy blue), towards the bottom and right, had the highest GDP per capita in 2008 and low growth rates. Towards the top and left are the central and eastern European countries (maroon), which had, on average, the lowest GDP per capita in 2008 and the highest growth rates during 2008–2021. Convergence in GDP per capita is mainly driven by the central and eastern European economies catching up with the income levels of richer countries. Southern European countries (orange) had a poor performance over the period, with economies such as Greece, Italy and Spain experiencing negative growth rates between 2008 and 2021. In fact, as depicted in Figure 21 (d), once central and eastern European countries are removed from the sample, convergence in the EU disappears.

The results show absolute convergence in GDP per capita in the two subperiods of analysis. During 2008–2014, the results indicate unconditional beta-convergence at a rate of about 1.3% a year, a coefficient that increases to 1.8% during 2014–2021.

GDP per capita at regional level

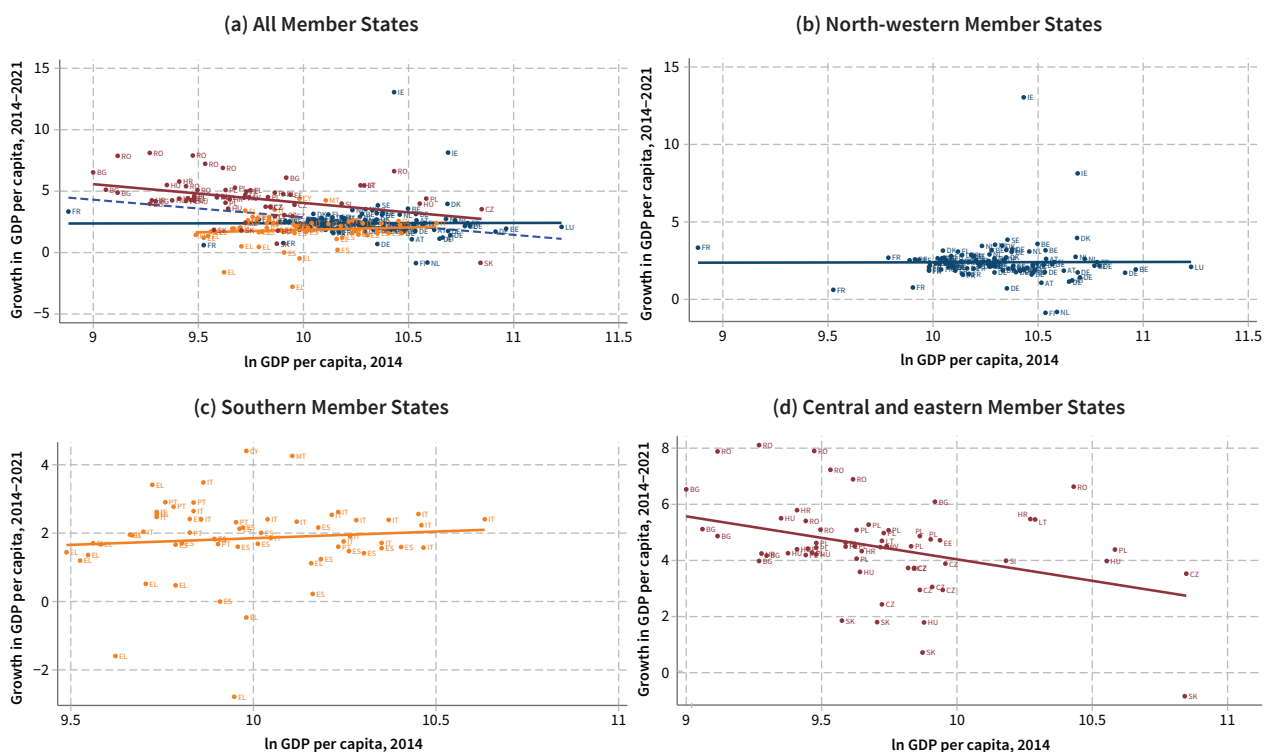
In this section, the analysis looks at whether there has been convergence in GDP per capita across NUTS 2 regions over 2014–2021, and, if so, what has been the role of the population with tertiary education in the convergence process. Given the available data at regional level, GDP per capita is measured using the regional GDP in purchasing power standards per inhabitant.⁹ The share of graduates is measured using the tertiary education attainment for the population aged 15–64 years.¹⁰

The results show absolute beta-convergence in income levels across regions. Figure 22 (a) displays the relationship between level of income per inhabitant in 2014 and its growth rate over 2014–2021 in 242 regions in the EU. The fitted (blue dashed) line shows a negative

correlation between the two variables, indicating that those regions that had lower income levels in 2014 experienced, on average, higher economic growth rates during 2014–2021. In line with previous findings, Figure 22 paints a different picture when we look within geographical areas. While there is convergence in income levels across the regions located in central and eastern Europe (panel (d)), Figure 22 (b) and (c) indicate a slight divergence across regions within north-western Europe and within southern Europe.

When looking more closely at convergence in income levels within countries in each area, most countries in north-western Europe show convergence across regions within the same country, with it being particularly strong in countries such as Austria and Germany. Conversely, divergence is observed in Denmark and Ireland. In southern European countries, there is slight divergence across regions, yet there is within-country convergence in Greece, Italy, Portugal and Spain. By contrast, in central and eastern countries there is convergence across regions, but divergence within some countries in this area. Specifically, there is

Figure 22: Regional beta-convergence in GDP per capita in the EU27, 2014–2021



Notes: The dashed blue line represents the regression line of beta-convergence. A downward slope indicates the beta coefficient is negative and significant, meaning there is convergence; a flat or almost flat slope indicates very weak or no convergence; and an upward slope indicates divergence. The continuous lines show convergence or divergence among the country clusters. Navy blue denotes north-western European countries, maroon denotes central and eastern European countries and orange denotes southern European countries.

Source: Eurofound, 2024a

⁹ The variable code in Eurostat statistics is tgs00005.

¹⁰ There are no available data on the share of graduates abroad at regional level.

divergence in Bulgaria, Croatia, Czechia and Poland, whereas Hungary, Romania and Slovakia display regional convergence.

Econometric model

The question of whether poorer countries are converging to the income levels of richer countries has long captured the attention of researchers. For many years, no evidence was found of unconditional convergence, in the sense that the income levels of poor countries would unconditionally catch up with those of rich economies (Baumol, 1986; De Long, 1988; Barro, 1991; Pritchett, 1997; Rodrik, 2013; Johnson and Papageorgiou, 2020). However, some indications of absolute convergence are found from the 2000s onwards in a broad sample of countries (Kremer et al, 2021). In this analysis, the focus is on the role of human capital in beta-convergence of the EU economies, which refers to a process in which countries with relatively low initial values in GDP per capita grow faster than countries that start with higher values.

To evaluate absolute beta-convergence in income, the following econometric model was used:

$$\ln(y_{i,t+\Delta t}) - \ln(y_{i,t}) = \alpha + \beta_t \ln(y_{i,t}) + \mu_t + \varepsilon_{i,t}$$

where y is the real GDP per capita in country i at year t , μ_t is a year fixed effect that controls for shocks that are common to all countries, and $\varepsilon_{i,t}$ is an error term that varies across countries and years. We assume that $\varepsilon_{i,t}$ is uncorrelated with the explanatory variables. The convergence coefficient β is allowed to vary over time. In this framework, the estimate of β will be a measure of unconditional or absolute convergence. There is unconditional convergence in GDP per capita if β is less than zero. When there is beta-convergence, countries or regions in which the initial level of income is higher have a slower pace of growth. The magnitude of β gives an indication of the speed of the convergence process.

Castelló-Climent and Doménech (2022) show that convergence in human capital, approximated by a measure of the average years of schooling, has played an important role in explaining convergence in income levels in a broad sample of countries at global level. Here the focus is on highly educated individuals at EU level. To assess the influence of skilled workers on the convergence rate, the share of graduates is included

in the set of controls, and the previous equation is enlarged as follows:

$$\ln(y_{i,t+\Delta t}) - \ln(y_{i,t}) = \alpha + \beta^*_t \ln(y_{i,t}) + \lambda_t \ln(h_{i,t}) + \mu_t + \varepsilon_{i,t}$$

where $h_{i,t}$ measures the proportion of graduates aged 15–64 in country i at the beginning of the period. The coefficient β^* captures convergence conditional on controlling for the initial level of graduates. There is conditional convergence if β^* is less than zero. The role of human capital in the convergence rate, as measured by the proportion of graduates, is the difference between β^* and β .¹¹

The analysis shows that highly educated workers played a role in increasing GDP per capita convergence in the EU during 2008–2021.

Role of human capital in income convergence

The results demonstrate that the economic crisis was detrimental to convergence in income levels. The beta-convergence coefficient was smaller in 2008–2014 than during the aftermath, 2014–2021.

Convergence in income levels also differs depending on the Member States included in the sample and whether convergence is estimated across countries, across regions or within countries. Cross-country convergence is greater than regional convergence. In both scenarios, convergence has mainly been driven by poorer central and eastern European countries and regions growing faster than their richer peers, enabling them to catch up in terms of income levels. Convergence across regions within countries is also found, but it occurs at a slower pace.

Human capital has played a role in the convergence process. The results indicate that controlling for the share of graduates aged 15–64 years increases the convergence coefficient, suggesting that highly educated individuals helped low-income countries and regions to catch up with their richer counterparts in respect of income. Nevertheless, when considering country-specific effects and studying convergence among regions in the same country, the speed of convergence is lower, with a rate of about 0.5%. The relationship between initial income and growth is conditional on the proportion of graduates, and

11 See Castelló-Climent and Doménech (2022) for an explanation of the decomposition of absolute convergence into conditional convergence and the role of human capital through the omitted variable bias formula.

controlling for the share of graduates increases the beta-convergence coefficient to 0.7, indicating that the population with tertiary education has also sped up convergence at regional level. Thus, the share of individuals with tertiary education increased regional convergence within countries by 0.1 percentage points, which is by no means a negligible increase.

Overall, the results confirm the existence of absolute convergence not only across countries, but also across regions in Europe. The estimate of beta-convergence conditional on the share of graduates is higher than the estimate of absolute convergence in all specifications, suggesting that countries and regions with a higher share of graduates have been able to speed up convergence, catching up with the income levels of their richer counterparts.

Most of the convergence has been driven by the higher growth rates of the countries and regions in central and eastern Europe. The integration of these countries into German-centred supply chains has been fundamental in allowing them to maintain or even increase the share of manufacturing in their GDP (Pina and Sicari, 2021). The highly skilled workforce in most of these countries might have helped them to take advantage of foreign direct investment and speed up convergence with the richer countries and regions. By contrast, the growth rates in southern European countries have been modest, and the convergence they enjoyed in the 1990s and the beginning of the 2000s has slowed down. The investment in human capital, especially in tertiary education, has helped them to speed up convergence. However, additional reforms need to be undertaken in this area to enable these countries to catch up with the income levels of their better-performing counterparts in northern and central Europe.

4 Human capital circulation and costing the loss of talent

As Chapter 2 illustrated, there are disparities among Member States in terms of outbound human capital flows – that is, tertiary graduates leaving their own countries. For this reason, it is worth investigating not only the outbound flow but also the inbound flow – in other words, how many tertiary graduates enter a country to live and work there. By combining these two opposite flows, we can calculate the net circulation for each Member State. EU27 data are only available for 2021 and 2022, too short a period for convergence analysis to be performed on the inbound flows and on the net circulation indicator. Nevertheless, it is possible to get a snapshot of net circulation in 2022.

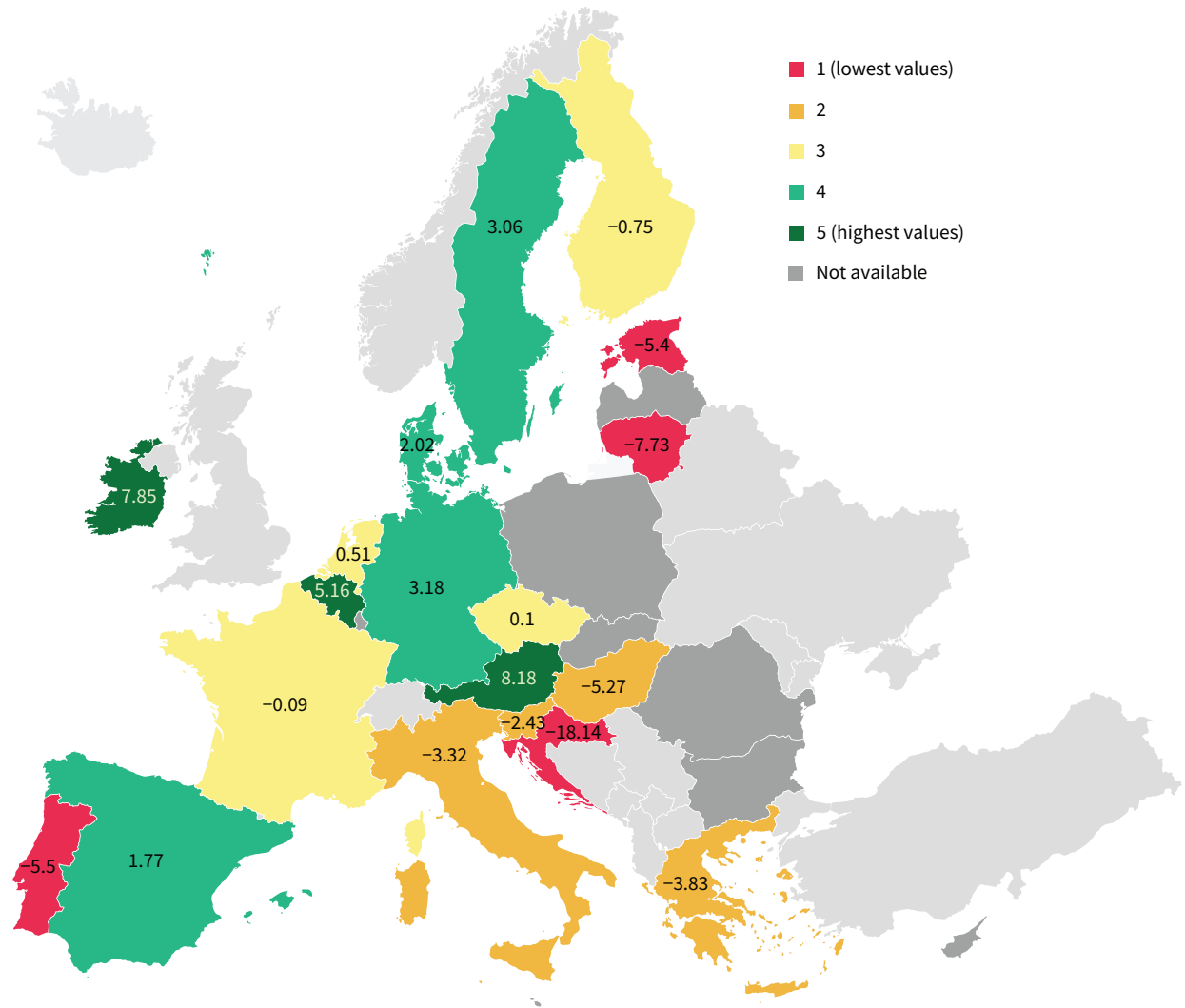
Net circulation of human capital

The circulation of human capital is an ideal scenario for a country. An inflow of talented workers compensating for nationals going abroad and returning nationals both bring new ideas and knowledge that can contribute to the economic fabric of an area. For many, migration is not a permanent choice. Short-term migration is mostly for economic reasons, and often remittances are sent to the home country as part of family commitments (Bardak, 2005). Other migrants return because they did not manage to integrate into the host country, because economic and social ties in the home country outweigh the newly created ties, or simply because migration did not improve their initial economic situation (de Haas et al, 2015). Findings from intra-EU mobility studies show that the selection of and preference for highly skilled migrants determine the inflow and the length of stay of migrants (Mayr and Peri, 2009).

The net circulation of human capital in this report is defined as the difference between the share of graduates leaving the country (outbound flow) and the share of graduates entering the country (inbound flow), not necessarily of the same nationality. A balanced circulation where the comings and goings do not differ significantly would be an ideal outcome. Issues arise when the outflow becomes haemorrhagic. Figure 23 shows the values for the net circulation of ISCED level 5–8 graduates for each Member State. The top receiving countries in 2022 were Austria, Ireland and Belgium, while the group with the highest outflows includes Croatia, Lithuania, Portugal and Estonia. Member States in the middle groups (yellow and light green in the map) are hovering around a balanced threshold, while the orange group, with Slovenia, Italy and Greece, includes countries that experienced more outflow than inflow, but not to the extent of the red group.

In terms of ability to attract talent, McGinnity et al (2023) describe the successful strategy of Ireland in promoting itself as a knowledge economy in the early 2000s, a period in which the single market was being established, and as a greenfield location for teleservices (White and Grimes, 2004), which at the time were only starting. Twenty years later, Ireland is a hub for human capital in information- and communication-related technologies. McGinnity et al (2023) show that the strategy attracted highly educated migrants from western Europe and beyond, to the extent that the share of highly educated migrants is now higher than the corresponding share of the native population.

