The Geography of Europe's Brain Business Jobs: 2023 Index

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Foreword: Klas Tikkanen

Since 2017 we have studied the geography of Europe's knowledge-intensive jobs, in an index that is increasingly followed by national governments, regional governments, educators, researchers, and businesses across Europe. It has also reached global impact, being used for example as university course literature in places such as India and Mexico. Recently the governments of Ireland and Estonia have used the results of the brain business jobs index, for their innovation policy planning.

As a leading investor in Europe, it is natural for Nordic Capital to support research on how knowledge strengthens good investment conditions. Europe is increasingly an integrated marketplace, and knowledge-intensive jobs are growing rapidly in particularly the Southern and Eastern parts of Europe – creating a significant catch-up to Western and Northern European countries.

Currently, Europe is going through difficult times, with war, inflation, and a recent global pandemic. Yet change is on the horizon. Each year that we publish the index of the geography of Europe's brain business jobs, we see the same trend of increased competition and economic integration in Europe – which is creating a more dynamic and integrated European economy. To understand what is happening in Europe, it is no longer enough to look at individual countries, as progress is increasingly happening in Europe as a whole. The economic geography of Europe is everchanging, a sign of competition and progress.

This year's index shows that there is a general trend in Europe, in which those countries that have experienced the strongest growth of brain business jobs are found to be those that have a lower tax burden. None of the top growing countries has a high tax burden, while most of the slow growing ones do have high tax burdens of over 40 percent of GDP. Taxes are not the only relevant factor, but it is interesting to note that above one third of the variation of growth of brain business jobs concentration over time can be explained by the variation of tax rate as share of GDP. Competitive taxes it turns out, is important for fostering knowledge intensive jobs.

Klas Tikkanen is COO of Nordic Capital. He has helped drive Nordic Capital's transformation the past decade, including the development of its strategy, governance, culture, and operations, and sits on Nordic Capital's top management company board, the investment review committees for Nordic Capital X and Nordic Capital Evolution, portfolio review committee, fair value committee, operations advisory board, and value portfolio committee, as well as chairing the HR and compensation committee and charities boards.

Summary

• Southern European capital regions have 600 000 more brain business jobs than Western European capital regions.

• Eastern European capital regions have twice as many brain business jobs than Nordic capital regions.

• Sweden again climbs to second place, after Switzerland, in brain business jobs concentration.

• Bratislava is for the first time surpassed, by Budapest, as the European region with highest share of adults employed in brain business jobs.

• European countries with lower taxes as share of GDP tend to have higher pace of brain businesss jobs growth.

The study The geography of Europe's brain business jobs measures the share of the working-age population across Europe employed in highly knowledge-intensive enterprises. The data is compiled through an analysis of detailed structural business statistics for European countries and regions. This is the sixth edition of the index, which is used by national governments, regional governments, universities, and businesses to better understand the changing geography of enterprise in Europe.

By looking at the share of the population employed in high-value-creating sectors in 31 European countries and 277 regions within these countries, this study finds a significant link to regional unemployment.[1] Regions that have a high share of brain business jobs tend to have lower unemployment than those with a lower share of knowledge-intensive jobs. There is an even stronger link between the combined share of employment in high-value-creating sectors (including manufacturing industries and professional services, as well as brain business jobs) and regional unemployment. Several interesting findings emerge in this study:

- **Southern European capital regions have 600 000 more brain business jobs in total, compared to Western European capital regions.** Paris has above 1.2 million brain business jobs and remains the only region in Europe with more than one million employees in knowledge-intensive businesses. In total, the capital regions of Southern Europe (Paris, Madrid, Rome, Lisbon, Athens, Cyprus, and Malta) have above 2.4 million brain business jobs. This can be compared to above 1.8 million knowledge-intensive firms' employment in the capital cities of Western Europe (London, Berlin, Amsterdam, Vienna, Brussels, Luxembourg).

1 Regional analysis includes 29 countries, as data of high quality does not exist yet for Switzerland, and Ireland.

- **Eastern European capital regions have twice as many brain business jobs in total, compared to Nordic capital regions.** In total, there are above 1.5 million brain business jobs in the capital cities of Eastern European nations (Warsaw, Budapest, Bucharest, Prague, Sofia, Bratislava, Zagreb, Latvia, Ljubljana, Vilnius, and Estonia). The Nordic nations have a strong performance in creating knowledge-intensive jobs, but smaller populations. There are in total slightly above 700 000 brain business jobs in the Nordic capital regions (Stockholm, Copenhagen, Helsinki, Oslo, and Iceland).

- **Successful new European firms focused on software/AI/digital media, digital infrastructure/platforms, and business services.** A panel of 150 newly founded, and on Crunchbase highly ranked, firms in the 30 leading brain business hubs of Europe, have been studied. The most common forms of innovations that the companies rely on are software/AI/digital media, digital infrastructure/platform, as well as business services. Each of these forms of innovations, are central for the operations of above four out of ten of the novel successful new firms, in the top-30 brain business regions of Europe. Many of the novel innovation companies follow a combination of these forms of innovations.

- **New Nordic firms in brain business hubs have a significant lead in funding.** The median leading innovation company in Eastern European brain business hubs founded since 2018 has attracted 3 million Euros in funding (venture capital, own investment of owner, bank loan), compared to 5 million in the average leading innovation firm of Western European brain business hubs, and 20 million Euros in the average leading innovation firm of Southern European brain business hubs. The median innovation firms of the Nordic brain business hub regions have on average attracted 29 million Euros in funding, the highest rate of funding.

- **Switzerland, Sweden, and Ireland are the top knowledge economies of Europe.** The concentration of knowledge-intensive jobs is highest in Switzerland, where fully 10.7 percent of the population is employed in brain business jobs. Sweden climbs back to second place, after last year being surpassed by Ireland, with 10.1 percent of adults employed in brain business jobs, while Ireland is slightly behind with 10.0 percent.

- **Fostering high-value-creating jobs is an important aspect of reducing regional unemployment.** Each percentage point higher share of the population of European regions employed in high-value-creating sectors (brain business jobs + manufacturing industries and professional services corresponds with 0.21 percent lower regional unemployment. Meaning that in a region where 10 percentage points more of the population is employed in high-value-creating sectors, the average unemployment is 2.1 percent lower, compared to the typical European region.

- **4 out of 10 top brain business jobs regions are found in Eastern Europe, 3 in Western, 2 in the Nordics, and 1 in Southern Europe.** In all previous editions of this index, the Slovakian capital region of Bratislava has had the highest concentration of brain business jobs per capita. This year's index finds that 22.8 percent of the adults in Bratislava are employed in knowledge-intensive firms, but Budapest climbs to first place with 23.9 percent of adults in brain business jobs. Prague follows on third place, followed by Oberbayern, Paris, Stockholm, the Oxford region (Berkshire, Buckinghamshire and Oxfordshire), Copenhagen, London, and Bucharest. Four of the regions in the top-10 are found in Eastern Europe, three in Western Europe, two in the Nordics, and one in Southern Europe.

- **Brain business jobs become increasingly distributed over Europe.** The knowledge jobs are growing largely in the South and East, the two regions that used to be quite significantly behind the North and West. Places such as Stockholm and London remain leading knowledge hubs, yet it is now three Eastern European capital regions that have the highest concentrations of knowledge workers. English as a common language for work, and digital connectiveness, is increasingly shaping Europe (the EU countries, UK, Switzerland, Iceland, and Norway) into an integrated economy. An analysis of how the concentration of brain business jobs has changed over time (table 1), finds that nine European countries have had an increase of above 40 percent, since 2014. In Lithuania, Cyprus, and Portugal the rate has risen by more than 60 percent over this period. All nine top climbers are found in the Southern and Eastern European regions.

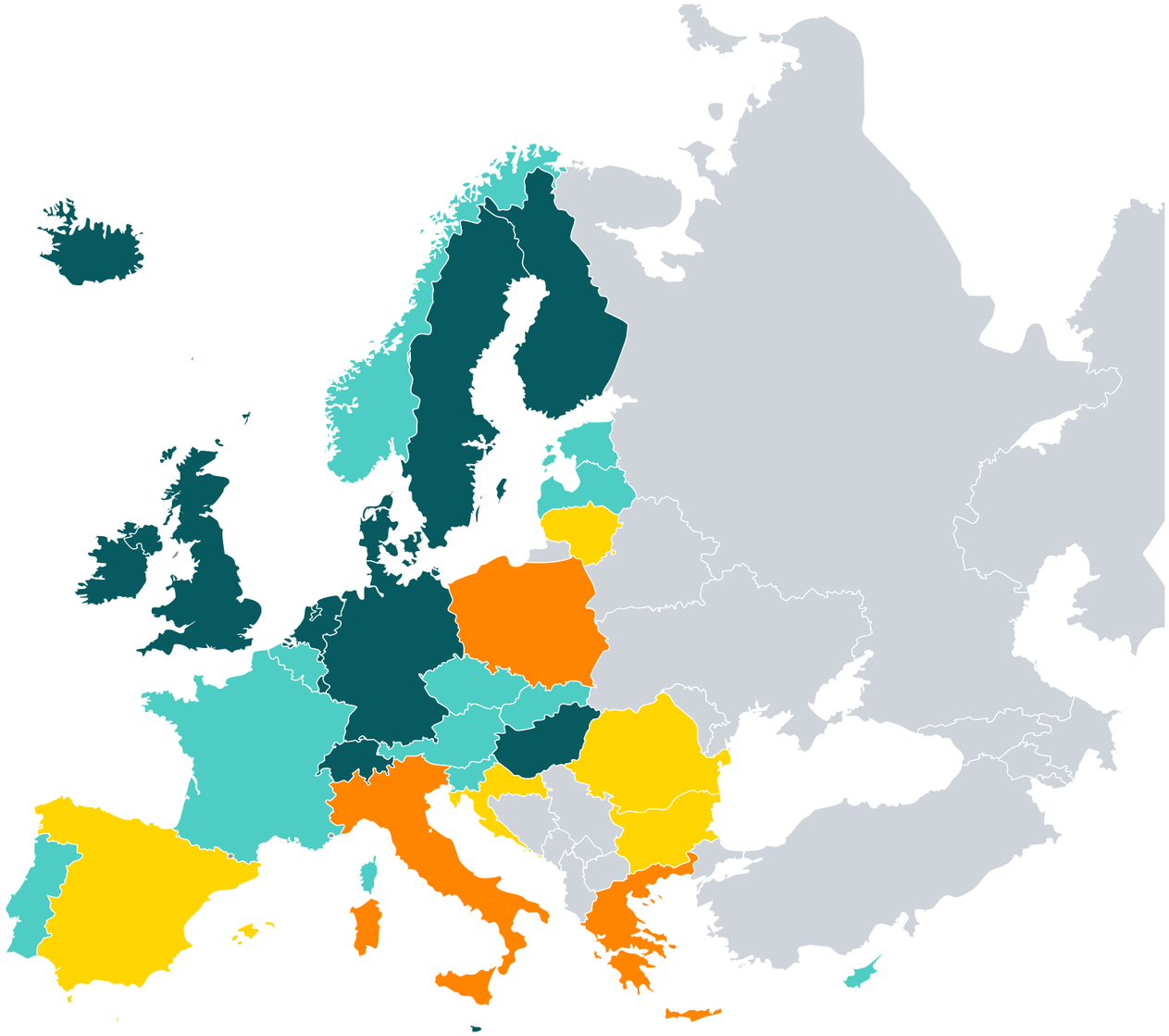
- **European nations with lower tax levels tend to experience faster increase of brain business jobs concentration.** There is a general trend in Europe in which those countries that have experienced the strongest growth of brain business jobs, per capita, tend to be those that have lower tax levels as share of GDP. The fast-growing European nations (50 percent or more growth of share of adults in brain business jobs between 2014 and 2022) mainly have low taxes as share of GDP, or medium tax levels, with none having a high tax level of 40 percent or more of GDP. On the other end of the spectrum, the slow-growing European nations (less than 10 percent growth of share of adults in brain business jobs) tend to have high tax levels. Just above 33 percent of the variation in the growth rate of brain business jobs can be explained by the variance in the tax level as share of GDP.

Table 1. *Rate of change in brain business jobs concentration (per capita working-age inhabitants) between 2014 and 2022*

Lithuania	62%
Cyprus	62%
Portugal	61%
Romania	53%
Hungary	51%
Bulgaria	50%
Croatia	42%
Poland	42%
Slovenia	42%
Estonia	40%
Malta	40%
Slovakia	37%
Latvia	37%
Spain	36%
Germany	28%
Czechia	25%
Netherlands	20%
Belgium	17%
Finland	17%
United Kingdom	16%
Italy	13%
Sweden	12%
Luxembourg	11%
France	9%
Norway	7%
Austria	7%
Denmark	6%
Iceland	6%
Switzerland	5%
Greece	4%

Source: Own analysis of Eurostat structural business statistics, short-term business statistics, and population data. Note: Ireland had no complete data for previous years, and is therefore excluded in this historical comparison.

Figure 1. *Share of the workforce in brain business jobs*



What innovations are driving new business development, in Europe's 30 strongest brain business hubs?

The brain business jobs index includes a mapping of newly founded innovation companies, in the 30 leading brain business jobs hubs of Europe. The source of the data is Crunchbase, a leading international enterprise database, which includes information on firm activity, investments, industry trends, and innovations. For each region, the 5 top-ranking firms on the Crunchbase founded since 2018, have been examined.[2] The result is data on 150 European innovation companies, with a focus on their key innovations and financing. Crunchbase was originally created as a tool for investors to find promising start-up firms to invest in and has since grown to become perhaps the most comprehensive global business database, with a focus on firm innovation. Information on Crunchbase is gathered via four different channels: from the listed companies, through machine learning, from a team of researchers working at the database, and lastly through some half a million active users of the database.

Information on investments and other changes in the firms listed on Crunchbase is often updated live, or on the day following the investment. While Crunchbase is created mainly as a tool for investors and entrepreneurs, it has also gained considerable academic interest in recent years. For example, Jean-Michel Dalle, Matthijs den Besten, and Carlo Menoni published a study in 2017 for the OECD on the possibility to use Crunchbase for research in economics and management. The authors noted that Crunchbase is attracting interest from researchers in different fields since it contains unique data on the start-up eco-system.[3] Yuxian

2 Data gathered end of November 2022.

3 Dalle, Den Besten & Menon (2017).

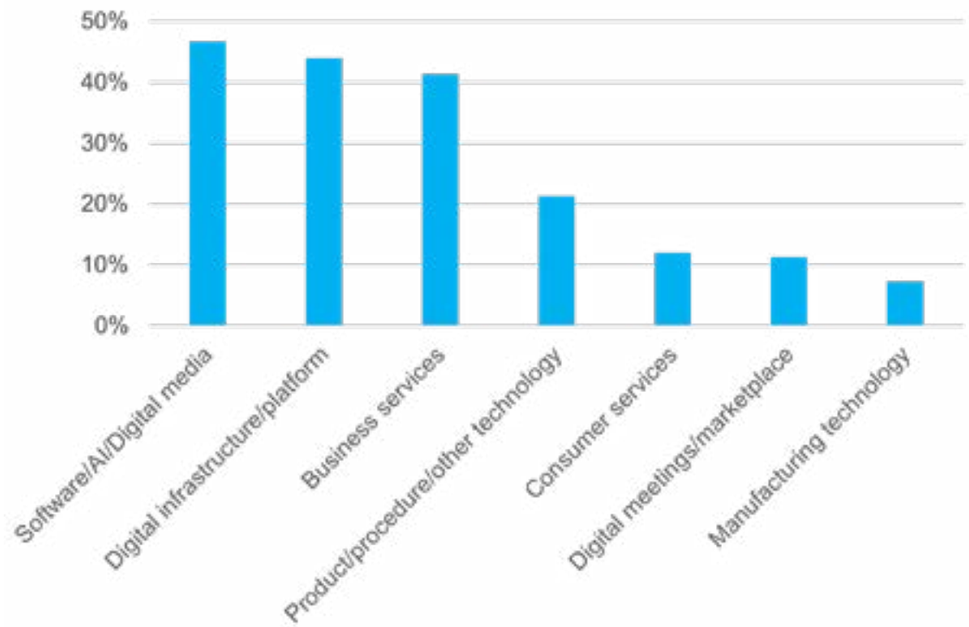
Eugene Liang and Soe-Tsyr Daphne Yuan have relied on Crunchbase for studying firm investments, with the motivation that Crunchbase is the largest global database with profiles for the included firms.[4] Ross Brown and Augusto Rocha have used the database in order to study the actions of investors during the uncertainty created by the COVID-19 pandemic.[5]

Figure 2 shows the innovation reliance, of the panel of 150 newly founded, and on Crunchbase highly ranked, firms in the 30 leading brain business hubs of Europe. The most common forms of innovations that the companies rely on are software/AI/digital media, digital infrastructure/platform, as well as business services. Each of these forms of innovations, are central for the operations of above four out of ten of the novel successful new firms, in the top-30 brain business regions of Europe. Many of the novel innovation companies follow a combination of these forms of innovations. One fifth of the novel innovation companies in the top-30 brain business regions of Europe rely on product/procedure/other technology innovations. Around one in ten relies on consumer services innovations, and the same is also true for digital meetings/marketplace, as well as manufacturing technology, innovations.

4 Liang & Yuan (2016).

5 Brown & Rocha (2020).

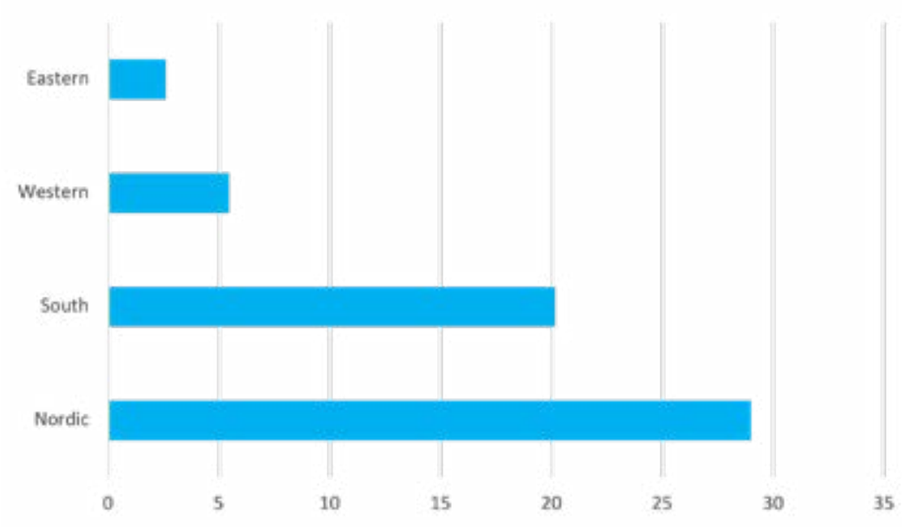
Figur 2. *Firm innovation reliance, panel of 150 high-ranking businesses founded since 2016 in 30-top brain business jobs centres of Europe (firms can rely on a combination of innovations)*



The most common forms of innovations that the companies rely on are software/AI/digital media, digital infrastructure/ platform, as well as business services.

There are, as shown in figure 3, geographical differences in funding for innovative businesses. The median leading innovation company in Eastern European brain business hubs founded since 2018 has attracted 3 million Euros in funding (venture capital, own investment of owner, bank loan), compared to 5 million in the average leading innovation firm of Western European brain business hubs, and 20 million Euros in the average leading innovation firm of Southern European brain business hubs. The median innovation firms of the Nordic brain business hub regions have on average attracted 29 million Euros in funding.

Figure 3. *Median investments (million Euros) in the panel of 150 high-ranking businesses founded since 2018 in 30-top brain business jobs centres of Europe*



Leading brain business jobs regions of Europe

The capital regions of Eastern European nations have some of the highest levels of brain business jobs concentration. The Slovakian capital region of Bratislava for the first time in this index is not ranked as number one, as Budapest climbs to the top spot. Nearly a quarter of the adults in Budapest and Bratislava are employed in knowledge-intensive enterprises. Prague, Oberbayern, Paris, Stockholm, the Oxford region, Copenhagen, London, and Bucharest are the other regions in the top-10 (table 2). Budapest is still ranked as number one followed by Bratislava, with Paris on third place, followed by Luxembourg, Prague, Vilnius, Oberbayern, Warsaw, Bremen, and Stuttgart (table 3).

