EUROPEAN
COMMISSION

Brussels, 24.11.2026
SWD(2026) 977 final

PART 4/15

COMMISSION STAFF WORKING DOCUMENT

Accompanying the document

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

On the Tenth Report on economic, social and territorial cohesion

Chapter 2.1 Competitiveness, innovation and economic performance

{COM(2026) 966 final}

Chapter 2.1
Competitiveness, innovation and economic performance

2.1.1. Introduction

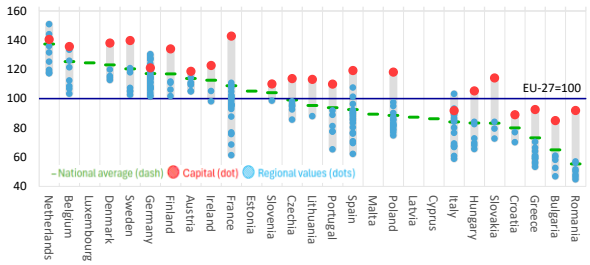
Europe has several major economic strengths: a skilled workforce, substantial private capital, a large single market, strong institutions and a distinctive social model. Yet weak productivity growth, persistent market barriers and a widening innovation gap are eroding its competitive position (Letta, 2024) (Draghi, 2024); , with some regions and territories in a weaker position that others. This is why boosting territorial competitiveness is a key challenge and a main focus of the 2026 European Semester Spring Package. The central question for this chapter is therefore not only how Europe can create more frontier firms and technologies, but also how more of its regions can contribute to productivity, innovation and resilience.

The chapter follows the mechanisms through which territorial assets become competitive performance. It examines the regional foundations of competitiveness through the Regional Competitiveness Index and then decomposes productivity growth into within-sector upgrading and structural change, using manufacturing as a concrete transition case. The subsequent sections examine innovation and digital diffusion and how access to finance and risk capital impact regional and national competitiveness. The common message is that competitiveness and cohesion can reinforce each other when policy broadens the territorial base for productive upgrading.

2.1.2. The territorial foundations of competitiveness

Regional competitiveness is uneven not only across countries, but also within them (Graph 2.1.1). The contrast is especially visible in countries such as France, Poland and Romania, where the capital region stands well above most other regions, whereas the Netherlands combines a high national average with a broad range of regions above the national benchmark. Current competitiveness levels also reflect different recent trajectories. Regions with similar RCI Indexes today have not necessarily followed the same path over time. This dynamic perspective matters for policy because a region that is catching up rapidly requires a different diagnosis from a region that has remained persistently below the EU average, even when their latest scores are similar. National competitiveness therefore depends both on leading hubs and on how widely competitive capacity is distributed across the territory and the direction of change. In fact, the European Semester Spring Package Communication (European Commission, 2026a) states that "*the 2026 CSRs focus on regional competitiveness*" and that, for instance, "*in the area of innovation it is particularly important to take into account regional specificities (Croatia, the Netherlands, Poland, Romania)*".

Figure 2.1.1: Regional Competitiveness Index 2022 – regional variation by Member State

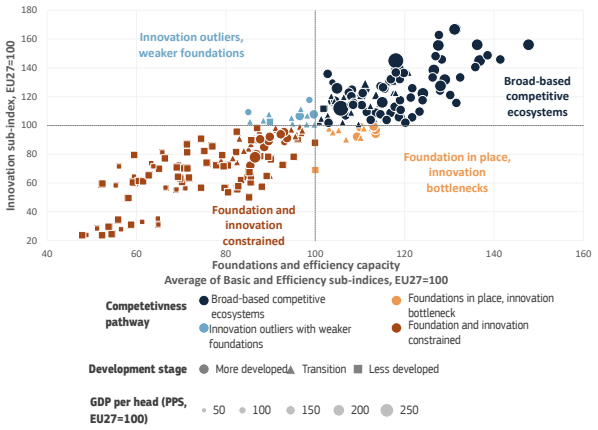


Source: DG REGIO and JRC.

Competitiveness is associated with multiple factors rather than a single attribute. The RCI measures it using a combination of foundational, efficiency and innovation elements. The three pillars can be used as a diagnostic tool to identify clusters of regions according to the average of the RCI Basic and Efficiency sub-indices on the horizontal axis and the Innovation sub-index on the vertical axis (Figure 2.1.2). Stockholm, Utrecht, Brussels and Île-de-France are examples of broad-based ecosystems that perform strongly on both dimensions; Luxembourg combines strong foundations with an innovation score around or just below the EU benchmark; Malta and Budapest appear as

innovation outliers relative to weaker foundations; and Śląskie illustrates a region where foundations are closer to the EU average than innovation performance. The same overall competitiveness score can therefore conceal very different bottlenecks.

Figure 2.1.2: Regional competitiveness pathways: foundations, efficiency and innovation



(1) Regional competitiveness pathways: foundations, efficiency and innovation.

Source: DG REGIO and JRC

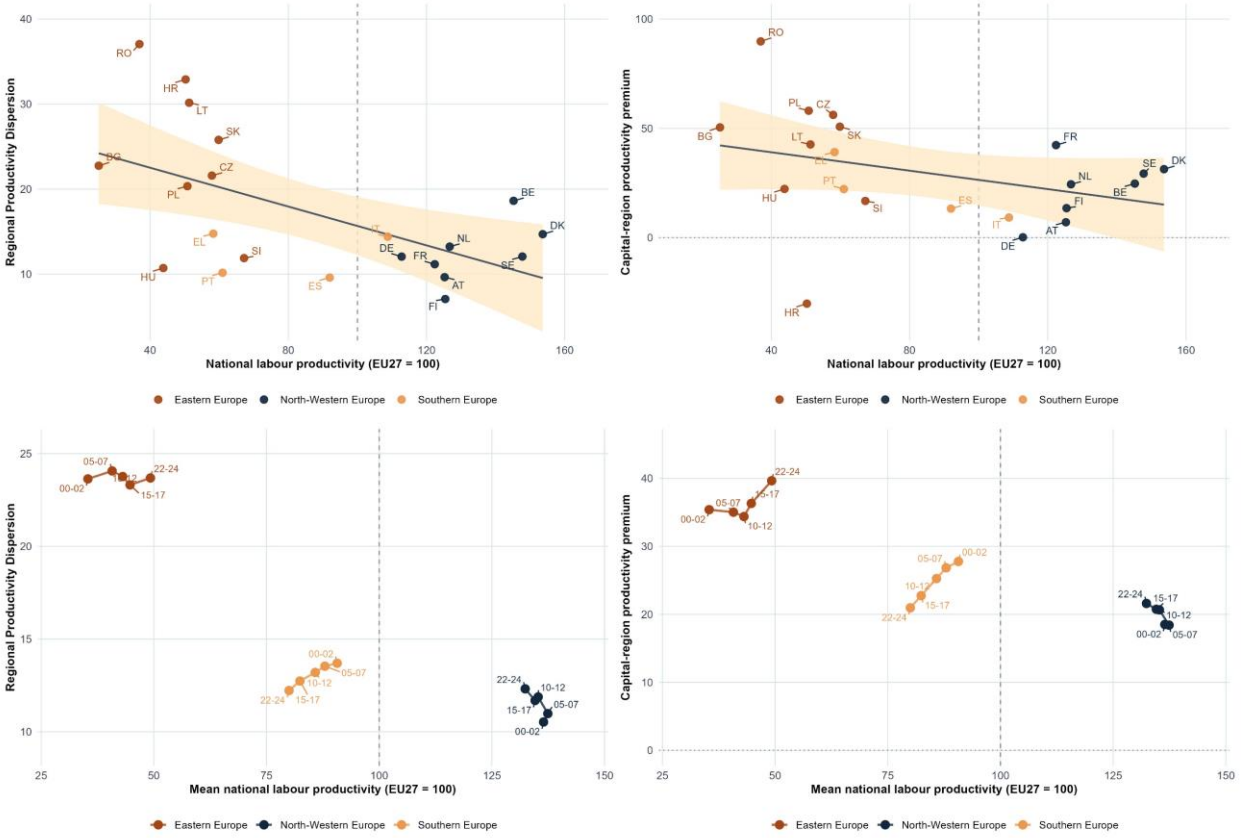
This territorial and sectoral diagnosis informs what a place-sensitive competitiveness policy needs to do. Regions with weak foundations require stronger institutions, infrastructure, skills and market access; those with solid foundations but weaker innovation need better links between firms, research, finance and skills; and leading regions need to spread knowledge and market opportunities beyond their immediate ecosystems. In Figure 2.1.2, the size of the marker reflects GDP per head, while marker shape distinguishes development stages, so the chart does not simply reproduce a rich-region versus poor-region ranking. Some transition or less-developed regions sit close to the EU average on foundations or innovation, while some more-developed regions show a clear imbalance between the two dimensions. This is important because policy needs to target the missing complement: innovation support will have limited effects where basic conditions remain weak, while better infrastructure alone may not generate upgrading where firms and research systems are poorly connected. A place-aware competitiveness strategy therefor is not about redistribution: it serves to indicate where national and EU-wide productive capacity is being left unused.