Figure 23: Net circulation of ISCED 5–8 graduates, EU Member States, 2022

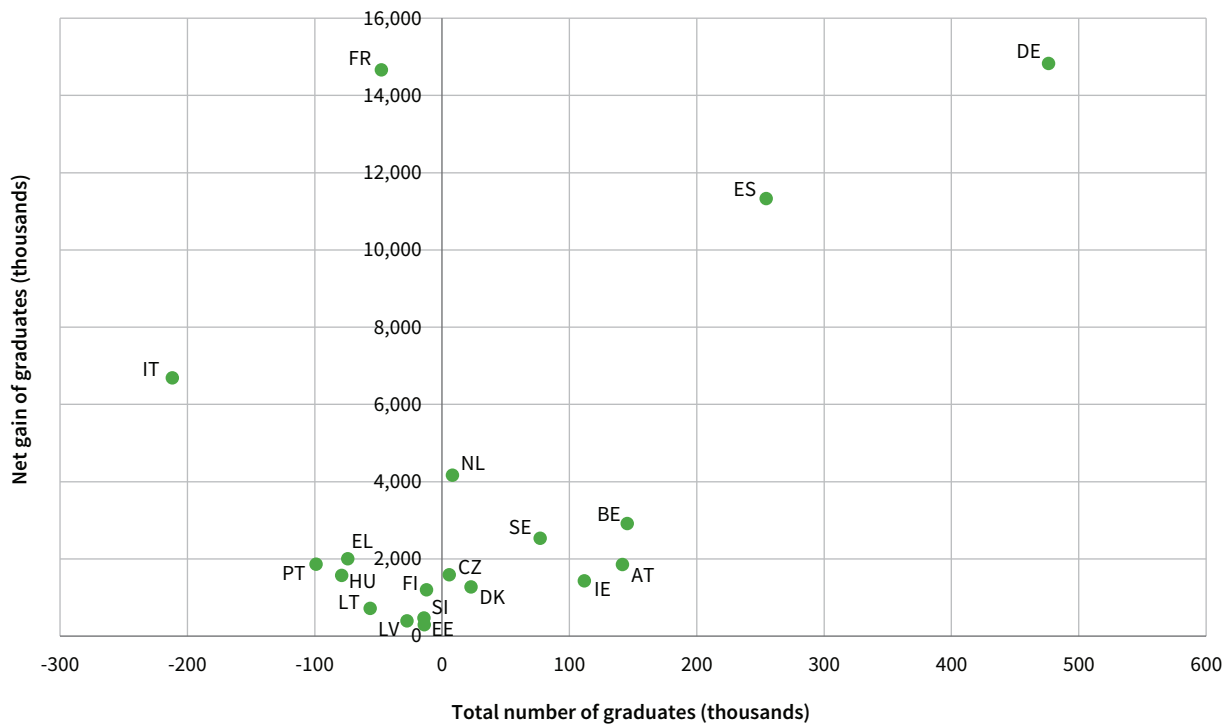


Notes: Data refer to 15–64-year-olds. Data are not available for Hungary, Latvia, Poland, Romania and Slovakia. The values represent net circulation and have been classed into groups, with the red (lowest) group representing the Member States with a high imbalance and the deep green (highest) group representing the Member States most able to attract talent.
Sources: Eurostat, [lfst_lmbpcited] and [lfsa_pgaed]; authors' calculations

The Member State holding the highest stock of higher educated human capital in absolute numbers is Germany, with 715,900 graduates; it is followed by Spain, Belgium, France and Austria. Member States less successful in attracting human capital are Lithuania, Latvia and Slovenia, with fewer than 3,300 EU graduates each. Absolute numbers have to be put in the context of the total graduates of a country. When calculating these

figures as shares of the total graduates in the country, the net circulation shows clearly which countries are gaining talent and which are losing talent. Figure 24 confirms Germany as a major pole of attraction, and shows that Italy, Greece, Portugal and Hungary are losing much of their graduate stock without replenishing it.

Figure 24: Correlation between total graduates in Member States and net gain of graduates, 2021



Notes: Reliability for this indicator is low. Data for Bulgaria, Croatia, Poland, Romania and Slovakia are not available.

Sources: Eurostat, EU-LFS data [lfsa_pganedm]

Why do they leave? Reasons for migration

Several scholars share the opinion that highly educated migrants maximise their employment and educational choices by migrating (Czaika and Parsons, 2017; Cebolla-Boado and Miyar-Busto, 2019). A large pool of research has focused on the conditions for highly educated workers to migrate, and they mostly relate to a better return for one's education, a fruitful labour market and quick recognition of previous education (Belot and Hatton, 2012; Cadena and Kovak, 2016; Meierrieks and Renner, 2017). They are often short-term migrants, interested in 'exploiting' the favourable conditions of the host country. Findings show that short-term migrants prefer lighter fiscal pressure (Akcigit et al, 2016). Another strand of the literature suggests that highly educated migrants are attracted not only by better economic conditions but also by improved quality of healthcare and better lifestyles and cultural life for them and their families, especially among those who plan longer stays in the host country (Khoo, 2014; Iredale et al, 2015; Hendriks and Bartram, 2016; Cebolla-Boado and Miyar-Busto, 2019). As the migration experience evolves over time, so do motivations for staying or returning to the home country. These can include feeling included in the host country's society and having a good social welfare

system (Cebolla-Boado and Miyar-Busto, 2019), and having economic and social ties with one's home country (de Haas et al, 2015). The following section summarises the literature concerning those who migrate, those who stay and those who return.

Similarly to students seeking international education, highly skilled migrants seek both better employment opportunities and better social or institutional conditions (Recchi and Favell, 2009). Moreover, this tendency has been found to be stronger in times of crisis, for instance during the 2008–2012 economic crisis. Many highly skilled workers from southern Europe decided to leave their home country with the expectation of a better future. The results from a survey showed that, between 2009 and 2013, young highly educated migrants from southern European countries moved abroad mostly to improve their jobs and quality of life (Bartolini et al, 2016). Among those under 30, training and career, escaping unemployment, and finding employment were the main reasons after 2009. Pre 2009, adventure-seeking was one of the main reasons, which was relevant not only for intra-EU mobility but for non-EU migration too. The 'migration hump' – an increase in migration following economic growth in a developing country – is a common phenomenon among educated migrants who want to test their ability to live in industrialised countries (European Commission, 2002b).

Not all highly educated migrants have the same clear path. As explained by Bardak (2005), migration is both sectoral and selective. Information and communications technology and health are the two main sectors, with the migration of highly skilled healthcare workers being the most persistent and draining form of migration (Bardak, 2005). In 2021, the tertiary graduates who were more likely to move were those in business and administration professions and in science and engineering professions (European Commission, 2023a). Furthermore, workers with a STEM background are more likely to find employment abroad and hence are more likely to migrate (Fassio et al, 2015). In this case, the importance of skills matching is a determining factor for successful migration. An increase in regional GDP in host countries happens with an increase in human capital (education), but mostly when there is a clear skills match (Rodríguez-Pose and Vilalta-Buffi, 2005).

After the initial migration period, highly educated migrants are faced with a decision: settle down in the host country, migrate again or return home. Reasons for settling down are various, and sometimes they collide with economic interest. As shown by Cebolla-Boado and Miyar-Busto (2019), highly educated migrants who plan to stay longer value welfare and public services in the host country. The economic and financial stability of the host country is another relevant factor that contributes to life satisfaction and quality of life. So are the presence of family ties or a social network in the host country (Recchi and Favell, 2009) and the quality of amenities (Rodríguez-Pose and Ketterer, 2012).

The EU-LFS 2021 ad hoc module collected data on the main reason behind respondents' migration. Overall, 46.1% of Europeans moved for family-related reasons; 17.7% did not have a job before migrating and 18.5% did. Additionally, 4.3% moved for education and training purposes, 0.5% for retirement reasons and the rest for other reasons (Eurostat, 2022b). When focusing on the EU tertiary graduates who moved to another EU Member State, the top reason was to work (44%), while 35% moved for family-related reasons and 12% for education or training; the remainder moved for other reasons or gave no reason. Among those who moved for work, 28% did so without already having found a job while 14% left their home country with a job already in place. The share of those who left for another EU Member State without having a job set up in the destination country was above 20% and up to 40% for Member States with negative net circulation.

The difference in percentage points between tertiary graduates who leave with and without a job is above the EU average for 22 countries, and the biggest differences are found in southern European Member States. More than one in five mobile citizens in several eastern European Member States moved without having a job.

Family reasons for moving to another EU Member State were stated more often than work reasons by citizens of western European Member States.

The findings show that human capital mobility needs to be contextualised within the reasons illustrated above and, not surprisingly, the countries that experience an imbalance in human capital circulation tend to be the ones where individuals leave without a job lined up.

Cost estimate of emigrating talent

With the increase of intra-EU labour mobility, the interest in its economic impact has risen significantly. Especially for countries experiencing a brain drain, a deeper understanding of underlying dynamics and the quantification of impacts when the highly skilled emigrate could provide important insights. One approach to contextualising the phenomenon of brain drain involves examining the economic costs that countries face in terms of failed return on investment. In other words, public money is invested to support citizens' education, and the higher the education level, the higher the investment. When individuals complete their education, the knowledge and skills they acquired contribute to the country's human capital accumulation and, consequently, economic growth. This section provides an overview of the literature and the results of the calculation to estimate potential economic loss to public finances if citizens leave the country.

Previous studies

Although several papers explore the theoretical channels through which both sending and receiving countries are affected (Stark, 2003; Gibson and McKenzie, 2011), the empirical evidence on these channels is scarce. There are many channels through which the sending country's economy could incur economic and financial losses due to graduate outflows.

First, assuming that all emigrants would have participated in the labour market in their home country, the lower human capital stock due to graduate emigration results in lower productivity (Docquier and Rapoport, 2012). Also, Anelli et al (2023) find a negative causal effect of brain drain on entrepreneurial activity.

Second, forgone tax earnings due to a smaller tax base constitutes a forgone income stream for the public sector. From a public finance perspective, assuming that graduates stay abroad for their entire working lives, the government misses out on the returns (income taxes) on the investment of educating these non-returning citizens (Lynn, 1968; Čekanavičius and Kasnauskienė, 2009).

Multiple papers have investigated the economic cost of brain drain in low- and middle-income countries (Abdelbaki, 2009; Desai et al, 2009; Gibson and McKenzie, 2011); however, evidence on brain drain in high-income countries is very limited. One paper that empirically addresses the question of economic costs associated with graduate emigration in Italy is that by Boffo and Gagliardi (2017). The authors use OECD (2019) data to determine education costs per student up to tertiary level, which come to €121,500 on average. Forgone tax earnings through national income tax and taxes paid by the employer are computed, but local taxes and social security contributions are disregarded. In the next step, the authors deduct per capita public spending and the government's savings on education spending for potential children of emigrants. However, the authors do not account for the associated productivity loss. Their final calculation estimates a potential loss of approximately €10.5 billion over 2010–2014.

Maslennikov et al (2018) examine the economic cost of labour migration in Russia during 2000–2017. The authors compute an estimate based on the average value of the life of an emigrant, which takes into account GDP per capita, the average working years until retirement and the human development coefficient. Their final estimate is a cost of 27 trillion roubles (€280 billion as of 15 July 2024) for the period 2000–2017. The Bulgarian Industrial Capital Association calculated that Bulgaria lost BGN 25 billion (€12.8 billion as of 15 July 2024) over 28 years due to emigration (Kapital, 2018). Its baseline estimate considers both secondary

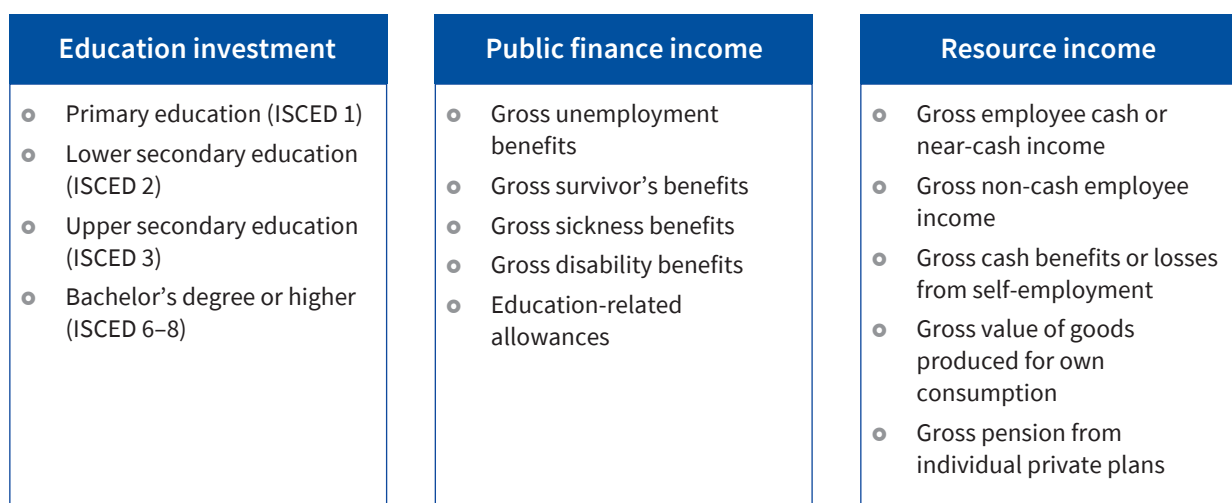
and tertiary degrees since no data are available for emigration by education level.

Cost calculation

The challenge of coming up with a comparable cost estimate for all EU Member States lies in the complexity and diversity of tax and social security systems and education systems across Europe.¹² Thus, the approaches of two different studies are combined to obtain an estimate. To compute an estimate capturing the economic loss associated with brain drain that accounts for both forgone tax earnings and lost productivity, the methodology follows the steps of the EU-wide costing exercise on economic costs associated with people who are NEET conducted by Eurofound (2012) using European statistics on income and living conditions (EU-SILC) data. The rationale behind the costing framework applied to the brain drain context is the following: the economic contribution that an average graduate would have made to the local economy had they not emigrated is captured by resource income (Figure 25, right-hand panel), which sums up several strands of individual gross income derived from EU-SILC. On the other hand, there are welfare transfers that the fiscal body retains due to emigration of the graduate, labelled public finance income and displayed in the middle panel of Figure 25.

Hence, in 2021, the economic loss associated with one 'average' bachelor's degree graduate emigrating is the sum of the education investment plus the resource income, minus the public finance income. To obtain the total economic loss, this total unit cost is multiplied by the number of graduates who emigrated in 2021.

Figure 25: Schematic of the components of the cost estimate of emigrating graduates



Source: Authors

¹² According to Eurostat data, almost 90% of education in Europe is publicly funded, with varying degrees of contribution required from citizens. This implies that the estimation cost carried out in this analysis covers public expenditure, and it can be considered to cover with good approximation the vast majority of graduates.

A set of analytical choices were made to achieve a conservative estimate of the cost of skilled emigration. An average bachelor's degree graduate aged 25–34 was selected as the unit of analysis, and the authors quantify the cost linked to the emigration of this average graduate for each EU Member State where data are available. The reason for choosing this cohort was to have a conservative estimate; people who were 34 years old in 2021 would have started their educational path (assuming a straight trajectory) at the beginning of the 1990s. The authors felt that it was too great an assumption to presuppose that the same amount would have been invested for people who graduated earlier. The 25–34 cohort represents approximately 50% of the graduate migrants (in Austria, Belgium and Italy), and it is not a given that those emigrating have only a bachelor's-level degree; indeed, the literature shows that the higher the educational level, the more likely an individual is to move abroad (Docquier and Marfouk, 2004; Kerr et al, 2016; Anelli et al, 2023; European Commission, 2023a).

One implicit assumption that might lead to an overestimation of the cost is that these graduates did not contribute to the local economy at all and thus the countries' investment in their education did not yield any returns. This is a strong assumption and could easily be voided by graduates moving abroad after some time working in their home country.

The calculations are fed by the three cost-related components shown in Figure 25.

The **first component is investment in education**. The information on country-specific education systems and duration of education cycles was retrieved from the publication *The structure of the European education systems 2022/2023: Schematic diagrams* (European Commission/EACEA/Eurydice, 2022). Where there are several options in terms of duration of an education cycle, the minimum duration required to attain a specific education level was selected.

To account for the investment in creating human capital, Boffo and Gagliardi's (2017) schema was followed to compute the education-related cost per graduate. To obtain the figures on total expenditure per student by country and education level, two data sources were combined. Education cost estimates were calculated using data from the OECD on country-specific expenditure per student. Specifically, the dataset 'Educational finance indicators', which collects indicators of education financing by education level, type of educational institution, source of funds and type of expenditure, was used. For comparability reasons, local currencies were converted to US dollars using purchasing power parity conversion factors, which have been converted to euro in this report based on the exchange rate of 0.93 on 9 February 2024.

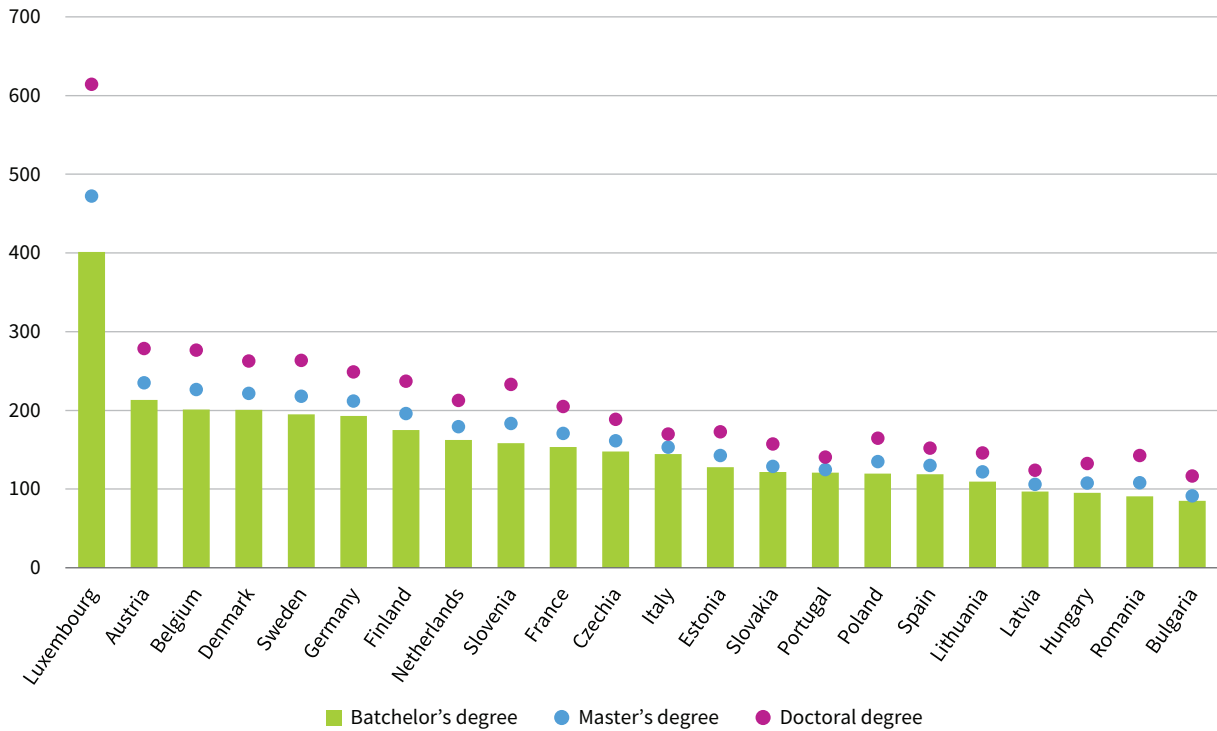
The most common path for students before pursuing tertiary education is the completion of compulsory schooling, which is primary and lower secondary education (ISCED levels 1 and 2), followed by higher secondary education (ISCED level 3). Thus, the indicators used for our calculations are primary education (ISCED 1), lower secondary education (ISCED 2), upper secondary education (ISCED 3) and bachelor's degree or equivalent (ISCED 6–8).¹³ Figure 26 shows the amount invested by each Member State to educate an individual from primary level to bachelor's degree level; master's and doctoral degree levels are also shown for comparison.

