Europe's Brain Business Jobs 2018 Index

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1. Summary: ICT has surpassed Tech

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 detailed analysis of structural business statistics for European countries and regions. This second edition of the index extends the analysis to 31 European countries and 283 regions within these countries. A number of interesting findings emerge:

In 2014 the largest share of Brain Business Jobs across Europe was found in the tech-sector. Already by 2016 however, ICT (Information and communications technology) had become the dominant sector. This reflects the rapid digitalization of European economies.

Large regional differences exist. Switzerland, Sweden and Luxemburg are the three leading nations, with 9 percent of their working age population employed in highly knowledge-intensive companies. In Romania, Poland, Greece, Croatia, Italy and Cyprus the share is below 4 percent.

If current trends continue, Sweden will overtake Switzerland as having the highest share of Brain Business Jobs per capita. The reason is that Sweden is growing through digitalization and advanced services growth. The knowledge intensive jobs of Switzerland on the other hand are focused on the tech-sector, which is stagnating relative to ICT and advanced services.[1]

A number of Central and Eastern European nations have experienced a significant increase in Brain Business Jobs concentration. The most rapid change has however occurred in the UK, where the share of Brain Business Jobs increased by fully 1 percentage point – from 7.1 percent of the population in 2014 to 8.1 in 2016. Next year's index will show if Brexit will undermine this rapid increase.

The rise of highly knowledge-intensive jobs is heavily concentrated to the capital regions of Central and Eastern European countries. Therefore, while Slovakia as a nation ranks on 21st spot, its capital region of Bratislava has the highest regional concentration in all of Europe. Prague, Bucharest and Budapest also rank amongst the leading regions:

Paris has a higher concentration of Brain Business Jobs than London, while the UK as a nation is ahead of France. The UK region where Oxford is located is the second strongest Brain Business Jobs hotspot in Europe, followed by Stockholm.

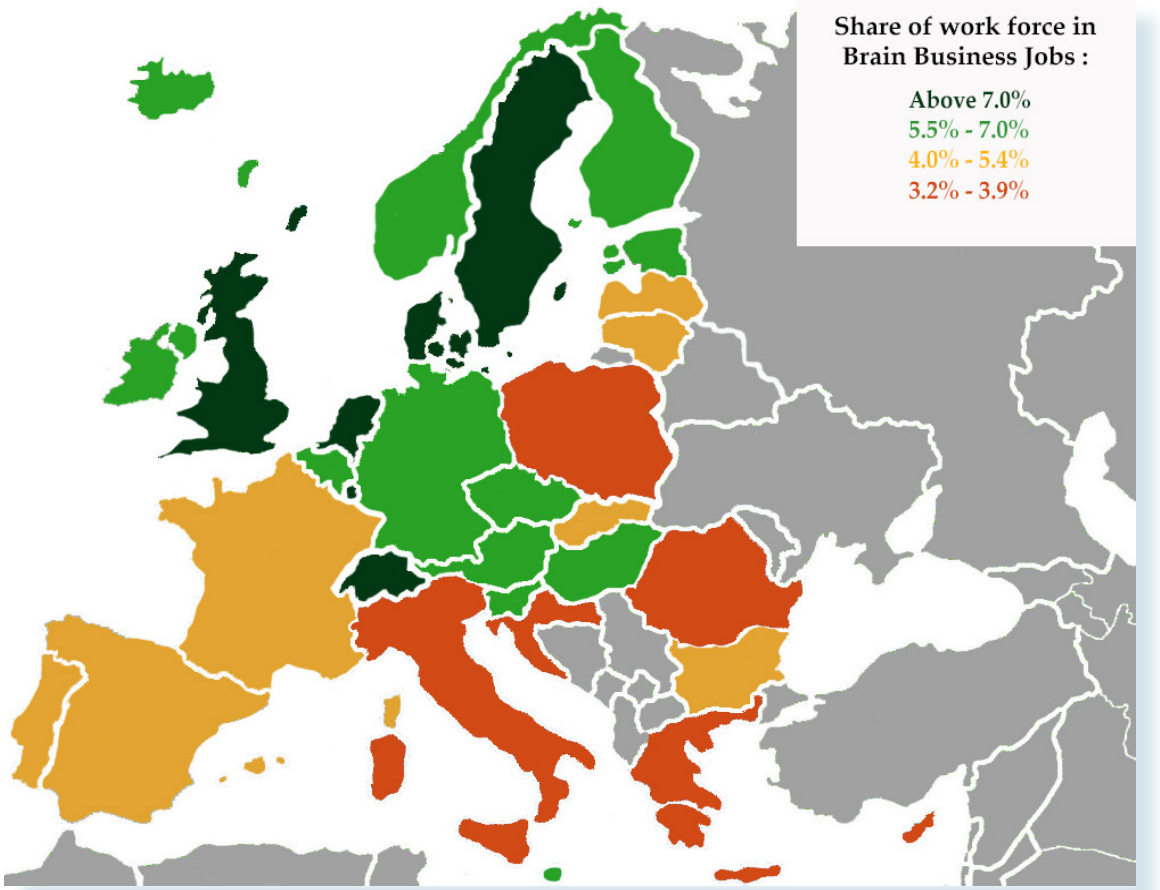
The two German regions of Hamburg and Oberbayern are found amongst the top-10 European regions, while Berlin ranks on 23rd place, below Madrid. The Dutch region of Utrecht similarly ranks on 10th place, above Amsterdam on 14th place.

