POLICY BRIEF

Migration patterns and the knowledge economy

Territorial cohesion in a COVID-19-driven digital era

The COVID-19 pandemic has negatively impacted consumption and production levels and patterns all over the world. European regions and cities were confronted by the shock of this pandemic at a time when digitisation, the growth of the Knowledge Economy (KE), demographic changes and globalisation have transformed labour markets.

Despite various negative impacts of the pandemic on people's lives and the functioning of cities and regions, the COVID-19 disruption may result in long-term innovation effects as the digital transition could be accelerated and the provision of digital services has been reinforced. These developments will continue to shape the way people live and work as telework and ICT-based mobile working arrangements may provide more flexibility, job autonomy, improved work-life balance and reduced commuting time. While these shifts can provide new development opportunities for disadvantaged territories, they also have the potential to increase socioeconomic and territorial discrepancies for regions with poor or no broadband access and digital skills.

Regional socioeconomic convergence is the main aim of Cohesion Policy. Post-2020 Cohesion Policy will have to address the socioeconomic and territorial challenges associated with the acceleration of digitisation and the increasing role of the KE.

Against this backdrop, this policy brief updates the evidence provided in the EMPLOY (Geography of new employment dynamics in Europe) study (ESPON, 2018) and focuses on the effects of the COVID-19 pandemic, and institutional and policy developments dealing with current and future challenges.

KEY POLICY MESSAGES

- To counteract the emergence of new employment and social inequalities, European and national policy strategies need to address the social implications of extensive telework, aiming at enhancing the opportunities offered by such forms of work and increasing social inclusion of currently marginalised groups and territories.

- This entails a strong focus on skills policies and investment in higher education and training to maintain and/or improve the competitiveness of European regions and cities. In this context, the employability of disadvantaged groups needs to be considered to ensure social inclusion and reduce the risk of poverty.

- Policies for less developed regions should focus on promoting the specific attractiveness of these territories for businesses and investment, which will also help to keep highly qualified people in these regions.

1.
Relevance of knowledge economy trends to employment and mobility patterns

The **free movement of labour** is one of the 'four freedoms' of the EU and its single market. Although many economically dynamic cities and regions have experienced significant inward migration of skilled and semi-skilled workers, other regions, particularly in the European peripheries, are dealing with the opposite problem. These **migration patterns are resulting in considerable regional disparities** and are the root cause of many of the sociopolitical challenges Europe is facing today.

The geographical employment dynamics and the unbalanced spatial distribution of employment opportunities are having large territorial impacts and will have significant implications for future EU cohesion policies. The features of the knowledge economy (KE) accentuate the territorial polarisation of growth and widen both regional disparities and territorial imbalances between urban and rural areas. The increased variance in the performance of local economies and labour markets prompts the **need for a new focus on the possible strategies to support more balanced and sustainable regional growth, as part of economic and employment patterns driven by the KE**. Uneven economic development might further feed into a marked differentiation of mobility patterns across Europe; although regions without knowledge-related industries tend to lose sections of the young and skilled population, places that offer a broad spectrum of knowledge sectors can attract highly skilled workers and support their growth.

Digitisation, the KE, demographic changes and globalisation are transforming labour markets at a time when policymakers are also struggling with the dramatic coronavirus disease 2019 (COVID-19) pandemic shock, which is negatively affecting both consumption and production levels and patterns, demanding new approaches to policymaking.

In this period of emergency due to the **COVID-19 pandemic**, digital infrastructure and services are playing (and will play) a crucial role, and the use of digital technologies for distance working, distance learning and the provision of services has sharply increased. These trends **will have a long-term impact on society and the economy**. On the one hand, this provides new opportunities for disadvantaged areas. On the other hand, it increases socioeconomic and territorial inequalities for some social groups and territorial areas with poor or no broadband access and digital skills, as digitisation requires digital infrastructure, digital skills and accessibility.

Regional socioeconomic convergence is the main aim of cohesion policy. To achieve this goal, the post-2020 cohesion policy will have to address the socioeconomic and territorial challenges associated with the acceleration of digitisation and the increasing role of the KE.

This policy brief updates the evidence provided in the EMPLOY (Geography of new employment dynamics in Europe) study (ESPON, 2018) on the territorial and employment patterns of and trends in the KE, and their effects on regional and urban/rural disparities. It focuses on the effects of the COVID-19 pandemic, and institutional and policy developments dealing with current and future challenges.

2.
Territorial and employment patterns of the knowledge economy and their effects on regional imbalances

In recent years, economic growth in the EU has been largely driven by investments in human capital and innovation. Increasing access to knowledge and developments in information and communications technology (ICT) has enabled European economies to evolve and simultaneously changed the skills needs of the labour market.

The KE can be defined as an economy that is 'able to produce new knowledge from technologically advanced sectors and/or functions present in a territorial area and/or where knowledge is obtained through links (formal or informal) with other economies' (ESPON, 2018). A KE region is identified as a region that is 'specialised either in high-tech sectors, or in scientific functions or capable to obtain knowledge from other economies through cooperation and networking'. One of the consequences of this transformation of economies is the development of a new category of workers, namely knowledge workers. As defined by the literature, a knowledge worker is a highly skilled individual who is able to convert knowledge into tangible, innovative products or services, and transfer their competences and knowledge to others (Daugeliene, 2007).

The spatial distribution of economic activities is linked to the presence of positive externalities, which determine competitive advantages. In particular, knowledge-based economic activities tend to be located in **urban areas that offer high levels of human and social capital, and good physical accessibility**. Given the unequal distribution of KE regions across Europe, one of the main consequences of this transformation is the increasing mobility of highly skilled individuals towards areas that offer opportunities that match their own skill levels.

A recent report by the European Commission shows that in 2019 there were 13 million working-age movers in the EU, thus confirming that intra-EU mobility is growing, although at a slower pace than in previous years (European Commission, 2020a). According to EU Labour Force Survey data, 34 % of EU movers had a tertiary level of education

and could thus be considered 'highly skilled'; this was 9 % more than in 2009. The most important EU destination countries of highly skilled movers are Austria, Belgium, France, Germany and Spain. Prior to its exit from the EU, the United Kingdom was the destination with the most highly skilled movers.

The major sending countries are Italy, Poland and Romania, but also Bulgaria and Portugal. **Results on migration patterns are consistent with the spatial distribution of KE regions** across Europe (see Section 4). Previous studies have found that there is an increasing concentration of KE areas in northern and western Europe, whereas southern, eastern and peripheral regions are lagging behind. In fact, regions with the highest KE indicators also have the highest employment rates and are 'receiving' regions of migration flows. Highly skilled and specialised young workers generally show higher mobility rates than other groups in the population. They are also more likely to move to regions with higher levels of gross domestic product (GDP) and incidence of KE, as well as from rural to urban regions – particularly to national and regional capitals. In the receiving regions and countries, the immigration of highly skilled workers is often regarded as an important positive factor for development, through knowledge flows and local knowledge creation. However, for sending regions and countries, this produces negative effects resulting in the so-called brain drain effect. Although there is abundant literature on the impact of migrants on the economy of the receiving country, there is little knowledge of the effects on sending countries and of the possible contribution of migrants returning to their home country (ESPON, 2018).

In this context, the concentration of the KE in some areas contributes to the development of territorial disparities and socioeconomic imbalances across Europe and within Member States. These imbalances may fuel political turbulence and have negative effects on European stability and cohesion.

3.
The knowledge economy, COVID-19 and the recent evolution of jobs and job creation

Increasing Europe's competitiveness through **innovation stimulates the creation of new jobs**. In this context, a more skilled workforce capable of contributing and adjusting to technological developments is needed. Developing workers' skills and competences is often considered part of the mechanism to achieve innovation goals, rather than an objective in itself, and neglecting this dimension of innovation may hinder the effectiveness of policy (Eurofound, 2018). Employment forecasts predict that the occupational employment structure of the economy is changing in favour of skilled, non-manual occupations. The analyses also highlight a shift towards more autonomy, less routine, more ICT, fewer physical tasks, and more social and intellectual tasks over the forecast period to 2030 (Kraatz, 2020). New forms of work, such as telework and platform work, require enhanced digital skills as well as soft skills.

Research has detected **a number of skills challenges in the EU** to adequately react to these requirements, such as early school leaving, low participation rates of adults in training and education, skills mismatches and youth unemployment (Kraatz, 2020). The **KE is one of the key factors that define the new skills demand in Europe**. It demands specialised and highly skilled labour, for example in ICT and engineering. Furthermore, it stands out from other sectors for its capacity to create (and necessitate) highly skilled, high-wage jobs, and to produce spillover effects for the creation of jobs in related sectors, fostering a demand for worker upskilling (ESPON, 2019).

As anticipated, **the KE is also a driver of highly skilled migration**, which in turn helps to develop the knowledge-based economy in receiving KE regions and countries. However, this outcome strongly depends on the capacity of the receiving region/country to match highly skilled movers with jobs that match their ability (Todisco et al., 2003; Gracia Pires, 2015; Milasi et. al., 2020; Grubanov-Boskovic et al., 2020).

In addition to the long-term KE-driven trends described above, the COVID-19 pandemic had global shock effects on the EU productive systems and labour markets, negatively affecting low-skilled individuals, youth, women and migrants in particular. At the same time, the pandemic accelerated the demand for digital skills, as it became necessary to extend and manage the use of telework and to serve more clients online.

During the pandemic, **digital infrastructure and services became even more crucial for distance working and distance learning**. For workers, telework and ICT-based mobile work (TICTM) working arrangements may entail greater time and place flexibility, enhanced job autonomy, improved work–life balance and reduced commuting time. Telework may also improve employment opportunities for people with disabilities, older workers, women with care responsibilities and people living in rural or peripheral areas (European Parliament, 2021).

However, TICTM may also contribute to the **emergence of new employment and social inequalities** between those who can telework and those who cannot because they are employed in sectors in which teleworking is not possible, or because they have no access to a good broadband connection or broadband equipment, or they lack digital skills. TICTM working arrangements are still predominantly used by highly educated workers with strong digital skills. With the return to 'normality' after the pandemic, the extensive use of teleworking is expected to continue, requiring a rethink of the way work is performed, co-ordinated and regulated.