The **second component is the average yearly public finance income**, and it is the sum of unemployment benefits, survivor's benefits and sickness benefits for the 25–34 cohort who have a bachelor's degree. (Data for gross disability benefits and education-related allowances are not available.)

The **third component is resource income**, which comprises several components of employee gross income for those in the 25–34 cohort who have a bachelor's degree.

13 There are four dimensions for each indicator that can be adjusted according to the question of interest. This analysis uses 'general government' as the reference sector, determining the source of funds; 'public and private institutions' as the counterpart sector, indicating the beneficiary of the funds; and 'NORD' as expenditure type, which yields an indicator where funds dedicated to R&D activities are deducted.

Figure 26: Investment required to bring one individual from primary education level to degree level, EU Member States, 2022 (€, thousands)



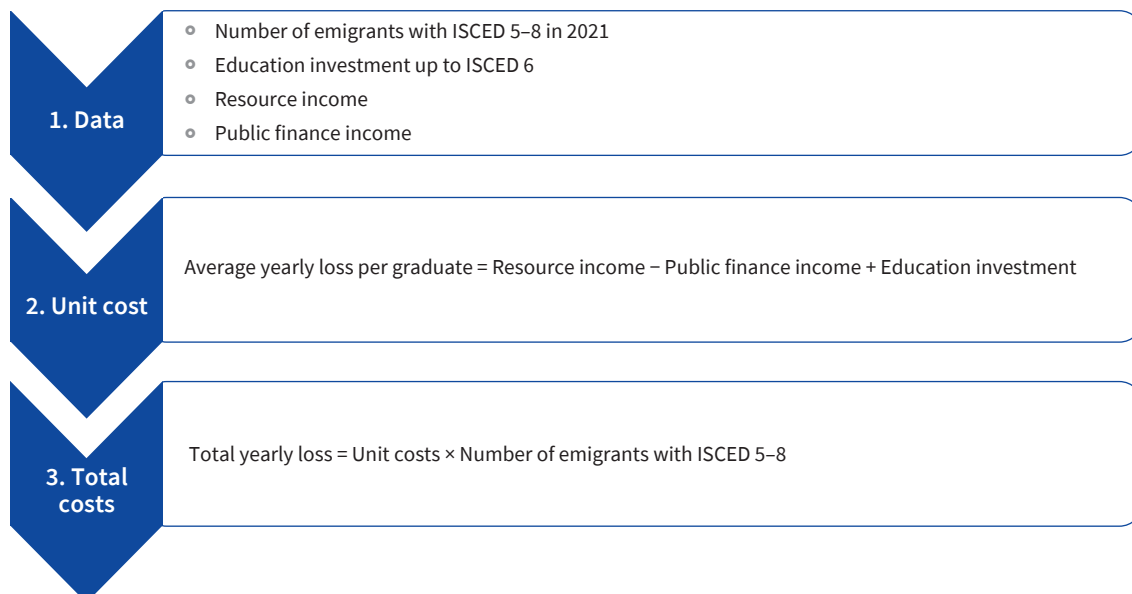
Note: Data for Cyprus, Greece, Hungary, Ireland and Malta are missing.
Sources: European Commission/EACEA/Eurydice, 2022; OECD, 2024

Therefore, the combination of the second and third components represents the yearly loss incurred by the government as the sum of average forgone contribution to the local economy and tax earnings and social security contributions, minus the average welfare

transfer payments that the government saves on due to emigration.

The full calculation for the cost of emigration of graduates is summarised in Figure 27.

Figure 27: Schema for estimating the cost of highly skilled emigration



Note: Data for the full calculation are available for six Member States: Austria, Belgium, Estonia, Finland, Italy and Sweden.
Sources: European Commission/EACEA/Eurydice, 2022; OECD, 2024

The different cost elements and the resulting cost estimates associated with brain drain are displayed in Table 3. It shows that the cost of brain drain is determined by the interplay of education expenditure, size of public welfare payments and income generated by graduates. The last column represents the economic loss as a share of GDP for the six Member States for which the full calculation was possible; this allows for the comparison of these Member States. In absolute terms, Italy is notable for its number of graduate emigrants (14,379), which is reflected in the associated economic loss (€2.28 billion). However, the loss accounts for only 0.12% of GDP. The highest economic loss in terms of share of GDP occurs in Belgium, with a loss of 0.26% of GDP. This can be explained by a comparatively high education expenditure and the large number of emigrants (5,162) in relation to population size. Economic losses between 0.11% and 0.17% of GDP were calculated for Austria, Estonia and Finland. By far

the lowest absolute and relative cost was computed for Sweden (0.01% of GDP) due to the low number of graduate emigrants.

This exercise reveals that, for the countries where data are available, the impact of emigrating talent seems to be minor in terms of GDP when calculated on a yearly basis. For some countries such as Belgium and Italy, however, the amounts become significant if they stay at the same level, amounting to more than €10 billion over a decade. The estimate is very conservative and is calculated only as a baseline; just the 25–34 age group was considered in calculating the cost of education, and the number of graduates emigrating with a level of education higher than bachelor's level was not considered for lack of detailed data. The exercise also highlights the challenge in retrieving mobility data collected at different levels of granularity across Member States. It gives an insight into how the education systems and fiscal systems are still very tied

Table 3: Cost components and economic loss associated with highly skilled emigration, by Member State

Member State	Unit of education investment up to bachelor's degree (€)	Unit of public finance income (€)	Units of resource income (€)	Unit total cost (€)	Graduate outflow 2021	Total cost (€)	% of GDP
Austria*	213,335	1,499	22,898	234,733	1,744	409,375,213	0.11
Belgium**	200,918	1,822	28,619	227,715	5,162	1,175,465,464	0.26
Bulgaria	85,058	464	13,405	97,999			
Czechia	147,753	179	15,818	163,392			
Denmark	200,725	3,050	24,417	222,092			
Estonia	127,598	1,012	19,342	145,928	424	61,873,461	0.17
Finland	175,145	1,327	22,122	195,940	1,410	276,275,534	0.14
France	153,457	1,115	22,492	174,834			
Germany	192,953	920	35,461	227,494			
Hungary	95,198	125	14,421	109,494			
Italy***	144,505	1,557	15,327	158,275	14,379	2,275,841,019	0.12
Latvia	96,960	703	21,028	117,285			
Lithuania	109,588	886	23,123	131,826			
Luxembourg	401,282	2,550	32,775	431,507			
Netherlands	162,234	388	29,358	191,204			
Poland	119,556	87	19,169	138,639			
Portugal	120,819	169	14,746	135,396			
Romania	90,650	39	20,963	111,574			
Slovakia	121,589	264	7,638	128,962			
Slovenia	158,515	552	17,497	175,459			
Spain	118,674	1,059	16,210	133,825			
Sweden****	194,758	1,738	23,809	216,828	150	32,524,274	0.01

* Gross non-cash employee income (EU-SILC, PY20G) is missing; graduate outflow average 2019–2021; ** graduate outflow 2017 data; *** gross sickness benefits (EU-SILC, PY120G) is missing; **** values refer to only those born in Sweden.

Notes: Shading denotes countries for which data were available for the full calculation. Due to rounding, figures in the Total cost column do not reflect exactly the product of the Unit total cost and the Graduate outflow 2021 columns.

Sources: Second column: European Commission/EACEA/Eurydice, 2022, and OECD, 2024 (authors' calculations); third and fourth columns: EU-SILC (calculated); sixth column: national statistical offices

to national systems and thus the movement of highly skilled EU citizens is good news for the EU as whole but less so for Member States not able to attract enough talent. Various proposals to link education to a ‘loan’ that needs to be repaid by students if they emigrate have been proposed over the years (Lynn, 1968; Kapital, 2018), but this solution, in the authors’ opinion, does not cross national borders to become a European solution that can raise the attractiveness of places with high outflows. It rather constrains the movement of talent.

As discussed in the literature, the presence of tertiary graduates boosts economic growth and innovation, so the overall focus should not be on the economic cost of emigrating talent but on the capacity to attract this talent, in terms of nationals coming back or providing opportunities for foreign citizens. In the end, it is the share of graduates in a territory that helps to make a difference as seen in Chapter 3.

Interplay of human capital potential, utilisation and innovation

The convergence analysis in Chapter 2 highlighted the presence of a geographical divide in regard to human capital creation, utilisation in the labour market and mobility. This divide may be related to differences in how human capital is developed in different Member States, and whether common patterns and policy strategies can be identified. For this reason, the next part of this study aims to cluster Member States based on relevant human capital development dimensions. It goes beyond the World Bank Human Capital Index as it includes the creation of human capital, its utilisation in the labour market, and the stocks and flows of highly skilled migrants in the economy. Inspired by a previous study (Vaitkevičius et al, 2015), human capital development can be divided into three main dimensions: social progress of human capital, innovation rate and potential of human capital development. Hence, this study replicates the analysis by Vaitkevičius et al (2015) that was performed on 2010 data, adapting indicators and countries to provide an updated overview of human capital patterns in each Member State.

To create a reliable human capital development index, several variables were considered. The selected variables reflect the main indicators of human capital creation, utilisation and mobility, to which other contextual variables were added, resulting in a total of 26 variables. They include access to the internet, lifelong learning, employment rate and high-technology

exports (for the full methodology of both factor and cluster analyses, see Annex 1. After running correlations and factor analysis, the 26 variables were merged into two indicators.

- **Potential for human capital development** is captured by the following variables: the share of the population with access to the internet, the share of adults in education or training, the share of patents, GDP, population growth, the share of the population who are healthy at 65, human resources in science and technology, the share of R&D personnel and researchers, income by education level, the share of individuals with tertiary education, the share of mobile graduates and net human capital circulation.
- **Human capital utilisation and innovation** is captured by the following variables: employment rate by education level, the share of the population at risk of poverty or social exclusion (negatively correlated), and the share of high-technology exports in manufacturing.

The first indicator has elements of well-being and education as well as factors that enable human capital development, whereas the second reflects human capital utilisation and technological advancement.

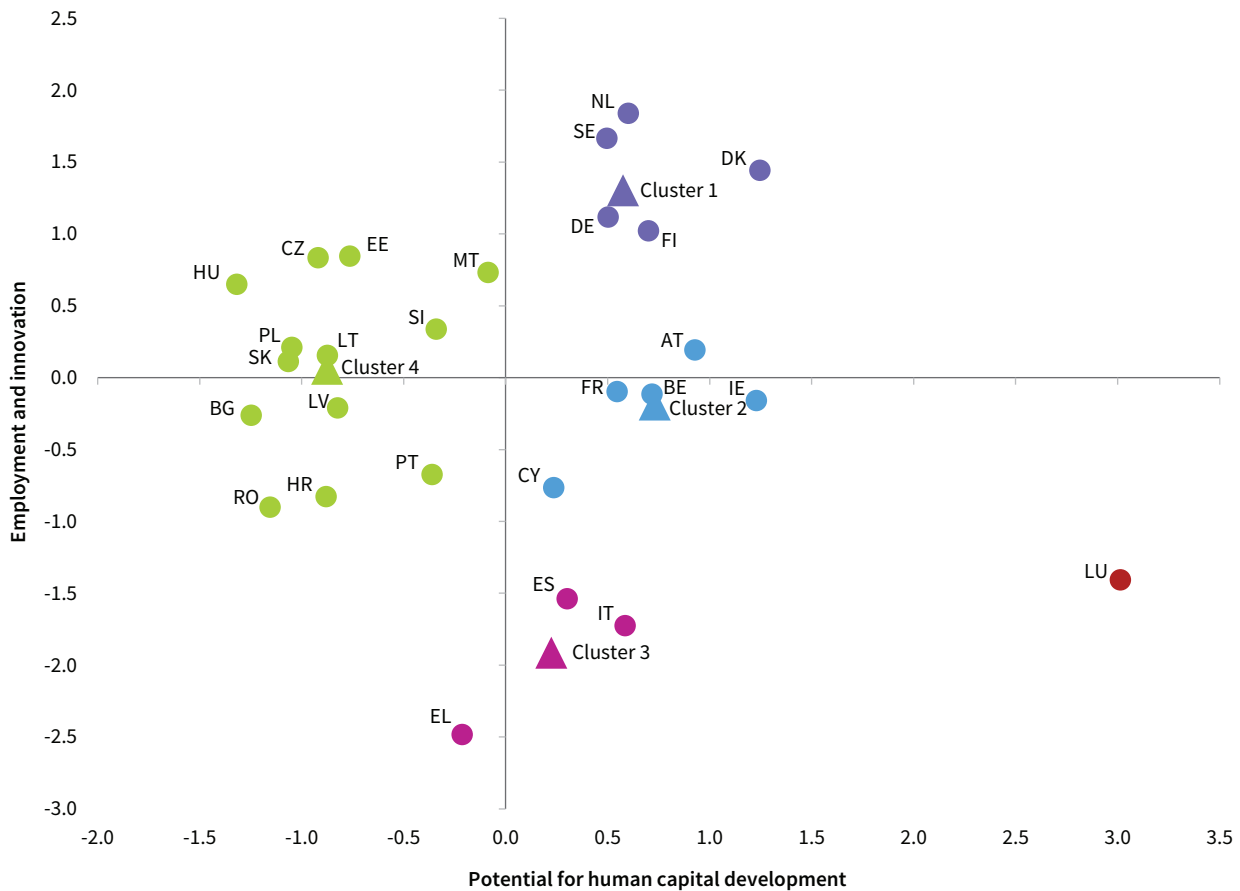
To find commonalities among Member States on the two indicators of human capital development, countries were then clustered. The exercise resulted in the creation of four clusters, with Luxembourg as an outlier (Figure 28).¹⁴

- Cluster 1: Relatively high potential for human capital development and high levels of employment and innovation (Denmark, Finland, Germany, the Netherlands and Sweden).¹⁵
- Cluster 2: High potential for human capital development but relatively low levels of employment and innovation (Austria, Belgium, Cyprus, France and Ireland), plus very high potential for human capital development but low levels of employment and innovation (Luxembourg).
- Cluster 3: Relatively high potential for human capital development but very low levels of employment and innovation (Greece, Italy and Spain).
- Cluster 4: Low potential for human capital development and average levels of employment and innovation (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia).

¹⁴ Due to the large number of mobile students, Luxembourg had an extremely high score on potential for human capital development, so the country could be added to Cluster 2 or considered separately from the other clusters.

¹⁵ ‘Relatively high’ signifies a value that is within 1 standard deviation of the average (0.83 for potential in human capital development and 0.74 for employment and innovation); ‘high’ and ‘low’ signify a value between 1 and 2 standard deviations; and ‘very high’ signifies a value over 2 standard deviations.

Figure 28: Result of cluster analysis on human capital development, EU Member States, 2021



Note: Triangles represent the average position for the clusters.
Sources: Eurostat, EU-LFS and EU-SILC data; authors' calculations

The cluster analysis reflects some of the results produced by the convergence analysis. Nordic countries, alongside Germany and the Netherlands, can create human capital and utilise it abundantly for employment and innovation. This reflects the efforts made by those countries to increase R&D expenditure, adult learning and attractiveness to foreign talent.

The cluster including Austria, Belgium, Cyprus, France and Ireland is in the opposite situation to the cluster including most eastern European Member States. The analysis shows a balanced picture when it comes to human capital utilisation and innovation for both clusters, meaning that several countries are performing quite close to the EU average when it comes to employment and innovation. The main difference lies in the potential for human capital development. Central European Member States have put in place measures to improve their human capital, for instance by reducing the proportion of early school-leavers and boosting tertiary education attainment. Meanwhile, eastern European Member States lag in several indicators, especially due to the large part of the population that emigrates to pursue higher education and better jobs, as seen in the net circulation analysis earlier in the chapter.

Notwithstanding, eastern European Member States are faring much better than the group of countries that struggle to exploit their above-average potential (Greece, Italy and Spain), with repercussions for employment and innovation. As a result, many young graduates emigrate to find a better match for their skills.

The takeaways from the exercise are twofold. First, it strengthens the convergence analysis results, highlighting how some countries are performing similarly in key indicators related to human capital and how human capital development can be conceptualised. Second, it helps policymakers in finding similarities across Member States, which could suggest policies to foster human capital development and its utilisation by creating and attracting new talent. At the end of their paper, Vaitkevičius et al (2015) pondered why structurally different countries had similar human capital outcomes. The reasons for such a complex issue might be found in specific traits of each country, which might be shared within the clusters. The qualitative information from the case studies on policies in the next chapter could help to answer these questions.

5 Policies for human capital retention or attraction

This chapter takes a qualitative approach to the analysis of policies for talent retention and attraction and uses country case studies to describe a number of initiatives undertaken in five EU Member States at national or subnational level (Table 4). For the national-level initiatives, objectives, target categories of talent, implementation process and participating stakeholders are described. Where available, evaluations of these initiatives (conclusions from internal or external reviews or opinions of the implementers or social actors) are summarised. Initiatives at regional level are described more briefly in boxed text. For each country, the lessons learnt from these initiatives are highlighted with a view to transferring knowledge to other countries, regions or cities. The case studies cover Ireland and the

Netherlands, as countries primarily benefiting from brain gain, and Italy, Lithuania and Portugal, as countries largely focusing on containing brain drain. The methodology used for developing this chapter is presented in Annex 2.

The case studies are intended to cover a sufficiently representative range of situations and, hence, of policies. Bearing in mind that talent attraction and retention often require multilevel governance and multiactor approaches (Cavallini et al, 2018), the case studies investigate national and regional experiences. They also consider different types of talent, namely skilled professionals, researchers, PhD holders, PhD students and tertiary students (ISCED levels 5–8).

Table 4: Summary of national and regional policies in the selected Member States

Initiative	Country	Level	Creation	Utilisation	Mobility
Highly Skilled Migrant Programme	Netherlands	National			✓
University of the North	Netherlands	Regional	✓	✓	
Agenda of the Groningen Agreement	Netherlands	Regional		✓	
International Talent Programme	Netherlands	Regional		✓	✓
Third Level Graduate Programme	Ireland	National			✓
GradStart	Ireland	National		✓	
Postgraduate scholarships and postdoctoral fellowships	Ireland	National	✓		
Remote working in the south-east	Ireland	Regional		✓	
Scientific Employment Incentive Programme	Portugal	National		✓	
Collaborative Laboratories (CoLABs)	Portugal	Regional		✓	
Create Lithuania	Lithuania	National		✓	✓
Brain Gain and Reintegration (SMART)	Lithuania	National			✓
International House Vilnius	Lithuania	Regional			✓
Rientro dei cervelli	Italy	National			✓
INN Veneto	Italy	Regional	✓	✓	
Torno subito	Italy	Regional	✓	✓	✓

Source: Authors

Netherlands

Country background

Although the Netherlands is one of the most attractive EU Member States for talent because of its favourable living and working conditions, the country has national policies for attracting non-EU talent and competing in the challenging global ‘war for talent’. Such policies do not target specific countries but focus on types of talent and on a restricted number of economic sectors, namely those where brain gain contributes to keeping the national economy competitive and innovative.