Table 2. *Regional Ranking of brain business jobs*

Rank	Region	Percentage of the adult (20-64 years old) population employed in brain business jobs
1	Budapest	23,9%
2	Bratislava	22,8%
3	Prague	19,9%

4	Oberbayern	18,7%
5	Paris	17,9%
6	Stockholm	17,7%
7	Berkshire, Buckinghamshire and Oxfordshire	17,7%
8	Copenhagen	17,3%
9	London	16,6%
10	Bucharest	16,3%
11	Warsaw	16,1%
12	Walloon Brabant	16,1%
13	Hamburg	15,8%
14	Utrecht	15,8%
15	Amsterdam	14,3%
16	Berlin	14,2%
17	Vilnius	13,8%
18	Darmstadt	13,6%
19	Oslo	13,3%
20	Helsinki	13,0%
21	Köln	12,9%
22	Sofia	12,9%
23	Mittelfranken	12,8%
24	Brussels	12,7%
25	Madrid	12,6%

26	Vienna	12,6%
27	Karlsruhe	12,4%
28	Bedfordshire and Hertfordshire	12,4%
29	North Eastern Scotland	11,9%
30	Cheshire	11,8%
31	Lisbon	11,8%
32	Ljubljana	11,3%
33	Stuttgart	11,3%
34	Flemish Brabant	11,0%
35	Surrey, East and West Sussex	10,8%
36	Bremen	10,4%
37	Hampshire and Isle of Wight	10,2%
38	Antwerp	10,2%
39	Gloucestershire, Wiltshire and Bristol/ Bath area	10,1%
40	East Anglia	9,4%
41	Luxembourg	9,4%
42	Düsseldorf	9,4%
43	Noord-Brabant	9,2%
44	Zuid-Holland	9,2%
45	Västsverige	9,2%
46	Iceland	8,6%
47	Herefordshire, Worcestershire and Warwickshire	8,5%

48	Malta	8,4%
49	Sydsverige	8,2%
50	North Yorkshire	8,0%

Capital regions are marked in blue. Smaller countries such as Iceland and Malta make up single NUTS2 regions and are marked in green. Regional data is not available for Switzerland and Ireland.

Table 3. *Regional Ranking of high-value-creating jobs (brain business jobs + manufacturing industry jobs + professional services jobs)*

Rank	Region	Percentage of the adult (20-64 years old) population employed in high value-creating jobs
1	Budapest	65,4%
2	Bratislava	61,4%
3	Paris	61,2%
4	Luxembourg	59,0%
5	Prague	56,7%
6	Vilnius	52,9%
7	Oberbayern	52,1%
8	Warsaw	50,9%
9	Bremen	50,2%
10	Stuttgart	48,0%
11	Mittelfranken	47,8%
12	Iceland	46,9%
13	Hamburg	46,5%
14	North Eastern Scotland	45,2%
15	Dublin	44,3%
16	Bucharest	44,1%
17	Darmstadt	44,1%
18	Ljubljana	44,0%
19	Åland	43,5%
20	Cheshire	43,3%
21	Stockholm	43,3%
22	Karlsruhe	42,8%
23	Provincia Autonoma di Bolzano/Bozen	42,6%

24	Notio Aigaio	41,9%
25	Highlands and Islands	41,9%
26	Tirol	41,7%
27	Vorarlberg	41,7%
28	Salzburg	41,1%
29	Jihovýchod	41,1%
30	Oberösterreich	40,8%
31	Agder og Rogaland	40,7%
32	Severovýchod	40,5%
33	Köln	40,3%
34	Cumbria	40,0%
35	Copenhagen	40,0%
36	Střední Morava	40,0%
37	Småland med öarna	39,6%
38	Berkshire, Buckinghamshire and Oxfordshire	39,6%
39	Estonia	39,5%
40	Detmold	39,2%
41	Veneto	39,2%
42	Sofia	39,1%
43	Västsverige	39,0%
44	Vidurio	39,0%
45	Ionia Nisia	38,9%
46	Oberpfalz	38,7%
47	Oslo	38,7%
48	London	38,6%
49	Norte	38,6%
50	Amsterdam	38,5%

Capital regions are marked in **blue.** Smaller countries such as Iceland and Malta make up single NUTS2 regions and are marked in **green**. Regional data of high quality is not available yet for Switzerland, and Ireland.

Mapping Europe's brain business jobs

For an investor, a business, or an employee choosing where to locate, the characteristics of regions and countries matter. Previous studies that have attempted to identify knowledge-intensive industries tend to end up with the following four knowledge-intensive types of business, namely the tech sector, ICT (information and communications technology), advanced services, and creative professions. These broad fields are in the data analysis divided into twelve subfields, as shown below. This comprehensive way of defining brain business jobs includes not only those who work with novel technological solutions but also the creators and advanced service providers who play a key role in modern societies.

Table 4. *Division of brain business jobs*

Tech sector	High-tech Manufacturing Engineering/Architecture Research and Development Pharmaceutical industry
ICT	Telecom IT Services Computer Programming
Advanced services	Head office Management Advertising and Market Research
Creative professions	Publishing Film/TV/Music Design and other Creative Work

The source of the data is structural business statistics, published by the European statistics agency Eurostat. Through this comprehensive database of activity in the business sector, the share of people who work in highly specialized knowledge-intensive workplaces or local units of firms is measured. Structural business statistics is highly detailed, but since it relies on firms' annual accounts, and firms have different accounting years, the data measures the situation two years previously. Quarterly employment statistics (for Q2 of each year) are added to the analysis to estimate brain business jobs also during 2020 and 2021. The technical source of regional data is SBS data by NUTS 2 regions and NACE Rev. 2.

The statistical unit used for regional SBS is generally the local unit, which is an enterprise or part of an enterprise situated in a geographically identified place. Local units are usually classified under NACE according to their main activity. Manufacturing industries (except high-tech manufacturing and pharmaceuticals which are counted as brain business jobs, as well as electricity & gas) and professional services (except engineering & architecture, R&D, telecommunications, IT Services, programming, head office & management, advertising & market research, publishing, film/TV/music, and design & other creative professions, which are counted as brain business jobs) are also included in the analysis. Together brain business jobs, manufacturing industries jobs, and professional services jobs are referred to as high-value-creating sector jobs. These jobs are important for regional economic activity, bringing in export revenues, and are often also drivers of innovation.

Short-term and long-term business data, as well as population data, all have Eurostat as their source. Following Brexit, quarterly data over changes in labour input are no longer reported by Eurostat for the UK, as the information is now deemed to be confidential. Structural business data is however still published for the

UK. To calculate the brain business jobs concentration for the UK, an assumption is made that quarterly changes in labour output follow the pattern of Switzerland, in line with previous trends.

National and regional data for 31 countries are included in this study. These countries are the 27 EU member states plus the UK, Switzerland, Norway, and Iceland. Data over the working-age (20-64 years old) population is calculated for the corresponding years in each region and country—again with Eurostat as the source. As shown in figure 4, 6.7 percent of the working-age population of the 31 studied European countries work in brain business jobs. Additionally, 15.3 percent work in manufacturing industries, and 10.0 percent in professional services.

Figure 4. *The high-value-creating jobs sectors of Europe*

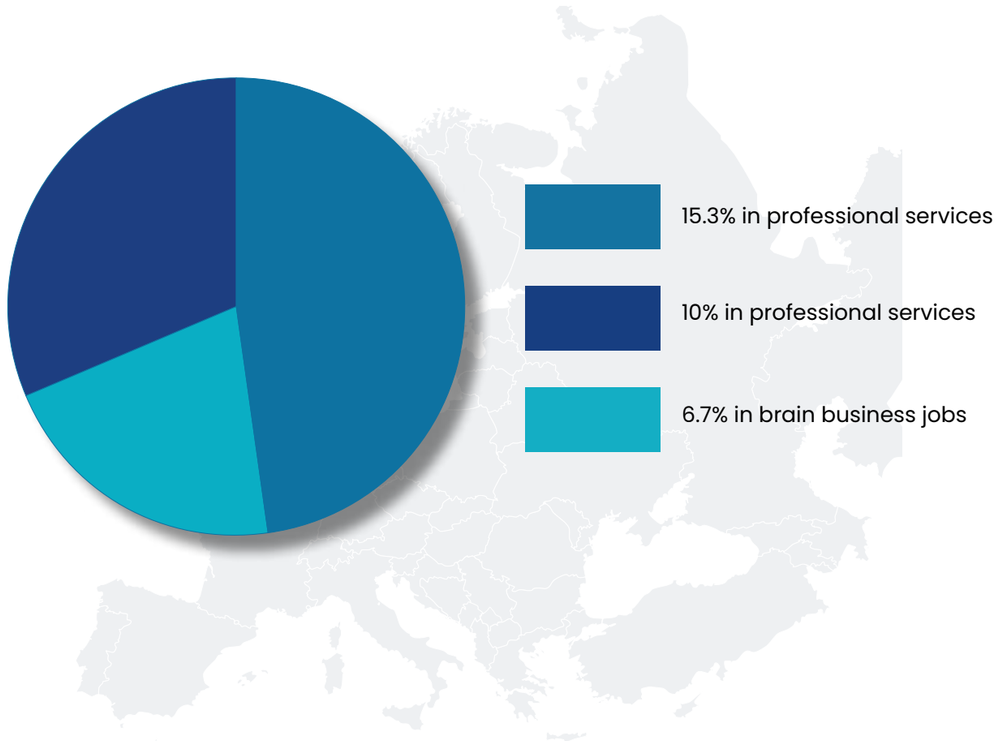


Table 5. *Detailed brain business jobs, manufacturing jobs, and professional services jobs rating for European nations*

	BBJ per capita total	Tech sector BBJ	ICT sector BBJ	Advanced services BBJ	Creative professions BBJ	Manufacturing industries per capita	Professional services per capita
Switzerland	10,7%	5,7%	2,6%	1,7%	0,7%	15,9%	9,8%
Sweden	10,1%	3,1%	3,6%	1,8%	1,5%	18,0%	9,3%
Ireland	10,0%	2,8%	3,6%	2,2%	1,4%	14,9%	14,0%
Denmark	9,5%	3,3%	2,8%	1,7%	1,7%	15,0%	9,9%
Netherlands	9,4%	2,4%	2,9%	2,8%	1,4%	12,0%	10,9%
Luxembourg	9,2%	2,2%	4,8%	1,5%	0,6%	21,0%	20,7%
Germany	8,7%	3,3%	2,6%	1,7%	1,1%	20,2%	11,2%
United Kingdom	8,4%	2,4%	2,8%	2,0%	1,3%	10,3%	13,2%
Iceland	8,2%	2,1%	3,3%	1,1%	1,7%	17,2%	14,2%
Malta	8,1%	1,7%	2,8%	2,6%	1,0%	11,1%	12,3%
Hungary	8,1%	2,8%	2,4%	1,6%	1,2%	18,0%	9,1%
Finland	8,0%	2,8%	2,8%	1,2%	1,1%	16,4%	8,3%
Estonia	7,9%	1,9%	3,5%	1,3%	1,2%	21,5%	10,0%
Slovenia	7,7%	2,8%	2,1%	1,9%	0,9%	23,6%	9,0%
Norway	7,0%	2,5%	2,4%	0,8%	1,3%	17,4%	9,8%
Lithuania	6,9%	1,7%	2,4%	1,7%	1,1%	20,9%	15,6%
Belgium	6,6%	1,8%	1,8%	2,4%	0,6%	13,1%	7,9%

Czechia	6,6%	2,3%	2,1%	1,0%	1,2%	25,1%	8,7%
Latvia	6,5%	1,4%	3,0%	1,2%	0,9%	17,9%	11,0%
Austria	6,4%	2,4%	1,9%	1,3%	0,8%	18,8%	11,0%
Cyprus	6,2%	1,2%	2,1%	2,1%	0,8%	12,9%	15,4%
Portugal	6,1%	1,6%	2,0%	1,7%	0,9%	18,4%	11,1%
Slovakia	6,0%	1,6%	2,0%	1,8%	0,7%	19,3%	6,9%
France	6,0%	2,0%	1,9%	1,1%	1,0%	13,3%	8,4%
Bulgaria	5,4%	1,1%	2,7%	0,7%	0,9%	16,4%	8,7%
Croatia	5,2%	1,8%	1,8%	0,9%	0,7%	17,5%	10,2%
Spain	5,0%	1,6%	1,6%	1,0%	0,8%	12,1%	10,2%
Romania	4,5%	1,3%	1,9%	0,8%	0,5%	14,2%	5,9%
Poland	4,4%	1,2%	1,6%	1,0%	0,6%	17,6%	6,7%
Italy	4,3%	1,3%	1,4%	0,7%	0,8%	14,8%	9,0%
Greece	4,2%	1,6%	1,1%	1,0%	0,6%	7,6%	13,6%

Brain business jobs, high-value-creating jobs, and unemployment

Previous editions of the geography of Europe's brain business jobs index have shown that there is a link between brain business jobs, on a regional level, and unemployment. This is still apparent, as shown in figure 4. However, regions do not necessarily need to rely on knowledge-intensive jobs, as in fact also manufacturing industries jobs, and professional services jobs can bring in export revenues and economic activity. Figure 5 shows the relation between the total number of high-value-creating jobs (brain business jobs + manufacturing industries jobs + professional services jobs).

Each percentage point higher share of the population of European regions employed in high-value-creating sectors corresponds with 0.21 percent lower regional unemployment.[6] A region where 10 percentage points more of the population (compared to the average European region) is employed in brain business jobs, manufacturing industries, and professional services, on average has 2.1 percent lower unemployment. Promoting brain business jobs, manufacturing industries jobs, and professional services jobs in all European regions is a policy priority. This enables job growth, which is vital in a time where structural shifts are happening, with old jobs disappearing and new ones being formed.

A region where 10 percentage points more of the population (compared to the average European region) is employed in brain business jobs, manufacturing industries, and professional services, on average has 2.1 percent lower unemployment.

6 Data on jobs for 2022 is matched with latest available regional unemployment data for 2021.

Figure 4. *Unemployment and BBJ concentration in European regions*

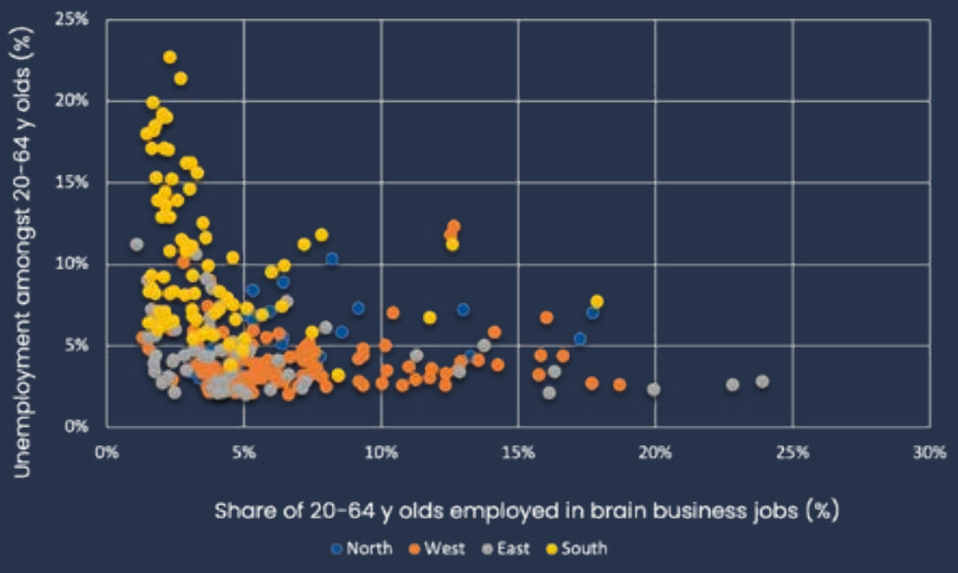
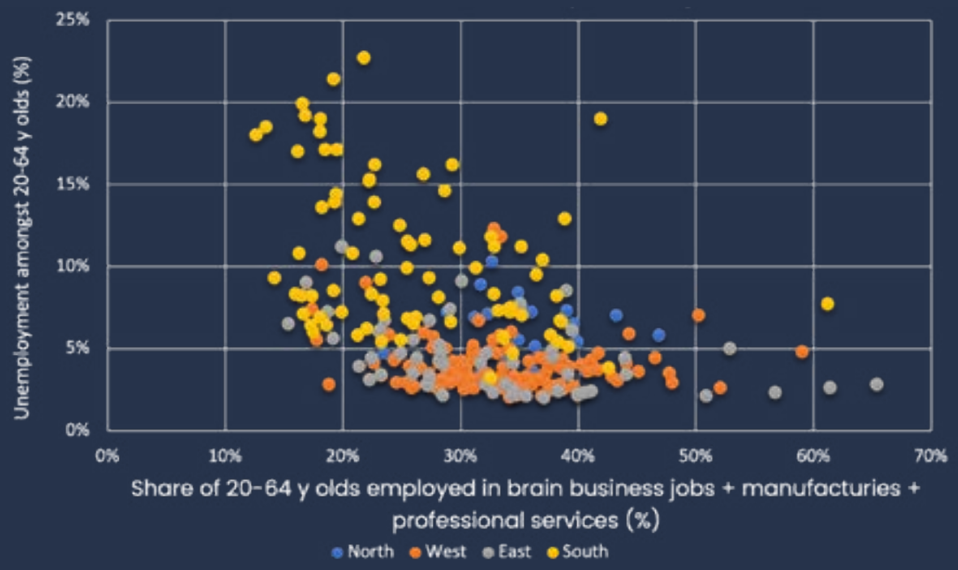


Figure 5. *Unemployment and value driving sectors (BBJ + manufacturing industries + professional services) concentration in European regions*

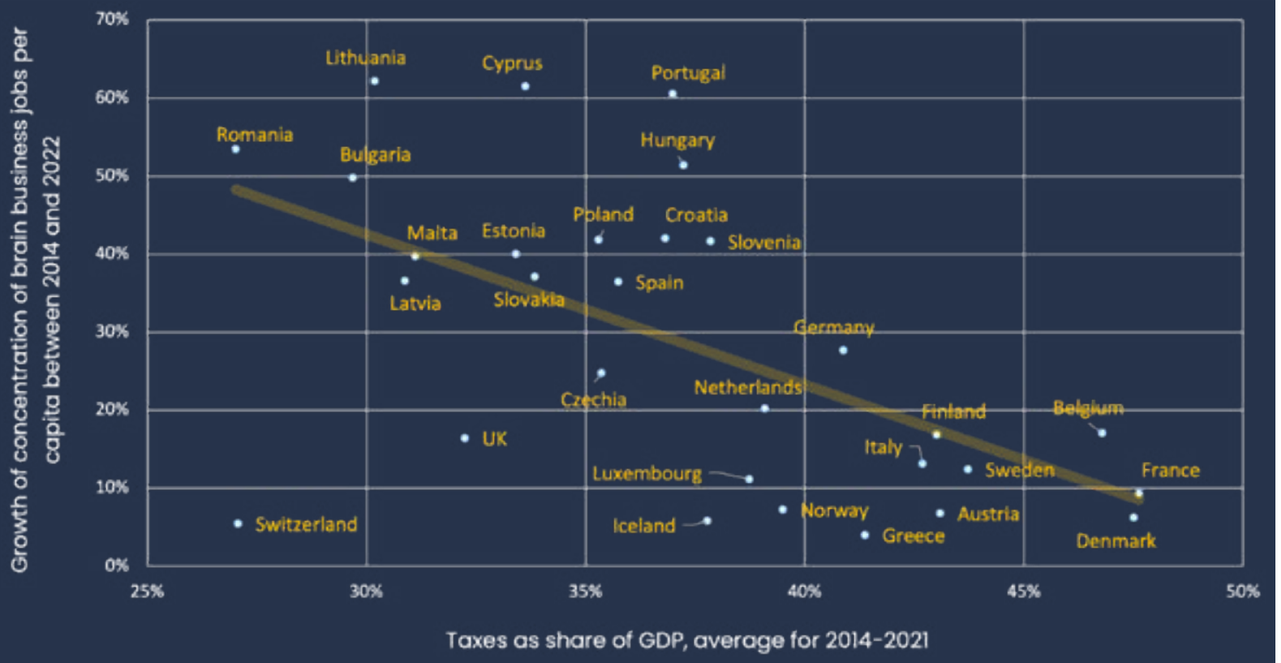


As shown in figure 6, there is a general trend in Europe in which those countries that have experienced the strongest growth of brain business jobs, per capita, tend to be those that have lower tax levels as share of GDP. Lithuania, Cyprus, Portugal, Romania, Hungary and Bulgaria are the six European countries which have experienced an increase of brain business jobs concentration, per capita, of 50 percent or more between 2014 and 2022. Four out of these countries have low tax levels of between 27 and 34 percent of GDP, while two (Portugal and Hungary) have medium tax levels of 37 percent of GDP. No European country with a high tax level (40 percent or more of GDP) is found amongst the fast-growing nations.

At the other end of the spectrum Greece, Switzerland, Iceland, Denmark, Austria, Norway and France are the seven European countries in which the growth of brain business jobs per capita has been less than 10 percent between 2014 and 2022. Five out of these countries have high tax levels of 40 percent or more of GDP, while Iceland is just below that with 38 percent taxes as share of GDP. Switzerland is an outlier, having low tax level of 27 percent of GDP and yet slow development of brain business jobs concentration. This can be explained by Switzerland being so far ahead in brain business jobs concentration, as the number one European nation in terms of concentration of knowledge-intensive jobs, that prospects for further growth are limited.

Just above 33 percent of the variation in the growth rate of brain business jobs can be explained by the variance in the tax level as share of GDP. The tax burden is an important explanation for the ability of countries to grow with brain business jobs. This can be explained by high taxes crowding out investments in firm development and technological progress. High tax rates also affect individuals, reducing the incentives to study advanced degrees, become entrepreneurs, or work more intensely.