Currently, teleworking jobs tend to be more concentrated in cities and urban centres than in smaller towns and rural areas. Cities have more teleworking employment (44 %) than towns or suburbs (35 %), or rural areas (29 %) (Milasi et al., 2020; Sostero et al., 2020). Moreover, during the COVID-19 crisis, 61 % of those living in cities had access to telework, as opposed to 41 % of those living in small towns (European Commission, 2020a). The concentration of telework in urban areas may also be due to broadband coverage continuing to be lower in rural areas than in urban areas, despite some progress (European Commission, 2020b). Ten per cent of households in rural areas are still not covered by any fixed network, and 41 % are not covered by any fast broadband technology (European Commission, 2020c). Likewise, internet access also varies between urban areas and rural areas; in 2019, cities (92 %), towns and suburbs (89 % for both) had comparatively higher access rates than rural areas (86 %) (Eurostat, 2020a). These disparities are likely to be further challenged in the next few years, as people living in Europe's main cities will have the opportunity to switch to fifth-generation (5G) internet services (Eurostat, 2021). However, by providing spatial flexibility, TICTM could facilitate remote and distributed work, contributing to a more balanced spatial distribution of employment and population.

There is wide recognition that the **explosion of teleworking following the COVID-19 pandemic is likely to have a long-lasting impact on the spatial distribution of work, including in peripheral geographical locations, for example across borders** (ILO, 2016). TICTM provides

workers with much greater spatial flexibility, and people may opt to work remotely, either from home or from other locations, as in the case of the so-called digital nomads,[1] instead of regularly commuting to the urban/city centres where most offices and business activity are usually based (Batut and Tabet, 2020; López-Igual and Rodriguez-Modroño, 2020;). There is already evidence pointing to more telework, leading to city dwellers leaving densely populated and expensive urban centres for less densely populated suburbs and rural areas. For example, evidence from the United States shows that, following the COVID-19 pandemic, there has already been a significant reallocation of residents from the most densely populated US counties to the least densely populated counties (Delventhal and Parkhomenko, 2021).

Teleworking could not only increase the appeal of non-urban living but also lead to demand-driven development of co-working spaces or improvements to telecommunication infrastructure. Moreover, the local spillover effects may also come into play in suburban and rural areas as a result of increased numbers of TICTM workers leaving large metropolitan areas, for example with moving ancillary economic activity from business centres to residential and possibly rural areas (Eurofound, 2020; Delventhal and Parkhomenko, 2021).

It should be noted that the decision about where to live relies on a mixture of interacting factors and not only on employment opportunities – although these play a significant role. Other factors influencing this decision include proximity of family, friends and other support networks; availability and cost of housing; and accessibility, affordability, and quality of services (e.g. education and health services; transport; arts, cultural or other recreation and leisure activities). Such factors are likely to mitigate the effect of teleworking on the spatial distribution of work, including the considerable attraction that large metropolitan areas and cities hold (Batut and Tabet, 2020).

4.
Key maps and cluster analysis summarising trends/patterns identified

This section presents updated data and maps of ESPON EMPLOY indicators focusing on changes between 2015 and 2019 (2020 if available) at regional levels (NUTS 2).

In particular, the considered indicators refer to (1) net migration rate, (2) people with tertiary education (as a percentage of the population), (3) youth employment rate (those aged 15–24 years), (4) total intramural research and development (R&D) expenditure as a percentage of GDP and (5) employment in tech and knowledge sectors as a percentage of total employment.

As most of the data are available for 2019, very little can be said about the effect of the COVID-19 pandemic on labour migration trends and some indicators on digitisation of work and teleworking.

The section also presents an updated and integrated version of the regional classifications according to the potential role of the KE in the last three-year average.
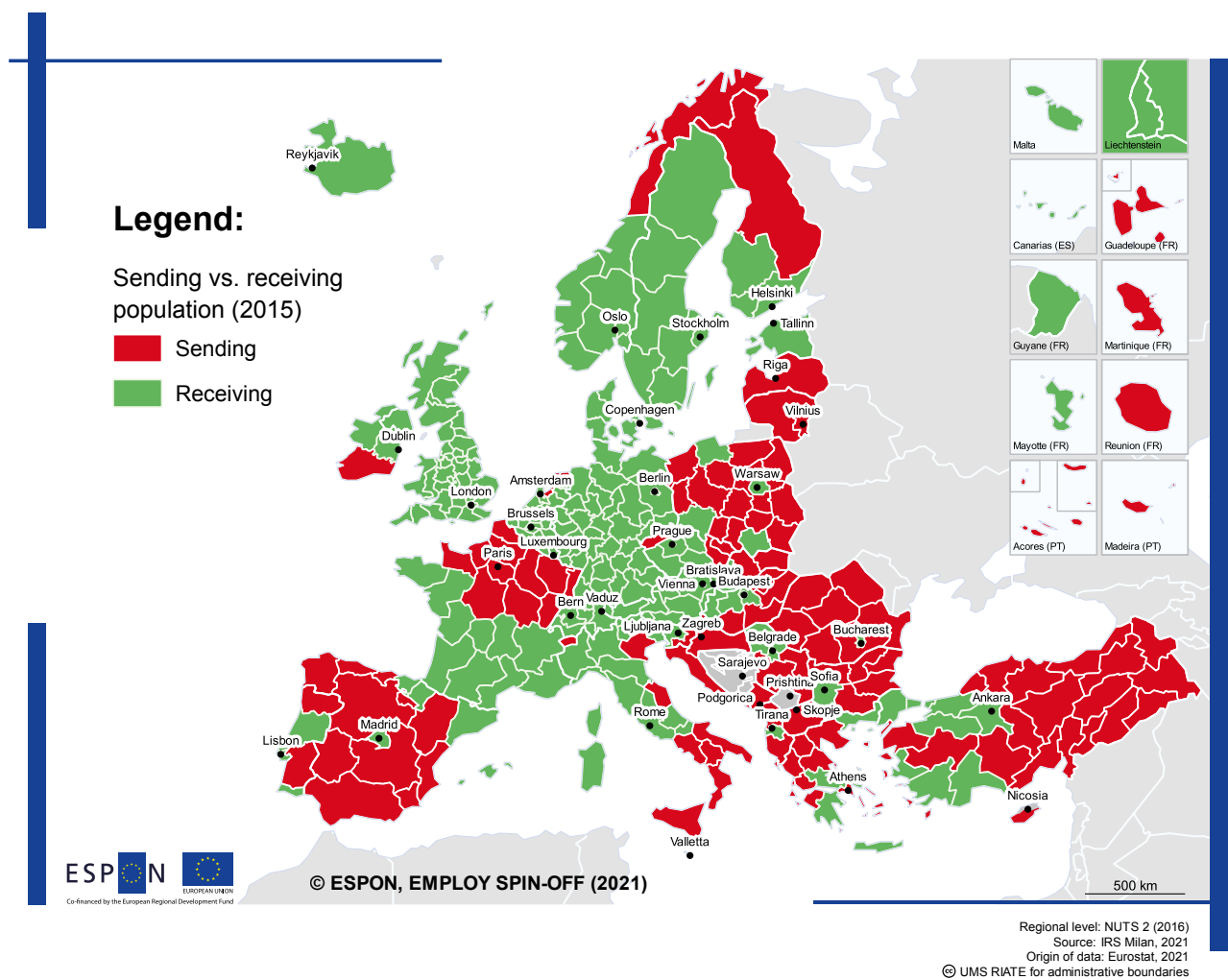
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[1]   Digital nomads are people who use telecommunications technologies to earn a living and conduct their life in a nomadic manner, often working remotely from foreign countries, coffee shops, public libraries, co-working spaces, etc., through the use of devices that have wireless internet capabilities, such as smartphones or mobile hotspots.

Population change

Demographic developments are unevenly distributed among European regions. Urban centres are generally gaining population while peripheral regions and rural areas are losing inhabitants and/or are at risk of depopulation trends. When migration patterns are correlated with the economic conditions – at both the point of origin and the point of destination – it becomes clear that regions with higher levels of GDP per capita and higher employment rates are experiencing migration influxes. Meanwhile, 'less developed' and 'transition' regions, which are characterised by lower levels of GDP per capita and lower employment rates, are experiencing higher rates of emigration and have become 'sending' regions.

Map 1a
Sending and receiving regions of European migration (2015)

Legend:

Sending vs. receiving population (2015)

■ Sending
■ Receiving

© ESPON, EMPLOY SPIN-OFF (2021)

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
© UMS RIATE for administrative boundaries

Source: Eurostat (tgs00099).

In 2015, the average net migration rate in ESPON countries was 3.1 per 1 000 inhabitants, ranging from a minimum of –26.9 (Ağrı Subregion, Turkey) to a maximum of 23.4 (Trier, Germany), whereas in 2019 it was 2.8, with a minimum of –32.8 (Çankiri, Kastamonu and Sinop in Turkey) and a maximum of 40 (Malta). Maps 1a and 1b show both 'sending' regions (those with a negative net migration rate) and 'receiving' regions (those with a positive net migration rate) in 2015 and 2019, respectively. Some regions, such as in Ireland, Spain and western Turkey, switched from being sending regions in 2015 to being receiving areas of migration in 2019.[2]

