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## COVER NOTE

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| To: | Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union |
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**COMMISSION STAFF WORKING DOCUMENT**

**Regional Trends for Growth and Convergence in the European Union**

# Regional Trends for Growth and Convergence in the European Union

## 1.  Introduction

**The sustainable development of all regions is key for economic prosperity, social welfare, and the competitiveness of the EU as a whole. Various EU policies, in particular cohesion policy, have contributed to significantly reducing disparities between the levels of development of the various regions in the last decades.** This effort continues daily.

**In most Member States, important persistent regional asymmetries need to be addressed.** The European Commission's 2023 country reports and their "Annexes 17 – Economic and Social Performance at regional level" highlight significant asymmetries between EU regions, particularly concerning access to basic public services, employment and unemployment rates, competitiveness, and productivity. Member States such as Czechia, Bulgaria, Estonia, France, Spain, Hungary, Italy, Latvia, Lithuania, Slovakia, and Portugal register regional disparities in access to education or public transportation. Disparities are further accentuated in rural areas where access to basic public services remains generally a challenge. Disparities in labour market outcomes (i.e. employment and unemployment rates) and competitiveness are also found in Austria, Belgium, Germany, Bulgaria, Czechia, Germany, Hungary, Poland, and Portugal, whilst also significant gaps remain concerning research and innovation (R&I). Differences in digital or energy efficiency persist in Bulgaria, Czechia, Greece, Croatia, Italy, Portugal, and Slovakia.

**Along with the Recovery and Resilience Facility (RRF), cohesion policy remains key for supporting reforms and growth-enhancing investments in the years ahead**. The peaking implementation of the 2014-2020 cohesion policy programmes (EUR 405 billion) in parallel with the launch of the 2021-2027 programmes (EUR 378 billion)[1] provides a continuous stream of investment in people and businesses. Since the outbreak of the pandemic, cohesion policy programmes have disbursed more than EUR 186 billion to increase resilience and boost (upwards) social and regional convergence. The requirement for Member States to fulfil enabling conditions[2] before the disbursement of EU funds has supported the reform agenda. Furthermore, the European Commission supports the Member States and regions via the Technical Support Instrument (TSI), including through a new flagship initiative to overcome barriers to regional development. This will focus on three areas: improving the quality of governance and public services; strengthening productivity, innovation, and green transition; and harnessing talent and employment opportunities[3].

**Cohesion policy programmes are adapted to the specific needs of different categories of EU regions[4] and are in line with the investment guidance outlined in the European Semester.** The European Semester country reports highlight the regional dimension of the EU's growth and

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[1] EU contribution in current prices.
[2] Member States shall fulfil 'enabling conditions', setting up general and sectorial framework ensuring the effectiveness of EU Support. Member States must meet these conditions during the whole programming period in order to make the most of the funds allocated.
[3] TSI 2024 flagship: https://reform-support.ec.europa.eu/tsi-2024-flagship-overcoming-barriers-regional-development_en.
[4] See this data story on the Cohesion open data platform (https://cohesiondata.ec.europa.eu) analyses the policy choices of the Member States within the 2021-2027 Partnership Agreements: https://cohesiondata.ec.europa.eu/stories/s/2021-2027-Adopted-National-Partnership-Agreements/4jua-76d5.

resilience agenda and the potential challenges and responses to regional disparities in the delivery of the four dimensions of competitive sustainability: promoting environmental sustainability; productivity; fairness; and macroeconomic stability.

*Figure 1. European Regional Development Fund (ERDF) investment priorities by category of region.*



*Source: European Commission, Open Data Platform.*

**Developing people-based and place-based policies is key to the EU's overall prosperity.** By identifying the specific challenges of each Member State at regional level, the European Semester country reports highlight the importance of taking into account different growth and convergence models as well as of tapping into the growth potential of each region, in order to deliver investment effectively. People-based and place-based policies – and mobilising all EU funds in line with the "do no harm to cohesion" principle[5] – will increase regional and national competitiveness and are therefore key to the EU's overall prosperity.

# 2. Convergence trends at national and regional level and identification of the main regional issues

## A European Model of Upward Regional Convergence

**Investment financed by cohesion policy must take account of the diversity of growth models across the EU in order to accelerate the upward convergence experienced over the last 20 years.** Disparities in terms of gross domestic product (GDP) per capita are high in the EU[6] but decreasing. GDP per capita (euro per inhabitant, Purchasing Power Standard; PPS) in Luxembourg is five times higher than in Bulgaria, while GDP per capita in Southwest Ireland is almost eight times higher than in Sverozapaden, Bulgaria, and nine times higher than in the French outermost region Mayotte. Nevertheless, Europe has experienced a significant dynamic of upward convergence over the last 20
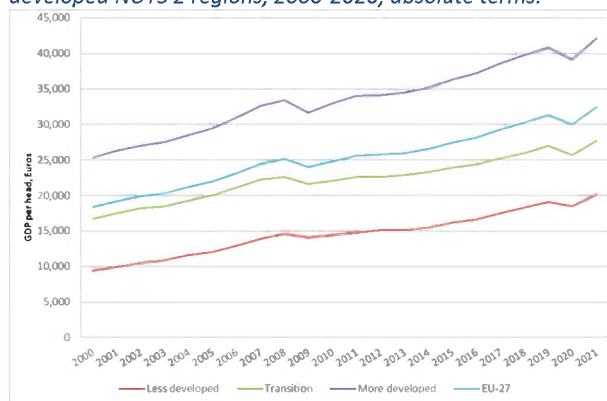
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[5] The principle of "do no harm to cohesion" implies that European policies must consider their territorial impacts, when relevant. It has been strongly emphasised by the European Commission and is embedded in the Better Regulation agenda through the development of Territorial Impact Assessment (TIA) (see European Commission (2002), *Cohesion in Europe towards 2050: Eighth report on economic, social, and territorial cohesion*; Publications Office of the European Union).

[6] For instance, while the ratio of top 20% over bottom 20% of regions is around 2 in the United States (OECD (2020), *OECD regions and cities at a glance – Country note United States*), it is close to 3 in the EU.

years[7] in terms of GDP per capita. As highlighted by Map 1 in Annex 1, real GDP per capita growth has often been higher in the less developed regions of the EU. This is also highlighted by the trends observed for different groups of regions (Figure 2). In 2000, GDP per capita (PPS) in the group of less developed regions[8] was around EUR 9,300, or 51% of the EU average (Figure 3). By 2021, GDP per capita in these regions had increased to more than EUR 20,000, reaching 62% of the EU average. However, real GDP per capita growth was negative in several regions in southern Member States, notably in Greece and Italy. Furthermore, a group of transition regions started diverging from the EU average after 2008, including in some more developed Member States. In 2021, GDP per capita in the transition regions had declined to around 85% of the EU average, from 91% in 2000.
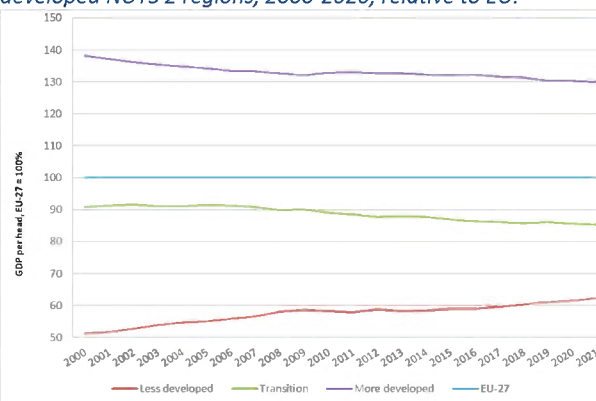
**An increasing number of EU regions, primarily in southern Member States (e.g. Calabria and Sicily in Italy or Ipeiros and Dytiki Elláda in Greece) but also in north-western Europe (e.g. Centre - Val de Loire and Aquitaine in France or Schleswig-Holstein in Germany) as well as a few in eastern Europe (e.g. Nord-Est in Romania or Severen tsentralen in Bulgaria), are in a "development trap" or at risk of falling into one[9].** These regions experience lengthy periods of low or negative growth, weak productivity increases, and low employment creation. While some had low GDP per capita and were catching-up, others were formerly prosperous but have moved into a prolonged period of relative economic decline. This requires particular attention from the most affected Member States.

| *Figure 2. GDP per capita (PPS), in less, transition and more developed NUTS 2 regions, 2000-2020, absolute terms.* | *Figure 3. GDP per capita (PPS), in less, transition and more developed NUTS 2 regions, 2000-2020, relative to EU.* |
|---|---|
|  |  |
| *Source: Eurostat; REGIO calculations.* | *Source: Eurostat; REGIO calculations.* |

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[7] Defined as a situation where GDP per capita in the European Union steadily grows but with less developed Member States and regions growing faster and hence catching up on the EU average (Eurofound, 2018, *Upward convergence in the EU: Concepts, measurements and indicators*, Publications Office of the European Union, Luxembourg).

[8] Cohesion policy distinguishes three groups of regions by their level of development. For this analysis, the groups correspond to those defined by eligibility for the 2014-2020 European Regional Development Fund. The group of less developed regions includes regions with a GDP per capita of less than 75% of the EU average, so-called transition regions have a GDP per capita between 75% and 90% of the EU average, and more developed regions have a GDP per capita of over 90%. The composition of the groups is therefore constant throughout the whole period of analysis.

[9] See Map 2 European Commission (2022), *Cohesion in Europe towards 2050: Eighth report on economic, social, and territorial cohesion*; Publications Office of the European Union. https://ec.europa.eu/regional_policy/information-sources/cohesion-report_en.

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*Figure 4. Coefficient of variation within Member States, GDP per capita (PPS), NUTS 2 regions, 2000 and 2021.*
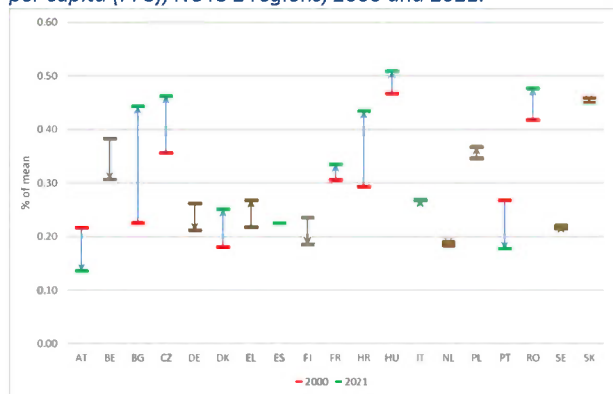
Note: In this analysis, only Member States with at least four regions are being consider as the margin of error is likely to be too large in case of fewer than four observations.
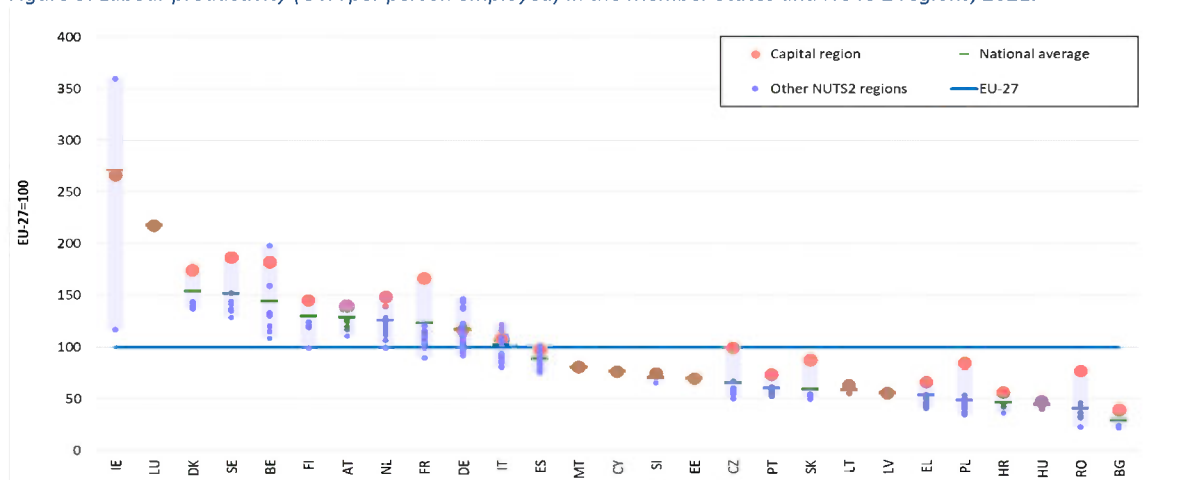Source: Eurostat; DG REGIO calculations.

**Changes in internal disparities show different patterns across Member States (Figure 4).** In Member States like Bulgaria or Romania, increases in disparities have been driven by the very high growth rates in the most developed regions (typically the capital city region). Their other regions, however, still experienced higher growth than the EU average and hence converged, albeit at a slower pace than the capital region, implying increasing domestic disparities. In France or Greece, internal disparities increased because growth of GDP per capita in poorer regions was particularly low – lower than in the most developed regions of the country but also lower than in the EU. In some other Member States, the decrease in regional disparities is due to the relatively poor performance of some developed, previously dynamic regions. For example, in Portugal, internal convergence is driven by the catching up of less developed regions but also by the loss of ground of the capital city region.

## Factors behind convergence

**Positive trends in labour productivity reflect upward convergence, though disparities are still high between Member States and even more between EU regions (Figure 5).** Based on the grouping for the 2014-2020 programming period, less developed regions are generally catching up with the EU average in terms of labour productivity. However, in this context the pace of convergence has considerably decelerated since 2008, notably after the economic turmoil which followed the economic and financial crisis which affected EU regions asymmetrically. In transition regions, labour productivity has drifted away from the EU average during the last decade. Disparities in terms of regional labour productivity are also high and growing in several Member States (e.g. Bulgaria and Czechia) but decreasing in others (e.g. Germany, Poland, Portugal).