2.1.3. Productivity upgrading and structural change

Higher-productivity Member States tend to display a more even territorial distribution of productivity, although national productivity catch-up does not automatically translate into territorial convergence. A level of national labour productivity 10 points above the EU27 average is associated with around a 1.1-point lower dispersion of productivity across NUTS2 regions (see top-left panel of Graph 2.1.3)([83]). The data in the top-right panel points in the same direction for the concentration of productivity in capital regions: higher-productivity countries tend to have smaller capital-region productivity premia. The time dimension, however, provides an important qualification. Within-country estimates do not show rising national productivity systematically reducing regional disparities (bottom panels). Eastern Europe illustrates this distinction particularly well: its average productivity index increased from 35.4 in 2000–2002 to 49.2 in 2022–2024, while average NUTS2 productivity dispersion remained virtually unchanged (23.6 and 23.7, respectively). Territorial diffusion therefore appears to be a distinct dimension of high productivity countries rather than an automatic consequence of national productivity convergence.

([83]) The relationship is statistically significant and remains negative across alternative measures of dispersion, sample restrictions and all leave-one-country-out checks. Ireland is excluded because of the impact of multinational firms activities in GDP statistics.

Figure 2.1.3: National productivity, regional dispersion and capital-region productivity premiums in the EU



(1) The upper charts show EU Member States in 2022-2024, with national labour productivity on the horizontal axis and either Regional Productivity Dispersion (upper left) or the capital-region productivity premium (upper right) on the vertical axis. Each point is labelled with its country code; the fitted line is an OLS regression and the shaded area is its 95% confidence interval. The lower charts show unweighted macro-region means for five three-year windows—2000-02, 2005-07, 2010-12, 2015-17 and 2022-24—with lines connecting periods chronologically. National productivity is calculated as total regional real GVA divided by total regional employment and indexed to the full EU27 average (=100). Regional Productivity Dispersion is 100 times the unweighted standard deviation of log labour productivity across usable NUTS 2 regions. The capital-region productivity premium is 100 times the log ratio between capital-region labour productivity and the employment-weighted labour productivity of all other usable NUTS 2 regions; positive values indicate a premium. Ireland is excluded from the analytical sample but retained in the full EU27 productivity benchmark throughout. Colours identify the three macro-regions.

Source: DG REGIO calculations based on ARDECO

The main route to higher regional productivity has been upgrading within existing sectors rather than wholesale reallocation between them. To distinguish these mechanisms, the chapter applies a shift-share decomposition to NUTS2 labour productivity between 2000 and 2024. The method separates a within-sector component, a between-sector component and a cross component, allowing the analysis to identify whether productivity rises because existing activities become more efficient, because labour moves towards more productive sectors, or because employment shifts towards sectors whose productivity is growing faster.

Figure 2.1.4 **shows that the within-sector component dominates the decomposition at EU level and in each macro-region.** Central and Eastern Europe records by far the strongest overall productivity growth, driven by large gains within sectors and reinforced by favourable reallocation. North-Western Europe also records positive within-sector upgrading, while the contribution of reallocation is much smaller and partly offset by a negative cross term. Southern Europe shows the weakest overall productivity performance, with modest within-sector gains and structural change that does not consistently reinforce them.

Box 2.1.1: How the shift-share decomposition is calculated

Productivity and structural change are calculated from ARDECO regional sectoral accounts for 242 NUTS2 regions using a consistent nine-sector aggregation. Real labour productivity is measured as real gross value added per worker, while sector employment shares are based on employment. To reduce short-run business-cycle noise, productivity levels and employment shares at the beginning and end of each period are measured using three-year averages.

For each region r, the change in aggregate labour productivity is decomposed as:

$$\Delta P_r = \text{Within}_r + \text{Between}_r + \text{Cross}_r$$

$$\text{Within}_r = \Sigma_i \, s_{i0}(p_{i1} - p_{i0})$$

$$\text{Between}_r = \Sigma_i \, p_{i0}(s_{i1} - s_{i0})$$

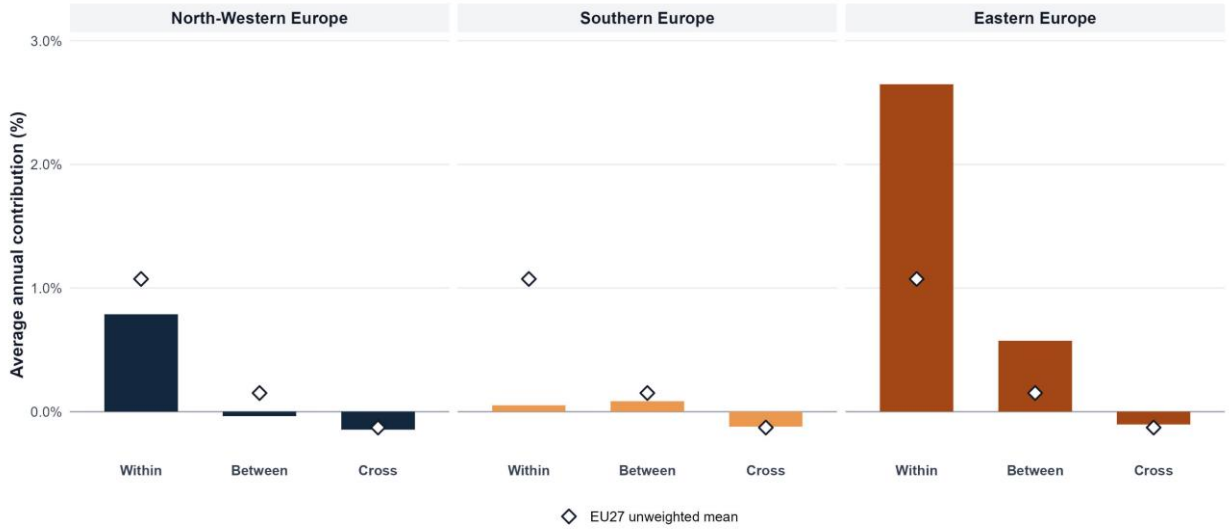
$$\text{Cross}_r = \Sigma_i (s_{i1} - s_{i0})(p_{i1} - p_{i0})$$

where i indexes sectors; 0 and 1 denote the beginning and end of the period; p_{it} is labour productivity in sector i at time t; and s_{it} is that sector's share of regional employment. The summation Σ_i therefore adds the contribution of all sectors in the region.

The within term measures productivity growth occurring inside sectors, holding their initial employment shares fixed. The between term measures the contribution of shifts in employment across sectors, and is positive when employment moves towards sectors with higher initial productivity and away from sectors with lower initial productivity. The cross term captures the interaction between changes in employment shares and changes in sector productivity: it is positive when sectors gaining employment also experience relatively strong productivity growth, and negative when employment shifts towards sectors with weaker productivity growth (or away from sectors with stronger growth). A negative cross term should therefore be interpreted as a reallocation headwind, rather than automatically as evidence of inefficient restructuring.

Results are robust to alternative regional weighting, NUTS classifications and different lengths of the initial and final periods. The main substantive sensitivity concerns sector definition: including real estate activities (sector L) materially distorts the Between and Cross terms, particularly in Southern Europe and most notably in Greece. This reflects a well-known measurement issue associated with owner-occupied housing: imputed rental output is included in real-estate GVA without a corresponding labour input, which can generate exceptionally high and unstable measured productivity. For this reason, the results reported here exclude the real-estate sector.