Map 1b
Sending and receiving regions of European migration (2019)
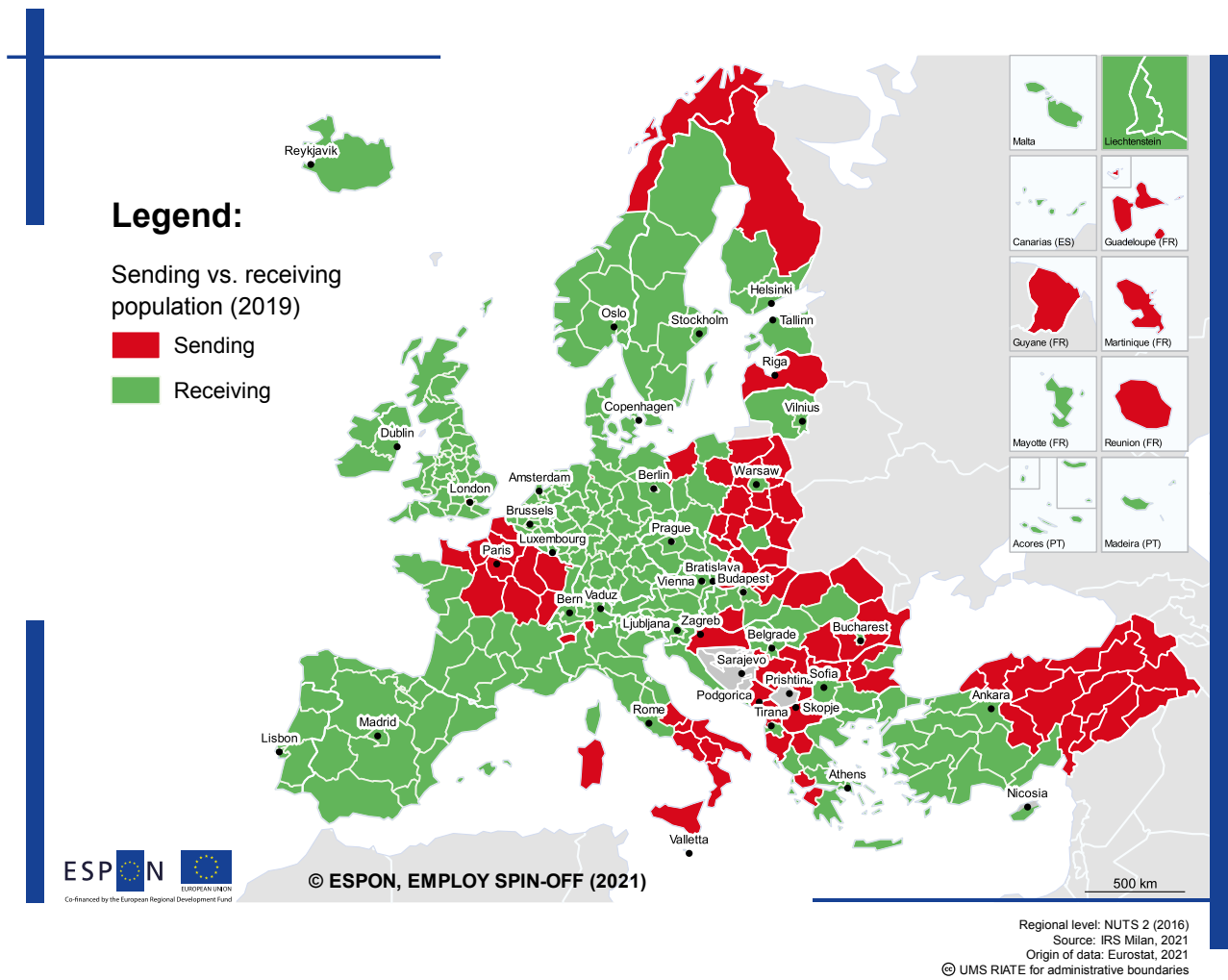
Source: Eurostat (tgs00099).

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[2] Major changes have taken place since the 1950s in French regions in terms of patterns of arrival and departure. The underlying logic is more complex than that of overall mobility. The direction of migration flows has changed radically over these 50 years, with previously attractive regions losing their appeal, and vice versa. The most striking change is probably the reversed situation of the Paris region, which, over half a century, changed from being the most attractive to the least attractive region in terms of net migration. Declining net migration in the Paris region is primarily due to a growing number of departures to other regions, with arrivals remaining practically stable. **Leavers are mainly retired people and families, who move away in growing numbers, whereas young adults are still drawn to the capital to study or find their first job.** This change testifies to the appeal of the southern and western regions of France, which are now the country's most attractive migrant destinations (see Baccaïni, 2007).
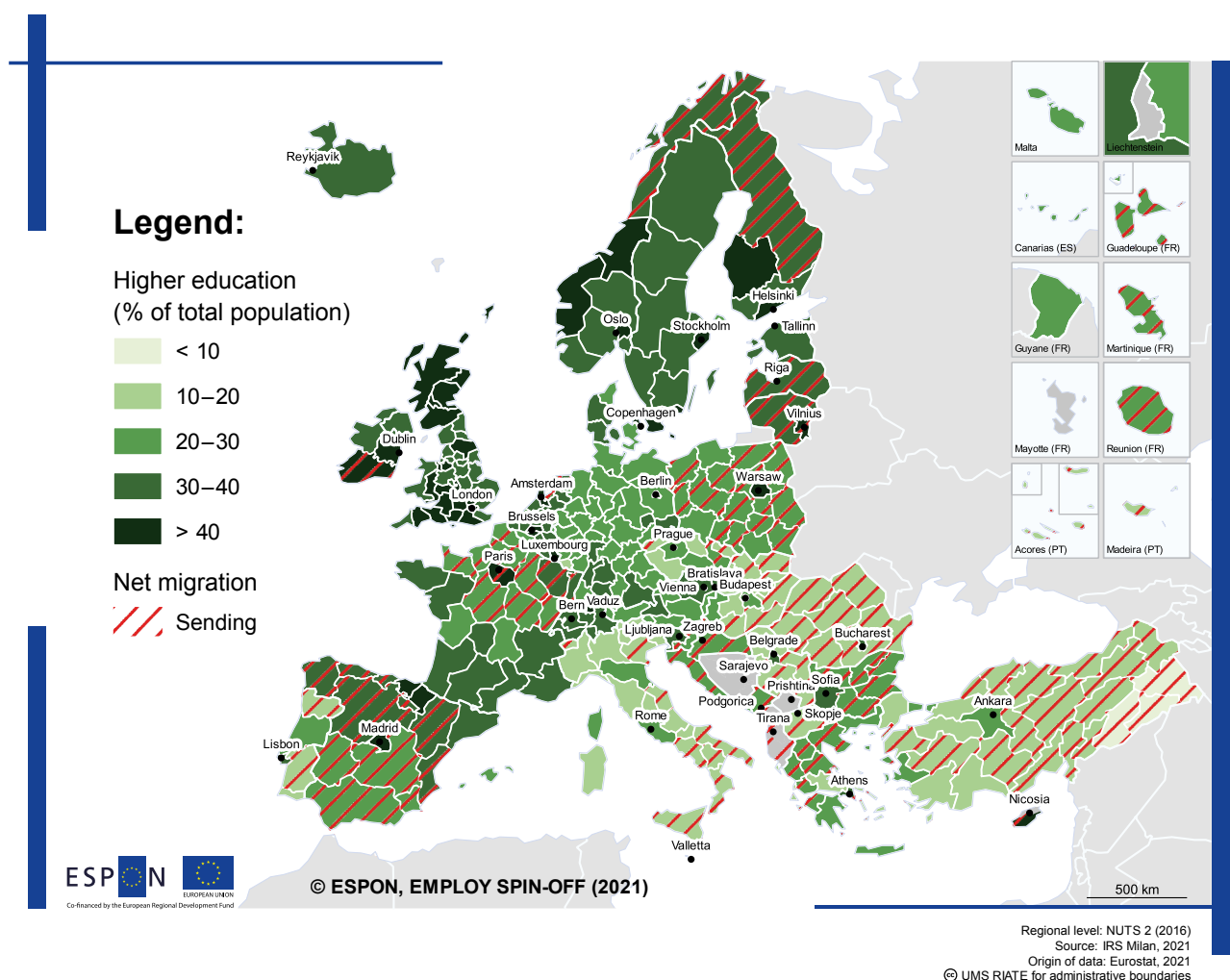
Higher education

In 2019, the tertiary education rate substantially increased compared with 2015 in all regions, with the average rate rising from 29 % in 2015 to 33 % in 2019. However, large disparities across regions persist. The proportion of population with tertiary education in 2019 ranged from a minimum of 11.8 % (North-East, Romania) to a maximum of 72 %

(inner London – west, United Kingdom). In general, the highest rates of tertiary education are recorded in northern and western European regions, as well in ESPON partner states (Iceland, Liechtenstein, Norway, Switzerland), whereas Mediterranean regions appear to be lagging behind. Many of these regions are rural or sparsely populated regions, with low levels of employment opportunities for the highly skilled. For example, as underlined in a recent publication

Map 2a

People with higher education (as a percentage of the population) and regions with negative net migration (2015)

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Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
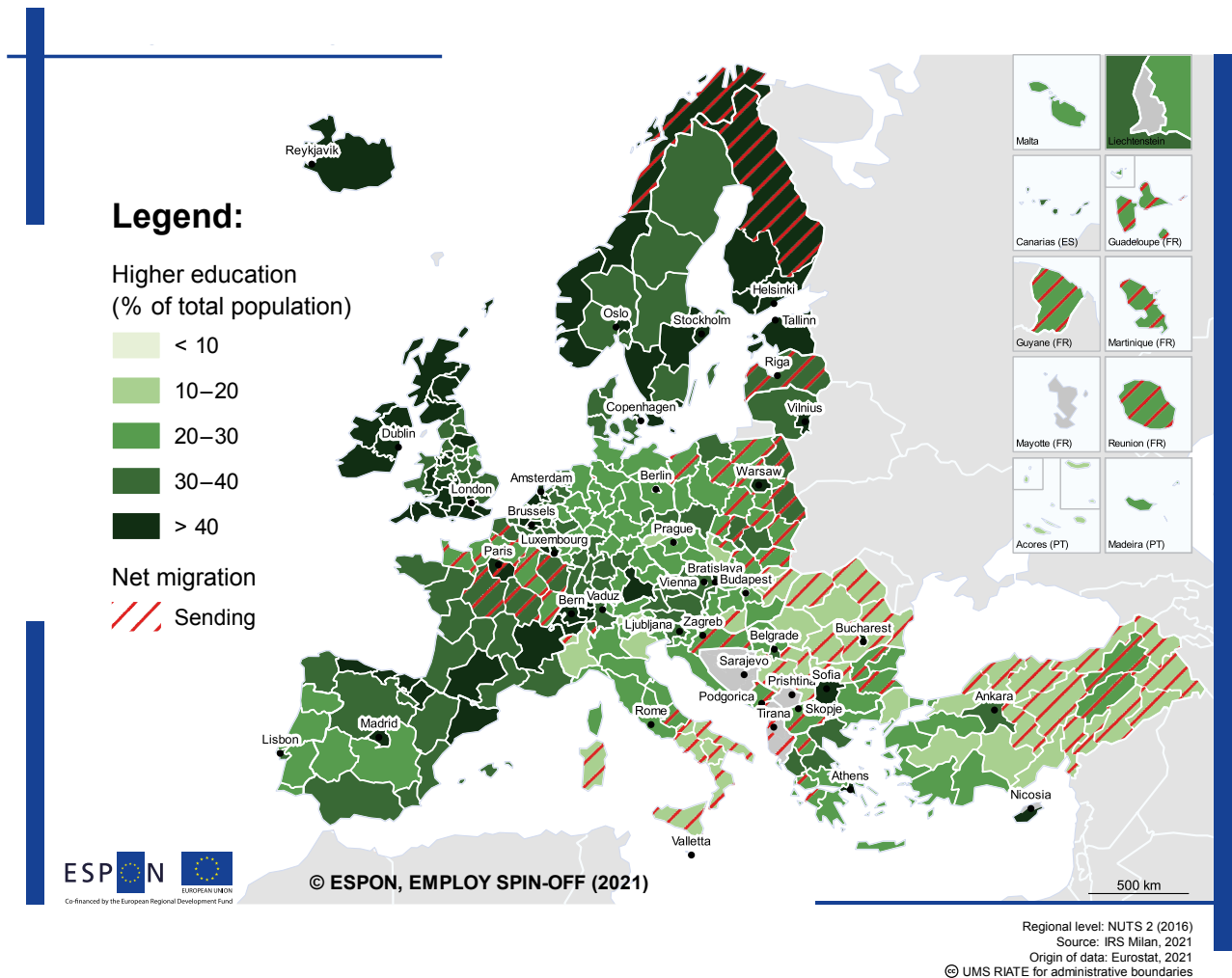UMS RIATE for administrative boundaries

Source: Eurostat (tgs00099 and EDAT_LFSE_04__custom_909921).

by Eurostat (2020b), in eastern Germany, Italy, Portugal and several eastern EU Member States, all regions (except for the capital regions) recorded a relatively low level of tertiary educational attainment. Regions with a low level of tertiary education attainment tend to be short of highly skilled workers, which can impair the potential expansion of knowledge-based industries in these areas.