A regression analysis examines what factors explain a high regional concentration of knowledge-intensive jobs.

Innovation capacity is found to be the dominant determinant for Brain Business Jobs concentration, followed closely by market efficiency. The third driver is disposable income, which reflect that knowledge-intensive businesses

are businesses are drawn to regions in Eastern and Central Europe where the wages of skilled workers are lower than in Northern and Western Europe. Being a capital region also increases attractiveness, although this effect is smaller.

The *basic competitiveness* ranking of a region – a factor which measures institutional quality, infrastructure and health – is however not a driver for Brain Business Jobs.



2. The Brain Business landscape of Europe is changing

Economic development can broadly speaking occur in two different ways. It is possible for economies to experience gradual growth within existing frameworks. Economies also undergo periods of significant structural shifts, where changes in the global marketplace, the introduction of disruptive technologies and/or new organizational and management practices in companies fundamentally alter how business is conducted.

Currently, European economies are experiencing a period of change brought on by shifts in the landscape of competition, game-changing technologies as well as a general shift towards greater demand for services. Those individuals, firms, regions and countries, which turn out to be the winners in this period of change, tend to have one thing in common: they rely on knowledge to succeed.

This second edition of The Geography of Europe's Brain Business Jobs maps the national and regional distribution of knowledge-intensive jobs – for 31 European countries and 283 regions within these countries.

Based on this data, a regression analysis is carried out in order to examine what factors make regions attractive for knowledge-intensive occupations.

The study is based on analysis of the most detailed business statistics that exists for European economies. Through this analysis, the share of the working age population across Europe who work in the most knowledge-intensive parts of the economy is calculated. These Brain Business Jobs are made up of employment in firms within highly knowledge-intensive parts of the tech-sector, the ICT-sector, advanced services and creative professions.[2]

In total, 5.2 percent of working age individuals in Europe worked in Brain Business Jobs in 2014. By 2016, this share had risen to 5.6 percent. As shown in table 1 the most rapid rate of increase of Brain Business Jobs has occurred in advanced services, followed by ICT, creative professions and lastly tech. While the largest share of Brain Business Jobs was found in the tech-sector in 2014, two years later ICT had become the dominant sector.