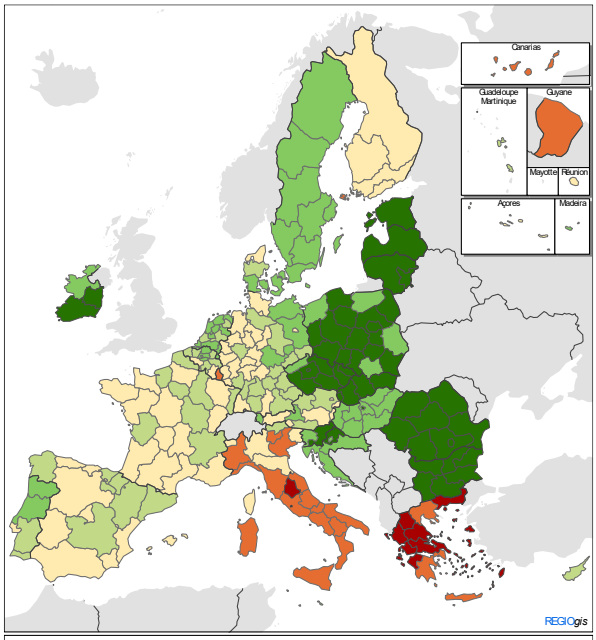
Figure 2.1.4: Sources of regional productivity growth across European macro-regions



(1) Bars show simple arithmetic means across NUTS2 regions of the annualised Within, Between and Cross coefficients for each macro-region; diamonds show the corresponding EU27 unweighted mean. The decomposition is exact: Delta P equals Within plus Between plus Cross. Coefficients are divided by initial regional productivity and by 22 years. Nine sectors are used, Real Estate (L) is excluded as standard practice in this exercise due to the noise generated by inputted rents for owner-occupied dwellings.

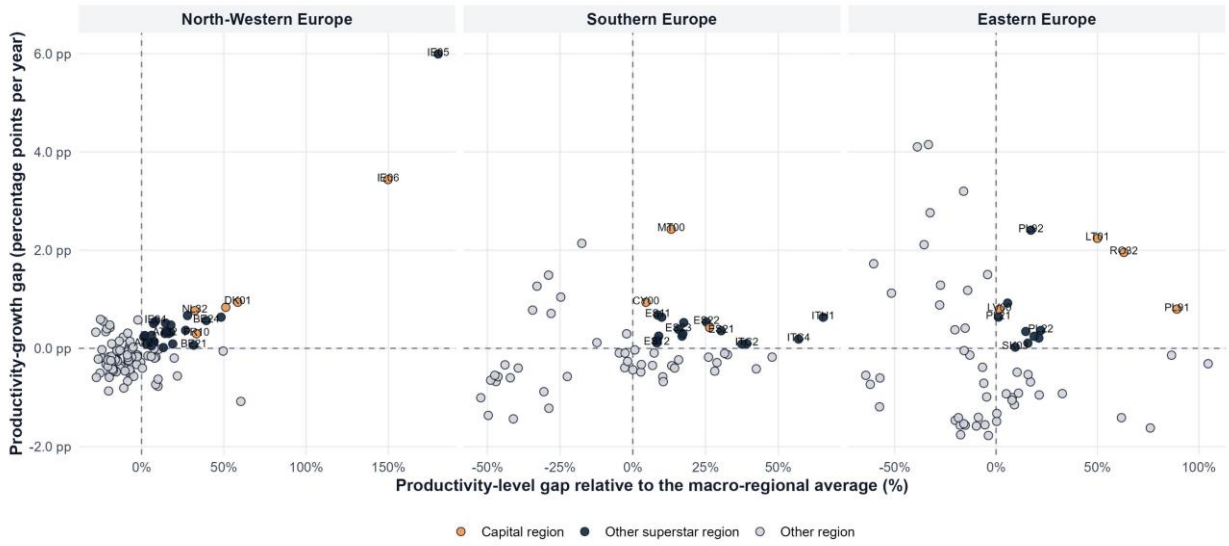
Source: DG REGIO calculations based on ARDECO

The regional map confirms that these macro-regional averages conceal a strongly differentiated geography. There are large positive within-sector contributions across much of Central and Eastern Europe, consistent with technology adoption, capital deepening, managerial upgrading and integration into European production networks (Map 2.1.1). Weaker or negative contributions are more frequent in parts of Southern and Western Europe. This reinforces the central result in Figure 2.1.4: convergence has depended heavily on making existing regional activities more productive, not only on changing sectoral composition. It also shows that high productivity and rapid growth can coexist outside national capitals. Figure 2.1.5 identifies 'superstar' regions as those above their macro-regional average in both productivity level and productivity growth, and highlights capital regions separately. Capital-region markers are prominent among the labelled outliers, but also it also contains non-capital superstars.



Map 2.1.1: Within-sector productivity change across EU regions between 2000 and 2024

Figure 2.1.5: Superstar regions within European macro-regions



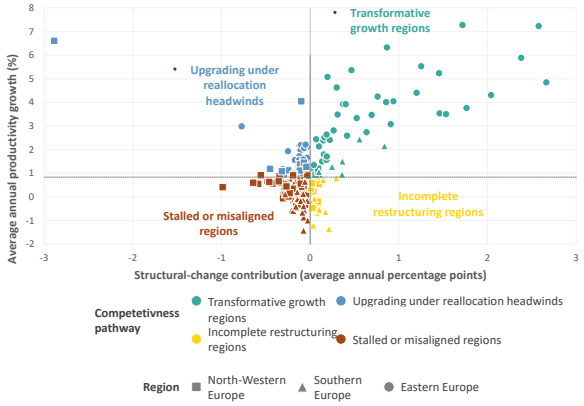
(1) A superstar is a NUTS2 region above the unweighted average of its macro-region in both final-period productivity level and average annual productivity growth. The chart uses the 2022-2024 productivity level and productivity change from the 2000-2002 baseline. Capital regions are highlighted separately. Grey observations are other regions. The exceptional productivity performance of the two Irish regions (IE05 and IE06) partly reflects the effects of multinational enterprises on recorded gross value added, particularly following the relocation of intellectual property assets in the mid-2010s.

Source: DG REGIO calculations based on ARDECO

A simple leader–laggard ranking therefore misses an important distinction between regions that grow through both upgrading and reallocation and regions that rely mainly on one of the two. Figure 2.1.6 classifies regions by annual productivity growth and the net structural-change contribution, defined as the sum of the between and cross terms. Central and Eastern European regions are heavily represented among 'transformative-growth' cases, where above-EU productivity growth coincides with favourable reallocation. Southern European regions are more concentrated in the below-average growth groups, and North-Western Europe is more dispersed across pathways.

The decomposition also clarifies why productivity levels and productivity growth should be analysed together. Some regions with very high productivity levels grow only moderately, while some catching-up regions grow rapidly from lower starting points (Figure 2.1.6). A region can therefore be competitive because it already operates at a high productivity frontier, because it is converging quickly, or because it combines both. These different economic situations imply different priorities: frontier regions need continued innovation and renewal, while fast-converging regions must sustain investment and avoid bottlenecks as wages and production costs rise.

Figure 2.1.6: Productivity growth and structural-change alignment across EU regions



(1) Each observation is a NUTS 2 region. The horizontal axis is the annualised structural-change contribution, defined as the sum of the Between and Cross coefficients. The vertical axis is annualised log productivity growth. The horizontal reference is the unweighted EU mean across regions and the vertical reference is zero. Colours identify four combinations of above/below-EU productivity growth and positive/negative structural change; shapes identify macro-regions.

Source: DG REGIO calculations based on ARDECO

Higher productivity does not, however, translate one-for-one into higher worker compensation. (Bukowski, 2026) finds substantial regional differences in this pass-through across European macro-regions. On average over 1995–2023, a 1% increase in productivity was associated with around a 0.24% increase in compensation in North-Western European regions, compared with around 0.7% in Southern and Central-Eastern Europe. The pass-through has strengthened over time, particularly in smaller regions, but remains below one across all three macro-regions.