Maps 2a and 2b overlap the presence of outmigration (sending regions) with the indicator of percentage of people with higher education, confirming that regions presenting a high proportion of highly educated individuals are not losing their population, whereas sending regions are characterised by a low incidence of highly educated people.

Map 2b

People with higher education (as a percentage of the population) and regions with negative net migration (2019)

© ESPON, EMPLOY SPIN-OFF (2021)

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
© UMS RIATE for administrative boundaries

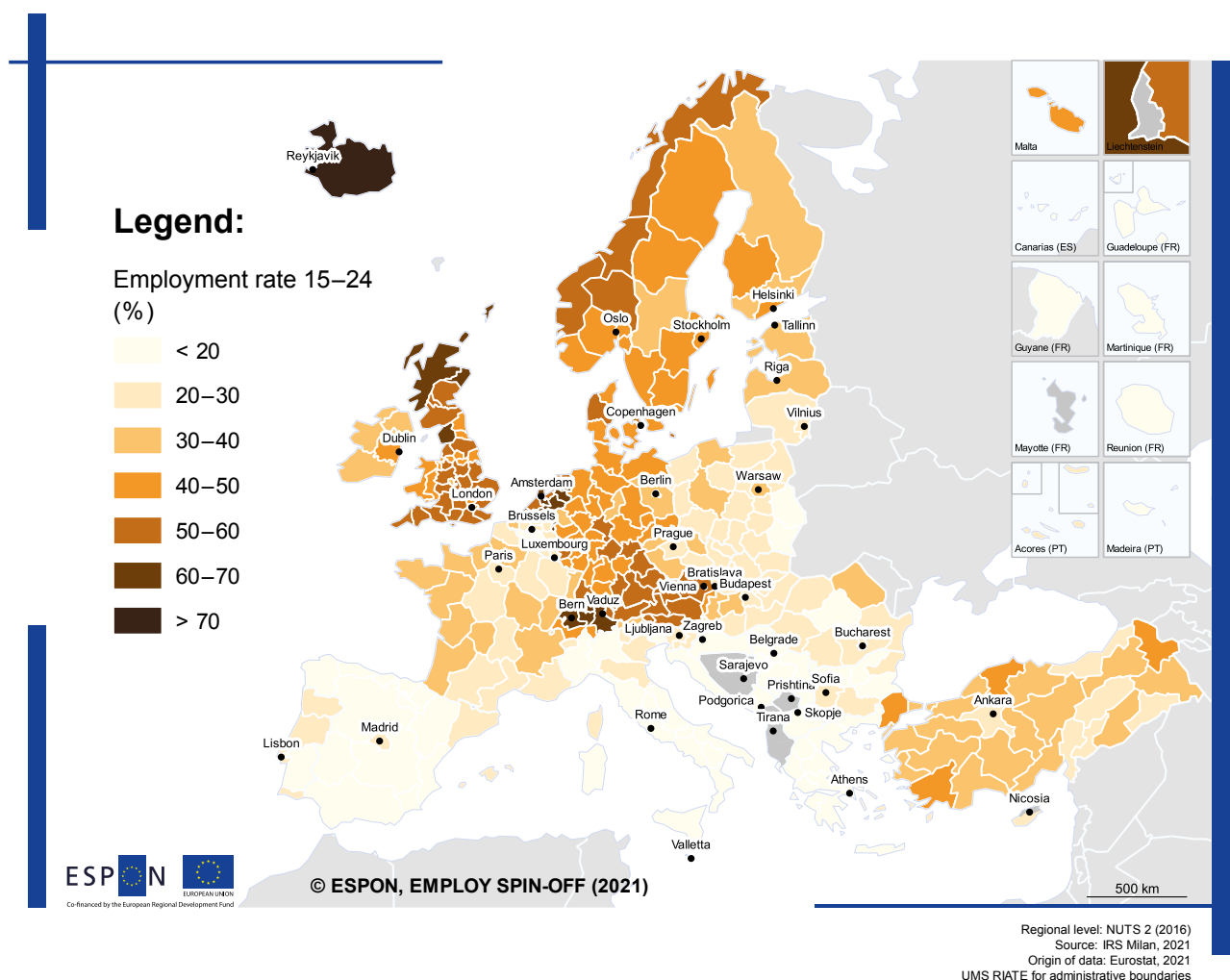*Source*: Eurostat (tgs00099 and EDAT_LFSE_04__custom_909921).

Youth employment

Overall, the analysis of the employment and migration patterns across Europe shows that there is a certain degree of labour mobility, both for the population as a whole and specifically for young people. The youth (age group 15–24 years) employment rate in southern Europe has decreased over time, which is in part related to the prevalence of 'two-tier'[3] labour markets, with young workers mainly employed on temporary contracts, whereas regions in central Europe report substantially stable numbers or increases in the youth employment figures. These factors are important determinants of labour mobility, since migration towards those regions with better conditions for young people, especially for highly skilled workers, is higher.

Maps 3a and 3b show the youth employment rate in 2015 and 2020, respectively. In 2015, the youth employment

Youth employment rate (15–24 years) (2015)

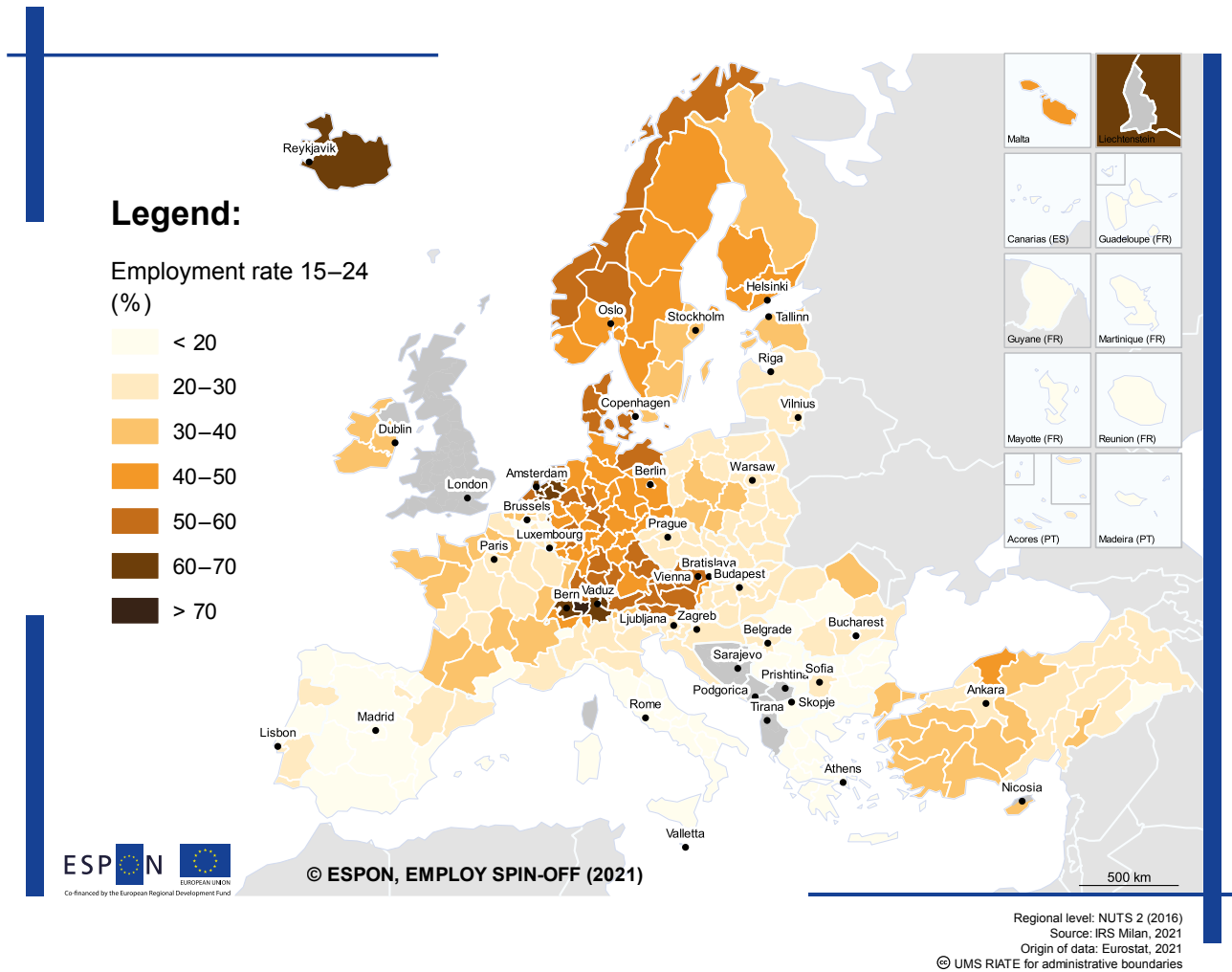
© ESPON, EMPLOY SPIN-OFF (2021)

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
UMS RIATE for administrative boundaries

Source: Eurostat (lfst_r_lfe2emprt).

