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EU Regional Competitiveness Index 2.0

2022 edition



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*Lewis Dijkstra, Eleni Papadimitriou,
Begoña Cabeza Martinez, Laura de
Dominicis and Matija Kovacic*

Regional and
Urban Policy

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Authors:

Lewis Dijkstra, Directorate-General for Regional and Urban Policy
Eleni Papadimitriou, Joint Research Centre of the European Commission
Begoña Cabeza Martinez, Joint Research Centre of the European Commission
Laura de Dominicis, Directorate-General for Regional and Urban Policy
Matija Kovacic, Joint Research Centre of the European Commission

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1. Introduction

This paper presents the fifth edition of the European Regional Competitiveness Index (RCI). Since its first edition, RCI 2010 (Dijkstra et al., 2011), the RCI has grown into a much-cited and widely used index. The focus of the first few editions was on capturing the differences in competitiveness between regions at one point in time. As more editions were published, however, the focus expanded to capturing changes over time in a robust manner. This presented several challenges: the list of indicators has changed over time; some indicators are no longer collected or are no longer relevant; and new indicators have been added to capture new issues. In addition, the changes in the Nomenclature of Territorial Units for Statistics (NUTS) 2 regions of Croatia, Ireland, Lithuania and Poland have created breaks in the time series.

The countries included in the RCI have also changed. Croatia was added in the 2013 edition, and this fifth edition is the first one that doesn't include the United Kingdom. The changing composition of the EU means that previous editions cannot be used for a time comparison. This break in the series was used as an opportunity to re-evaluate the underlying methodology and recalculate the previous two editions using the updated methodology. To highlight these changes, this new version has been called 'RCI 2.0'.

According to the World Economic Forum (WEF), competitiveness at the national level is the 'set of institutions, policies and factors that determine the level of productivity of a country, (Schwab, 2012; Schwab and Porter, 2007). Our definition of regional competitiveness is slightly different, as it integrates the perspective of both businesses and residents (Dijkstra et al., 2011).

Regional competitiveness is the ability of a region to offer an attractive and sustainable environment for firms and residents to live and work.

This definition balances the goals of business success with those of societal well-being and responds, at least partially, to the 'beyond GDP' discussion. In our definition, the concept of sustainability relates to the region's capacity to provide an attractive environment in both the short term and the long term. For example, by including numerous indicators on human capital and the quality of institutions, the RCI is meant to measure the long-term potential of a region.

Starting from the framework developed by the WEF for their Global Competitiveness Index (GCI) ⁽¹⁾, the RCI adapts this framework and extends it to the regional context in the EU, with the aim of capturing the underlying factors that support a region's long-term economic development. It does not aim to capture the impact of short-term shocks, such as the COVID-19 pandemic or the invasion of Ukraine. To avoid the pandemic biasing the underlying factors of competitiveness, we used data from 2019 for certain indicators instead of that from 2020 or 2021. For example, the number of flights was much lower in 2020 than in 2019, so the 2019 data was used. The impact of the invasion of Ukraine is not yet reflected in this edition as the data used predates the invasion.

Given the high interest in the index and its changes over time, we developed new interactive tools (which are available at the URL https://ec.europa.eu/regional_policy/information-sources/maps/regional-competitiveness_en). These tools facilitate the comparison of the RCI, its sub-indices and the pillars between EU regions. These include scores for the 2022 index for comparison with scores of 2016 and 2019, calculated using the new methodology. Interactive scorecards provide a quick overview of how a region performs and compares to its peer regions. All the scores and their underlying data can be downloaded.

¹ The RCI followed the approach used by the WEF to construct the GCI up until the 2018 edition. After that edition, the index was substantially modified. See: <https://www.weforum.org/reports/the-global-competitiveness-report-2017-2018>.

2. The Regional Competitiveness Index revamped – from RCI to RCI 2.0

2.1. An updated framework for RCI 2.0

The fifth edition of the RCI maintains the structure of the previous editions but uses an improved framework to facilitate comparisons over time. To highlight the change in methodology, this new edition is referred to as RCI 2.0. The indices for 2019 and 2016, recalculated using the new methodology, are called RCI 2.0 2019 and RCI 2.0 2016, to avoid confusion with the original 2019 and 2016 results.

The RCI is composed of three sub-indices – **‘Basic’**, **‘Efficiency’** and **‘Innovation’** – and of 11 pillars that describe the different aspects of competitiveness. The structure of the framework can be found in [Figure 1](#). This has remained unchanged since the first edition (Annoni and Kozovska, 2010; Dijkstra et al., 2011) ⁽²⁾.

The **‘Basic’ sub-index** refers to the key basic drivers of all types of economies. It identifies the main issues that are necessary to develop regional competitiveness, and includes five pillars: (1) ‘Institutions’, (2) ‘Macroeconomic stability’, (3) ‘Infrastructures’, (4) ‘Health’ and (5) ‘Basic education’.

The ‘Institutions’ pillar captures the quality and efficiency of the institutions, the level of perceived corruption and the general regulatory framework within countries. It shows whether the institutional climate is supportive of entrepreneurship and whether it is easy to open a new business. It captures the extent to which people trust their national legislative and regulatory systems and whether managers consider various aspects of the business environment to be efficient and reliable.

‘Macroeconomic stability’ measures the quality of the general economic climate. Economic stability is essential for guaranteeing trust in the markets, both for consumers and producers of goods and services. Stable macroeconomic conditions lead to a higher rate of long-term investments and are essential ingredients for maintaining competitiveness.

The ‘Infrastructure’ pillar describes dimensions of infrastructural quality such as connectivity and accessibility. The quality of infrastructure is essential for the efficient functioning of an economy. High-quality infrastructure guarantees easy access to other regions and countries, contributes to better integration of peripheral and lagging regions and facilitates the transport of goods, people and services. This has a strong impact on competitiveness as it increases the efficiency of regional economies.

The ‘Health’ pillar describes human capital in terms of health condition and well-being, with a special focus on the workforce. Good health of the population leads to greater participation in the labour market, a longer working life, higher productivity and lower healthcare and social costs.

The ‘Basic education’ pillar focuses on compulsory education outcomes as an indication of the effectiveness and quality of the educational system across EU Member States. High levels of basic skills and competences increase the ability of individuals to subsequently perform well in their work and to continue into tertiary education.

The **‘Efficiency’ sub-index** includes three pillars: (6) ‘Higher education, training and lifelong learning’, (7) ‘Labour market efficiency’ and (8) ‘Market size’. As a regional economy develops, these aspects are related to a more skilled labour force and a more efficient labour market.

The ‘Higher education and lifelong learning’ pillar captures the contribution of education to productivity and economic growth. Knowledge-driven economies based on innovation require well-educated human capital capable of adapting and education systems that successfully transmit key skills and competencies.

The ‘Efficiency of the labour Market’ gives an important indication as to the economic development of a region. Efficient and flexible labour markets contribute to efficient allocation of resources.

‘Market size’ aims at describing the size of the market available to firms, which directly influences their competitiveness. In fact, larger markets allow firms to develop and benefit from economies of scale and could potentially incentivise entrepreneurship and innovation.

Lastly, the **‘Innovation’ sub-index** includes the three pillars that are the drivers of improvement at the most advanced stage of economic development: (9) ‘Technological readiness’, (10) ‘Business sophistication’ and (11) ‘Innovation’.

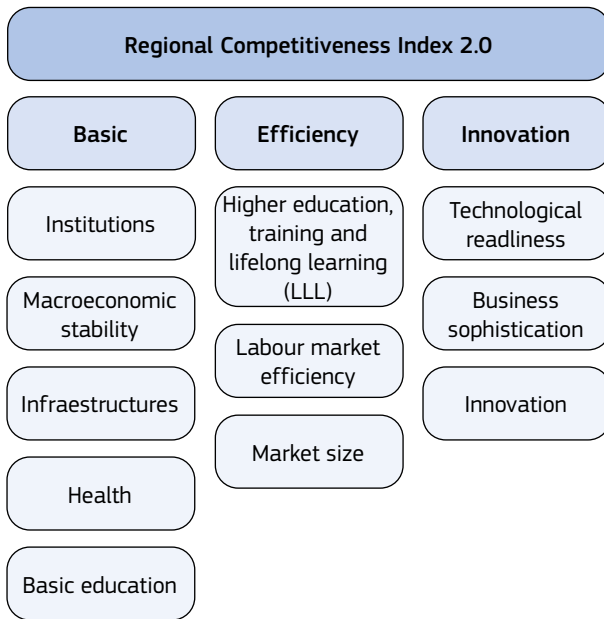
‘Technological readiness’ measures to what extent households and enterprises are using and adopting existing technologies. The adoption and diffusion of new technologies is widely considered as fundamental to boosting growth and competitiveness.

The next pillar is ‘Business sophistication’. The level of business sophistication within an economy shows its potential for specialisation and diversification, which can help regions to respond to competition. Specialisation in sectors with a high added value also contributes to competitiveness.

The final pillar is ‘Innovation’. Developed economies need to be at the forefront of new technologies, producing cutting-edge products and processes to maintain their competitive edge. The level of innovative capacity of a region impacts the ways in which technology is diffused within the region.

² <https://publications.jrc.ec.europa.eu/repository/handle/JRC58169>.

Figure 1: RCI 2.0 framework structure.



Given the nature and availability of the indicators, two of the pillars – ‘Macroeconomic stability’ and ‘Basic education’ – are measured at the national level, while the ‘Institutions’ and ‘Technological readiness’ pillars include two sub-pillars each, one at the national and one at the regional level.

Unlike the previous editions, EU regions are divided into three development stages based on their average 2018–2020 gross domestic product (GDP) per head in purchasing power standards (PPS), expressed as an index with the EU-27 average set to 100 (Table 1). In the previous three editions of the RCI – 2013, 2016 and 2019 (Annoni et al., 2013; Annoni et al., 2017; Annoni et al., 2019), EU regions were divided into five development stages, the same way the Global Competitiveness Index (WEF-GCI) did up to its 2017/2018 edition. Since then, the WEF-GCI no longer uses development stages. As a consequence, RCI 2.0 returned to the initial approach used in the 2010 edition of using three stages, adapting them to the thresholds used in cohesion policy today ⁽³⁾. These stages of development are recalculated for each edition and do not fully correspond to the category of regions used by cohesion policy

programmes. Matching these categories is not feasible due to the changes in NUTS boundaries over time and the use of combined NUTS 2 regions (see below) to better capture metropolitan dynamics.

The RCI sub-indices are weighted differently per development stage, as shown in Table 1.

Table 1: Weighting scheme for the three RCI sub-indices, differentiated by development stage.