The analysis above confirms that structural change should not be treated as place-blind. A negative cross term can arise when highly productive sectors shed labour while employment expands in lower-productivity-growth services, a common pattern in advanced economies. What matters is whether regions can raise productivity inside existing activities while allowing labour, capital and capabilities to move towards new opportunities without destroying productive assets that remain valuable.

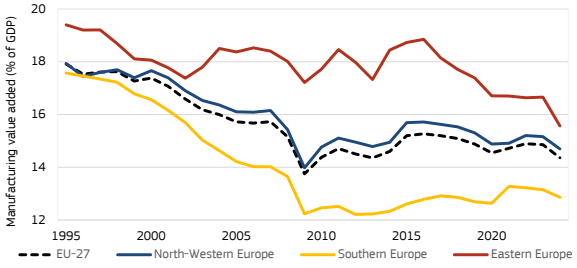
2.1.4. Manufacturing as a challenge for territorial transition

Manufacturing illustrates why productivity growth and employment change need to be read together. EU manufacturing share of value added fell from around 18% of GDP in 1995 to about 14% in 2024, while its employment share declined from around 19% to below 14% (Figures 2.1.7 and 2.1.8). The larger contraction in the employment share is consistent with productivity increasing faster in manufacturing than in much of the rest of the economy: manufacturing employs less workers but its contribution to aggregate value added has proved comparatively resilient. It is the very increase in productivity in manufacturing relative to services that explains the declining share in employment and value added while real production has kept constant or increased.

The trajectory conceals markedly different macro-regional trajectories. Eastern Europe remains the most manufacturing-intensive part of the EU. In 2024, manufacturing accounted for 18.7% of employment, compared to 12.3% in both North-Western and Southern Europe. Its value-added share was also higher, at 15.6% of GDP, against 14.7% in North-Western Europe and 12.9% in Southern Europe. Eastern Europe's trajectory has not, however, been one of industrial expansion. Its manufacturing employment share fell sharply during the global financial crisis, subsequently recovered from 18.9% in 2010 to 20.0% in 2016, and then resumed its decline. Its manufacturing value-added share also fell by more than three percentage points between 2016 and 2024. This suggests that the region retains a strong industrial base but is increasingly exposed to the same structural and cyclical pressures affecting manufacturing elsewhere in Europe.

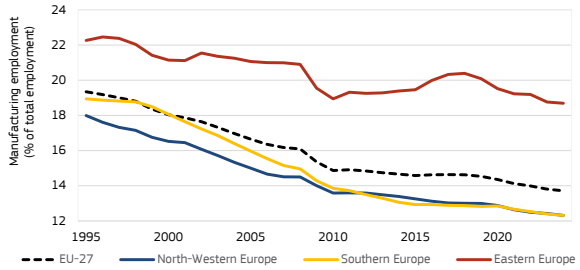
Southern Europe entered the global financial crisis after a substantial period of industrial erosion. Between 1995 and 2007, its manufacturing employment share had already fallen from 18.9% to 15.2%, while manufacturing value added declined from 17.6% to 14.0% of GDP. These pre-crisis reductions were considerably larger than those recorded in Eastern Europe and, for value added, North-Western Europe. The financial and sovereign-debt crises therefore reinforced an adjustment that was already well under way rather than initiating it. By contrast, North-Western Europe experienced a more gradual long-term reduction in manufacturing employment, while its value-added share stabilised at around 15% after the initial post-2008 contraction.

Figure 2.1.7: Manufacturing value added as a share of GDP, by EU macro-region



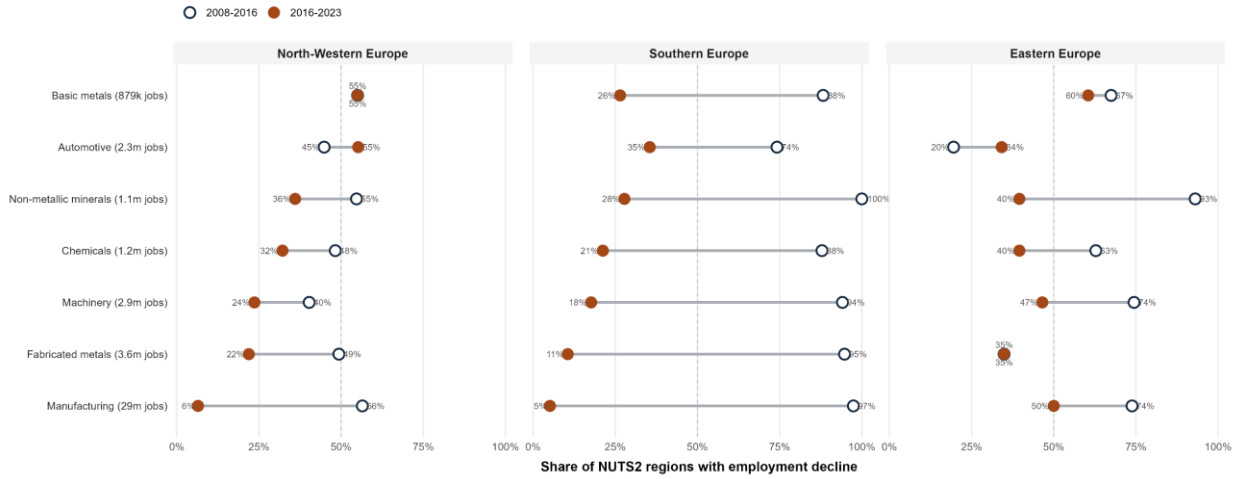
Source: DG REGIO calculations based on Eurostat

Figure 2.1.8: Employment in manufacturing as a share of total employment, by EU macro-region



Source: DG REGIO calculations based on Eurostat

Figure 2.1.9: Regional incidence of manufacturing employment decline, by sector and EU macro-region



(1) Open circles show 2008-2016 and filled circles 2016-2023. Each panel calculates the share separately within the indicated macro-region. For every sector and macro-region, the denominator is a common sample of NUTS2 regions with non-missing employment in 2008, 2016 and 2023. Labels in parentheses report EU-wide sector employment in 2023.

Source: DG REGIO calculations based on Eurostat (SBS and Regional Accounts)

The regional incidence of manufacturing decline was substantially lower in 2016–2023 than during the preceding post-financial-crisis adjustment, although developments varied across sectors and macro-regions (Figure 2.1.9). Across the common sample, manufacturing employment fell in 72.7% of NUTS2 regions between 2008 and 2016, compared with 18.9% between 2016 and 2023. The improvement was particularly pronounced in Southern Europe, where the corresponding share dropped from 97% to 5%, following substantial industrial losses both before and during the financial and sovereign-debt crises. Decline also became less widespread in North-Western and Eastern Europe across most activities, particularly non-metallic minerals, machinery and fabricated metals.

Automotive was the main exception. The share of regions recording employment losses in the automotive sector increased from 45% to 55% in North-Western Europe and from 20% to 34% in Eastern Europe, pointing to a more recent phase of restructuring associated with technological change, international competition and the transition towards electric mobility. Basic metals also remained persistently exposed. These developments matter because the selected industries employed approximately 11.7 million people in 2023, just over 40% of EU manufacturing employment, and are often geographically concentrated. Sectoral adjustment can therefore have substantial local effects even when manufacturing employment appears relatively stable at EU level.

The timing of industrial adjustment has also changed substantially across sub-sectors and regions. Manufacturing employment fell in about 73% of the NUTS2 regions with available data between 2008 and 2016, but in only about 19% between 2016 and 2023 (Graph 2.1.9). Most selected sectors display the same easing after the global financial crisis: non-metallic minerals, chemicals, machinery and fabricated metals all show a much smaller share of regions in decline in the later period. Basic metals remains persistently exposed, while automotive is the main exception, with the share of regions losing employment remaining broadly unchanged at around 44% in both periods.