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3   In a two-tier labour market, as defined by Bentolila et al. (2012), there is a large gap between the dismissal costs of workers with permanent and temporary contracts and much laxer regulation of the use of temporary contracts than permanent ones. As stated by the authors, the wider the gap, the lower will be both the level of hiring of workers on permanent contracts and the proportion of temporary jobs transformed into permanent ones, implying that a widespread use of flexible temporary contracts is more likely to raise unemployment in labour markets already regulated by stringent permanent job security provisions (Bentolila et al., p. 2).

rate was, on average, 34.3 %, with a minimum of 7.4 % (Epirus, Greece) and a maximum of 73.1 % (Iceland). It substantially increased from 2015 to 2019 (to 36.4 % on average) in all regions; however, **a general decline was registered between 2019 and 2020 because of the pandemic crisis**, when the value fell to 32.4 %. This decrease was particularly significant in southern European regions, where young people, mainly those employed on temporary contracts, had been more likely to lose their job during the pandemic than adult workers. Conversely, an increase in 2020 compared with 2019 was registered in some regions in Austria and Germany characterised by a dual educational system, and in Romania, where COVID-19 measures were less restrictive and had a lower impact on the economy than in other southern and western European countries.

Map 3b
Youth employment rate (15–24 years) (2020)

Legend:

Employment rate 15–24 (%)

- < 20
- 20–30
- 30–40
- 40–50
- 50–60
- 60–70
- > 70

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500 km

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
UMS RIATE for administrative boundaries

Source: Eurostat (lfst_r_lfe2emprt).
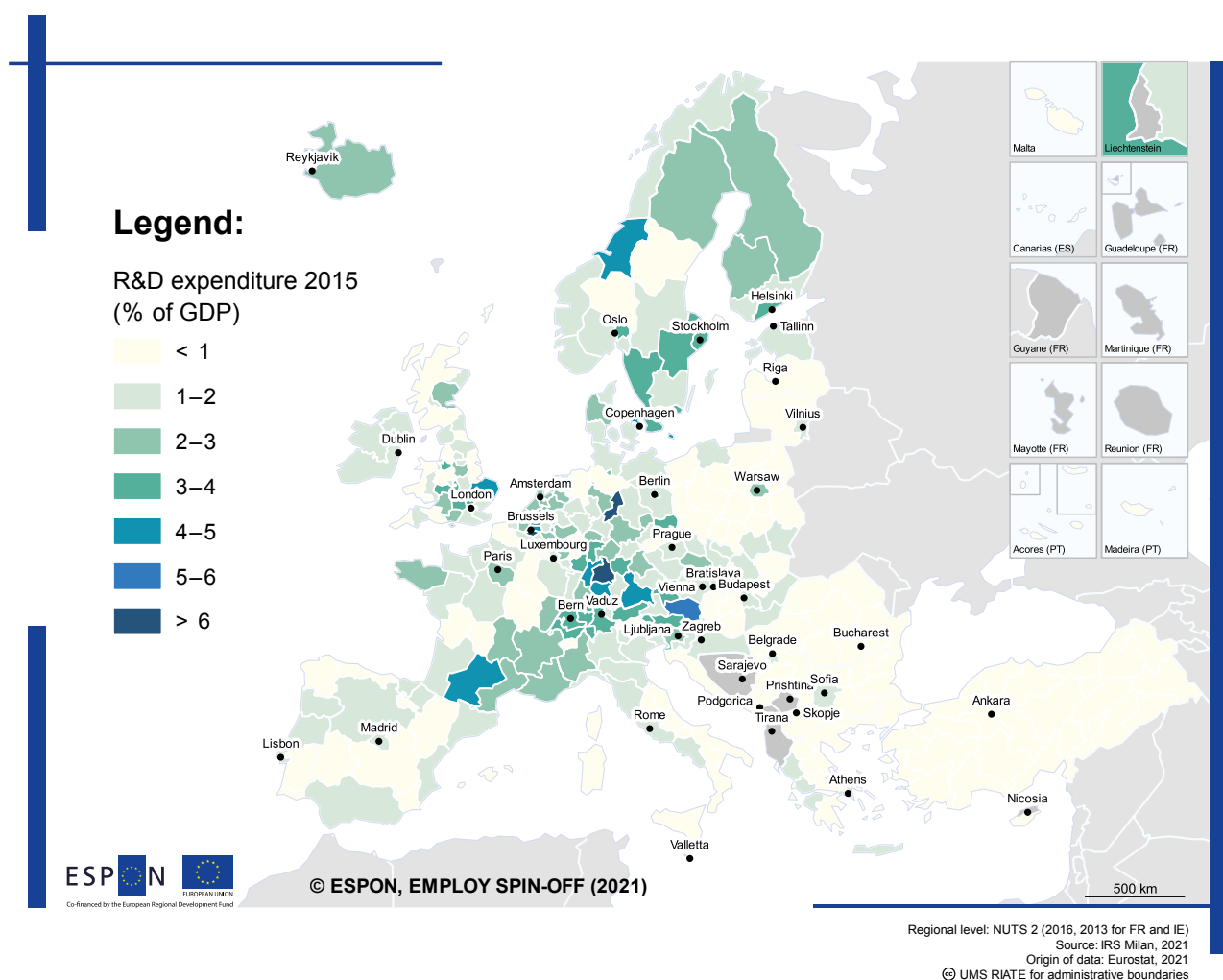
Research & Development

R&D activities are a good indicator of the presence of the KE. The empirical analysis so far shows that the total intramural R&D expenditure is unequally distributed across Europe. It is especially concentrated in metropolitan areas and in some regions in central Europe, which have the highest total R&D expenses. Regions in the Scandinavian countries have high levels of R&D investment and expenditure, whereas 'less developed' regions (where GDP per inhabitant is less than 75 % of the EU average) and 'transition' regions (where GDP per inhabitant is between 75 % and 90 % of the EU average) are characterised by lower levels of spending on R&D.

Maps 4a and 4b show the regional distribution of R&D expenditure as a percentage of GDP in 2015 and 2018, respectively. **Almost all regions registered an increase in the percentage of R&D expenditure, although large regional differences still persist.** The average

Map 4a

Total intramural R&D expenditure (gross domestic expenditure R&D) as a percentage of GDP (2015)

Legend:

R&D expenditure 2015
(% of GDP)

- < 1
- 1–2
- 2–3
- 3–4
- 4–5
- 5–6
- > 6

© ESPON, EMPLOY SPIN-OFF (2021)

500 km

Regional level: NUTS 2 (2016, 2013 for FR and IE)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
cc UMS RIATE for administrative boundaries

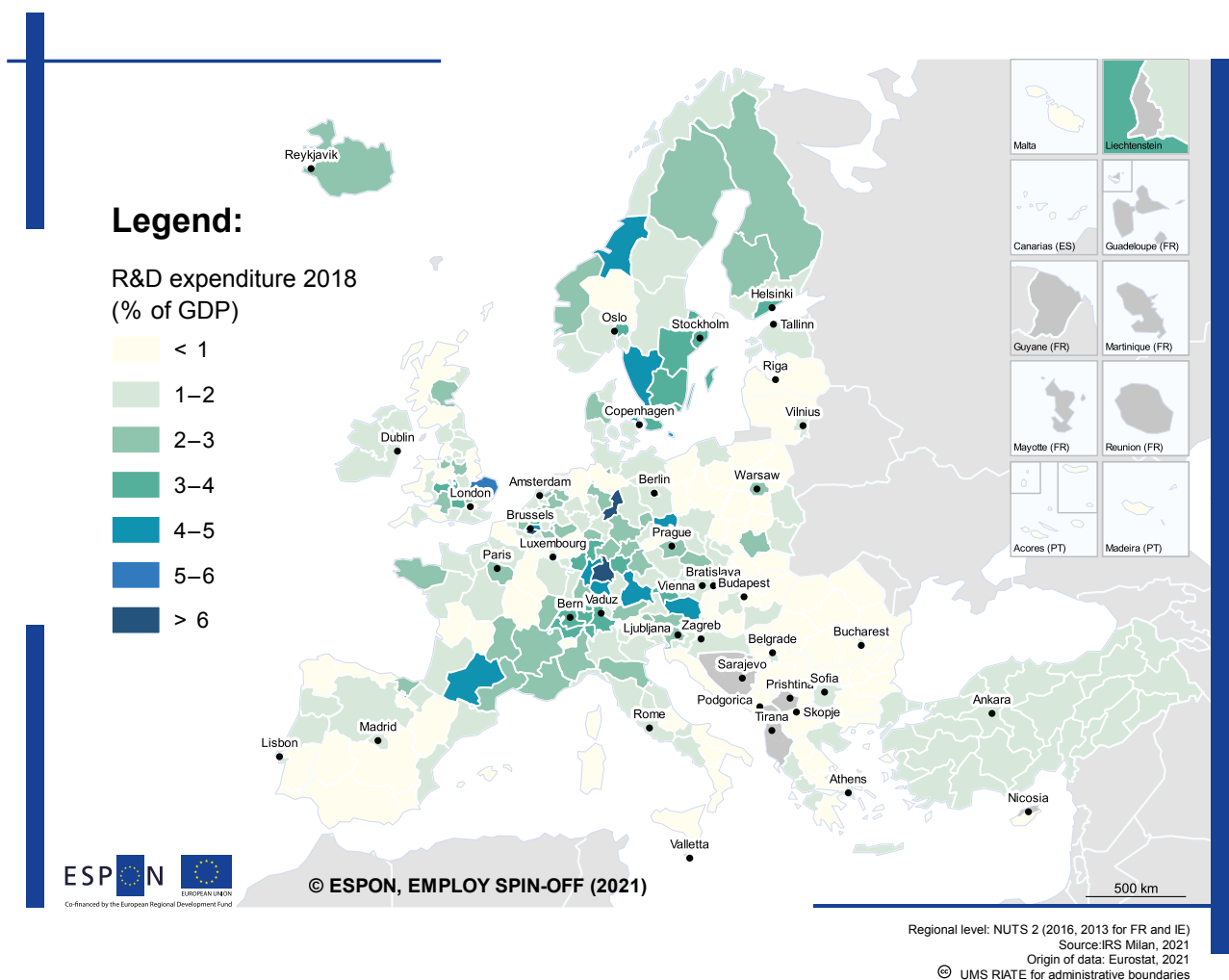*Source*: Eurostat (rd_e_gerdreg).

R&D expenditure (as a percentage of GDP) in 2018 was 1.7 % (versus 1.6 % in 2015), ranging from a minimum of 0.09 % (South-East, Romania) to a maximum of 8.5 % (Braunschweig, Germany). Regions in northern and western Europe as well as ESPON partner states have higher incidences of R&D expenditure than other areas.