Table 1. Growth of Brain Business Jobs in Europe

	Brain Business jobs per 1000 working age individuals			Change 2014-2016 (%)
	2014	2015	2016	
Tech	16.0	16.5	16.9	5.5
ICT	15.7	16.4	17.2	9.1
Advanced services	11.7	12.4	12.9	9.9
Creative professions	8.5	8.6	9.0	5.6
All	52.0	53.9	56.0	7.6

The share of Brain Business Jobs differs markedly across Europe. At one end of the spectrum are Switzerland, Sweden and Luxemburg, three countries in which around 9 percent of the working age population are employed in highly knowledge-intensive companies. At the other end of the spectrum are Romania, Poland, Greece, Croatia, Italy and Cyprus – countries in which less than 4 percent of the working age population works in Brain Business Jobs.

The country ranking follows a geographical division of Europe: with Northern and Western Europe at top and Southern, Central and Eastern Europe at bottom. However, rapid changes in the geographical distribution have occurred during the short period between 2014 and 2016.

Switzerland, the leading region, has in fact seen a decline in the share of Brain Business Jobs. If this trend continues,

Sweden will soon overtake the top position. This is notable, for while the two countries are often mistaken for one another, they have widely different distribution of Brain Business Jobs. Switzerland is relying strongly on the tech-sector including research and development.

Sweden has more broadly dispersed strengths, being a leading nation in all four categories. In a time when the traditional tech-sector is growing slower than ICT, advanced services and creative professions in terms of Brain Business Jobs, Switzerland has fallen behind and might soon be overtaken by Sweden.

The other Nordic countries are faring worse than Sweden, with Denmark, Iceland and Finland experiencing a loss of Brain Business Jobs concentration. Norway has had a minor increase. Austria, France, Italy, Malta and Croatia are countries that have seen increases in Brain Business Jobs concentration, but still fallen in position relative to the rest of Europe. This illustrates an important point: in order to not trail behind a changing world, European countries must strive to increase their knowledge-intensive business sectors. Status quo equals stagnation.

A number of Central and Eastern European countries have experienced a significant increase in Brain Business Jobs. The strongest growth amongst these countries has occurred in Latvia followed by Hungary, Bulgaria, Czech Republic, Slovakia, Lithuania, Poland and Estonia. Catching-up allows for rapid development in Central and Eastern European countries. Yet the highest increase in Europe has taken place in a Western European country, namely the UK, where the share of individuals working in Brain Business Jobs rose with fully 1 percent (0.98 percent to be precise) of the total working age population between 2014 and 2016.

Since it takes time to gather detailed business statistics, the latest data in this study comes from the year in which the Brexit vote was undertaken in the UK. Next year's index, with data for 2017, will show if the exit of the UK from the EU will lead to a significant outflow of knowledge-intensive jobs from the country. Ireland is also experiencing a strong growth of Brain Business Jobs per capita, being outpaced only by the UK and Latvia.

Table 2. National Ranking of Brain Business Jobs
All brain business sectors, jobs per 1 000 working age population

