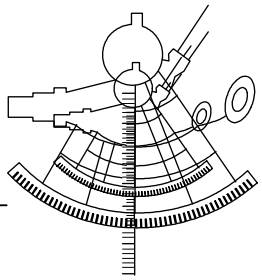
European Trend Chart on Innovation



2002 European Innovation Scoreboard: Technical Paper No 3 EU Regions

November 28, 2002

European Commission
Enterprise Directorate-General

A publication from the Innovation/SMEs Programme

The European Trend Chart on Innovation

Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aimed at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States. The 'First Action Plan for Innovation in Europe', launched by the European Commission in 1996, provided for the first time a common analytical and political framework for innovation policy in Europe.

Building upon the Action Plan, the *Trend Chart on Innovation in Europe* is a practical tool for innovation policy makers and scheme managers in Europe. Run by the European Commission (Innovation Directorate of DG Enterprise), it pursues the collection, regular updating and analysis of information on innovation policies at national and Community level, with a focus on innovation finance; setting up and developing innovative businesses; the protection of intellectual property rights; and the transfer of technology between research and industry.

The Trend Chart serves the "open policy co-ordination approach" laid down by the Lisbon Council in March 2000. It delivers summarised and concise information and statistics on innovation policies, performances and trends in the European Union. It is also a European forum for benchmarking and the exchange of good practices in the area of innovation policy.

The Trend Chart products

The Trend Chart on Innovation has been running since January 2000. It tracks innovation policy developments in all EU Member States, plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovak Republic and Slovenia. The Trend Chart website (www.cordis.lu/trendchart) provides access to the following services and publications:

- the European Innovation Scoreboard and other statistical reports;
- regular country reports for all countries covered;
- a database of policy measures across Europe;
- a "who is who?" of agencies and government departments involved in innovation;
- regular trend reports covering each of the four main themes;
- benchmarking reports from the Trend Chart workshops;
- a news service and thematic papers;
- the annual reports of the Trend Chart.

The present report was prepared by Hugo Hollanders of MERIT (www.merit.unimaas.nl). The information contained in this report has not been validated in detail by either the Member States or the European Commission.

Contact: Peter Löwe: peter.loewe@cec.eu.int

This document originates from the European Commission's "European Trend Chart on Innovation" (Enterprise Directorate-General). Copyright of the document belongs to the European Commission. Neither the European Commission, nor any person acting on its behalf, may be held responsible for the use to which information contained in this document may be put, or for any errors which, despite careful preparation and checking, may appear.

European Innovation Scoreboard

The European Innovation Scoreboard (EIS) was developed at the request of the Lisbon European Council in 2000[1]. It focuses on high-tech innovation and provides indicators for tracking the EU's progress towards the Lisbon goal of becoming the most competitive and dynamic knowledge-based economy in the world within the next decade.

The EIS contains 17 main indicators, selected to summarize the main drivers and outputs of innovations. These indicators are divided into four groups: Human resources for innovation (5 indicators); the creation of new knowledge (3 indicators of which one is divided into EPO and USPTO patents); the transmission and application of knowledge (3 indicators); and Innovation finance, outputs and markets (6 indicators).

The EIS complements the *Enterprise Policy Scoreboard*[2] and other benchmarking exercises of the European Commission. It mainly uses Eurostat data, or private data of sufficient reliability if official data is not available. Six indicators are drawn from the European Commission's Structural indicators.

All indicators have been updated based on data availability as of September 15, 2002. Four indicators could not be updated due to delays in the execution of the third Community Innovation Survey[3]. As a result, the 2002 EIS does not provide trend results for these indicators and it does not contain a summary innovation index similar to the one offered in 2001. Subject to the availability of new CIS data, the 2003 EIS is expected to offer again an updated composite innovation index and a comparison between the index and average trends for each country, which was one of the most interesting features of the 2001 EIS.

The EIS is complemented by six technical papers:

(1) Technical Paper No 1: Member States and Associate Countries
Detailed results for current and trend data, innovation leaders, relative strengths and weaknesses per country, convergence and divergence analysis between member states and different groups of member states, and country pages with trend diagrams and main policy changes.

(2) Technical Paper No 2: Candidate Countries
Detailed results for current and trend data, innovation leaders, relative strengths and weaknesses per country, and country pages with both current and trend graphs.

(3) Technical Paper No 3: EU Regions
Detailed results for currently available data, leading regions, two tentative composite innovation indicators, indicator graphs, and preliminary steps towards the 2003 regional scoreboard.

(4) Technical Paper No 4: Indicators and Definitions
Full definitions and graphs for all indicators.

(5) Technical Paper No 5: Thematic Scoreboard "Lifelong Learning for Innovation"
Prototype of a complementary scoreboard on "Lifelong Learning for Innovation".

(6) Technical Paper No 6: Methodological Report
Overview of five different methods for constructing composite indices, and review of the similarities and differences between the EIS and other European Commission scoreboards.

All technical papers are available from the Trend Chart website (www.cordis.lu/trendchart).

---

[1] A first provisional EIS was published in September 2000: COM(2000) 567. The first full version of the EIS was published in October 2001: SEC(2001) 1414.
[2] SEC(2002) 1213.
[3] These are indicators 3.1, 3.2, 3.3 and 4.3.

Table of Contents

1. Introduction

One of the expansions of the 2002 EIS is the development of a Regional Innovation Scoreboard (RIS). The 2002 RIS is limited to those indicators from the EIS for which regional data are available and to a static comparison only. The 2003 RIS will include more region-specific innovation indicators and will also include a dynamic comparison of the regions. This report gives the full results for the Member States' Regions for the Trend Chart's third annual European Innovation Scoreboard (EIS).

Regional level data are of value for two reasons. First, innovation policies are often developed and implemented at the regional and even municipal level, in addition to national and EU level policies. Several member states are currently giving more responsibilities to regions for innovation policy (e.g. Sweden, United Kingdom), while others (e.g. Germany, Belgium, Spain, Austria) have already a long tradition in this area. Regions with development problems can get additional funding through the European Regional Development Fund, and innovation promotion is more and more considered as a key dimension in programmes set up under this Fund. Regional indicators can help inform these policies. Second, and more importantly, many innovative activities are strongly localized into clusters of innovative firms, sometimes in close co-operation with public institutions such as research institutes and universities. More generally, the spatial dimension of innovative activities is recognised as important, even when this does not take the form of fully developed clusters, Policy needs to be directed at supporting these clusters and, where feasible, encouraging new clusters of innovation in other regions. This will often require different types of policy actions. The effective design and implementation of such policies therefore depend on identifying both highly innovative regions and less innovative regions that might have future potential. Other regions, due to an economic basis in tourism, agriculture, or resource extraction, may need diffusion-oriented policies that focus on the adoption rather than the creation of new technology, while others, with high-level knowledge creation activities, might be best served with policies focusing on spin-offs and high-tech clusters creation. This year's RIS introduces seven innovation indicators plus per capita GDP at the regional level (NUTS 1 or NUTS 2) for the EU member states.

The seven regional indicators as listed in Annex Table R-A are a first start at providing useful data for regional policy. They provide coverage of human resources, employment in high-technology sectors, and the creation of new knowledge through R&D and patents. However, due to data limitations[4], the regional indicators are better at identifying strong innovative regions than regions with future potential, or regions that require diffusion-oriented policies.

The choice for what constitutes a region has been in line with the European Commission's guidelines[5]: NUTS 1 for Austria, Finland, France, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and Sweden, and NUTS 2 for Belgium, Germany and the UK[6]. As the NUTS classification is mainly designed to suit political and administrative needs, it is not the best system for measuring innovative performance at the regional level. However NUTS is meaningful for policies that are normally defined according by administrative borders. An alternative regional concept is used by the PAXIS project[7], which identified 15 excellent "economic areas" showing excellence in innovation. The concept of an "economic area", linking innovative cities, might be better suited for a regional

[4] Regional data for the EIS innovation indicators are only available for the categories *Human resources* and *Knowledge creation* (see Annex Table R.A). The Community Innovation Survey does not provide reliable regional data, as the region is not included in the survey sample design. The category *Transmission and application of knowledge* will thus be difficult to proxy.

[5] European Commission, *The Regions and the New Economy: Guidelines for Innovative Actions under the ERDF in 2000-06*, Brussels, 2001.

[6] For Denmark there is no breakdown into NUTS 1 or 2 regions. For Luxembourg there is no NUTS breakdown.

[7] The Pilot Action of Excellence on Innovative Start-ups.

innovation scoreboard[8]. However, constraints in data availability made it impossible to choose a different regional dimension.

The use of NUTS also introduces several other problems for analysing the innovative capabilities of regions. First, there are large discrepancies in the size (in terms of population and economic output) of the regions, both within and between countries. This can create anomalies, such as a small region doing comparatively well on an indicator because a single innovative firm or public research institute is based there. This explains the good performance of Flevoland in public R&D (see Figure 5 below). Second, a few countries such as Belgium and Ireland have very few regions. This places these countries at a serious disadvantage in analyses of leading regions. A country such as France with 22 regions has a higher probability of showing up as a leading region for one or more indicators than a country such as Belgium with only 3 regions.

[8] One might argue that directly promoting these 'highly innovative regions or areas' leads to an overall larger increase in innovation through spillovers to neighbouring less-innovative regions than by directly promoting these less-innovative regions. Empirical evidence about the size of these (possible) spillovers is incomplete to make any definite statement.