As regards **human resources in science and technology**, Maps 5a and 5b show employment in the technology and knowledge sectors as a percentage of total employment in 2015 and 2020, respectively. The average incidence of technology and knowledge workers overall is constantly growing, and reached 3.9 % in 2020, 0.5 percentage points more than in 2015. Northern European and ESPON partner state regions again show the highest average percentages; however, metropolitan regions in eastern Europe also present a high level of employment in the technology and knowledge sectors (Bratislava, Bucharest, Budapest and Prague).

Map 4b

Total intramural R&D expenditure (gross domestic expenditure R&D) as a percentage of GDP (2018)
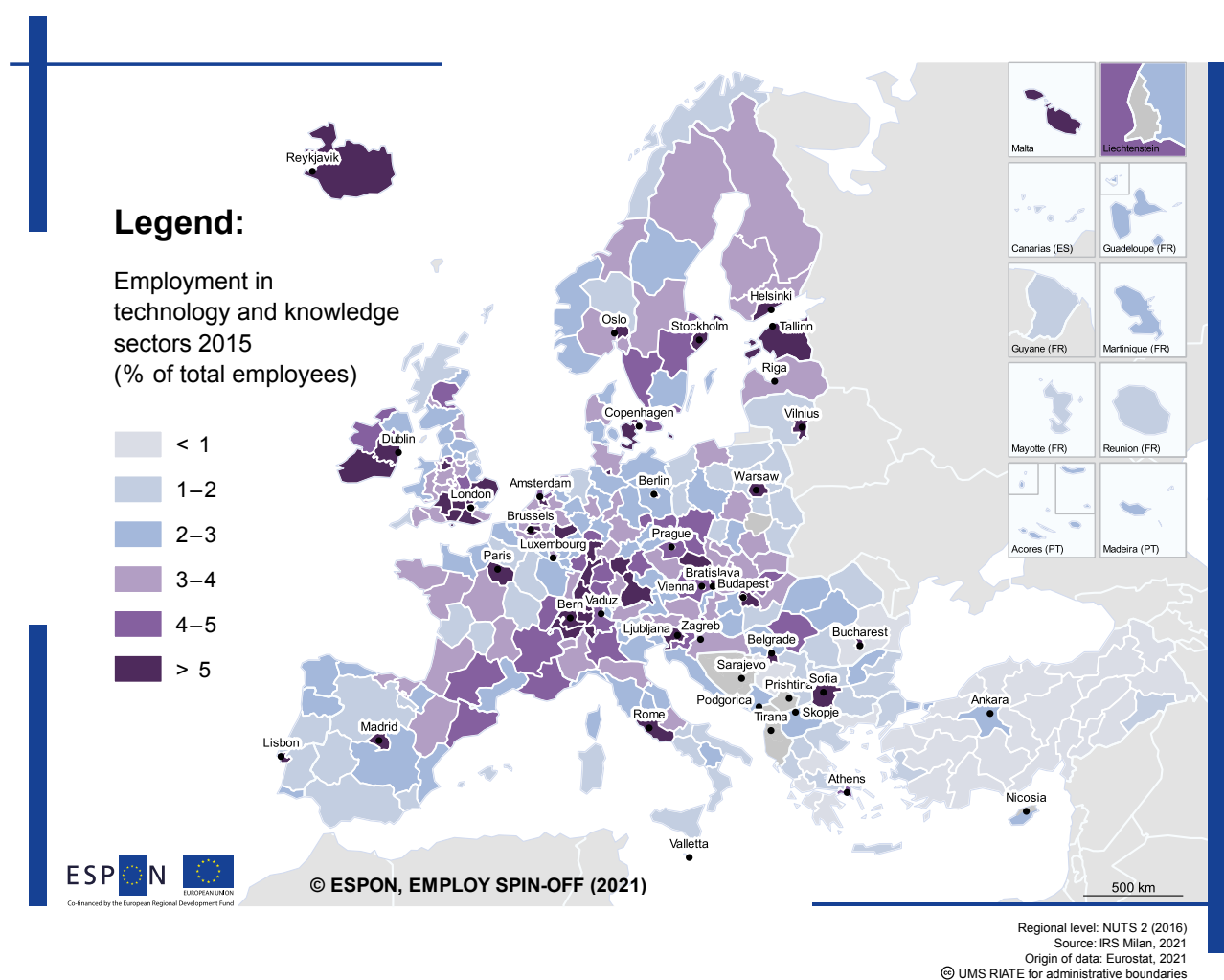

Source: Eurostat (rd_e_gerdreg).

The potential for the KE in European regions

Table 1 and Map 6 present the updated clusterisation of EU regions[4] according to the potential to further develop the KE in the region in 2018–2020 depending on labour market and economic conditions and the presence of a highly skilled and educated population.[5] Following the ESPON EMPLOY analysis, the classification is based on a selection of available regional indicators for each one of the following four main dimensions:

- **labour market** (not in employment, education or training rate (18–24 years), youth employment rate (15–24 years), adult employment rate (25–64 years), youth unemployment rate (15–24 years), adult unemployment rate (25 years and over));

- **migration and population dynamics** (crude rate of natural change, crude rate of net migration, old-age dependency ratio);

- **KE potential** (total intramural R&D expenditure (gross expenditure R&D) as a percentage of GDP, human

Map 5a

Employment in the technology and knowledge sectors as a percentage of total employment (2015)

Legend:

Employment in technology and knowledge sectors 2015 (% of total employees)

- < 1
- 1–2
- 2–3
- 3–4
- 4–5
- > 5

© ESPON, EMPLOY SPIN-OFF (2021)

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
UMS RIATE for administrative boundaries

Source: Eurostat (htec_emp_reg2).

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4   The updated classification also includes Iceland, Serbia, Switzerland and Turkey.

5   According to the selected KE indicators, regions have been classified into KE-based metropolitan areas and KE-related regions (areas with a KE indicator that is above the average and increasing), regions with potential in the KE (KE indicators slightly below the EU average but with a positive trend) and regions with low/no potential in the KE.

resources (workers and inflow students) in science and technology, percentage of population aged 30–34 years with tertiary education);[6]

▪ **context indicator** represented by the regional GDP (in purchasing power standards)) per inhabitant.
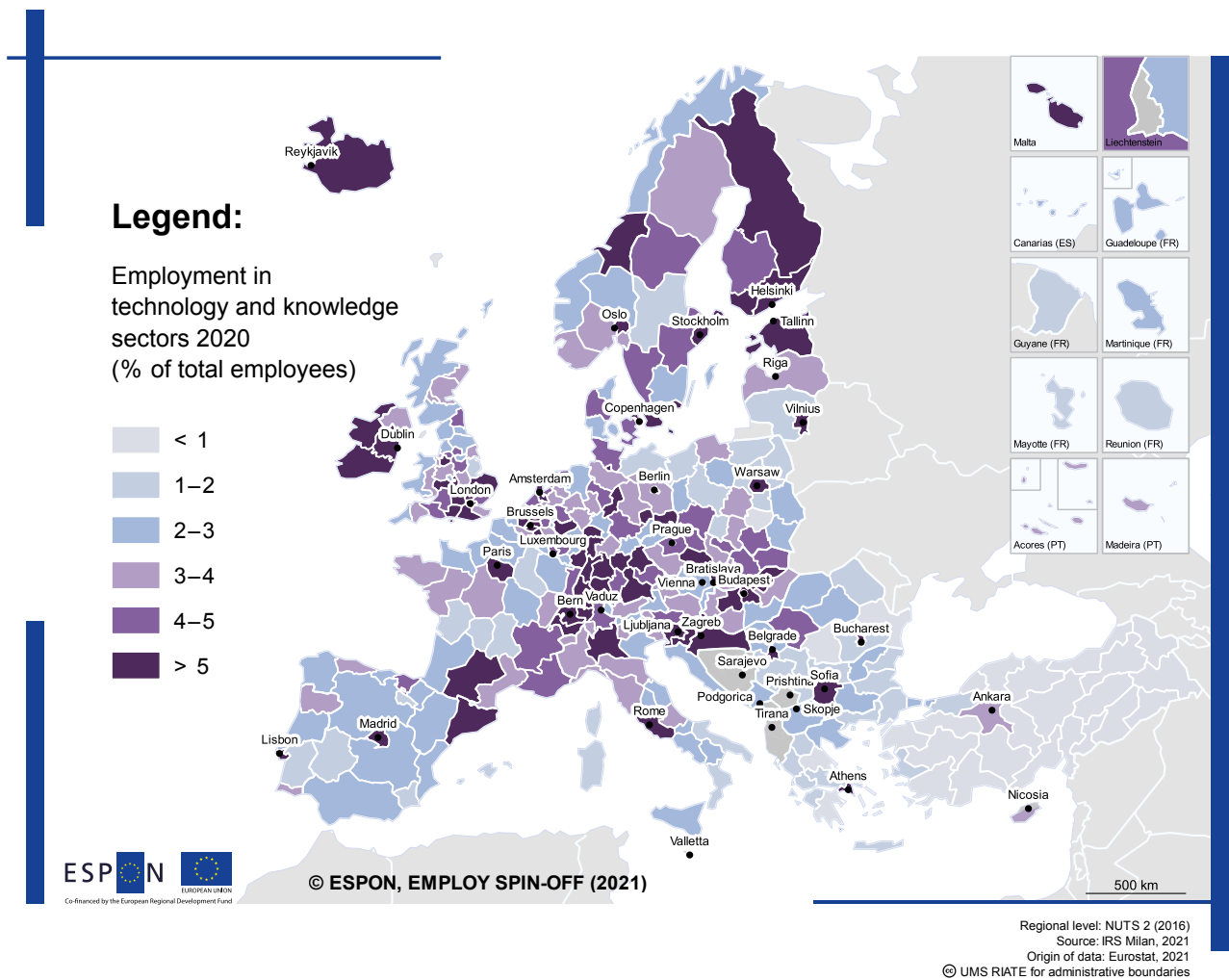
Using the K-means algorithm, the analysis established five[7] different clusters of regions that gave the best

representativeness and reliability, each of them well identified by feature values and stable with respect to variations in the calculations.

The geographical representation of the obtained five clusters is presented in Map 6, whereas Table 1 reports both average values of the cluster indicators within each cluster and the global mean.

Map 5b
Employment in the technology and knowledge sectors as a percentage of total employment (2020)

© ESPON, EMPLOY SPIN-OFF (2021)

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
UMS RIATE for administrative boundaries

Source: Eurostat (htec_emp_reg2).