Figure 6. *European countries with higher tax rates experience slower growth of brain business jobs over time*



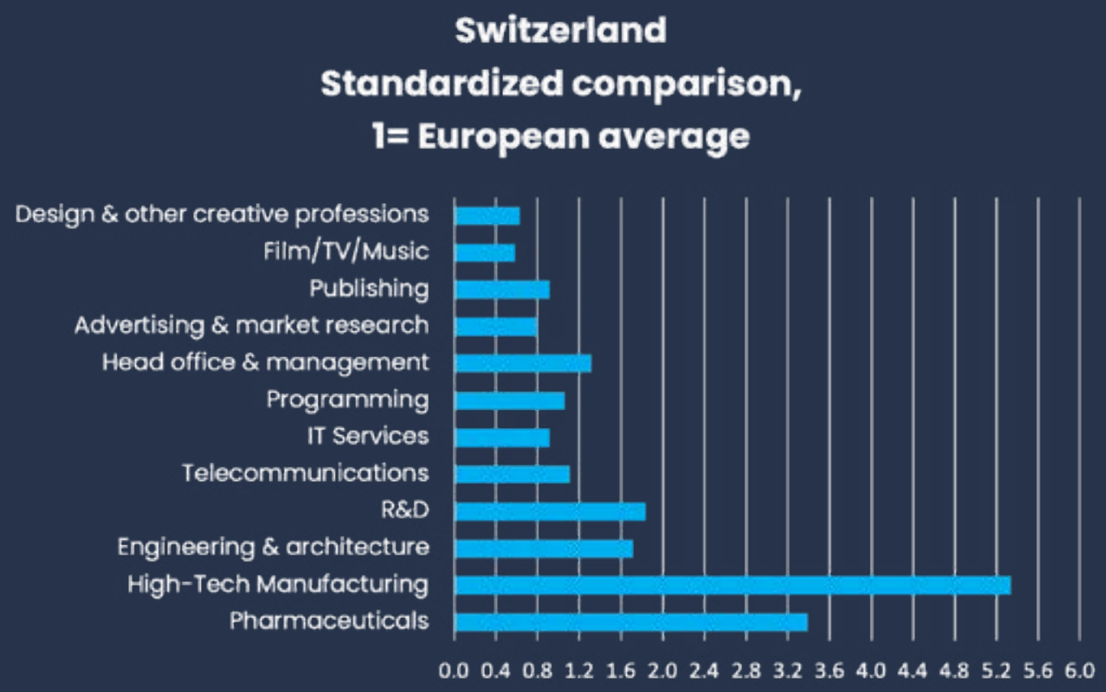
Country Analysis: Switzerland

In 2022, 10.7 percent of the working-age adults of Switzerland were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 10.1 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 5 percent in Switzerland. Switzerland remains, as in all previous editions of this index, the European country with the highest concentration of knowledge-intensive jobs.

Switzerland also has a strong manufacturing sector, with 15.9 percent of the adult population employed in manufacturing industries. Professional services employ additionally 9.8 percent of the adults. Due to limitations in data, the regional number of brain business jobs in Switzerland is not included in this study.

While Switzerland does have a commanding lead in brain business jobs compared to the rest of Europe, the country relies heavily on two sectors. These are high-tech manufacturing, and the pharmaceutical industry. In areas such as design & other creative professions, and film/TV/music, Switzerland lags behind the rest of Europe.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Switzerland	10.7%	15.9%	9.8%



Country Analysis: Sweden

In 2022, 10.1 percent of the working-age adults of Sweden were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 9.3 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 12 percent in Sweden. Last year Sweden fell from second, to third, position among European countries, in comparison of brain business jobs – but this year climbed back to second place. Switzerland is the only European country with a higher share of the adults employed in knowledge-intensive sectors, which makes Sweden first place amongst EU-member states.

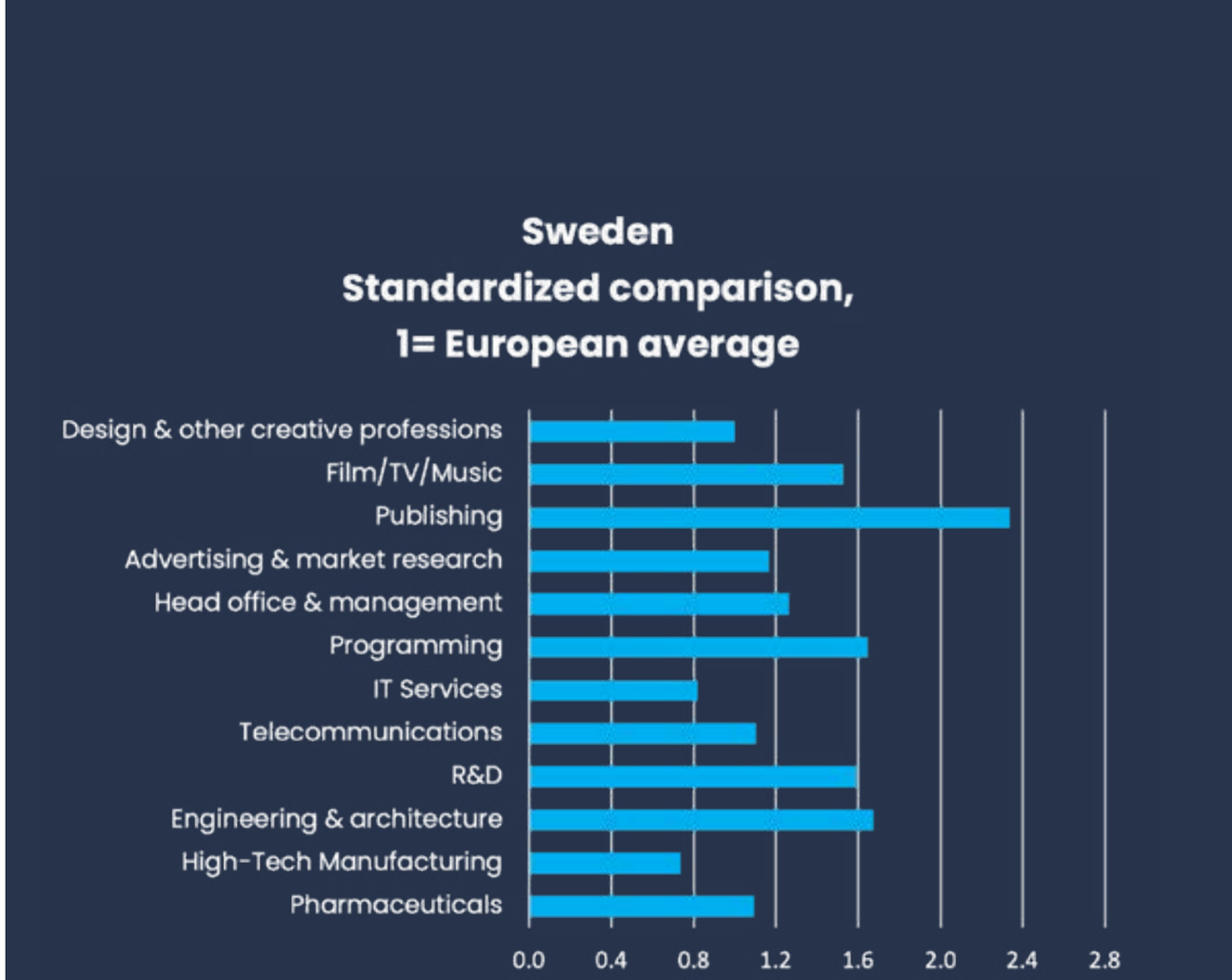
In Stockholm, 17.7 of the adults are employed in brain business jobs. This is the 6th highest concentration, in comparison of 277 European countries. Stockholm shares the 6th spot with the Oxford region (Berkshire, Buckinghamshire and Oxfordshire). While an impressive ranking, Stockholm has gradually fallen behind somewhat, as it used to be the region in Europe with the second highest concentration of brain business jobs per capita. The Västsverige region has 9.2 percent of the adults employed in brain business jobs, while the rate is 8.2 percent in Sydsverige.

Småland med öarna is a strong industry hub, as fully 25.3 percent of the adults are employed in manufacturing industries. Norra Mellansverige (21.3 percent) and Övre Norrland (21.0 percent) also have considerable employment in manufacturing industries.

The highest share of employment in professional services is found in Stockholm, where 12.0 percent of adults are employed in this part of the economy, followed by Mellersta Norrland (9.6 percent), and Västsverige (9.2 percent).

Compared with the rest of Europe, Sweden has particular strengths in publishing, engineering & architecture, research and development, programming, as well as film/TV/music. The country is overall strong in all segments of knowledge-intensive jobs and is only somewhat behind the rest of Europe in high-tech manufacturing, and in IT services.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Stockholm	17.7%	13.6%	12.0%
Västsverige	9.2%	20.6%	9.2%
Sydsverige	8.2%	16.2%	8.3%
Mellersta Norrland	6.4%	18.9%	9.6%
Östra Mellansverige	6.4%	18.2%	7.1%
Övre Norrland	6.4%	21.0%	9.0%
Småland med öarna	5.4%	25.3%	9.0%
Norra Mellansverige	5.3%	21.3%	8.3%



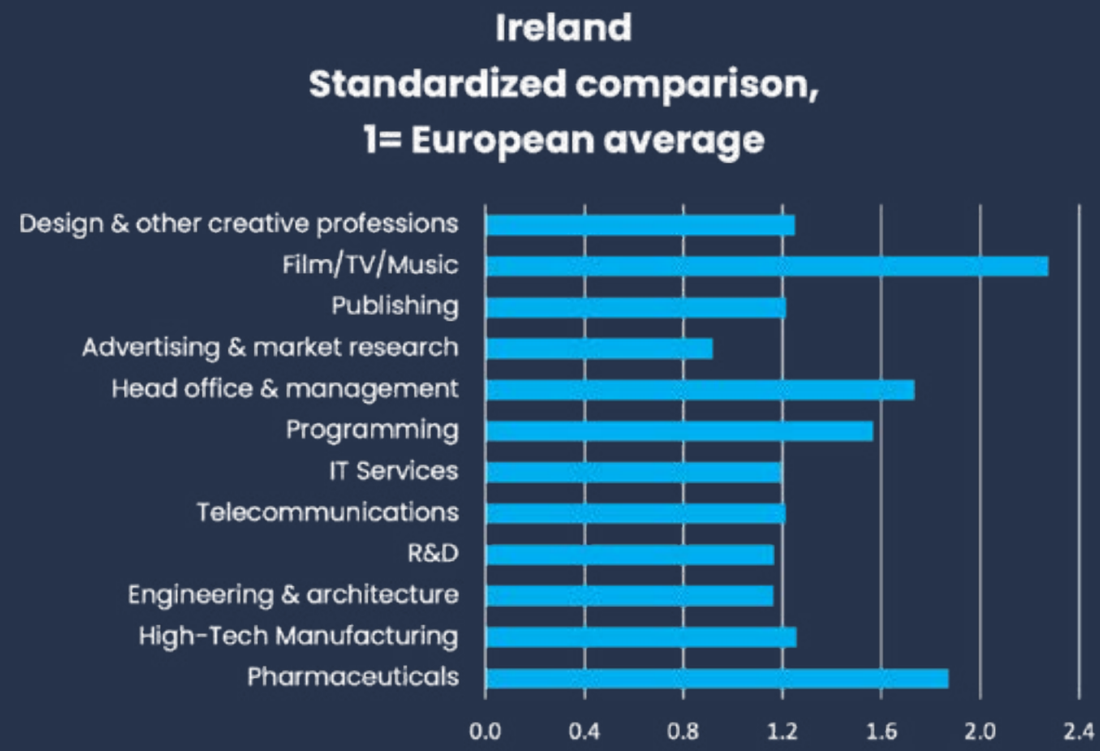
Country Analysis: Ireland

In 2022, 10.0 percent of the working-age adults of Iceland were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is slightly higher than 9.8 percent in the previous year. Ireland is ranked as the country in Europe with the third highest concentration of brain business jobs, slightly after Sweden on second place.

Ireland also has 14.9 percent of the adult population employed in manufacturing industries. Professional services employ additionally 14.0 percent of the adults. Due to limitations in data, the regional number of brain business jobs in Ireland is not included in this study.

Compared to the rest of Europe, Ireland has several strengths. Ireland has a strong pharmaceutical sector, a strong presence in film/TV/music, and a relatively strong presence of head office & management as well as programming sector jobs. The country does not have any major weaknesses but lags behind the rest of Europe somewhat in advertising & market research.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Ireland	10.0%	14.9%	14.0%



Country Analysis: Denmark

In 2022, 9.5 percent of the working-age adults of Denmark were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 8.9 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 6 percent in Denmark.

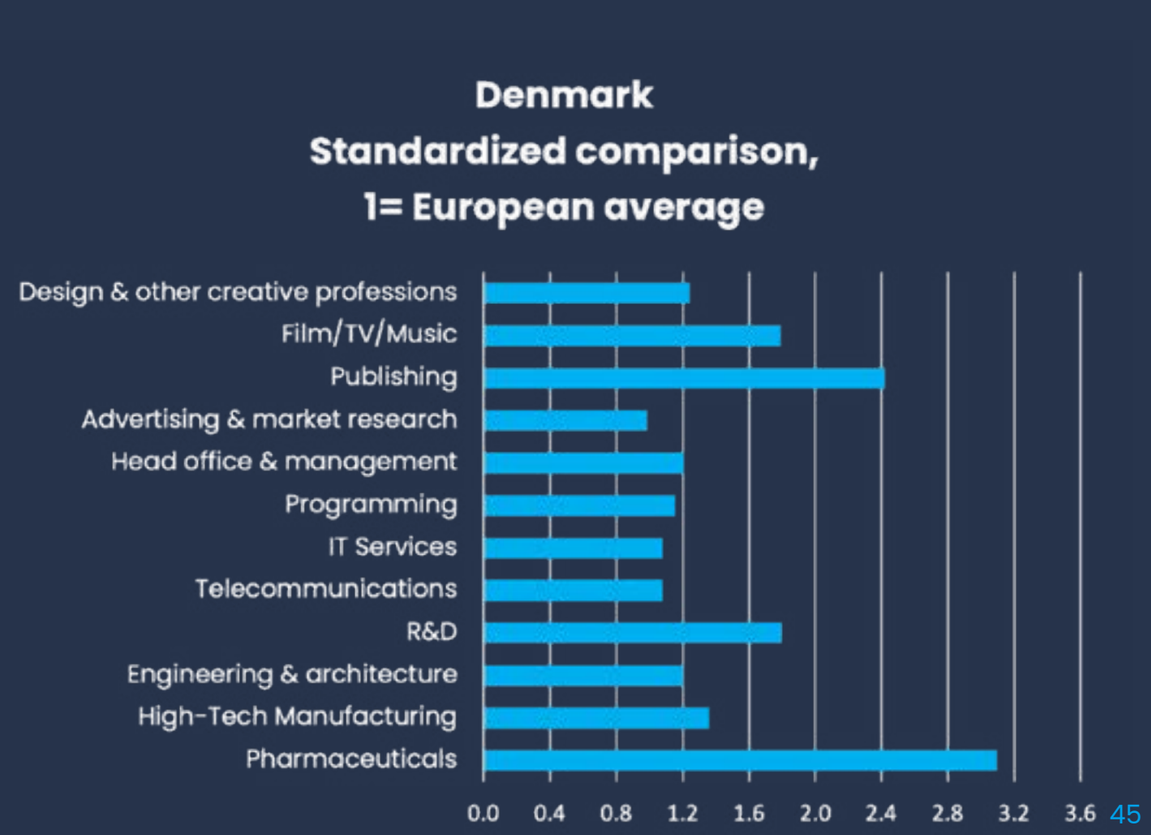
Copenhagen is the brain business hub of Denmark, with 17.3 percent of the adult population employed in knowledge-intensive jobs. This is the 8th highest concentration, in comparison of 277 European regions. Copenhagen is now only slightly behind Stockholm, and ahead of London, Amsterdam, and Berlin, in terms of knowledge-intensive jobs concentration. In Midtjylland 7.8 percent of adults are employed in brain business jobs.

Syddanmark is an important hub for manufacturing, as fully 19.4 percent of the adults are employed in manufacturing industries. Nordjylland (18.6 percent) and Midtjylland (18.5 percent), also have high rates of employment in manufacturing industries.

The highest rate of employment in professional services is found in Copenhagen, where 13.3 percent of adults work in this part of the economy, followed by Syddanmark (9.5 percent), and Midtjylland (7.7 percent).

Compared to the rest of Europe, Denmark has strengths in pharmaceuticals, publishing, film/TV/music, as well as research and development. The country is overall strong in knowledge-intensive sectors but lags somewhat in advertising & market research.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Copenhagen	15.9%	8.6%	13.5%
Midtjylland	7.0%	16.6%	7.1%
Syddanmark	4.5%	17.9%	8.8%
Nordjylland	4.3%	16.9%	7.2%
Sjælland	2.5%	12.4%	6.0%



Country Analysis: Netherlands

In 2022, 9.4 percent of the working-age adults of Netherlands were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 9.0 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 20 percent in Netherlands.

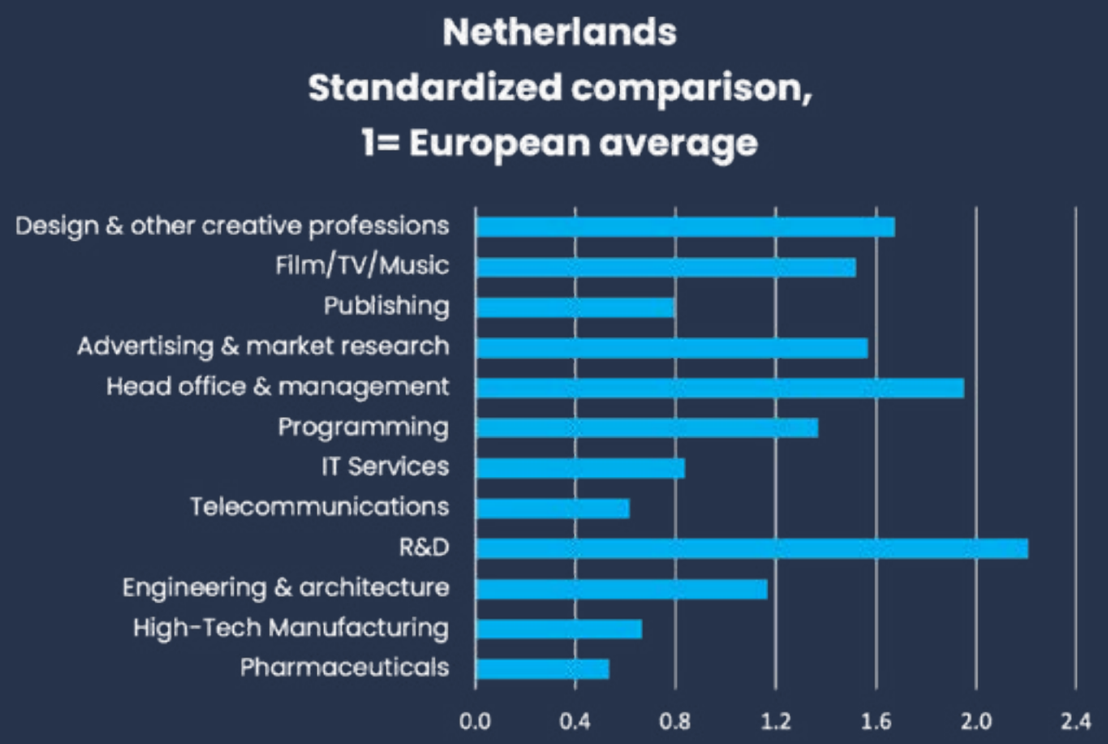
A comparison of 277 European regions shows that Utrecht has the 14th highest concentration of brain business jobs, followed by Amsterdam on 15th place. Both regions have a higher concentration of brain business jobs than Amsterdam, Oslo, and Helsinki.

Noord-Brabant is an important manufacturing hub, as 16.3 percent of the adults are employed in manufacturing industries. Overijssel (15.8 percent) and Zeeland (14.8 percent) also have high shares of manufacturing employment.

The highest share of employment in professional services exists in Amsterdam, where 15.0 percent of the adults are employed in this part of the economy. Zeeland (13.3 percent) and Limburg (11.5 percent) also have strong professional services sectors.