Stage of development	Sub-index weights		
	Basic	Efficiency	Innovation
Stage 1: GDP index (*) < 75	30 %	50 %	20 %
Stage 2: GDP index (*) [75-100]	25 %	50 %	25 %
Stage 3: GDP index (*) > 100	20 %	50 %	30 %

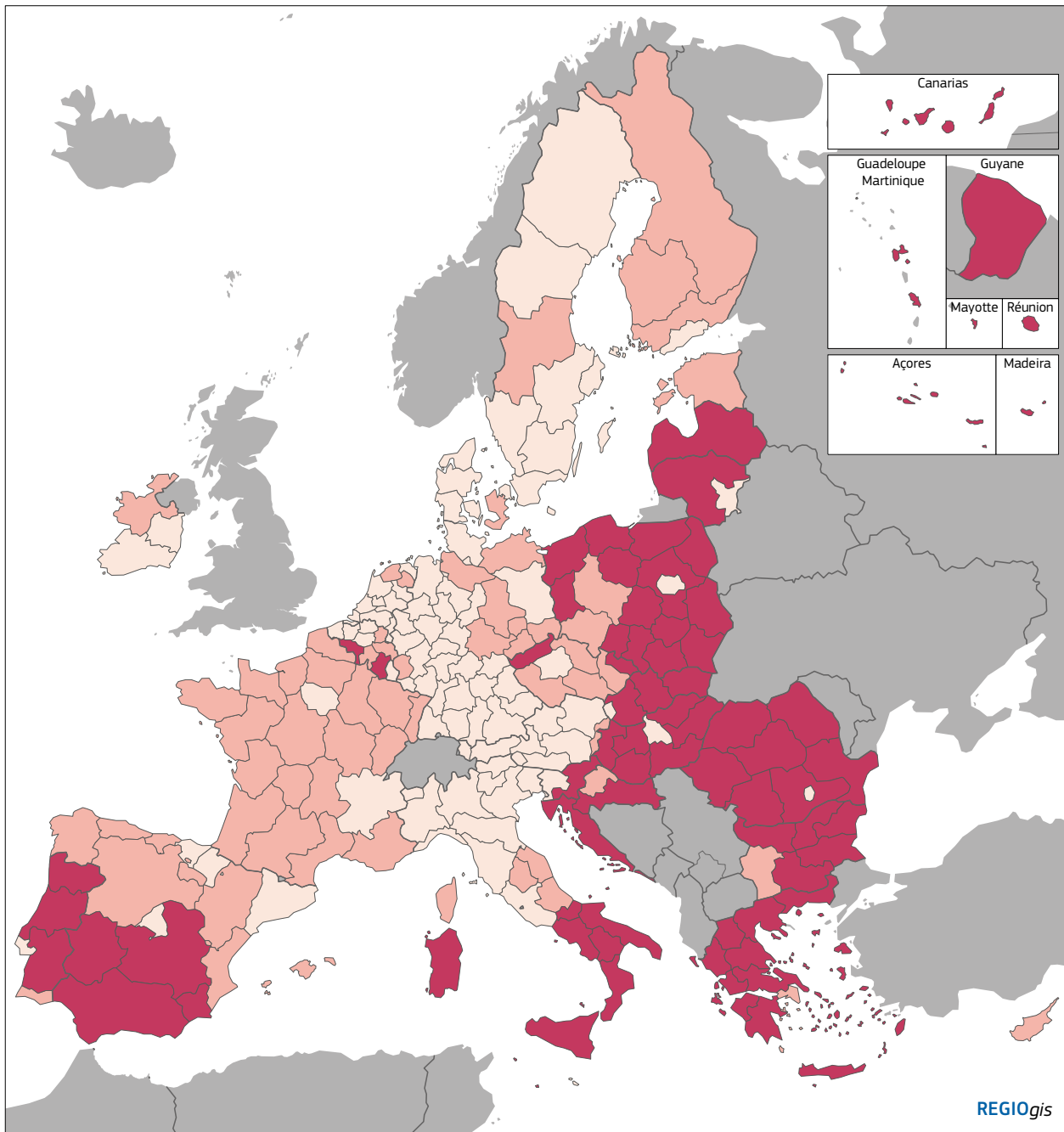
(*) GDP/ head (PPS), Index EU-27 = 100

RCI 2.0 2022 is based on 68 indicators, of which 48 are at the regional level. Of the 68 indicators, 51 were used in the two previous editions, 9 were used in one of the two previous editions and 8 are new. These were primarily national level indicators in the ‘Institutions’ and ‘Technological readiness’ pillars.

A composite indicator of this complexity is always subject to small modifications and adjustments. The reasons for such changes include the revisions of the NUTS classification, the availability of new and better indicators at the regional level, or the fact that indicators previously included are no longer updated or reliable. Moreover, in long-standing indices, such as the RCI, the framework and methodology should be evaluated from time to time, to better reflect the current needs and to ease the communication of the results. A brief overview of the main changes implemented is given below, while the detailed framework with the included indicators can be found in the Annex. The methodology of RCI 2.0 is described in more detail in the RCI methodological technical report (Papadimitriou et al., 2023).

³ https://ec.europa.eu/regional_policy/information-sources/cohesion-report_en.

Map 1: RCI 2.0 regions, grouped into three development stages, by GDP per head (PPS), average for 2018–2020.



GDP/head (PPS) by RCI 2.0 region, average 2018–2020

Index, EU-27 = 100

- < 75
- 75 - 100
- >= 100

Source: JRC (ARDECO) based on Eurostat data.

0 500 km

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2.2. Methodology and changes

The construction of RCI 2.0 follows the 10 steps guide ⁽⁴⁾ based on the *Handbook on Constructing Composite Indicators* ⁽⁵⁾. In general, the index follows the methodology adopted in the first 2010 edition (Annoni and Kozovska, 2010) ⁽⁶⁾; a few adjustments and updates have been made and are described below.

The steps used to construct the RCI, after developing the conceptual framework and selecting the indicators, are the following.

Missing data

The first step of the analysis is checking for missing data. The maximum share of missing values allowed is defined at around 15–20 %. Fortunately, all indicators could be included in this edition as all of them comply with this rule. There are some cases, however, where only NUTS-1-level data is available. In these cases, the NUTS 1 value is imputed to all the NUTS 2 regions within the parent NUTS 1 region. There are 68

indicators present in RCI 2.0 2022. Most indicators have 100 % coverage, while for the few remaining (16 indicators), the availability is between 92 % and 99 %. Looking for missing patterns at the unit (region) level, again, most regions have excellent coverage (above 93 %). Only two regions have a lower coverage: Åland (FI20), with a coverage of 88 %, and Mayotte (FRY5), one of France's outermost regions, with a coverage of 80 %.

Outlier detection

Potentially problematic indicators that could bias the overall index results were identified based on two measures that capture the shape of their distribution, skewness and kurtosis. A practical rule, suggested by the Joint Research Centre, is that a value should be considered an outlier and treated as such if the indicator's absolute skewness is greater than 2.0 and its kurtosis is greater than 3.5. In the current version, six outlying indicators were detected. Four of those were treated by using a logarithmic transformation, while for the remaining two winsorisation was applied for one and two values, respectively (Table 2).

Table 2: Indicators corrected for outliers.

Pillar	Indicator	Description	Treatment
Infrastructure	Rail transport performance	Share of population in a 120 km radius accessible by rail within 1 hour and 30 minutes	Logarithmic transformation
Labour market efficiency	Long-term unemployment	% of labour force unemployed for 12 months or more	Winsorisation of two points
Labour market efficiency	Unemployment rate	% of unemployed as a % of active population	Logarithmic transformation
Labour market efficiency	Gender balance unemployment	distance to equilibrium: absolute value of (rate women – rate men)	Logarithmic transformation
Market size	Potential market size GDP	Potential market size expressed in GDP	Winsorisation of one point
Innovation	Total Patent applications	Average number of applications per million inhabitants	Logarithmic transformation

Normalisation

Contrary to the previous editions where weighted z-scores were adopted with the regions' population sizes as weights, in RCI 2.0 2022 we opted for min–max normalisation. This is reflected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the best. At the same time, the indicators that have a negative direction are reversed. The formula used is the following:

$$y = 100 \times (x - \min) / (\max - \min),$$

where *min* and *max* are the minimum and maximum values in the set of observed values.

The reason for this change was that the two methods produced similar results, while the min–max method is easier to interpret and communicate to a less-technical audience. More details can be found in the accompanying methodological document of the RCI (JRC, 2023).

Weighting

Equal weights were used from the base indicators up to the sub-indices level. From the sub-indices to the overall RCI, unequal weights were used. As already discussed, the three RCI sub-indices ('Basic', 'Efficiency' and 'Innovation') are weighted unequally and, at the same time, differently for the different development stages (see Table 1).

⁴ https://knowledge4policy.ec.europa.eu/publication/your-10-step-pocket-guide-composite-indicators-scoreboards_en.

⁵ <https://www.oecd.org/sdd/42495745.pdf>.

⁶ <https://publications.jrc.ec.europa.eu/repository/handle/JRC58169>.

Aggregation

Simple arithmetic averages were used at the first aggregation levels: each of the 11 pillars uses a simple arithmetic average of the underlying indicators (⁷), and, similarly, the sub-index score is an arithmetic average of the underlying pillars. The rationale for this choice is that arithmetic averages are easy to interpret and allow perfect compensability between indicators, whereby a high score in one indicator can fully offset low scores in other indicators. The three sub-indices are aggregated into the overall RCI using once more an arithmetic, but weighted, average, as discussed above.

Conversion to an EU index

As a final step, to facilitate the interpretation of the RCI and to make it more accessible to a less-technical audience, we transformed the final scores of the overall RCI, the sub-indices and the pillars into an EU index, by expressing each value as a percentage of the EU average. This is done using the following formula.

$$x_{new} = 100 + \left(\frac{x - EU-27}{EU-27} \times 100 \right)$$

This way, 100 represents the EU-27 average for the index, the sub-indices and each pillar. A region value of 90 % means that the specific region scores 90 % of the EU average, while a value of 120 means that the region scores 20 % more than the EU average.

The statistical coherence is a necessary condition for a sound index. The assessment of statistical coherence consists of a

multi-level analysis of the correlations of variables, the application of principal component analysis to the structure of the index, and the analysis on the impact of the index's components. We studied the correlation structure of the index extensively and performed a principal component analysis. The results can be found in the accompanying methodological document of the RCI (Papadimitriou et al., 2023) with the impact of different modelling assumptions on the results. In the same document, all the indicators' changes and the steps described above are discussed in detail.

2.3. Changes in regional borders and metropolitan areas

RCI 2.0 2022 is based on the NUTS 2 regions 2021 classification (⁸), which includes one significant change at the NUTS 2 level compared to the previous classification: Croatia went from having two to four NUTS 2 regions.

As in the previous editions of RCI, when the need is identified (⁹), some regions are merged into larger metropolitan areas. This ensures that the RCI is an appropriate measure when commuting may affect the indicators, such as, for example, when the indicator measures volumes relative to the resident population. This issue has been observed for seven capital regions, which are combined with one or more adjacent regions, as shown in Table 3. This merge should be kept in mind when analysing and comparing the performance of the aforementioned regions. The resulting number of regions included in RCI 2.0 2022 is 234.

Table 3: Hybrid regions in RCI 2.0 2022 edition, consisting of capital regions and their commuting zones.

Country	'Code in RCI 2.0 2022'	'Name in RCI 2.0 2022'	'NUTS 2 Code 2021'	'NUTS 2 Name 2021'	Notes
Austria	AT_C	Vienna and its commuting zone	'AT12 AT13'	'Niederösterreich Wien'	Same as in RCI 2019
Belgium	BE_C	Brussels and its commuting zone	'B10 B24 B31'	'Région de Bruxelles Capitale Prov. Vlaams Brabant Prov. Brabant Wallon'	Same as in RCI 2019
Croatia	HR_C	Zagreb and its commuting zone	'HR05 HR06'	'Grad Zagreb Sjeverna Hrvatska'	Change with respect to RCI 2019 as the NUTS 2 classification changed for Croatia
Czechia	CZ_C	Prague and its commuting zone	'CZ01 CZ02'	'Praha Střední Čechy'	Same as in RCI 2019
Germany	DE_C	Berlin and its commuting zone	'DE30 DE40'	'Berlin Brandenburg'	Same as in RCI 2019
Hungary	HU_C	Budapest and its commuting zone	'HU11 HU12'	'Budapest Pest'	Same as in RCI 2019
Netherlands	NL_C	Amsterdam and its commuting zone	'NL23 NL32'	'Flevoland Noord Holland'	Same as in RCI 2019

⁷ In the case of the 'Institutions' and 'Technological readiness' pillars, the indicators are first aggregated into the two sub-pillars (regional and national), which are then aggregated by simple arithmetic average into the corresponding pillars.