2. 2002 Regional Innovation Scoreboard

2.1 Leading regions within countries

As noted earlier, a Summary Innovation Index (SII) could not be calculated for the national EIS because the four CIS indicators could not be updated. However, the CIS to date is a poor source of regional indicators because the region was not included in the sampling frame, although this may change in the future. Therefore, a regional composite innovation index can be calculated based on the seven indicators for which data are available. Two tentative summary indicators are provided: the RNSII, which identifies leading regions *within* each country, and the RRSII, which compares each region against the EU mean[9].

Table 1 identifies the leading regions within each country, using the RNSII. Some of the leading regions, including very often the capital city, perform far above the country mean, most notably in Spain, France and the Netherlands. In most countries only a few regions are above the country mean, showing that innovative capabilities are concentrated in a few regions. The long-standing problem of "islands of innovation" in Europe is thus still visible in these data for countries with a large number of regions.

Table 1. Leading innovation regions within countries

Country	No. of regions	% regions > country mean	Leading regions (RNSII) [1] [2]		
Austria	9	22%	Wien (1.45)	Kaernten (1.29)	--
Belgium	3	67%	Vlaams Gewest (1.11)	Reg. Bruxelles (1.09)	--
Germany	16	25%	Berlin (1.35)	Bayern (1.34)	Baden-Württemberg (1.34)
Spain	18	28%	Comunidad de Madrid (2.01)	Cataluña (1.34)	Comunidad Foral de Navarra (1.30)
Greece	13	15%	Attiki (1.39)	Kriti (1.04)	--
France	22	14%	Ile-de-France (1.60)	Midi-Pyrenees (1.31)	Rhone-Alpes (1.12)
Finland	6	33%	Uusimaa (Suuralue) (1.30)	Pohjois-Suomi (1.07)	--
Italy	20	20%	Lombardia (1.44)	Piemonte (1.35)	Lazio (1.35)
Ireland	2	50%	Southern & Eastern (1.12)	--	--
Netherlands	12	33%	Noord-Brabant (1.59)	Utrecht (1.06)	Limburg (1.02)
Portugal	7	29%	Lisboa E Vale Do Tejo (1.39)	Centro (P) (1.01)	--
Sweden	8	25%	Stockholm (1.46)	Oestra Mellansverige (1.00)	--
UK	12	25%	Eastern (1.48)	South East (1.35)	South West (1.21)

1: Some regional indicators are not available or incomplete: 2.1 and 2.2 for Austria, 2.1 for Belgium and Sweden, 1.3, 2.1 and 2.2 for Ireland, 2.1 and 2.2 for the Netherlands, and 1.4, 1.5 and 2.3.1 for Greece, Italy, Portugal and Spain.
2: The RNSII (regional national summary innovation index) is calculated as the average of the indicator values indexed to the country mean. An index value above (below) 1.00 indicates that the region is performing above (below) the country mean. RNSIIs should not be compared across countries.

[9] These composite indicators are of an experimental nature. The definitions are given in the Technical Annex.

2.2 Regional innovation performance per indicator

Regional performance can vary significantly within countries. In this section, for each country for which regional data are available for at least three regions, the *top* and *bottom* innovative region and the spread per country will be displayed. Note that being the *bottom* innovative region does not necessarily imply a normative judgement.

Figure 1 shows the regional spread for population with **tertiary education**. The leading positions by Finland, Sweden and the UK are reflected by the fact that the three leading EU regions can also be found in these countries: Vaeli-Suomi, South West and Oestra Mellansverige. Due to discrepancies in educational systems, definitions of tertiary degrees might differ among countries. This is reflected by the fact that for Austria, Greece, Italy and Portugal all regions score below the EU mean, whereas for Belgium, Finland, Sweden and the UK all regions score above the EU mean.

For participation in **life-long learning**, Sweden 'stars' among the EU top-10 with five regions and the UK with four (Figure 2). Differences in adult education systems favour these two countries: Northern Ireland e.g. is the only UK-region that is not in the EU top-20. The relatively homogenous situation within countries, for this indicator, should be noted, reflecting the importance of the national context for life-long learning practices.

Employment in medium/high-tech manufacturing is highest in four German, two French and two Italian regions (Figure 3). In Baden-Württemberg (Stuttgart-Karlsruhe-Freiburg) this employment exceeds 18%, more than 3 %-points above the 2nd EU-region. The automobile industry (Mercedes) is a major contributor to this success. This industry by itself explains to a large extent the ranking of the top EU-regions: e.g. Piemonte (rank 3: Fiat), Bayern (rank 4: BMW) and Comunidad Foral De Navarra (rank 6: Volkswagen). Discrepancies within countries are generally large within countries, reflecting imbalances between heavily industrialised regions and rural or services-oriented areas.

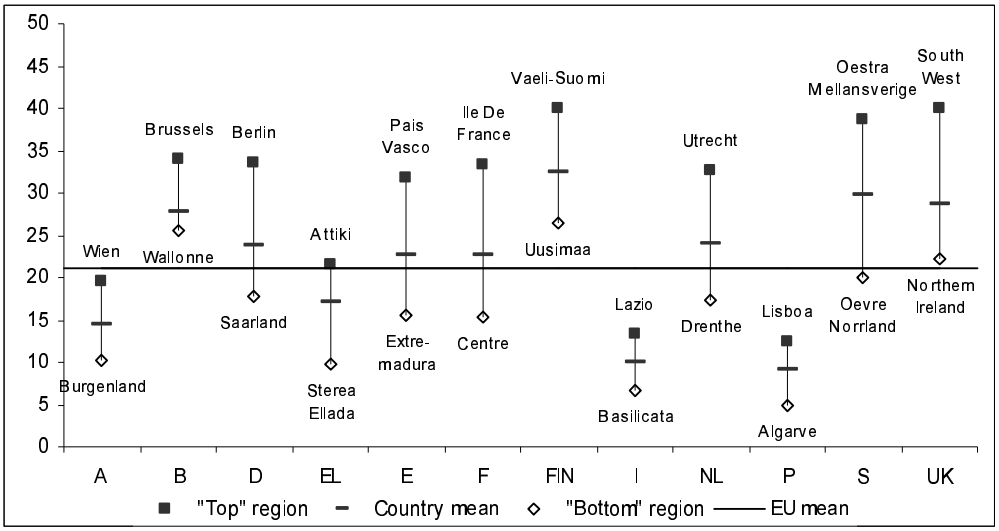
Employment in high-tech services is highest in Stockholm and Uusimaa (Figure 4). In both regions we see a strong ICT services sector (Ericsson and Nokia). Most of the strongest regions are capital city regions. For most countries this indicator shows large regional disparities. Statistically, there is no relation between employment in high-tech services and that in medium/high-tech manufacturing, reflecting the relative specialisation of regions within countries.

Public R&D expenditures is a good indicator of the presence of voluntary policies directed to specific regions. However, it should be noted that funds can be of regional or national origin, thus this should not be taken as an indicator of the intensity of regional R&D policies. Public R&D expenditures are highest in Flevoland, Midi-Pyrenees and Berlin (Figure 5). Besides Flevoland, four other Dutch regions appear in the EU top-10 ranking, reflecting the overall strong Dutch performance. A region's public R&D intensity will depend heavily on the presence of both universities and public and non-profit research institutes. Universities e.g. are mostly located in more densely populated and urbanized regions. In more rural regions public R&D expenditures are thus expected to be small. Here again, national disparities are large.

Business R&D expenditures are highest in Vaestverige, Stockholm and Eastern (Figure 6). Business R&D expenditures are highly concentrated in several countries. E.g., four Swedish regions appear in the EU top-10 ranking, with intensities between 2.28% and 4.27%. For the other four Swedish regions intensities are only between 0.66% and 0.95%. The overall lagging position for Greece, Italy, Portugal and Spain is also witnessed at the regional level. Only for Piemonte the R&D intensity is above the EU mean. Interestingly, all countries (with the exception of Belgium) include at least one region with performance far below the EU average for this indicator. The lagging situation of Flevoland contrasts with the leading position this region has for public R&D as shown in Figure 6.

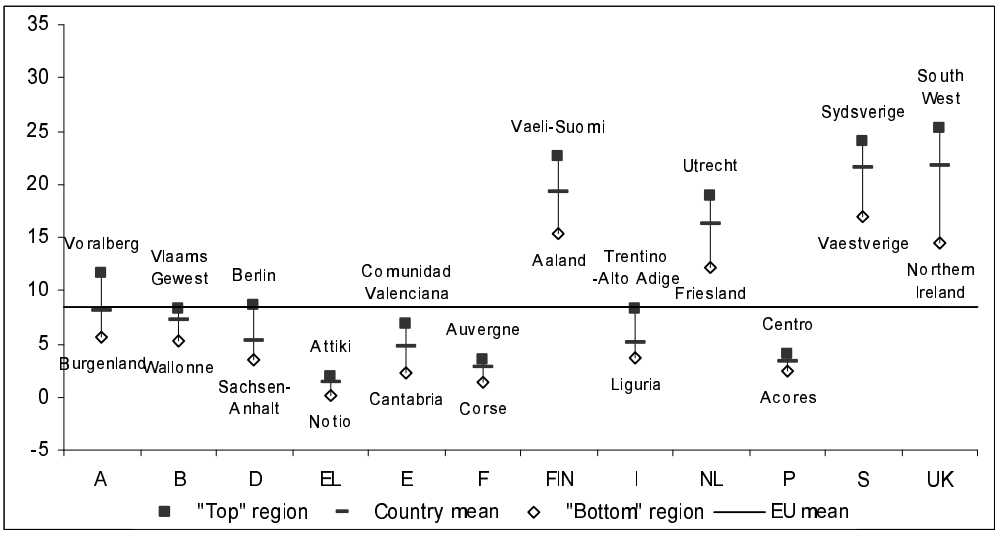
Uusimaa (Suuralue), Noord-Brabant and Stockholm are the three leading regions for **high-tech patent applications** (Figure 7). Finland and Sweden, the EU leaders in high-tech patent activity, both have three regions in the EU top-10 ranking. Finland, Sweden and the Netherlands show large regional disparities. For Finland and the Netherlands this can be explained by the location of the multinationals Nokia in the Helsinki area and Philips in the Eindhoven area.