Current industrial risks are geographically concentrated rather than uniform. Heikkonen, Listl and Reuter (2025) identify 67 NUTS2 regions where a continuation of recent sectoral trends would have particularly strong employment repercussions. Exposure was particularly concentrated in Europe's industrial core and especially visible in Germany, Slovakia and Estonia. Trade exposure adds another layer: around 5.18 million EU jobs are supported by exports to the United States, almost one third of them in manufacturing, with strong regional exposure in parts of Ireland, Northern Italy, Germany and Slovakia (European Commission, 2025b). This makes particularly relevant the EU

Industrial Accelerator Act, which aims to promote Europe's economic security by strengthening industrial capacities in key sectors while keeping on track with the transition to decarbonised manufacturing (European Commission, 2026a). The completion of the TEN-T road network may support regions where connectivity is a bottleneck and industrial transition an important challenge. Several of the regions most exposed to industrial transition are in Member States where road transport performance is currently weak, which limits access to markets, suppliers and alternative employment centres and so reduces their capacity to adjust (Brons, 2027).([84]) Completing the TEN-T network, which aims to provide coherent, efficient and multimodal transport infrastructure across the EU, could therefore help strengthen the resilience of some of the regions facing the greatest industrial transition challenges.

The challenge is therefore industrial transformation, not the mechanical preservation of every existing job or activity. Regions need the capacity to upgrade viable specialisations and diversify into related activities, retraining workers and connecting to emerging European value chains. The challenge is to avoid an erosion of capabilities that would be difficult to rebuild. This is where competitiveness and cohesion meet most directly: a successful transition turns local industrial assets into new sources of productivity, whereas an unsuccessful one can leave persistent employment, fiscal and social costs. This challenge led to the establishment of the Just Transition Fund and is highlighted in the 2026 Spring Package Communication, which states that "[s]upport should be provided to regions that are facing industrial transition challenges". This is also reflected across a number of the 2026 country-specific recommendations, including Italy ("Implement an industrial strategy with the aim to also reduce territorial disparities, by streamlining current policy measures and taking into account key infrastructure projects"), France ("Continue to promote diversification and employment in regions affected by industrial transition.") or Poland ("Enable clean industrial transformation and foster innovation-oriented transition strategies for coal-dependent regions"). (Council of the European Union, 2026)

([84]) An analysis of the completion of TEN-T shows that the largest gains in road transport performance would be in the eastern EU, in particular in Romania, Bulgaria, Hungary and Slovakia, where connectivity is currently relatively poor (Brons, 2027). Slovakia stands out as being both among the most exposed to sectoral and trade-related risks and among the main beneficiaries of TEN-T.

Box 2.1.2: Spatial convergence, clustering, and regional competitiveness

EU competitiveness and convergence are shaped by regional and spatial dynamics, in addition to national performance. Spatial econometric analysis suggests that regional growth and convergence are not driven by isolated "islands" of performance, but are strongly influenced by the broader geographic context in which a region is embedded. In other words, a region's prospects depend not only on its own characteristics, but also on economic developments in neighbouring territories and, potentially, on the wider cross-border production systems to which its firms are connected (Table 2.1.1).

)irect, indirect and total effects from a spatial autoregressive model of regional GDP-per-capita growth, EU NUTS-2 regions, 1995–2024

Structural variable	Direct effect	Indirect spatial effect	Total effect
Investment (GFCF/GDP)	0.018***	0.026***	0.043***
Industry share in GVA	0.233***	0.343***	0.576***
Energy intensity	−0.246***	−0.363***	−0.609***
Industry × energy intensity	−1.494***	−2.206***	−3.700***

(1) The table reports the spatial impact decomposition from a panel spatial autoregressive (SAR) model estimated for 242 EU NUTS-2 regions over 1995–2024. The dependent variable is annual regional GDP-per-capita growth. A SAR model augments a conventional regional growth regression with a spatial lag of the dependent variable, so that growth in region i is allowed to depend on contemporaneous growth in neighbouring regions. Neighbourhood is defined by a time-invariant geographic contiguity matrix constructed from NUTS-2 2021 boundaries: two regions are connected when they share a land border, including borders between Member States. The estimated spatial autoregressive parameter (ρ = 0.780) indicates strong positive spatial interdependence. The underlying specification includes lagged GDP per capita, GFCF as a share of GDP, the region's share of national population, the share of industry in regional GVA, energy intensity, the interaction between industry share and energy intensity, and a post-GFC indicator. The model controls for persistent regional heterogeneity using a fixed-effects spatial-panel framework. Statistical significance: *** p < 0.01.

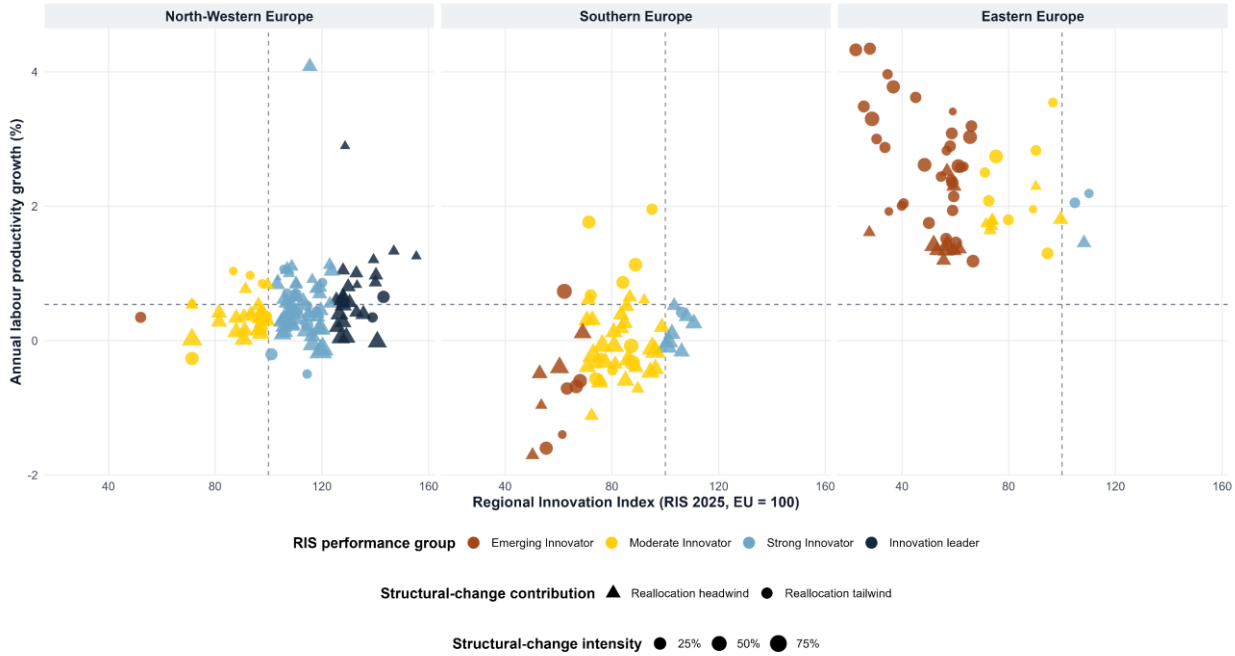
Source: DG REGIO calculations based on ARDECO and Eurostat

This is consistent with the literature highlighting the importance of integration into wider value chains. It also complements the analysis in this chapter showing that regional productivity growth depends on the interaction between within-sector upgrading and sectoral restructuring. The spatial econometric analysis adds a related qualification: several important drivers of regional growth, including investment and industrial specialisation, generate spatial spillovers. Investment in one region can therefore benefit neighbouring regions, potentially including across national borders (Crucitti et al., 2024; Salotti et al., 2025; (Prota and Serlenga, 2026)This suggests that regional policy should not be interpreted only as support for individual territories, but also as investment in wider functional areas and cross-border growth systems.

2.1.5. Innovation: frontier excellence and diffusion

Strong productivity growth is not confined to Europe's most innovation-intensive regions. Combining the Regional Innovation Index with long-run productivity growth and the direction and relative importance of structural change shows that structural reallocation is more frequently supportive of competitiveness in the East: it acts as a tailwind in 69% of Eastern regions, compared with 18% in North-Western Europe and 29% in Southern Europe (Figure 2.1.10). Specific regions illustrate this very clearly. Sud-Muntenia and Sud-Vest Oltenia are displayed as relatively large rust-coloured circles in the top-left quadrant of Eastern Europe panel: both are both classified as emerging innovators, record productivity growth of approximately 4.3% per year and combine within-sector upgrading with a sizeable positive contribution from structural reallocation. Bucureşti-Ilfov also grows rapidly, around 3.4%, but its much smaller circle indicates that its performance is driven predominantly by productivity improvements within (established) sectors rather than by changes in sectoral composition. At the other end of the innovation spectrum, Stockholm and Hovedstaden appear as small dark-blue triangles: they are innovation leaders with very high RIS scores, but have a productivity growth of around 1.3% and a small negative structural-change contribution. Southern Europe contains important exceptions to its

Figure 2.1.10: Innovation capacity and productivity-upgrading pathways, by macro-region



(1) Colours identify RIS performance groups; circles indicate that structural reallocation supports productivity growth and triangles that it acts as a headwind. Marker size shows the relative importance of structural change in the productivity decomposition (measured as absolute contribution of the Between and Cross components relative to the absolute value of all three shift-share components). Dashed lines indicate an RIS score of 100 and median productivity growth across the plotted regions.