*Figure 5. Labour productivity (GVA per person employed) in the Member States and NUTS 2 regions, 2021.*



Source: Eurostat; REGIO calculations.

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**Research and innovation remains highly concentrated in north-western Member States and in capital and other metropolitan regions (Figure 6).** While some Member States spend more than 3% of their GDP on research and development (R&D) (Sweden, Germany, Belgium, and Austria), others spend less than 0.5% of their GDP on similar types of investment. Variations are wider between EU regions. Expenditure shares of R&D ranges from 8% to less than 0.1% of GDP. R&D is also often geographically concentrated within the Member States.

*Figure 6. R&D intensity in EU-27, Member States, and NUTS 2 regions.*
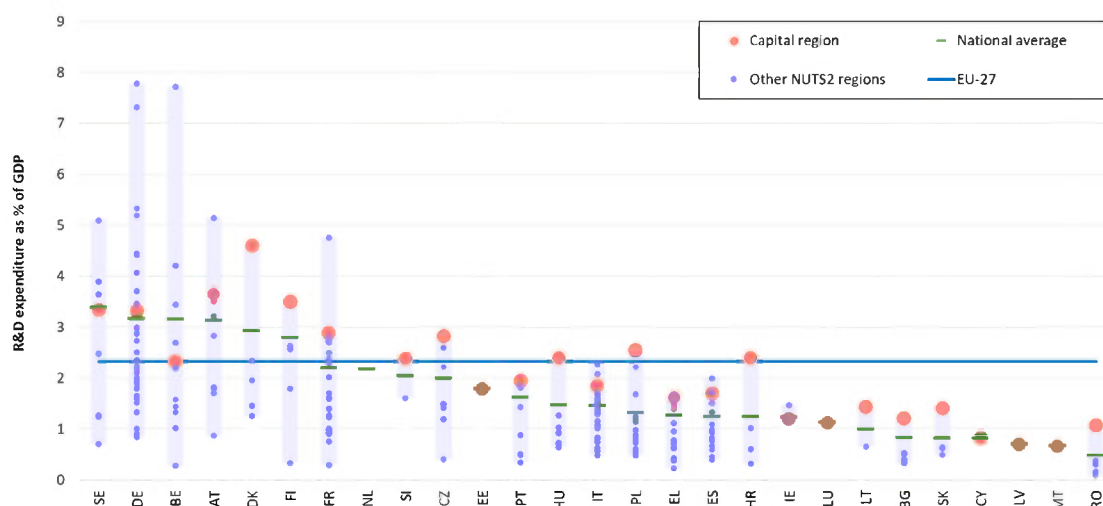


*Note: The reference year is 2017, 2019 or 2020 depending on regions and data availability. Data for the Netherlands is only available at national level.*
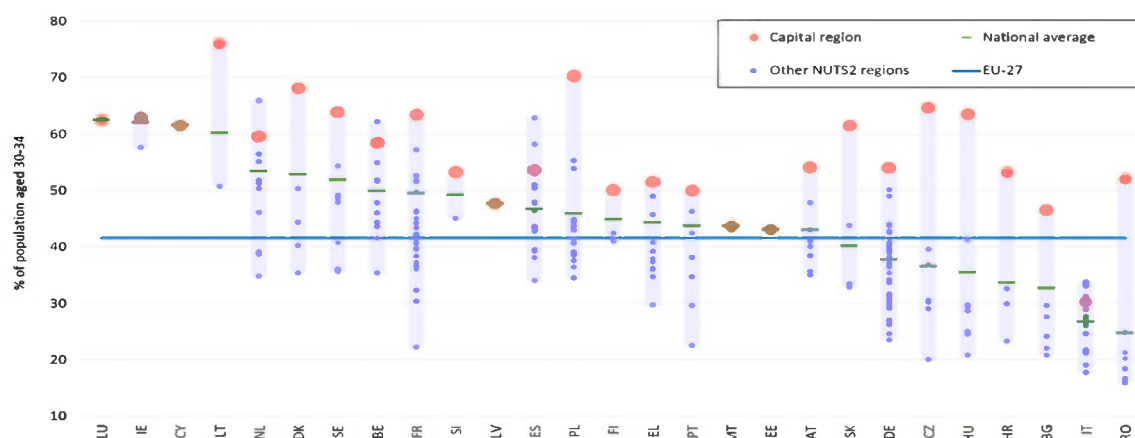*Source: Eurostat.*

**The 2022 European Regional Competitiveness Index shows large differences in regional competitiveness in the EU[10].** In general, there is a strong performance of regions hosting large urban areas, especially for capital regions, while important gaps remain in other regions, despite significant improvements in less developed regions. The least competitive regions are in the eastern Member States, followed by southern Member States. More competitive Member States tend to have a smaller gap between their capital city region and other regions as well as between all their regions, which suggest that the performance of all regions matters for a country's competitiveness.

**Wide regional variations in levels of education reflect a tendency of human capital to concentrate in more developed and metropolitan regions.** In general, educational attainment is much higher in more developed regions than in less developed regions. In 2021, in more developed regions around 37% of the population (aged 25-64) had a tertiary education degree, against 25% in less developed regions. Educational attainment grew in all Member States and regions of the EU during the last decades, though the gap between the most and least performing regions has steadily increased (see Annex 1.5). In some regions (e.g. the capital city regions of Denmark, Lithuania or Poland), close to or more than 70% of the population have tertiary education while in some regions (e.g. Sud-Est in Romania or Sicilia in Italy) this share is less than 20% (Figure 7). Differences in educational attainment are also particularly pronounced in France where some regions have much lower scores than the national average (22% in Guyane, 30% in Guadeloupe, and 32% in Corse).

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[10] European Commission (2023), *EU Regional Competitiveness Index 2.0*, 2022 edition, REGIO Working Paper 01/23, Publication Office of the European Union, Luxembourg.

*Figure 7. Share of population aged 30-34 with tertiary education, in EU-27, Member States, and NUTS 2 regions, 2021.*



Source: Eurostat.

**Labour market performance also shows significant variations which are much wider at the regional than at the Member State level.** Regional disparities in the labour market remain very high. Unemployment rates exceed 20% in some regions (France's Mayotte, Spain's Ciudad de Ceuta, Ciudad de Melilla, Canarias, and Andalucía, Greece's Anatoliki Makedonia and Thraki, or Italy's Campania and Sicilia). Employment rates can be as low as 40% in Mayotte and 44% in Sicilia, compared to an EU average of 73%. While the unemployment rate in less developed regions has converged to the EU average, in transition regions it remains systematically higher than the EU mean and tends to diverge away from it (see Annex 2.4). Similarly, the employment rate in transition regions is lower than – and has been drifting away from – the EU average since 2008.

**Urban and rural territories differ in their labour market performance.** In some Member States, notably in eastern Member States, the unemployment rate is generally higher in rural than in urban areas. This is the opposite case for other Member States. For instance, the 2021 unemployment rate in the rural regions of Romania was 8.4%, against 2.8% in cities. In Belgium, the unemployment rate in rural regions was 4.5%, against 10.2% in cities. Rural regions often demonstrate lower educational attainment and lower access to high quality IT infrastructure, such as high-speed broadband connection. The coverage of very high-capacity networks in rural areas is much lower than in urban areas (70% compared to 37%)[11].

**Demography is a major challenge for several regions, in particular in eastern Member States, with EU regions varying widely in terms of population growth.** National trends often hide wide domestic variation as many Member States have both growing and declining regions in terms of their population. Less developed rural regions tend to be over-represented in the latter group (Figure 8). As highlighted in the recently adopted Communication on "Harnessing talent in Europe's regions" (COM(2023) 32 final), two groups of regions face particular difficulties in developing, retaining or attracting the talents needed to mitigate the impact of demographic transition. The first group of regions experiences a low and stagnating share of tertiary educated people, which is insufficient to offset the consequences of their rapidly shrinking working age population, falling into a talent development trap. The second group of regions at risk of soon falling into a talent development trap is characterised by experiencing high net out-migration of their younger cohorts who tend to be

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[11] Digital Economy and Society Index 2022.

more educated than the average working age population[12]. As these regions are predominantly less developed and rural, leaving this situation unaddressed could further impede their growth potential, convergence capacity, and further widen territorial disparities.

*Figure 8. Population growth in EU-27, Member States and NUTS 2 regions, 2011-2020.*
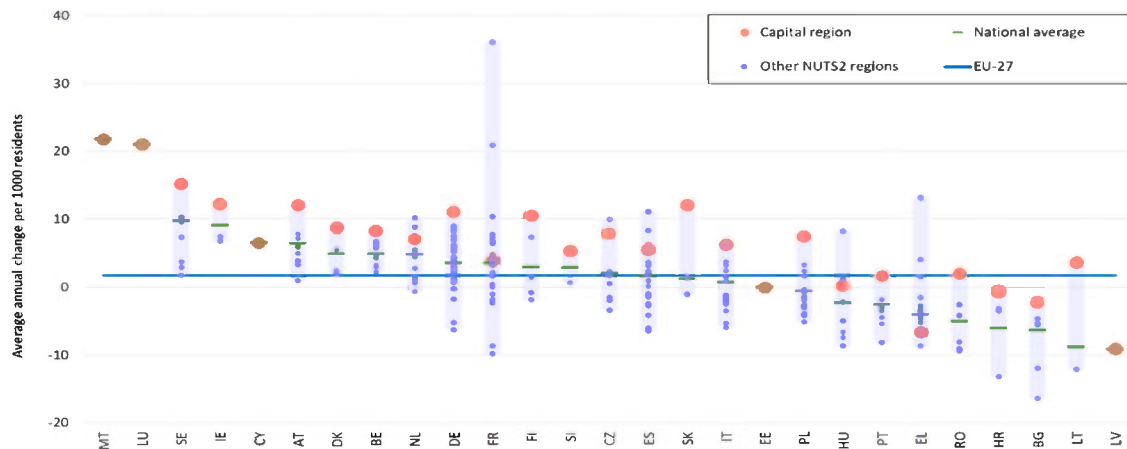


*Source: Eurostat.*

**Access to basic services remains low in a number of EU regions, even in Member States where the national performance is relatively high.** For instance, data shows that the EU has made significant progress in improving urban waste water treatment during the last decades but disparities between and within countries remain significant. Around 85% of urban waste water received more stringent (tertiary) treatment standards in 2020[13]. This share is above 70% in most Member States, but is lower in Slovenia (63%), Portugal (62%), Romania (50%), and Croatia (bottoming at 6%). In addition, in many regions the uptake of a high standard treatment of waste water remains very low, including in Member States where the national average is relatively high.

**The EU's goal to become climate-neutral by 2050[14] presents opportunities and costs which are unequally spread across the EU.** This territorial dimension of the green transition is reflected in the support provided by the Just Transition Fund (JTF) and the Social Climate Fund which address the impacts of decarbonising the economy on the most vulnerable (see Map 2 in Annex 2).

# 3. Delivering sustainable development of all regions

**Seeking the sustainable development of all regions is key for economic prosperity, social welfare, and the competitiveness of the entire EU.** Economic, social, and territorial cohesion is key to ensuring the balanced and sustainable growth of the EU. Growth without cohesion will compound concentration trends, increasing territorial and social division. Those left behind may grow resentment and discontentment towards the democratic system and the values in which the EU is

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[12] See also *Employment and Social Developments in Europe 2022 - Young Europeans: employment and social challenges ahead.* Publications Office of the European Union, 2022.

[13] The Urban Waste Water Treatment (UWWT) Directive stipulates that waste water must be subject to biological treatment (secondary treatment), except in catchments with particularly sensitive waters, such as those suffering from eutrophication, where more stringent (tertiary) waste water treatment may be required. However, the treatment of urban waste water is fundamental to ensuring public health and environmental protection and the indicator on tertiary treatment is often used to assess progress in terms of water treatment.

[14] The European Climate Law has written this ambition into law, see: https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en.

grounded. Furthermore, tapping into the unfulfilled potential of less competitive regions and sub-regional territories in line with the Investment Guidance outlined in the European Semester is beneficial for the competitiveness and resilience of Member States and the EU overall.

**Different growth and convergence models require targeted action in the implementation of cohesion policy programmes.** The alignment of the 2021-2027 cohesion policy with the European Semester empowers regions, as well as sub-regional territories and local communities, to deliver EU priorities that consider regional needs in an integrated and participatory way. In urban areas, strategies are mainly tackling climate change adaptation, urban regeneration, and sustainable urban mobility, whereas non-urban strategies, in addition to climate change adaptation, tend to focus on addressing demographic and territorial challenges such as those related to access to public services.

**The current challenges call for concerted action from all EU policies and funding tools, including the Recovery and Resilience Facility, in full complementarity with cohesion policy funds.** Strong synergies between the various EU instruments allow for the maximisation of the value added from EU actions. In Member States like Italy for example, RRF support in instigating reforms and investments in energy and transportation is coupled with European Regional Development Fund (ERDF) measures reinforcing energy efficiency as well as interventions promoting R&I and business competitiveness. Likewise in Bulgaria, support from the RRF is intertwined with ERDF intervention as well as the JTF on areas such as decarbonisation. It is therefore paramount to accelerate the implementation of both the Recovery and Resilience Facility and cohesion policy funds, ensuring the full complementarity of investments.
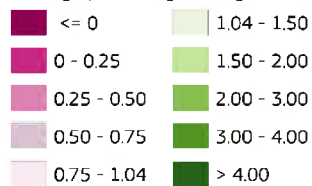
# Annex 1.