Figure 1. Population with tertiary education



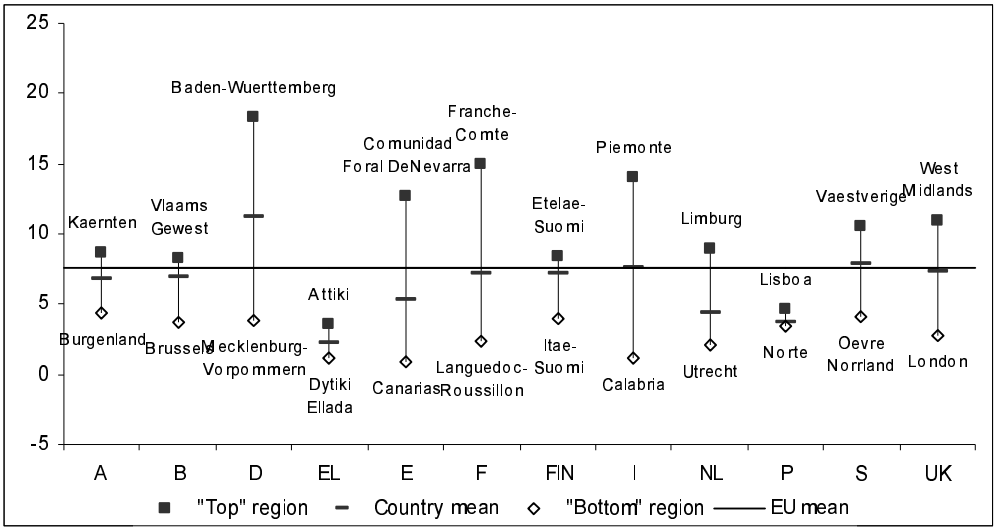
All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 2001, except for 2000 for D. No regional data for DK and L. For IRL no data are displayed, as there are only 2 regions.

Figure 2. Participation in life-long learning



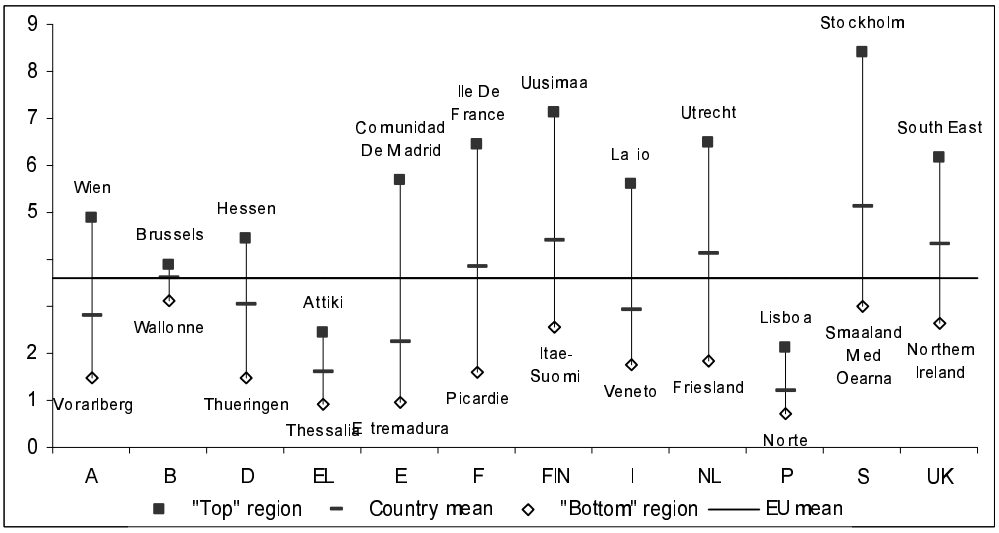
All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 2001. No regional data for DK, IRL and L.

Figure 3. Employment in medium/high-tech manufacturing



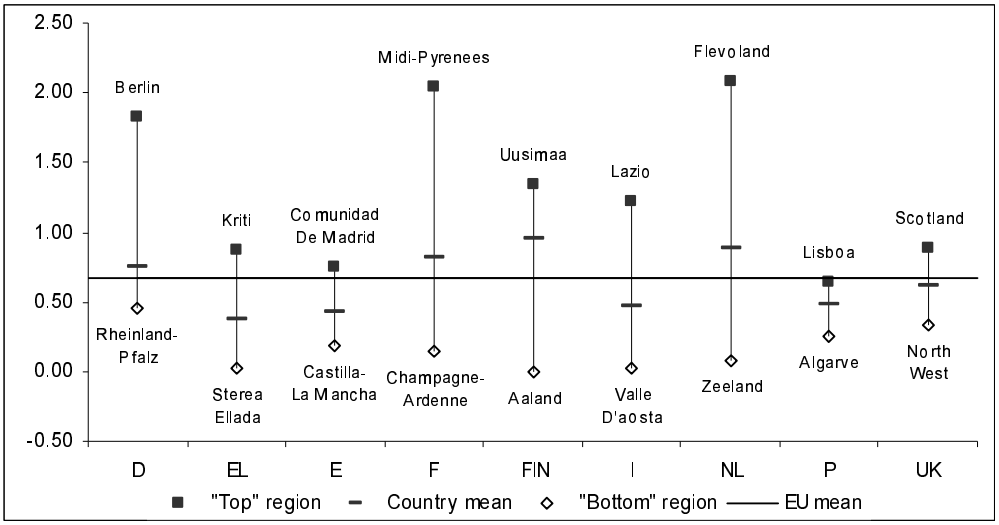
All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 2000. No regional data for DK and L. For IRL no data are displayed, as there are only 2 regions.

Figure 4. Employment in high-tech services



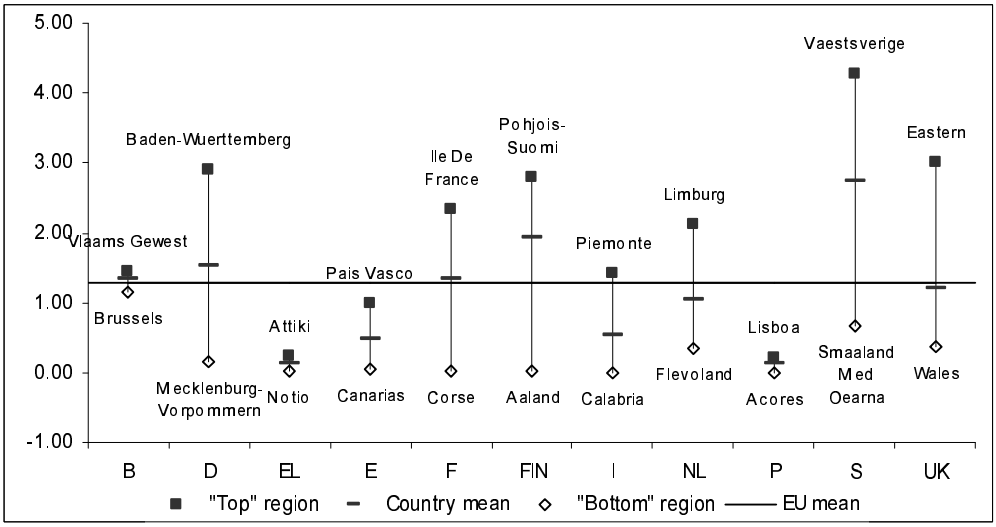
All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 2000. No regional data for DK and L. For IRL no data are displayed, as there are only 2 regions.

Figure 5. Public R&D expenditures



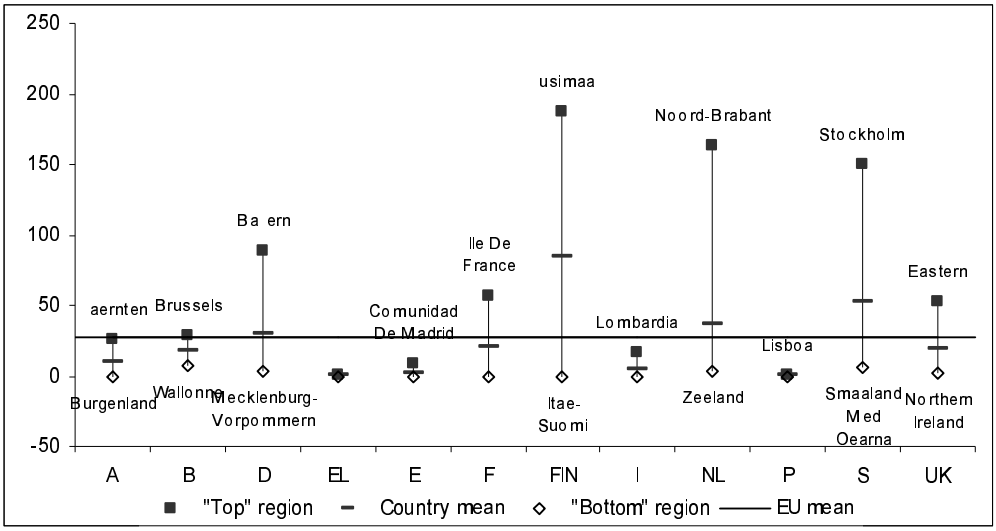
All data at NUTS 2 level, except for D and UK at NUTS 1. All data are for 1999, except 1998 for NL, 1997 for D, EL and P, and 1996 for I. No regional data for A, B, DK, IRL, L and S.