Source: DG REGIO calculations based on ARDECO and the Regional Innovation Scoreboard (2025)

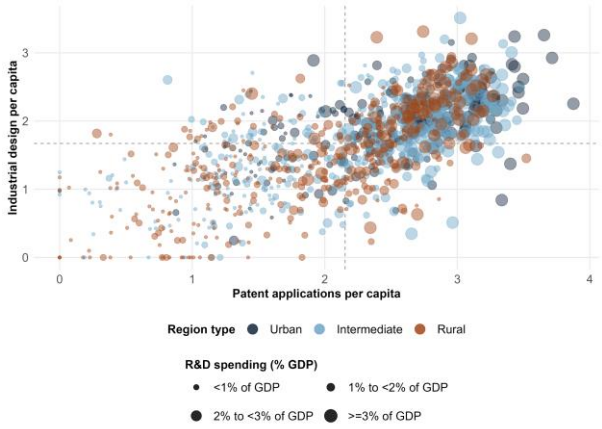
generally weaker performance. Norte in Portugal, a moderate innovator, records productivity growth of around 1.1% per year, with structural reallocation making a positive contribution. Galicia, also a moderate innovator, grows by around 0.6% despite structural reallocation acting as a headwind, indicating that its gains are driven predominantly by within-sector upgrading.

Innovation must be understood as a regional system. The negative cross-sectional association between innovation scores and productivity in Eastern Europe reflects different positions in the convergence process: frontier regions tend to grow more gradually, while less innovation-intensive regions can expand rapidly through technological absorption, capital deepening and structural transformation. Additionally, technology adoption, process improvement, management quality and skills upgrading can raise productivity even where the local economy is not producing frontier technologies itself, because firms innovate through relationships with suppliers, customers, workers, training institutions, public administrations, financial actors and research organisations (Cooke, 1992); (Asheim and Gertler, 2005); (Tödtling and Trippl, 2005).

Granular innovation indicators also show that advanced capabilities extend beyond Europe's largest urban cores. Graph 2.1.11 relates patenting, an indicator of technological invention, to industrial-design activity, which captures a more applied and commercially oriented dimension of innovation. Major urban innovation ecosystems such as Stuttgart and Munich feature prominently, but they do not occupy this space alone. Intermediate regions including Tuttlingen and Starnberg in Germany, Bologna, Pordenone and Modena in Italy, and Nordsjælland in Denmark also combine strong patenting with substantial design activity. The same applies to several predominantly rural regions, such as Steyr–Kirchdorf and Traunviertel in Austria, Vestjylland in Denmark and Holzminden in Germany. Some of these regions achieve strong outcomes even outside the highest R&D-intensity category, suggesting that formal research expenditure is only one part of the innovation process. It is no coincidence that all these regions are in countries with a long industrial tradition. The pattern highlights the importance of territorially embedded industrial capabilities: specialised suppliers, skilled workforces, engineering expertise and close

producer–customer relationships can support innovation in smaller cities, industrial districts and rural manufacturing areas.

Figure 2.1.11: Innovation beyond the core: patents and industrial design



(1) Each point represents a NUTS3 region in the common sample. Colour identifies the urban-rural typology and marker size the R&D expenditure band. Both axes use a logarithmic function; the transformation changes distances but not regional rankings. Dashed lines show unweighted sample means.

Source: DG REGIO calculations based on JRC and OECD

Different regional ecosystems nevertheless face different innovation bottlenecks. Large frontier hubs benefit from diverse labour markets, universities, headquarters, advanced services and global networks, features associated with 'Jacobian' agglomeration and cross-sector knowledge exchange (Jacobs, 1969); (Glaeser et al., 1992); (Duranton and Puga, 2001). Industrial and intermediary regions often rely more on 'Marshallian' advantages: specialised suppliers, occupational skills, shared know-how and dense production networks (Marshall, 1890). In this broader perspective, innovation is not confined to frontier research but also encompasses the adaptation, combination and commercial application of knowledge within established regional production systems (OECD, 2026b).

Regional innovation systems can also fail in different ways. (Tödtling and Trippl, 2005) and (Isaksen and Trippl, 2016)distinguish, among others, organisationally thin systems with too few knowledge actors, fragmented systems in which actors are present but poorly connected, and mature systems that risk technological lock-in. This distinction complements the analysis in Figure 2.1.11 suggesting that a moderate innovation score may reflect limited frontier R&D, but can also coexist with strong absorptive capacity and productivity growth. The most efficient competitiveness-boosting intervention may therefore be institution-building or diversification rather than more research spending.

Skills and education are an important part of regional productivity and innovation capacity. (Castelló-Climent, 2026), examining 234 EU regions over 2005–2025, finds that the relationship between educational attainment and productivity growth differs markedly across Europe. Secondary and tertiary education are positively associated with productivity growth in Central and Eastern Europe, while in North-Western Europe the relationship is driven mainly by tertiary education. Southern Europe shows a weaker pattern, compounded by relatively high number of persons not in education, employment or training (NEET), whose negative association with productivity growth becomes more pronounced in the more recent period. Moreover, addressing the marked geographical inequalities in health could deliver significant health and economic gains (OECD, 2026b). The accumulation of human capital early on in life through quality schooling and education, the reduction of NEET rates and the ability to preserve good health are therefore necessary to put people's potential to productive use and contribute to regional competitiveness.

Skills also shape regions' capacity to absorb and diffuse innovation. Stronger collaboration between firms, education and training providers, research organisations and public administrations can help align skills supply with changing technological and industrial needs, including those associated with the green transition. Well-designed skills partnerships can make education and training systems more responsive to labour demand while strengthening firms' capacity to adopt technologies, undertake applied research and innovate (Liang and Comyn, 2025). More broadly, regional ecosystems connecting firms, knowledge institutions, public authorities and other local actors can facilitate knowledge diffusion and entrepreneurship, while interregional value chains and research networks allow local capabilities to connect with complementary assets elsewhere in Europe.

Europe needs excellence and diffusion at the same time. Frontier regions require research quality, talent, risk capital and global scale;

industrial and intermediate regions need applied research, technology extension, skills and stronger supplier networks; and catching-up regions need absorptive capacity and connections to wider markets. A competitive European innovation system is one in which some places invent at the frontier while many more places adapt, commercialise and diffuse this new knowledge. This is clearly acknowledged by the European Commission in its 2026 European Semester spring package Communication, which recalls that "progress [to boost research and innovation] remains limited and uneven across EU Member States and regions" and recalls that "the 2026 CSRs prioritise closing Europe's innovation gap and boosting R&D investment. They highlight the need to: foster public and private R&D investment; strengthen innovation systems by improving business-academia cooperation, the efficiency of public support to business innovation and access to finance; and enhance access to innovation, including, where relevant, in regions lagging behind" (European Commission, 2026a).