Compared to the rest of Europe, the Netherlands has strengths in research & development, head office & management, and design & other creative professions. The country lags behind the rest of Europe in pharmaceuticals, and telecommunications.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Utrecht	15.8%	10.2%	10.7%
Amsterdam	14.3%	9.2%	15.0%
Noord-Brabant	9.2%	16.3%	10.6%
Zuid-Holland	9.2%	10.3%	10.6%
Gelderland	7.9%	13.3%	9.5%
Overijssel	7.5%	15.8%	10.2%
Groningen	7.2%	9.9%	7.6%
Flevoland	5.9%	9.0%	7.7%
Friesland	5.2%	13.7%	9.3%
Limburg (Netherlands)	5.1%	13.2%	11.5%
Drenthe	4.4%	11.7%	9.8%
Zeeland	4.0%	14.8%	13.3%



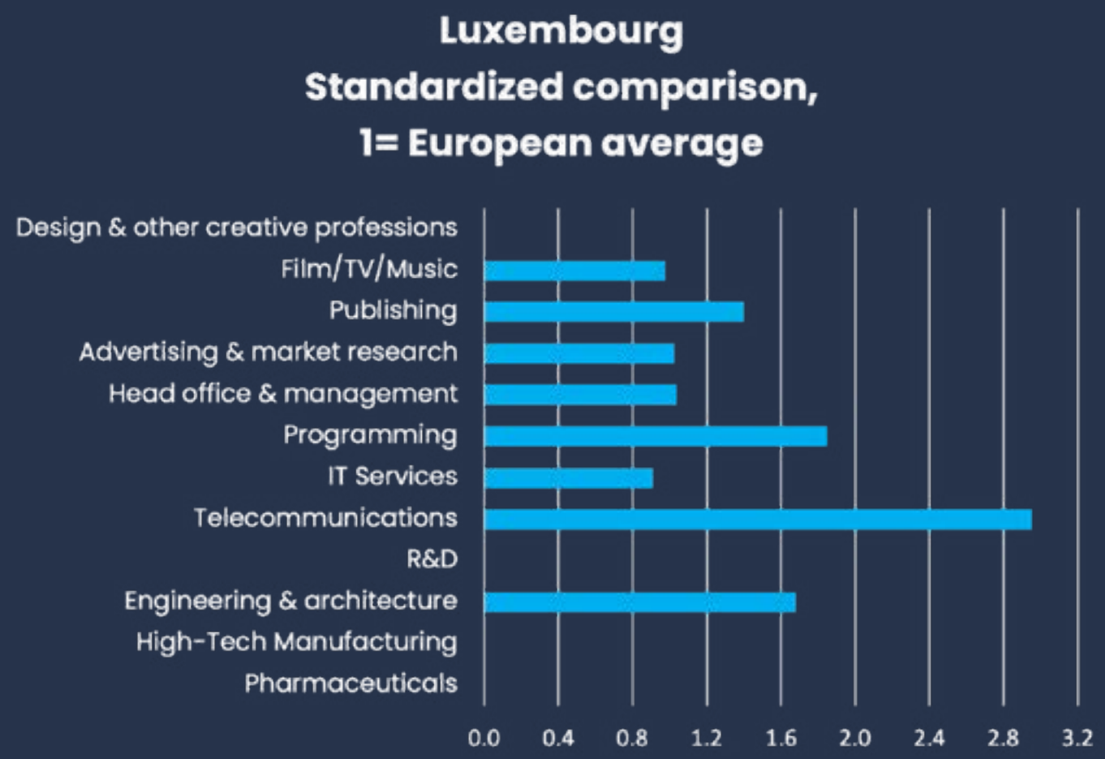
Country Analysis: Luxembourg

In 2022, 9.2 percent of the working-age adults of Luxembourg were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is higher than 8.9 percent the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 11 percent in Luxembourg.

Luxembourg also has a strong manufacturing sector, with 21.0 percent of the adult population employed in manufacturing industries. Professional services employ additionally 20.7 percent of the adults.

Compared to the rest of Europe, Luxembourg has strengths in telecommunications, as well as programming, and engineering & architecture. The country however lags in areas such as design & other creative professions, research & development, and pharmaceuticals.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Luxembourg	9.2%	21.0%	20.7%



Country Analysis: Germany

In 2022, 8.7 percent of the working-age adults of Germany were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 8.1 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 28 percent in Germany.

Germany has numerous regions, which are amongst the European top when it comes to concentration of brain business jobs. In particular, Oberbayern has 18.7 percent of adults employed in knowledge-intensive industries. This is the 4th highest figure in comparison of 277 European regions, as the concentration of brain business jobs in Oberbayern is higher even than Paris, Stockholm, and the Oxford region (Berkshire, Buckinghamshire and Oxfordshire). Hamburg has 15.8 percent of the adults employed in brain business jobs (13th highest concentration in Europe), while Berlin has 14.2 percent (16th highest concentration).

Stuttgart is a leading manufacturing hub, with fully 26.7 percent of the population employed in manufacturing industries. Oberpfalz (25.7 percent), and Tübingen (24.7 percent), have the second and third highest shares of adults employed in manufacturing, in Germany.

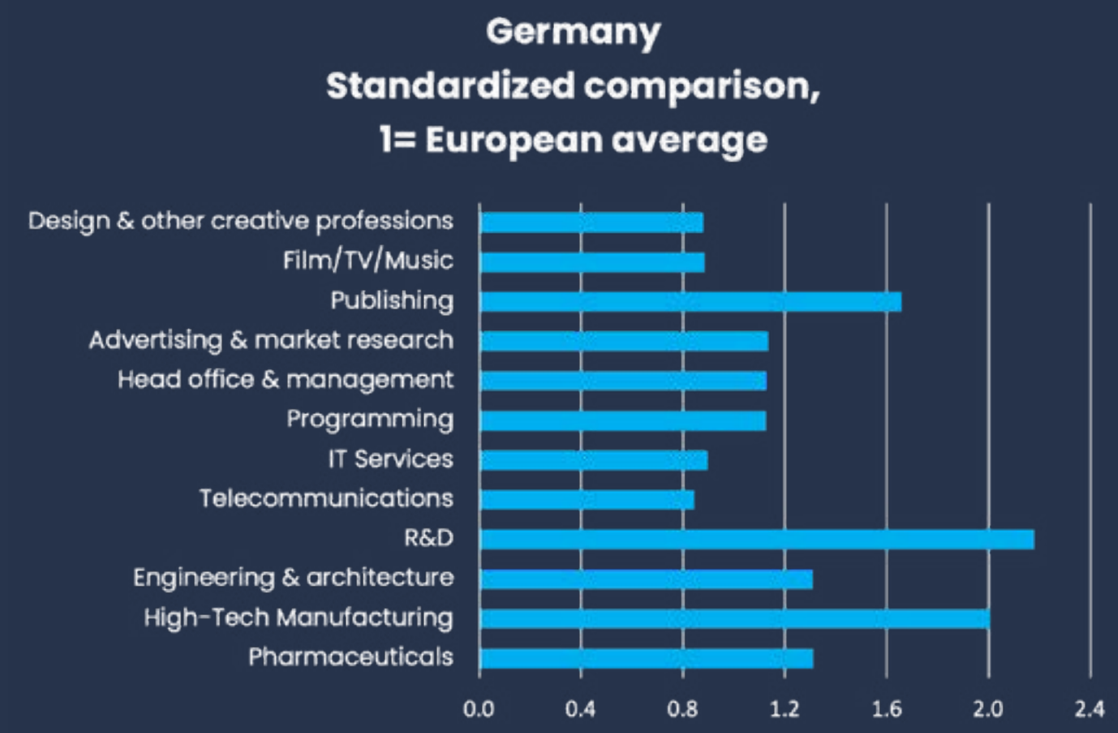
The highest share of employment in professional services exists in Bremen, where 22.1 percent of the adults work in this part of the economy. Hamburg (18.8 percent) and Darmstadt (17.6 percent) also have strong professional services sectors.

Compared to the rest of Europe, Germany has strengths in research & development, high-tech manufacturing, and publishing. Germany is not weak in any area but lags behind the rest of Europe slightly in telecommunications and IT services.

	Brain business jobs per capita	**Industries per capita**	**Professional services per capita**
Oberbayern	18.7%	18.4%	15.0%
Hamburg	15.8%	11.9%	18.8%
Berlin	14.2%	7.9%	11.3%
Darmstadt	13.6%	13.0%	17.6%
Köln	12.9%	13.2%	14.2%
Mittelfranken	12.8%	23.7%	11.2%
Karlsruhe	12.4%	20.7%	9.8%
Stuttgart	11.3%	26.7%	10.1%
Bremen	10.4%	17.7%	22.1%
Düsseldorf	9.4%	14.2%	13.6%
Braunschweig	7.7%	21.4%	8.3%
Leipzig	7.5%	15.8%	13.4%
Dresden	7.4%	18.5%	8.7%
Rheinhessen-Pfalz	6.7%	14.7%	9.6%
Hannover	6.5%	14.6%	11.4%
Tübingen	6.2%	24.7%	7.5%
Freiburg	6.2%	23.2%	7.8%
Schleswig-Holstein	6.0%	13.2%	10.6%

Saarland	5.7%	19.6%	8.2%
Thüringen	5.5%	20.7%	6.5%
Detmold	5.4%	24.3%	9.5%
Unterfranken	5.3%	23.5%	8.0%
Oberpfalz	5.2%	25.7%	7.8%
Arnsberg	4.9%	19.2%	11.7%
Koblenz	4.8%	5.0%	9.0%
Münster	4.7%	18.0%	9.2%
Oberfranken	4.6%	24.4%	7.4%
Kassel	4.5%	20.9%	12.7%

Weser-Ems	4.3%	21.9%	9.4%
Chemnitz	4.3%	24.5%	5.6%
Schwaben	4.2%	22.4%	8.9%
Brandenburg	3.8%	13.6%	8.0%
Niederbayern	3.8%	23.9%	7.1%
Sachsen-Anhalt	3.7%	17.8%	7.8%
Gießen	3.6%	19.2%	6.5%
Mecklen-burg-Vorpom-mern	3.3%	13.2%	10.1%
Trier	2.9%	5.0%	9.6%
Lüneburg	2.4%	14.5%	7.7%



Country Analysis: UK

In 2022, 8.4 percent of the working-age adults of UK were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is higher than 8.1 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 16 percent in the UK.

In comparison of 277 European regions, the Oxford region has the 7th highest concentration of brain business jobs, while London has the 9th highest concentration. The total number of brain business jobs is nearly 950 000 in London, which besides the close to 1.3 million brain business jobs in Paris, is by far the highest number in Europe.

Chemnitz has the highest concentration of manufacturing sector jobs in the UK, with 24.5 percent of the adults employed by manufacturing industries. North Eastern Scotland (19.9 percent) and Cumbria (18.7 percent) also have significant employment in manufacturing.

The highest share of employment in professional services exists in Highlands and Islands, where 20.5 percent of adults work in this part of the economy. Cheshire (18.7 percent) and North Yorkshire (17.4 percent) also have strong professional service jobs concentration, slightly ahead London (16.7 percent).

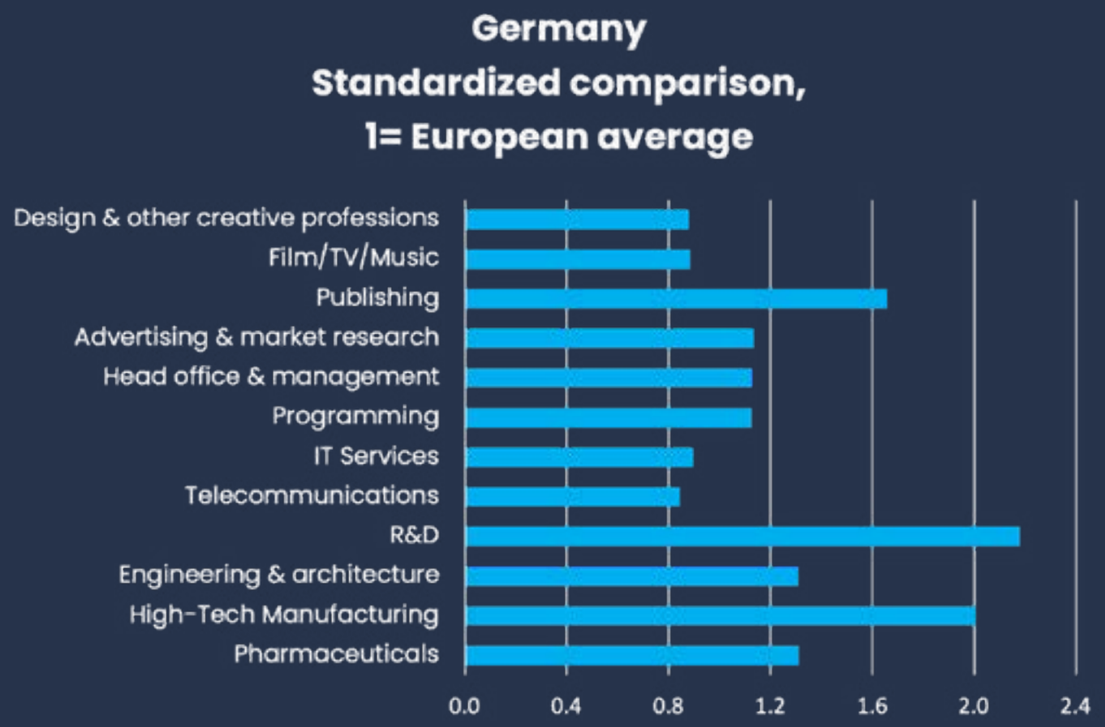
Compared to the rest of Europe, the UK has several strengths. The main strengths are in research & development, film/tv/music, and head offices &

management. On the other hand, the UK is behind the rest of Europe when it comes to areas such as pharmaceuticals, and high-tech manufacturing.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Berkshire. Buck-inghamshire and Oxfordshire	17.7%	9.5%	12.5%
London	16.6%	5.3%	16.7%
Bedfordshire and Hertfordshire	12.4%	9.7%	13.3%
North Eastern Scotland	11.9%	19.9%	13.4%
Cheshire	11.8%	12.8%	18.7%
Surrey. East and West Sussex	10.8%	8.0%	12.4%
Hampshire and Isle of Wight	10.2%	9.9%	12.2%
Gloucestershire. Wiltshire and Bris-tol/Bath area	10.1%	11.1%	13.6%
East Anglia	9.4%	11.5%	12.7%
Herefordshire. Worcestershire and Warwickshire	8.5%	15.5%	12.7%
North Yorkshire	8.0%	12.1%	17.4%
West Yorkshire	7.6%	11.7%	12.3%
Eastern Scotland	7.5%	8.2%	11.7%
Leicestershire. Rutland and Northamptonshire	7.5%	13.5%	12.6%
Greater Manchester	7.4%	9.6%	14.1%
West Central Scotland	7.3%	9.2%	12.0%
Essex	7.2%	9.4%	11.9%
Dorset and Somerset	6.6%	13.3%	14.3%

Derbyshire and Nottinghamshire	6.3%	13.6%	10.4%
Northumberland and Tyne and Wear	6.3%	10.8%	10.6%
East Wales	6.3%	13.4%	13.0%
Kent	5.7%	8.9%	11.0%
Merseyside	5.4%	8.5%	12.4%
Shropshire and Staffordshire	5.4%	14.3%	11.2%
West Midlands	5.3%	11.0%	10.5%
South Yorkshire	5.3%	11.2%	11.1%
Devon	5.2%	10.5%	13.4%
Highlands and Islands	5.0%	16.4%	20.5%

Cumbria	4.7%	18.7%	16.5%
Northern Ireland	4.7%	11.9%	9.5%
East Yorkshire and Northern Lincoln-shire	4.5%	16.7%	11.9%
Lancashire	4.5%	14.8%	11.2%
Chemnitz	4.3%	24.5%	5.6%
Tees Valley and Durham	4.2%	11.1%	8.5%
Lincolnshire	3.9%	13.7%	11.3%
Cornwall and Isles of Scilly	3.7%	9.6%	14.8%
West Wales and The Valleys	3.6%	10.9%	9.8%
Southern Scotland	3.5%	10.4%	9.5%



Country Analysis: Iceland

In 2022, 8.2 percent of the working-age adults of Iceland were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 7.5 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by 6 percent in Iceland.

Iceland also has a strong manufacturing sector, with 17.2 percent of the adult population employed in manufacturing industries. Professional services employ additionally 14.2 percent of the adults of Iceland.

Compared to the rest of Europe, Iceland has several strengths. The main strength is in film/TV/music, design & other creative professions, as well as research & development. Iceland lags behind the rest of Europe in high-tech manufacturing, and head office & management.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Iceland	8.2%	17.2%	14.2%

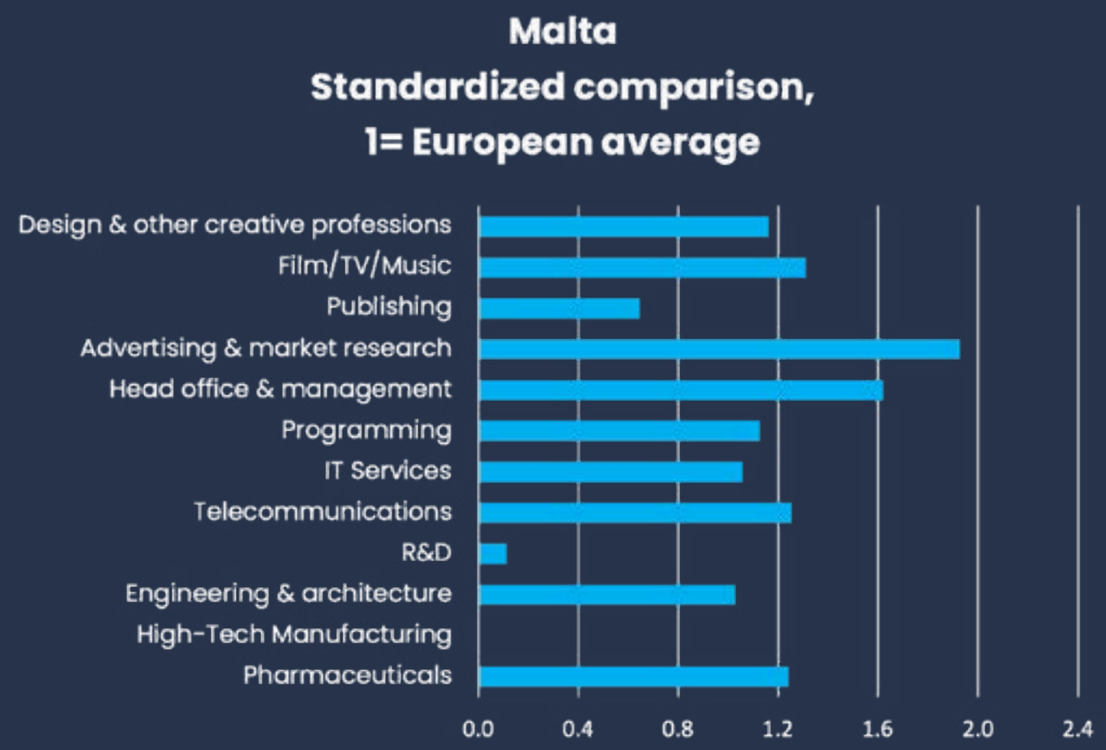
Country Analysis: Malta

In 2022, 8.1 percent of the working-age adults of Malta were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 7.6 percent in the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by fully 40 percent in Malta.

Malta also has 11.1 percent of the adult population employed in manufacturing industries. Professional services employ additionally 12.3 percent of the adults of Malta.

Compared to the rest of Europe, Malta strengths in advertising and market research, as well as head offices and management. Film/TV/music, telecommunications, and pharmaceuticals are other strengths of Malta. Malta however lags in areas such as high-tech manufacturing and research & development.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Malta	8.1%	11.1%	12.3%



Country Analysis: Hungary

In 2022, 8.1 percent of the working-age adults of Hungary were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 7.5 percent the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has increased by fully 51 percent in Hungary.

In Budapest, fully 23.9 percent of the adults are employed in brain business jobs. In all previous version of this index, Bratislava has been the European region with the highest concentration of brain business jobs, but this year it is Budapest that climbs to the number one position, with the highest share of knowledge-intensive jobs amongst the adult population in 277 European regions.

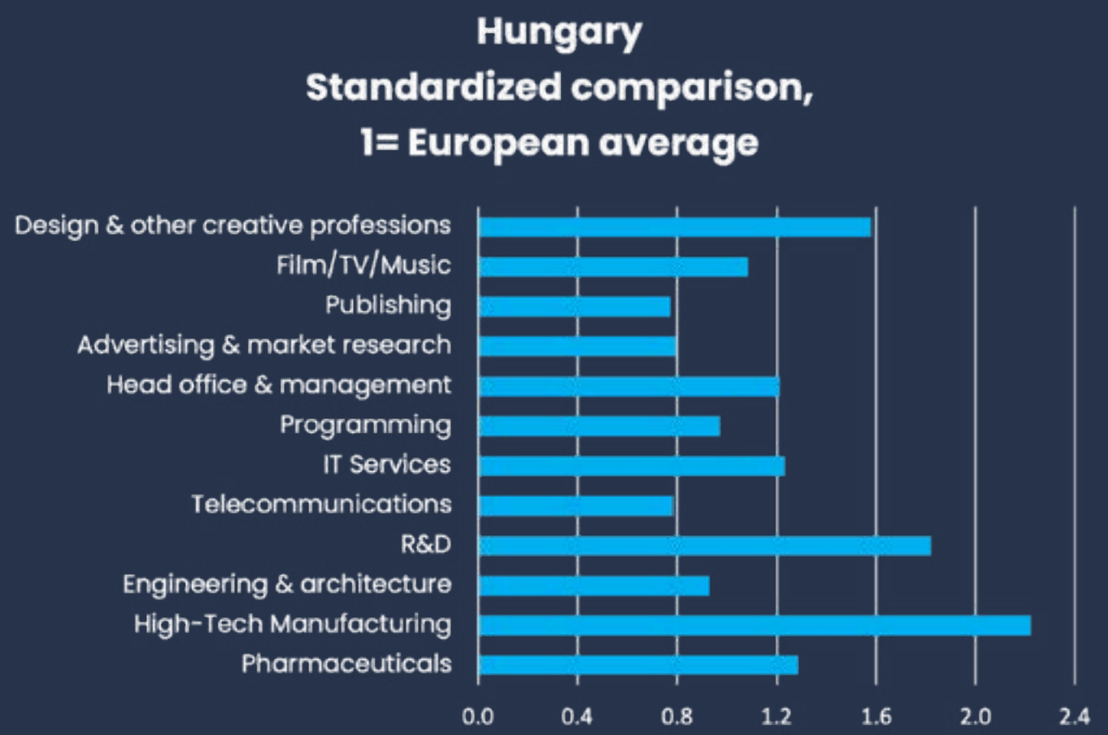
Paris and London have higher total number of brain business jobs, but it is the three Eastern European capital regions of Budapest, Bratislava, and Prague that have the highest concentrations. In Hungary, the region with second highest concentration of brain business jobs is Pest (7.3 percent), followed by Dél-Dunántúl (5.2 percent).