Figure 6. Business R&D expenditures



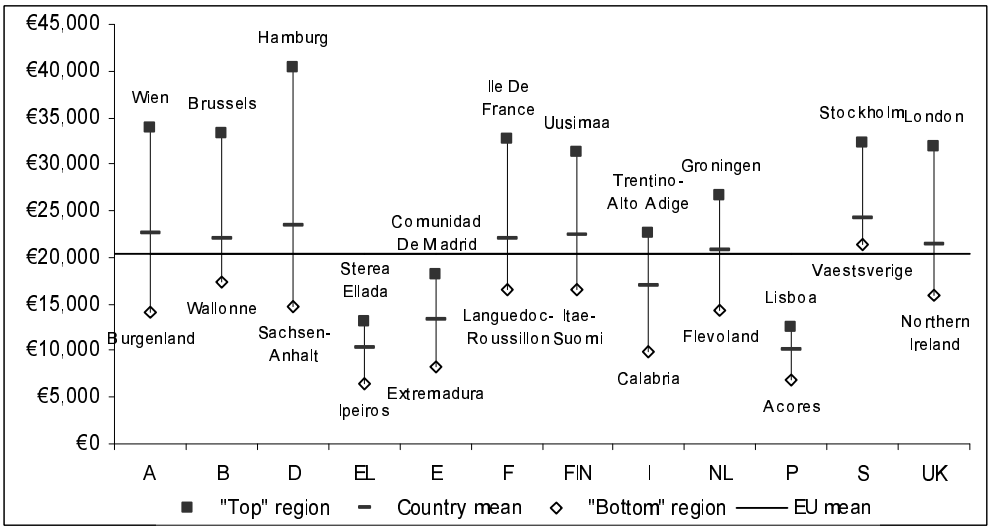
All data at NUTS 2 level, except for D and UK at NUTS 1. All data are for 1999, except 1998 for B and NL, 1997 for D, EL and P, and 1996 for I. No regional data for A, DK, IRL and L.

Figure 7. High-tech EPO patent applications



All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 1999, except 1998 for F. No regional data for DK and L. For IRL no data are displayed, as there are only 2 regions.

Figure 8. Regional per capita GDP



All data at NUTS 2 level, except for B, D and UK at NUTS 1. All data are for 1998, except 1996 for A, I and NL. No regional data for DK, IRL and L.

Although there seems to be a positive relation between a region's innovative performance and its per capita income (see section 2.4), only three of the ten regions with the highest per capita income also appear in the innovative EU top-10 ranking (as measured by the RRSII): Stockholm, Uusimaa (the Helsinki area) and Ile-de-France (the Paris area). The other 7 regions are: Hamburg, Wien, Brussels, London, Bremen (D), Hessen (D) and Aaland (FIN) (Figure 8). On the one hand, this could suggest that regions with high per capita income levels also have high rates of urbanisation and population density, which both are assumed to foster the diffusion of knowledge within regions. On the other hand, it could also be that regions scoring high on the GDP index derive their prosperity from service and commercial activities, which rank poorly with innovation measures.

2.3 'Local' EU innovation leaders

The RRSII tries to locate *local* leaders by taking into account both the region's relative performance within the EU and the region's relative performance within the country[10]. Identifying local leaders reduces the influence of those indicators for which a country has an above average performance. For the indicator on life-long learning, both the UK and Sweden show a value about 2.5 times above the EU mean. In calculating the RRSII, this indicator only weighs about 1.7 times the EU mean. Peaks for indicators for which the country performs well above the EU mean are thus adjusted downwards, peaks for indicators for which the country performs well below the EU mean are thus adjusted upwards. The RRSII will thus increase the composite indicator value for leading regions in lagging countries: local leaders become more visible.

Table 2 presents both the top-10 leading EU regions and the top EU region per country. The top-5 leading regions are found in the innovation Leaders[11], with Stockholm, Uusimaa and Noord-Brabant clearly ahead of the other regions. The appearance of Comunidad De Madrid at rank 9 is a clear example of a local leader within a *lagging* country[12]. The local regions in Portugal and Greece are in 49th and 50th place out of the total number of 148 regions. Nine Southern regions can be found in the bottom-10 of the 148 regions (results not shown).

Table 2. 'Local' EU innovation leaders

Rank	Region	Country	RRSII [1 2]
1	Stockholm	Sweden	225
2	Uusimaa (Suuralue)	Finland	208
3	Noord-Brabant	Netherlands	191
4	Eastern	United Kingdom	161
5	Pohjois-Suomi	Finland	161
6	Ile-de-France	France	160
7	Bayern	Germany	151
8	South East	United Kingdom	150
9	Comunidad de Madrid	Spain	149
10	Baden-Württemberg	Germany	146
17	Wien	Austria	126
21	Vlaams Gewest	Belgium	112
22	Lombardia	Italy	112
31	Southern and Eastern	Ireland	108
49	Lisboa E Vale Do Tejo	Portugal	94
50	Attiki	Greece	93

1: The RRSII (revealed regional summary innovation index) is calculated as the average of the RNSII and the regional European summary innovation index (REUSII). The REUSII is calculated as the average of the indicator values indexed to the EU mean.
2: In total there are 148 regions for which a RRSII could be calculated.

[10] The RRSII is designed to pinpoint 'local leaders'. Regions in highly performing countries will always look more favourable when compared directly to regions from less performing countries. Locating regions which do relatively well despite their country's innovation weaknesses seems worthwhile and interesting. The experimental nature of the RRSII might call for a redesign in the 2003 EIS.
[11] Based on the ranking of the 2001 Summary Innovation Index, 3 groups of countries can be distinguished (cf. the Annex report on Member States and Associate Countries). The group of *Leaders* includes Denmark, Finland, the Netherlands, Sweden, and the United Kingdom. The group of *Followers* includes Austria, Belgium, Germany, France and Ireland. The group of *Southern* countries includes Spain, Greece, Italy and Portugal.
[12] A ranking based on the REUSII would place Comunidad de Madrid on rank 42. Of the top-10 leading regions, nine would be from leading countries.

Table 3 gives the five leading regions per indicator. Of the top-5 slots, France and Sweden are represented by 6 regions each, Germany, Finland and the UK by 5 each, Italy by 4, and Spain and the Netherlands by 2 each. Innovation leaders per indicator are more diversely spread within Europe than overall leading regions are. Spain, not doing well as a country, shows up with 2 leading regions for the employment indicators. The UK shows top regional performance in the education indicators, France in the employment indicators and public R&D, Finland in high-tech patents, and Germany and Sweden in almost all indicators.

Table 3. Leading EU innovation regions per indicator

Indicator	**Leading regions**				
Tertiary education	South West (UK)	Oestra Mellansverige (S)	Vaeli-Suomi (FIN)	Ile-de-France (F)	Berlin (D)
Life-long learning	South West (UK)	Sydsverige (S)	Vaeli-Suomi (FIN)	West Midlands (UK)	North West (Inc. Merseyside) (UK)
Medium/high-tech empl in manuf	Comunidad Foral de Navarra (E)	Baden-Württemberg (D)	Franche-Comte (F)	Piemonte (I)	Alsace (F)
High-tech empl in services	Comunidad de Madrid (E)	Stockholm (S)	Uusimaa (Suuralue) (FIN)	Ile-de-France (F)	Lazio (I)
Public R&D	Midi-Pyrenees (F)	Flevoland (NL)	Berlin (D)	Lazio (I)	Languedoc-Roussillon (F)
Business R&D	Vaestsverige (S)	Eastern (UK)	Stockholm (S)	Baden-Württemberg (D)	Piemonte (I)
High-tech patents	Noord-Brabant (NL)	Uusimaa (Suuralue) (FIN)	Stockholm (S)	Bayern (D)	Pohjois-Suomi (FIN)

2.4 Innovative and economic performance

Almost 40 percent of the variation in per capita regional income can be explained by differences in innovative performance, as shown in Figure 9. This suggests a positive relation between a region's innovative performance as measured by its RRSII and its economic performance. The high per capita income levels for Hamburg and other regions, however, do point out that other factors also generate high incomes. Conversely, as demonstrated by Noord-Brabant, a strong innovation performance does not automatically result in higher per capita income.