*Map 1. Real GDP per capita growth, 2001-2021.*
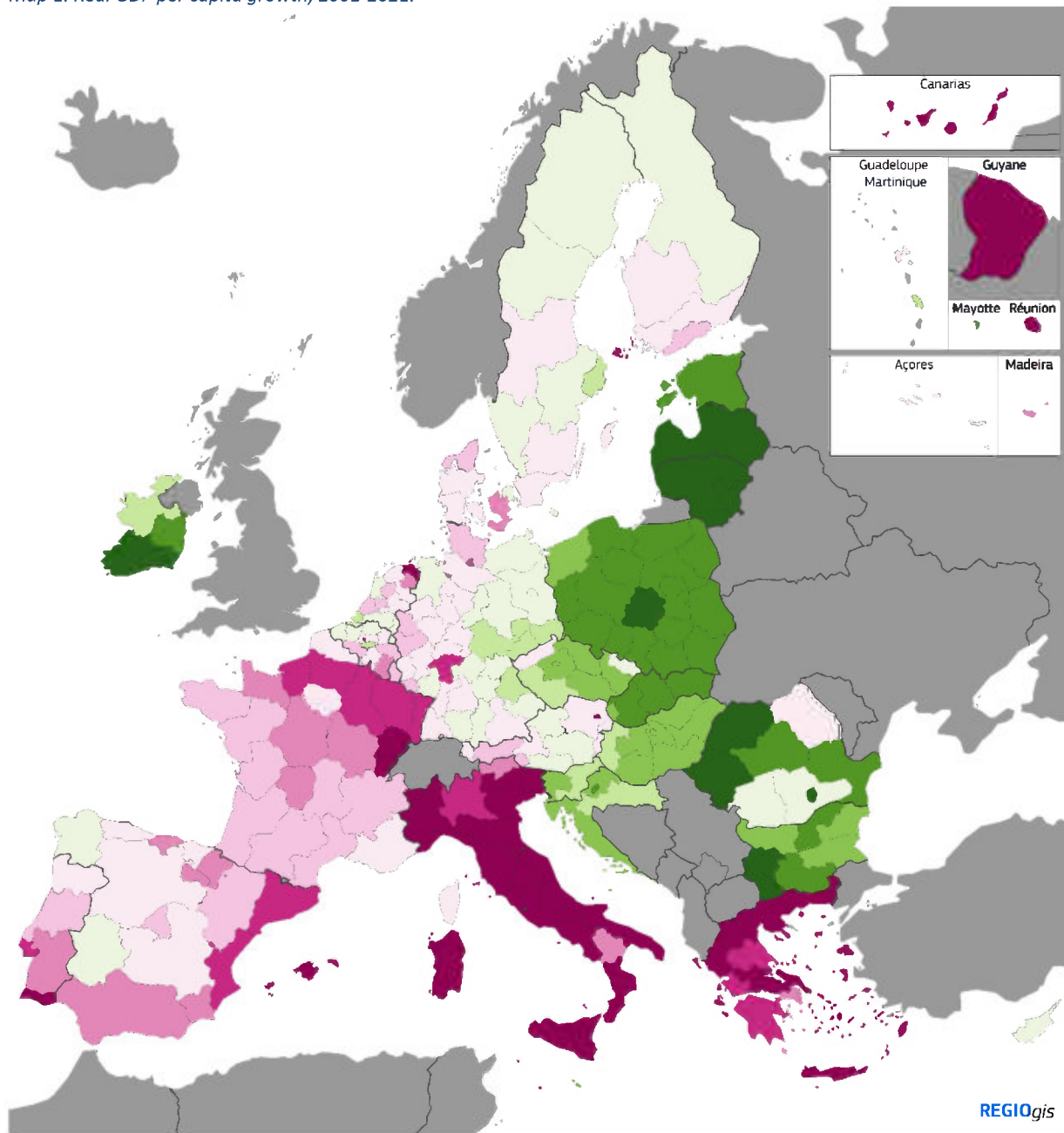


## Growth of GDP per head, 2001-2021
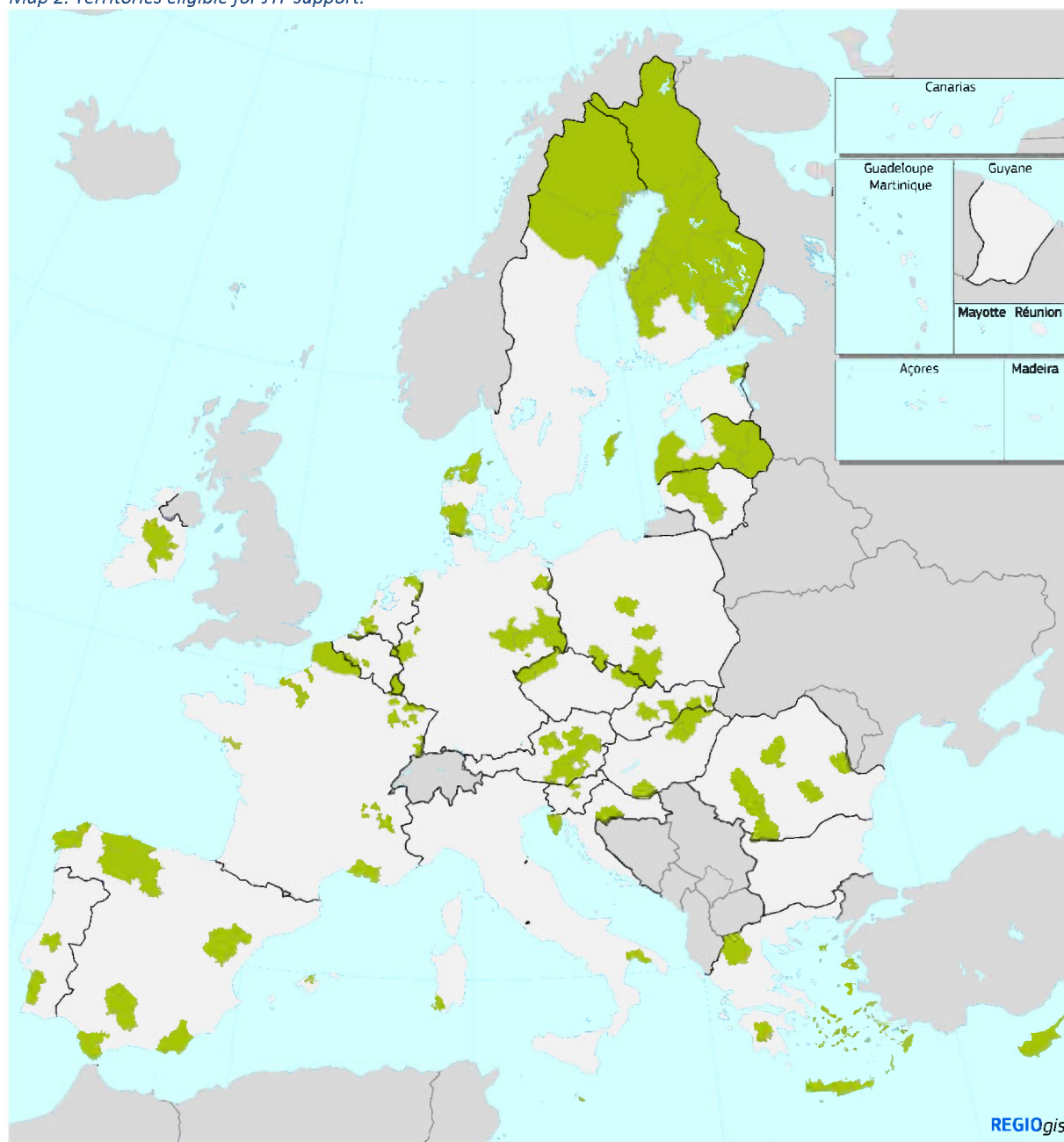
Average percentage change on the preceding year

| | |
|---|---|
| <= 0 | 1.04 - 1.50 |
| 0 - 0.25 | 1.50 - 2.00 |
| 0.25 - 0.50 | 2.00 - 3.00 |
| 0.50 - 0.75 | 3.00 - 4.00 |
| 0.75 - 1.04 | > 4.00 |

EU-27= 1.04
Source: DG REGIO based on JRC and Eurostat data

0 ___ 500 km

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9

**JTF territories included in approved territorial just transition plans (Feb. 2023)**

JTF territory included in approved
territorial just transition plans

0          500 km

© EuroGeographics Association for the administrative boundaries

*Source: Eurostat.*

# Annex 2. Indicator fiches

## Annex 2.1. GDP per capita

Gross domestic product (GDP) per capita is an indicator for potential welfare of the citizens in a country. One aim of cohesion policy is to reduce dispersions of GDP per capita across regions of the EU, in particular by fostering increases in GDP per capita in relatively less affluent regions to converge with more wealthy regions.

### Trends in GDP per capita and current situation

*Figure 1. Trends in GDP per capita, relative to EU average.*
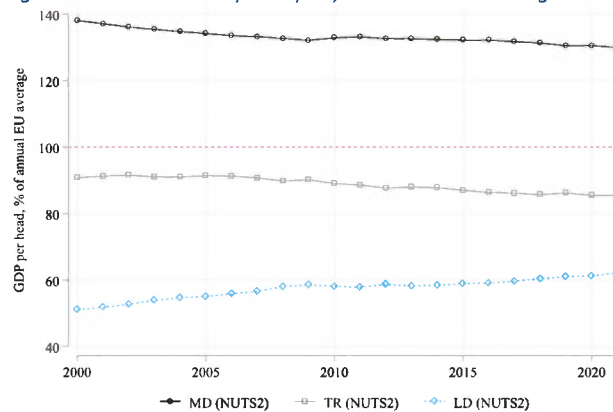


*Source: Eurostat; REGIO calculations.*

**Overall, GDP per capita in Member States and regions of all income groups grew significantly since 2000, while displaying diverse trends.** Figure 1 shows GDP per capita in NUTS 2[15] regions, relative to the annual EU average, grouped by the categorisation of the fund eligibility criteria for the last programming period. While regions in the less developed group (almost) continuously approached the annual EU average over time, the transition and more developed groups displayed rather opposing trends. Within these groups, trends differ too, e.g. within the less developed group only the regions in central and eastern Member States converged to the EU mean.

**Despite this significant progress, Figure 2 shows that disparities in terms of GDP per capita remain high in the EU, between Member States and even more between regions.** The GDP per capita in Luxembourg is five times higher than in Bulgaria, while GDP per capita in Southwest Ireland is almost eight times higher than in Sverozapaden (BG) and nine times higher than in the French outermost region Mayotte. Within countries, this spread is often as large as between the means for highest and lowest performing Member States across the EU, highlighting variations hidden by national averages.

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[15] Based on 2021 NUTS version, cf. Eurostat: https://ec.europa.eu/eurostat/web/nuts/history.

11

*Figure 2. GDP per capita (PPS) in Member States and in NUTS regions, 2021 (EU-27=100).*
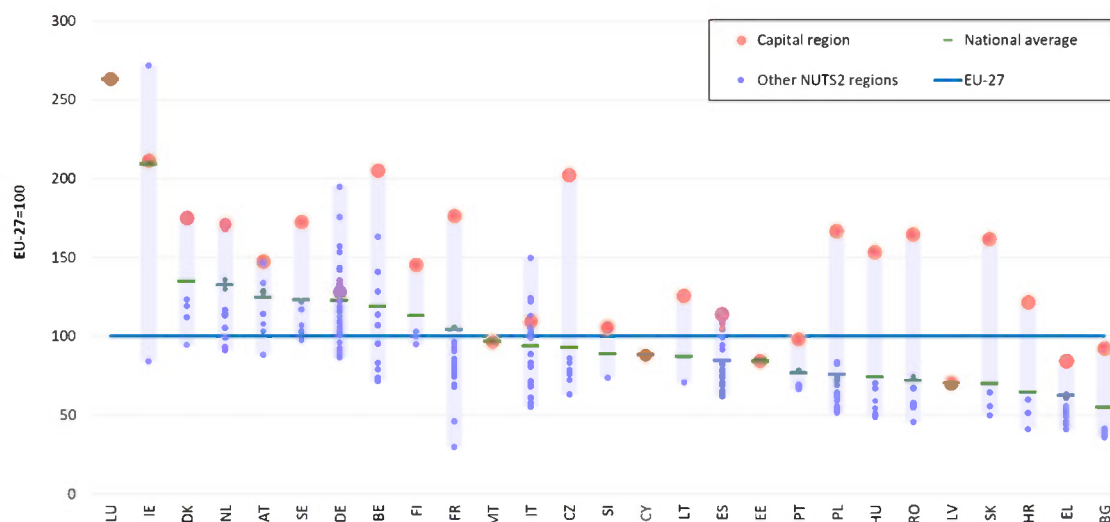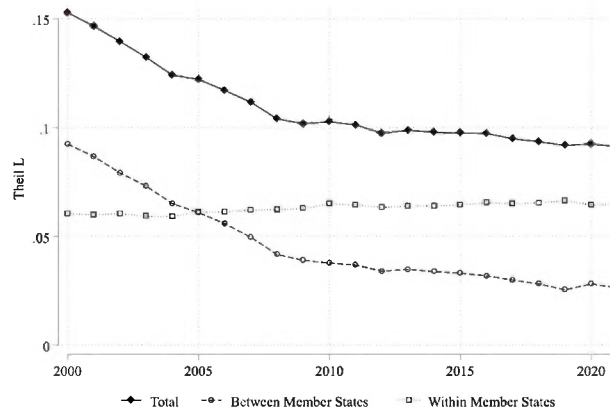


*Source: Eurostat.*

## Dispersion index across administrative levels of the EU

**Overall, GDP per capita disparities are receding, but at a declining speed.** Figure 3 shows the trends in GDP per capita disparities, measured by the Theil L index, in the EU across administrative levels, over time. Similar to the coefficient of variation, a decrease of the Theil L index indicates convergence, while an increase shows divergence[16]. Against the backdrop of an overall downward – and hence convergence – trend, the pace of convergence has declined since 2008. Further, the figure shows that the overall observed disparities are driven by variations across Member States. The degree of dispersion is significantly lower across NUTS 2 regions within Member States. The trend decomposition in Figure 3 underscores that the cross-Member State disparities drive the aggregate trends.