Different schemes have been used in the last 10 years to attract non-EU talent to the country. Examples include the ‘start-up permit’ to attract start-ups of talented immigrants residing in other EU Member States through the removal of the requirement for temporary residence permits and the setting of favourable business conditions (subsidies, access to networks, tax exemptions); the ‘orientation year permit’, aiming to retain highly educated foreign graduates; and the Highly Skilled Migrant Programme, which aims to attract highly skilled migrant workers and complement similar types of permits such as the EU Blue Card scheme and the permit for intra-corporate transferees (I amsterdam, undated-a).

An attractive job market has a pull effect on international degree students looking for high-quality education and appealing job opportunities. In the academic year 2022/2023, 122,287 international degree students were enrolled in Dutch higher education, of whom 88,265 (72.2%) were from countries in the European Economic Area (EEA), primarily Germany (22,775 students), Italy (7,633) and Romania (6,717). The most relevant non-EU countries of origin were China (5,610 students) and India (3,504 students). The attractiveness of the country is also based on the number of bachelor’s and master’s degrees taught in English. In the academic year 2021/2022, 222 bachelor’s programmes were taught only in Dutch, 122 only in English and 78 in both languages. For master’s programmes, teaching in English prevails (535 programmes were taught only in English, 98 only in Dutch and 67 in both languages) (Nuffic, 2023). This attractiveness varies across the country. The South Holland province has the highest number of enrolled international degree students (30,255 in 2022/2023, or around 15% of its degree student population), and Zeeland the lowest (697). Limburg has the largest share of international degree students in its degree student population (38.7%, with 13,730 international degree students) and Utrecht the lowest (8.9%, with 7,153 international degree students). Among cities, Amsterdam leads with 23,268 international degree students in 2022/2023, approximately 20% of all the international degree students enrolled in the Netherlands. It is followed by Groningen (12,537), Maastricht (12,443) and Rotterdam

(11,812). In the academic year 2022/2023, compared with the previous year, almost all Dutch cities experienced an increase in the number of enrolled international degree students (Nuffic, 2023).

Despite the human capital potential available through the attraction of foreign degree students, in June 2023 the indirect costs related to educating early-stage talent and the risk of high rates of return of these individuals to their countries of origin led the Dutch Minister of Education, Culture and Science to propose measures to regulate incoming degree students’ mobility (Brussels Signal, 2023). Among the measures are an ‘emergency cap’ to limit unforeseen peaks in the number of non-EU student applications and limitations on the international recruitment activities of higher education institutions (with exceptions applying for those economic sectors suffering from skills shortages). These include the reduction of the number of courses offered in English at bachelor’s level and the introduction of the Dutch language learning requirement for international students (Nuffic, 2023).

Highly Skilled Migrant Programme

Objectives

The Highly Skilled Migrant (*Kennismigrant*) Programme (HSMP) aims to attract non-EU talent to the Netherlands to contribute to the country’s knowledge economy.

Target talent category

This programme targets highly skilled non-EU workers. There are no education requirements for applicants, but it is necessary for the employer (that is, the company) to be recognised as a sponsor by the Dutch Immigration and Naturalisation Service of the Ministry of Justice and Security.

Implementation process, stakeholders and roles

Highly skilled non-EU migrants need a residence permit to work in the Netherlands. An employment contract with a company in the Netherlands lasting at least three months is a prerequisite for the permit. The employer is responsible for the application. The Ministry of Justice and Security oversees the implementation of the programme by checking all the requirements for issuing the first residence permit. It is also responsible for the extension or transfer of the permit to another employer. A minimum salary requirement applies. In 2023, the minimum monthly gross salary of highly skilled migrants aged under 30 years was €3,672; for those aged 30 years and over it was €5,008; and for those requiring the EU Blue Card it was €5,867. A reduced salary (€2,631) is applicable in specific cases (e.g. immediately after the expiration of the ‘orientation year permit’ for a highly educated individual) (IND, undated).

Additional benefits granted to highly skilled migrants include exemption from language learning requirements (the so-called civic integration

requirement), eligibility for five years for the 30% tax ruling (a tax-free compensation that the employer provides to the international employee for the extra costs incurred for moving to a new country) (Octagon Professionals, undated) and the ability of the employer to apply for a residence permit for the migrant's family members. In some cities (Amsterdam, for instance), the procedure for the residence permit initiated by the employer can be jointly managed alongside the request by the migrant for municipal registration and a citizen service number (where both are necessary conditions for opening a Dutch bank account or arranging health insurance) (I amsterdam, undated-b).

The duration of the permit depends on the duration of the employment contract. If the employee has a contract for an indefinite duration, the permit is issued for a maximum of five years and is subject to extension. After a five-year legal stay in the Netherlands without interruptions, the holder of the Dutch highly skilled migrant permit qualifies for a permanent long-term residence permit in the EU (under Directive 2003/109/EC).

Evaluation

Interviewed representatives of the social partners (a trade union and an employer organisation) consider the HSMP successful in filling specific gaps in the Dutch labour market. In fact, the representative of the Federation of Dutch Trade Unions (FNV) believes that the programme is even too successful and that, because of

the advantages offered to employers (financial advantages and lower labour costs related to, for example, pension contributions, social premiums and unemployment benefits), it somewhat discriminates against Dutch workers, creates uneven competitive conditions in some sectors and results in increasing amounts of missed revenue for the central government. The FNV representative explained that the programme was very well communicated and is now very popular, and that the number of highly skilled migrants hired is on the rise also because there are commercial parties helping companies search for these workers. Because of this success, the programme will continue, but the opportunity to review its financial component is currently being debated by the government and the social partners. This discussion is part of a wider national-level political discussion on the national taxation system.

The representative of the Dutch employer organisation VNO-NCW emphasised that the HSMP is preferred to the EU Blue Card scheme because it is more flexible, less strict and easier to use. According to him, companies are very willing to employ highly skilled migrants under this programme and would welcome even less strict conditions for its application to increase the number of attracted migrants. In 2022, highly skilled migrants using the Dutch scheme numbered 21,550, whereas only 220 individuals in the Netherlands benefited from the EU Blue Card scheme (Ministerie van Justitie en Veiligheid, 2023).

Regional initiative: North Netherlands – Human capital absorption using Smart Specialisation Strategy

The five main higher education and knowledge institutions of the North Netherlands region are in the cities of Groningen and Leeuwarden. Higher education students move from peripheral areas of the region to Groningen and, to a lesser extent, Leeuwarden for their studies, and often do not return after graduation. This situation drives brain drain in peripheral areas, especially those near the coast and the German border, as well as depopulation, an ageing labour force and a reduction in the number of educated people. But the entire North Netherlands suffers from brain drain. Groningen attracts half of its degree students from outside the city and usually has a small net positive inflow–outflow balance of graduates each year. Still, it has been noted that, in the medium term (4–6 years after graduation), graduates who previously settled in the region decide to leave, in most cases because of career opportunities elsewhere (van Dijk et al, 2022). The West Netherlands region in general and the Randstad area in particular (which includes some of the biggest cities of the country such as Amsterdam, Rotterdam, The Hague and Utrecht) are the main attraction poles for these graduates.

Since 2010, the EU has promoted the development of Smart Specialisation Strategies to build research and innovation capacity at regional level. A case study conducted by the European Commission Joint Research Centre on the role of higher education institutions in the design and implementation of the North Netherlands Smart Specialisation Strategy shed light on the importance of human capital in regional innovation (Benneworth and Arregui-Pabollet, 2021). It also highlighted the need for the North Netherlands region to develop a clear and shared path among actors to address the region's brain drain to the main Dutch urban areas and abroad. The findings of the case study contributed to the preparation of the 2021–2027 Research and Innovation Strategy for Smart Specialisation, which became the starting point of initiatives aiming to foster the absorption of talent across the region.

Among these initiatives was the establishment of the University of the North, a knowledge and innovation network joining the five main higher education and knowledge institutions of the region. The network is meant to enable these entities to join forces and adopt a common and shared approach. The University of the North established innovation facilities (campuses, field labs, hubs and clusters) in the peripheral areas most affected by brain drain. This improved the collaboration between higher education students and staff of the public authorities and local businesses (van Dijk et al, 2022) and created opportunities to absorb talent in regional innovation processes, as recommended by the Joint Research Centre analysis. Financing of these activities comes from regional, national and EU funds such as the Groningen National Programme (2019–2030), which provides ‘compensation financing’ for the earthquakes induced by natural gas drilling (Groningen is Europe’s biggest natural gas field), and the Just Transition Fund, a significant amount of which will be used to address aspects of labour and brain drain, according to van Dijk et al (2022).

Another initiative is the inclusion of talent exploitation in the top three ambitions of the 2022–2025 Agenda of the Groningen Agreement. Established in 2005, the agreement is a collaboration between the municipality, the province and knowledge institutions and hospitals in the area. The current four-year agenda is funded by the participating partners’ own budgets and has a yearly allocation of about €1 million. Implementation is open to the contribution of external actors, and cooperation with other partners in the northern region, such as the Northern Netherlands Alliance, the Groningen National Programme and the Groningen-Assen region, is anticipated. Among the supported initiatives are the Talent in the Region programme, for the monitoring of school-to-work transitions, and TalentWeb Groningen, for strengthening the ties between students and the business community.

Regional initiative: Human capital policy in the South Holland province – International Talent Programme

The International Talent Programme was established under the South Holland Human Capital Agreement 2019–2024 put forward by the South Holland province and South Holland Economic Board with the aim of improving the functioning of the labour market. The agreement has been signed by 66 parties and sectors of the province, which is in the West Netherlands region and is also known as the Greater Rotterdam–The Hague area.

The programme is coordinated by InnovationQuarter, the economic development agency of South Holland, and implemented in cooperation with the International Centres of Rotterdam, The Hague and Leiden (these centres provide practical support and information to those individuals wishing to work, live, study or do business in their respective territories) and educational institutions and social partners from South Holland. The programme is financially supported by the South Holland province and other parties to the agreement.

Established in early November 2021, the International Talent Programme aims to group and strengthen existing initiatives to attract and retain international talent. The target of 1,000 employed individuals is primarily pursued through the development of a platform named Work in Rotterdam – The Hague, which provides information and matching services to both international job seekers and companies. In early November 2023, the platform indicated that it had supported the employment of 180 talented individuals in the Greater Rotterdam–The Hague area. In July 2024, around 2,000 vacancies were advertised on the portal.

In March 2023, South Holland public authorities objected to the central government’s decision to ask training institutions across the country to stop actively recruiting international talent. In an open letter, they reiterated the importance of the province’s human capital policy; indicated broad support for internationalisation processes, asking for the continuation of the national ‘Make it in the Netherlands’ programme with which the International Talent Programme is aligned; expressed the need to adopt customised measures according to type of institution, type of study programme and location; and asked for dialogue to identify concerted measures (EBZ, EBTH and EBD, 2023).

Lessons learnt

- In the HSMP, labour market shortages of qualified workers make employers willing to pay a high minimum salary. This willingness is used in the programme as the mechanism to attract highly skilled migrants.
- The HSMP competes with the EU Blue Card scheme by providing more flexible and favourable conditions for employers. The minimum employment period is three months (versus one year for the EU Blue Card) and the salary threshold is much lower, especially for migrants aged under 30 years. A representative of the Dutch employer organisation VNO-NCW highlights that the HSMP is preferred because it fits the Dutch labour market conditions very well. For this reason, its replicability in other countries requires a deep knowledge of the functioning of each country's labour market and of the capacity of the training and education system to provide qualified workers.
- The representative of the FNV considers the HSMP effective also in the social integration of the participating migrants. The employer is responsible for providing support and, often, even housing to the migrant. In addition, since the required working language for highly skilled occupations is usually English, migrants' cultural integration is smooth.
- The assumption that human capital in general and talent in particular are key to an innovation economy is specifically stated in the RIS3 framework of the North Netherlands region. The attention to talent absorption under the RIS3 facilitates the convergence of initiatives by different actors of the territory towards common scopes.
- The case of the North Netherlands and Groningen shows how brain drain is a spatial and temporal variable. Brain gain at regional level does not imply that all areas within the receiving region attract talent. In addition, in Groningen, brain drain is not the result of a yearly computation of inflows/outflows of university graduates, as the loss of talent is a phenomenon occurring over time and concerns talented individuals who settled down in the city, or nearby areas, 4–6 years earlier.
- Although Dutch actors are used to working and cooperating according to a quadruple helix approach (government, knowledge institutions, industry and society), the lack of common agendas for absorption of human capital may hamper the effectiveness of a concerted approach and, instead, trigger competition for talent at territorial level. The creation of the University of the North in the North Netherlands has boosted cooperation, instead of competition, among the existing knowledge institutions of the region.

Ireland

Country background

During the 1990s and early 2000s, Irish authorities led the transformation of Ireland into a knowledge-driven economy, focusing specifically on attracting high-value inward investment, which, in turn, would attract highly educated workers. The Irish industrial development agency, IDA Ireland, became more selective in terms of firms it wanted to attract to Ireland. It tried to identify niches and sectors with high growth potential, shifting from manual labour-intensive sectors such as textiles to high-skilled sectors such as software development and technology, and medical devices (Cooke and Piccaluga, 2004). The success of these strategies, combined with the widespread use of English and a low company tax rate, means that Ireland has become a pole of attraction for highly educated migrants.

During the Great Recession of 2007–2009, net immigration remained positive, but decreased compared with the previous years. The years following the economic crisis were characterised by negative net immigration. However, from 2015 to 2022, an upwards trend was observed, with a dip during the COVID-19 pandemic. In addition, a clear rise in the share of highly

educated workers took place in this period (Central Bank of Ireland, 2022). In fact, Ireland has been experiencing brain gain, as the number of jobseekers, particular highly educated ones, coming to Ireland exceeded the number of jobseekers leaving the country: in 2022, 70,300 (58.2%) immigrants had a tertiary qualification and 30,700 (51.5%) emigrants had a tertiary qualification (Central Statistics Office, 2022).

Ireland's focus on attraction and retention of talent is ongoing and is supported by several measures. First, there are programmes targeting graduates and focusing on legal aspects to facilitate the process of application for work permits for non-EEA workers. Second, graduate programmes linking universities and companies help to expand the pool of researchers and highly skilled professionals within the country. Following the trend started in the 1990s, and as attractiveness of a territory is closely related to employment opportunities, various initiatives are continuously in place to specifically target businesses and incentivise them to relocate to, or expand in, Ireland. Moreover, with the National Skills Strategy, Ireland aims to enhance workforce capabilities through targeted skills development programmes and educational initiatives (Department of Further and Higher Education, Research, Innovation and Science, 2021).

One initiative that contributed towards the establishment of Ireland as a tech hub is the marketing campaign Tech/Life Ireland, launched in 2018. In collaboration with the two business agencies, IDA Ireland and Enterprise Ireland, the Department of Enterprise, Trade and Employment proactively engaged in the promotion of Ireland as an attractive target for tech workers by providing an informative website, creating social media content and distributing job advertisements. As of October 2023, 16 out of the 20 top global tech companies have established hubs in Ireland (IDA Ireland, undated). As of 2023, Ireland is a destination for highly skilled professionals who are attracted by job offers from multinational corporations with a presence in Ireland. According to the Economic and Social Research Institute, immigrants are on average more highly educated than Irish nationals. In fact, 55% of immigrants in Ireland have a tertiary qualification (McGinnity et al, 2023), and the majority were born in Europe. Also, immigrants are more likely to be working in a professional occupation than nationals.

Third Level Graduate Programme

Objectives

This initiative started in April 2007, the year when the official policy document *Third Level Graduate Programme Immigration Rules for Non-EEA students* was first published. This policy document was put in place to facilitate a smooth application process for General Employment Permits, Critical Skills Employment Permits or Research Hosting Agreements for non-EEA graduates (Irish Immigration Service, 2023). The purpose is to attract non-EEA students and to incentivise non-EEA graduates who studied in Ireland to remain in the country after graduation and seek employment in Ireland by supporting their application for an employment permit.

Target talent category

Non-EEA graduates legally residing in Ireland and holding an ISCED level 6 degree or higher from a recognised Irish awarding body are allowed to reside in Ireland for a period of 12 months or 7 years in total (under Stamp 2 permission as a student and Stamp 1G permission as a graduate).¹⁶ Graduates holding an ISCED level 7 degree or above are allowed to stay for 12 months to seek employment,¹⁷ but the permission can be renewed for another 12 months.¹⁸

Implementation process, stakeholders and roles

The parties involved in creating and revising this initiative are the Immigration Service Delivery, the Department of Education and the higher education sector. Applicants holding a tertiary education degree must apply to their local registration office to obtain a Stamp 1G permission. Depending on the type of qualification, graduates can apply for different types of employment permits. If their profession is regarded as being short in supply in Ireland, graduates can apply for a Critical Skills Employment Permit. Examples of eligible professionals are health professionals and engineers. This permit is attractive for foreign graduates, as no labour market needs test is required, which shortens the application process.¹⁹ Moreover, holders of a Critical Skills Employment Permit can promptly apply for family reunification. After settling down in Ireland, family members are entitled to seek any employment and can apply for a Dependant/Partner/Spouse Employment Permit, which is free of charge. Furthermore, once the Critical Skills Employment Permit expires, graduates can apply for permission to work and reside in Ireland without requiring a work permit.

A broader range of professions is covered by the General Employment Permit, which is another type of employment permit that graduates can apply for.

Graduates seeking employment as researchers with universities, accredited research institutes or businesses can obtain a work permit under the Research Hosting Agreement scheme. Once they have a valid Research Hosting Agreement with an eligible institution, they are allowed to work and reside in Ireland for the duration of the agreement. Furthermore, dependants of the researcher have full access to the Irish labour market without requiring a work permit.

Evaluation

According to representatives of the Department of Enterprise, Trade and Employment, this legal measure is a key aspect in talent attraction for Ireland. By facilitating and accelerating access to the Irish labour market for graduates themselves and for their dependants, Ireland can retain a high number of non-EEA graduates. The total number of permits is approximately 40,000 per year, but no breakdown by educational attainment is available.