⁸ For more information on the NUTS 2021 classification, see: <https://ec.europa.eu/eurostat/web/nuts/background>.

⁹ A region adjacent to a capital region is considered to be part of its commuting belt if at least 40 % of its population live in the same functional urban area, defined according to the approach defined by the Organisation for Economic Co-operation and Development (OECD) and the European Commission (Dijkstra and Poelman, 2012).

3. RCI 2022: Key findings

3.1. Most capital cities are more competitive

The RCI reveals a remarkable spatial pattern across EU regions (Map 2). Regional competitiveness is above the EU average in all regions in Austria, Benelux, Germany and the Nordic Member States. In contrast, all the eastern regions, except most capital city regions, score below the EU average. The regions of southern EU Member States tend to score below the EU average, with only five exceptions: Cataluña, Madrid and País Vasco in Spain, Lombardia in Italy and Área Metropolitana de Lisboa in Portugal. Ireland and especially France have a mix of regions above and below the EU average.

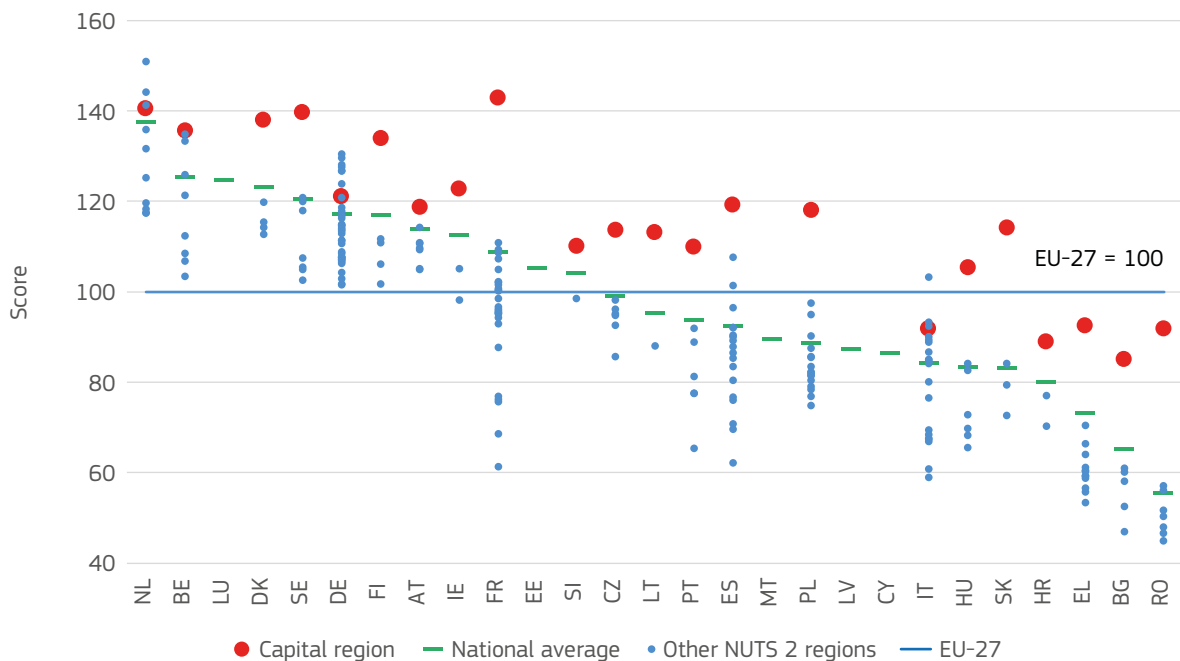
In line with previous editions, the 2022 RCI shows a polycentric pattern, with a strong performance of regions hosting large urban areas in the EU, which benefit from agglomeration

economies, better connectivity and higher levels of human capital (Figure 2).

Within Member States, capital regions tend to be the most competitive ones. The gap between the capital city region and the remaining regions is particularly wide in France, Spain, and Portugal and many of the eastern EU Member States. This can be a reason for concern as it puts pressure on the capital city region while possibly leaving resources under-used in other regions.

In three countries, the capital regions are not the most competitive: Germany, Italy and the Netherlands. In the Netherlands, the best performing region remains Utrecht (at 151 of the EU average), followed by Zuid-Holland which includes Rotterdam and The Hague (at 144). In Italy, Lombardia, which includes Milan (at 103), continues to be the best performing Italian region. In Germany the best performing region remains Oberbayern, which includes Munich (at 130). Several other Germany regions also outperform Berlin and Brandenburg.

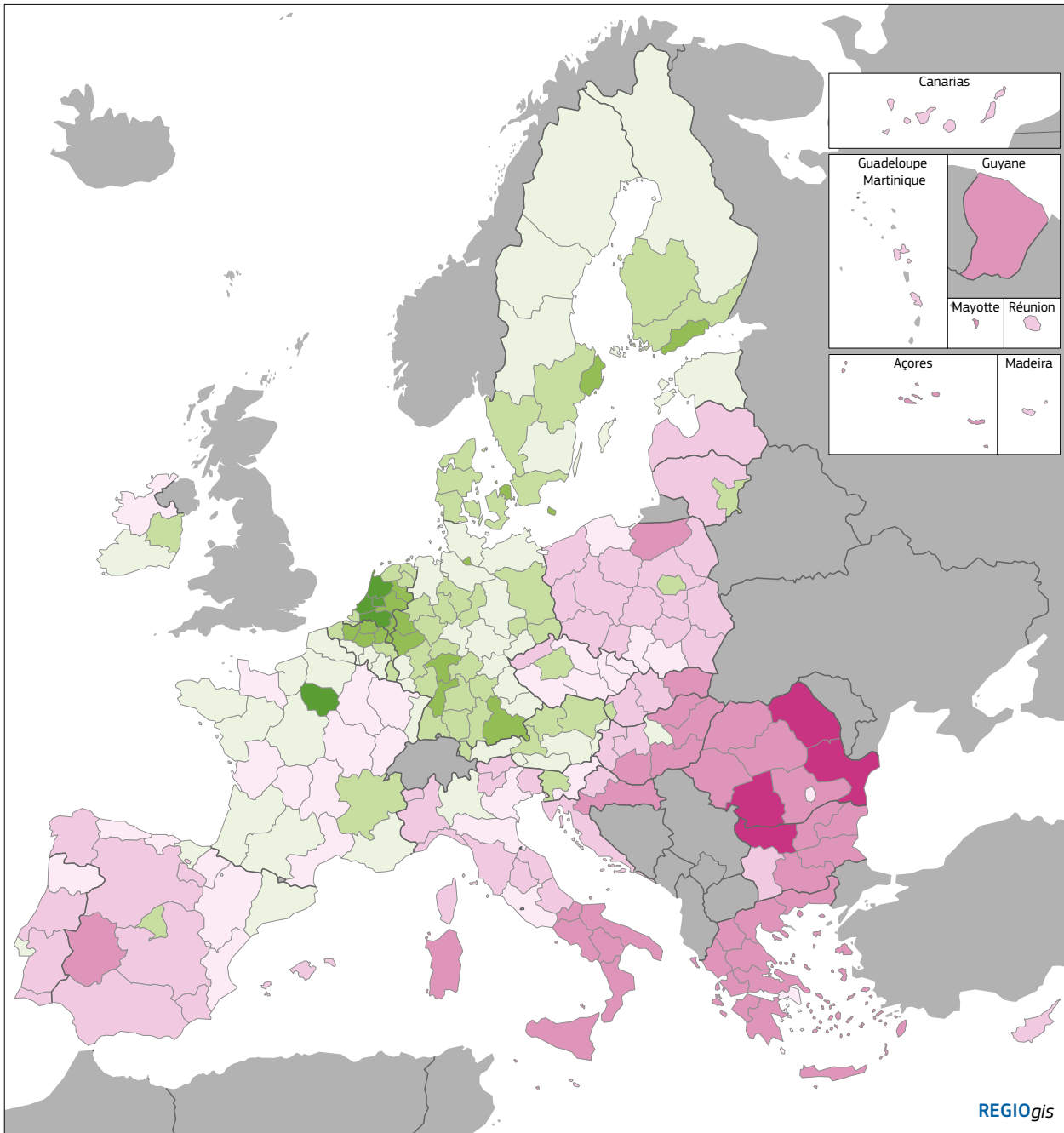
Figure 2: RCI 2.0 – 2022 edition – regional variation by Member State.



Source: Directorate-General (DG) for Regional and Urban Policy and Joint Research Centre.

NB: Member States ranked by national averages. There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

Map 2: Regional Competitiveness Index 2.0, 2022 edition.



Regional Competitiveness Index 2.0, 2022 edition

Index		
 <= 50.0	 100.1 – 110.0	
 50.1 – 75.0	 110.1 – 125.0	
 75.1 – 90.0	 125.1 – 140.0	EU-27 = 100
 90.1 – 100.0	 > 140.0	

0 500 km

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Source: DG Regional and Urban Policy and Joint Research Centre.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

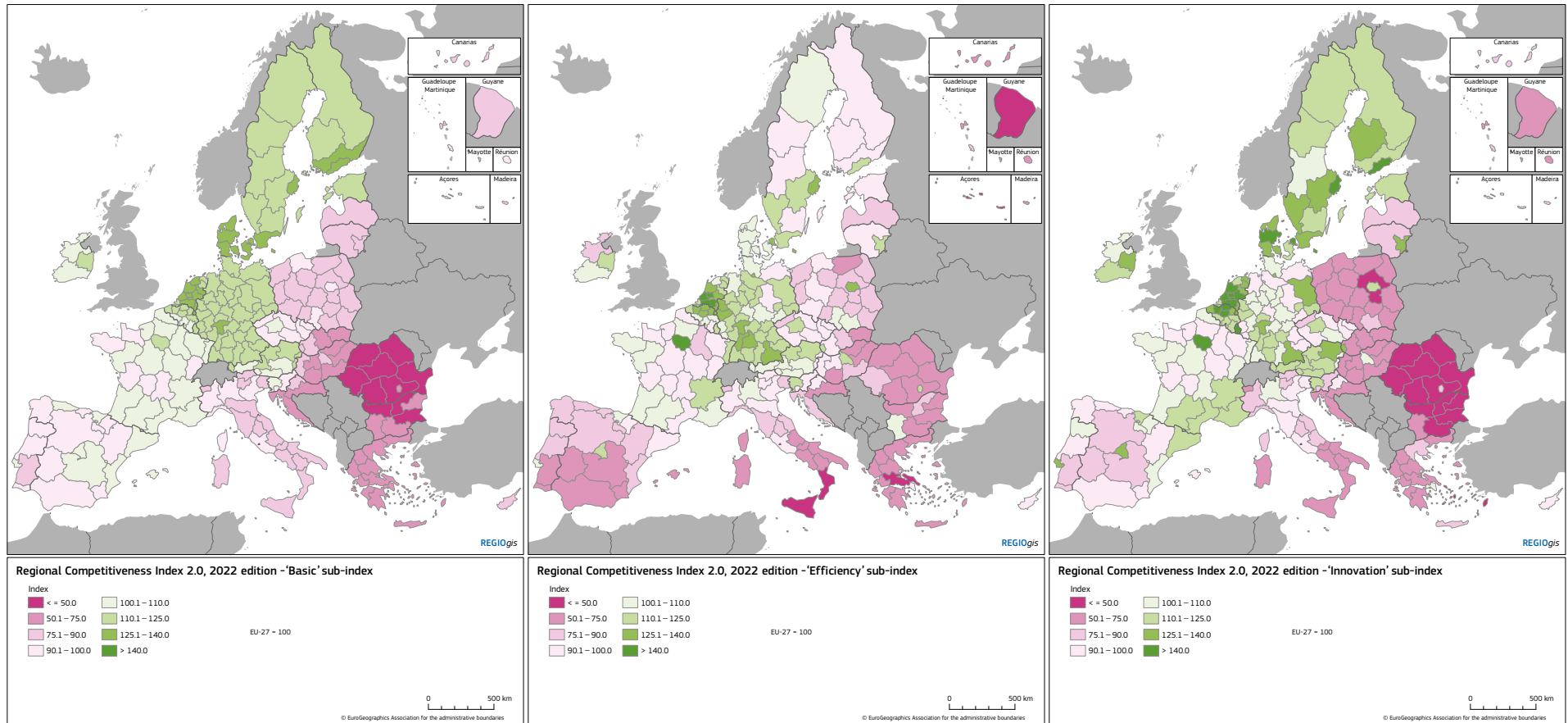
The top performer of the 2022 edition of the RCI is the region of Utrecht (Netherlands), followed by Zuid-Holland (Netherlands) and the French capital region of Île-de-France (Table 4). All three score at least 40 points above the EU average (EU-27 = 100). Overall, among the 10 top-performing regions, we find five Dutch regions (including the capital region of Amsterdam and its commuting zone), two Belgian regions (including the capital region of Brussels and its commuting zone), and the three capital regions of Denmark, France and Sweden. At the other end of the scale, lagging 50 or more points behind the EU average, we find six Romanian regions, two Greek regions and two Bulgarian regions. The bottom 10 regions do not include any capital city regions.