**Within Member States, disparities partly increased.** Figure 5 shows the dispersion trends for lower administrative levels within the Member States, i.e. the variations across and within NUTS 2 regions. In line with the observations in Figure 3, dispersion levels are lower and trends are relatively flatter. However, the variations within Member States do not support overall cohesion. Indeed, Figure 4 and Figure 6 highlight that, on average, within countries disparities grew over time, albeit at much lower levels than across Member States.

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[16] The index allows to investigate the source of observed variations. A decrease of the index indicates convergence, an increase yields divergence. The index accurately decomposes the dispersion in a given year, into variation between Member States as well as within Member States. The sum of the dispersion between and within Member States yields the total dispersion. Thereby it is possible to differentiate the trends across administrative levels. Here the Theil L index is applied. The Theil L index is relatively more sensitive to deviations at the bottom of the distribution; in contrast to the Theil T which is more sensitive to deviations at the top of the distribution.

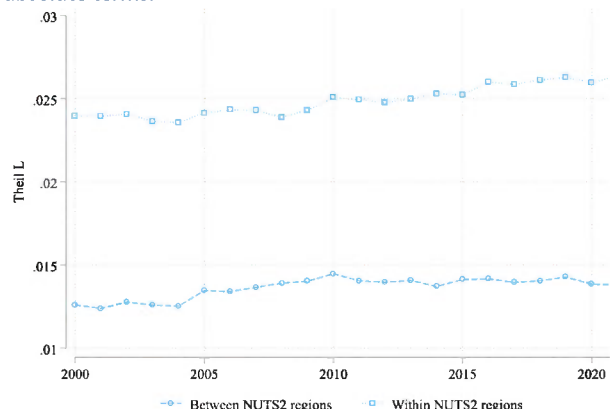Figure 3. Theil L index for GDP per capita, national level, absolute terms.



Source: Eurostat; REGIO calculations.

Figure 4. Theil L index for GDP per capita, national level, with index year 2000 = 100%.
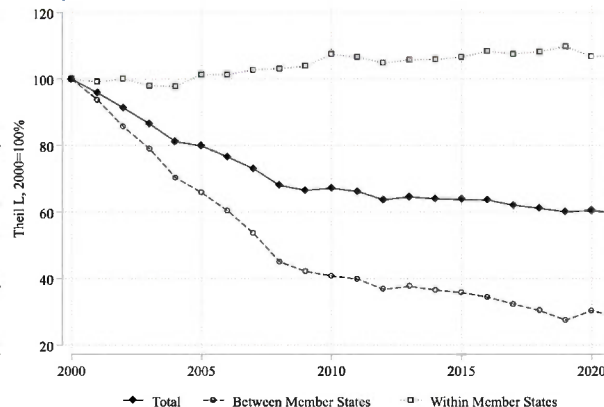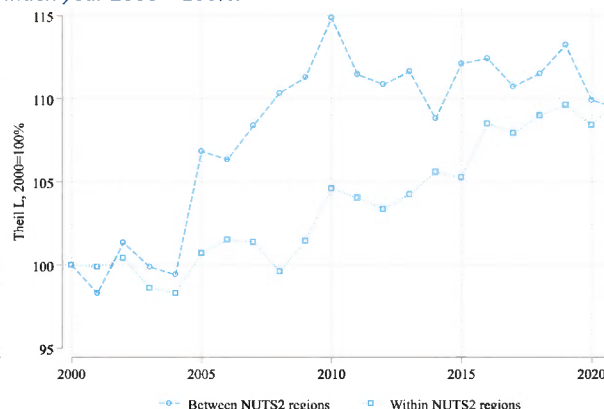


Source: Eurostat; REGIO calculations.

Figure 5. Theil L index for GDP per capita, NUTS 2 level, absolute terms.



Source: Eurostat; REGIO calculations.

Figure 6. Theil L index for GDP per capita, NUTS 2 level, with index year 2000 = 100%.



Source: Eurostat; REGIO calculations.

**However, in some Member States disparities decreased.** Figure 7 presents dispersion trends within individual Member States, showing for each Member State the Theil L index across and within NUTS 1 regions. A decrease of the index indicates convergence; an increase yields divergence. The dark bars display the disparities across NUTS 1 regions, the light bars show the variation within the NUTS 1 regions, i.e. the disparities between NUTS 3 regions within the NUTS 1 regions of the Member States (cf. also footnote 2). For example, in Austria the disparities across regions remained relatively stable whereas the disparities within regions declined over time. In contrast, in Poland regions tended to drift apart as disparities between the regions increased over time. However, in Poland also disparities within regions increased. Indeed, the figure confirms that within several Member States disparities have increased, notably in eastern Member States (Bulgaria, Romania, and Slovakia) but also in western Member States (France, Ireland). Following the above observations, the mean of the domestic dispersions (both within and between regions) increased (bar '*Mean*'). In turn, for other Member States disparities decreased, implying diverse trends across the EU.

13

*Figure 7. Theil L index for GDP per capita, decomposed across and within NUTS 1 regional dispersion, within Member States, over time (2000, 2010, 2020, 2021).*
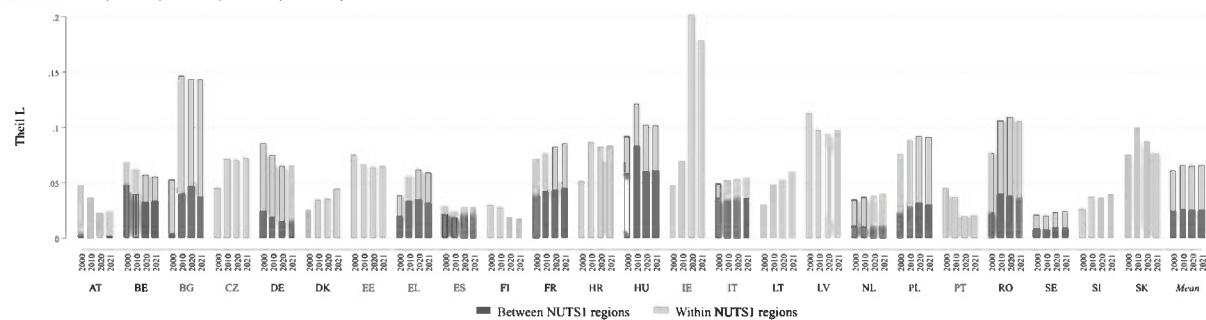


*Note: A decrease in the Theil L index implies convergence; an increase implies increasing disparities. Dark bars: disparities between NUTS 1 regions within the Member States. Light bars: disparities between NUTS 3 regions within NUTS 1 regions of the Member States. CY, LU, and MT omitted as they have insufficient number of lower administrative regions for the analysis (less than four NUTS 3 regions). If 'between' variation is missing and only 'within' variation shown, then the Member State has only one NUTS 1 region in data.*
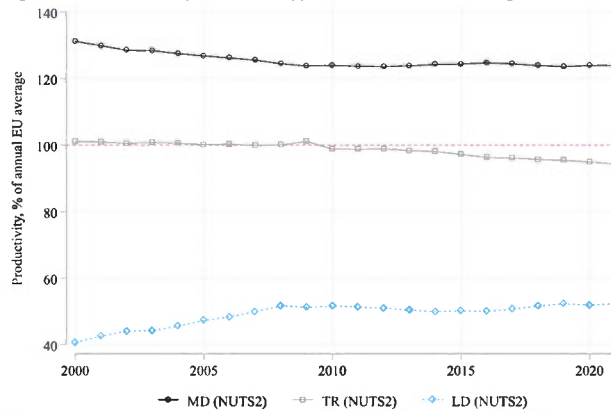*Source: Eurostat; REGIO calculations.*

## Annex 2.2.  Labour productivity

The labour productivity of an economy is a key driver for economic development, e.g. via faster and cheaper production and dissemination of goods and services. Hence, trends in productivity and GDP (per capita) are closely related. One aim of the EU cohesion policy is to foster productivity across the EU regions.

### Trends in productivity and current situation

*Figure 8. Trends in productivity, relative to EU average.*



*Source: Eurostat; REGIO calculations.*

**Labour productivity grew overall and significantly since 2000 in all Member States and regions of the EU.** Figure 8 shows labour productivity, defined as the ratio of gross value added (in current prices, million euro) to the number of employed persons (employees plus self-employed persons) in NUTS 2[17] regions, by the categorisation of the fund eligibility criteria for the 2014-2020 programming period. Until 2008, less developed regions converged to the EU average, but the pace of this process has considerably decelerated since. Labour productivity in the transition regions used to be stable at the level of the EU average but has been drifting away from it during the last decade.

**Figure 9 shows that disparities in terms of labour productivity remain high in the EU, between Member States as well as between regions.** Labour productivity in Ireland is over nine times higher than in Bulgaria. In the Irish Southern Region, the productivity indicator is exceptionally high, likely related to local agglomeration of IT companies. In general, the regional variations are substantial, both within and across Member States.

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[17] Based on 2021 NUTS version, cf. Eurostat: https://ec.europa.eu/eurostat/web/nuts/history.

*Figure 9. Labour productivity in the Member States and NUTS 2 regions, 2021.*
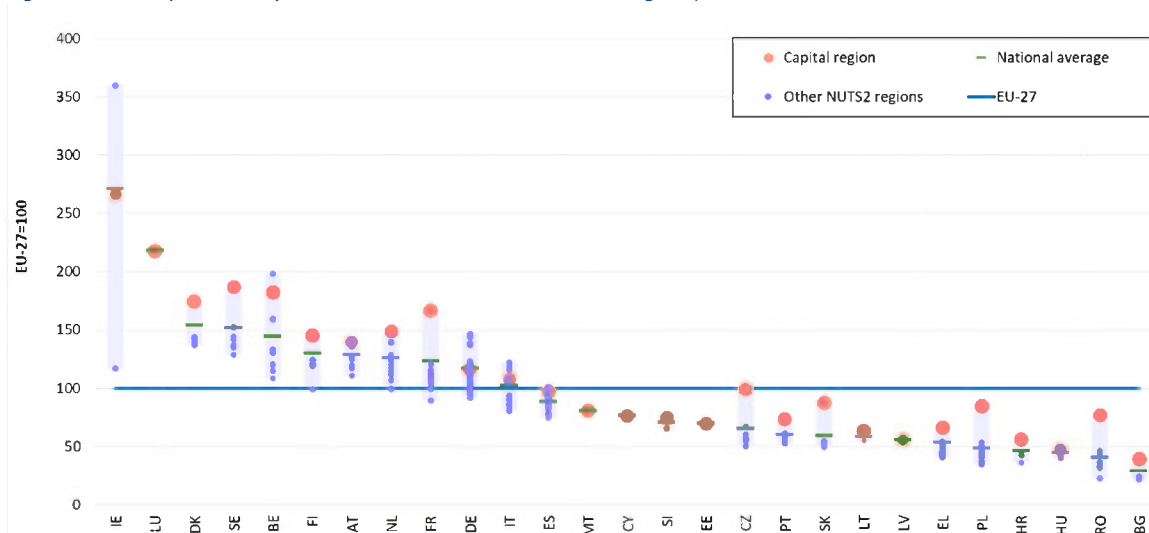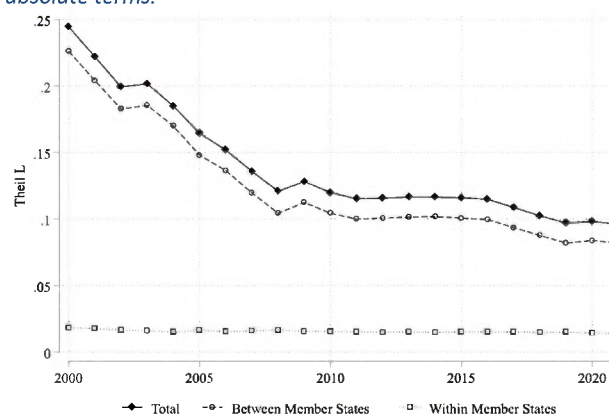


*Source: Eurostat; REGIO calculations.*

## Dispersion index across administrative levels of the EU

**Overall in the EU, the disparities in terms of labour productivity are receding, but at a declining speed.** Figure 10 shows the trends in labour productivity disparities in the EU over time, measured by the Theil L index. Against the backdrop of an overall downward trend, the pace of convergence has declined since 2008 (as for GDP p.c.). Further, the figure shows that disparities are predominantly driven by cross-Member States variation, and less so by variations at lower administrative levels.

**Within Member States, disparities decreased only slightly[18].** Figure 10 follows the structure of Figure 3, presenting the Theil L index, in the EU across administrative levels, over time. As for the coefficient of variation, a decrease of the Theil L index indicates convergence, an increase yields divergence. Figure 10 shows rather flat trends for disparities within Member States. Figure 11 highlights that within Member States disparities declined, too, albeit at a lower pace than across Member States. However, as highlighted by Figure 12, within-country disparities have increased in some Member States (e.g. Bulgaria, Czechia) while decreasing in others (e.g. Germany, Poland, Portugal). Notably, the mean of the domestic dispersions (within and between regions) also decreased (bar '*Mean*').