¹⁶ An ISCED level 6 degree is equivalent to a level 8 degree in the Irish National Framework of Qualifications (NFQ).

¹⁷ An ISCED level 7 degree is equivalent to an NFQ level 9 degree.

¹⁸ The maximum overall residence in Ireland is eight years.

¹⁹ 'The government's policy is that employment opportunities which arise in Ireland should, in the first instance, be offered to suitably skilled Irish and other EEA nationals and should only be offered to non-EEA nationals where no suitable candidate emerges from within the EEA to fill the vacancy' (Department of Enterprise, Trade and Employment of the Government of Ireland, undated).

GradStart

Objectives

GradStart supports the retention and recruitment of graduates for client companies of Enterprise Ireland, Ireland's government organisation in charge of the development and growth of Irish firms in the world market. By attracting talent, the innovation and growth of enterprises are enhanced, which subsequently positively affects competitiveness of indigenous firms as well as employment. The legal basis for the initiative is Section 25 of the Industrial Development Act 1986 and Section 7 of the Industrial Development Act 1998. The state aid basis is aid under de minimis aid, which stems from Commission Regulation (EU) No. 1407/2013.

Target talent category

The programme targets all graduates and postgraduates (EU and non-EU) who have a qualification at ISCED level 4 and above.²⁰ The graduates may have a large variety of educational backgrounds and can work in several fields within the business, except for roles concentrating on marketing and sales. Prerequisites for graduates are a valid Irish work permit for 24 months or a one-year working visa with the option to renew it after one year, and proof of language proficiency. As this measure targets entry-level jobs, graduates should have graduated within the previous four years.

Implementation process, stakeholders and roles

Eligible companies are all Enterprise Ireland small and medium-sized enterprises, mid-tier companies with fewer than 500 employees, large companies (under certain circumstances), high-potential start-ups, accelerate companies (companies that aim to scale up quickly, usually supported through funding and mentorship) and local enterprise offices. These entities can hire up to three graduates for a two-year period with the exception of local enterprise offices (as they are state run), which can employ one graduate on a two-year contract. Moreover, the programme is open to clients of Údarás na Gaeltachta, which is a regional state agency responsible for the development of Irish-speaking regions in Ireland.

The stakeholders involved are Enterprise Ireland, the applying firms and the applying graduates. The applications are processed by Enterprise Ireland. Firms apply with a specific project, outlining how it will foster the growth of the company and specifying the graduate's role. Companies are then responsible for recruiting the graduates suitable for their project.

The funding approval process is not competitive, and applications are evaluated against the following set of established criteria:

the potential impact of the project on the strategic direction of the company; the commitment of the company to enhance its capability; the quality of the proposed infrastructure within the company to enable the graduate to fulfil the aims of this initiative; previous Enterprise Ireland financial support and performance against targets; all companies must identify a suitable in-company mentor.

(Enterprise Ireland, undated)

Enterprise Ireland is accountable for €30,000 per two-year cycle or 50% of individual graduate salary cost. Graduates must work full time in accordance with the working schedule of their employer, and Enterprise Ireland can evaluate single-company projects at any point during the project period. The initiative is funded under de minimis aid.

Evaluation

The programme fosters a symbiotic relationship between graduates in search of challenging and rewarding career opportunities and Irish businesses eager to incorporate new skills and expertise into their workforces. In 2021, 177 graduates were employed under the GradStart programme in 121 Enterprise Ireland client companies. Overall, according to interviews, this initiative has been successful in attracting and retaining talent thus far, but detailed statistics are not yet available.

Government of Ireland Postgraduate Scholarship Programme and Government of Ireland Postdoctoral Fellowship Programme

Objectives

These programmes aim to attract high-level researchers to Ireland. There are two categories of eligible applicants. Applicants who are EU citizens or nationals of Iceland, Liechtenstein, Norway, Switzerland, Ukraine and the United Kingdom (UK) and have been residing in one of these countries for at least three to five years, depending on the country, before 1 September 2024 fall into priority category 1. All others are allocated to priority category 2.

Target talent category

These programmes target master's, doctoral and postdoctoral candidates who aim to conduct research on a full-time basis (ISCED levels 7 and 8).

20 ISCED level 4 is equivalent to NQF level 6.

Implementation process, stakeholders and roles

The programmes are funded by the Department of Further and Higher Education, Research, Innovation and Science and are administered by the Irish Research Council. Several government departments and agencies collaborate with the Irish Research Council and support the initiative as strategic funding partners. For the Government of Ireland Postgraduate Scholarship Programme 2024, these are the Environmental Protection Agency; the Department of Children, Equality, Disability, Integration and Youth; the weather service, Met Éireann; and the Department of Foreign Affairs. A prerequisite to be eligible for the scholarship is affiliation with an Irish university or research institution. In principle, there are no constraints regarding the field of research tied to the scholarships, and the initiative should also encourage bottom-up and non-directed research, except in the case of scholarships funded by the above-named strategic funding partners.

Government of Ireland Postgraduate Scholarship Programme

Researchers from any discipline can apply. The duration of funding lasts for one to four years. The provided scholarship amounts to a maximum of €28,000 per year and consists of a stipend of €22,000 (€19,000 until January 2024) and a contribution to fees, including non-EU fees, paid to the host institution up to a maximum of €5,750. Research expenses related to the specific research project amount to €3,250.

Government of Ireland Postdoctoral Fellowship Programme

These awards are granted for up to two years and consist of a salary of €42,783 in the first year and €43,371 in the second year, an employer's Pay Related Social Insurance contribution and research expenses of €5,000 per annum.

Evaluation

Every year, 200 scholarships are funded by the Irish Research Council, with half of them awarded to STEM graduates and half of them to arts, humanities and social sciences graduates. On top of that, a small number of scholarships are granted by the strategic funding partners. Furthermore, 80 postdoctoral researchers receive funding under the fellowship programme. For 2024, around 1,500 applications for the two schemes were submitted. Between 2018 and 2022, the scholarship programme maintained an average application success rate of 18%, pointing towards the high level of competitiveness. In 2022, the overall (categories 1 and 2) success rate for STEM graduates was 17%. In comparison, 19% of applicants in fields related to arts, humanities and social sciences were successful. The success rate for STEM graduates in category 2 was 3% and for arts, humanities and social sciences graduates it was slightly higher at 4.5%.

Regional initiative: Positioning the south-east as Ireland's top remote working location

Objective

This initiative tackles the aspect of regional attractiveness as a determinant of talent attraction and retention. In recent times, the south-east of Ireland, which includes Carlow, Kilkenny, Wexford, Waterford City and Waterford County, has been experiencing an increase in the share of young and well-educated individuals leaving the region to seek employment elsewhere. The region's demography is characterised by a far larger share of children and retired individuals than of the working-age population. In 2019, over 8,621 locally born students pursued a degree outside of the region compared with only 5,601 studying at a local university.

The goal of the initiative is to advocate for regional hubs as excellent secondary office options for companies aiming to expand their teams beyond their main office and to offer remote working to employees. Additionally, the aim is to provide the opportunity of remote employment for individuals residing in high-cost regions, allowing them to enjoy the benefits of living in the area. The initiative is not aimed specifically at graduates, but remote work is highly correlated with occupations that require a degree. This initiative is to be built upon the insights gathered from the 2020 South-East Remote Working Survey.

Implementation process, stakeholders and roles

The initiative is part of the South-East Regional Enterprise Plan to 2024, which was launched by the Department of Enterprise, Trade and Employment in Wexford on 24 March 2022. The partners involved are the Connected Hubs network of hubs in the south-east and local authorities. Defined action outcomes of the initiative are the preparation of marketing material, the launch of a marketing campaign and the establishment of company contacts for hubs.

Source: Eurofound, 2024b

Lessons learnt

- Ireland's strategy to attract and retain talent puts an emphasis on the promotion of Ireland as a top business location and as a country of rich job opportunities. The interplay between a well-educated workforce and a growth-fostering business environment has been key for the economic success of Ireland in recent years. In addition, Ireland continuously monitors the skills profile of its labour force and identifies skills needs summarised in the National Skills Strategy. In collaboration with educational institutions and the business sector, Ireland invests in targeted human capital creation.
- Legal regulations such as those concerning the Third Level Graduate Programme facilitate access to the Irish labour market and further contribute to attraction of graduate talent from abroad.
- GradStart succeeds at attracting and retaining talent by creating job opportunities for recent graduates and at the same time supporting indigenous companies.
- R&D activity is encouraged by partnerships between businesses and universities and by funding opportunities for researchers provided by the Government of Ireland Postgraduate Scholarship Programme and the Government of Ireland Postdoctoral Fellowship Programme. The adequate remuneration of researchers, especially considering the high cost of living in Ireland, has been pointed out as a key challenge by representatives of the Irish Research Council.
- In countries where economic activities are concentrated in a few areas, it is challenging to attract talent to regions outside of major cities due to the presence of fewer businesses and job opportunities. Ireland is investing in the creation of regional hubs to attract talent.
- According to officials of the Department of Enterprise, Trade and Employment, a programme providing support for highly educated migrants regarding practical issues such as housing, schooling and bank affairs could, despite being resource intensive, potentially add to the strategy in the future.

Portugal

Country background

For decades, the stock of human capital in Portugal has been dependent on emigration and immigration flows, with temporary and circular migration being used to minimise the impact on the labour market of emigration and brain drain. In the early 2000s, Portugal almost doubled its immigrant population due to the inflows from eastern European countries. Compared with the largely unqualified immigrants from Portuguese-speaking African countries, who were previously the main immigrant group in Portugal, European immigrants were generally overqualified for the blue-collar jobs they performed, had expectations with respect to their job mobility, did not concentrate around Lisbon and were not structured according to bilateral agreements on circular migration made by Portugal with third countries. Thus, in the 2000s, the focus of immigration policies progressively moved from immigration regulation to recognition of immigrants' qualifications and immigrant integration (Olivera and Fonseca, 2013).

The most important reforms in the education, science and technology sectors for the attraction and retention of highly skilled individuals started being implemented in 2006 with the launch of the programme Commitment to Science for the Future of Portugal. The economic recession experienced by the country in the early 2010s

and the austerity measures imposed jointly by the European Commission, the European Central Bank and the International Monetary Fund (known as the Troika) over 2011–2014 significantly affected investments in human capital creation, while the country experienced a massive emigration of highly skilled individuals. In 2016, a new impetus to investments in the education, science and technology sectors was approved with Resolution 32/2016 of the Council of Ministers on the Commitment to Knowledge and Science Agenda 2016–2020. The policy underpinned by the agenda has four main objectives: (1) to strengthen advanced training through the provision of scholarships to PhD researchers; (2) to strengthen the scientific system by reinforcing R&D institutions and associated laboratories and by promoting collaborative arrangements between scientific institutions and the industry (particularly in the Collaborative Laboratories (CoLABs)); (3) to support scientific employment and scientific careers; and (4) to strengthen the internationalisation of the scientific and academic sectors. These same objectives have been carried forward in the strategy Higher Education, Research and Innovation in Portugal – Perspectives for 2030, published in 2018.

Notwithstanding the continuous public support for the employment of scientists by means of various instruments, brain drain is considered a major issue by the Portuguese business community.²¹ Business Roundtable Portugal,

21 Over the period 2008–2023, these instruments disbursed some €933 million for the employment of scientists (FCT, 2023).

an association representing 41 of the largest enterprise groups in the country, recently reported a net loss of 742,000 Portuguese citizens in the decade 2012–2021, of whom almost 194,000 had higher education. According to the analysis of national data, the association estimates that 37% of the 50,000 Portuguese graduates, or 20,000 highly skilled individuals, emigrate each year (ABRP, 2023). A survey by the association indicates that 24% of the interviewed talent is likely or very likely to emigrate; this share rises to 48% if the youngest cohort is considered (individuals born after 1997 or ‘generation Z’). Among the most important factors influencing the decision of talented individuals to emigrate is salary, followed by opportunities and prospects for career development (ABRP, 2023).

Scientific Employment Incentive Programme

Objectives

The Scientific Employment Incentive Programme (Programa de Estímulo ao Emprego Científico, PEEC) is framed by the Commitment to Knowledge and Science Agenda and based on Decree-Law 57/2016, amended by Law 57/2017. Launched in 2016, the programme supports the employment of researchers and the development of scientific careers for individuals of any nationality within Portuguese public and private institutions. The aim is to strengthen the scientific and technological system of the country, to attract and retain scientists (in particular, highly qualified young individuals) and to encourage mobility (Gabinete do Ministro da Ciência, Tecnologia e Ensino Superior, 2017). This is achieved by means of the following measures, overseen by the Cabinet of the Minister of Science, Technology and Higher Education:

- provision of incentives for the employment of researchers in R&D institutions, categorised as individual Concurso Estímulo ao Emprego Científico (Competitions to Stimulate Scientific Employment) (CEEC) or institutional CEEC
- contracting of researchers (1) through R&D projects; (2) according to the transitional regime defined in Decree-Law 57/2016; (3) through open competitions launched by higher education institutions; (4) through the establishment of CoLABs; and (5) through European co-funding mechanisms such as the Marie Skłodowska-Curie Fellowships
- provision of tax incentives to companies

Target talent category

All instruments are aimed at PhD holders or postdoctoral scientists of any nationality.

Implementation process, stakeholders and roles

Several of the instruments under the PEEC are administered by the Foundation for Science and Technology (FCT), a public agency supervised by the Ministry of Science, Technology and Higher Education. Portuguese higher education institutions, private non-profit entities and companies focusing on R&D activities are also involved in the implementation of the programme as employers of the scientists.

In the individual CEEC, candidates of any nationality can identify the institution where they want to develop their research activity. Research can relate to any scientific area. If selected, they are hired by the institution and fully financed by the FCT (through national funds) for three to six years. The total annual value of each contract is €33,000. PhD holders with permanent employment cannot apply.

In the institutional CEEC, R&D institutions or networks of R&D institutions apply for public funding to finance the hiring of researchers and the development of scientific careers. Contracts of hired researchers are partially (between 30% and 50% of the total cost) supported by the FCT (through national funds) for three to six years. FCT Regulation 1083/2023 specifies that private non-profit institutions focusing on R&D activities and companies whose activity is considered of scientific or technological interest or that have been awarded the title of CoLAB are eligible to be supported under the institutional CEEC. FCT Regulation 1083/2023 introduces the obligation of the hosting institution/company to conclude a permanent contract with the selected candidate.²²

Contracting of researchers is achieved through various means and modalities.

- The FCT launches open public tenders for R&D projects where a contract for a researcher is envisaged. The FCT fully covers the cost of the contract of the researcher for up to three years (through national funds). The total maximum cost of each project is €240,000, including the cost of the researcher.
- Higher education institutions launch open calls for postdoctoral fellows and fully fund the offered contracts.

22 The recent amendments introduced with Regulation 1083/2023 aim to transform fixed-term employment of scientists into permanent employment, thus reducing job insecurity.

- Host institutions open permanent positions for researchers based on the number of hosted PhD scholarship holders funded by the FCT. The obligation of host institutions refers to the transitional regime set in Decree-Law 57/2016. Permanent contracts of researchers are fully funded by the FCT (through national funds) for a period of three years. The total annual value of each contract is €33,000.
- European co-funding mechanisms award contracts to researchers by means of open calls at EU level and for periods of up to five years.

Finally, the Sistema de Incentivos Fiscais à I&D Empresarial (System of Tax Incentives for Corporate R&D) provides private companies with fiscal benefits if they invest in R&D activities. The cost of PhD researchers is considered to be 120% for the purposes of tax incentives.

Evaluation

Over 2017–2019 (three years of investment), the PEEC aimed to reach a total of 5,000 doctoral research contracts (MCTES, 2018). Up to May 2023, the individual CEEC and the institutional CEEC led to the employment of 1,869 scientists, while 1,696 researchers were contracted in accordance with Decree-Law 57/2016 (FCT, 2023). The online data of the Scientific and Teaching Employment Observatory (Observatório do Emprego Científico e Docente) indicate the finalisation of 6,653 contracts with PhD holders for research purposes over the period 2017–2023.²³ In addition, according to the National Innovation Agency, the 35 CoLABs approved by 2021 contributed to the creation of 639 highly qualified jobs (with 56% of the employees having a Master of Science degree, 32% a PhD and 12% a bachelor's degree), which was 107% of the employment target for 31 December 2021 (ANI, 2022). Data provided by the Promotion and Monitoring of Innovation Policies Unit of the National Innovation Agency indicate that 77 of these 639 highly qualified jobs are occupied by non-Portuguese individuals.

In 2020, an evaluation of the programme concluded that, with some exceptions, most of the instruments put forward by the PEEC were successful in stabilising the linkage between researchers and the national R&D system. However, the evaluation also highlighted that most of the supported individuals were hired with fixed-term contracts and that these precarious working conditions of individuals were not contributing to the stability of the scientific and technological system of the country. In addition, the evaluation found that most of the scientists were employed in the education and scientific sectors and that the private sector was still receiving few incentives to take advantage of this category of human capital (Nazaré et al, 2020).

In July 2022, Fenprof, the largest trade union of teachers and researchers in Portugal, emphasised the need to reduce the long-standing phenomenon of precarious working conditions of researchers at higher education institutions. As the PEEC does not guarantee long-term employment for PhD holders at the end of their fixed-term contracts, the trade union suggested enabling public higher education institutions to open competitions for scientific careers, one for each researcher employed through the transitional regime or through the CEEC, whether institutional or individual (Fenprof, 2022).

According to a representative of the employer organisation Portuguese Commerce and Services Confederation, the CEEC is considered to have been working well since it started in 2016. The impression is that big companies and even small and medium-sized enterprises are profiting from it, although it may be less relevant for very small companies. Overall, the programme is seen as a clear and easy mechanism for individuals as well as for companies to receive support to carry out research activities. This support was also considered particularly important to revamp the funding of the education and research sectors, which was limited in the Troika period.

Regional initiative: The territorial dimension of CoLABs

CoLABs are established countrywide through the launch of open public tenders. They are required to offer contracts to researchers for periods of up to three years. The cost of the researchers is funded by the European Structural and Investment Funds and by national funds (through the FCT). The FCT is responsible for the recognition of the CoLABs, and the National Innovation Agency is in charge of monitoring the implementation of the research and innovation agenda of the CoLABs.