Figure 9. Innovative and economic performance on a regional level

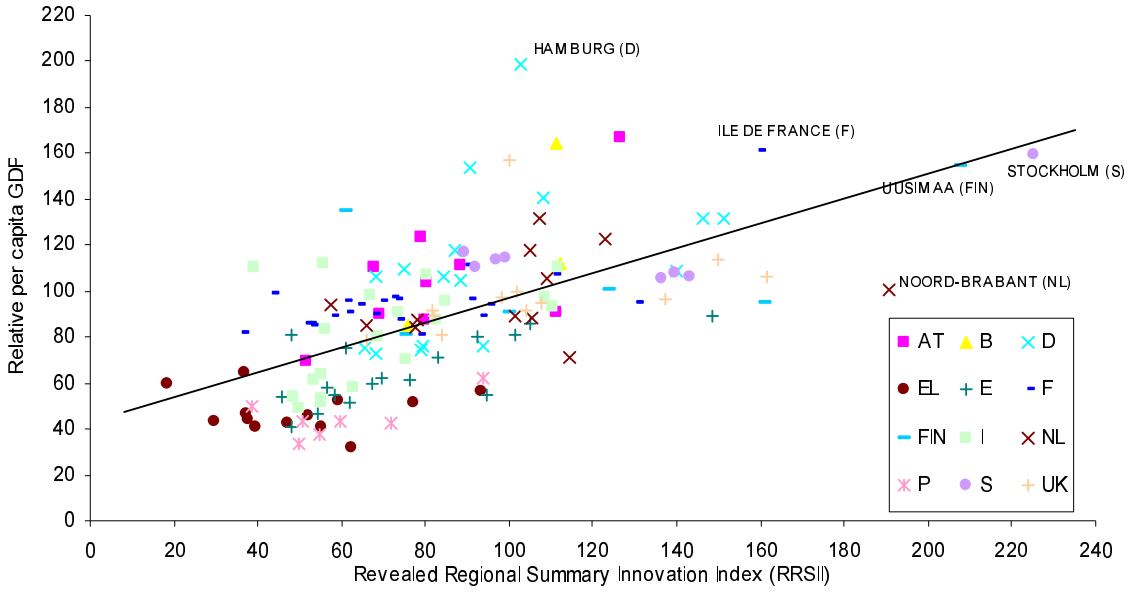


Figure 9 also shows the spread between regions within countries. Finland, France, the Netherlands and Sweden show the largest spread between the 'best' and the 'worst' performing regions. For countries identified as leading innovation countries (Finland, the Netherlands, Sweden and the UK), more than half of the regions perform above the EU mean. For the following countries national innovation performance seems to be below the EU mean due to a lack of a sufficient *number* of innovative regions and not so much to the *level* of innovative performance in these countries' leading regions. Ile-de-France, for example, is among the leading regions within Europe, while France as a country is not[13]. Such a situation is typical of a centralised country, with concentration of wealth and innovative capabilities in the core. For the group of Southern countries, most regions are below the EU mean, but Italy and Spain both have three regions above the EU mean.

[13] Based on France's 2001 Summary Innovation Index (see also footnote 10 in this document).

3. Towards a Full Regional Innovation Scoreboard

The results presented in the previous section were limited to an analysis of those regional innovation indicators, which, firstly, are equivalent to the indicators used in the 2002 EIS, and, secondly, for which data were available at EUROSTAT. Innovation at the regional level however, is different from that at the national level. First, innovation policies are often developed and implemented at the regional level. Secondly, innovation activities are strongly localized into clusters of innovative firms and public research institutions. A Full Regional Innovation Scoreboard (FRIS) should take the specific character of innovation at the regional into account. At the same, current data availability will limit the choice of regional innovation indicators. The 2003 EIS will feature a RIS, which will be closer to the FRIS than the scoreboard in this document. Although the work on developing a FRIS is far for complete, a first list of *possible* indicators will be discussed in this section[14].

Annex Table R.A lists the categories used in the EIS, the indicators that are already used in the 2002 RIS and those that *could* be used for the 2003 FRIS. For the categories human resources and knowledge creation there is a good coverage of the EIS indicators at the regional level. As an alternative for EIS indicator 1.1 (new S&E graduates), one could use indicator 1.6: Human resources in S&T. HRST are defined as people who fulfil one or other of the following conditions:

- Successfully completed education at the tertiary level in an S&T field of study;
- Not formally qualified as above but employed in an S&T occupation where the above qualifications are normally required.

Indicator 1.6 is broader than 1.1, as it includes S&E graduates and non-S&E graduates in S&T fields of study, and it also partially overlaps with indicator 1.2. Nevertheless, this indicator could complement the present indicators for human resources as it might better reflect differences in educational systems among countries. The indicators for knowledge creation are well enough covered and do need an additional indicator.

The Community Innovation Survey does not provide reliable regional data due to its sample design. With CIS-3 already underway, regional indicators based on this survey will not be available for the near future. Only if future CIS surveys will include the regional level in defining the sample frame, reliable regional statistics might become available.

Interregional knowledge spillovers are generally assumed to benefit from the presence of a large and diverse range of innovation actors, i.e. private companies, public research institutes and universities. The R&D indicators 2.1 and 2.2 may be assumed to capture these potential spillover effects. At the industry level, two effects benefit knowledge spillovers:

- *Location or specialization effect* due to the location of multiple companies within the same branch in the same region;
- *Urbanisation or diversification effect* due to the location of multiple companies from different branches in the same region.

The first effect assumes that both existing knowledge flows more easily between companies active in the same branch, and that competition between these companies might also lead to the creation of more knowledge. The second effect assumes that the exchange of existing ideas between different branches will introduce new concepts and ideas within each branch, and might thus increase the creation of new knowledge.

[14] The following has been inspired by the following report: Fraunhofer-Insitut für Systemtechnik und Innovationsforschung, *Regionale Verteilung von Innovations- und Technologiepotentialen in Deutschland und Europa*, October 2000.

Regional data from EUROSTAT's *Structural Business Statistics* (SBS) will be used to construct a specialization index:

- Specialization index: the number of companies in medium/high-tech manufacturing[15] and high-tech services[16] as a percentage of the total number of companies.

The possibility of developing a diversification index will be explored[17]. Higher values for both indicators are assumed to imply a better diffusion of knowledge.

For innovation finance, output and markets, EIS indicators 4.1 (high-technology venture capital investments), 4.2 (capital raised on parallel markets plus by new firms on main markets) and 4.5 (ICT expenditures) are either directly or indirectly based on private data sources and EIS indicator 4.3 is based on CIS, leaving only two EIS indicators for which regional data might be developed. EIS indicator 4.4, home internet access, is based on the Eurobarometer, a survey in which households are asked by phone if they have access to the internet. Household address details should allow a breakdown of the national data into regional data, if future sample designs takes the regional level into account. Furthermore, as the number of households interviewed for most countries is around 2000[18], the number of households interviewed per region would range between 100 for the larger countries and 300 for the smaller countries. These numbers are too small to provide reliable regional estimates. Larger survey samples would be needed to provide reliable regional statistics.

The level of detail in SBS does not allow calculating the share of manufacturing value-added in high-tech sectors[19] (EIS indicator 4.6). However, the NACE sectors for medium-high and high-tech manufacturing are covered, but value-added data are not available. Available data do include gross investment in tangible goods and wages and salaries, but these are only imperfect proxies for value-added.

The list of possible FRIS indicators as given in Table R.A is far from complete. Further study and discussion with EUROSTAT are needed to supply additional indicators:

- Those already available for the short-run;
- Those for which existing surveys or sampling techniques can be *easily* adjusted for the medium-run;
- Those for which new surveys have to be constructed.

Preliminary and final results from other European Commission projects[20] might provide useful information and data in the near future.

Finally, the 2003 FRIS will be extended to include trend analyses on the regional level for those indicators for which time series are available.

---

[15] These include chemicals NACE (24), machinery (NACE 29), office equipment (NACE 30), electrical equipment (NACE 31), telecom equipment (NACE 32), precision instruments (NACE 33), automobiles (NACE 34), and aerospace and other transport (NACE 35).

[16] These include post and telecommunications (NACE 64), information technology including software development (NACE 72), and R&D services (NACE 73).

[17] An example of a diversification index is: the number of medium/high-tech manufacturing and high-tech services branches in which at least *n* companies are active as a percentage of the total number of branches in which at least *n* companies are active. The number of companies *n* might differ per country.

[18] For Germany the number of households interviewed is about 4000.

[19] These include pharmaceuticals (NACE 24.4), office equipment (NACE 30), telecommunications and related equipment (NACE 32), and aerospace (NACE 35.3).

[20] One example is DG Research's preparation, in cooperation with EUROSTAT, of a regional research scoreboard. Another is ESPON, the European Spatial Planning Observation Network (www.espon.lu).

Annex Table R-A: Regional indicators: Definitions and Sources

No	Short definition of indicator	Included in [1]	Source
1.	**Human resources**		
1.2	Population with tertiary education (% of 25 – 64 years age class)	RIS	EUROSTAT, Labour Force Survey
1.3	Participation in life-long learning (% of 25 – 64 years age class)	RIS	EUROSTAT, Labour Force Survey
1.4	Employment in medium-high and high-tech manufacturing (% of total workforce)	RIS	EUROSTAT, Labour Force Survey
1.5	Employment in high-tech services (% of total workforce)	RIS	EUROSTAT, Labour Force Survey
1.6	Human resources in science & technology (HRST) (% of 25 – 64 years age class)	FRIS	EUROSTAT
2.	**Knowledge creation**		
2.1	Public R&D expenditures (GERD – BERD) (% of GDP)	RIS	EUROSTAT, R&D statistics
2.2	Business expenditures on R&D (BERD) (% of GDP)	RIS	EUROSTAT, R&D statistics
2.3.1	EPO high-tech patent applications (per million population)	RIS	EUROSTAT
3.	**Transmission and diffusion of knowledge**		
3.5	Specialization index: number of companies in medium-high and high-tech manufacturing and high-tech services (% of total number of companies)	FRIS	EUROSTAT, Structural Business Statistics
3.6	Diversification index: number of medium-high and high-tech manufacturing and high-tech services sectors (% of total number of sectors)	FRIS	EUROSTAT, Structural Business Statistics
4.	**Innovation finance, output and markets**		
4.4	Home internet access (% of all households)	FRIS	

1: RIS = Regional Innovation Scoreboard; FRIS = Full Regional Innovation Scoreboard.