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[18] The index allows to investigate the source of observed variations. A decrease of the index indicates convergence, an increase yields divergence. The index accurately decomposes the dispersion in a given year, into variation between and within countries; the sum yields the total dispersion. Thereby it is possible to differentiate the trends across administrative levels. Here the Theil L index is applied. The Theil L index is relatively more sensitive to deviations at the bottom of the distribution; in contrast to the Theil T which is more sensitive to deviations at the top of the distribution.

16

Figure 10. Theil L index for productivity, national levels, absolute terms.
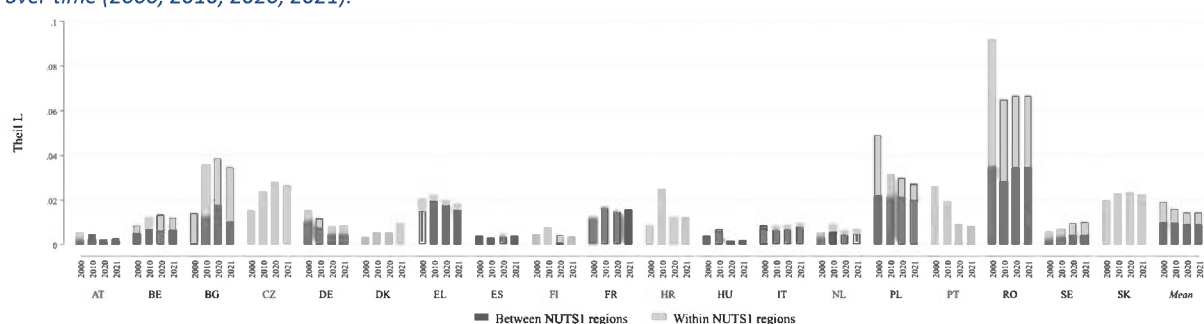


Figure 11. Theil L index for productivity, national level, with index year 2000 = 100%.

Source: Eurostat; REGIO calculations.
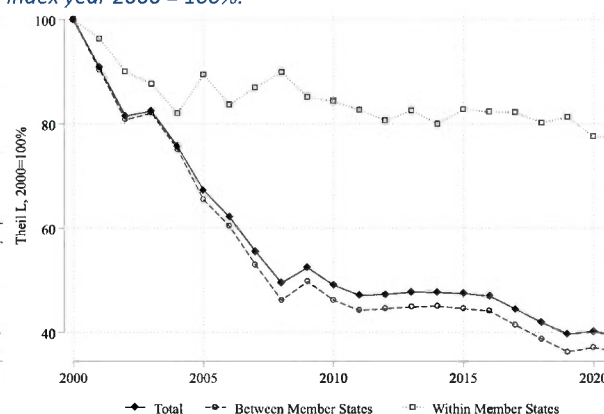
Source: Eurostat; REGIO calculations.

Figure 12. Theil L index for productivity, decomposed across and within NUTS 1 regional dispersion, within Member States, over time (2000, 2010, 2020, 2021).



*Note: CY, EE, IE, LT, LU, LV, MT, and SI omitted as they have insufficient number of lower administrative regions for the analysis (less than four NUTS 2 regions). If 'between' variation is missing and only 'within' variation is shown, then the Member State has only one NUTS 1 region in data.*
*Source: Eurostat; REGIO calculations.*

## Annex 2.3.    Demographics (% population change)

The growth of the population relates to the change in the (potential) human capital of an economy and society, as well as to broader dynamics such as migration trends, sustainability of public finances or social security systems, and to the (long term) development or growth potential of regions.

### Trends in demographics and current situation

**Until 2019, the EU population continued to grow.** Over the last decades, the EU-27 population continuously grew, albeit at a decreasing pace (Figure 13). However, 2020 and 2021 showed a slight decline. The overall positive trend persisted despite declining birth rates and increasing death rates (see Figure 14). In particular, since 2013 the natural change turned negative, implying that the overall positive change was sustained by positive net-migration.

17

Figure 13. Population trends in the EU-27, over time.

**Population, EU, 1960-2022**
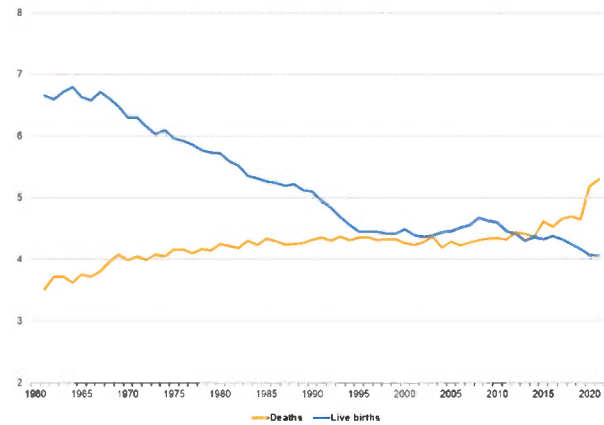(at 1 January, million persons)
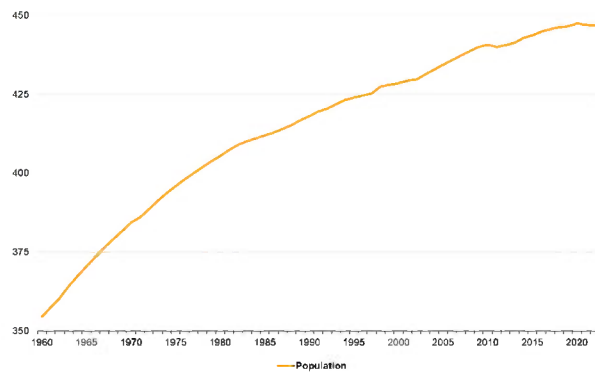
Note: Excluding French overseas departments up to and including 1997. Breaks in series: 1991, 1998, 2000-01, 2008, 2010-12, 2014, 2016, 2017, 2019, 2021 and 2022.
*Source:* Eurostat (online data code: demo_gind)

*Source: Eurostat.*



Figure 14. Births and deaths in the EU-27, over time.

**Births and deaths, EU, 1961-2021**
(million)

Note: 1960: not available. Excluding French overseas departments up to and including 1997.
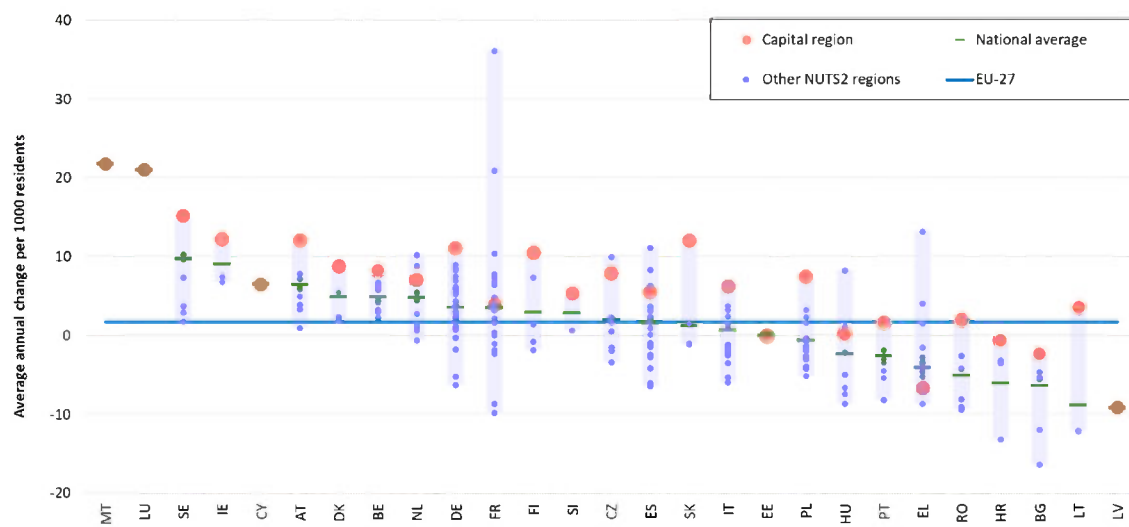*Source:* Eurostat (online data code: demo_gind)

*Source: Eurostat.*

**Disparities in the EU are strong.** Figure 15 presents the population growth for NUTS 2 regions between 2011 and 2020. The EU population displayed an average annual change of +1.72 per 1,000 residents. Indeed, the majority of the regions recorded a positive population change over time. However, while Malta, Luxembourg, and some of the French outermost regions experienced growth rates higher than 20%, many regions in southern and eastern Member States faced significant population decreases, several by more than -10%.
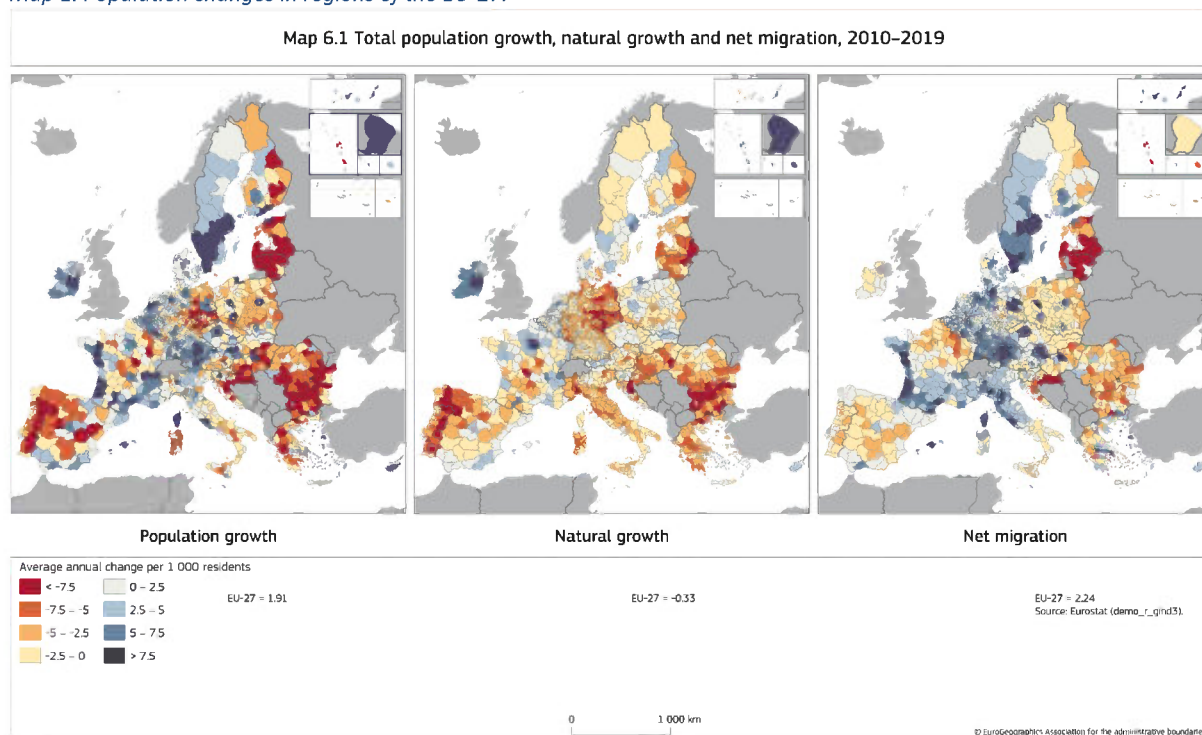
## Natural change vs. net-migration

**Within Member States disparities are also significant; a combination of natural change ('aging') and net-migration drives regional trends.** The spread of population dynamics across NUTS 2 regions is very significant in some Member States (Figure 15), with gaps exceeding 45 percentage points within France. Map 1 shows that regions with higher population growth tend to have both, higher (or less negative) natural population growth and higher net-migration flows, and that regional population decline is generally driven more by natural population decline than outmigration. Further, the maps highlight the immense domestic disparities which are hidden by national averages.

*Figure 15. Population growth in EU-27, Member States and NUTS 2 regions, 2011-2020.*



*Source: Eurostat.*

18

*Map 1. Population changes in regions of the EU-27.*



Map 6.1 Total population growth, natural growth and net migration, 2010–2019

Population growth | Natural growth | Net migration

Average annual change per 1 000 residents

< -7.5
-7.5 – -5
-5 – -2.5
-2.5 – 0
0 – 2.5
2.5 – 5
5 – 7.5
> 7.5

EU-27 = 1.91

EU-27 = -0.33

EU-27 = 2.24
Source: Eurostat (demo_r_gind3).

0        1 000 km

© EuroGeographics Association for the administrative boundaries

*Source: Cohesion in Europe towards 2050: Eighth report on economic, social, and territorial cohesion; Publications Office of the European Union, 2022.*

19

## Annex 2.4.    Employment and unemployment rates

The European Pillar of Social Rights Action Plan presented EU headline targets for 2030, including an employment rate of 78%, welcomed by EU leaders at the 2021 Porto Social Summit. Employment and unemployment rates are key indicators to gauge the performance of the labour market and the progress towards the 2030 EU and national targets on employment. They are often used in combination because they provide different insights on the working of the labour market.

The unemployed are people of working age who are without work, are available for work, and have taken specific steps to find work. The unemployment rate is measured as the number of unemployed people as a percentage of the labour force, which is defined as the total number of unemployed people plus those in employment. It measures the severity of disequilibrium (i.e. distance between labour demand and labour supply) on the labour market. It also reflects the economy's spare capacity and unused resources.

The (overall) employment rate is the percentage of employed persons in relation to the population of working-age.