The first CoLABs were established in 2017 to facilitate the access of Portuguese companies to global markets and to attract foreign investment in technology-intensive areas (ANI, undated). CoLABs' primary goal is to foster qualified scientific employment and to attract skilled workers to Portugal in all areas of knowledge by sharing,

23 The number of contracts does not correspond to the number of individuals as some PhD holders signed more than one contract.

through innovation projects, investment and risk among government, industry and academia. Each CoLAB is established as a company or private non-profit association and includes at least one company and one R&D unit evaluated and financed by the FCT or a state laboratory. Unlike traditional research units and laboratories, CoLABs act in accordance with a business plan and are structured to attract alternative funding to public support, including private funding (such as services or research contracts for industries) and competitive funding (MCTES, 2018). Since 2019, public funding of CoLABs has added up to around €72.4 million, of which €60.4 million is from regional operational programmes through a specific measure aiming to hire highly qualified human resources and the remaining €12 million is from the FCT. Additionally, in February 2022, around €80 million was made available to the existing CoLABs through the Portuguese National Resilience Plan.

In 2022, 35 entities in 21 Portuguese cities (with at least one entity in each NUTS 2 region) were recognised as CoLABs. Lisbon and Porto are the cities with the highest numbers of CoLABs (four each) (ANI, 2022). Each CoLAB has a national or regional geographical scope, specific areas of expertise belonging to one of the eight identified thematic areas (agri-food; social services and tourism; health; energy and sustainability; biodiversity and forest; climate, space and ocean; digital and communication systems; materials, circular economy and urban sustainability) and affiliates among universities, research centres, companies, public authorities (including municipalities) and associations.

Lessons learnt

- The establishment of a national policy that mainstreams the employment of highly skilled individuals by means of several instruments effectively attracted PhD holders at country level. However, subsidising the employment of PhD holders in the public sector does not provide these individuals with permanent employment. Recent rule changes at national level focus on developing careers for these researchers rather than only offering one-off contracts.
- The establishment of geographically distributed CoLABs as public-private intermediaries focusing on specific thematic areas allows for the creation of market-ready hubs of knowledge that share the risk of the investment across different actors (including the private sector) and guarantee the involvement of qualified workers in business environments.
- Social partners were involved in the discussion of the instruments for scientific employment, but not in their implementation. As highlighted by a representative of the Portuguese Commerce and Services Confederation, since the programme ultimately relates to employment it would be useful for the government to periodically discuss results with social partners and to conduct a qualitative assessment of what went well and what did not. However, the representative also noted that, as salaries are comparatively low in Portugal, additional instruments are needed to attract people from abroad (e.g. support for housing).
- According to the representative of the Portuguese Commerce and Services Confederation, replicability of the CEEC is easy if funds to sustain such a long-term policy are available. Other factors that contributed to the success of the programme are its simplicity, clarity on the way it works and the fact that it was very well communicated to stakeholders.

Lithuania

Country background

In the wake of Lithuania's accession to the EU, opportunities arising from the free movement of Lithuanians across the EU caused an important (skilled and unskilled) labour migration. As this migration added to previous waves, Lithuania has become a diaspora state with an estimated 1.3 million people (Lithuanians and Lithuanian descendants) currently living abroad. In 2011, the government of Lithuania initiated the multi-year Global Lithuania programme to reach out to Lithuanians living abroad. Recognising the potential of human capital for innovation and economic development, the programme aimed to preserve the

national identity of the 'foreign' Lithuanians and to involve them as much as possible in the life and growth of the country. Initially expected to span 2011–2019, Global Lithuania was renewed up to 2021 and then relaunched under the name of 'diaspora policy' to cover the period from 2022 to 2030. The diaspora policy frames many initiatives undertaken by various ministries and state agencies in accordance with an action plan coordinated by a dedicated department within the Ministry of Foreign Affairs. The programme is primarily funded by the state budget, but local budgets contribute when municipalities participate in the initiatives. The yearly programme budget was €2.5 billion in 2012 and €4.5 billion in 2021. In 2022, it doubled to €9.3 billion (Government of Lithuania, 2021, 2022).

Examples of initiatives supported through the diaspora policy are the strengthening of Lithuanian education schools abroad; fostering Lithuanian culture and identity abroad; supporting the employment of diasporic individuals (for example, supporting scientists in research activities); supporting a return to Lithuania, including through the provision of better information following the one-stop-shop principle; and encouraging diasporic young people to return to Lithuania for their studies and training (Government of Lithuania, 2021).

The attraction and retention of third-country students in higher education – pivotal to building in-country talent – is generally achieved in the country through migration and integration policies. However, the most important and active role is played by Lithuanian universities (17 across the country), which are supported by the Ministry of Education and Science and by the Education Exchanges Support Foundation (the former approves annual priorities related to the promotion of internationalisation in higher education and the latter implements visibility actions to attract international students to Lithuania). From 2014 to 2018 (before the transposition of Directive (EU) 2016/801, which covers the short-term mobility of researchers), several derogations from migration laws and employment rules were introduced to favour the residence status and employment of third-country graduates in Lithuania. Examples include waiving the obligation to have work experience if they intend to be employed in a domain related to their field of study; extending the period available to seek employment after graduation from 6 to 12 months; and computing the entire study period at the higher education institution, and not half of it, when applying for permanent residence in Lithuania (EMN, 2018). Notably, figures from the Official Statistics Portal show that, although the number of university students has been constantly decreasing in the country (from 77,321 in 2018–2019 to 71,506 in 2022–2023), the number of foreign nationals studying at Lithuanian universities has been on the rise (from 7,592 in 2018–2019 to 9,467 in 2022–2023).

Create Lithuania

Objectives

Create Lithuania (Kurk Lietuvai) is one of the initiatives promoted by the Global Lithuania policy. It focuses on the return and retention of talent. It has been implemented since 2012 under the aegis of the Ministry of Economy and Innovation. Formerly called the Junior Professional Programme, Create Lithuania is managed by the state agency Invest Lithuania and aims to attract qualified professionals in the public sector by giving them the means to implement a project of their choice through which they might initiate change. The opportunity to create something different in their home country is the attraction factor of the programme.

Target talent category

The policy targets Lithuanian young people who have completed studies or work experience abroad and wish to use their knowledge to improve Lithuania's public sector. These are young professionals or specialists with a bachelor's or higher academic degree and more than two years of work experience. They follow a one-year journey during which they are employed by Invest Lithuania and are then posted for six months to a public sector institution where they implement their projects.

Implementation process, stakeholders and roles

Invest Lithuania selects the candidates (around 20) each year and matches the candidates' ideas for projects with the expectations of the public host institutions. The posting is based on a cooperation agreement between Invest Lithuania (the employer) and the public institution (the host). The public institution must collaborate with the posted professional and is obliged to take into account the results of the project implemented by the professional. According to the working model set by Invest Lithuania, young participants in the programme must implement their projects by involving as many stakeholders as possible (Kurk Lietuvai, undated). Starting from 2014, the programme was extended to municipalities (as host institutions) and graduates of Lithuanian universities (as participants) (Government of Lithuania, 2014).

Evaluation

Create Lithuania has been running for more than a decade, during which time 50 public institutions have hosted 236 professionals who were attracted to return, live and work in Lithuania. Of the participants, 80% remained in the country after the completion of their projects and 40% still work in the public sector (Lithuania Co-create, 2022). The programme itself and some of the projects implemented under its umbrella received international acknowledgements. Examples include the Easy to Read project, finalist of the Innovation in Politics Awards 2023 in the 'Government Improvement' category; and the project entitled 'Dialogue between the city & its people: Guide to civic participation in public space projects', mentioned in the OECD Public Governance Reviews series in *Global trends in government innovation 2023* as an impacting tool used by municipalities throughout Lithuania for training hundreds of public servants (OECD, 2023c).

Brain Gain and Reintegration

Objectives

The Brain Gain and Reintegration (SMART) programme was framed by the diaspora policy and aimed to 'attract foreign researchers with international recognition, including of Lithuanian background, to carry out research in the smart specialisation areas and to encourage their self-establishment in institutions of education and science in Lithuania' (LMT, undated-a).

The programme had three main objectives: ‘achieve in Lithuania’ by implementing relevant research projects with applicable research outcomes; ‘gather in Lithuania’ by establishing and leading independent and high-level research teams; and ‘introduce in Lithuania’ by transferring research experience, advanced methods and innovative practices to the country. The attraction of researchers focused on areas of the Lithuanian SMART specialisation strategy (Strata, undated).

Target talent category

SMART targeted foreign researchers and Lithuanian researchers working in other countries who were interested in carrying out research in Lithuanian universities or research centres. These lead researchers – researchers continuously engaged in R&D activities for at least five years in a foreign country, living and working outside Lithuania or working in the country for no longer than 12 months – were invited to establish a research group in Lithuania.

Implementation process, stakeholders and roles

In 2018, the Ministry of Education and Science and the Research Council of Lithuania activated the programme by launching a call for proposals. Tenderers had to define a project leading to high-level scientific results and to their commercialisation in a four-year period and with a maximum budget of €1 million. The budget covered research activities (the wages of researchers, other costs for the execution of the research), mobility of researchers (the cost for the resettlement of the research leader and of the other members of the research team, including travel costs) and project management (LMT, undated-a). Some €14.4 million was made available from the 2014–2020 European Structural and Investment Funds (measure 01.2.2-LMT-K-718 ‘Targeted scientific research in the field of skilled specialisation’, activity ‘Attracting scientists from abroad to carry out scientific research’) and the Lithuanian state budget (LMT, undated-b). In October 2018, out of the 24 eligible proposals received, 13 projects were funded with a budget of €11.9 million.

Evaluation

SMART attracted 13 lead researchers, of whom 11 were Lithuanians. Interviews carried out with the programme beneficiaries in 2019–2020 revealed that Lithuanian researchers were attracted by the possibility of returning to work in their country under favourable conditions; non-Lithuanian researchers valued the opportunity to establish forward-looking partnerships in the country. Conversely, the relatively low visibility, internationally, of the Lithuanian research and innovation system, the lack of basic preconditions in some institutions (e.g. no experience in publishing in high-impact journals, absence of administrative support staff for projects) and the limited availability and quality of public services for foreigners and their families (e.g. international kindergartens) were indicated as factors limiting the attraction of international researchers (Martinaitis et al, 2020).

Among the identified pitfalls of SMART are the limited size of the research projects (a larger financial allocation and longer durations were suggested to create stable research groups and thus ensure long-term impacts through the retention of the researchers after the completion of the project) and the lack of synergies of the programme with other research funding opportunities at EU level (e.g. Marie Skłodowska-Curie Actions, teaming actions and twinning actions) (Martinaitis et al, 2020). Moreover, the results of the programme were negatively impacted by bureaucratic procedures and decisions taken during the implementation of the research projects. Administrative burdens prevented the smooth management of the grants (rigid public procurement procedures, reduced flexibility in reallocating the budget), and a 40% reduction in the hourly rate of the researchers, decided by the Research Council of Lithuania after a state audit detected some issues in the definition of the researchers’ rates, made the researchers’ salaries no longer competitive internationally. Since the budget for some expenses was computed as a percentage of the grant for human resources, the overall funding of the projects was negatively affected, ultimately making the grant insufficient to achieve the expected results.

Regional initiative: International House Vilnius

Since November 2021, International House Vilnius has facilitated the arrival of talent in the capital city, providing free counselling and services to those individuals interested in moving to Vilnius. Promoted by the city’s official tourism and business development agency, Go Vilnius, jointly with the national talent attraction programme, Work in Lithuania (launched in 2017 and including branding support for companies and job-matching activities for workers), the initiative was originally started to attract talent to meet the demand of rapidly growing sectors such as information technology, fintech, biotechnology and laser technology, and to support talent in relocating to and integrating into the city. International House Vilnius is located in the building of Vilnius City Municipality. Here, all major institutions involved in relocation-related aspects (residence permits, driving licences, taxation, social and health insurance, employment and business development, housing and school/kindergarten

registration) have representative offices. The functioning of the service centre is continuously monitored and adapted by Go Vilnius to meet quantitative and qualitative targets, serving 1,000 clients per month with satisfaction scores of 4 out of 5 points. From November 2021 to October 2022, International House Vilnius served more than 15,000 clients from more than 100 countries (International House Vilnius, 2022).

Lessons learnt

- A country analysis of the migration of highly skilled individuals suggests that, if economic conditions are the basis of the decision to migrate, the decision to return to Lithuania depends more on the returnee's perception of norms and values in the homeland and, ultimately, on the possibility of influencing their reform (Labanauskas, 2019). The set-up of Create Lithuania follows this rationale as talented professionals are invited as 'change makers' and 'solution finders' of specific national problems.
- Create Lithuania has had an impact at local level by extending participation in the programme to municipalities as host institutions. Also, the scope widened from talent return to include talent retention when the programme became open to Lithuanian graduates.
- An interviewed representative of the Lithuanian trade union Solidarumas reported that, in the research sector, as salaries are extremely low, current remuneration is not a reason for scientists to return to Lithuania. In fact, the economic conditions initially set up in SMART proved to be key for the attraction of talent from abroad. Once these conditions vanished, the potential impact of the programme was immediately affected.
- In SMART, one-shot initiatives with limited ambition were not considered sufficient to kick-start brain gain. The establishment of a critical mass of talent seems to be a necessary condition for further talent attraction.
- When talent attraction is based on 'bait and switch' elements, such as in the case of high remuneration, and not on structural changes coordinated among the social partners and leading to the permanent improvement of working conditions, it may be difficult to assess the impact of these policies. The representative of Solidarumas underlined that neither the trade union nor its members were involved in Create Lithuania or SMART and that it is hard for them to ascertain the success of these two programmes.
- Proper visibility of and communication on opportunities for talent in Lithuania are crucial. The representative of Solidarumas highlighted the importance of properly reporting the situation in the country to attract talent. The media often focuses on negative aspects, but, overall, the situation in Lithuania is not as bad as is often depicted. For example, in terms of salaries, some sectors (e.g. information technology) offer remuneration comparable to that paid in the United Kingdom (UK).
- The Talentas project notes how International House Vilnius implements the one-stop-shop concept first introduced in Nordic countries such as Denmark and Finland. This concept is considered a best practice for talent soft landing or welcoming (ICMPD, 2021).

Italy

Country background

National policies to prevent brain drain have been in place since 2003, when it was first highlighted that Italy was not attracting enough talent (national or foreign) to even out the outgoing human capital (Becker et al, 2003). According to the Italian Institute of Statistics (ISTAT, 2021), the number of graduates emigrating has progressively increased between 2011 and 2021 and even the pandemic did not stop the outward flow. The share of graduates choosing to move abroad sharply increased from 28.5% in 2012 to 45.7% in 2021. Other European countries are the main destination of these flows, with the UK on top, followed by Germany, Switzerland and France. In the decade 2012–2021, around 250,000 people aged 25–34 with tertiary education emigrated while noticeably lower numbers

are returning, leaving Italy with a negative balance of 79,000 individuals (ISTAT, 2021). Liaci and Ricciardi (2022) found that the number of graduates coming back from abroad and benefiting from income tax relief more than doubled between 2018 and 2020 (from approximately 7,000 to approximately 15,000). The Crescita Decree-Law of 2019, which increased the tax relief to 70% (from 50%) favoured this change (Bassetto and Ippedico, 2023; Fondazione Migrantes, 2023). But 2020 and 2021 were special years due to the COVID-19 pandemic, which, on the one hand, hampered people's movement, and, on the other hand, prompted many migrants to move back to their home country so that they would not remain 'trapped' abroad. This suggests the need for caution in the interpretation of the data and a review of 2022–2023 data when they become available, also considering the fact that the 2024 budget law lowered the exempt income share to 50% and narrowed the eligibility criteria.

Rientro dei cervelli

Objectives

Rientro dei cervelli (brains return) – the national policy to attract talent back to Italy – is a revised iteration of previous policies, the first of which was launched in 2003 and was aimed only at ‘researchers and professors’ (Ministry of Economy and Finance, 2023). The 2003 policy was renewed in 2010 (Art. 44 DL n. 78/2010) and expanded (Law 238/2010) to other categories of workers to win back Italian graduates working abroad (it was also opened to other EU citizens). In 2016, the law was revamped (D.Lgs. 147/2015 Art. 16, para. 1 ‘Impatriati’). The latest incarnation of the Rientro dei cervelli policy stems from Article 5 of Decree-Law n. 34 2019 (Normattiva, 2023), and it was renewed in 2021 and more recently in 2022.²⁴ It has always consisted of fiscal incentives in the form of income tax breaks, valid for three or more years immediately after the worker’s return to Italy.

Target talent category

There are two main strands of this initiative. Like in previous versions, the revamped law aims to grant fiscal incentives to ‘researchers and professors’ and ‘graduates’ not necessarily involved in academic work or R&D (Table 5). The researchers and professors strand aims to attract both Italians abroad and foreign talent by granting the same fiscal incentives to non-nationals (both EU and non-EU). Further, the Ministry of Education and Merit is financing programmes that allow researchers and professors who do work in academia to work on projects based in Italy.

Implementation process, stakeholders and roles

In both cases, an application (DPR 445/2000) needs to be submitted either to employers or to the revenue offices for self-employed people, for the adjustment of the tax rate. In 2022, beneficiaries paid income taxes on only 10–30% of their income, while the rest was exempt. As no government budget is foreseen for the fiscal incentives for graduates, the tax relief translates into less tax revenue. The other strand of the initiative aims to attract back researchers and professors to Italian higher education institutions. The budget foreseen by the Ministry of Education and Merit amounts to €600 million over three years (DM 9894/2022); the sum includes Recovery and Resilience Facility funds and

Horizon Europe projects (Il Sole 24 Ore, 2022). The strategy includes three programmes.

- The Rita Levi Montalcini programme, for which researchers are eligible if they have been resident abroad for the previous three years and achieved their latest qualification in the previous six years. The latest iteration of the programme was carried out in 2021 (MIM, 2023a). On average, approximately €5 million per year is allocated for approximately 24 researchers.
- The Fondo Italiano per la Scienza is aimed at both Italian and foreign researchers but research must be carried out at an Italian research centre (public or private) (MIM, 2023b). The initial grant ranges between €1.5 and 2.5 million depending on the researcher’s experience. For STEM-related projects, the grant can be increased by €500,000.
- Recovery and Resilience Facility funds are allocated to support 1,700 projects in Italian higher education institutions. Eligible candidates are young researchers who have been awarded prestigious grants from the European Research Council, the Marie Skłodowska-Curie Fellowships or the Seal of Excellence. According to a representative of the Ministry of Education and Merit, the target for 2022 has been met with slightly over 300 researchers’ contracts signed.