Annex Table R-B: EU Regional Indicators

NUTS CODE		1.2 Tertiary education		1.3 Lifelong learning		1.4 Medium/high-tech employment in manufacturing		1.5 High-tech employment in services		2.1 Public R&D		2.2 Business R&D		2.3.1 High-tech patent applications		GDP per capita		RNSII	RRSII
AT	**AUSTRIA**	14.52	a	8.18	a	6.77	b	2.80	b	0.65	d	1.28	d	9.8	c	22584	f	-	-
AT11	Burgenland	10.16	a	5.61	a	4.31	b	2.00	b	-		-		0.0	c	14105	f	0.57	52
AT12	Niederoesterreich	13.00	a	7.61	a	5.84	b	3.02	b	-		-		6.5	c	17793	f	0.89	80
AT13	Wien	19.56	a	9.32	a	6.80	b	4.89	b	-		-		20.0	c	33924	f	1.45	126
AT21	Kaernten	12.89	a	7.51	a	8.62	b	2.22	b	-		-		26.6	c	18399	f	1.29	111
AT22	Steiermark	12.29	a	6.02	a	7.05	b	1.99	b	-		-		5.0	c	18237	f	0.77	69
AT31	Oberoesterreich	13.27	a	8.98	a	8.47	b	2.12	b	-		-		3.6	c	21097	f	0.88	80
AT32	Salzburg	15.90	a	8.09	a	5.03	b	2.07	b	-		-		9.7	c	25041	f	0.89	79
AT33	Tirol	13.49	a	8.67	a	4.94	b	2.02	b	-		-		3.0	c	22462	f	0.75	68
AT34	Vorarlberg	14.76	a	11.61	a	8.28	b	1.49	b	-		-		5.8	c	22646	f	0.98	88
BE	**BELGIUM**	27.82	a	7.27	a	6.90	b	3.60	b	0.55	d	1.35	d	17.7	c	21936	d	-	-
BE1	Bruxelles/Brussels	34.08	a	8.15	a	3.72	b	3.87	b	-		1.34	d	29.3	c	33292	d	1.09	111
BE2	Vlaams Gewest	28.10	a	8.19	a	8.32	b	3.79	b	-		1.44	d	21.8	c	22698	d	1.11	112
BE3	Région Wallonne	25.47	a	5.31	a	4.85	b	3.14	b	-		1.15	d	6.9	c	17329	d	0.74	76
DE	**GERMANY**	23.84	b	5.25	a	11.18	b	3.03	b	0.75	e	1.54	e	30.4	c	23421	d	-	-
DE1	Baden-Württemberg	25.06	b	5.84	a	18.30	b	3.49	b	0.86	e	2.90	e	41.8	c	26671	d	1.34	146
DE2	Bayern	23.12	b	4.76	a	13.54	b	3.47	b	0.64	e	2.08	e	88.8	c	26743	d	1.34	151
DE3	Berlin	33.61	b	8.61	a	6.24	b	4.29	b	1.83	e	1.58	e	27.7	c	22142	d	1.35	140
DE4	Brandenburg	32.39	b	5.15	a	4.58	b	2.32	b	0.89	e	0.60	e	9.3	c	15412	d	0.77	79
DE5	Bremen	19.53	b	6.37	a	9.02	b	3.03	b	1.05	e	1.02	e	7.5	c	31237	d	0.88	91
DE6	Hamburg	25.39	b	7.46	a	5.80	b	3.64	b	0.77	e	1.18	e	28.2	c	40267	d	0.99	103
DE7	Hessen	24.74	b	5.45	a	12.06	b	4.43	b	0.46	e	1.76	e	22.7	c	28593	d	1.02	108
DE8	Mecklenburg-Vorpommern	27.85	b	4.38	a	3.80	b	2.73	b	0.82	e	0.15	e	2.8	c	15331	d	0.65	65
DE9	Niedersachsen	19.95	b	4.19	a	10.77	b	2.35	b	0.68	e	1.06	e	16.9	c	21664	d	0.79	84
DEA	Nordrhein-Westfalen	19.34	b	5.09	a	10.19	b	2.76	b	0.63	e	1.06	e	19.0	c	23887	d	0.82	87
DEB	Rheinland-Pfalz	20.88	b	4.90	a	12.65	b	2.55	b	0.45	e	1.66	e	11.4	c	21228	d	0.83	88
DEC	Saarland	17.85	b	5.71	a	8.76	b	2.34	b	0.63	e	0.33	e	6.5	c	21533	d	0.66	68
DED	Sachsen	31.69	b	5.44	a	7.89	b	2.01	b	1.12	e	1.07	e	11.4	c	15471	d	0.90	94
DEE	Sachsen-Anhalt	27.12	b	3.52	a	6.63	b	2.25	b	0.77	e	0.51	e	3.0	c	14778	d	0.66	68
DEF	Schleswig-Holstein	21.47	b	4.87	a	8.17	b	2.97	b	0.64	e	0.44	e	10.8	c	22167	d	0.72	75
DEG	Thueringen	30.49	b	5.25	a	8.06	b	1.50	b	0.81	e	0.89	e	5.3	c	15159	d	0.76	79
GR	**GREECE**	17.08	a	1.35	a	2.22	b	1.62	b	0.38	e	0.13	e	0.6	c	10319	d	-	-
GR11	Anatoliki Makedonia, Thraki	12.58	a	0.87	a	1.20	b	-		0.35	e	0.06	e	0.0	c	8655	d	0.66	47
GR12	Kentriki Makedonia	17.90	a	1.57	a	2.14	b	1.38	b	0.43	e	0.09	e	0.0	c	10576	d	0.83	59
GR13	Dytiki Makedonia	13.12	a	0.89	a	-		-		0.35	e	0.07	e	0.0	c	9373	d	0.72	52
GR14	Thessalia	15.44	a	0.57	a	1.35	b	0.94	b	0.09	e	0.05	e	0.0	c	8969	d	0.52	38
GR21	Ipeiros	14.43	a	0.61	a	-		-		0.62	e	0.07	e	0.0	c	6546	d	0.89	62
GR22	Ionia Nisia	11.22	a	0.34	a	-		-		0.18	e	0.02	e	0.0	c	8743	d	0.38	30
GR23	Dytiki Ellada	11.46	a	1.09	a	1.19	b	1.24	b	0.52	e	0.07	e	1.4	c	8228	d	0.81	55
GR24	Sterea Ellada	9.67	a	0.39	a	2.44	b	-		0.02	e	0.10	e	0.0	c	13148	d	0.55	37
GR25	Peloponnisos	12.66	a	0.35	a	1.35	b	1.27	b	0.10	e	0.09	e	0.0	c	8230	d	0.56	40
GR3	Attiki	21.46	a	1.96	a	3.56	b	2.43	b	0.45	e	0.23	e	1.4	c	11527	d	1.39	93
GR41	Voreio Aigaio	10.47	a	0.28	a	-		-		0.36	e	0.02	e	0.0	c	9478	d	0.48	37
GR42	Notio Aigaio	9.75	a	0.16	a	-		-		0.05	e	0.01	e	0.0	c	12044	d	0.22	18
GR43	Kriti	13.34	a	1.19	a	-		1.38	b	0.87	e	0.05	e	0.0	c	10450	d	1.04	77