### Convergence across the EU

**Regional disparities both in terms of unemployment and employment rates fell prior to 2008 (Figure 16).** The financial and economic crisis (2008-2012) impacted EU regions very differently. Some regions were hardly affected while others experienced a dramatic deterioration of their labour market performance. As a result, regional disparities significantly increased in the aftermath of the crisis, both in terms of unemployment and employment rates. However, the recovery resumed the convergence trend. In terms of unemployment rates, in 2021 the extent of disparities was lower than prior to the economic and financial crisis. In contrast, disparities in terms of employment rates are persistently higher than before the economic and financial crisis.

*Figure 16. Regional disparities across EU NUTS 2 regions in terms of employment and unemployment rates.*
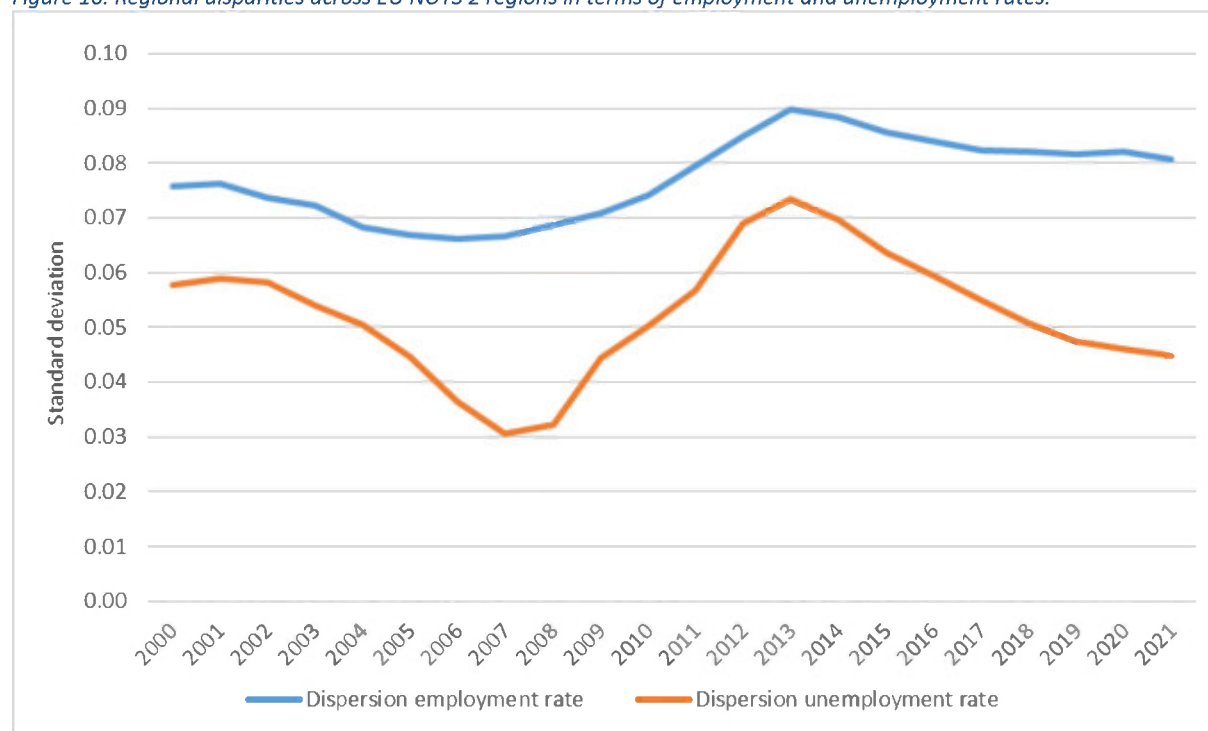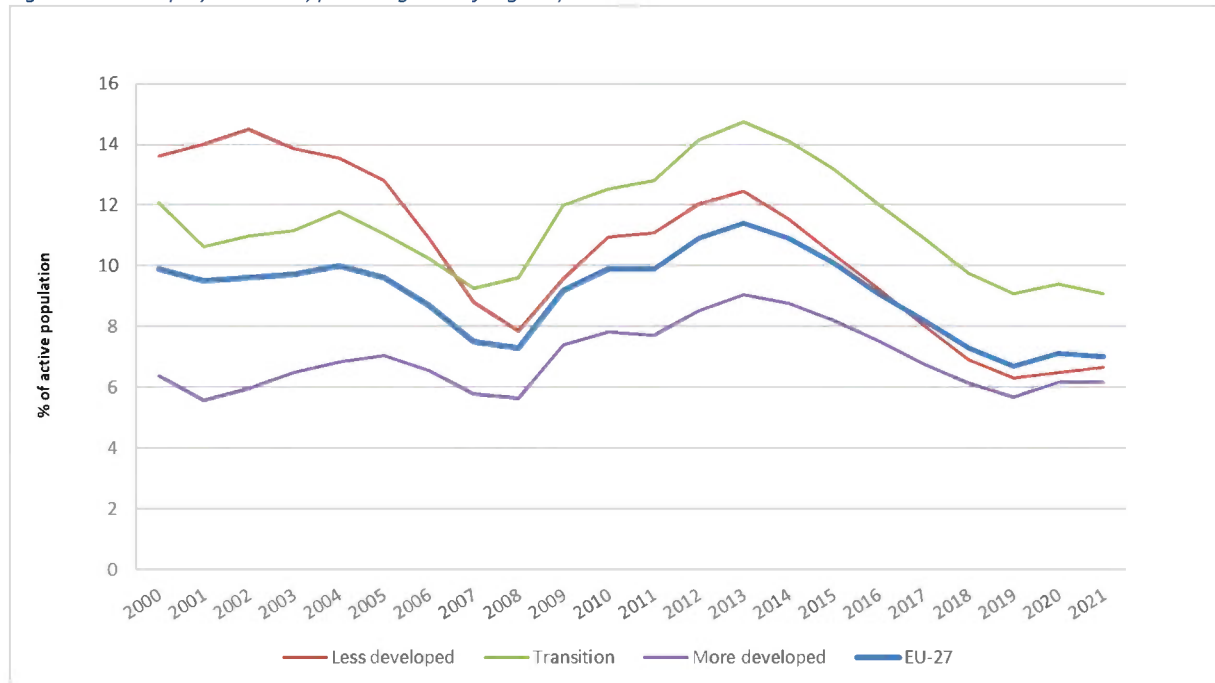


*Source: Eurostat; REGIO calculations.*

**The EU average hides important differences between groups of regions.** Before the outburst of the 2008 economic and financial crisis, the unemployment rate in the less developed regions was generally higher but rapidly converged to the EU average (Figure 17). On the contrary, the unemployment rate in the transition regions was systematically higher and tends to diverge away from the EU average. Those regions were the most affected by the economic turmoil following the 2008 crisis; their unemployment rate surged at close to 15% in 2014.

*Figure 17. Unemployment rate, per categories of regions, 2000-2021.*



*Source: Eurostat; REGIO calculations.*

**The employment rate in the less developed regions is lower but slowly converges to the EU average while in the transition regions, it increases but at a slower pace than the EU average** (Figure 18). On this front as well, transition regions drift away from the EU average since 2008.

21

*Figure 18. Employment rate, per categories of regions, 2000-2021.*



*Figure 18. Employment rate, per categories of regions, 2000-2021.*
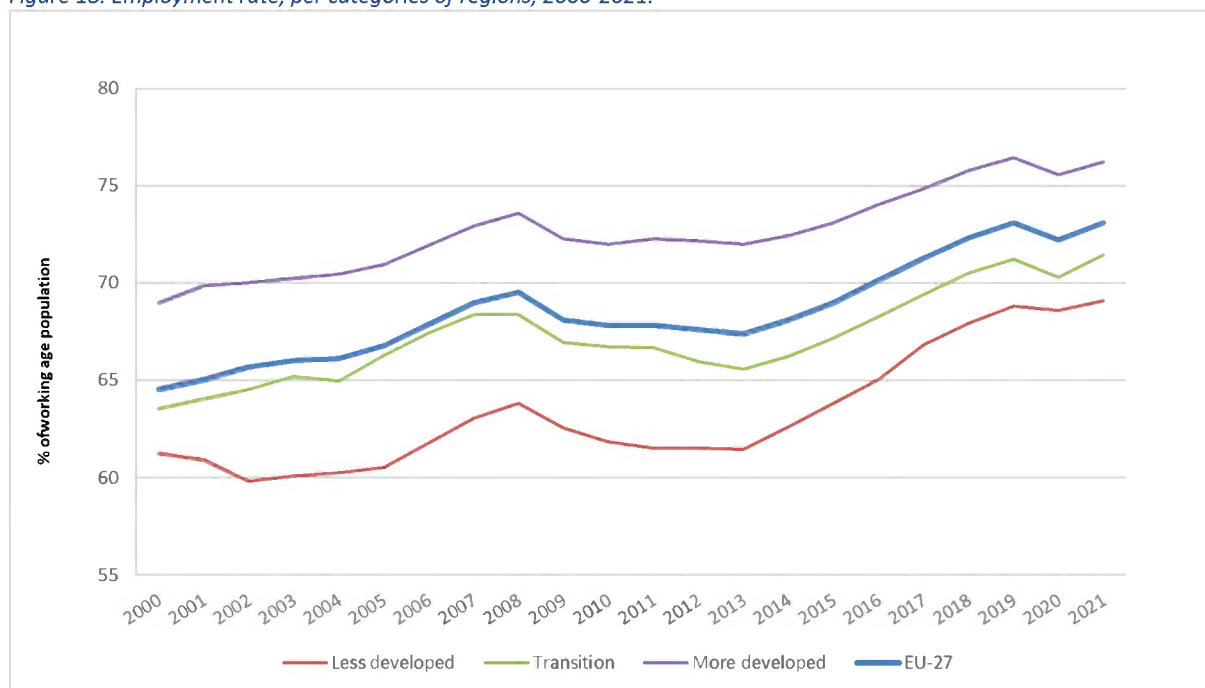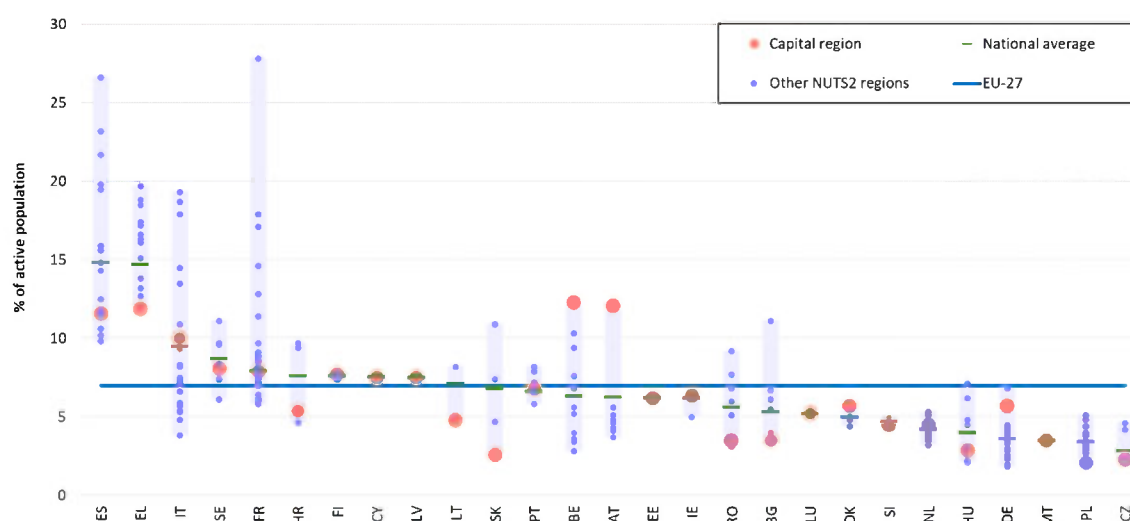
*Source: Eurostat; REGIO calculations.*

## Regional disparities between and within Member States

**Disparities in terms of employment and unemployment rates remain high in the EU.** In 2021, the unemployment rate was at 2.8% in in Czechia against 14.8% in Spain. It was as low as 1.8% in the German Niederbayern while in the French outermost region Mayotte it was at almost 28% and at 22% in Andalusia (Figure 19). This highlights that the impacts of (negative) labour market shocks tend to persist, even after the factors that led to these shocks dissipated.

**The same holds for disparities in terms of employment rates (Figure 20).** Participation is very high in some Member States, for instance in 2021 in the Netherlands where the employment rate reached almost 82%, and even more so in some regions like Åland in Finland (almost 90%). It was much lower in Greece (63%) while it bottoms at about 44% and 40% in Sicilia and Mayotte, respectively.