Közép-Dunántúl is an important hub for manufacturing, with fully 25.7 percent of the adults employed in manufacturing industries. The second highest concentration of industry jobs is found in Nyugat-Dunántúl (22.8 percent), followed by Dél-Alföld (18.7 percent).

Budapest has the highest share of adults employed in professional services, 23.8 percent. Pest (7.6 percent) and Nyugat-Dunántúl (7.5 percent) also have high concentration of professional services employment.

Compared to the rest of Europe Hungary has strength in high-tech manufacturing, research & development, as well as in design & other creative professions. It lags behind the rest of Europe in telecommunications, publishing, and advertising & market research.

	Brain business jobs per capita	**Industries per capita**	**Professional services per capita**
Budapest	23.9%	17.6%	23.8%
Pest	7.3%	17.3%	7.6%
Dél-Dunántúl	5.2%	14.5%	5.2%
Közép-Dunántúl	5.1%	25.7%	6.3%
Nyugat-Dunántúl	4.1%	22.8%	7.5%
Észak-Alföld	3.8%	15.1%	4.6%
Észak-Magyarország	3.8%	15.0%	4.4%
Dél-Alföld	3.8%	18.7%	5.7%
Észak-Magyarország	3.9%	16.3%	6.1%
Észak-Alföld	3.8%	14.8%	5.5%
Dél-Alföld	3.7%	18.2%	6.7%



Country Analysis: Finland

In 2022, 8.0 percent of the working-age adults of Finland were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a decrease from 8.6 percent the previous year. Since 2014, the share of adults in Finland who are employed in knowledge-intensive occupations has increased by 17 percent.

In Helsinki, 13.0 percent of the adults are employed in brain business jobs. This is the 20th highest concentration, in comparison of the 277 European regions. Helsinki has a higher concentration of knowledge-intensive jobs compared to Köln, Mittelfranken, and Brussels. The second highest concentration of brain business jobs is found in Länsi-Suomi (6.0 percent), followed by Åland (5.5 percent).

Länsi-Suomi is an important industrial hub, as fully 19.6 percent of the adults are employed in manufacturing industries. Eletä-Suomi follows on second place (18.4 percent), and Pohjois-ja Itä-Suomi is ranked third (16.4 percent), in terms of concentration of manufacturing industry jobs in Finland.

Åland has the highest share of adults employed in professional services, fully 25.9 percent. Helsinki has the second highest share in Finland (9.9 percent), followed by Eletä-Suomi (7.7 percent).

Compared to the rest of Europe, Finland has strengths in high-tech manufacturing, publishing, programming as well as engineering &

architecture. The country lags the rest of Europe in pharmaceuticals, and also IT services.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Helsinki	13.0%	13.1%	9.9%
Länsi-Suomi	6.0%	19.6%	6.7%
Åland	5.5%	12.2%	25.9%
Pohjois- ja Itä-Suomi	5.2%	16.4%	7.3%
Etelä-Suomi	5.1%	18.4%	7.7%

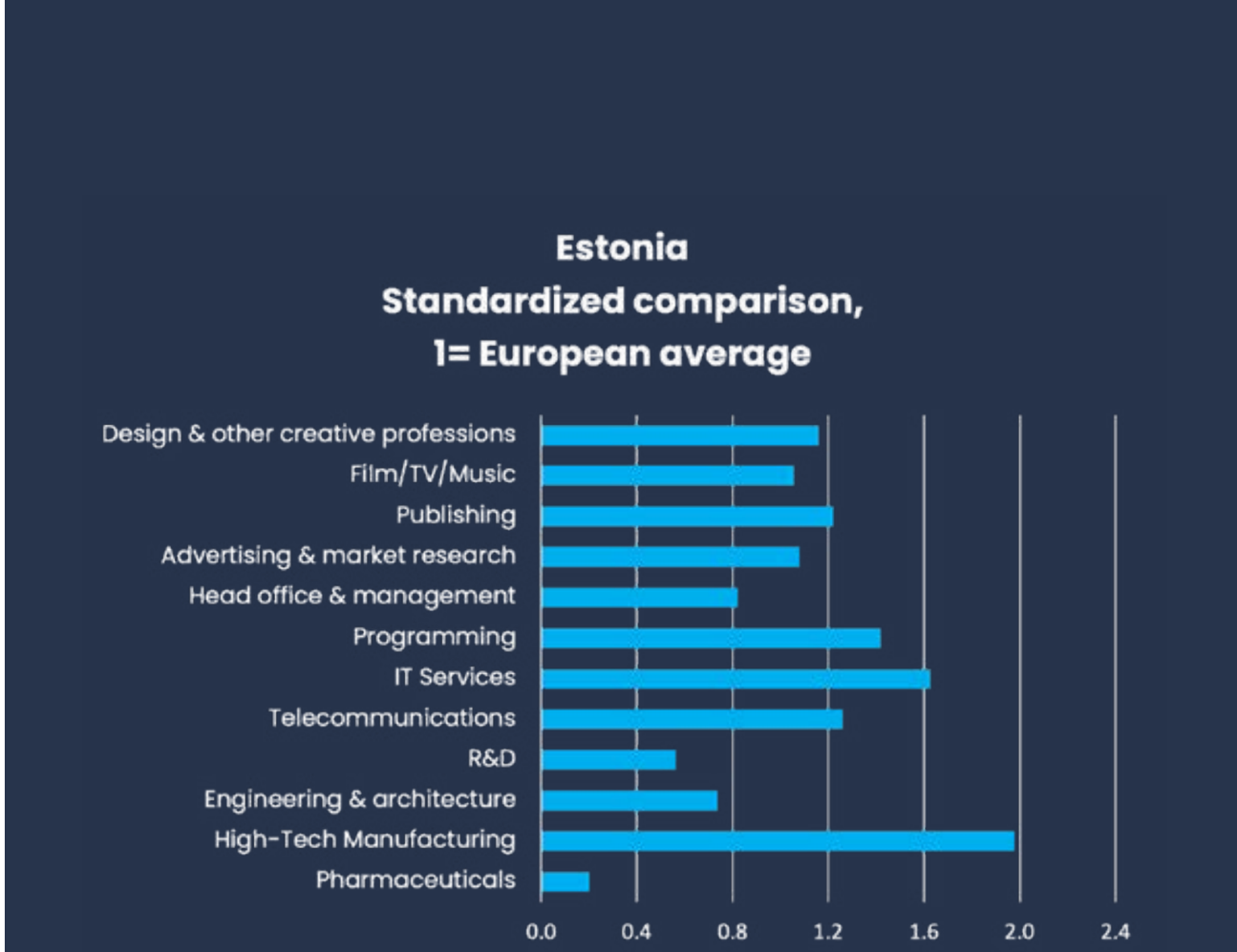
Country Analysis: Estonia

In 2022, 7.9 percent of the working-age adults of Estonia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase compared to 7.7 percent the previous year. Since 2014, the share of adults employed in knowledge-intensive occupations has increased by fully 40 percent in Estonia.

Estonia also has many manufacturing industries, which employs a further 21.5 percent of the adult population. Professional services employ additionally 10.0 percent of the adults of Estonia.

Compared to the rest of Europe, Estonia has strengths in high-tech manufacturing, IT services, programming, and telecommunications. It lags behind the rest of Europe in pharmaceuticals, and research & development.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Estonia	7.9%	21.5%	10.0%



Country Analysis: Slovenia

In 2022, 7.7 percent of the working-age adults of Slovenia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 7.3 percent the previous year. Since 2014, the share of knowledge-intensive workers of Slovenia has increased by fully 42 percent.

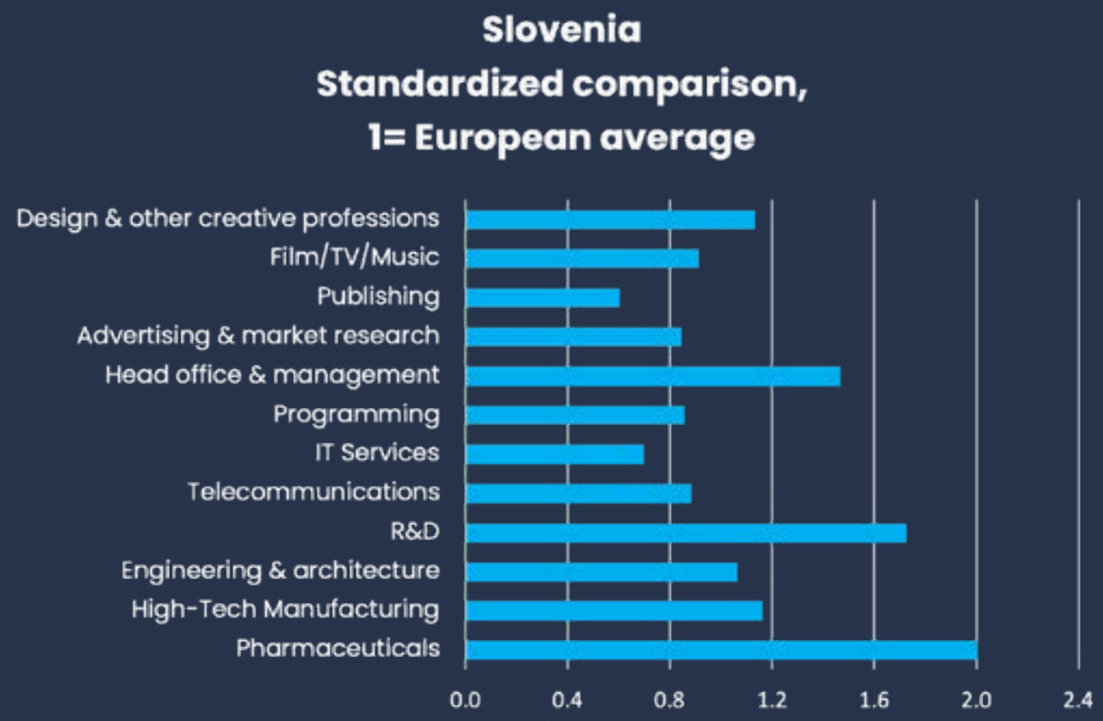
In the Ljubljana capital region, fully 11.3 percent of the adults are employed in brain business jobs, compared to 4.8 percent in Vzhodna Slovenija.

Vzhodna Slovenija is an important manufacturing hub, where fully 25.6 percent of the adults are employed in manufacturing industries, which can be compared with 21.5 percent in Ljubljana.

Professional services employ 11.1 percent of the adults of Ljubljana, and 7.4 percent of the adults of Vzhodna Slovenija.

Compared to the rest of Europe, Slovenia has strengths in pharmaceuticals, research & development, and head office & management. It lags in IT services and publishing.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Ljubljana	11.3%	21.5%	11.1%
Vzhodna Slovenija	4.8%	25.6%	7.4%



Country Analysis: Norway

In 2022, 7.0 percent of the working-age adults of Norway were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase, compared to 6.8 percent of adults employed in brain business jobs the previous year. Since 2014, the share of adults employed in knowledge-intensive occupations has increased by 7 percent in Norway.

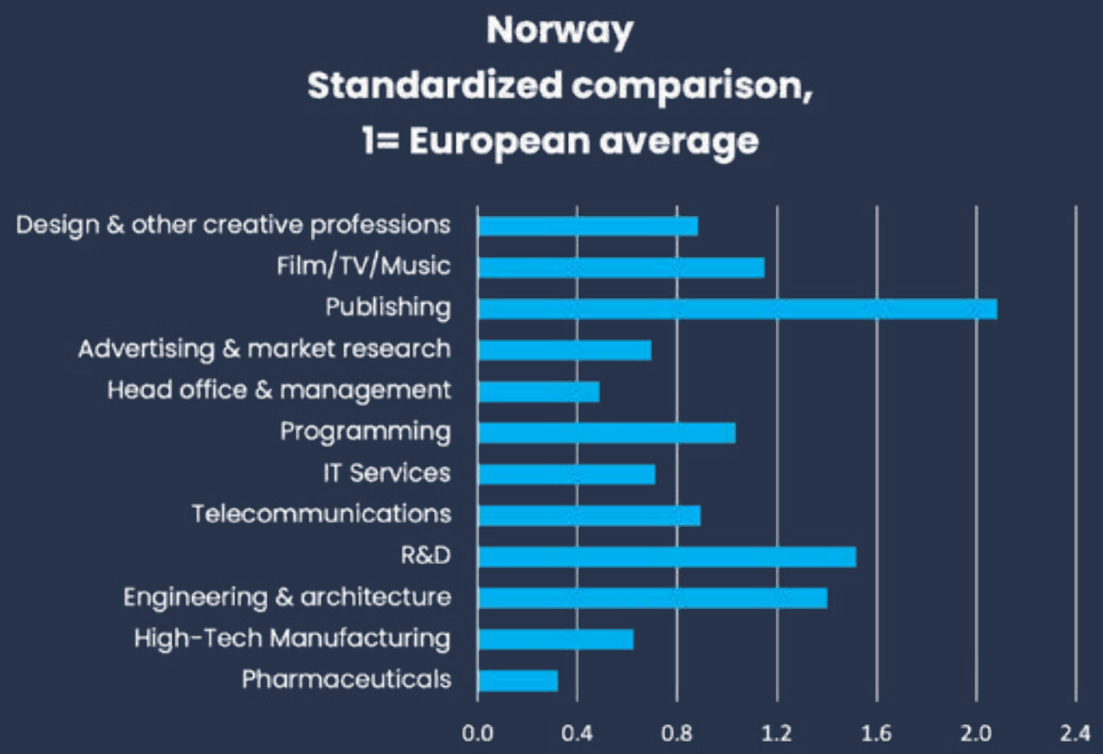
In Oslo, fully 13.3 percent of adults are employed in brain business jobs. This is the 19th highest concentration, in comparison of 277 European regions. Oslo has a higher share of adults employed in knowledge-intensive jobs compared to Helsinki, Köln, and Brussels. The region in Norway with the second highest concentration of brain business jobs employees is Trøndelag (6.5 percent), followed by Agder og Rogaland (5.4 percent).

Agder og Rogaland is a key manufacturing hub, with fully 25.0 percent of adults employed in manufacturing industries. Vestlandet follows on second place (20.9 percent), and Hedmark og Oppland on third place (18.1 percent).

Oslo has the highest share of adults employed in professional services, 13.6 percent. Nord-Norge follows on second place (12.5 percent), and Vestlandet on third place (10.4 percent), in concentration of professional services employment.

Compared to the rest of Europe, Norway has strengths in publishing, as well as research & development. In head office & management, and pharmaceuticals, Norway however lags the rest of Europe.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Oslo	13.3%	11.8%	13.6%
Trøndelag	6.5%	15.6%	9.7%
Agder og Rogaland	5.4%	25.0%	10.3%
Vestlandet	4.8%	20.9%	10.4%
Sør-Østlandet	4.5%	17.6%	8.3%
Hedmark og Oppland	3.4%	18.1%	9.7%
Nord-Norge	3.1%	16.1%	12.5%



Country Analysis: Lithuania

In 2022, 6.9 percent of the working-age adults of Lithuania were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase, compared to 6.0 percent the previous year. Since 2014, the share of adults employed in knowledge-intensive occupations has increased by 62 percent in Lithuania, which alongside Cyprus and Portugal is the strongest rate of growth in Europe.

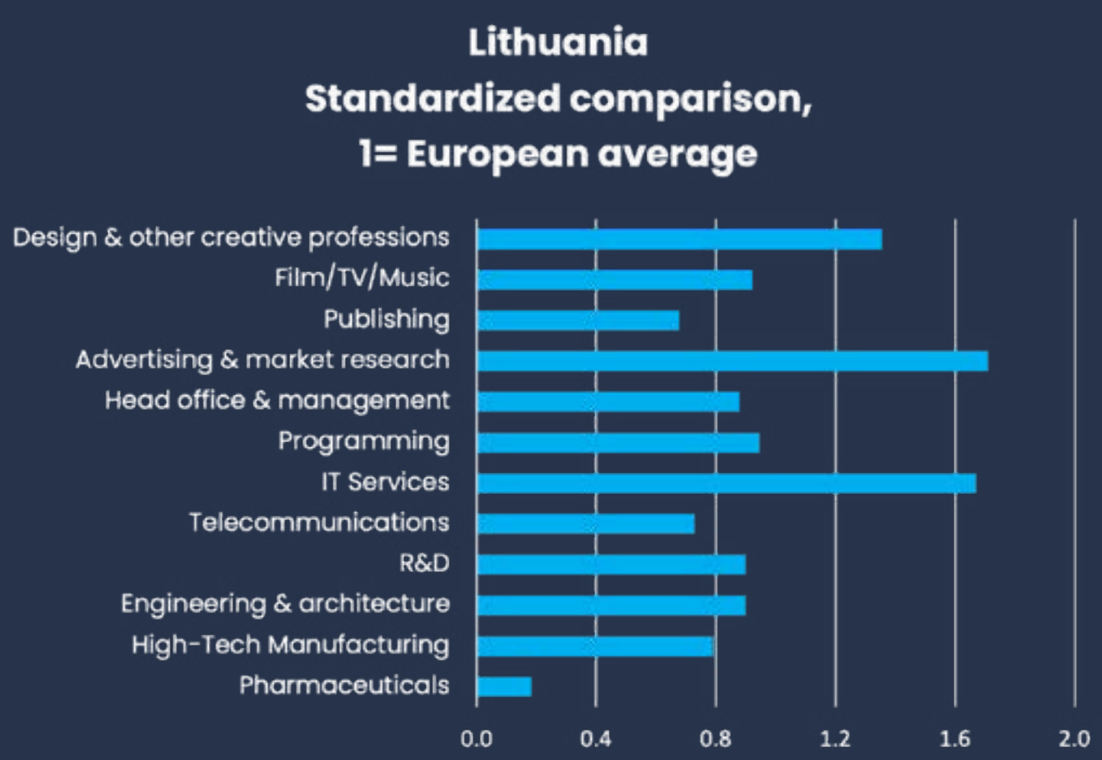
In the Vilnius region, 13.8 percent of adults are employed in brain business jobs. This is the 17th highest concentration, in comparison of the 277 European regions. Vilnius has a larger share of adults employed in knowledge-intensive occupations than Oslo, Helsinki, and Brussels. In the Vidurio region, 3.8 percent of adults work in brain business jobs.

Vidurio has 21.9 percent of adults employed in manufacturing industries, a high rate, while in Vilnius 18.4 percent of adults work in the same part of the economy.

Vilnius has 20.8 percent of adults employed in professional services, compared to 13.3 percent in Vidurio.

Compared to the rest of Europe, Lithuania has strengths in advertising & market research, IT services, and design & other creative professions. The country lags behind the rest of Europe in pharmaceuticals. Telecommunications, and publishing, are also relatively less developed in a European comparison.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Vilnius	13.8%	18.4%	20.8%
Vidurio	3.8%	21.9%	13.3%



Country Analysis: Belgium

In 2022, 6.6 percent of the working-age adults of Belgium were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a decrease compared to 7.1 percent the previous year. Since 2014 however, the share of adults employed in knowledge-intensive jobs has increased, by 17 percent.

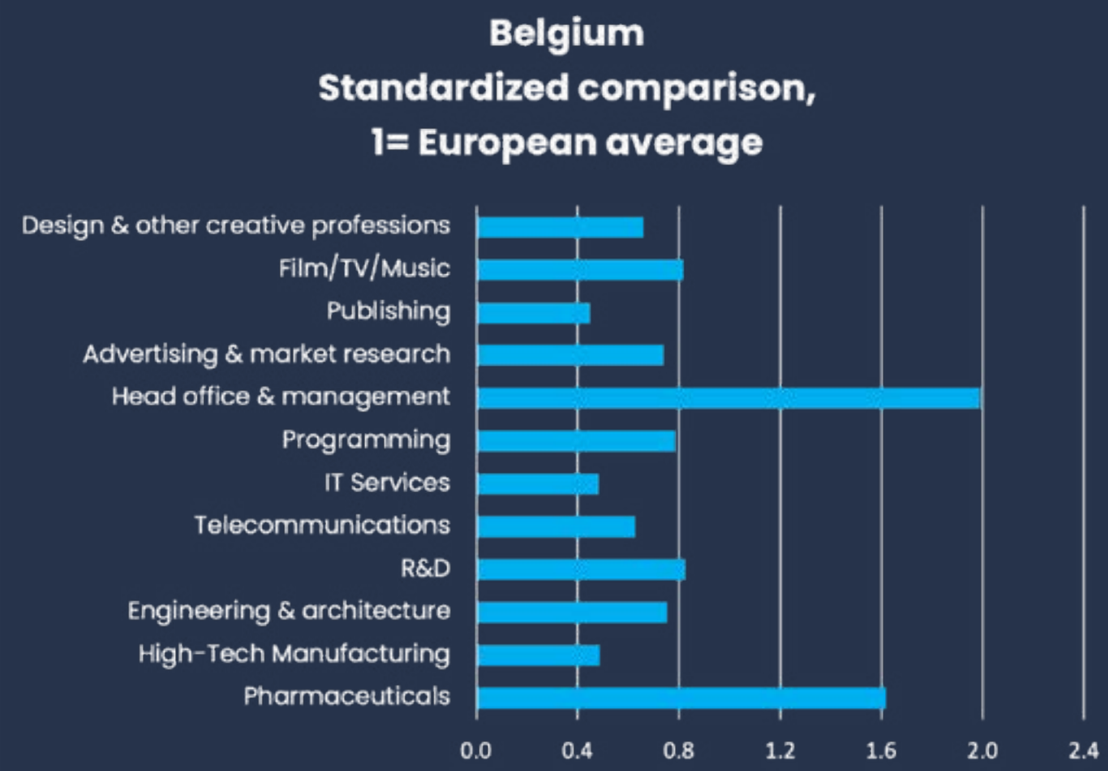
Walloon Brabant is the brain business hub of Belgium, as fully 16.1 percent of adults in the region are employed in knowledge-intensive occupations. This is the 12th highest rate in comparison of the 277 European regions, and higher than Hamburg, Amsterdam, as well as Berlin. Brussels has 12.7 percent of adults employed in brain business jobs, which is the 24th highest rate amongst European regions.