Map 3 shows the spatial distribution of the 'Basic', 'Efficiency' and 'Innovation' sub-indices. In line with past editions, the 'Basic' sub-index features the least within-country variability, while the 'Efficiency' and especially the 'Innovation' sub-indices vary more (see also Figure 3). The variation in the scores increases from the 'Basic' to the 'Innovation' sub-index between and even more so within countries. The within-country variation and the gap between the capital region and the remaining regions within a country are larger in the more advanced components of competitiveness – i.e. in the 'Efficiency' and 'Innovation' sub-indices.

Table 4: RCI 2.0 – 2022 edition. Top 10 and bottom 10 EU regions.

TOP 10				
Member State	Region code	Region name	RCI 2.0 - 2022 (EU-27 = 100)	Rank
Netherlands	NL31	Utrecht	150.9	1
Netherlands	NL33	Zuid-Holland	144.1	2
France	FR10	Île-de-France	142.8	3
Netherlands	NL41	Noord-Brabant	141.4	4
Netherlands	NL_C	Amsterdam and its commuting zone	140.5	5
Sweden	SE11	Stockholm	139.7	6
Denmark	DK01	Hovedstaden	138.1	7
Netherlands	NL22	Gelderland	136.0	8
Belgium	BE_C	Brussels and its commuting zone	135.7	9
Belgium	BE23	Oost-Vlaanderen	134.8	10
BOTTOM 10				
Member State	Region code	Region name	RCI 2.0 - 2022 (EU-27 = 100)	Rank
Romania	RO11	Nord-Vest	56.1	225
Greece	EL51	Anatoliki Makedonia, Thraki	55.8	226
Greece	EL64	Sterea Elláda	53.4	227
Bulgaria	BG34	Yugoiztochen	52.6	228
Romania	RO31	Sud-Muntenia	51.6	229
Romania	RO12	Centru	50.4	230
Romania	RO41	Sud-Vest Oltenia	47.9	231
Bulgaria	BG31	Severozapaden	46.9	232
Romania	RO21	Nord-Est	46.6	233
Romania	RO22	Sud-Est	44.9	234

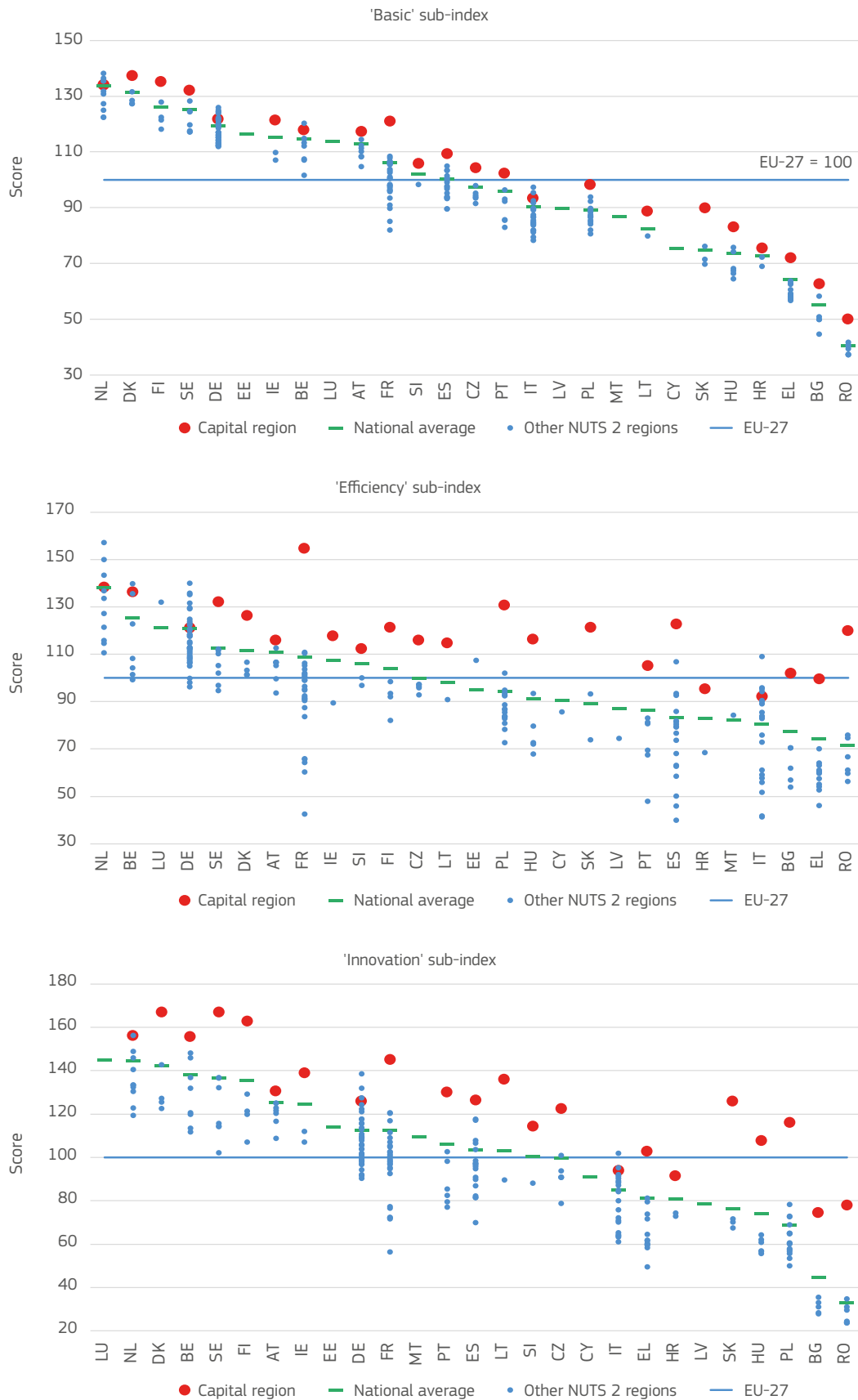
Map 3: RCI 2.0 - 2022 edition, by sub-index.



Source: DG Regional and Urban Policy and Joint Research Centre.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

Figure 3: regional variation of RCI-2.0 sub-indices, by Member State, 2022 edition.



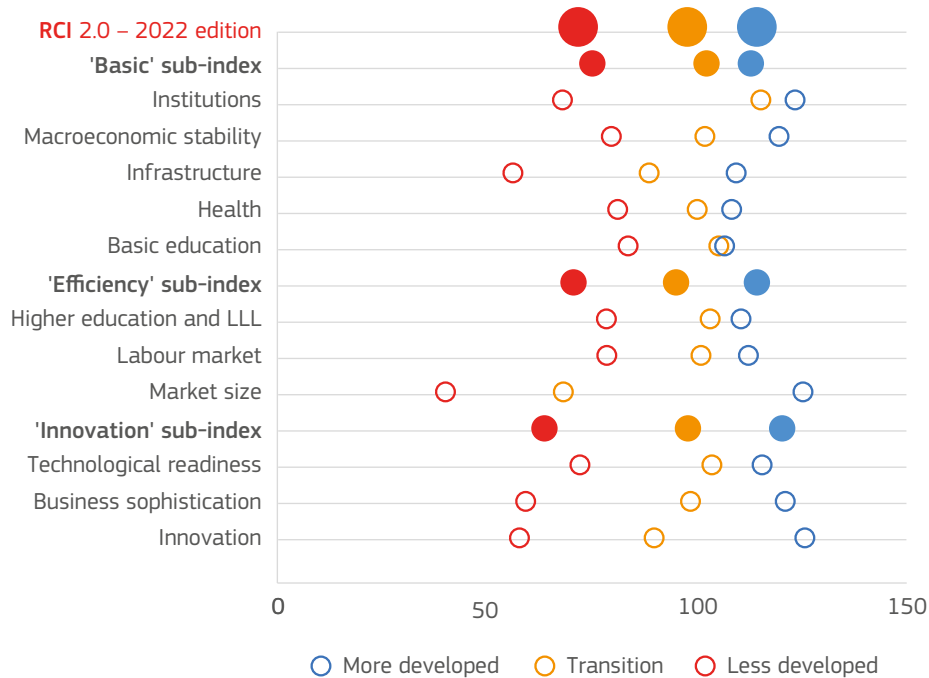
Source: DG Regional and Urban Policy and DG Joint Research Centre.

NB: Member States ranked by national averages. There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

Using the classification of regions by stage of development (with thresholds defined as in [Map 1](#)) highlights the link between development and competitiveness (Figure 4). On average, more developed regions (with a GDP per head above 100 % of the EU average) perform better than transition (between 75 % and 100 %) and less developed regions (with a

GDP per head of less than 75 %) in all components of the RCI. The gap between more and less developed regions is widest for the 'Innovation' sub-index and its pillars. Some of the basic pillars, such as 'Institutions' and 'Infrastructure' (mainly measured within the RCI by accessibility), also reveal a wide gap between less developed and more developed regions.

Figure 4: RCI 2.0 – 2022 edition. Scores by stage of development.



Source: DG Regional and Urban Policy and Joint Research Centre.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

The region's performance across the 11 pillars provides a more granular picture of competitiveness. As an example, [Figure 5](#) compares the top three and bottom three regions for each stage of development group. At both ends of the spectrum (the bottom three less developed regions and the top three more developed regions), a more irregular pattern emerges, in contrast to the more regular and spherical one of the remaining regions. Among these remaining regions, the pattern becomes rounder and more regular when moving from less to more developed regions.

Being an aggregate measure of different factors of competitiveness, higher RCI levels can only be obtained if higher scores are reached across all 11 pillars. In other words, as already highlighted in Annoni and Dijkstra (2019), '[...] good performances correspond to an ensemble of factors acting in unison. Recent analyses on key factors of regional economic growth (Annoni et al., 2019) highlighted that simultaneous gains in several areas, rather than being excellent in just one or a few of them, is a good recipe for economic success'.