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6   The indicator of patent applications (per million inhabitants) is not included in the cluster, because data are available only up to 2012.

7   We tested solutions ranging from three to eight groups, and we also ran a preliminary hierarchical cluster

Cluster 1 – strongly attractive and KE-based metropolitan areas and financial services hubs

This group of 39 regions is widely characterised by the presence of large European metropolises and financial services hubs. The main urban areas are Amsterdam, Berlin, Dublin, Hamburg, London, Luxembourg, Oslo, Paris, Stockholm and Zurich, but also Budapest, Madrid and Prague. In this cluster, all variables present strongly positive values, which are much higher than those of the other regions and the European average: a per capita GDP of over EUR 50 000, the highest level of educational attainment in Europe, minimum values in terms of total and youth unemployment, and a very high employment rate. These regions also present the highest average and growing values for KE indicators in comparison with the 2013–2015 average values.

The demographic indicators show an uncommon situation for Europe: a positive natural population change rate (2.8 %) and a high net migration rate (5.4 %), despite showing a negative trend compared with the 2013–2015 average, accompanied by an old-age dependency ratio (measured as the percentage of the population over 65 years compared with the working-age population) that is lower than the EU mean.

Together with the regions in Cluster 2 (see below), these urban areas represent the real engine of Europe and the main immigration destinations.

Cluster 2 – attractive and KE-related regions

This cluster is composed of 121 regions strongly characterised by a powerful innovative pulse: R&D expenditure as a percentage of total GDP is higher than the average (2.1 % versus 1.6 %); and the medium per capita GDP is EUR 6 000 above the European average, although it is still much lower than that of Cluster 1.

Labour market conditions are quite similar to those of the metropolitan areas in Cluster 1, and the proportion of people aged 30–34 years with tertiary education is equal to the European mean.

Overall, this cluster is the second most important group of regions for economic and labour market conditions and a strong attractor of immigration inflows, with a high positive net migration rate (4.1 %) – although to a smaller extent than the regions in Cluster 1 – which compensates for a negative natural population change rate (−0.9 %).

In this cluster, all the indicators show a significant improvement compared with 2013–2015.

Geographically, this cluster includes Austria, Denmark, Flanders (Belgium), Germany, northern Italy, some Scandinavian regions and the United Kingdom.

Cluster 3 – less attractive regions with potential in the KE

This group of 104 regions is composed of two distinct blocks of regions that are geographically distant from each other but similar in their economic and demographic aspects. The main regions are, on the one side, France, central Italy, Portugal and northern Spain and, on the other side, eastern EU regions, such as Bulgaria, Poland, Romania, and the western Balkan regions for which data are available, except for capital cities.

This cluster presents worse economic and labour market conditions than the previous clusters: the level of employment is below the EU average, and the unemployment rate is slightly above; and per capita income does not reach EUR 25 000. The KE indicators are slightly below the EU average even though they show a positive trend compared with 2013–2015. As for demographic conditions, these regions are characterised by a stable population, with a positive net migration rate (2.3 %), which compensates for a negative natural population change rate (−2 %), but a high and growing old-age dependency ratio.

Cluster 4 – depopulating regions with low KE potential

This cluster is composed of the most economically depressed regions (37 in total), which are also characterised by labour markets with structural difficulties and depopulation dynamics. Geographically, they are positioned at the southern borders of Europe facing the Mediterranean Sea.

This cluster is composed of sending regions, which are regions with a negative net migration rate (−0.5 %). In addition, the natural population change rate is negative (−1.2 %), although it is less than that of the regions in Cluster 3.

The average GDP per capita in these regions reaches only 62 % of the EU average. These regions also present, on average, the lowest values for the KE indicators and the worst labour market and socioeconomic conditions. The average employment rate (25–64 years) is only 61.2 % compared with 79.7 % in Cluster 1, whereas youth employment (15–24 years) is only 15 % compared with over 40 % in Clusters 1 and 2. In addition, the youth unemployment rate reaches 42 %.

Cluster 5 – regions with no KE potential and a positive demographic balance

This cluster includes only Turkish regions and the French overseas department of French Guiana, which present very different features from the other European regions. These regions show worse economic and labour market conditions than the other European regions, with very low indicator values related to the KE and a general negative trend compared with the 2013–2015 average. They are, however, characterised by very fast internal demographic growth, with the highest positive natural population change rate (9.8 %) and a positive net migration rate (3.5 %), which is likely to be due to internal movement. It is interesting to highlight that these regions register better labour market indicator values for young people than the most economically depressed EU regions in Cluster 4.

Table 1
Cluster analysis results (2018–2020)

INDICATOR	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	AVERAGE
Not in employment, education or training rate (18–24 years)	10.2	10.2	14.0	26.7	33.4	15.2
Youth employment rate (15–24 years)	79.7	80.3	74.3	61.2	54.3	74.0
Employment rate (25–64 years)	41.0	49.3	27.2	15.0	31.5	36.0
Youth unemployment rate (15–24 years)	13.5	10.6	17.8	42.0	23.3	17.8
Unemployment rate (25 years and over)	4.4	3.4	5.7	15.6	10.4	6.2
Crude rate of natural change	2.8	−0.9	−2.0	−1.2	9.8	0.1
Crude rate of net migration	5.4	4.1	2.3	−0.5	3.5	3.3
Old-age dependency ratio	25.8	33.3	31.2	31.1	13.9	29.9
Total intramural R&D expenditure (gross expenditure R&D) as a percentage of GDP	2.7	2.1	1.1	0.7	1.0	1.6
Percentage of population aged 30–34 years with tertiary education	57.4	39.4	38.1	33.0	28.4	39.5
Human resources (in science and technology, percentage of active population)	60.3	48.5	40.7	32.8	26.4	43.8
GDP at current market prices (in purchasing power standards per inhabitant) (EUR)	51 758	33 572	22 340	17 936	15 574	28 927

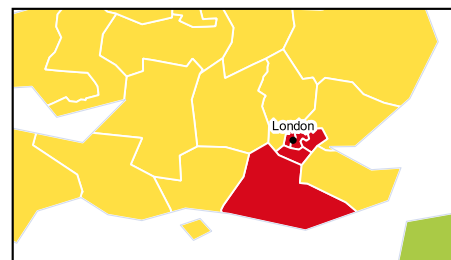*Source*: Own calculations using the Eurostat data.

Map 6

Cluster analysis – regional classification according to labour market conditions, KE potential, population and migration dynamics, and context indicators (2018–2020)

© ESPON, EMPLOY SPIN-OFF (2021)
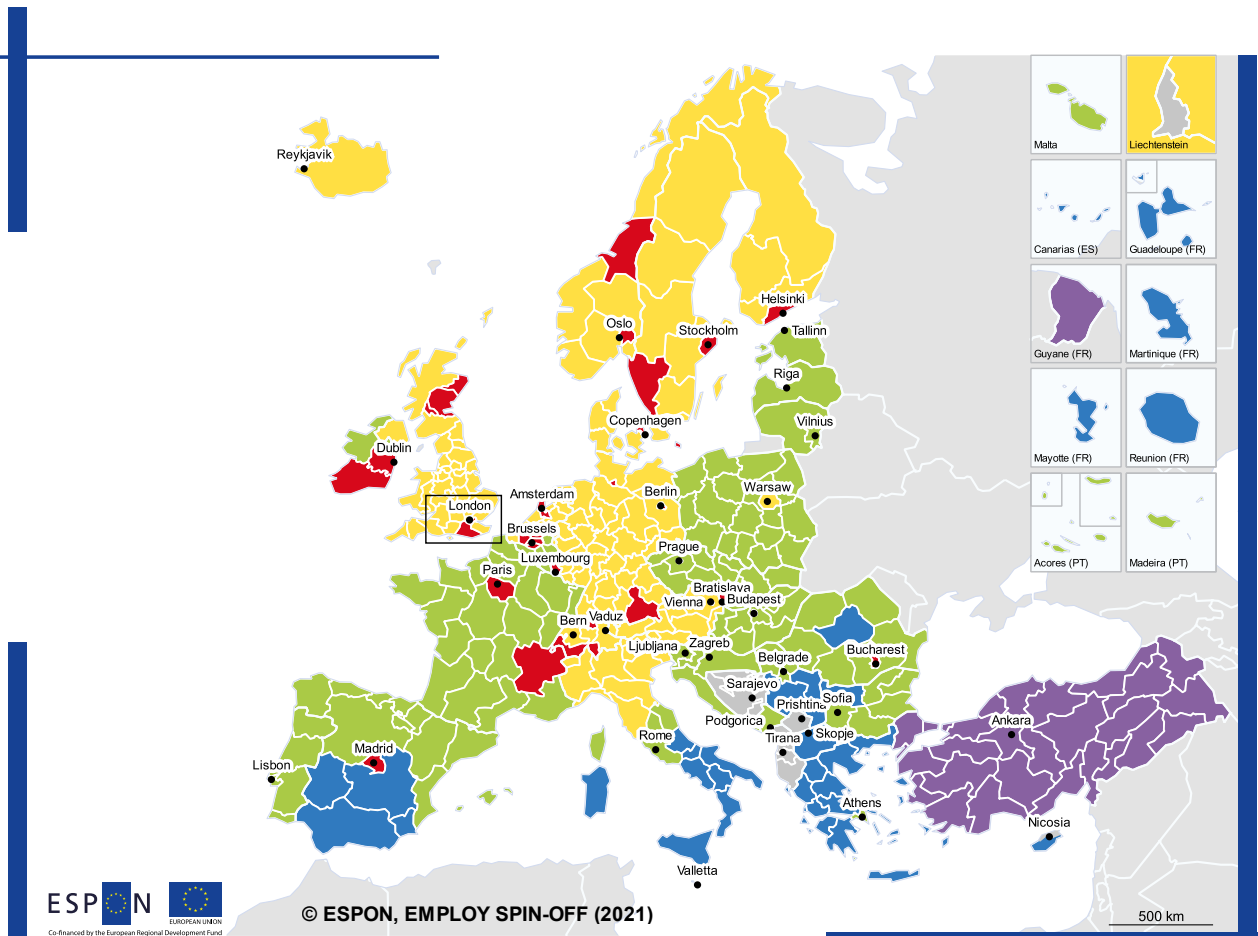
Legend:

KE cluster analysis (2018–2020)

- 🟥 1
- 🟨 2
- 🟩 3
- 🟦 4
- 🟪 5

Source: Own calculations using the Eurostat data.