In addition, the ‘direct assignment’ tool allows for special cases of researchers and professors who have received international recognition of their work by internationally recognised awards or substantial EU grants; they are assigned a relevant post without going through a public competition (approval by the Commission for National Scientific Qualification (Commissione per l’Abilitazione Scientifica Nazionale) and by the minister is still needed). The current programmes under the Rientro dei cervelli initiative tackle different aspects of talent attraction and retention. The initiative has been accompanied by the revamp of the University website to reinforce the graduate pool by giving information and promoting the Italian higher education system among foreign students. Another supporting component of the initiative is the investment in improving and modernising infrastructure (such as buildings and laboratories).

²⁴ Circolare n. 17 del 25 maggio 2022 and Budget Law 2023.

Table 5: Description of eligibility criteria and timeline of the Rientro dei cervelli initiative

Category	Eligibility criteria	Benefits/tax relief
Graduates	<ul style="list-style-type: none"> Has resided abroad for the previous two years Plans to reside and work in Italy for the next two years (employed or self-employed) Will transfer financial residence to Italy 	<ul style="list-style-type: none"> 70–90% of personal income is tax exempt depending on the region 5 years of financial relief 10 years of financial relief if the individual has a child under 18 (valid also in the case of adopted children) or if they acquire a property where they will reside
Researchers and professors	<ul style="list-style-type: none"> Will transfer financial residence to Italy Has the right qualification Has lived abroad continuously (not occasionally) for at least two years while working at a university or public or private research centre Will work in Italy as a researcher or as a third-level teacher (professor, assistant professor or lecturer) 	<ul style="list-style-type: none"> 70–90% of personal income is tax exempt depending on the region 6 years of tax relief 8 years of tax relief for those who have an underage child (valid also in the case of adopted children) or if they acquire a property where they will live 11 years of tax relief for two or more children (including adopted children)

Note: This is a summary table; for details related to individual circumstances, the reference document is the Circolare n. 17 del 25 maggio 2022. The maximum tax rate relief applies to those who take up fiscal residence in the Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sardinia or Sicily region.

The stakeholders involved in the initiative and their roles are as follows:

- government (which establishes the legal basis to attract highly educated individuals)
- Ministry of Education and Merit (MIM, 2023c)
- employers and universities (to supply documentation for proof of work in Italy)
- revenue offices (Agenzia delle Entrate) to calculate tax relief

Evaluation

The work of Bassetto and Ippedico (2023) compares the 2010, 2015 and 2019 laws, reaching the conclusion that tax incentives can mitigate the net brain drain phenomenon, but only if the duration of the incentives is not excessive, if the incentives are limited to younger cohorts and if they are supported by measures that prevent re-emigration. In the case of the 2019 law, the absence of an age limit for eligibility reduced the tax revenue for the state; eligibility instead depends on the numbers of years a worker is in active employment before retirement once they come back. Nonetheless, 2021 saw a doubling of returnees – to more than 6,500 – and there was a similar figure in 2022 (Fondazione Migrantes, 2023). The proportion of highly qualified foreigners also increased from 2018 to 2022, from 4% to 7.8%.

A report by the Controesodo think tank, which analysed the number of people who applied for the fiscal incentives between 2011 and 2017, found that around 2,000 skilled

individuals came back each year, but by 2012 one in four had already left; the number of re-emigrants increased every year until 2017, when 1,610 out of 2,000 individuals left (Controesodo, undated). These high numbers are most probably linked to the temporary abolition of the policy in 2015, disrupting the plans of those preparing to return.²⁵ In addition, in 2016 a new retroactive measure changing some residence registration requirements required that some of those who had benefited from the 2010 scheme repay what they gained from the income exemption, thus further discouraging potential returnees (Italian Parliament, 2019).

The Italian Labour Union underlines how the increase of the tax relief rate in 2019 seems to have been successful in increasing the number of graduates coming back but not the number of academics, therefore implying that not only fiscal pressure but also investment in research and innovation should be undertaken, including the hiring of young researchers in teaching positions (UIL, 2023). The Italian General Confederation of Labour also supports the strategy of investing in universities and research and highlights how eastern Germany was able to attract talent despite an overall flexibilisation of work in the country.

The federation of employers, Confindustria, welcomed the part of the 2019 law that reduced the minimum length of the stay abroad from five to two years since the previous thresholds could have delayed the return of qualified workers, and the part of the law that clarified the treatment of workers on assignments

25 Decree-Law n. 147/2015, which abrogated Law n. 238/2010.

abroad (not eligible) (Confindustria, 2019). But Confindustria also highlights that perhaps the lower eligibility criteria in terms of qualifications could lead to the application of the tax relief to individuals who are not ‘talent’. The employer federation expresses doubts about further incentives for those who take up residence in the southern regions since they could work

in another region, and about the differential treatment of family incentives between returnees and those who did not move. The Italian General Confederation of Labour argues that the incentives linked to family and owning property are a positive development in the effort to retain talent.

Regional initiative: INN Veneto

The INN Veneto initiative aimed to increase the competitiveness and attractiveness of the regional socioeconomic system by sponsoring R&D, training and social inclusion (Regional operative programme POR FSE 2014–2020). The 12-month initiative promoted tailored interventions, according to the available skills and the needs of the local actors, to attract and retain returning talent and both national and foreign businesses. INN Veneto received €750,000 from the European Social Fund, €525,000 from regional funds and €225,000 in additional resources, making a total of €1.5 million. Fourteen projects were funded and implemented. In each of the projects, the aim was the stimulation of talent exchange by means of formative experiences and funds to support the creation of innovative jobs. The *borsa di rientro* (return visiting fellowship) offered a competitive salary when compared with foreign salaries, thus attracting highly skilled migrants who had left the region to work abroad. Its aim was to help talent to return for brief periods and contribute to regional socioeconomic innovation by exchanging knowledge, best job practices and business projects (for a maximum of two months), increasing the attractiveness of the region for foreign businesses.

Eight projects focused on the Brain Exchange and Ideas for Veneto initiatives. The projects combined the use of workshops and seminars with networking opportunities to enrich the entrepreneurial fabric of the region. Some projects involved learning experiences to improve the participants’ skills and innovative thinking. Stakeholders had the role of organising the learning courses and setting up networking opportunities. A large proportion of tenderers were human resource providers, universities, professional centres, cooperatives and management consultancies. Six projects focused on the Excellence in Arts and Crafts initiative. Four of them proposed projects relevant to fostering cultural and creativity hubs, while two proposed revamping unused buildings to transform them into public art spaces. To establish a connection with the local territory, the initiative partnered with two employer organisations, Confcommercio and Confcooperative, to promote synergies with local businesses. The network of chambers of commerce of the region, Unioncamere, was involved in raising awareness of the initiatives among citizens and local businesses.

Several meetings encouraged much wider and diversified networking. The large number of planned activities gave uneven results. Short-term results were achieved, but the initiative did not envisage a long-term impact assessment on employability and retention. Similarly, it was not possible to evaluate which skills were developed the most by the participants. As the initiative started towards the end of the six-year planning, it was only possible to implement it for 12 months, and no follow-up was envisaged. Notwithstanding, the initiative served as a testing ground for future policies and increased attention and awareness.

Regional initiative: Torno subito

The Torno subito (I’ll be right back) initiative aims to increase the knowledge and skills of local human capital through participation in courses or traineeships in Italy, but outside the Lazio region, or abroad.

The initiative is sponsored by the Lazio region, and the European Social Fund has allocated €24 million to train the target beneficiaries, who are young people aged 18–35 years. The majority of the funding, €16 million, targets tertiary degree students or graduates and those who have a higher technical institute (ISCED 5) qualification. Similar initiatives were run from 2014 to 2019, sponsored under the European Social Fund 2014–2020. Up to 2019, 8,200 participants took part in the project.

The aim of the initiative is to improve training opportunities and therefore the employability of participants in sectors of strategic activity for the Lazio region such as tourism, food and wine, cinema and audiovisual. The project is implemented in two phases. The first phase concerns learning or training outside the region for a minimum of 30 days and a maximum of 180 days. The second phase entails participants coming back to undergo

a three-month traineeship with a pre-agreed local partner in the Lazio region, which can be a commercial company or a non-profit. Selected participants can access funds, which, for phase 1, include training course costs up to €7,000 and a flat-rate reimbursement for living and travel expenses. If the phase 1 activity is carried out abroad, the participants are also assigned €500 for health insurance cover. Participants need to establish a surety policy before the start of phase 1. In phase 2, participants receive a traineeship allowance amounting to €800 gross per month. An extra allowance of €7,000 is available for people with disabilities. The final reimbursement is granted only when the phase 2 activities are concluded. Participants whose income is below €25,000 (proof required) receive an extra €250 in phase 1. Individuals' projects can be interrupted if they accept a job offer.

During the 2015–2016 round, the Torno subito initiative contributed to:

- increasing the share of highly educated people in the region (34.5% in 2020) and bringing the share closer to the EU objective of 40%
- enabling people from disadvantaged economic backgrounds to access high-quality training
- improving the share of participants in lifelong learning for adults and skills development

Lessons learnt

- The country analysis of the Italian highly skilled returning emigrants suggests that the two target groups behave differently; while a certain level of economic incentive is sufficient to attract back generic graduates, academic talent also seeks enabling infrastructure and a career progression speed at least equivalent to the one they can achieve abroad.
- Given that the issue is long-standing, national-level policy initiatives could encompass longer time spans, with eligibility criteria and incentives that remain stable over time until a sustainable cycle is established.
- In a country with net brain drain, it is fundamental to enable attraction policies that go beyond tax incentives, including reactivating the social elevator and the expansion of the tertiary student pool (both national and international). The labour market context frames attraction not only in terms of salary but also in terms of training and career development. An increase in university-level scholarships and a reinforced fight against school and university dropouts are also needed. It is necessary to reduce the north–south territorial gaps in access to the labour market and in skilled labour.
- Supporting the acquisition of skills abroad that are relevant to regional economic activities helps to ensure that the skills individuals obtain abroad can be added to the skills people already have and will lead to job acquisition and retention in the sending region (as seen in the Torno subito initiative). In these activities, funding training and lifelong learning enables individuals from a disadvantaged background, or those living with a disability, to reach their potential.
- Whether the focus is on traineeships, on the development of innovative start-ups or on enabling people's return, coordinating funds that invest in infrastructure and technology would enable initiatives to have more impact. For instance, on top of improving infrastructure, different funds could be used to plan a structured labour market integration for returning talent. Networking initiatives should be linked to labour market induction ones to fully exploit the initiative's potential.

Findings from the case studies

The five country case studies present a variety of policy solutions used by national and subnational public authorities to contain brain drain or to manage talent attraction and retention, or both. The comparison of these policies highlights the following findings.

- (1) **Policies generally perceived as successful target a specific type of talent.** This may imply that tailored policies better meet the needs or expectations of the targeted talent than broad policies do. Besides personal motivations, every type of talent with a propensity to move (degree students, graduates, scientists and researchers, and professionals)

decides to undertake a career in a certain place given certain living and working conditions.

Evidence: The Dutch HSMP focuses only on highly educated non-EU professionals, and the Irish Third Level Graduate Programme focuses only on non-EEA students and graduates. The Government of Ireland Postgraduate Scholarship Programme and the Government of Ireland Postdoctoral Fellowship Programme target master's, doctoral and postdoctoral candidates who aim to conduct research on a full-time basis. The Portuguese PEEC targets only PhD holders, and Create Lithuania is only for young graduates with at least two years of professional experience.

(2) **National policies for talent attraction that encourage a countrywide geographical distribution of talent reduce human capital inequalities across regions.**

Evidence: The Portuguese policy for scientific employment includes an instrument with a territorial dimension, the CoLABs, that spreads talent all over the country. Create Lithuania works through the involvement of national and subnational public entities across the whole country.

(3) **Talent attraction policies** (policies that by design stimulate talent to learn abroad before making its return to the country of origin) **dominate brain circulation policies.** Brain circulation is favoured by ease of movement and a scenario where both sending and receiving countries benefit from the exchange over time (ILO, 2002).

Evidence: The Italian local initiative Torno subito is the only measure among those investigated that, by design, relies on the advantages implied by brain circulation. At national level, the Rientro dei cervelli policy in Italy and Create Lithuania are intended as policy ‘emergency responses’ to contain the talent exodus affecting the two countries.

(4) **Countries labelled as receiving countries seem to heavily rely on market-pull policies,** meaning policies aiming to support the business demand for talent. On the other hand, **countries labelled as sending countries seem more oriented towards research-push policies** aimed at the in-country creation and development of talent, with less emphasis on the actual capacity to absorb this talent in the country.

Evidence: In the Netherlands, the national government focuses on the attraction of highly skilled non-EU workers to fill labour shortages in specific sectors. The Dutch HSMP is a national mechanism justified by market-driven needs for talent and aims to strengthen the country’s knowledge economy and competitiveness. In Ireland, the national government focuses on attracting a well-educated workforce to support the development of the business environment. Both the Irish Third Level Graduate Programme and the GradStart programme aim to foster innovation and growth of enterprises as well as employment and competitiveness of firms.

On the other hand, the Portuguese PEEC is meant to reinforce the national scientific and technological system through the employment of PhD holders. As evidenced by its review, the programme has difficulties encouraging the development of careers for these scientists. The SMART programme in Lithuania offered a one-off opportunity for selected lead researchers and their teams. The opportunity was limited to the

duration of the research project and did not create synergies with other initiatives for talent retention. This was considered one of the factors hampering the creation of stable research groups in the country after the completion of the projects. The Italian Rientro dei cervelli policy, based on giving tax incentives both to researchers and professors and to graduates, does not foresee any transfer mechanism to guarantee the employment of skilled human capital in the academic or scientific world or in the knowledge economy of the country.

(5) **Receiving countries** (which have a net gain of talent with respect to other Member States) **may suffer from brain drain in specific areas or regions and therefore need local initiatives to address it.**

Evidence: In both Ireland and the Netherlands, some regions are less attractive than others for tertiary education and employment opportunities. This situation creates in-country competition for talent, which is addressed through subnational strategies or plans. In the North Netherlands region, talent retention is pursued through the 2022–2025 Agenda of the Groningen Agreement, which includes initiatives such as Talent in the Region for monitoring purposes and TalentWeb Groningen for strengthening the ties between degree students and the business community. In Ireland, the South-East Regional Enterprise Plan to 2024 tackles the low attractiveness of the region for talent by promoting it as a top remote working location.

(6) **The implementation of policies for talent attraction and retention relies on a wide range of funding options and makes use of fiscal incentives.** Combined approaches are sometimes used for **the sustainability over time of the concerned policies.**

Evidence: Policies to attract and retain talent do not necessarily rely on monetary investments. Examples are the fiscal advantages for enterprises in the Dutch HSMP and the tax relief for returning talent in the Italian Rientro dei cervelli initiative. In these cases, the cost of the national policy is represented by lower revenues for the national government. When funds are used (including national and regional funds, European Structural and Investment Funds and the Just Transition Fund, to mention a few of the options presented in the case studies), it is noted that some policies encourage the concurrent use of different sources to increase the sustainability of interventions. This is the case, for example, of the Italian INN Veneto scheme, the Dutch initiatives in the North Netherlands region and the Portuguese CoLABs. The CoLABs, in particular, are structured by design to attract private and competitive funding to complement public support and enhance their viability.

- (7) **Salary is the most relevant attracting factor in policies when foreign talent is targeted.** Usually, other factors such as the provision of support and an offer of housing are also important, but they are rarely mainstreamed into policies and are instead left to ancillary or local initiatives. However, a distinction is evident when considering the type of attracted talent, because when the return of national talent that previously emigrated is targeted (brain circulation), cultural aspects or personal reasons may also play a role.

Evidence: Both the Dutch HSMP and the Portuguese PEEC use high salaries to attract talent. Within the Italian INN Veneto initiative, the *borsa di rientro* (return visiting fellowship) offered a competitive salary compared with remunerations offered abroad. The SMART programme in Lithuania attracted lead scientists with a relevant budget allocation for their research projects, which provided researchers with internationally comparable salaries. When these favourable economic conditions were withdrawn, the impact of the programme was negatively affected.

On the other hand, in Lithuania, brain circulation, which is the basis of the Create Lithuania initiative, relies on the willingness of the returning young professionals to contribute to the country's development. The Italian case study highlights that the factors affecting talent return vary according to the maturity of the talent. Although tax incentives might be sufficient to attract

back graduates working outside academia or R&D, academic talent also seeks enabling infrastructure and a career progression speed at least equivalent to the one that can be achieved abroad. During the Eurofound expert meeting held on 12 October 2023, personal or cultural aspects were included among the factors favouring the return of talent to the country of origin.

- (8) **The social impact of talent attraction and retention policies is given low emphasis compared with the economic effects of such policies.**

Development of innovation potential, economic growth, strengthened competitiveness and employment prevail among the foreseen impacts of the investigated initiatives and policies in both receiving and sending countries.

Evidence: Among the initiatives and policies reviewed, only three policies specifically tackle social objectives. In the North Netherlands region, brain drain is addressed in peripheral areas near the coast and the German border concurrently with depopulation, the ageing labour force and the reduction in the number of educated people. From the talent perspective, social inclusion elements are considered also in the Torno subito initiative, which arranged training and lifelong learning activities to enable individuals from disadvantaged backgrounds or those with disabilities to become 'talent'. Finally, the way the Dutch HSMP attracts highly skilled non-EU migrants facilitates their social integration.

Conclusions

Key takeaways

The report confirms the important role of human capital in economic growth and innovation found in the literature. **Human capital is an asset for Member States, and the presence of tertiary graduates has helped Member States with initially low national income levels to begin catching up with those that have a higher GDP.**

For most indicators of human capital creation, Member States are converging upwards, with improving performance and a reduction of the disparities between them. The share of GDP dedicated to tertiary education, the share of early school-leavers, tertiary education attainment, and participation in lifelong learning and on-the-job training all moved towards the policy targets. Poor-performing Member States have been catching up with the best-performing ones, although for education expenditure and tertiary education attainment the distance of the frontrunners from the rest of the Member States has widened. Quality of education has also converged, but downwards, as the educational performance of students aged 15 years seems to have suffered a general decline.

There are differences in the way human capital is utilised in the labour market, with some Member States better absorbing human capital than others. This is reflected in increasing disparities in employment rates and investment in R&D. On the positive side, better integration of graduates in the labour market is evidenced by the reduction in those who are NEET or those who are overqualified for their jobs; however, at regional level, especially in Greece, Italy and Spain, integration remains an issue.

Imbalances in human capital mobility among the Member States might hinder cohesion and convergence both in terms of economic growth, leading to less innovation and reduced creation of firms in some, and in public governance, where skills in the public services are needed to navigate the complex challenges of the twin transition. In cases where talent circulation is not bidirectional, and the outbound flows are disproportionate, there is an economic loss in terms of social investment to create human capital – the education of an individual up to tertiary level. The investment of public finances does not benefit the territory where it was invested, and the limited ability to attract back nationals or foreign talent is not enough to compensate for the loss.