Figure 5: RCI 2.0 and its components by stage of development (top three and bottom three regions for each group), 2022 edition.



Source: DG Regional and Urban Policy and Joint Research Centre.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

3.2. Less developed regions are catching up

Comparing the RCI over time has always been complicated because each edition of the index incorporates slight modifications. There are many reasons for this: new indicators may become available at the regional level while others are no longer available, and revisions of NUTS 2 boundaries cause breaks in series. For the current edition, for the first time, we are able to present a reinforced time comparison between 2016, 2019 and 2022. Starting from the original data, the scores were re-calculated using the new methodology, and labelled as 'RCI 2.0, 2016', and 'RCI 2.0, 2019'.

Over the full period, thus between the 2016 and 2019 editions, we mainly observe a process of catching up in regions of eastern EU Member States combined with improvement in the regions of southern EU Member States – Spain, Greece, Italy and Portugal – as they recovered from the economic and financial crisis. A catching-up process that has occurred in the context of an RCI that at the EU level has steadily improved during the same period ⁽¹⁰⁾.

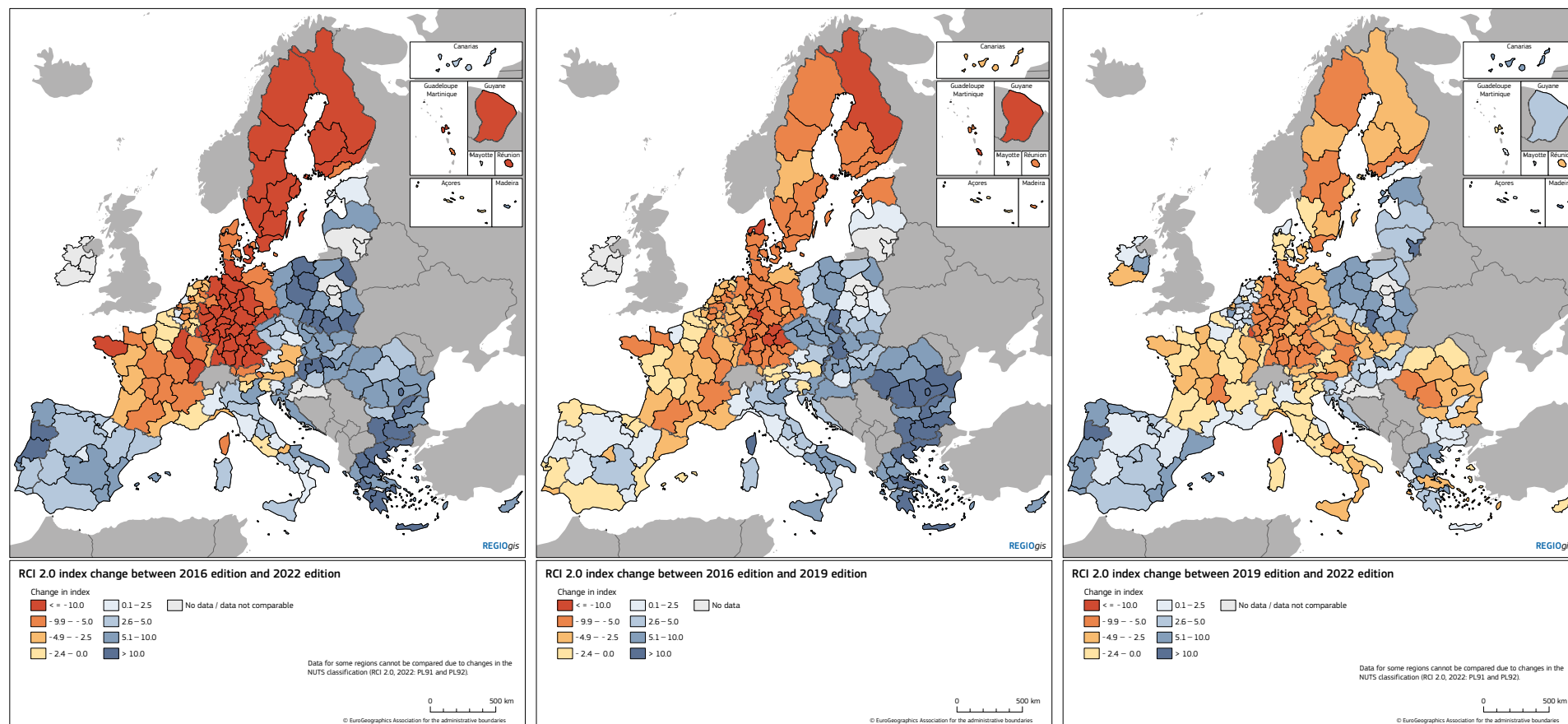
Between the 2019 edition and the 2022 edition of the RCI, regional competitiveness improved by 10 index points or more

in the capital region of Lithuania (+ 18 index points), followed by the region of Norte in Portugal (+ 14), the capital region of Poland (+ 12), the Portuguese outermost region of Madeira (+ 12), and the region of Śląskie in Poland (both +10). [Map 4 to Map 6](#) show the RCI index change between the 2016 and 2019 editions (in the centre) and between the 2019 and 2022 editions (on the right). While, in the 2022 edition, we clearly still observe a marked spatial pattern in the EU, with the most competitive regions mainly concentrated in regions in Austria, Benelux, Germany and the Nordic MS, over the full period, we observe a clear process of catching-up of regions located in regions in the eastern/southern EU Member States (Map 4).

A more variegated spatial pattern emerges between 2019 and 2022. The catching-up of regions in eastern EU Member States continues in the Baltics, Croatia, Hungary, Poland and Slovenia. The regions in Czechia, Romania, Slovakia and part of Bulgaria, however, are moving away from the EU average. In southern EU Member States, regions in Greece, Portugal and Spain continue to improve their performance vis-à-vis the EU average, but not in Italy (with the exception of the regions of Lombardia, Marche and the autonomous region of Valle D'Aosta / Vallée d'Aoste).

¹⁰ The EU-27 value of the RCI, prior to the conversion to an index equal to 100, increased from 48 in the 2016 edition, to 51 in the 2019 edition, to reach 52 in the 2022 edition.

Map 4, Map 5 and Map 6: RCI 2.0 index changes between 2016 and 2022 editions (on the left), between 2016 and 2019 editions (in the centre) and between 2019 and 2022 editions (on the right).



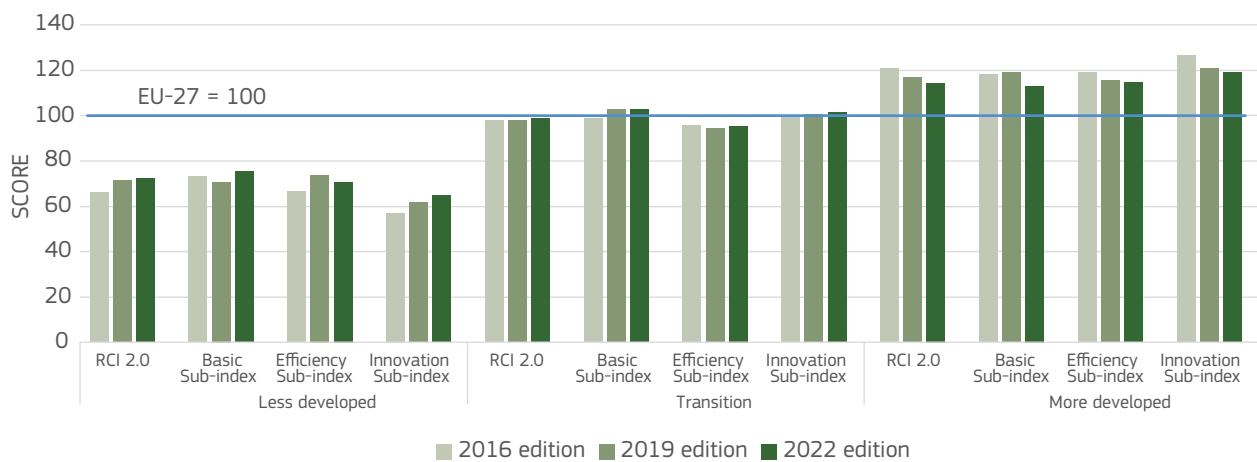
Source: DG Regional and Urban Policy and Joint Research Centre.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

Overall, regional competitiveness in less developed regions is improving over time (Figure 6), and it is doing so not only in the least-advanced components of regional competitiveness (i.e. the 'Basic' sub-index), but also in the most advanced ones ('Innovation' sub-index). Improvements in transition regions have been more mixed. There was a slight overall improvement thanks to improvements in the 'Basic' and 'Innovation'

sub-indices, but the 'Efficiency' sub-index – which looks at issues such as advanced education and the labour market – has deteriorated a bit and remains below the EU average. Regional competitiveness has dropped slightly in more developed regions, but this does not mean that their performance has declined. This reduction is a result of the better performance / catching-up of other regions.

Figure 6: Time evolution of RCI 2.0 and its sub-indices, by stage of development.



Source: DG Regional and Urban Policy and Joint Research Centre.

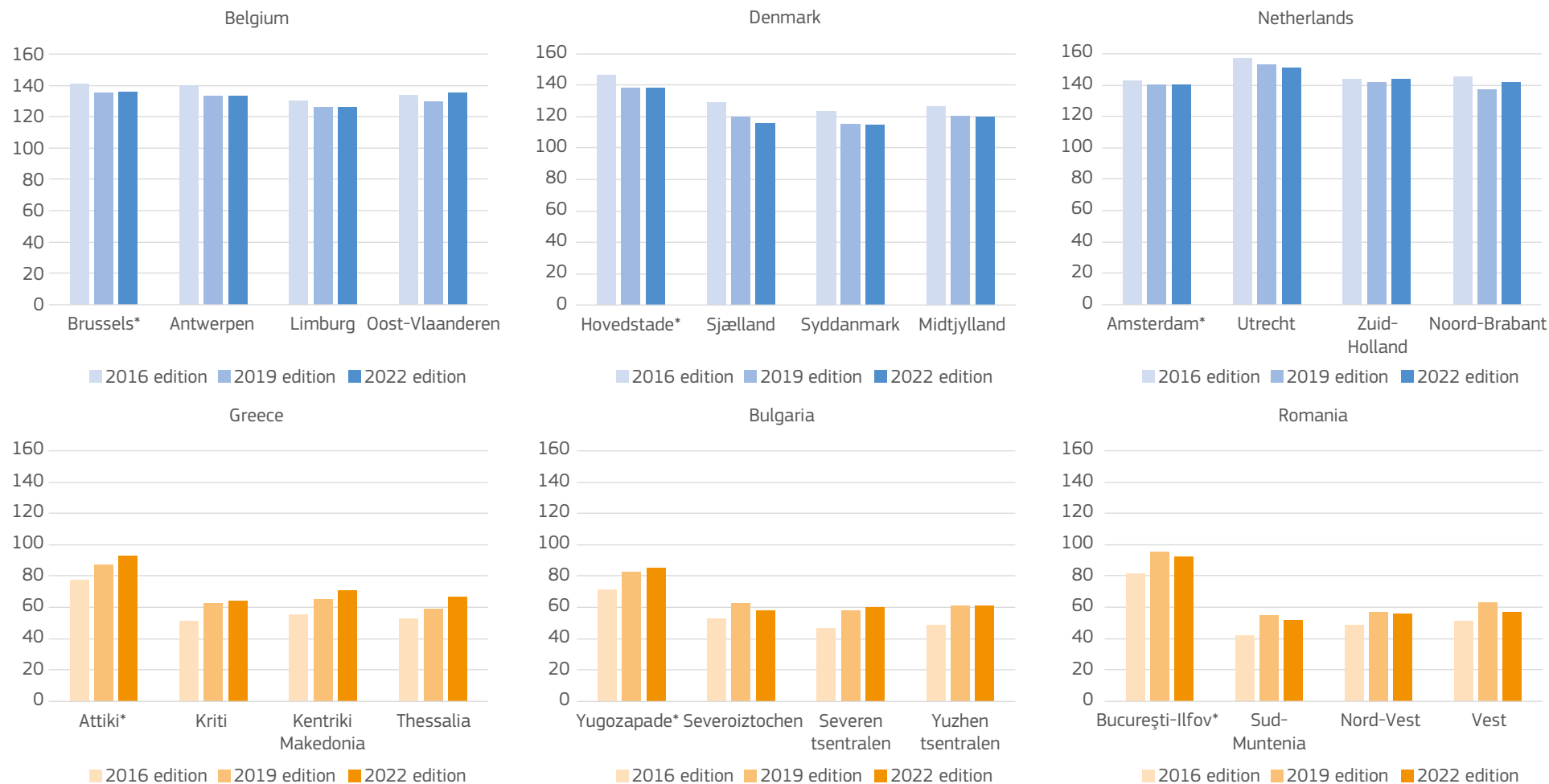
NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine)