Rank		2014	2015	2016	Change per capita 2014-2016	Change in rank 2014-2016
1	Switzerland	92.5	90.5	90.6	-1.9	
2	Sweden	87.1	88.3	89.6	2.5	
3	Luxembourg	82.4	81.8	86.7	4.3	
4	Netherlands	77.1	78.8	81.0	3.9	+1
5	UK	70.8	74.5	80.6	9.8	+2
6	Denmark	80.1	81.2	77.0	-3.1	-2
7	Germany	65.8	67.5	69.4	3.7	+2
8	Ireland	60.4	63.7	67.6	7.1	+3
9	Iceland	74.1	73.3	67.1	-6.9	-3
10	Norway	64.6	65.8	65.3	0.7	
11	Finland	66.9	66.3	60.9	-6.0	-3
12	Estonia	56.1	58.6	60.1	4.0	+1
13	Czech Republic	51.5	53.8	57.5	6.0	+5
14	Austria	56.9	57.2	57.2	0.3	-2
15	Hungary	50.5	53.4	56.9	6.3	+4
16	Slovenia	54.3	56.1	56.3	2.0	-2
17	Belgium	52.9	54.7	55.3	2.4	-1
18	Malta	53.6	60.1	55.1	1.5	-3
19	Latvia	46.1	50.6	53.4	7.4	+1
20	France	52.4	52.7	52.7	0.3	-3
21	Slovakia	43.3	48.7	48.6	5.3	
22	Lithuania	42.2	45.6	47.4	5.2	
23	Portugal	37.3	39.4	40.9	3.6	
24	Bulgaria	34.2	36.8	40.4	6.2	+4
25	Spain	35.0	37.3	40.3	5.4	+2
26	Cyprus	35.5	37.8	38.9	3.4	-1
27	Italy	36.3	37.2	38.1	1.8	-3
28	Croatia	35.0	35.5	36.7	1.7	-2
29	Greece	34.1	35.3	36.2	2.1	
30	Poland	30.1	32.4	34.6	4.5	
31	Romania	28.8	30.5	32.3	3.5	

The regional results might come as a surprise for those who do not closely follow the development of knowledge-intensive jobs in Europe. The main finding is that the capital regions of Central and Eastern European nations have some of the highest levels of Brain Business Jobs concentration. The Slovakian capital region of Bratislava emerges as the number one region in Europe in terms of the concentration of Brain Business Jobs. This might seem as a paradox, given that Slovakia as a nation ranks 21st amongst the 31 countries in this study.

The explanation lies in the fact that many amongst the new generation growing up in Central and Eastern Europe work hard to learn those knowledge's which are in hot demand in the marketplace, such as programming and engineering. While the countries as a whole still have not reached up to Northern and Western Europe, their capital regions are becoming hotbeds for knowledge-intensive occupations.

For example, the Czech Republic has a considerably lower Brain Business Jobs concentration than Sweden. Yet, the capital region of Prague is nearly tied with the capital region of Stockholm. Romania stands out as the country with the lowest share of Brain Business Jobs in Europe, yet the countries capital region of Bucharest scores above Helsinki, Brussels, Vienna, Madrid, Berlin, Lisbon and Rome in Brain Business concentration.

Differences in geographical concentration exists also within Western Europe. Paris for example has slightly higher Brain Business Jobs concentration than London, while France as a country scores far below the UK. Berkshire, Buckinghamshire and Oxfordshire (the region in the UK in which the University of Oxford and accompanying tech-companies is located) however is the region with the second highest Brain Business Jobs concentration in Europe, and thus the top region in all of Northern and Western Europe. Germany also deviates from the pattern of having a high share of knowledge jobs concentration in the capital region. The two German regions of Hamburg and Oberbayern are found amongst the top-10 European regions, while Berlin ranks on 23rd place, below Madrid. The Dutch region of Utrecht similarly ranks on 10th place, above Amsterdam on 14th place.

While European economic progress is almost exclusively judged on a national basis, the competition for the most knowledge-intensive jobs is increasingly occurring at a regional basis. A regression analysis is carried out to determine which factors make regions come at top. *Innovation capacity* is found to be the dominant determinant for Brain Business Jobs concentration, followed closely by *market efficiency*.

The third driver is *disposable income*, a factor which is negatively correlated. This illustrates that knowledge-intensive businesses are drawn to regions in Eastern and Central Europe where the wages of skilled workers (such as programmers, engineers etc.) are lower than in Northern and Western Europe. Being a capital region is also increasing attractiveness, although this factor is less important than the above mentioned three factors.

The final parameter, the *basic competitiveness* ranking of a region according to Eurostat scores, is however not a driver for Brain Business Jobs concentration. The latter index, which is based

on an aggregated score based on the assessment of the regional quality of institutions, infrastructure and health, is positively linked to Brain Business Jobs concentration on its own. When put in a statistical model together with the other four factors however, it is negatively correlated. This shows that the traditional models of explaining economic development are not capturing knowledge-intensive business development. Even in countries such as Romania, with major institutional challenges, single regions (in this case Bucharest), can thrive by competing with knowledge combined with lower wages.