Regional level: NUTS 2 (2016)
Source: IRS Milan, 2021
Origin of data: Eurostat, 2021
© UMS RIATE for administrative boundaries

5.
Policy recommendations

Economic convergence among regions is one of the main political objectives of the EU. In particular, the cohesion policy aims to promote growth, with a strong focus on less developed areas, by allocating larger amounts of funding to investments in regions identified as falling behind. To achieve its goals, it provides support in a wide range of policy areas, which can be grouped into five broad categories: research and innovation; support for enterprises; infrastructure; human capital; and support for administrative and institutional capacity.

To address the abovementioned challenges, **the cohesion policy and national/regional employment strategies are increasingly focused on supporting the KE**, for example by incentivising R&D and ICT/digital development, by increasing participation in tertiary education, attracting skilled migrants and promoting the return of skilled workers living abroad. This is consistent with the EU's efforts in recent years to promote the development of economies based on knowledge and innovation through flagship policies such as the EU 2020 programme for smart, sustainable and inclusive growth (European Commission, 2020d). However, instead of just promoting investments in R&D, innovation and digitisation, **the cohesion policy should aim to reduce the structural disparities that make certain regions less attractive than others in the eyes of workers and investors**. Regional attractiveness is influenced by economic, demographic and social conditions, including quality of government, public services, inclusion policies and the local political and social climate (ESPON, 2019). **Investments should focus on valorising existing local knowledge and assets to make places attractive for living and for business opportunities, providing accessible services and infrastructure of general interest, fostering horizontal and vertical cooperation among stakeholders (especially universities and small and medium-sized enterprises) and bridging the rural–urban divide.** Tailoring measures requires a good knowledge of the regional context, the integration of different measures according to local needs and the capacity to find new solutions; moreover, the effectiveness of such measures largely depends on the quality of national and local institutions and actors. **Recapturing the lost skills of emigrants** through measures supporting brain circulation, return migration and/or diaspora strategies to facilitate the return of highly skilled emigrants, and/or their contribution to the country/region of origin through the creation of knowledge networks and remittances, **is also essential to reducing regional imbalances**. Some southern and eastern European countries have developed **national and regional strategies to incentivise highly skilled migrants to return to their country/region of origin**, for example by offering tax incentives or employment opportunities, and by developing networks with citizens abroad, known as diaspora strategies (European Commission, 2020a).[8]

The ESPON EMPLOY study identified five potential strategies that could be deployed to stimulate KE drivers based on territorial assets. These strategies are even more relevant in the post-COVID-19 framework.

Building a KE

- Provide monetary or non-monetary incentives, such as fiscal deductions, grants, services or other incentives, to attract (highly skilled) workers, companies or research centres. Incentives often support the promotion of clusters of universities and companies. The regular and close interaction promoted under the clustering scheme is expected to improve cooperation among actors that have not cooperated previously.

- Develop an **'oasis strategy'** that **focuses only on the most successful, vibrant and growing sector of the region**. The sector's stakeholders are incentivised to work together to achieve the common goals of fostering innovation and promoting economic development.

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[8] ESPON (2018, p. 52–53) provides examples of brain circulation and return policies adopted in EU Member States, For example, in **Croatia**, the **'Crossing Borders – Scientific Cooperation'** programme is meant to facilitate the return of scientists from the Croatian diaspora through the creation of networks between Croatian scientists and experts working abroad. In **Estonia**, the portal **'Talents Back Home!'** provides information to Estonian migrants about employment opportunities in their home country. In **Romania**, the **'Diaspora Start-up'** programme, launched in 2016 and managed by the Romanian Ministry of Foreign Affairs, aims to incentivise Romanian entrepreneurs abroad to invest in Romania. In **Bulgaria**, the **national strategy in the field of migration, asylum and integration (2011–2020)** seeks, inter alia, to attract back Bulgarian migrants who have emigrated in the past two decades. In **Hungary**, the **'Youth, Come Home'** programme was launched in spring 2015 to assist young Hungarians in returning home from abroad by providing housing allowances and employment opportunities for them in Hungary. In **Poland**, the **Tax Abolition Act** was introduced in 2008 to avoid double taxation for Polish migrants, to introduce tax credits and investment allowances, grants for individual technology transfer, and support for the recognition of education and qualifications acquired abroad, and to ensure easier acquisition or restoration of Polish citizenship.

- Design development strategies that can be oriented towards **'building a magnet', that is, attracting highly skilled workers** by exploiting some unique resources of the territory.

- Create KE opportunities through urban development by **providing a physical environment that facilitates cooperation between science and industry**. Develop a perception of opportunities for young professionals to work in innovative businesses in regenerated and/or newly developed areas.

- Create regional branding through the use of slogans and hashtags.

- Develop overall KE strategies that will benefit from fostering vertical and horizontal cooperation among stakeholders (especially universities and small and medium-sized enterprises), as well as territories, through financial incentives, technical assistance, networking or the creation of formal structures supporting interactions among different actors.

Improving the attractiveness of regions

In terms of more general attractiveness of regions, there is a need to develop an explicit 'mobilisation strategy'. This requires cities and regions to assess their position in terms of endowments, identifying positive and negative factors, and then develop policies to bring about change. Two main recommendations can be highlighted.

- **Strengthen the role of public authorities** and their capacity to strategically instigate and direct the mobilisation processes. This requires a governance system that can identify the existing strengths and weaknesses of an area's territorial capital and develop an appropriate mobilisation strategy to enhance/develop the different forms of territorial capital. This also requires the involvement of relevant stakeholders/actors in coordinating the actions of different levels of governance.

- Develop the capacities of stakeholders to mobilise assets in a multilevel governance framework. It is unlikely that regions and cities will possess all the resources/powers necessary to realise a mobilisation strategy, so they will need to be able to access and connect resources available at national and EU levels.

Developing diaspora strategies

In the context of globalisation, as regions become more interconnected, **a functional approach can also be applied to territories that are not spatially contiguous but are linked at a pan-European scale**. The following recommendations can be highlighted.

- **Adopt explicit diaspora strategies** to develop mutually beneficial strategic partnerships between countries that encourage return migration and incentivise non-returning migrants to invest in the development of their country/region of origin. This can be through economic support (e.g. with remittances, direct investments, diaspora tourism), supporting the creation of knowledge networks and human capital investments, and social investments.

- Strategies dedicated to the reinforcement of quality of life can have long-term benefits, particularly by encouraging returning processes, whereby those who have left for a more attractive region eventually migrate back and contribute to development through skills, knowledge and resources acquired elsewhere. The key issue is to **establish cooperative relationships between original and destination regions to better manage migration and ensure the achievement of win–win situations**.

Implementing a functional approach in urban governance

There is no one-size-fits-all functional approach to urban governance. It involves a process of dialogue that includes actors from different territories, levels and sectors. However, there are many political and institutional cultural barriers and obstacles to cooperative territorial governance, which will require sustained action at different political levels to overcome in the short and longer terms. The ESPON policy brief 'Governance, planning and financial tools in support of polycentric development' provides a number of concrete recommendations showcasing the ways to realise a functional approach and cooperation in practice among different administrative levels and timescales.

- **Through policy coordination.** Intensify policy coordination at EU level on the issues related to functional cooperation areas at different scales and different interpretative geographies (e.g. transnational macro regions, metropolitan areas, cross-border areas, transnational areas, city networks, rural–urban linkages) and how these can be addressed by the EU programmes. Such cooperation could be incentivised in the short to medium term through greater cohesion policy incentives. At national level, establish an overarching policy framework and guidance to enhance the involvement of regional and local authorities in long-term cooperative governance and planning initiatives at various functional scales.

- **Through funding.** At EU level, improve the vertical coordination of different funding sources in the governance of the post-2020 cohesion policy and programmes to guarantee more coherence of the agendas at different governance and planning levels in the short to medium term. At national level, allocate financial incentives to support networking, cooperation and linkages among municipalities to promote longer-term cooperation.

▪ **Through capacity building, territorial networking and knowledge sharing.** At EU level, address more robustly the under-researched phenomenon of territorial networking and cooperation and spatial planning, in particular the impact of sectoral EU legislation and funding instruments on shaping territorial governance and spatial planning at regional, metropolitan and local levels. At national level, help disseminate good practices on and share knowledge of the use and benefits of collaborative governance and planning tools to support polycentric development.

Dealing with a widespread use of tele-working in the post-COVID-19 period

The possibility that widespread telework may remain a permanent feature of the future working environment after the COVID-19 crisis calls for the **strengthening of policy strategies and financial support to address the socioeconomic and territorial implications of digitisation**. This should enhance the employment opportunities offered by this new form of work and mitigate any negative effects.

As already mentioned, TICTM may contribute to the emergence of new employment and social inequalities between those who can telework and those who cannot. Institutions at European and national levels should **develop policy strategies to address the societal implications of extensive use of TICTM**, aiming to enhance the opportunities offered by this form of work and increase the level of social inclusion of currently marginalised groups and territories. Such strategies should address the digital divide and its implications for spatial and social inequalities, and ensure widespread access to good quality and affordable broadband and suitable ICT equipment, including by supporting the creation of neighbourhood co-working spaces and

childcare services, and the redesign of housing, mobility and spatial planning policies.

In particular, **skills policies** are well anchored in key European policy strategies for transformation and in the programmes for recovery from the COVID-19 crisis; the Green New Deal, the digital agenda for Europe and especially the Next Generation EU programme designed in response to the COVID-19 crisis have dedicated sections or funding opportunities for skills policies.

Investing in higher education and training is thus crucial to remaining competitive in a context of increasing relevance of the KE and rising competition, but also because of the possibility of working remotely. At the same time, it is also crucial to address inequality and exclusion, as higher educational levels improve the employability of disadvantaged groups and reduce poverty risks over the life course. This is particularly essential in regions with lower KE indicators and higher unemployment and inactivity rates. At the same time, and to avoid skill mismatches and the 'brain drain', policy decisions should focus on promoting the attractiveness of less developed areas for businesses and investments.

From another point of view, public policies and cooperation among social partners are crucial to ensuring that new, efficient and welfare-improving working methods that emerged during the pandemic crisis are maintained and developed once physical distancing is over. To maximise the gains for productivity and welfare that are inherent in the use of more widespread telework, governments should **promote investments in the physical and managerial capacity of firms and workers to telework**. They should also address potential concerns for workers' well-being, and longer-term innovation related to the excessive downscaling of workspaces in particular (OECD, 2020).

6.
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