West Flanders is an important industrial hub, with 20.8 percent of adults employed in manufacturing industries. East Flanders follows on second place (16.5 percent), and Limburg on third place (15.9 percent).

Brussels is the region in Belgium where the highest share of adults, 13.2 percent, are employed in professional services. On second place follows Flemish Brabant (9.1 percent), while Antwerp (8.9 percent) is ranked third.

Compared to the rest of Europe Belgium has strengths in head office & management, as well as in pharmaceuticals. It lags behind Europe in publishing, high-tech manufacturing and IT services.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Walloon Brabant	16.1%	8.8%	6.7%
Brussels	12.7%	6.9%	13.2%
Flemish Brabant	11.0%	9.3%	9.1%
Antwerp	10.2%	15.1%	8.9%
East Flanders	7.0%	16.5%	6.8%
West Flanders	5.8%	20.8%	8.0%
Limburg (Belgium)	5.5%	15.9%	6.6%
Liège	3.8%	12.0%	6.2%
Namur	3.7%	8.7%	5.0%
Hainaut	2.8%	10.3%	5.1%
Luxembourg (Belgium)	1.3%	11.3%	5.1%



Country Analysis: Czechia

In 2022, 6.6 percent of the working-age adults of Czechia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase, compared to 6.4 percent of adults the previous year. Since 2014 the share of adults employed in knowledge-intensive occupations has grown, by 25 percent.

Prague is the brain business hub of Czechia, as fully 19.9 percent of the adults are employed in knowledge-intensive occupations. This is the third highest rate in comparison of the 277 European regions, with only Budapest and Bratislava having a higher concentration of knowledge-intensive jobs.

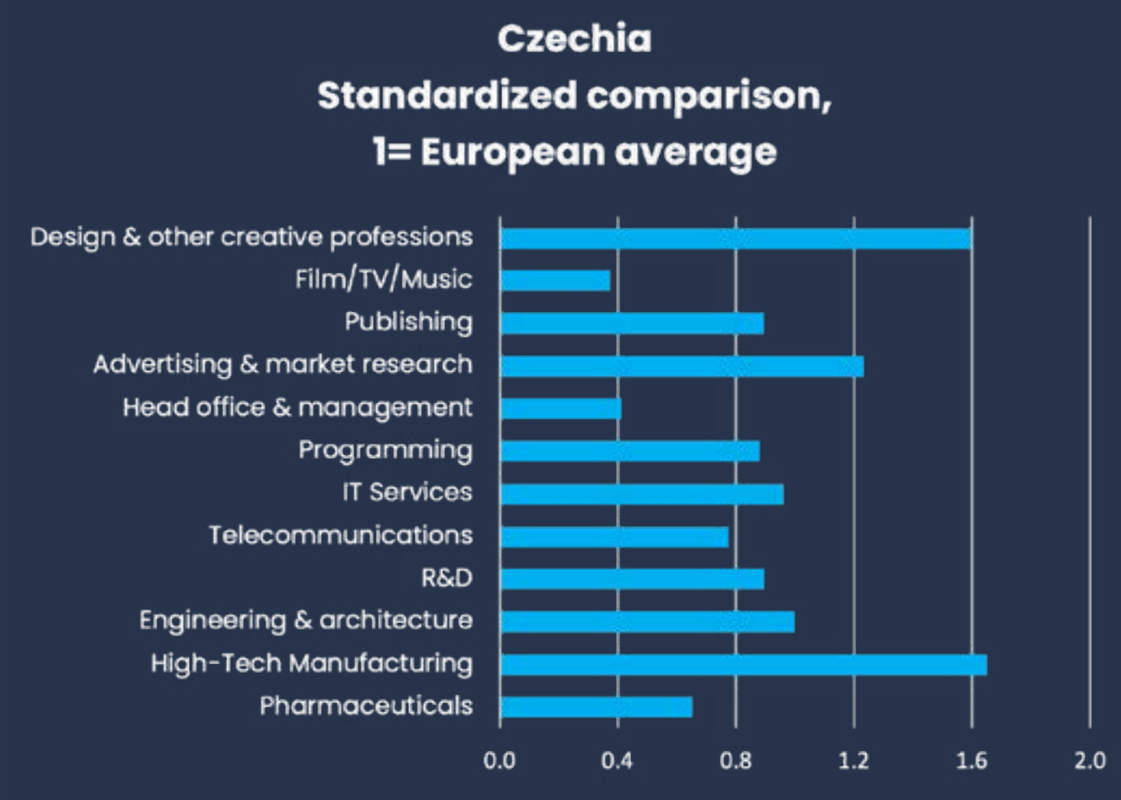
While regions such as Paris and London have a larger absolute number of brain business jobs, in terms of concentration, it is the three Eastern European capital regions that have the highest concentration of knowledge-intensive employees. The region in Czechia with the second highest concentration of brain business jobs is Jihovýchod (7.1 percent).

Severovýchod is an important manufacturing hub, as fully 29.0 percent of the adults are employed in manufacturing companies. Strední Morava follows on second place (28.8 percent), while Jihozápad has the third highest concentration of manufacturing employment (26.6 percent).

The highest share of employment in professional services is found in the capital Prague region, where 18.2 percent of adults work in this part of the economy. The second highest rate is found in Strední Cechy (8.1 percent), followed by Jihozápad (7.8 percent).

Compared to the rest of Europe, Czechia has strengths in high-tech manufacturing, design & other creative professions, and advertising & market research. The country lags in film/TV/music, and in head office & management.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Prague	19.9%	18.6%	18.2%
Jihovýchod	7.1%	26.6%	7.4%
Severovýchod	4.8%	29.0%	6.7%
Moravskoslezsko	4.8%	26.0%	7.1%
Strední Morava	4.3%	28.8%	6.9%
Strední Cechy	4.1%	22.4%	8.1%
Jihozápad	3.9%	26.6%	7.8%
Severozápad	2.4%	22.8%	6.5%



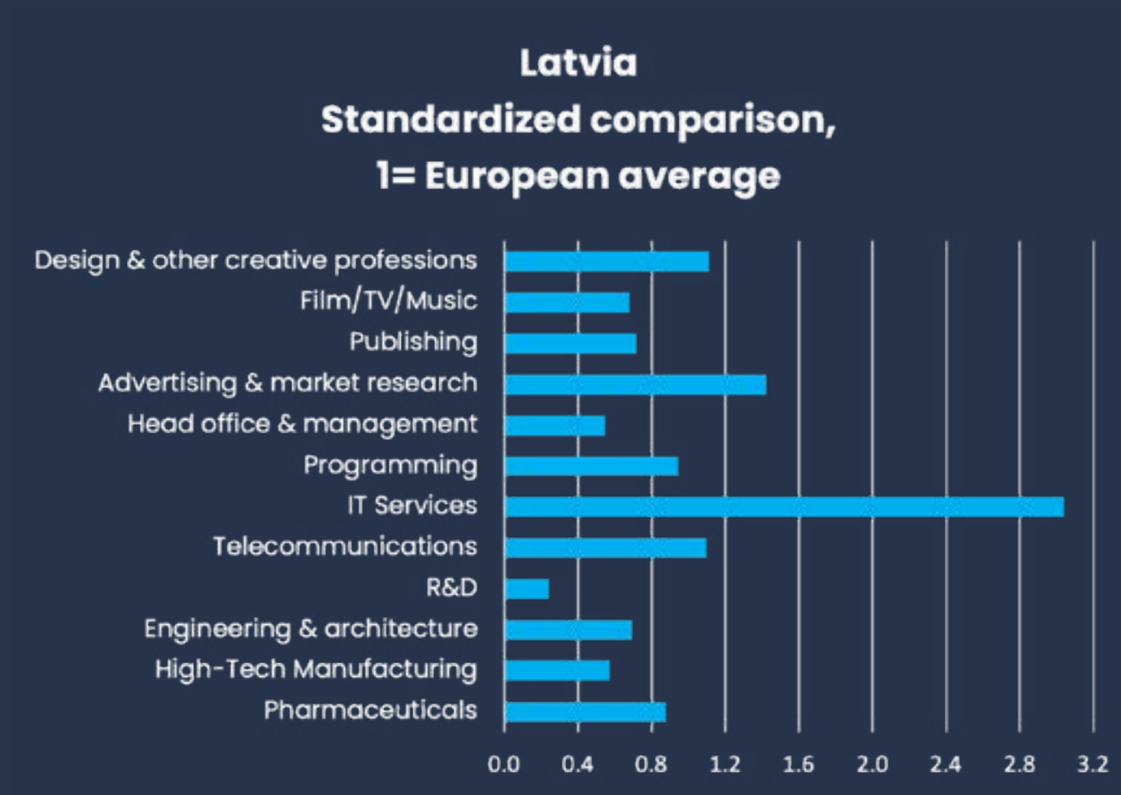
Country Analysis: Latvia

In 2022, 6.5 percent of the working-age adults of Latvia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is lower than 7.1 percent the previous year. Since 2014, the share of knowledge-intensive jobs employees in Latvia has however increased, by 37 percent.

There are 17.9 percent of the adults in Latvia who are employed in manufacturing industries. Professional services employ additionally 11.0 percent of the adults.

Compared to the rest of Europe, Latvia is particularly strong in IT services. Other strengths include advertising & market research, and design & other creative professions. The country lags the rest of Europe in research & development, and head office & management.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Latvia	6.5%	17.9%	11.0%



Country Analysis: Austria

In 2022, 6.4 percent of the working-age adults of Austria were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase from 6.1 percent the previous year. Since 2014, the share of knowledge intensive workers has increased by 7 percent.

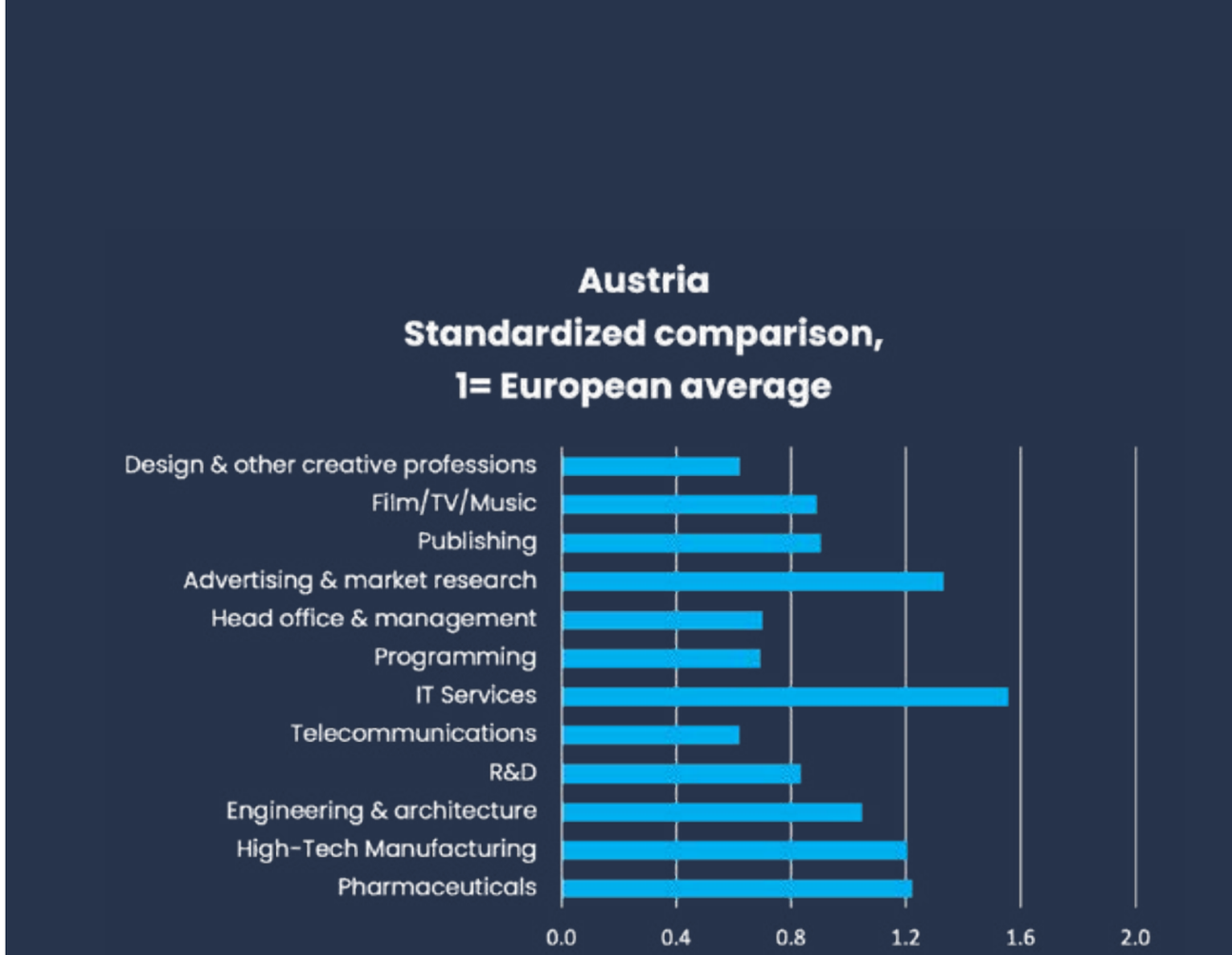
In Vienna, fully 12.6 percent of adults are employed in brain business jobs. This is the 26th highest rate, in comparison of 277 European regions, and higher than regions such as Stuttgart, and Luxembourg. The second highest rate in Austria is found in Steiermark (7.2 percent), followed by Tirol (7.1 percent).

Oberösterreich is an important manufacturing hub, as 26.9 percent of the adults are employed in manufacturing industries. The second highest rate is found in Vorarlberg (26.1 percent) followed by Steiermark (21.1 percent).

The highest share of employment in professional services, in Austria, exists in Tirol where 16.5 percent of adults work in this part of the economy. The rate of professional service employees is 16.4 percent in Salzburg, and 11.6 percent in Vienna.

Compared to the rest of Europe, Austria has strengths in IT services, advertising & market research. Pharmaceuticals and high-tech manufacturing are also strengths. Austria lags behind the rest of Europe in telecommunications, as well as design & other creative professions.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Vienna	12.6%	9.3%	11,6%
Steiermark	7.2%	21.1%	9.2%
Tirol	7.1%	18.1%	16.5%
Salzburg	6.7%	18.1%	16.4%
Kärnten	5.8%	16.4%	10.5%
Oberösterreich	5.6%	26.9%	8.4%
Vorarlberg	4.6%	26.1%	11.0%
Niederösterreich	4.2%	17.7%	9.1%
Burgenland	3.3%	16.6%	8.9%



Country Analysis: Cyprus

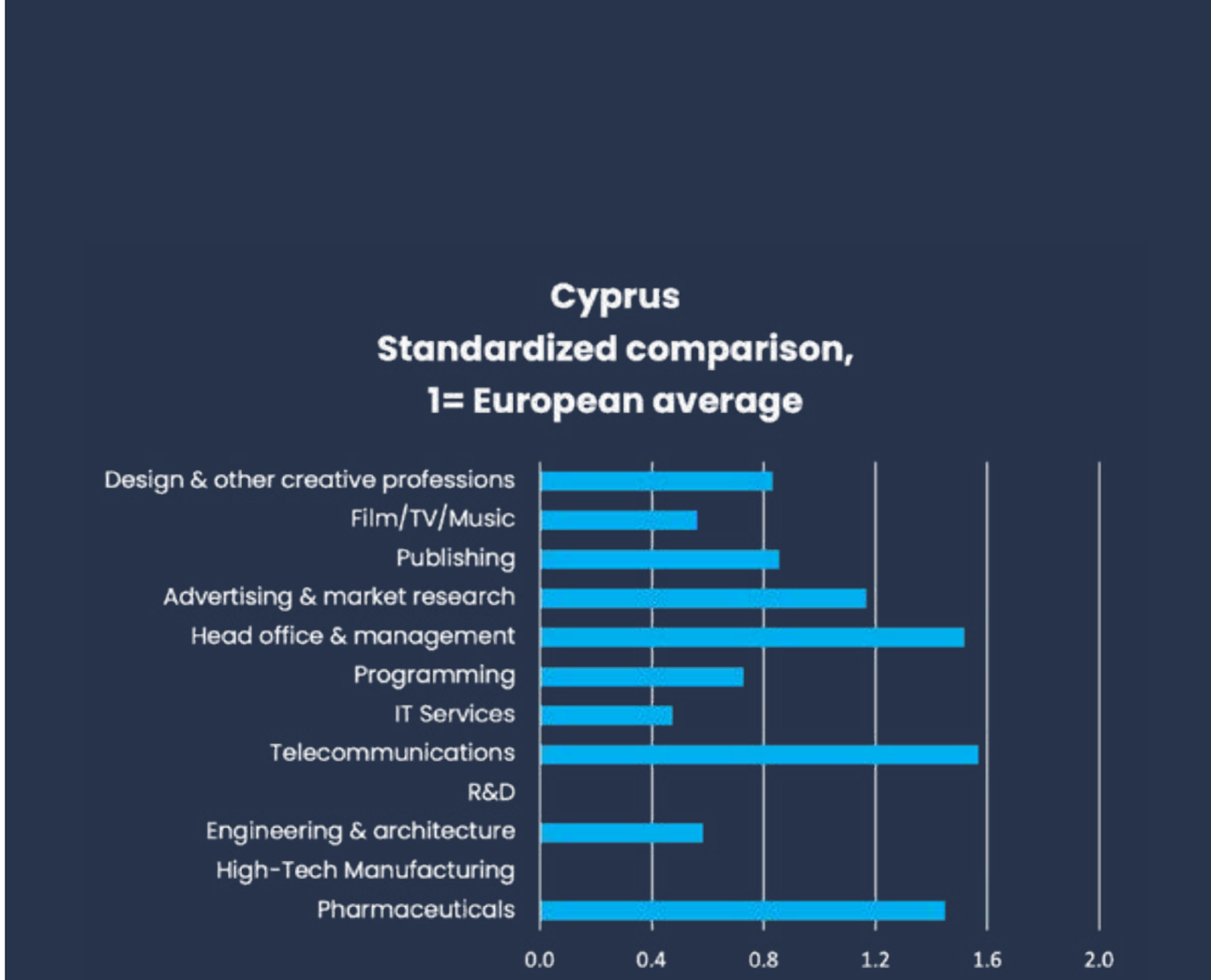
In 2022, 6.2 percent of the working-age adults of Cyprus were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase from 5.9 percent the previous year.

Since 2014, the share of adults employed in knowledge-intensive jobs has increased by fully 62 percent in Cyprus – which is together with Lithuania and Portugal the highest rate of growth in all of Europe.

There are 12.9 percent of the adults in Cyprus who are employed in manufacturing industries. Professional services employ additionally 15.4 percent of the adults.

Compared to the rest of Europe, Cyprus has strengths in telecommunications, and head office & management, as well as in pharmaceuticals. The country lacks research & development, and high-tech manufacturing, activities.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Cyprus	6.2%	12.9%	15.4%



Country Analysis: Portugal

In 2022, 6.1 percent of the working-age adults of Portugal were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase from 5.3 percent the previous year. Since 2014, the share of adults employed in knowledge-intensive jobs has grown by fully 61 percent in Portugal, the highest rate of increase alongside Lithuania and Cyprus.