While the EU as a whole can benefit from the reallocation of capital across the Member States, there is a risk of a negative feedback loop weakening both

education systems and labour markets at regional level, slowly eroding convergence and social cohesion. Cluster analysis shows that southern European Member States are actually creating human capital, even if they are not yet reaching the policy targets, but their labour markets are not attractive enough to convince workers to stay; and eastern European Member States struggle to create human capital while having average integration in the labour market and innovation. Net circulation of human capital reflects these disparities since these two geographical areas of Europe register negative flows. In terms of reallocation of resources, this means that highly skilled EU movers, unsurprisingly, flock towards attractive locations in terms of salary, amenities and career opportunities.

The potential economic loss suffered by territories with high outflows of tertiary graduates varies widely across the EU. The costing exercise revealed that, for the countries where data are available, the impact of emigrating talent seems to be minor in terms of GDP when calculated on a yearly basis. But for two of the countries analysed, Belgium and Italy, the amounts become important if the outflows stay at the same level for a long time, such as a decade, as the economic loss would amount to over €10 billion. The exercise gives an insight into how education systems and fiscal systems are still very tied to national systems, and so the movement of highly skilled EU citizens is good news for the EU as whole but less so for Member States not able to attract enough talent.

Pointers on policy to retain or attract talent

The most effective brain gain policies seem to be those that stem from a close dialogue between institutional actors and labour market actors. Brain gain happens when human capital is created and the labour market not only offers employment opportunities but also utilises these opportunities to attract talent from abroad, as seen in Ireland and the Netherlands. Across the five case studies, talent attraction policies dominate brain circulation policies, that is, policies that by design empower talent abroad and then encourage its return to the country of origin. The Italian local initiative Torno subito is the only measure among those investigated that by design relies on the advantages implied by brain circulation. On the other hand, at national level, the Rientro dei cervelli policy in Italy and Create Lithuania are intended as policy ‘emergency responses’ to contain the talent diaspora affecting the two countries.

The analysis uncovers factors enabling or limiting the success of the policies implemented. These factors may inform other decision-makers on the design or review of their talent attraction and retention policies. They are discussed below according to the main stages of the policy cycle: design, communication, implementation and monitoring.

In terms of policy design, in countries where economic activities or higher education institutions are concentrated in specific areas or cities, **mechanisms to facilitate the distribution of talent across the territory must be considered in the policy's design.** For example, the Portuguese PEEC and Create Lithuania have mechanisms allowing the countrywide outreach of the programmes (the CoLABs in Portugal and the participation of the municipalities in Lithuania). In Ireland, the promotion of remote working locations in the south-east aims to provide secondary or virtual office options for companies and their employees.

Another important factor to consider at the design stage is the sustainability of a talent attraction and retention policy. There is evidence that one-off economic support is unlikely to produce structural changes. For example, recent rule changes in the Portuguese PEEC aim to increase the chances for PhD holders being permanently contracted by higher education institutions in accordance with a career development plan. Similarly, the lack of concrete long-term perspectives prevented the Lithuanian SMART programme from achieving the expected impact. Synergies among different funding sources were meant to favour sustainability over time in the INN Veneto initiative. In general, market-pull policies for talent attraction by design provide for better employment opportunities for the individuals attracted than research-push policies. Thus, the latter should be accompanied either by structured initiatives for the integration of talent into the labour market or by offering concrete career development prospects.

Talent observatories provide the necessary insights to design policies tailored to specific categories of talent. For example, the HSMP is tailored to the needs of the Dutch labour market. Nevertheless, the local initiatives of the Dutch case study clearly show that computing brain gain, or brain drain, at national level does not suffice to depict the country's situation in terms of highly educated human capital. Because of the dynamics of talent in space and time, there is a need to have disaggregated data by region.

Clear communication mechanisms in policies for talent attraction contribute to their success. The HSMP and the PEEC are popular national programmes because they are well communicated to stakeholders and clear on the way they work. The uptake of the HSMP by Dutch businesses is facilitated by the presence of intermediaries reaching out to non-EU talent according to employers' needs. The INN Veneto initiative involved

the network of chambers of commerce in the region disseminating the initiative among citizens and local businesses. Create Lithuania, which targets young professionals, is active on social media (with thousands of followers on Facebook, LinkedIn and Instagram). These examples suggest that outreach modalities should adapt to the target category of talent.

Talent attraction policies offering high salaries must consider providing additional benefits related to living and working conditions when implementation takes place. This is particularly important when foreign workers are targeted. For example, conditions offered to highly skilled migrants in the HSMP are worse than those offered under the EU Blue Card scheme, but the HSMP often offers these migrants housing (which is an important issue in the country) and other support provided by the Dutch employers. Similarly, the government in Portugal is planning to start offering house rental support to foreigners within the PEEC, to compensate for the comparatively low salaries paid in Portugal. The Lithuanian SMART programme offered a full research package to selected lead scientists. Finally, the Italian Rientro dei cervelli initiative corroborates the evidence that the economic dimension is not enough to retain the attracted talent.

Talent attraction and retention policies at subnational level require instruments to work towards a common scope and common targets among the territorial stakeholders. For example, in the North Netherlands region, human capital absorption is tackled in the RIS3 framework, and the University of the North was established to achieve collaboration and common objectives among the existing knowledge institutions of the region. Also in the Netherlands, the exploitation of talent for the benefit of the economy is among the top three ambitions of the 2022–2025 Agenda of the Groningen Agreement. In Ireland, the South-East Regional Enterprise Plan to 2024 involves a network of hubs in the south-east and local authorities. Public authorities (including municipalities) are among the affiliates of the Portuguese CoLABs, which are spread over the country.

Talent attraction and retention policies require a structural monitoring and evaluation process aimed at assessing the effectiveness of the intervention, from both quantitative and qualitative perspectives. The outputs of this process are expected to be taken into account when deciding about the continuation of the policies and, eventually, to contribute to their fine-tuning. Objectives should be complemented by measurable targets to be achieved in a certain period of time. For example, the results of the Portuguese CoLABs are monitored on a yearly basis and made publicly available. Qualitative assessment is important as well.

The role of the social partners in terms of maintaining or creating desirable working conditions should not be underestimated, from on-the-job training

opportunities to the availability of state-of-the-art tools for R&D. Most of the social partners interviewed reported that they were not directly or only partially involved in the policies presented in the case studies. However, as they receive regular feedback from their members (employers or workers) on the achievements of these policies and on the level of satisfaction of beneficiaries, the social partners are in a position to contribute important policy-specific insights to the social dialogue. For example, in the Netherlands, changes to the HSMP are discussed by the social partners within a wider debate on the review of the fiscal system. In Portugal, the social partners are contributing to the debate on the factors affecting the precariousness of researchers and on their crucial contribution to the innovation potential of the country.

Future research

In terms of future research, exploring the interwoven threads of human capital, convergence and mobility is a complex exercise; hence, due to reasons of data availability and scope limitations, the analysis on non-EU immigration was limited and could be an interesting expansion of this study. Another issue for future studies in this field is that there is not enough data granularity for emigration flows at country or regional level. In some countries, where the issue of brain drain is a topic on the national agenda, data are available at a very granular level, while in countries where this is not perceived as an issue, data about emigration of country nationals are not collected in detail (for example, the level of education of emigrants is not collected). This is reflected in the available literature, where papers and case studies mostly come from countries where data are available.

In relation to the economic loss deriving from emigration, the estimate produced in this report is very conservative and only calculated as a baseline, since the graduates emigrating might have a higher level of education than a bachelor's degree. In addition, only the 25–34 cohort was considered; for the estimated investment in education of older cohorts, data further back in time might require more assumptions.

The limitation of the conditional convergence exercise is that computations are based on the average numbers of countries or regions and thus do not reflect changes in inequality or stratification within countries or regions. These changes could be addressed in further studies.

For a more comprehensive picture, further research should also take into consideration assessments that look at human capital stock in the adult population, namely the PIAAC (new data will be available after this report is published), and determine if convergence has taken place. Finally, further research is needed on the potentially unequal impact of climate change on education, employment opportunities and migration.

This report highlights that convergence in human capital in the EU is a multilayered phenomenon and that disparities can emerge among Member States in different human capital phases and at different geographical levels, thus requiring granular analysis and initiatives that are sustainable over time. Diminishing disparities through policies that nourish and attract human capital across Member States and regions remains a fundamental task in reinforcing the European project.

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All Eurofound publications are available at www.eurofound.europa.eu

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Annexes

Annex 1: Methodology for the factor and cluster analyses of human capital development

The cluster analysis in Chapter 4 investigates the patterns of human capital development of the EU27, taking inspiration from the paper of Vaitkevičius et al (2015). The output of the analysis is two indicators that cluster countries according to the potential for human capital development, and the utilisation and innovation of human capital. The main reason for choosing to replicate the work by Vaitkevičius et al (2015) and not simply taking the United Nations Human Capital Index is the inclusion in the former of both the creation of human capital up to the age of 18 and its utilisation in the labour market, including how many individuals leave or enter the economy. Hence, the analysis that was performed on 2010 data was replicated, with some adaptation of the indicators and a change in the country composition – removing the UK and including Croatia – providing an updated insight into human capital patterns in each Member State.

In 2010, 6 clusters were identified for 26 countries, for which different patterns were found:

- Cluster 1 (Finland, Italy and the Netherlands): Relatively high social progress in human capital and low potential for human capital development
- Cluster 2 (Austria, Czechia, France, Germany, Malta and Romania): High innovation development rate and high social progress in human capital but low development potential
- Cluster 3 (Estonia, Latvia, Lithuania, Luxembourg and Poland): Relatively high potential for human capital development and relatively low social progress
- Cluster 4 (Greece, Portugal, Slovakia, Slovenia and Spain): Relatively high social progress in human capital but a low innovation development rate
- Cluster 5 (Belgium, Bulgaria and Cyprus): Low social progress in human capital and low innovation of human capital
- Cluster 6 (Ireland, Hungary, Sweden and the UK): High innovation of human capital and relatively low social progress in human capital

Table A1: Primary variables used for the factor analysis, EU27, 2021

Primary variable	EU27 average	EU27 standard deviation
Share of population with access to the internet	91.8%	3.9
Share of high-technology manufacturing exports	14.2%	6.5
Adult learning	12.6%	8.2
GDP (€)	28,487.8	18,369.8
Number of patents filed yearly	149.6	178.7
At risk of poverty or social exclusion (AROPE)	20.3%	5.3
Employment rate by primary education	40.1%	11.9
Employment rate by secondary education	71.0%	6.5
Employment rate by tertiary education	85.8%	3.5
Population growth	-0.8%	11.3
Share of human resources in science and technology	50.4%	9.2
Share of R&D personnel and researchers in total active population	0.9%	0.4
Number of migrants in the population (thousands)	32,228.7	84,179.2
Share of population with tertiary education	32.2%	7.5
Number of mobile students (thousands)	56,255.0	80,903.6
Public expenditure in the healthcare system as share of GDP	7.3%	1.3

Primary variable	EU27 average	EU27 standard deviation
Share of high-technology exports	12.1%	8.0
Income by primary education (€)	15,305.9	8,541.9
Income by secondary education (€)	19,089.3	10,074.2
Income by tertiary education (€)	24,769.1	13,588.8
Healthy life at 65	9.0%	2.6
Share of mobile graduates	4.8%	7.2
Net graduate circulation	0.02%	10.8

Source: Eurostat

Based on the original paper, we identified 23 primary variables, as shown in Table A1. The following steps were taken in the analysis of these variables. Firstly, missing values were imputed, as otherwise a country with a missing value would have been excluded from the analysis. Imputation entailed averaging two years in cases of a missing year in the series, or if the missing year was at the end of the series, using the last available year. Secondly, all variables were standardised by creating z-scores, so that the mean was centred to zero. Thirdly, some variables that were highly correlated with other variables were removed, as they were linear combinations, as follows: the unemployment rate (employment rate by education was retained), death rate (population growth and healthy life at 65 was retained) and share of outbound graduates (net circulation rate was retained).

The scree plot and the eigen values were then checked. Although several eigen values were larger than 1, as literature suggests, the scree plot showed only two factors, after which the line flattened. Hence, it was decided to run the analysis with two indicators only, as different configurations resulted in mixed and unclear factors.

The factor analysis was run with varimax rotation to identify principal components. Four variables did not reach the minimum correlation threshold, set at 0.4, as per the literature. The factor analysis identified two indices, reflecting potential for human capital development ($\alpha = .96$) and human capital utilisation and innovation ($\alpha = 0.72$). Factor loadings can be found in Table A2.

Table A2: Factor loadings

Primary variable	Factor loadings	
	Potential for human capital development	Human capital utilisation and innovation
Share of population with access to the internet	0.75	
Adult learning	0.55	0.51
GDP	0.93	
Number of patents filed yearly	0.86	
Population growth	0.58	
Share of human resources in science and technology	0.74	0.41
Share of population with tertiary education	0.59	
Income by low level of education	0.94	
Income by medium level of education	0.95	
Income by high level of education	0.96	
Healthy life at 65	0.69	
Share of mobile graduates	0.66	
Net graduate circulation	0.81	
Share of R&D personnel and researchers	0.51	0.46
AROPE		-0.51
Employment rate by medium level of education		0.87
Employment rate by high level of education		0.70

Primary variable	Factor loadings	
	Potential for human capital development	Human capital utilisation and innovation
Share of high-technology manufacturing exports		0.45
Employment rate by low level of education		0.49
Share of migrants in the population		
Share of mobile students		
Public expenditure in the healthcare system as share of GDP		
Share of high-technology exports		

Source: Eurostat, authors' calculations

The first index includes elements of well-being, education and enabling factors, whereas the second reflects employment and technological advancement to a greater extent. Compared with the original paper, student mobility and net human capital circulation were added to enable the investigation of a country's attractiveness and graduate mobility.

Factor loadings were then extracted, and each country was assigned a value for the two indicators. In accordance with the original paper, a cluster analysis was performed using the two indices as orthogonal axes. As a result, the cluster analysis bundled together countries based on their performance on both indicators, assigning an x and y value on a plane. There are several ways to create the clusters, one related to k-means clustering and the other to hierarchical clustering. Both techniques gave roughly the same results, which is the creation of four clusters and Luxembourg as an outlier as seen in Figure 28 in Chapter 4.

Annex 2: Case study methodology

The five countries analysed in Chapter 5 were selected to represent a variety of situations in the EU, based on the classification of regions made by the European Commission in its communication *Harnessing talent in Europe's regions* (COM(2023) 32 final). More specifically, the situations that the five selected countries represent are as follows:

- Italy: a country where regions in a talent-development trap (that is, with a shrinking working age population and lagging level of tertiary education) prevail
- Lithuania: a country with regions at risk of falling into a talent-development trap (that is, with net out-migration of people aged 15–19) but without regions in a talent-development trap
- Portugal: a country where there is a balance between regions in a talent-development trap and regions at risk of falling into a talent-development trap, but where regions that are not in these situations prevail
- Ireland and the Netherlands: countries without regions in a talent-development trap or at risk of falling in a talent-development trap

The qualitative approach adopted in Chapter 5 for the analysis of policies related to human capital retention and attraction in Ireland, Italy, Lithuania, Portugal and the Netherlands was based on the following sources.

- **Descriptive statistics and data related to the framework conditions and the talent attraction and retention dynamics of the countries**, as per the convergence analysis and Chapter 4 on human capital circulation in this report. Reference to additional statistics and data, where available, was used in the country case studies to qualify the extent of specific aspects related to talent attraction or retention or to convey the impact of the described policies when focusing on their evaluation.
- **Desk research using publicly available documents.** Documents reviewed included scientific articles on the status of brain drain in the countries; legislative material related to a specific policies; the social partners' position papers on initiatives in the target countries; and official ex-post evaluation reports of policies. Desk research was used to identify policies and initiatives and present their objectives, targeted category of talent, implementation mechanisms and, where available, results and impacts. Preference was given to documents published in the last five years. Documents used in the preparation of the chapter are listed in the References section.
- **Interviews with informed key stakeholders.** Interviews contributed to developing an understanding of the impact of the national policies and local initiatives for human capital retention or attraction in the five Member States and of the lessons learned. They also helped to fill the information gaps that remained after desk research. In each of the five Member States, interviews targeted key stakeholders informed about one or more national policies or local initiatives identified by Eurofound and Progress Consulting. These stakeholders were selected from national, regional or local public bodies or agencies, and trade unions and employer associations. Among the representatives of trade unions and employer associations, priority was given to the members of the Eurofound Management Board.

Interviews were carried out online by Eurofound and Progress Consulting from September 2023 to November 2023. Guidelines on the main questions about the selected policies or initiatives were shared in advance with the interviewees and used to lead the discussion. Each interview lasted around 30-40 minutes and was carried out according to a semi-structured template allowing the interviewer a certain flexibility in asking the questions, taking into account the experience and knowledge of the interviewee. Interviews focused on three main topics for each of the selected measures of interest: key elements, impact and evaluation, and lessons learnt. Summaries of interviews were sent to the participants for their validation. Contributions from the interviews were used to enrich the evaluation and the lessons learnt in the description of the country case studies.

- **An expert meeting.** Insights into factors affecting talent flows were collected during an online meeting on the topic of human capital inequalities organised by Eurofound on 12 October 2023. Participants included policymakers belonging to EU institutions, researchers focusing on brain drain or gain, and experts in employment, inequalities and skills. Comments from these participants informed the 'Findings from the case studies' section in Chapter 5 and the pointers on policy in the Conclusions.

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This report examines convergence in human capital – specifically that of individuals with tertiary education – in the EU, analysing three phases: creation, utilisation in the labour market and mobility. The analysis finds that Member States are performing better in creating human capital through education but finds disparities in the other two phases, with differences in labour market opportunities resulting in different mobility flows.

A cost estimate exercise reveals that a country's lack of attractiveness to talented individuals has economic repercussions, and that loss of human capital through emigration is not balanced by returning or incoming talent. If the imbalance in human capital circulation in the EU is not addressed, this may hurt convergence, leaving Member States and regions without the skills to negotiate the twin transition successfully. An examination of policies to attract talent illuminates the need for long-term initiatives and to link them with labour market opportunities.

The European Foundation for the Improvement of Living and Working Conditions (Eurofound) is a tripartite European Union Agency established in 1975. Its role is to provide knowledge in the area of social, employment and work-related policies according to Regulation (EU) 2019/127.