NUTS CODE		1.2 Tertiary education		1.3 Lifelong learning		1.4 Medium/high-tech employment in manufacturing		1.5 High-tech employment in services		2.1 Public R&D		2.2 Business R&D		2.3.1 High-tech patent applications		GDP per capita		RNSII	RRSII
ES	**SPAIN**	22.66	a	4.67	a	5.37	b	2.23	b	0.43	c	0.47	c	2.5	c	13308	d	-	-
ES11	Galicia	19.54	a	5.11	a	4.26	b	1.20	b	0.36	c	0.17	c	1.5	c	10526	d	0.78	62
ES12	Principado De Asturias	19.98	a	3.50	a	3.96	b	1.74	b	0.31	c	0.23	c	0.9	c	11846	d	0.69	57
ES13	Cantabria	23.55	a	2.25	a	7.58	b	1.51	b	0.38	c	0.45	c	0.0	c	12499	d	0.91	76
ES21	Pais Vasco	31.76	a	4.90	a	9.62	b	2.05	b	0.25	c	0.99	c	0.5	c	16211	d	1.12	92
ES22	Comunidad Foral De Navarra	30.63	a	5.91	a	12.74	b	-		0.32	c	0.51	c	1.9	c	17453	d	1.30	105
ES23	La Rioja	23.50	a	2.30	a	4.91	b	-		0.20	c	0.30	c	0.0	c	15254	d	0.71	61
ES24	Aragón	24.66	a	3.62	a	10.54	b	1.15	b	0.31	c	0.39	c	0.0	c	14424	d	0.98	83
ES3	Comunidad De Madrid	31.56	a	3.79	a	6.77	b	5.68	b	0.75	c	0.85	c	9.1	c	18075	d	2.01	149
ES41	Castilla Y León	22.98	a	5.64	a	5.65	b	1.72	b	0.36	c	0.16	c	1.2	c	12144	d	0.82	67
ES42	Castilla-La Mancha	16.34	a	4.86	a	2.27	b	1.35	b	0.19	c	0.29	c	0.0	c	11005	d	0.55	46
ES43	Extremadura	15.52	a	3.27	a	-		0.95	b	0.36	c	0.07	c	0.0	c	8250	d	0.56	48
ES51	Cataluña	23.66	a	3.32	a	9.07	b	2.49	b	0.38	c	0.69	c	5.1	c	16462	d	1.34	101
ES52	Comunidad Valenciana	19.85	a	6.91	a	3.70	b	1.57	b	0.38	c	0.25	c	1.8	c	12675	d	0.88	69
ES53	Islas Baleares	16.73	a	3.96	a	0.99	b	1.90	b	0.22	c	0.07	c	1.4	c	16365	d	0.61	48
ES61	Andalucía	18.77	a	4.84	a	2.41	b	1.48	b	0.46	c	0.22	c	0.3	c	9508	d	0.65	54
ES62	Región De Murcia	21.08	a	5.05	a	1.97	b	1.05	b	0.36	c	0.21	c	0.0	c	11055	d	0.69	58
ES63	Ceuta Y Melilla	22.09	a	5.39	a	-		-		-		-		0.0	c	11074	d	1.07	95
ES7	Canarias	18.42	a	6.69	a	0.88	b	1.44	b	0.47	c	0.06	c	0.0	c	12701	d	0.71	60
FR	**FRANCE**	22.59	a	2.72	a	7.24	b	3.86	b	0.82	c	1.35	c	21.3	d	22095	d	-	-
FR1	Ile De France	33.32	a	3.40	a	6.65	b	6.46	b	1.10	c	2.33	c	56.0	d	32658	d	1.60	160
FR21	Champagne-Ardenne	15.53	a	2.16	a	4.63	b	2.30	b	0.15	c	0.39	c	1.5	d	20075	d	0.46	43
FR22	Picardie	15.34	a	1.90	a	8.67	b	1.60	b	0.15	c	0.94	c	6.9	d	18130	d	0.60	58
FR23	Haute-Normandie	19.63	a	2.31	a	10.74	b	2.35	b	0.20	c	1.35	c	3.9	d	19701	d	0.75	72
FR24	Centre	15.27	a	2.74	a	9.04	b	2.87	b	0.34	c	1.16	c	7.7	d	19587	d	0.76	73
FR25	Basse-Normandie	17.42	a	2.96	a	8.60	b	2.21	b	0.27	c	0.60	c	4.2	d	18403	d	0.66	62
FR26	Bourgogne	17.56	a	2.25	a	8.27	b	2.70	b	0.26	c	0.78	c	1.8	d	19503	d	0.63	61
FR3	Nord-Pas-De-Calais	16.39	a	2.08	a	6.59	b	2.40	b	0.31	c	0.36	c	3.7	d	17299	d	0.55	53
FR41	Lorraine	18.03	a	2.20	a	8.77	b	2.65	b	0.49	c	0.54	c	7.8	d	18212	d	0.70	68
FR42	Alsace	21.16	a	2.81	a	12.89	b	1.87	b	0.62	c	0.73	c	19.1	d	22643	d	0.93	90
FR43	Franche-Comte	19.14	a	3.42	a	14.91	b	2.50	b	0.22	c	1.81	c	10.7	d	19020	d	1.00	95
FR51	Pays De La Loire	19.20	a	2.27	a	8.11	b	3.18	b	0.32	c	0.65	c	3.1	d	19063	d	0.66	64
FR52	Bretagne	22.54	a	3.23	a	7.47	b	3.36	b	0.58	c	1.00	c	23.8	d	18051	d	0.96	93
FR53	Poitou-Charentes	17.49	a	1.84	a	5.46	b	2.73	b	0.34	c	0.42	c	2.4	d	17476	d	0.53	52
FR61	Aquitaine	20.34	a	2.72	a	5.20	b	4.05	b	0.41	c	0.98	c	2.8	d	19456	d	0.72	70
FR62	Midi-Pyrenees	26.07	a	3.53	a	6.88	b	5.11	b	2.04	c	1.66	c	14.6	d	19263	d	1.31	131
FR63	Limousin	17.01	a	2.82	a	4.38	b	3.18	b	0.21	c	0.53	c	1.4	d	17485	d	0.56	52
FR71	Rhone-Alpes	24.76	a	2.59	a	8.57	b	4.00	b	0.76	c	1.54	c	29.9	d	21803	d	1.12	111
FR72	Auvergne	19.77	a	3.55	a	5.26	b	2.21	b	0.46	c	1.68	c	3.8	d	17812	d	0.78	74
FR81	Languedoc-Roussillon	19.29	a	2.21	a	2.43	b	3.74	b	1.54	c	0.56	c	3.9	d	16464	d	0.78	79
FR82	Provence-Alpes-Cote D'azur	20.91	a	2.33	a	3.46	b	3.66	b	0.80	c	1.23	c	25.7	d	19596	d	0.91	91
FR83	Corse	17.79	a	1.33	a	-		-		0.23	c	0.02	c	0.0	d	16679	d	0.39	36
FI	**FINLAND**	32.47	a	19.25	a	7.23	b	4.39	b	0.95	c	1.94	c	84.1	c	22393	d	-	-
FI11	Uusimaa (Suuralue)	26.36	a	16.16	a	6.96	b	7.11	b	1.34	c	2.39	c	187.8	c	31350	d	1.30	208
FI12	Etelae-Suomi	29.30	a	16.96	a	8.45	b	3.37	b	0.73	c	1.90	c	59.4	c	20498	d	0.88	124
FI13	Itae-Suomi	28.87	a	17.60	a	4.00	b	2.58	b	0.75	c	0.54	c	4.3	c	16478	d	0.58	75
FI14	Vaeli-Suomi	40.01	a	22.68	a	7.83	b	2.99	b	0.46	c	1.27	c	9.9	c	18389	d	0.77	100
FI15	Pohjois-Suomi	30.83	a	18.98	a	7.16	b	3.51	b	1.03	c	2.79	c	107.7	c	19199	d	1.07	161
FI2	Aaland	29.21	a	15.28	a	-		-		0.00	c	0.03	c	0.0	c	27440	d	0.43	61
IE	**IRELAND**	23.66	a	-		6.97	b	4.04	b	0.38	e	1.01	e	10.3	c	20859	d	-	-
IE01	Border, Midland And Western	17.87	a	-		6.84	b	2.69	b	-		-		3.1	c	-		0.68	67
IE02	Southern And Eastern	25.62	a	-		7.01	b	4.47	b	-		-		12.5	c	-		1.12	108