In Figure 7, we look at the performance of the capital region and the three best performing regions in six EU Member States: the Netherlands (at 137 of the EU average), Belgium (at 125), and Denmark (at 123), with the highest national RCI score in 2022¹¹, and Greece (at 73 of the EU average), Bulgaria (at 65) and Romania (at 55) with the lowest ones. In the three most competitive Member States, the capital region is not

consistently far more competitive, while in the three least competitive EU Member States, the capital region is significantly more competitive than the other regions in the country. Regional competitiveness, however, has been growing in most of the non-capital regions in Greece, Bulgaria and Romania.

¹¹ Luxembourg, at 125 of the EU average, was not included in this analysis as it has only one region at the NUTS 2 level.

Figure 7: RCI scores in selected regions in six Member States.



Source: DG Regional and Urban Policy and Joint Research Centre.

NB: In each country, the capital region (indicated with an '*') and the three best performing regions are selected.

NB: There is a gap between the year mentioned in the title of the RCI and the actual data used for the calculations (i.e. RCI 2.0-2022 uses mainly data until 2019, prior to COVID-19 and the war in Ukraine).

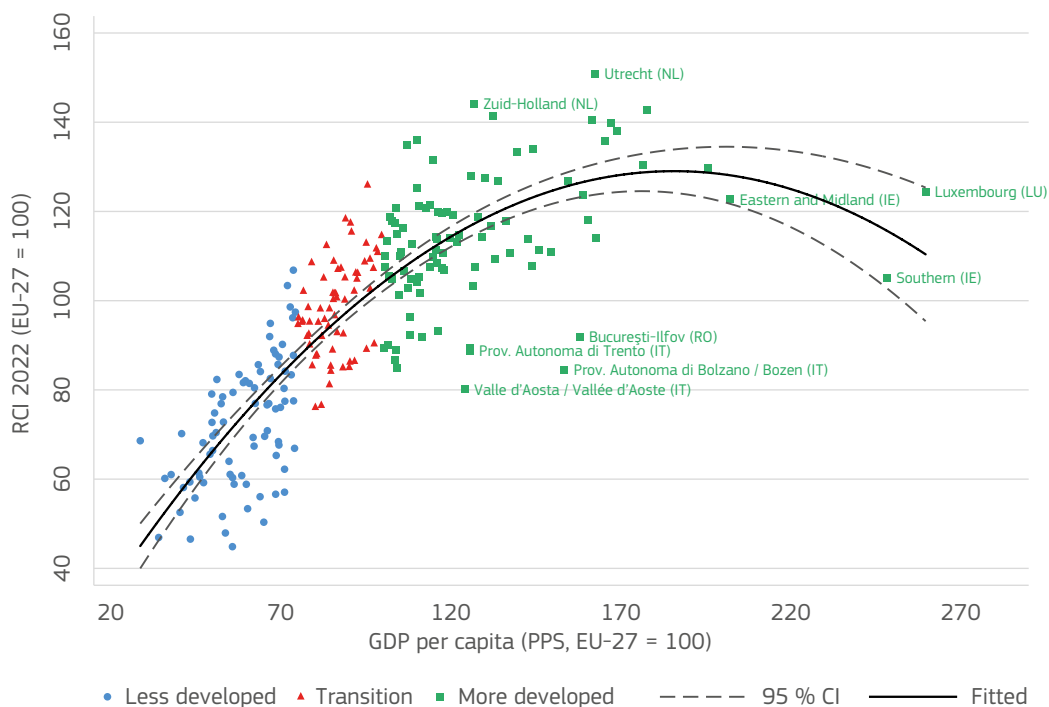
4. Prominent relationships

4.1. More competitive regions have a higher GDP per head

GDP per capita is arguably one of the economic indicators most widely employed to assess competitiveness in a country or region, both in the academic literature and in policymaking (Aiginger, 2006). While this correlational analysis does not allow causal conclusions to be drawn, [Figure 8](#) shows a clear and positive – albeit non-linear – relationship between GDP per capita and the RCI ⁽¹²⁾. A similar relationship ⁽¹³⁾ is found

consistently across all RCI editions. Higher GDP levels correspond to higher levels of competitiveness, but this relationship gets looser as the GDP increases, with richer regions broadly scattered around their expected competitiveness. For less developed regions, the relationship is stronger: a slight increase in competitiveness (driven by improvements in its fundamentals, i.e. ‘Institutions’, ‘Business sophistication’, ‘Basic education’ and ‘Innovation’) is linked to a clear increase in GDP per head (Podobnik et al., 2012). In more developed regions, competitiveness and its components are already high, and each extra euro of GDP per capita buys less and less competitiveness. We also observe that the range of variation in competitiveness for a fixed GDP value is wider for more developed regions than for less developed ones (Annoni and Dijkstra, 2019).

Figure 8: Relationship between RCI 2.0 - 2022 edition and GDP per capita index (PPS, EU-27 = 100; average 2018–2020).



NB: The different colours correspond to the region's development stage: less developed, transition and more developed regions are those with a GDP below 75 %, between 75 % and 100 %, and above 100 % of the EU average, respectively. The estimated quadratic curve is shown together with its statistical confidence bands.

4.2. Women achieve more in more competitive regions

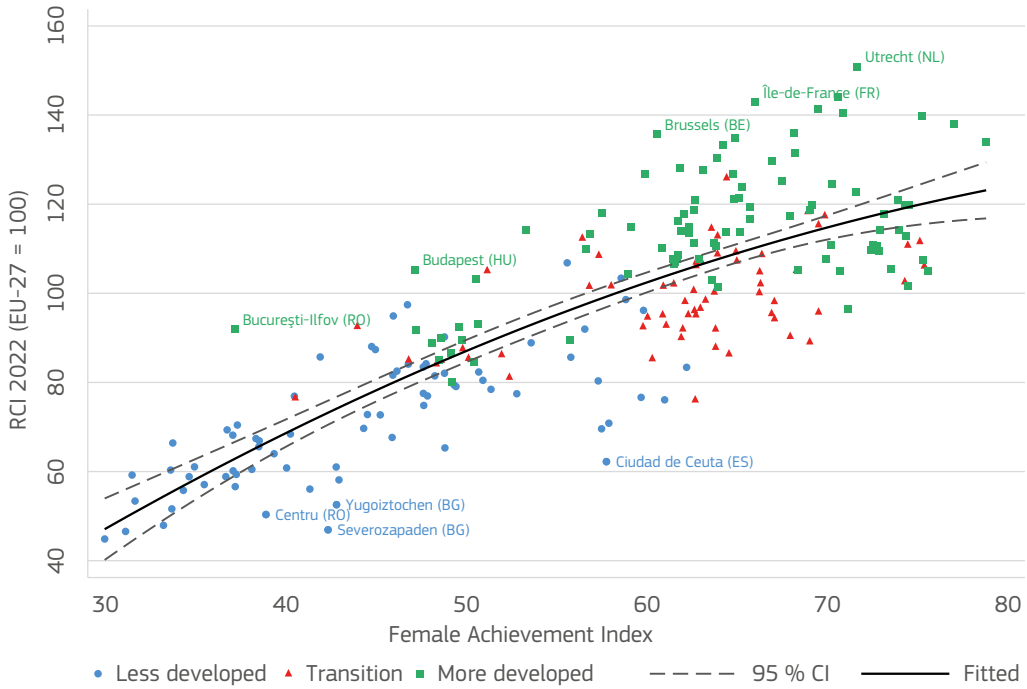
Achieving gender equality is an important objective in its own right, but it could also have a positive impact on economic growth, although the specific mechanisms are yet to be disentangled (Kabeer and Natali, 2013; Cuberes and Teignier, 2014). To shed some light on this issue, we look at the relationship between RCI and, respectively, female achievement and the percentage of young women who are neither working nor studying.

Female achievement is proxied by the Female Achievement Index, a composite index encompassing several indicators of women empowerment and achievement, in dimensions such as working conditions, knowledge, work-time balance, political representativeness, health, safety, security and trust, and life satisfaction (Norlén et al., 2019). [Figure 9](#) shows positive association between higher RCI and female achievement scores. Most regions with a below-average RCI have a low level of female achievement, especially the less developed regions. The transition and more developed regions cluster at the top right area of the graph, reflecting high levels of both RCI and female achievement.

¹² Given that disposable income per capita is already included in the ‘Market size’ pillar of the index, the robustness of the correlation between the RCI and GDP per capita could be put into question. However, after running the analysis excluding this indicator, comparable results in terms of size, direction and significance are obtained.

¹³ The line on the graph indicates that competitiveness drops at very high levels of GDP per head. This is mainly driven by two outliers. Removing these observations shows a curve that does not drop, but still flattens.

Figure 9: Relationship between RCI 2.0 - 2022 edition and the Female Achievement Index 2021.

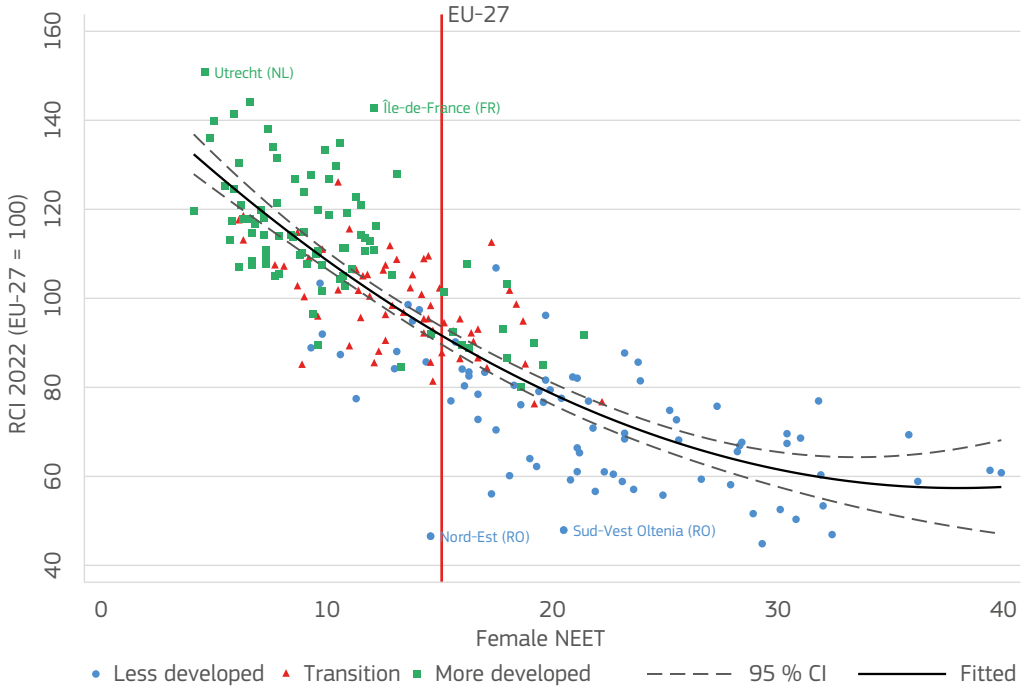


NB: The different colours correspond to the region's development stage: less developed, transition, and more developed regions are those with GDP below 75 %, between 75 % and 100 %, and above 100 % of the EU average, respectively.