*Figure 19. Unemployment rates in EU-27, Member States and NUTS 2 regions, 2021.*



*Source: Eurostat.*

*Figure 20. Employment rates in EU-27, Member States and NUTS 2 regions, 2021.*
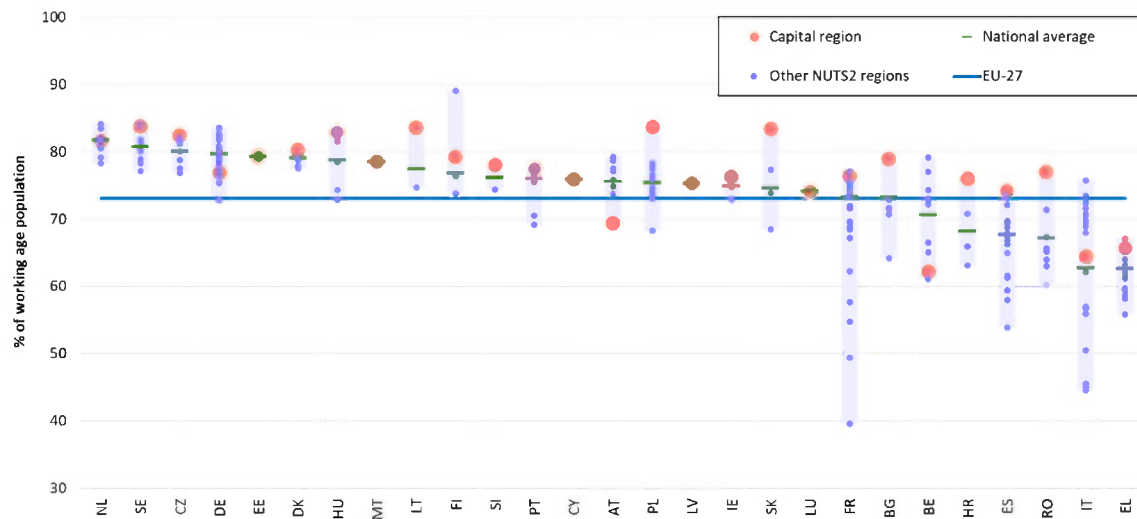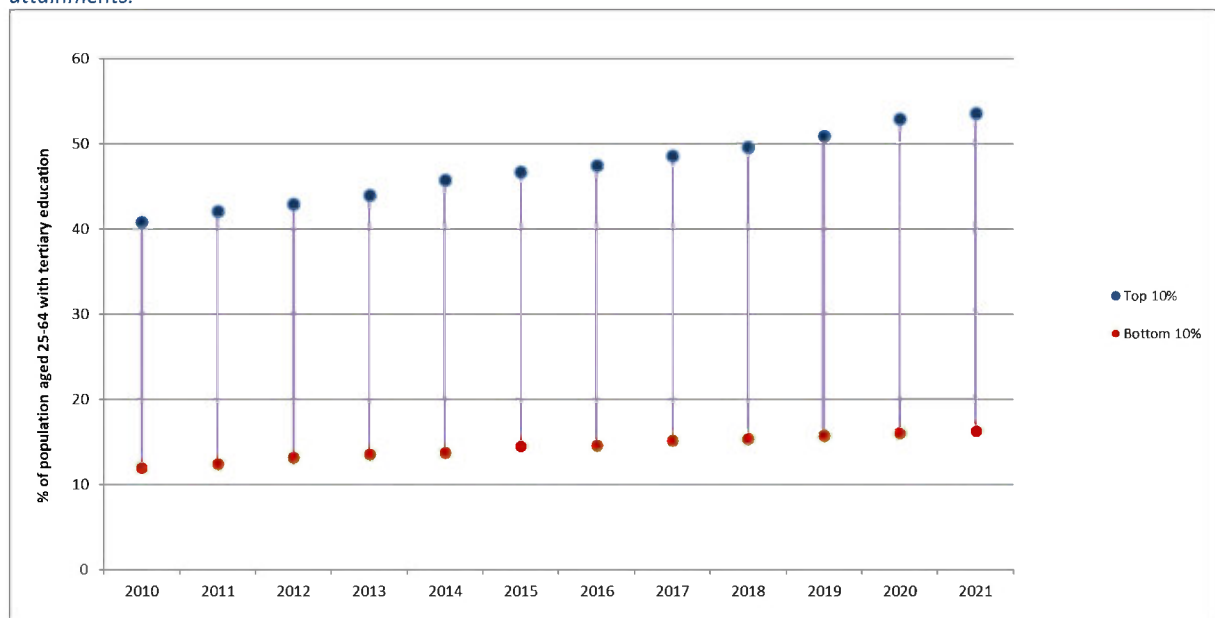


*Source: Eurostat.*

## Annex 2.5.        Educational attainment

The level of education of the population is recognised as a key factor for economic growth and development of an economy. It is also strongly associated to high levels of income and standards of living. Education is a major determinant of the knowledge and skills embodied in the workforce and hence of labour productivity. It is also a condition for the Member States and their regions to face the challenges ahead, notably for benefiting from the green and digital twin-transition.

### Convergence across the EU

**The level of education steadily grew during the last decades in all Member States and regions of the EU. However, the gap between the most and least performing regions increased (Figure 21).** In 2010, around 41% of the population had a tertiary degree in the 10% regions with the highest shares against 12% in the 10% regions with the lowest shares. In 2021, these figures were 43% and 16% respectively. There are a number of regions which have very low shares of tertiary educated people and where educational attainment has grown little in the last 10 years or has even decreased.

*Figure 21. Share of population aged 25-64 with tertiary education in regions with highest and lowest educational attainments.*



*Source: Eurostat; REGIO calculations.*

**This is also visible when looking at the evolution of educational attainment in the various categories of EU regions (Figure 22).** The share of tertiary educated people in the less developed regions is generally lower than in the rest of the EU and the gap with the EU-27 has increased. In 2010, the share of tertiary educated people in the less developed regions was 17.4% against 24.6% in the EU, i.e. a gap of -7.2 percentage points. In 2021, the share was 25.0% in less developed regions and 33.4% in the EU, a gap of -8.4 percentage points. The opposite is observed for the more developed regions where the share of tertiary educated people has increased from 28.2% in 2010 to 37.4% in 2021, hence increasing the gap with respect to the EU average from +3.6 to +4.0 percentage points.

24

*Figure 22. Share of population aged 25-64 with tertiary education in EU-27, less developed, transition, and more developed regions.*
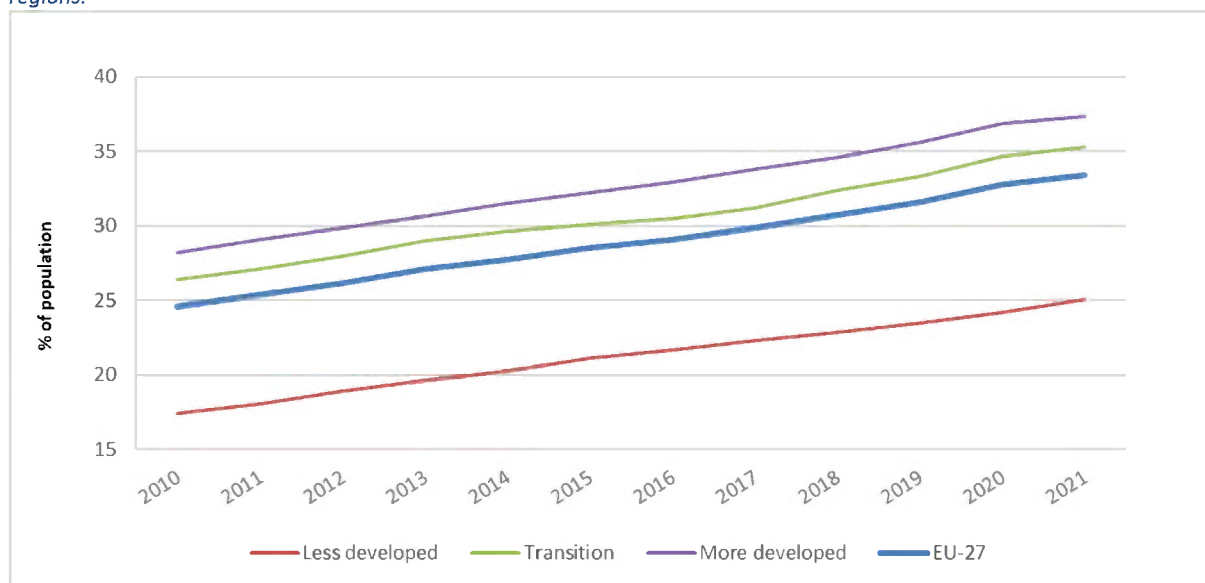


*Source: Eurostat; REGIO calculations.*

## Regional disparities between and within Member States

**Disparities in terms of educational attainment therefore remain high in the EU.** In 2021, more than 62% of the population aged 30-34 in Luxembourg has received tertiary education while in Romania the share is only 25% (Figure 23). There are regions in the EU where educational attainment remains very low, for instance in the Sud-Est Romania region where less than 16% of the population aged 30-34 has tertiary education. At the other end of the spectrum, the share was at 76% in Vilnius. There are also wide gaps in educational attainment in many Member States. For instance, the share of population aged 30-34 with tertiary education was at more than 63% in Île-de-France against 22% in Guyane, 30% in Guadeloupe, and 32% in Corse. In Czechia, the share of tertiary educated people was almost 65% in Praha against 20% in Severozápad.

*Figure 23. Share of population aged 30-34 with tertiary education, in EU-27, Member States, and NUTS 2 regions, 2021.*
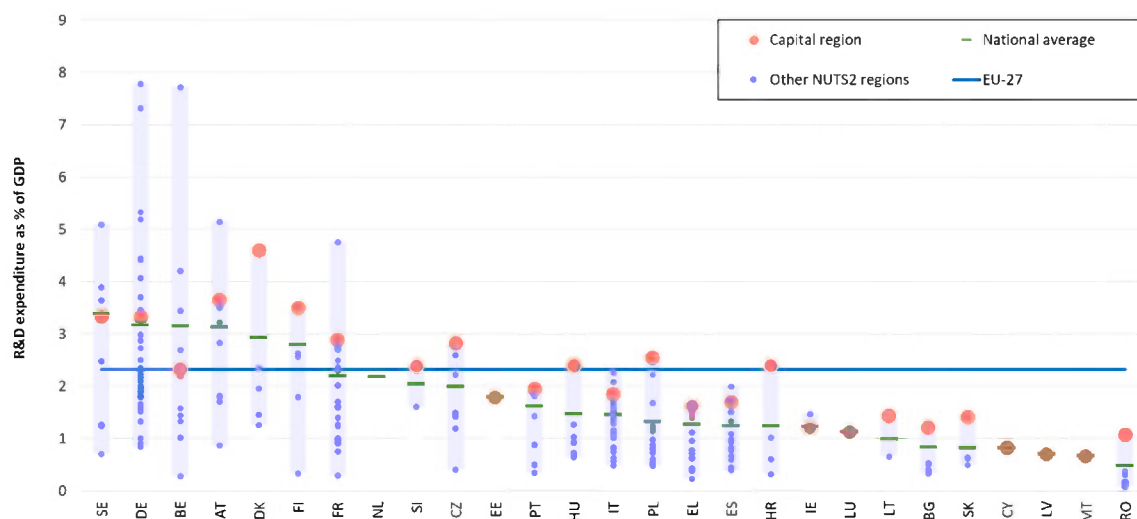


*Source: Eurostat.*

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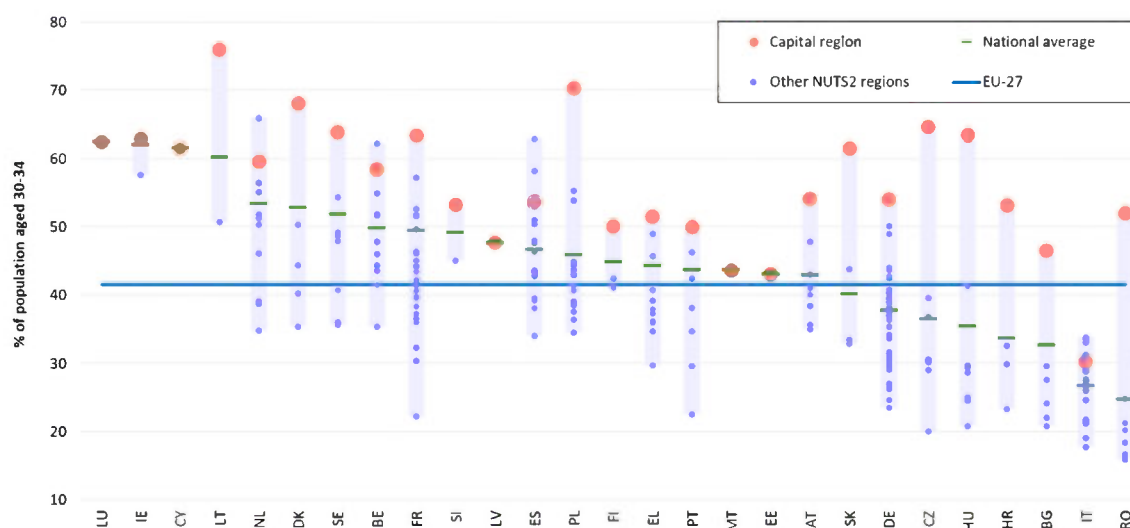
# Annex 2.6.    Innovation, research, and development

Innovation is a key engine of economic growth. Innovation can lead to significant productivity gains and hence to higher growth and higher income levels. Innovation is necessary to occupy high value-added niches in the global value chains and being sheltered from low-wages competition. Together with investing in education and easing the start of new businesses, structural measures to promote innovation include fostering spending on research and development (R&D) and hence increasing R&D intensity (the ratio of R&D expenditure to GDP).

## Regional disparities between and within Member States

**Expenditure on R&D in the EU increased only marginally over the previous decade, from 2.0% of GDP in 2010 to 2.3% in 2021**. Innovation and R&D expenditure remains highly concentrated in north-western Member States and in capital and other metropolitan regions (Figure 24). In 2021, R&D intensity was as high as 3.4% in Sweden and 3.0% in Germany. At the other end of the distribution, R&D intensity was only 0.4% in Romania. Variations are even wider at the subnational level with some regions investing close to 8% of their GDP in R&D (Braunschweig in Germany and Brabant Wallon in Belgium) while in others, the R&D intensity was less than 0.1% (Sud-Est Romania). R&D is also often geographically concentrated within the Member States. For instance, R&D intensity in some Belgian regions remained very low, notably in Province de Luxembourg where it was only 0.3%.