NUTS CODE		1.2 Tertiary education		1.3 Lifelong learning		1.4 Medium/high-tech employment in manufacturing		1.5 High-tech employment in services		2.1 Public R&D		2.2 Business R&D		2.3.1 High-tech patent applications		GDP per capita		RNSII	RRSII
IT	**ITALY**	10.03	a	5.06	a	7.62	b	2.92	b	0.47	f	0.54	f	4.9	c	16870	f	-	-
IT11	Piemonte	9.31	a	4.62	a	14.00	b	3.59	b	0.25	f	1.42	f	7.0	c	19744	f	1.35	109
IT12	Valle D'aosta	7.06	a	5.15	a	-		-		0.02	f	0.15	f	0.0	c	22492	f	0.51	39
IT13	Liguria	12.23	a	3.64	a	7.18	b	3.59	b	0.84	f	0.44	f	1.2	c	17773	f	0.99	83
IT2	Lombardia	10.15	a	4.59	a	11.91	b	3.35	b	0.30	f	0.88	f	16.5	c	22434	f	1.44	112
IT31	Trentino-Alto Adige	9.23	a	8.33	a	3.09	b	2.32	b	0.22	f	0.18	f	1.1	c	22698	f	0.68	56
IT32	Veneto	9.56	a	6.21	a	9.77	b	1.77	b	0.26	f	0.24	f	2.9	c	19858	f	0.81	67
IT33	Friuli-Venezia Giulia	8.63	a	7.01	a	8.88	b	2.45	b	0.43	f	0.64	f	4.2	c	19373	f	1.05	85
IT4	Emilia-Romagna	11.16	a	5.98	a	9.52	b	2.94	b	0.40	f	0.43	f	3.5	c	21715	f	0.97	80
IT51	Toscana	9.12	a	6.30	a	5.45	b	2.66	b	0.63	f	0.31	f	2.8	c	18435	f	0.90	74
IT52	Umbria	9.59	a	6.13	a	6.65	b	2.99	b	0.57	f	0.11	f	1.2	c	16284	f	0.81	69
IT53	Marche	11.29	a	3.92	a	7.34	b	1.82	b	0.30	f	0.12	f	2.1	c	16972	f	0.68	56
IT6	Lazio	13.39	a	5.24	a	4.17	b	5.60	b	1.22	f	0.66	f	3.6	c	18914	f	1.35	110
IT71	Abruzzo	9.23	a	4.88	a	6.45	b	2.22	b	0.44	f	0.82	f	3.1	c	14306	f	0.94	75
IT72	Molise	9.14	a	4.99	a	6.00	b	-		0.19	f	0.13	f	0.0	c	12936	f	0.67	55
IT8	Campania	8.81	a	3.86	a	4.46	b	2.05	b	0.54	f	0.29	f	0.5	c	10525	f	0.66	55
IT91	Puglia	9.36	a	4.66	a	3.99	b	2.19	b	0.30	f	0.15	f	0.5	c	10971	f	0.58	48
IT92	Basilicata	6.59	a	5.30	a	9.00	b	-		0.36	f	0.08	f	3.3	c	11826	f	0.77	63
IT93	Calabria	10.21	a	5.09	a	1.21	b	2.54	b	0.26	f	0.00	f	0.0	c	9983	f	0.60	50
ITA	Sicilia	9.47	a	4.18	a	2.30	b	2.12	b	0.48	f	0.03	f	4.9	c	10798	f	0.70	55
ITB	Sardegna	8.27	a	5.99	a	2.26	b	1.83	b	0.58	f	0.09	f	1.2	c	12407	f	0.65	53
NL	**NETHERLANDS**	23.96	a	16.27	a	4.44	b	4.11	b	0.89	d	1.05	d	36.1	c	20728	f	-	-
NL11	Groningen	23.66	a	17.33	a	3.03	b	3.72	b	1.39	d	1.25	d	10.7	c	26692	f	0.96	107
NL12	Friesland	18.59	a	12.25	a	4.36	b	1.83	b	-		-		3.2	c	17194	f	0.61	66
NL13	Drenthe	17.40	a	14.10	a	5.53	b	2.30	b	-		-		6.4	c	17069	f	0.71	78
NL21	Overijssel	19.53	a	14.48	a	5.13	b	2.43	b	0.47	d	0.79	d	11.2	c	17835	f	0.72	78
NL22	Gelderland	22.47	a	14.42	a	3.77	b	4.28	b	1.22	d	1.12	d	10.0	c	18096	f	0.92	101
NL23	Flevoland	18.06	a	16.25	a	4.43	b	5.97	b	2.08	d	0.35	d	6.5	c	14369	f	1.01	114
NL31	Utrecht	32.60	a	18.95	a	2.14	b	6.49	b	1.33	d	0.74	d	24.6	c	24954	f	1.06	123
NL32	Noord-Holland	29.50	a	18.23	a	2.56	b	5.54	b	0.91	d	0.80	d	14.4	c	23881	f	0.92	105
NL33	Zuid-Holland	24.66	a	17.41	a	3.51	b	4.64	b	1.33	d	0.83	d	16.0	c	21439	f	0.96	109
NL34	Zeeland	19.29	a	14.26	a	4.69	b	-		0.08	d	0.61	d	2.7	c	19024	f	0.49	57
NL41	Noord-Brabant	22.37	a	15.95	a	7.12	b	3.37	b	0.30	d	2.01	d	163.4	c	20495	f	1.59	191
NL42	Limburg (NI)	19.53	a	14.46	a	8.95	b	2.05	b	0.26	d	2.11	d	21.9	c	17928	f	1.02	105
PT	**PORTUGAL**	9.12	a	3.35	a	3.66	b	1.20	b	0.48	e	0.14	e	0.4	c	10006	d	-	-
PT11	Norte	7.34	a	2.77	a	3.39	b	0.74	b	0.30	e	0.10	e	0.3	c	8738	d	0.75	51
PT12	Centro (P)	7.62	a	4.11	a	4.34	b	0.90	b	0.51	e	0.14	e	0.0	c	8584	d	1.01	72
PT13	Lisboa E Vale Do Tejo	12.45	a	3.63	a	4.63	b	2.14	b	0.64	e	0.21	e	0.9	c	12545	d	1.39	94
PT14	Alentejo	9.92	a	3.78	a	-		-		0.35	e	0.05	e	0.0	c	8779	d	0.83	60
PT15	Algarve	4.95	a	2.92	a	-		-		0.26	e	0.02	e	0.0	c	10078	d	0.53	38
PT2	Acores	6.78	a	2.36	a	-		-		0.54	e	0.00	e	0.0	c	6881	d	0.64	50
PT3	Madeira	5.15	a	3.33	a	-		-		-		-		0.0	c	7618	d	0.78	55
SE	**SWEDEN**	29.71	a	21.58	a	7.90	b	5.13	b	0.93	e	2.75	e	52.4	c	24153	d	-	-
SE01	Stockholm	30.16	a	22.61	a	5.79	b	8.41	b	-		3.88	e	150.3	c	32377	d	1.46	225
SE02	Oestra Mellansverige	38.70	a	22.85	a	10.49	b	4.47	b	-		2.28	e	32.8	c	21869	d	1.00	140
SE03	Smaaland Med Oearna	27.95	a	21.23	a	8.98	b	2.99	b	-		0.66	e	6.2	c	23695	d	0.67	89
SE04	Sydsverige	29.21	a	23.95	a	7.49	b	4.58	b	-		2.81	e	48.0	c	21662	d	0.98	143
SE05	Vaestsverige	23.48	a	16.96	a	10.51	b	4.67	b	-		4.27	e	23.9	c	21339	d	0.97	136
SE06	Norra Mellansverige	23.96	a	22.46	a	6.80	b	3.24	b	-		0.95	e	14.2	c	22478	d	0.66	92
SE07	Mellersta Norrland	30.16	a	22.43	a	6.31	b	5.51	b	-		0.76	e	7.8	c	23193	d	0.73	99
SE08	Oevre Norrland	20.05	a	17.25	a	4.08	b	4.07	b	-		0.89	e	42.5	c	23046	d	0.66	97

NUTS CODE		1.2 Tertiary education		1.3 Lifelong learning		1.4 Medium/high-tech employment in manufacturing		1.5 High-tech employment in services		2.1 Public R&D		2.2 Business R&D		2.3.1 High-tech patent applications		GDP per capita		RNSII	RRSII
UK	**UNITED KINGDOM**	28.56	a	21.66	a	7.36	b	4.34	b	0.62	d	1.21	d	19.1	c	21307	d	-	-
UKC	North East	22.35	a	19.29	a	9.45	b	3.34	b	0.37	d	0.62	d	2.7	c	16451	d	0.71	84
UKE	Yorkshire & The Humber	26.22	a	21.58	a	6.25	b	3.19	b	0.44	d	0.45	d	2.8	c	18561	d	0.68	82
UKF	East Midlands	24.70	a	20.98	a	8.19	b	3.45	b	0.38	d	1.39	d	7.7	c	19773	d	0.85	98
UKH	Eastern	24.40	a	20.41	a	7.63	b	5.34	b	0.62	d	3.02	d	52.9	c	21666	d	1.48	161
UKJ	South East	24.42	a	21.61	a	8.00	b	6.16	b	0.88	d	2.00	d	39.1	c	23060	d	1.35	150
UKI	London	26.77	a	21.55	a	2.81	b	5.71	b	0.63	d	0.42	d	18.1	c	31960	d	0.85	100
UKK	South West	39.96	a	25.18	a	8.31	b	3.48	b	0.69	d	1.40	d	32.3	c	19588	d	1.21	137
UKG	West Midlands	31.35	a	23.12	a	10.90	b	3.77	b	0.47	d	1.02	d	6.9	c	19312	d	0.93	108
UKD	North West	29.79	a	22.98	a	8.19	b	4.01	b	0.34	d	1.41	d	7.1	c	18665	d	0.89	104
UKL	Wales	25.62	a	18.27	a	8.00	b	2.91	b	0.48	d	0.38	d	6.1	c	18065	d	0.70	82
UKM	Scotland	30.64	a	20.12	a	6.33	b	3.62	b	0.89	d	0.60	d	11.3	c	20298	d	0.89	102
UKN	Northern Ireland	22.18	a	14.47	a	5.54	b	2.65	b	0.39	d	0.45	d	2.4	c	15963	d	0.56	66

1: RNSII: Regional National Summary Innovation Index
2: RRSII: Revealed Regional Summary Innovation Index
Year of reference: a = 2001, b = 2000, c = 1999, d = 1998, e = 1997, f = 1996.

Technical Annex

A.1 Revealed Regional Summary Innovation Index: definition

The Revealed Regional Summary Innovation Index (RRSII) tries to take into account both the region's relative innovative performance to the EU mean as the region's relative performance within the country. For this two indexes are calculated of which then the mean value is taken for the RRSII:

- The average of the indicator values indexed to the country mean (RNSII: regional national summary innovation index):

$$RNSII_j = \left(\frac{100}{n}\right) * \sum_i \frac{X_{ijk}}{\overline{X}_{ik}}$$

- The average of the indicator values indexed to the EU mean (REUSII: regional European summary innovation index):

$$REUSII_j = \left(\frac{100}{n}\right) * \sum_i \frac{X_{ij}}{\overline{EU}_i}$$

where X_{ijk} is the value of indicator *i* for region *j* in country *k*, $\overline{X}_{ik}$ is the value of indicator *i* for country *k*, $\overline{EU}_i$ is the value of indicator *i* for the EU, and *n* is the number of indicators for which regional data are available.

The RRSII is then calculated as the unweighted average of the RNSII and the REUSII.

A.2 Regression results

For Figure 9, the following simple regression was run between the relative level of per capita GDP and the RRSII:

Relative GDP per capita = 42.963 (8.198) + 0.540 (9.414) * RRSII,

with t-values in parentheses and an adjusted R-square of 0.378.