The share of women aged 15–29 who are neither in employment nor in education and training (NEET) is negatively correlated with the RCI (Figure 10). Most regions with a

below-average RCI have a female NEET rate that is above the EU average. This is especially the case for the less developed regions.

Figure 10: Relationship between RCI 2.0 - 2022 edition and female NEET rate (2020).



NB: The different colours correspond to the region's development stage: less developed, transition and more developed regions are those with a GDP below 75 %, between 75 % and 100 %, and above 100 % of the EU average, respectively. The vertical line represents the EU-27 female NEET average (15.1).

4.3. Recent graduates find jobs faster in more competitive regions

Given their vulnerable situation in the labour market, young people (15–29 years old) have been heavily hit by the recent crisis that followed the COVID-19 pandemic. For the period 2021–2027, all Member States will have to invest an appropriate amount of their European Social Funds (ESF+) resources to targeted actions and structural reforms to support youth employment, education and training¹⁴. In addition, almost 10 % of the recovery and resilience plans launched by the Member States (in the framework of the European Commission’s Recovery and Resilience Facility) are measures oriented at improving youth employment (Lazarou et al., 2022).

Along with GDP per capita, employment has traditionally been regarded as the main economic outcome to assess the degree of competitiveness of a country or region. Given that the RCI already incorporates different population-wide employment

and unemployment rates in the ‘Labour market’ pillar, the attention is now shifted towards a specific group: that of recent graduates¹⁵. To show whether regions with a stronger competitiveness performance also provide young citizens with a smoother transition from education to work, RCI scores are plotted against employment rates of recent graduates in Figure 11.

A positive relationship is indeed observed, with the best RCI-scoring regions having as much as 90 % of their recent graduates already employed. When looking at the stage of development of the different regions included in the analysis, less developed regions spread from the bottom-left area of the figure towards its centre. In other words, regions that perform below the EU average in the RCI have much lower shares of young graduates employed. Similarly, the majority of the most-developed regions have both higher RCI scores and employment rates.

Figure 11: Relationship between RCI 2.0 – 2022 edition and employment rates of recent graduates (average 2019–2021).



NB: The different colours correspond to the region’s development stage: less developed, transition and more developed regions are those with a GDP below 75 %, between 75 % and 100 %, and above 100 % of the EU average, respectively.

¹⁴ Moreover, Member States with a rate of young people aged 15–29 not in employment, education or training (NEET) above the EU average for the years 2017–2019 should devote at least 12.5 % of their ESF+ resources to youth. See: <https://ec.europa.eu/social/main.jsp?catId=1176>.

¹⁵ Recent graduates are those aged 20–34 with at least upper secondary education, having left education or training 1–3 years earlier. See: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Employment_rate_of_recent_graduates.

5. Conclusions

The 2022 edition of RCI 2.0 shows large differences in regional competitiveness in the EU. The lowest values are concentrated in regions of the eastern EU Member States, followed by those of southern EU Member States. In the eastern and southern EU Member States, only some of the regions that host the capital city or a large city score above the EU average. All the regions in Austria, the Benelux, Germany and the three Nordic Member States score above the average, while in France and Ireland the performance is more mixed, with regions below and above the EU average.

The capital city region tends to be the most competitive in the country, with only a few exceptions (Germany, Italy and the Netherlands). The gap between the capital city region and the rest, however, varies, with particularly large gaps observed in France, Romania and Slovakia. More competitive countries tend to have a smaller gap between their capital city region and its other regions. They also have smaller differences between all

their regions. This shows that the performance of all regions matters for a country's competitiveness. Public policies and investments should promote upward convergence, which helps less competitive regions to improve their performance and catch up, while ensuring that the most competitive region continues to thrive.

Between 2016 and 2022, regional competitiveness has improved in the less developed regions, while the performance of transition regions has been more mixed. More developed regions continued to have the highest scores, but they have converged on the EU average.

More competitive regions have significant advantages in economic development and beyond. For example, in more competitive regions, the GDP per capita is higher. Women also perform better in more competitive regions, with higher achievements and lower NEET rates. Finally, more competitive regions are particularly attractive for recent graduates, as it is easier to find a job there.

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8. Annex

Table A1: Indicator framework for RCI 2.0, 2022 edition.

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Institutions – regional	Corruption	Pillar of the European Quality of Government Index: aggregate of survey questions assessing corruption in the provision of public services.	z-scores (the higher the better)	Quality of Government Index by the Quality of Government Institute (University of Gothenburg)	2021	NUTS 2 HRO2, HR_C: value of the former HRO4 region	Yes
Institutions – regional	Quality and accountability	Pillar of the European Quality of Government Index: aggregate of survey questions assessing the quality of public services.	z-scores (the higher the better)	Quality of Government Index by the Quality of Government Institute (University of Gothenburg)	2021	NUTS 2 HRO2, HR_C: value of the former HRO4 region	Yes
Institutions – regional	Impartiality	Pillar of the European Quality of Government Index: aggregate of survey questions assessing impartiality in the provision of public services.	z-scores (the higher the better)	Quality of Government Index by the Quality of Government Institute (University of Gothenburg)	2021	NUTS 2 HRO2, HR_C: value of the former HRO4 region	Yes
Institutions – regional	Individuals who used the internet for interaction with public authorities	Percentage of individuals who say they used the internet to interact with public authorities in the last 12 months.	% of respondents who agree	Eurostat (code: ISOC_R_GOV_I)	2021	NUTS 2	No
Institutions – national	Presence of corruption in the national public institutions in the country	Percentage of individuals who agree there is corruption in the national public institutions.	% of respondents who agree	Special Eurobarometer 470	2020	Country	Yes
Institutions – national	Presence of corruption in the local or regional public institutions in the country	Percentage of individuals who agree there is corruption in the local or regional public institutions.	% of respondents who agree	Special Eurobarometer 470	2020	Country	Yes
Institutions – national	Ease of doing business	This indicator benchmarks economies with respect to their proximity to the best performance on each area measured by doing business. For instance, a score of 75 means an economy was 25 percentage points away from the best regulatory performance constructed across all economies.	Score ranging from 0 (worst) to 100 (best)	Worldbank – Doing Business	2020	Country	Yes
Institutions – national	Property rights	The extent to which property rights, including financial assets are protected.	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Institutions – national	Intellectual property protection	The extent to which intellectual property is protected.	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes
Institutions – national	Efficiency of legal framework in settling disputes	The efficiency of the legal and judicial systems for companies in settling disputes.	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes
Institutions – national	Efficiency of legal framework in challenging regulations	How easy is it for private businesses to challenge government actions and/or regulations through the legal system.	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes
Institutions – national	Organised crime	To what extent does organised crime (mafia-oriented racketeering, extortion) impose costs on businesses?	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes
Institutions – national	Reliability of police services	Reliability of police services to enforce law and order (survey question).	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	Yes
Institutions – national	Judicial independence	How independent is the judicial system from influences of the government, individuals or companies?	1–7 (best)	World Economic Forum – Global Competitiveness Index 4.0	2019	Country	No
Macroeconomic stability	General government deficit/surplus	General government (central government, state government, local government and social security funds) net lending (+) / net borrowing (-). Average 2019–2021.	% of GDP	Eurostat (code: gov_10dd_edpt1)	Average 2019–2021	Country	Yes
Macroeconomic stability	National savings	Aggregate savings as share of GDP.	% of GDP	Eurostat (codes: nasa_10_nf_tr, nama_10_gdp)	Average 2018–2020	Country	Yes
Macroeconomic stability	Government bond yields	Central government bond yields on the secondary market, gross of tax, with around 10 years' residual maturity.	economic and monetary union convergence criterion bond yields	Eurostat (code: irt_lt_mcby_a)	Average 2019 – 2021	Country	Yes
Macroeconomic stability	Government debt	Ratio of government debt outstanding at the end of the year to GDP at current market prices.	% of GDP	Eurostat (code: gov_10dd_edpt1)	Average 2019 – 2021	Country	Yes
Macroeconomic stability	Net international investment position	The net international investment position provides an aggregate view of the net financial position (assets minus liabilities) of a country vis-à-vis the rest of the world.	% of GDP	Eurostat (code: tipsii10)	Average 2019 – 2021	Country	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Infrastructure	Road transport performance	Population accessible within 1h30 by road in a neighbourhood within a 120 km radius.	% of population	DG Regional and Urban Policy	2018	NUTS 2	Yes
Infrastructure	Rail transport performance	Population accessible within 1h30 by rail (using optimal connections) in a neighbourhood within a 120 km radius.	% of population	DG Regional and Urban Policy	2019	NUTS 2	Yes
Infrastructure	Accessibility to passenger flights	Daily number of passenger flights.	Number	Eurostat / EuroGeographics / national statistical institutes	2019	NUTS 2	Yes
Health	Road fatalities	Number of deaths in road accidents per million inhabitants.	Number	Eurostat (code: tran_r_acci)	3-year average 2018-2020	NUTS 2	Yes
Health	Healthy life expectancy	Number of years of healthy life expected.	Number	Eurostat (codes: demo_r_mlifexp & hlth_silc_17), DG Regional and Urban Policy elaboration	3-year average 2017-2019	NUTS 2	Yes
Health	Infant mortality	Number of deaths of children under 1 year of age during the year to the number of live births in that year (per 1 000 live births).	Rate	Eurostat Regional Statistics (code: demo_r_minfind)	3-year average 2017-2019	NUTS 2	Yes
Health	Cancer disease death rate	Standardised cancer death rate for population under 65 (neoplasm C00-D48).	Rate	Eurostat (code: hlth_cd_ysdr2)	3-year average 2015-2017	NUTS 2	Yes
Health	Heart disease death rate	Standardised heart diseases death rate for population under 65 (diseases of the circulatory system I00-I99).	Rate	Eurostat (code: hlth_cd_ysdr2)	3-year average 2015-2017	NUTS 2	Yes
Health	Suicide death rate	Standardised death rate for suicide for population under 65 (intentional self-harm X60-X84).	Rate	Eurostat (code: hlth_cd_ysdr2)	3-year average 2015-2017	NUTS 2	Yes
Basic education	Low achievement in reading (15-year-olds)	% of 15-year-old students with reading proficiency level 1a or lower.	Percentage % of 15-year-old students	PISA 2018 / OECD	2018	Country	No
Basic education	Low achievement in maths (15-year-olds)	% of 15-year-old students with math proficiency level 2 or lower.	Percentage % of 15-year-old students	PISA 2018 / OECD	2018	Country	No
Basic education	Low achievement in science (15-year-olds)	% of 15-year-old students with science proficiency level 1a or lower.	Percentage % of 15-year-old students	PISA 2018 / OECD	2018	Country	No