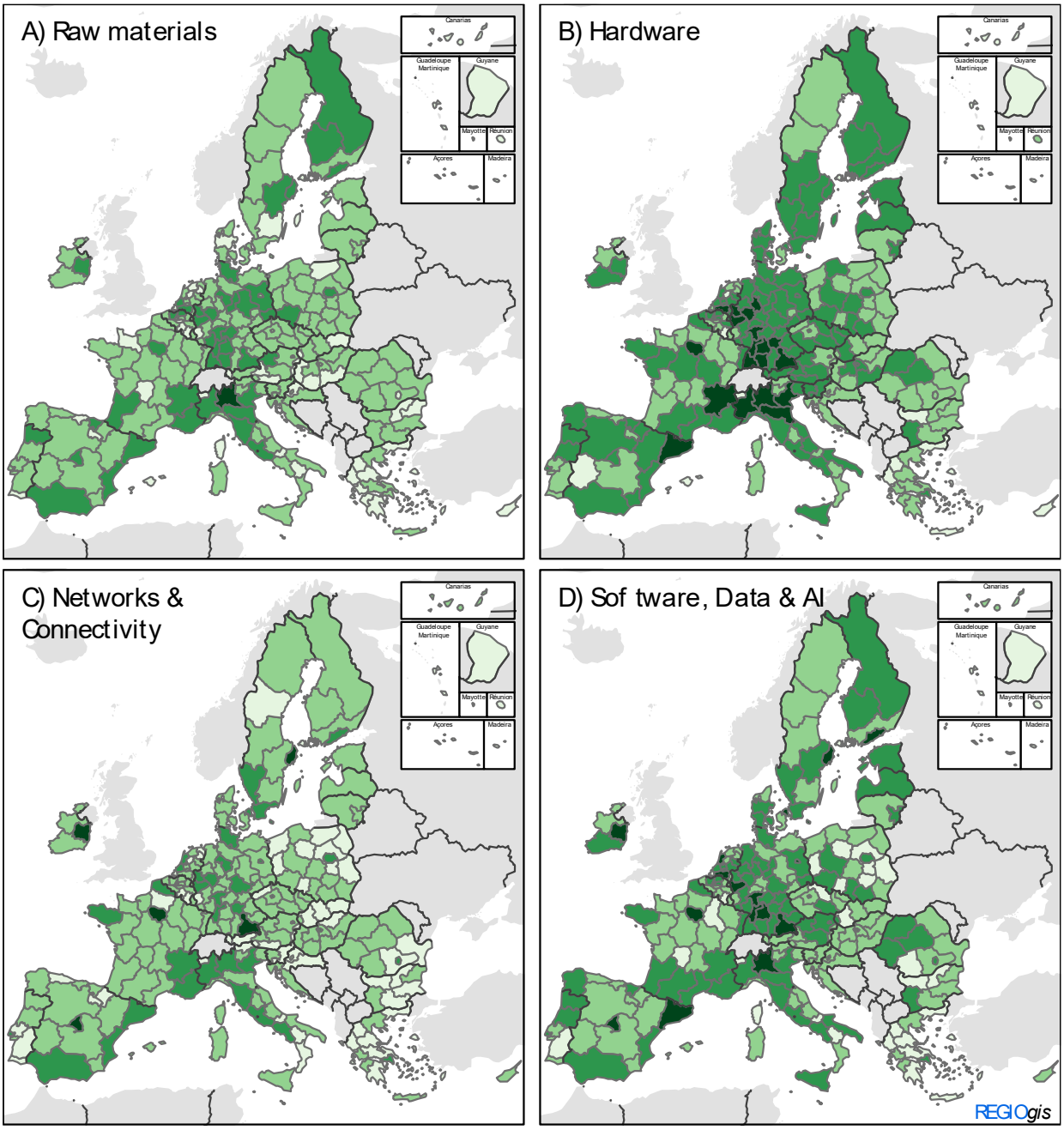
2.1.6. Digital competitiveness: production and adoption

Digital competitiveness is particularly relevant for the future of industry and standards of living in the EU. It has both a production side and an adoption side. Europe needs stronger capacity in software, artificial intelligence, data and other strategic technologies, but digital tools and skills also matter because they raise productivity across manufacturing, logistics, tourism, business services and the public sector (Draghi, 2024). The territorial question is therefore both where digital capabilities are produced and whether firms across the EU can use those capabilities effectively.

Current digital production capabilities in the EU are broader than software and AI hubs alone would suggest. Europe's digital base is territorially differentiated rather than simply core versus periphery (Gernone, 2026). The four panels in Map 2.1.2 combine employment, recent patents and high-growth enterprises for raw materials, hardware, networks and connectivity, and software and AI. The maps show that software and AI capabilities are more concentrated around metropolitan ecosystems, while hardware, network and upstream industrial capabilities extend across a wider set of established manufacturing regions.

A place-sensitive digital policy should offer different pathways. The current-capability map should not be read as a fixed ranking of future digital potential. (Gernone, 2026) compares observed activity with enabling assets to identify potential and untapped capability. This gap between current and potential capabilities identifies places where favourable conditions have not yet translated into a comparable scale of digital production. The results point to potential Nordic strengths in raw materials and hardware linked to energy, skills and resource endowments, and to several Central and Eastern European capital regions with strong graduate bases and related productive activities. The Industrial Accelerator Areas, the establishment of the European Digital Innovation Hubs (EDIHs) and the recently launched Apply AI strategy provide a good framework to connect different regions according to their current and untapped capabilities and to help to diffuse digital technologies across regions.

Connectivity remains a pre-condition for turning these capabilities into wider productivity gains. Capital regions generally record the highest fixed and mobile internet speeds, although other metropolitan regions are often close behind (JRC, forthcoming). Between 2019 and 2024 the largest improvements were in fixed broadband. France improved strongly across territorial types, the Netherlands and Germany show similar gains between capitals and other metropolitan regions, and Belgium records smaller improvements in the capital than in other metropolitan regions. The digital divide is increasingly about connection quality as well as basic coverage. The territorial implications of the digital divide are also tackled in the 2026 Spring Package. The Communication (European Commission, 2026a) mentions "*Reducing the urban-rural divide also demands better access to public services, for example in Ireland and Lithuania, as well as improved connectivity of remote regions (e.g. Bulgaria)*.". CSRs along these lines have also been adopted by the Council (e.g. Croatia: "*Accelerate broadband deployment in underserved areas, particularly rural areas and islands*") (Council of the European Union, 2026)



Map 2.1.2: Current regional capabilities by digital layer

Capacity Index
- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1

Note : For each region and digital layer, the current-capability index combines employment in relevant NACE sectors, recent PCT patent applications allocated by inventors' regional addresses, and estimated high-growth enterprises from Orbis.

Source : DG REGIO and Gernone (2026 forthcoming)

0 500 km

Administrative boundaries: © EuroGeographics, © OpenStreetMap contributors – Eurostat/GISCO

The use of Artificial Intelligence (AI) is rather concentrated, but it is not exclusive to capital regions. In 2025, 20% of EU enterprises used at least one AI technology, with a median of 26.2% in capital regions and 14.0% in non-capital regions. Midtjylland records the

Box 2.1.3: Smart Specialisation Strategies and Interregional Innovation Investments

Smart Specialisation has become the main tool for Member States and regions to strengthen regional competitiveness, innovation and industrial transformation. Introduced in 2014–2020 as a condition for ERDF support, more than 170 national and regional Smart Specialisation Strategies (S3) are now in place, with EUR 32.4 billion allocated to S3-related interventions under the 2021–2027 ERDF programmes. A 2025 Commission study found that 66% of surveyed authorities and stakeholders considered S3 the main R&I strategy for their country or region, confirming its evolution from a programming requirement into a valuable strategic policy framework.

S3 helps regions concentrate investment where local capabilities intersect with wider EU priorities. Around 84% of analysed S3 priorities correspond to at least one STEP domain, particularly clean and resource-efficient technologies and digital technologies. Regions such as Aragón, Sicily, North Rhine-Westphalia, Emilia-Romagna, Romania and Bayern already use S3 to target STEP-related technologies, industrial ecosystems and value chains.

Interregional cooperation reinforces this role. Since 2021, the Interregional Innovation Investments (I3) Instrument has supported 84 projects, involving 1,547 participations from all Member States and EUR 360 million committed by end-2026. Around 72% of EU regions participate. I3 connects complementary regional strengths and helps prepare investment, deployment and commercialisation. Less-developed regions are increasingly integrated: their share of private-company participation rose from around 20% in early calls to around 45% in 2024. Together, S3 and I3 strengthen both territorial competitiveness and European value chains, while helping ensure that the EU's technological transformation draws on capabilities across regions.

highest value in the available sample, at 50.8%, and other non-capital regions such as Västsverige, Sjælland, Syddanmark and Vorarlberg are also among the strong performers alongside Stockholm and Vienna. These examples show that strong regional ecosystems can support frontier adoption outside national capitals (Council of the European Union, 2026). At the same time, while exposure to AI and its use by workers are relatively widespread, innovation and firm-level adoption remain concentrated in high-income regions with strong human capital, raising concerns about widening regional divides and territorial cohesion (Buarque et al., 2026); (Kergroach and Héritier, 2025). When it comes to AI, the common objective is not to turn every region into a technology producer, but to ensure that digital technologies are extensively adopted and can raise productivity across a much wider territorial base.