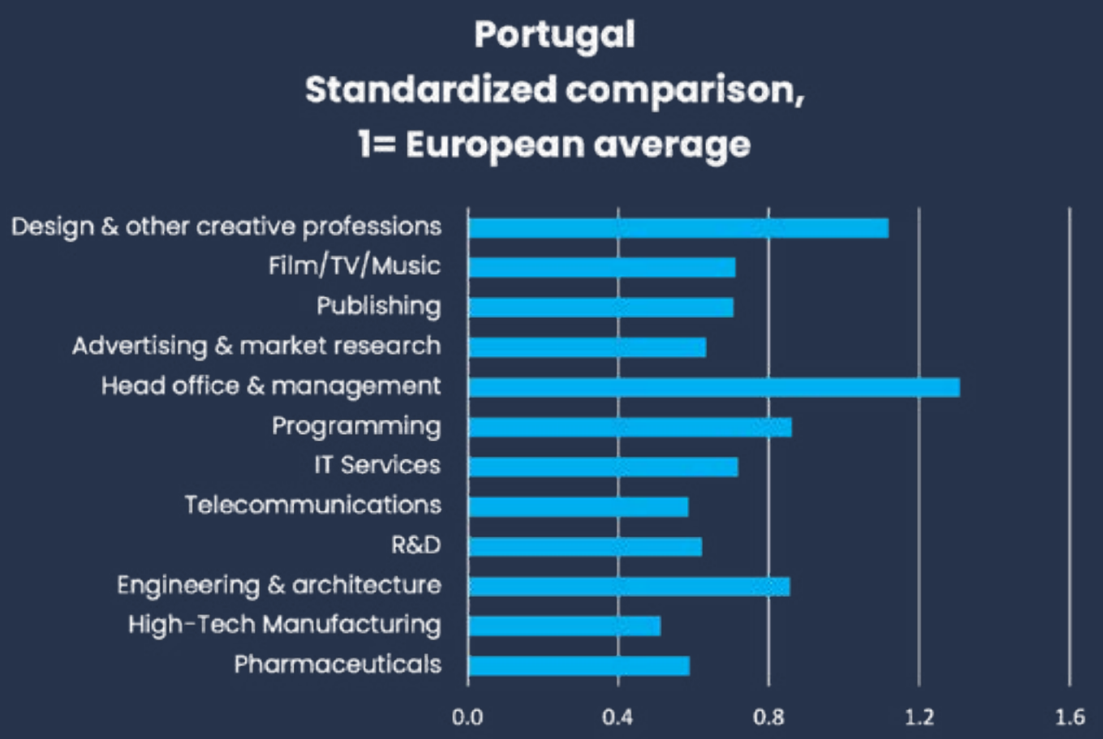
Lisbon is the brain business hub of Portugal, as fully 11.8 percent of adults are employed in knowledge-intensive jobs. This is the 31st highest rate in comparison of 277 European regions, and higher than regions such as Stuttgart, Bremen, and Luxembourg. The regions Norte (4.7 percent) and the Centro (3.5 percent) have the second and third highest rates of brain business jobs employees in Portugal.

Norte is an important manufacturing hub, as fully 24.7 percent of adults are employed in manufacturing industries. This can be compared to 21.1 percent in Centro, and 14.2 percent in Alentejo.

Algarve has the highest share of employment in professional services, with 23.6 percent of adults working in this part of the economy. On second place follows Região Autónoma da Madeira (15.8 percent), and on third Lisbon (15.6 percent).

Compared to the rest of Europe, Portugal has strengths in head office & management, as well as design & other creative professions. In high-tech manufacturing, however, Portugal lags behind the rest of Europe.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Lisbon	11.8%	11.0%	15.6%
Norte	4.7%	24.7%	9.2%
Centro	3.5%	21.1%	9.1%
Algarve	3.2%	11.3%	23.6%
Região Autóno-ma da Madeira	2.9%	9.5%	15.8%
Alentejo	2.4%	14.2%	9.4%
Região Autóno-ma dos Açores	2.1%	9.8%	11.6%



Country Analysis: Slovakia

In 2022, 6.0 percent of the working-age adults of Slovakia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a small increase from 5.9 percent in the previous years. Since 2014 the share of knowledge-intensive workers of Slovakia has increased by fully 37 percent.

In Bratislava, fully 22.8 percent of the adult population is employed in brain business jobs. In all previous editions of the brain business jobs index, Bratislava has been ranked as the European region where the highest share of adults are employed in knowledge-intensive jobs. For 2022 the index however finds that Budapest has a slightly higher rate (23.9), which makes Bratislava second amongst 277 European regions. Západné Slovensko and Stredné Slovensko have 4.2 percent of adults employed in brain business jobs.

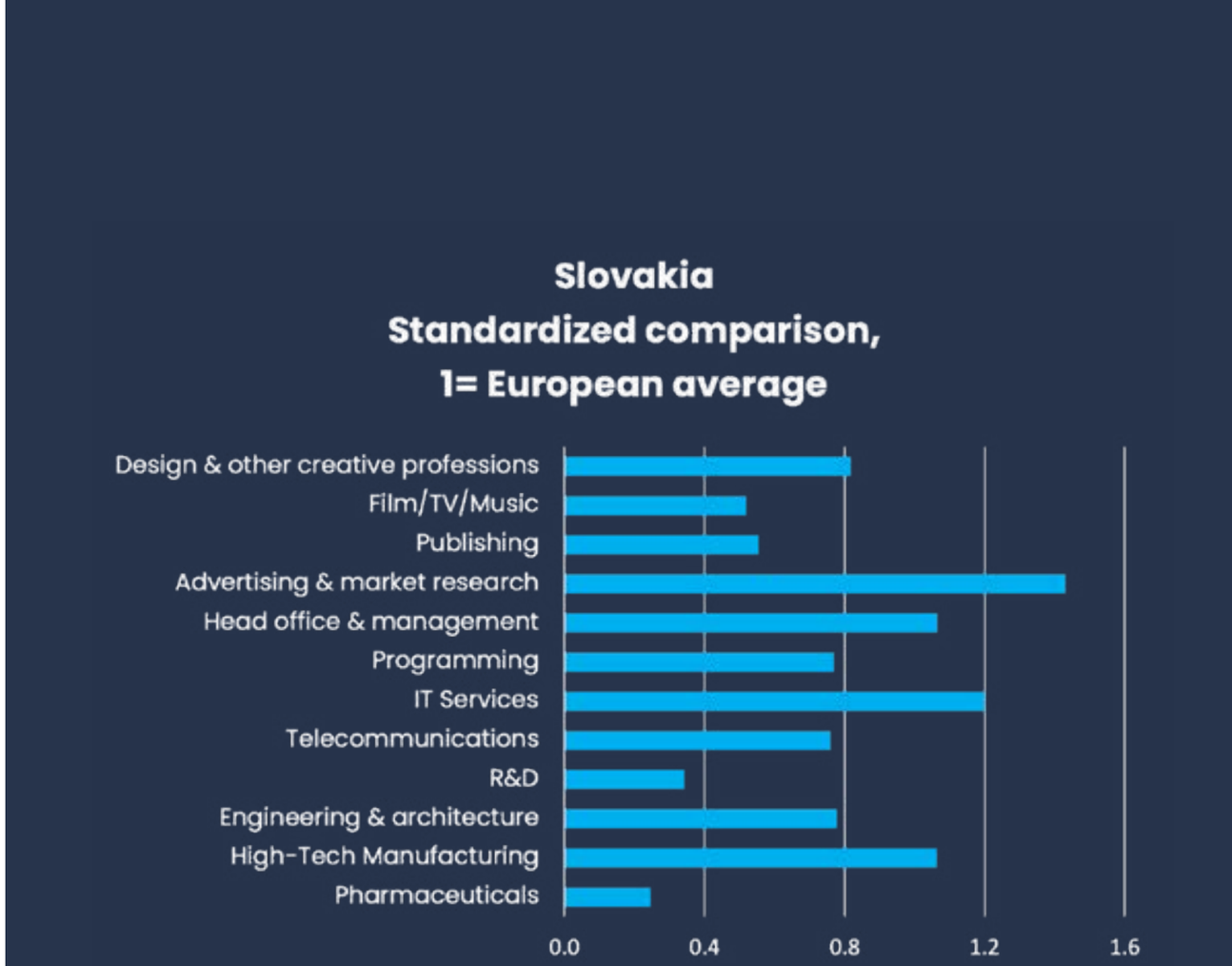
Západné Slovensko is an important manufacturing hub, as fully 21.9 percent of adults are employed in manufacturing industries. Bratislava follows on second place (20.6 percent), followed by Stredné Slovensko (19.7 percent) in terms of manufacturing employment.

The highest share of professional services employment in Slovakia exists in Bratislava, where 17.9 percent of adults are employed in this part of the economy, followed by Západné Slovensko (6.1 percent) and Stredné Slovensko (5.3 percent).

Brain business jobs are flocking to the capital city regions of eastern Europe, which combine a good supply of talent, with lower wages and lower taxes. A challenge for eastern European countries is to foster the growth of knowledge-intensive jobs also outside of the capital regions.

Compared to other European nations, Slovakia has particular strengths in advertising and market research, IT services, as well as head office & management and high-tech manufacturing. In pharmaceuticals as well as research & development, the country however lags the rest of Europe.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Bratislava	22.4%	21.2%	17.4%
Západné Slovensko	4.5%	22.3%	6.0%
Stredné Slovensko	3.8%	19.8%	5.3%
Východné Slovensko	2.9%	16.0%	4.2%



Country Analysis: France

In 2022, 6 percent of the working-age adults of France were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase from 5.6 percent the previous year. Since 2014, the concentration of adults employed in knowledge-intensive jobs has grown by 9 percent.

Paris is the main brain business hub of France, with 17.9 percent of adults employed in knowledge intensive jobs. Paris has nearly 1.3 million brain business jobs, the only European region with more than one million. London follows in second place with nearly 950 000 brain business jobs, and Madrid in third place with 520 000. Paris also has the 5th highest concentration of brain business jobs in comparison of 277 European regions, surpassing even Stockholm, Copenhagen, and London. Rhône-Alpes has the second highest concentration of knowledge-intensive jobs (5.7 percent), followed by Provence-Alpes-Côte d'Azur (4.4 percent).

Paris is additionally an important manufacturing hub, with fully 22.3 percent of the adults employed in manufacturing industries. Pays de la Loire follows on second place (15.8 percent) and Alsace on third place (14.5 percent) in terms of manufacturing jobs concentration.

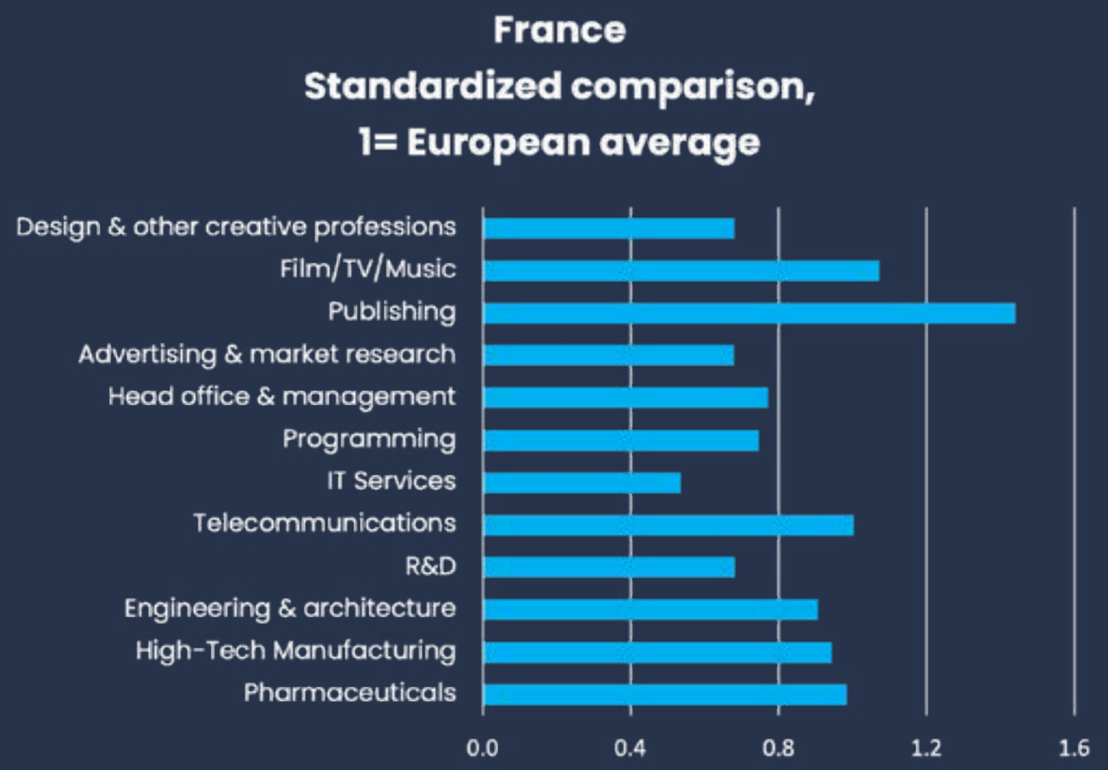
France is a country where much of the value producing jobs are focused on the capital region, as Paris also has the by far highest share of employment in professional services, with 21.0 percent of adults employed in this part of the economy. Corse follows on second place (8.9 percent) and Provence-Alpes-Côte d'Azur on third (8.3 percent) in share of adults employed in professional services.

Compared to the rest of Europe, France has strengths in publishing, film/TV/music. Also, telecommunications and pharmaceuticals are relative strengths. France lags other parts of Europe in IT services and research & development.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Paris	17.9%	22.3%	21.0%
Rhône-Alpes	5.7%	13.8%	6.7%
Provence-Alpes-Côte d'Azur	4.4%	10.6%	8.3%
Midi-Pyrénées	3.6%	12.0%	5.6%
Pays de la Loire	3.2%	15.8%	6.0%
Bretagne	3.2%	12.9%	7.3%

Alsace	3.1%	14.5%	7.8%
Aquitaine	3.1%	10.7%	6.0%
Langued-oc-Roussillon	2.9%	7.9%	5.5%
Nord-Pas de Cal-ais	2.3%	8.9%	5.3%
Auvergne	2.3%	9.9%	5.2%
Corse	2.1%	12.2%	8.9%
Bourgogne	2.1%	10.9%	5.1%
Haute-Nor-mandie	1.9%	9.6%	5.2%
Basse-Nor-mandie	1.9%	14.2%	5.9%
Limousin	1.9%	10.6%	4.9%

Poitou-Charentes	1.8%	10.8%	4.8%
Champagne-Ar-denne	1.7%	12.7%	4.8%
Picardie	1.6%	8.7%	3.9%
Lorraine	1.6%	9.4%	5.0%
Franche-Comté	1.5%	13.1%	4.0%



Country Analysis: Bulgaria

In 2022, 5.4 percent of the working-age adults of Bulgaria were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase compared to 4.7 percent in 2021. Since 2014, the concentration of adults employed in knowledge-intensive jobs has grown by fully 50 percent, an impressive rate of growth.

Sofia is the brain business hub of Bulgaria, with 12.9 percent of adults employed in knowledge-intensive jobs. This is the 22nd highest rate in comparison of 277 European regions. The Severoitztochen region has the second highest concentration of brain business jobs (2.5 percent) in Bulgaria, followed by Yuzhen tsentralen (2.4 percent).

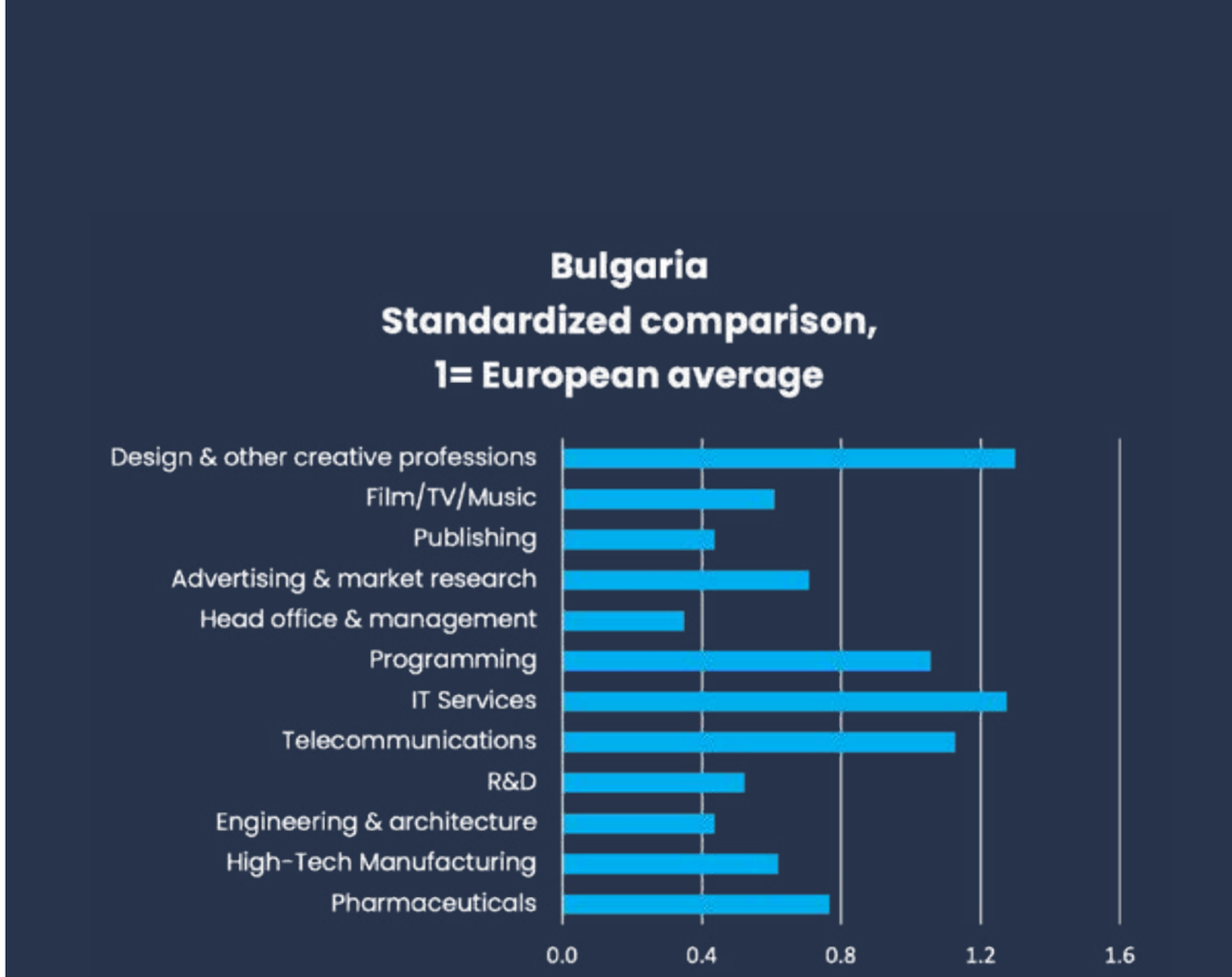
Yuzhen tsentralen is an important manufacturing hub, as 19.2 percent of adults are employed in manufacturing industries. Severen tsentralen follows on second place (18.8 percent) and Yugoiztochen on third place (17.0 percent) in terms of manufacturing industries employment.

The highest concentration of professional services employees is found in the capital Sofia region, where 11.4 percent of adults are employed in this part of the economy. Severoiztochen follows on second place (7.5 percent) and Yugoiztochen on third place (7.4 percent) in terms of professional services employment.

Compared to the rest of Europe, Bulgaria has strengths in design & other creative professions, as well as in IT services. Telecommunications and

programming are also relative strengths. The country lags behind the rest of Europe in head office & management, engineering & architecture, as well as research & development.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Sofia	12.9%	14.9%	11.4%
Severoiztochen	2.5%	13.1%	7.5%
Yuzhen tsentralen	2.4%	19.2%	6.9%
Severen tsen-tralen	1.8%	18.8%	6.7%
Yugoiztochen	1.5%	17.0%	7.4%
Severozapaden	1.1%	13.8%	5.0%



Country Analysis: Croatia

In 2022, 5.2 percent of the working-age adults of Croatia were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is significantly higher than 4.7 percent in 2021. Since 2014, the share of adults employed in knowledge-intensive jobs have grown by fully 42 percent.