*Figure 24. R&D intensity in EU-27, Member States, and NUTS 2 regions.*



*Note: The reference year is 2017, 2019 or 2020 depending on regions and data availability. Data for the Netherlands is only available at national (NUTS 0) level.*
*Source: Eurostat.*

**In general, R&D expenditure in the EU is highest in the north-western regions and lowest in the east and south.** In north-western EU Member States, good regional connections, high digital readiness, a skilled labour force, and an attractive business environment have enabled surrounding regions to benefit from proximity to highly innovative ones. In southern and eastern EU Member States, the most innovative regions are less strong and, accordingly, neighbouring regions reap little benefit. These patterns could lead to a widening research and innovation divide between EU regions.

## Annex 2.7. Urban wastewater treatment

Access to safe, affordable, and reliable drinking water and sanitation services is essential for human health and well-being. Water is also a key input for some sectors like agriculture, certain types of industries, energy production, or transport. High quality water is essential for the provision of several ecosystem services and for preserving biodiversity. The Urban Waste Water Treatment Directive (UWWTD; 9 1 /271 /EEC) requires Member States to collect and treat waste water from their agglomerations (cities, towns, urban settlements). It sets the objective of having all waste water collected and appropriately treated.

The UWWTD stipulates that waste water must be subject to biological (secondary) treatment, except in catchments with particularly sensitive waters, such as those suffering from eutrophication, where more stringent (tertiary) waste water treatment may be required. The treatment of urban waste water is fundamental to ensuring public health and environmental protection. The indicator on tertiary treatment is often used to assess progress in terms of water treatment.

### Regional disparities between and within Member States

**The EU made significant progress during the last decades in improving urban waste water treatment.** In 2020, around 98% of the EU-27 urban waste water was collected, with 23 Member States having more than 99% of their urban waste water collected. However, there are a few agglomerations where infrastructure still needs to be built or improved. Only 63% of the waste water was collected in Romania and 86% in Cyprus.

**The situation still requires a significant effort regarding treatment, especially in some of the Union's less developed regions.** In the EU-27, around 85% of the urban waste water received more stringent treatment (removal of phosphorus and nitrogen) standards in 2020 (Figure 26). In most Member States, this share was above 70%, the exceptions being Slovenia (63%), Portugal (62%), Romania (50%), and Croatia bottoming at 6%. However, there are many regions where high standard treatment remains very low, even in Member States where the national average is relatively high. Less than 30% of urban waste waters received tertiary treatment in all Croatian regions, some Italian, Romanian, and Spanish regions as well as in some French and Portuguese outermost regions.

*Figure 25. Share of urban waste water receiving more stringent treatment, Member States and NUTS 2 regions, 2020.*
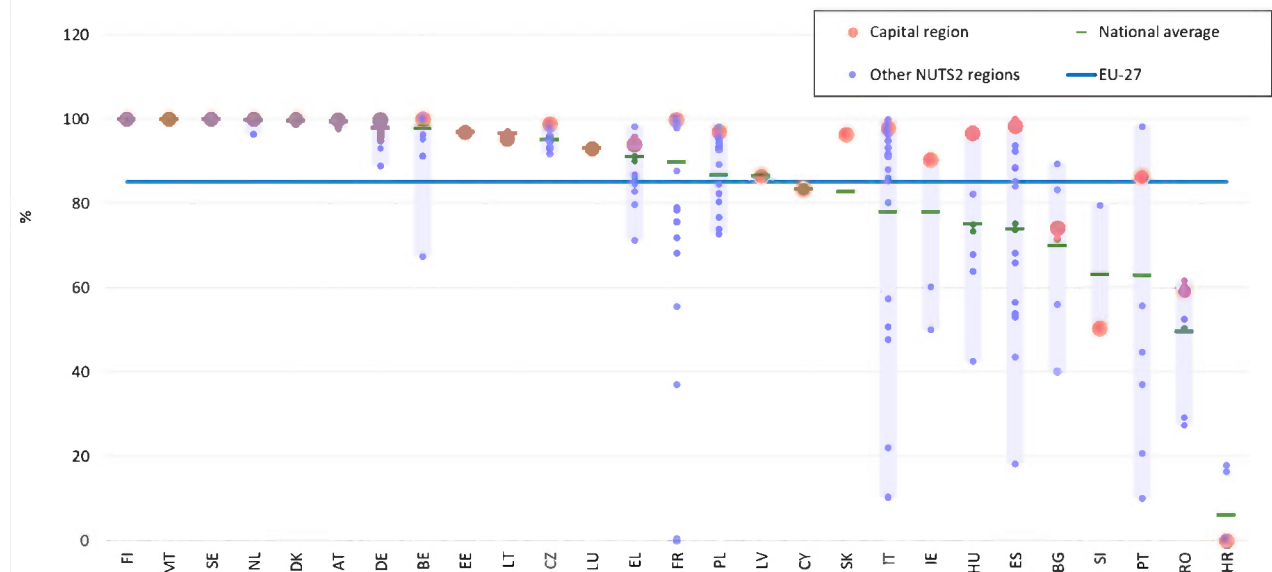


*Source: Eurostat.*

# Annex 2.8.    Greenhouse gas emissions

Under the European Green Deal, the EU has adopted ambitious targets, notably regarding the reduction of greenhouse gas (GHG) emissions. On this front, the 2030 target is to reduce net-GHG emissions by at least 55% and make the EU economy climate-neutral by 2050[19]. This must be achieved by cutting emissions and investing, amongst others, in green technologies. This transition to a climate neutral economy implies a deep transformation of our societies and means of production. For some regions, the transition is already underway but for others, adapting to these new standards will be much more difficult and costly. Both the capacity to reduce GHG emissions as well as the social impact thereof differ from one region to another.

## Regional disparities between and within Member States

**GHG emissions relative to population were reduced in 26 out of 27 Member States.** The exception is Cyprus where emissions increased by around 1.5% between 1990 and 2021 (Figure 26). In some Member States, the reduction was over or close to 50% (Luxembourg -56%; Denmark -48%). However, there is a much larger number of regions where GHG emissions increased during this period, notably in Poland, Spain, France, and Italy. In Opolskie (Poland), GHG emissions per capita increased by 156% between 1990 and 2021, by 60% in the French outermost region La Réunion, and by 52% in País Vasco. In the majority of Member States, reductions in GHG emissions show wide within-country variations. For instance, in Greece per capita emissions have been reduced by almost 64% in Dytiki Makedonia, whilst they increased by more than 30% in Attiki. Italy hosts regions with the most significant GHG emissions reduction in the EU (-68% in Liguria) and at the same time other regions which recorded among the highest increases (+36% % in Basilicata). In Poland, GHG emissions per capita decreased in only 6 out of 17 regions.

*Figure 26. Change in GHG emissions (tCO2 equivalent per capita) 1990-2021, EU-27, Member States and NUTS 2 regions.*
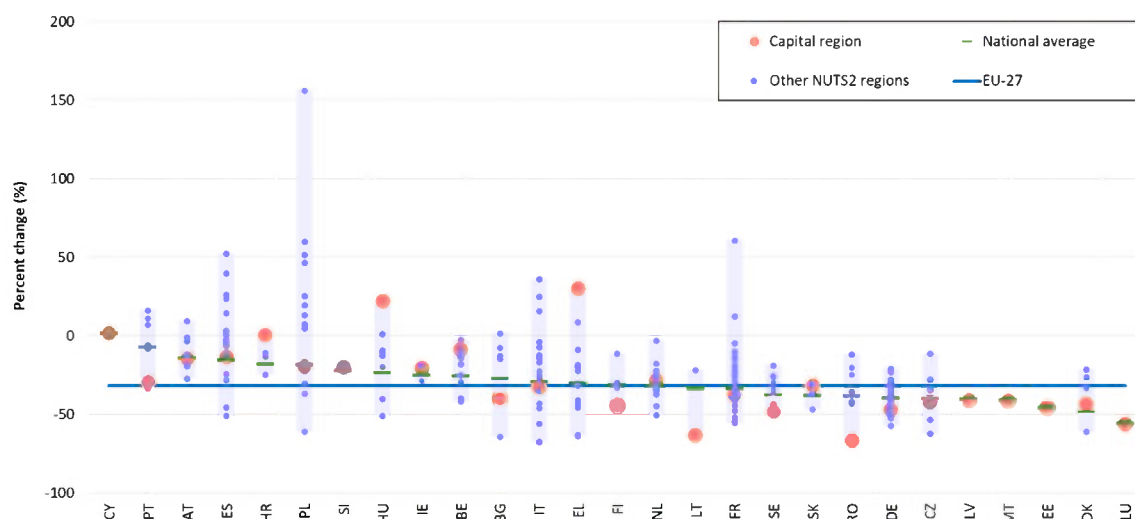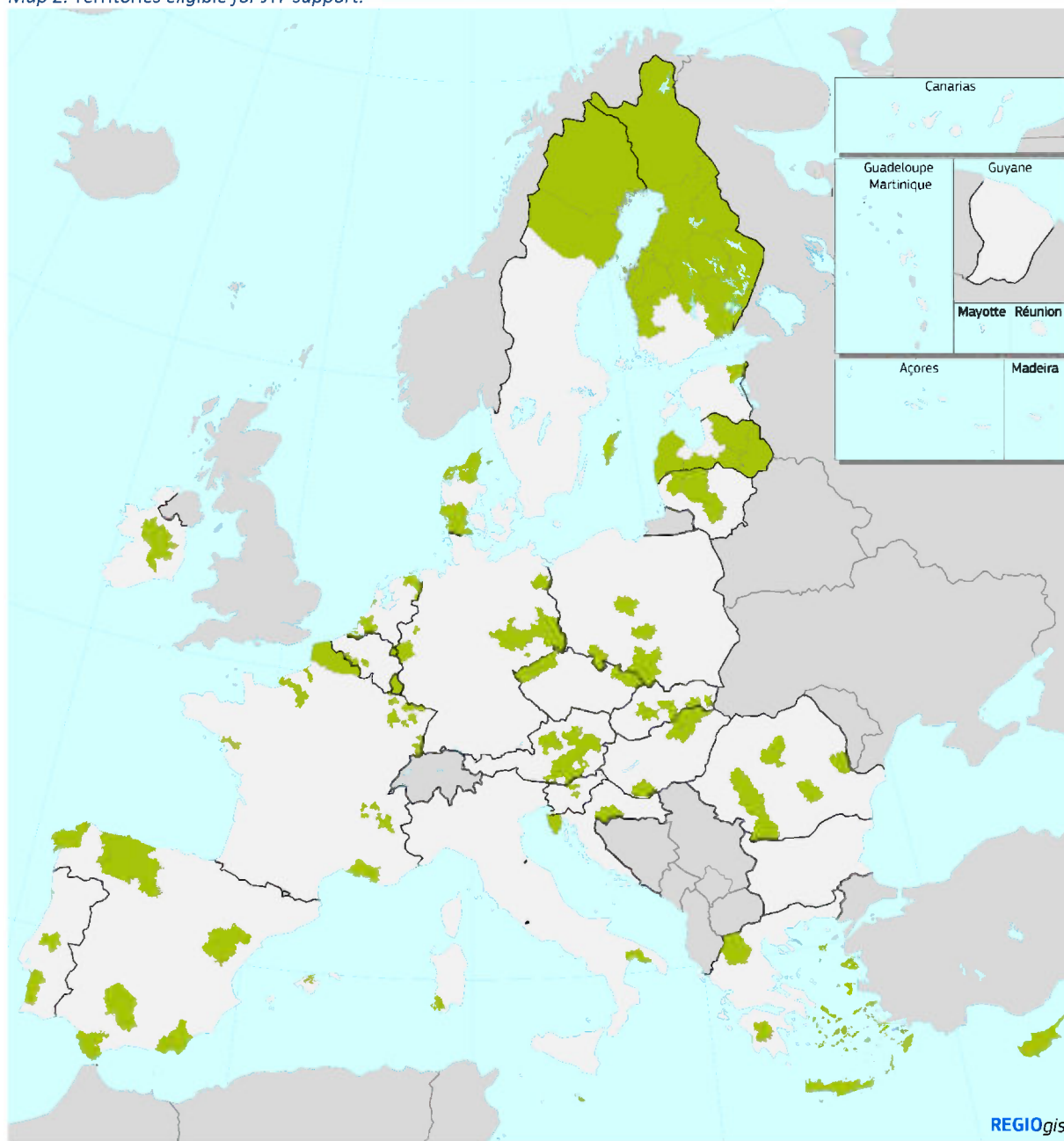


*Source: EDGAR (Emissions Database for Global Atmospheric Research) database, which provides emission data and grid maps for all Member States from 1970 to 2021, for both air pollutants and greenhouse gases, calculated in a consistent way to be comparable between Member States.*

**The capacity to effectively reduce GHG emissions depends on many factors**, such as the energy efficiency of production plants and buildings, the use of renewable energy, land use, climate, and

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[19] For more information, see: https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en.

geography as well as the level and composition of economic activity. The challenges tied to the green transition are therefore very much depending on the local context and some regions are likely to be more affected than others. This territorial dimension of the transition of a carbon-free economy is reflected in the selection of the areas eligible for the support provided by the Just Transition Fund (JTF) which aims at alleviating the socio-economic costs resulting from this transition. Although all Member States could benefit from the JTF, support is focused on regions that are most likely to be affected, notably those that still rely heavily on mining and extraction activities (especially coal, lignite, peat, and oil shale) and on GHG-intensive industries (Map 2).

*Map 2. Territories eligible for JTF support.*



**JTF territories included in approved territorial just transition plans (Feb. 2023)**

JTF territory included in approved
territorial just transition plans

*Source: Eurostat.*