Recent firm-level evidence suggests that AI adoption can already generate measurable productivity gains. Using data for more than 12,000 firms in the EU and the United States, (Aldasoro et al., 2026) find that AI adoption increases labour productivity among European firms by around 4%, primarily through capital deepening. AI-adopting firms are also more innovative and pay higher wages, suggesting that firms' capacity to combine new technologies with complementary intangible assets and skills is important for translating AI diffusion into productivity gains. The productivity gains are concentrated among medium-sized and large firms and appear to depend importantly on complementary investments in software and data and in workforce training. These findings highlight the need for targeted policies to support smaller firms and ensure inclusive growth.

2.1.7. Financing regional innovation and scale-up

Capabilities can translate into productivity only when firms, including SMEs, can finance investment and innovation. There are important differences in the share of fully credit-constrained firms across countries and among NUTS2 regions, with several Eastern and Southern Member States and regions displaying much higher regional values than the EU benchmark (European Commission, 2024).

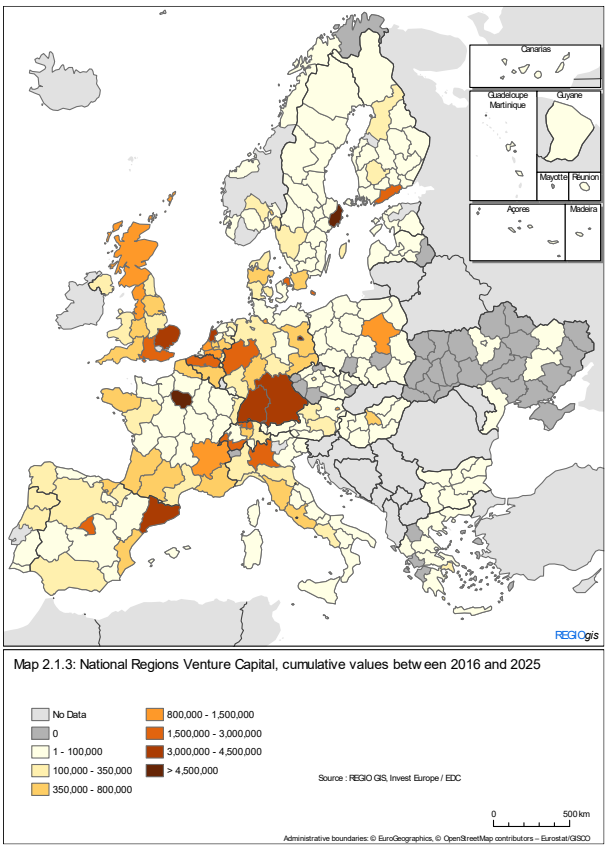
The regional financing problem sits within a broader European market structure. EU firms rely more heavily on banks than their US counterparts, and venture-capital and scale-up ecosystems remain fragmented across national markets (European Commission, 2025h). These features

matter most for investments based on intangible assets, uncertain revenues or new technologies because such projects are harder to finance against collateral. A region can therefore possess skills, firms and research capabilities and still fail to convert them into growth if appropriate finance is unavailable at the stage when firms need to scale-up their technological capabilities. This is reflected in some key regional challenges identified in the 2026 European Semester Spring Package ([85]), which have given rise to some relevant country-specific recommendations, such as those for Slovenia ("Strengthen competitiveness by promoting business dynamism and the creation of high-growth companies by improving the conditions for equity investment, including venture capital investment, for institutional investors, as well as for investments in research, development and innovation, including outside the capital region") (Council of the European Union, 2026), Latvia ("Improve access to finance for small and medium-sized enterprises, also outside of the capital region, including by stimulating competition in the financial sector and by developing the capital market") (b) or Estonia ("Improve access to finance, including for scaling up, especially for small and medium-sized enterprises and companies outside main urban areas, including by integrating innovation and business support frameworks") (Council of the European Union, 2026). Addressing the "valley of death" for growing firms requires a robust financial ecosystem, capable of offering a tailored set of financing products. Cohesion policy and RFF provide in this regard a wide set of financial instruments aiming at supporting scale up of EU innovative firms. In Saxony for instance, successive generations of the ERDF-supported Technology Start-up Fund (TGFS) have provided regional equity finance to innovative start-ups and technology-oriented SMEs. Under the 2014–2020 programme, TGFS+ used EUR 48 million of ERDF resources and financed 70 companies, mobilising EUR 138.8 million in private third-party capital. This support also contributed to build institutional capacity, promoting the set up of robust regional financial ecosystem

Risk finance is more geographically concentrated than bank finance. Cumulative venture capital investment between 2016-2025 shows a small number of regions with significant amounts against a much larger territory with low or very low recorded investment (Map 2.1.3). This concentration is important because young innovative firms and deep-tech companies depend heavily on intangible assets and uncertain future revenues, making equity or quasi-equity better suited than conventional debt to many high-growth investments.

Finance is thus a core part of the place-sensitive competitiveness agenda rather than a separate financial-market issue. Reinforcing this, channelling savings towards productive investments to boost competitiveness is a core part of "Strengthening the EU's competitiveness", as outlined in the Spring Package Communication (European Commission, 2026a). Regions with weak absorptive capacity may need grants and advisory support; regions with established firms may benefit more from loans and guarantees; and high-growth innovation ecosystems require patient equity and risk-sharing. Matching finance to the maturity of firms and projects can help turn regional capabilities into investment, innovation and productivity.

([85]) See both the Chapeau Communication (European Semester, 2026?) and the Country Reports (https://economy-finance.ec.europa.eu/economic-surveillance-eu-member-states/country-pages-including-country-reports_en)



2.1.8. Conclusion

Europe's competitiveness depends not only on the performance of its most productive regions, but also on the capacity of firms and territories across the Union to raise productivity, adopt technologies and connect to wider markets and value chains. The analysis in this chapter shows that competitiveness remains highly uneven across and within Member States. Higher-productivity countries tend to display lower regional productivity dispersion, but national catch-up does not automatically produce territorial convergence: the substantial productivity gains recorded in Central and Eastern Europe since 2000 have not been accompanied by a comparable narrowing of internal productivity gaps.

The mechanisms of productivity growth differ markedly across regions. A shift-share decomposition for 2000–2024 finds that most regional productivity growth in the EU has come from upgrading within existing sectors, while labour reallocation has reinforced these gains in some regions and acted as a headwind in others. Manufacturing illustrates particularly well this uneven adjustment. Earlier employment losses were particularly widespread in Southern Europe before and following the global financial crisis, while more recent pressures are increasingly visible in parts of North-Western Europe. Central and Eastern Europe has so far proved more resilient but recent trends in the automotive sectors point to potential vulnerabilities there too.

Innovation, digitalisation and finance reveal a similarly differentiated geography. Frontier capabilities and venture capital remain concentrated in a relatively small number of ecosystems, but strong productivity growth, technology adoption and applied innovation are also found outside capital and frontier regions. Europe needs strong metropolitan and scientific hubs capable of generating and scaling frontier technologies, but productivity upgrading is not confined to these places. Industrial, intermediate and rural regions can benefit through technology adoption, process innovation, managerial upgrading, specialised supplier networks and integration into higher-value production systems. The digital evidence makes the same distinction: production of frontier software and AI capabilities remains concentrated, while their productivity impact ultimately depends on how effectively firms across territories can adopt and combine them with existing capabilities and skills.

The policy implication is that achieving productivity gains across more regions make the EU as a whole more competitive. Strengthening European competitiveness therefore requires both support for leading innovation ecosystems and policies that improve the capacity of other regions to absorb technology, upgrade existing activities, develop skills, access appropriate finance and participate in European production networks. The relevant challenge is not to make regional economies alike, but to broaden the territorial base from which productivity growth can be generated and sustained.