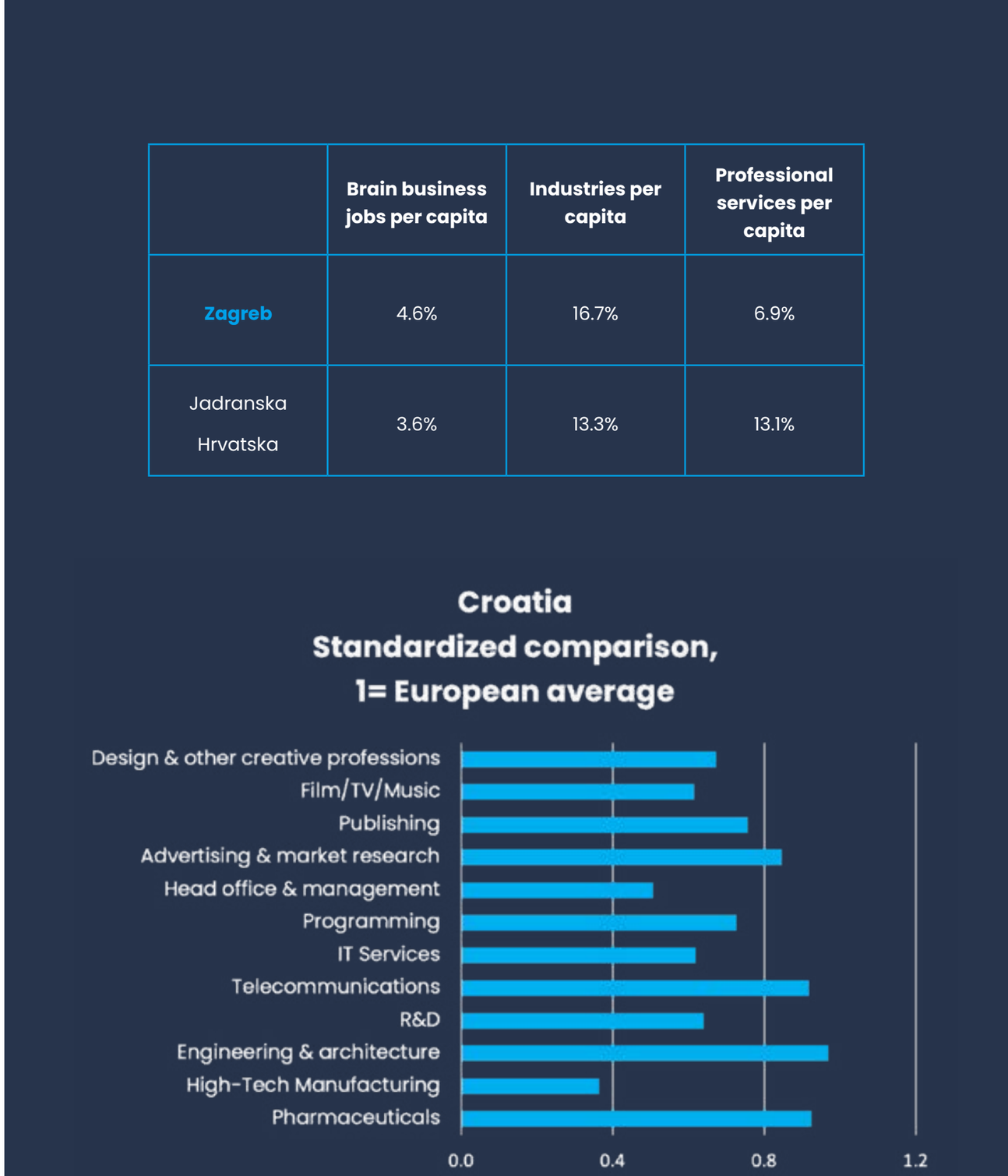
In the Zagreb capital region, 4.6 percent of adults are employed in brain business jobs, compared to 3.6 percent in Jadranska Hrvatska.

The share of adults employed in manufacturing industries is 16.7 percent in the Zagreb region, and 13.3 percent in Jadranska Hrvatska.

Jadranska Hrvatska however has a significantly higher concentration of professional services employment, as 13.1 percent of the adults work in this part of the economy, compared to 6.9 percent in Zagreb.

Compared to the rest of Europe, Croatia has a well-rounded knowledge-intensive industry sector, with strengths in pharmaceuticals as well as engineering & architecture, and telecommunications. The country lags Europe in high-tech manufacturing, as well as head office & management.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Zagreb	4.6%	16.7%	6.9%
Jadranska Hrvatska	3.6%	13.3%	13.1%



Country Analysis: Spain

In 2022, 5 percent of the working-age adults of Spain were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is an increase from 4.6 percent the previous year. Since 2014, the share of employment in brain business jobs has risen by 36 percent in Spain.

Madrid is the brain business jobs hub of Spain, with fully 12.6 percent of the adults employed in knowledge-intensive occupations. This is the 25th highest concentration in comparison of 277 European regions. Madrid has more brain business jobs per capita than regions such as Vienna, Stuttgart, and Luxembourg. There are close to 520 000 brain business jobs in Madrid, which in total numbers is the third highest in all of Europe, following Paris and London. The second highest concentration is found in Cataluña (7.2 percent) followed by País Vasco (6.0 percent).

Comunidad Foral de Navarra is an important manufacturing hub, as fully 23.3 percent of the adults are employed in manufacturing. Pais Vasco follows on second place (19.9 percent) and La Rioja on third place (18.0 percent) in manufacturing jobs concentration.

Illes Balears has the strongest concentration of employment in professional services, with 14.2 percent of adults working in this part of the economy. Canaries Islands (13.5 percent) and Madrid (12.5 percent) have the second and third highest concentration of professional services employees.

Compared to the rest of Europe, Spain has strengths in research & development, advertising & market research, and design & other creative professions. The country however lags in high-tech manufacturing and IT services.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Madrid	12.6%	10.1%	12.5%
Cataluña	7.2%	14.5%	11.2%
País Vasco	6.0%	19.9%	10.5%
Comunidad Foral de Navarra	4.6%	23.3%	9.1%
Aragón	3.7%	17.8%	9.8%
Galicia	3.6%	14.1%	9.2%
Principado de Asturias	3.5%	12.2%	9.1%
Comunidad Valenciana	3.3%	13.6%	9.9%

La Rioja	3.1%	18.0%	8.8%
Illes Balears	3.0%	11.4%	14.2%
Castilla y León	2.9%	14.1%	8.8%
Cantabria	2.7%	13.3%	9.5%
Andalucía	2.7%	8.1%	8.4%
Región de Murcia	2.6%	12.2%	7.9%
Canaries Islands	2.3%	5.9%	13.5%
Extremadura	2.1%	8.2%	6.5%
Castilla-la Mancha	1.8%	12.4%	8.1%

Country Analysis: Romania

In 2022, 4.5 percent of the working-age adults of Romania were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase, from 3.8 percent in 2021. Since 2014, Romania has experienced an impressive 42 percent increase, in the share of the population employed in knowledge-intensive jobs.

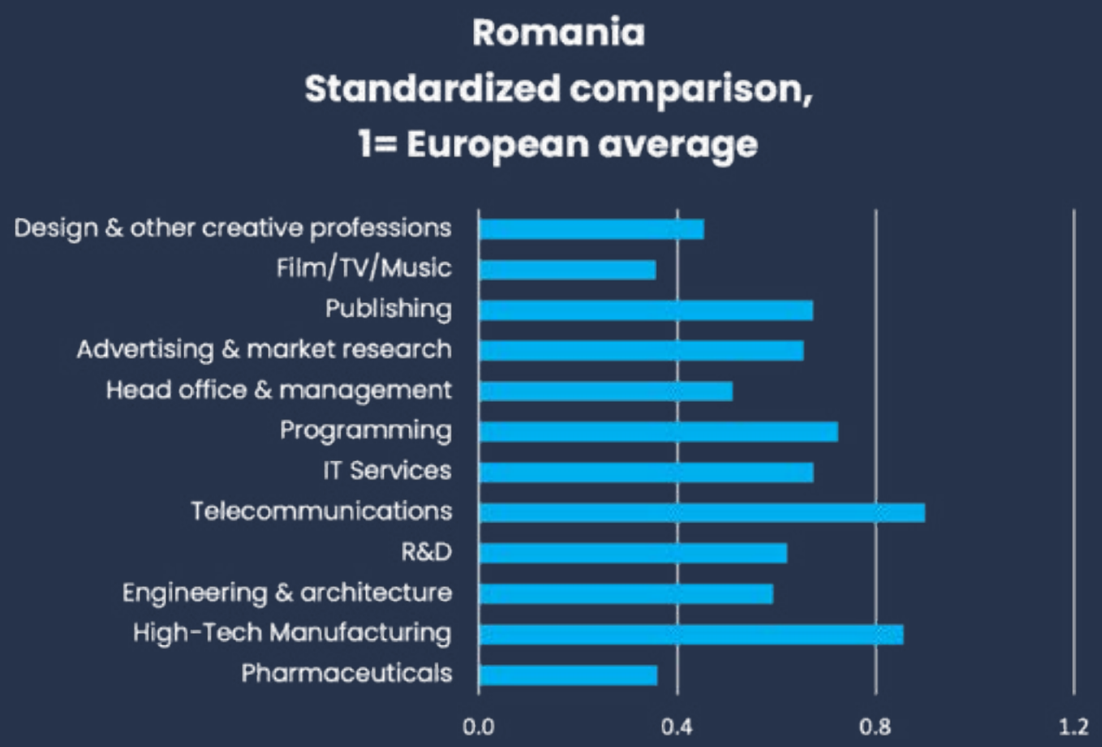
Bucharest is the brain business jobs hot-spot of Romania, with fully 16.3 percent of adults employed in knowledge-intensive services. This is the 10th highest concentration, in comparison of 277 European regions. Bucharest has a higher concentration of knowledge-intensive jobs than regions such as Warsaw, Amsterdam, and Berlin. The second highest concentration is found in the Vest region (4.6 percent) followed by Nord-Vest (4.3 percent).

Centru is an important manufacturing hub, as fully 18.9 percent of adults are employed in manufacturing industries. Vest follows on second place (16.7 percent), and Nord-Vest on third place (16.4 percent) in terms of manufacturing jobs concentration.

Professional services employment is most common in the Bucharest region, where 11.6 percent of adults are employed in this part of the economy. Nord-Vest follows on second place (6.4 percent) followed by Centru (6.3 percent).

Compared to the rest of Europe, Romania has strengths in telecommunications, and high-tech manufacturing. It however lags in film/TV/music and pharmaceuticals.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Bucharest	16.3%	16.2%	11.6%
Vest	4.6%	16.7%	6.1%
Nord-Vest	4.3%	16.4%	6.4%
Centru	3.2%	18.9%	6.3%
Nord-Est	2.2%	9.4%	3.7%
Sud-Est	1.8%	11.5%	5.9%
Sud - Muntenia	1.6%	12.8%	4.2%
Sud-Vest Oltenia	1.5%	11.1%	4.3%



Country Analysis: Poland

In 2022, 4.4 percent of the working-age adults of Poland were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. It is a slight increase from 4.3 percent the previous year. Since 2014, Poland has experienced an impressive 42 percent increase, in the share of the population employed in knowledge-intensive jobs.

Warsaw is the brain business hub of Poland, as fully 16.1 percent of the adult population is employed in knowledge-intensive jobs. This is the 11th highest concentration, in comparison of 277 European regions. Warsaw has a higher concentration of knowledge-intensive jobs than regions such as Hamburg, Amsterdam, and Berlin. The second highest concentration of brain business jobs is found in Malopolskie (6.6 percent), followed by Dolnoslaskie (6.3 percent).

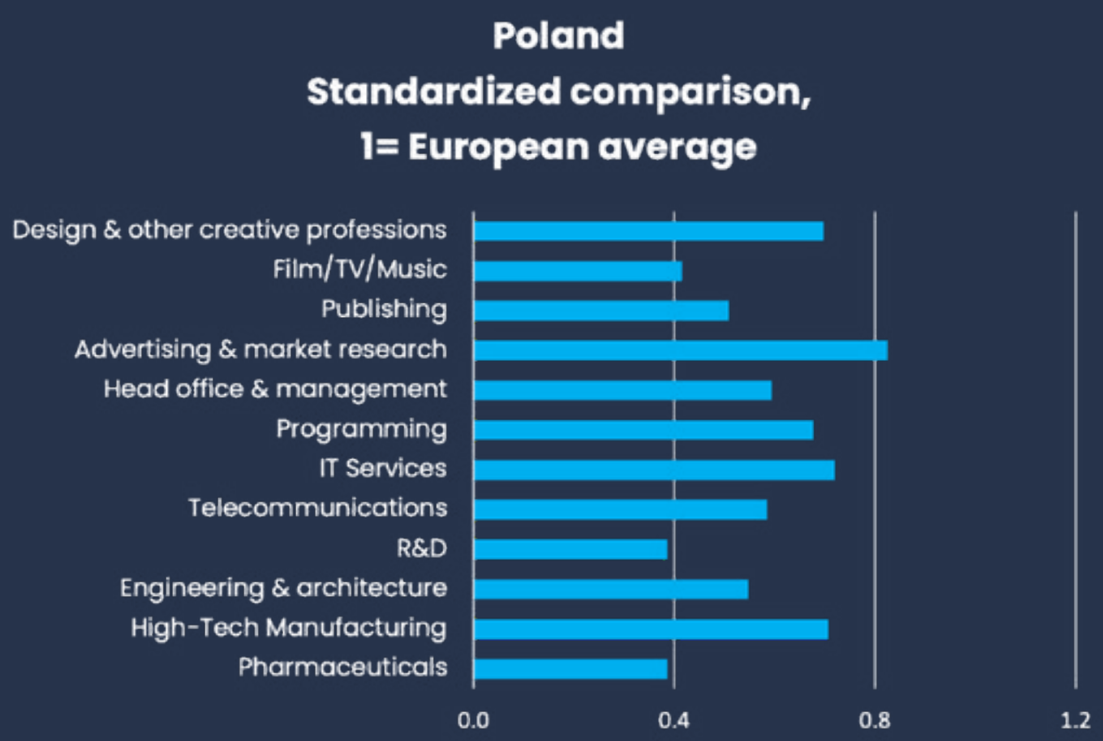
Wielkopolskie is an important industrial hub, with fully 23.6 percent of the adults employed in manufacturing industries. Slaskie follows on second place (23.1 percent), and Dolnoslaskie on third place (20.8 percent), in terms of industrial employment.

In Warsaw 17.2 percent of adults are employed in professional services, the highest rate in the country. The second highest concentration is found in Pomorskie (8.0 percent), followed by Wielkopolskie (7.9 percent).

Compared to the rest of Europe, Poland has strengths in advertising & market research, as well as design & other creative professions, and IT

services. Even in high-tech manufacturing, Polans is relatively strong. In research & development, pharmaceuticals, and film/TV/music, however, Poland lags behind the rest of Europe.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Warsaw	16.1%	17.5%	17.2%
Malopolskie	6.6%	18.2%	7.6%
Dolnoslaskie	6.3%	20.8%	7.4%
Pomorskie	6.0%	18.8%	8.0%
Wielkopolskie	4.1%	23.6%	7.9%
Slaskie	4.0%	23.1%	6.7%
Lódzkie	3.5%	18.1%	6.7%
Zachodniopo-morskie	2.9%	15.2%	7.8%
Kujawsko-Po-morskie	2.9%	18.2%	5.2%
Podkarpackie	2.5%	18.5%	4.4%
Lubuskie	2.5%	19.1%	6.9%
Podlaskie	2.3%	15.0%	5.0%
Lubelskie	2.1%	13.4%	4.8%
Opolskie	2.0%	19.8%	5.5%
Swietokrzyskie	1.8%	16.1%	4.5%
Warminsko-Ma-zurskie	1.8%	16.7%	4.8%
Mazowiecki re-gionalny	1.7%	14.3%	5.4%



Country Analysis: Italy

In 2022, 4.3 percent of the working-age adults of Italy were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. The concentration of brain business jobs employees remains the same as in 2021. Since 2014, employment in knowledge intensive sectors has increased by 13 percent in Italy.

Lombardia is the brain business jobs hub of Italy, as fully 7.5 percent of the adults in the region are employed in this part of the economy. Rome follows on second place (6.5 percent), and Piemonte (5.1 percent) on third place.

Veneto has the highest concentration of employment in industries, with 24.1 percent of the adults employed in manufacturing. Marche (22.5 percent) and Emilia-Romagna (22.2 percent) follows on second and third place in manufacturing jobs concentration.

Provincia Autonoma di Bolzano has the highest concentration of employment in advanced services, with 18.1 percent of adults employed in this part of the economy. Liguaria (16.7 percent) follows on second place, while Valle d'Aosta (16.2 percent) has the third highest concentration of employment in advanced services.

Compared to the rest of Europe, Italy has strengths in design & other creative professions and IT services. It however lags behind the rest of Europe in publishing, film/TV/music as well as research & development.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Lombardia	7.5%	20.1%	10.1%
Rome	6.5%	7.9%	11.0%
Piemonte	5.1%	19.5%	8.6%
Emilia-Romagna	5.0%	22.2%	11.1%
Provincia Autonoma di Trento	5.0%	17.1%	12.3%
Toscana	4.6%	19.1%	10.6%
Provincia Autonoma di Bolzano	4.5%	20.0%	18.1%
Veneto	4.5%	24.1%	10.6%
Liguria	4.1%	12.1%	16.7%
Valle d'Aosta	4.1%	13.9%	16.2%
Marche	4.0%	22.5%	8.8%
Friuli-Venezia Giulia	3.9%	20.1%	9.7%
Umbria	3.3%	16.8%	9.1%
Abruzzo	3.1%	15.9%	8.3%
Basilicata	2.5%	13.1%	6.9%
Molise	2.3%	11.6%	6.9%
Campania	2.2%	8.6%	7.3%

Sardegna	2.2%	7.6%	8.4%
Puglia	2.1%	10.2%	7.1%
Sicilia	1.8%	5.9%	5.8%
Calabria	1.5%	5.3%	5.9%

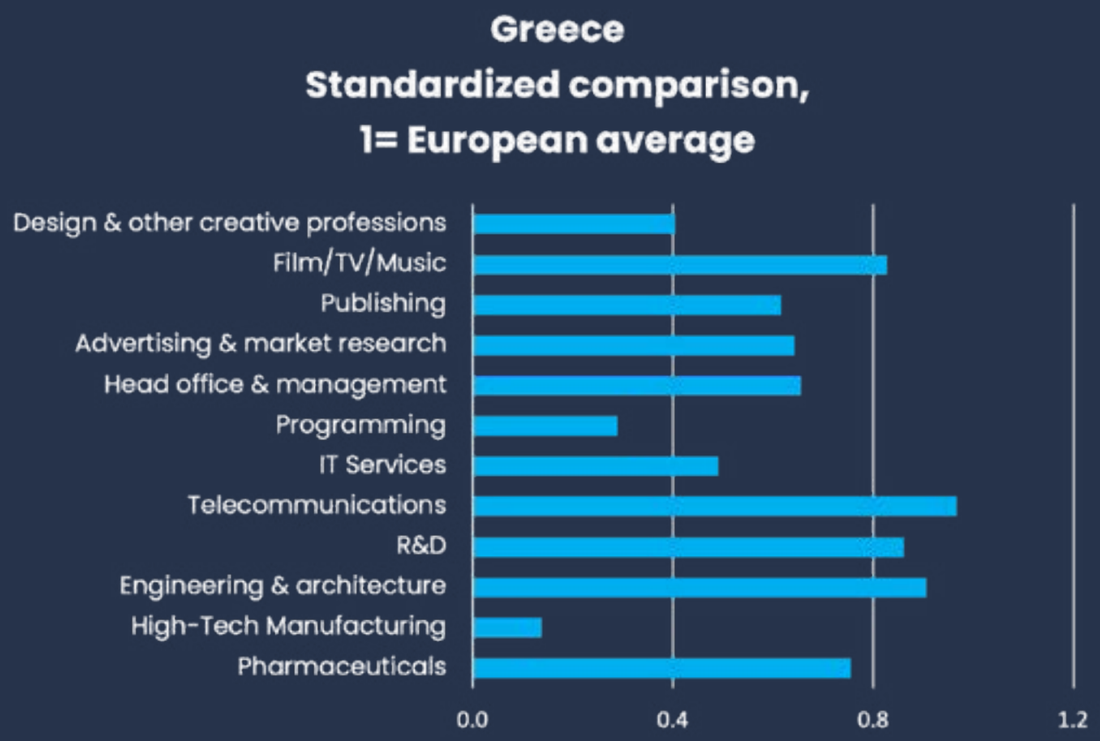
Country Analysis: Greece

In 2022, 4.2 percent of the working-age adults of Greece were employed in brain business jobs, a term for employment in knowledge-intensive firms in tech, information and communications technology, advanced services, and creative professions. This is a significant increase, from 3.6 percent in 2021. Between 2014 and 2022 the share of brain business jobs has only increased by 4 percent, lower than other European countries. The strong 2022 development may be the beginning of trend-shift towards growth for Greece.

Athens is clearly the brain business jobs center of Greece, as fully 7.8 percent of the working age population of the capital region is employed in brain business jobs. Kriti (3.1 percent) and Kentriki Makedonia (2.9 percent) have the second and third highest rates. Athens also has the highest concentration of employment in industries, with 8.9 percent of the adults working in manufacturing. Kentriki Makedonia has the second highest level of manufacturing employment (8.3 percent). The professional services hotspots of Greece are Notio Aigaio, where 33.2 percent are employed in this part of the economy, followed by Ionia Nisia (30.7 percent).

Compared to the rest of Europe, Greece has strengths in film/TV/music, telecommunications, as well as engineering & architecture. The country lags the rest of Europe in high-tech manufacturing, programming, as well as design & other creative professions.

	Brain business jobs per capita	Industries per capita	Professional services per capita
Athens	7.8%	8.9%	15.8%
Kriti	3.1%	6.7%	19.5%
Kentriki Makedo-nia	2.9%	8.3%	11.5%
Ipeiros	2.4%	7.4%	12.4%
Ionia Nisia	2.3%	5.9%	30.7%
Dytiki Ellada	2.3%	4.6%	9.3%
Thessalia	2.1%	7.0%	10.4%
Notio Aigaio	2.1%	6.7%	33.2%
Peloponnisos	2.0%	6.2%	13.1%
Voreio Aigaio	1.9%	4.5%	12.9%
Anatoliki Make-donia	1.7%	6.7%	9.7%
Dytiki Makedonia	1.7%	7.1%	7.8%
Sterea Ellada	1.7%	7.6%	9.2%



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