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Higher education and lifelong learning	Higher educational attainment	Population aged 25–34 with tertiary educational attainment.	% of population aged 25–34	Eurostat (codes: EDAT_LFSE_04 & LFST_R_LFSD2POP)	2021	NUTS 2	Yes
Higher education and lifelong learning	Lifelong learning	Adult population participation in lifelong learning (i.e. received education or training in the 4 weeks preceding the survey).	% of population aged 25–64	Eurostat (code: TRNG_LFSE_04 & LFST_R_LFSD2POP)	Average 2019–2021	NUTS 2	Yes
Higher education and lifelong learning	Early school leavers	Early leavers from education and training, i.e. those having attained at most lower secondary school and not going further.	% of the population aged 18–24 with at most lower secondary school	Eurostat (code: EDAT_LFSE_16 & DEMO_R_D2JAN)	Average 2019–2021	NUTS 2	Yes
Higher education and lifelong learning	University accessibility	Arithmetic average of the share of population within 45 minutes by car from nearest university main site and/ or campus.	Share of population	DG Regional and Urban Policy (Poelman and Dijkstra, 2018)	2016 (2018 for population grid data)	NUTS 2	Yes
Higher education and lifelong learning	Lower-secondary completion only	Percentage of people aged 25–64 who have successfully completed at most lower secondary education (ISCED 0–2).	% of population aged 25–64	Eurostat: edat_lfse_04	Average 2019–2021	NUTS 2	Yes
Labour market efficiency	Employment rate (excluding agriculture)	Percentage of people aged 15–64 that are currently employed in all economic sectors excluding agriculture	% of population 15–64 years	Eurostat Regional Labour Force Statistics (LFS) (codes: LFST_R_LFE2EN2 & LFST_R_LFSD2POP)	2021	NUTS 2	Yes
Labour market efficiency	Long-term unemployment	Percentage of unemployed people actively looking for a job (in the last 12 months or more)	% of labour force	Eurostat Regional Labour Force Statistics (LFS) (codes: LFST_R_LFU2LTU & LFST_R_LFP2ACT)	2021 and last available year	NUTS 2	Yes
Labour market efficiency	Unemployment rate	Share of unemployed persons aged 15–74 as a percentage of the labour force (given by the total number of people employed and unemployed).	% of active population	Eurostat Regional Labour Force Statistics (LFS) (codes: LFST_R_LFU3PERS & LFST_R_LFP2ACT)	2021 and last available year	NUTS 2	Yes
Labour market efficiency	Labour productivity	GDP (in terms of PPS) relative to the number of hours worked.	Index (PPS) EU-27=100	Eurostat and DG Regional and Urban Policy: (codes: nama_10r_2emhrw & NAMA_10R_2GDP)	2019	NUTS 2	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Labour market efficiency	Gender balance unemployment	Difference between female and male unemployment rates (in absolute value) as an indicator of the distance from gender parity.	Rate difference	Eurostat and DG Regional and Urban Policy (codes: LFST_R_LFU3PERS & LFST_R_LFP2ACT)	2021 and last available year	NUTS 2	Yes
Labour market efficiency	Gender balance employment	Difference between female and male employment rates (in absolute value) as an indicator of the distance from gender parity.	Rate difference	Eurostat and DG Regional and Urban Policy (codes: LFST_R_LFE2EMP & LFST_R_LFSD2POP)	2021	NUTS 2	Yes
Labour market efficiency	NEET	NEET rate of young people (aged 15–29).	% of population aged 15–24	Eurostat and DG Regional and Urban Policy (codes: EDAT_LFSE_22 & LFST_R_LFSD2POP)	3-year average 2019–2021 and last available year	NUTS 2	Yes
Labour market efficiency	Labour market slack	The unmet demand for employment as a percentage of the extended labour force (persons aged 15–74).	% of extended labour force	Eurostat and DG Regional and Urban Policy (codes: LFST_R_SLA_GA)	2021 and last available year	NUTS 2	No
Labour market efficiency	Temporary employment	Temporary employees as a percentage of the total number of employees aged 20–64.	Share of employed people aged 20–64	Eurostat (code: LFST_R_LFE2EFTPT)	Average 2018–2020	NUTS 2	Yes
Market size	Disposable income per capita	Net adjusted disposable household income in purchasing power consumption standards (PPCS) per capita (index EU-27 = 100).	Index (PPCS) EU-27=100	Eurostat (code: nama_10r_2hhinc & nama_10r_3popgdp)	2020 and last available year	NUTS 2	Yes
Market size	Potential market size expressed in GDP	Index GDP (PPS) EU-27 = 100 – EU-27 average computed as population weighted average of the NUTS 2 values.	Index GDP (PPS) EU-27=100	Eurostat, DG Regional and Urban Policy elaboration	2020	NUTS 2	Yes
Market size	Potential market size expressed in population	Potential market size expressed as index population EU-27 = 100.	Index GDP (PPS) EU-27=100	DG Regional and Urban Policy elaboration	2020	NUTS 2	Yes
Technological readiness – regional	Households with broadband access	Share of households with broadband access (%).	% of total households	Eurostat regional information statistics (code: isoc_r_broad_h)	2021	NUTS 2	Yes
Technological readiness regional	Individuals buying over internet the last year	Percentage of individuals who ordered goods or services over the internet for private use in the last 12 months.	% of individuals	Eurostat Regional Information Statistics (code: isoc_r_blt12_i)	2021 or last available year	NUTS 2	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Technological readiness – regional	Access to high-speed broadband	Percentage of population that lives in a local administrative unit (LAU), where a (fixed or mobile) broadband speed of at least 100 Mbps has been observed.	% of population	DG Regional and Urban Policy elaboration	2018	NUTS 2	No
Technological readiness – regional	Individuals with above-basic overall digital skills	Individuals with above-basic overall digital skills converted to an index of the EU average of 2021 (EU average = 100).	Index of EU-27 2021 (EU-27 average = 100)	Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs and DG Regional and Urban Policy elaboration	RIS 2021	NUTS 2	No
Technological readiness – national	Enterprises having received orders online (at least 1 %)	% of enterprises with at least 10 persons employed in the given NACE sectors, by size class (NACE Rev 2 since 2009) having received orders online (at least 1 %).	% of enterprises	Eurostat Community Survey on ICT usage and e-commerce (code: tin00111)	Average 2019–2021	Country	Yes
Technological readiness – national	Enterprises with fixed broadband access.	Enterprises that are connectable to an exchange which has been converted to support xDSL-technology, to a cable network upgraded for internet traffic, or to other broadband technologies. It includes fixed and mobile connections.	% of enterprises	Eurostat Community Survey on ICT usage and e-commerce (code: tin00090)	Average 2016–2017	Country	Yes
Business sophistication	Employment (K-N sectors)	Employment in the 'Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities' sectors (K-N) as % of total employment.	% of total employment	Eurostat Regional Statistics (code: ESTAT_NAMA_1OR_3GVA)	Average 2017–2019	NUTS 2	Yes
Business sophistication	Gross value added (GVA) (K-N sectors)	GVA in the 'Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities' sectors (K-N) as % of total GVA.	% of total GVA	Eurostat Regional Statistics: ESTAT_NAMA_1OR_3GVA	Average 2017–2019	NUTS 2	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Business sophistication	Innovative SMEs collaborating with others	Small and medium-sized enterprises (SMEs) with innovation cooperation activities as % of total number of SMEs. Joint European Innovation Scoreboard (EIS) and Regional Innovation Scoreboard (RIS) data are presented as performance scores compared to the EU performance (EU-27 = 100).	% of total SME	Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs – based on the Community Innovation Survey	RIS 2021	NUTS 2 NUTS 1 level: AT, BE, FR NUTS 0 level: NL	Yes
Business sophistication	Marketing or organisational innovators	SMEs introducing marketing or organisational innovation (i.e. SMEs introducing business process innovations in the RIS database) as a share of total number of SMEs (indicator 3.1.2). Joint EIS + RIS data are presented as performance scores compared to the EU performance (EU-27 = 100).	% of total SME	Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs – based on the Community Innovation Survey	RIS 2021	NUTS 2 NUTS 1 level: AT, BE, FR NUTS 0 level: NL	Yes
Innovation	Total patent applications	Number of total patent applications per million inhabitants.	Average number 2017–2018	DG Regional and Urban Policy, based on OECD REGPAT database August 2022; population data: JRC – Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy, based on Eurostat data (nama_10r_3popgdp)	Average 2017–2018	NUTS 2	No
Innovation	Core creative class employment	Population aged 15–64 classified as being a part of the core creative class according to the international standard classification of occupations, as % of population aged 15–64	% of population aged 15–64	Eurostat (LFS): ad hoc extraction	Average 2019–2021	NUTS 2	Yes
Innovation	Knowledge workers	Population aged 15–64 with an ISCO code classified as knowledge workers, as % of population aged 15–64 excluding non-stated ISCO code.	% of total employment	Eurostat (LFS): ad hoc extraction	Average 2019–2021	NUTS 2	Yes

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Innovation	Scientific publications	Total publications per capita (fractional count).	Number of publications per capita	DG Regional and Urban Policy elaboration, based on Science-Matrix (Elsevier Scopus Database). Main bibliometric indicators in all fields of science by NUTS region, 2000–2020	2000–2020	NUTS 2	Yes
Innovation	Total intramural research and development expenditure	Total intramural expenditure in research and development by NUTS 2 regions as a percentage of GDP.	% of GDP	Eurostat regional science and technology statistics	2019 and last available year	NUTS 2	Yes
Innovation	Human resources in science and technology	Share of persons with successfully completed tertiary education and/ or those without tertiary education but employed in a science and technology occupation where tertiary education normally required.	% of active population	Eurostat regional science and technology statistics	2021 and last available year	NUTS 2	Yes
Innovation	Employment in technology and knowledge-intensive sectors	Employment in technology and knowledge-intensive sectors by NUTS 2 regions.	% of total employment	Eurostat regional science and technology statistics	2021 and last available year - we need to calculate the 3-year average	NUTS 2	Yes
Innovation	Trademark applications	Number of trademark applications applied for at European Union Intellectual Property Office per billion regional GDP (in PPS).	Index of EU-27 2021 (EU-27 average = 100)	Joint European Innovation Scoreboard and Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs	Joint RIS 2021 and EIS 2021	NUTS 2	No
Innovation	Design applications	Number of individual design applications applied for at the European Union Intellectual Property Office per billion regional GDP (in PPS).	Index of EU-27 2021 (EU-27 average = 100)	Joint European Innovation Scoreboard and Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs	Joint RIS 2021 and EIS 2021	NUTS 2	No

Pillar name	Indicator name	Description	Unit of measurement	Source	Reference year	Geographical level	Present in RCI 2019
Innovation	Sales of new-to-market and new-to-firms innovation	Sales of new-to-market and new-to-firm innovations as % of turnover: it captures both the creation of state-of-the-art technologies (new-to-market products) and the diffusion of these technologies (new-to-firm products).	% of turnover	Regional Innovation Scoreboard, DG Internal Market, Industry, Entrepreneurship and SMEs – Based on the Community Innovation Survey	RIS 2021	NUTS 2 NUTS 1 level: AT, BE, FR NUTS 0 level: NL	Yes

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Any questions, comments or contributions should be sent to the following address: **REGIO-B1-PAPERS@ec.europa.eu**

Editor: Lewis Dijkstra, European Commission, Directorate-General for Regional and Urban Policy