Table 3. Regional Ranking of Brain Business Jobs

Rank	Region	All brain business sectors, jobs per 1 000 working age population
1	Bratislava	184.4
2	Berkshire, Buckinghamshire and Oxfordshire	170.6
3	Stockholm	166.0
4	Prague	165.7
5	Paris	162.9
6	London	156.5
7	Hamburg	136.6
8	Copenhagen	135.4
9	Oberbayern	130.8
10	Utrecht	129.9
11	Oslo	126.4
12	North Eastern Scotland	126.1
13	Bucharest	116.5
14	Amsterdam	116.5
15	Darmstadt	105.2
16	Budapest	104.7
17	Helsinki	104.5
18	Brussels	102.1
19	Bedfordshire and Hertfordshire	101.7
20	Köln	101.5
21	Vienna	101.3
22	Madrid	101.0
23	Berlin	97.8
24	Surrey, East and West Sussex	97.0
25	Cheshire	96.4
26	Hampshire and Isle of Wight	95.1
27	Stuttgart	91.5
28	Mittelfranken	90.0
29	Sofia	89.6
30	Prov. Brabant Wallon	89.5
31	Gloucestershire, Wiltshire and Bristol/Bath area	88.9
32	Prov. Vlaams-Brabant	85.8
33	Karlsruhe	83.4
34	Zahodna Slovenija	82.5
35	Lisbon	80.6
36	Västsverige	80.1
37	Luxembourg	80.0
38	Rome	77.4

39	Warsaw	76.9
40	East Anglia	75.9
41	Düsseldorf	75.1
42	Sydsverige	75.0
43	Noord-Brabant	74.6
44	Herefordshire, Worcestershire and Warwickshire	74.3
45	Zuid-Holland	73.8
46	Iceland	72.4
47	Greater Manchester	71.9
48	Midtjylland	71.3
49	Bremen	69.3
50	Gelderland	67.3

3. The quest for brain business hot spots

We live in a time of rapid changes in the global marketplace. A few decades ago, nearly all of the leading enterprises in the world were found in Western Europe, North America, Australia, Japan and a few other places such as South Korea and Hong Kong. The economic capital, the technologies and the know-how that was needed for high-end businesses existed in these places but were in short supply in the rest of the world. Business-conductive economic policies were also limited, with large parts of the world either being planned economies or on their route to introducing market-based economies.

Today the world is quite different. China and India, which have a much older tradition of enterprise, banking and market-based economic practices than Europe, are again returning to their entrepreneurial roots. Much of global growth is happening in these major countries, both of whom have considerably larger population than all of Europe. Within Europe, the former planned economies are becoming the focal point of growth. Businesses in Northern and Western European countries cannot compete in low-wage occupations, but see the opportunity to grow with advanced enterprises. At the same time, robotization, artificial intelligence and the move towards an increasingly service-based economy is fundamentally changing the nature of jobs.

Research suggests that firms starting or investing in an innovative region succeed better than those that invest in other areas.

For example, a meta-analysis of hundreds of studies, conclusively indicates that firms that locate in innovative themselves and that choosing matching clusters matters. of studies, conclusively indicates that firms that locate in innovative themselves and that choosing matching clusters matters.[3]

Another line of research corroborates that firms achieve higher productivity growth in regions with greater start-up activity.[4]

In this context, all regions aspire to become hotbeds for innovation and creativity. Only few however succeed to stand out as hotbeds for knowledge-intensive businesses. For investors, businesses and people choosing where to live and work, identifying regions that promise bubbly, innovative growth can be crucial. Start-ups and technological breakthroughs are more likely to succeed in regions that become magnets for entrepreneurs as well as for talented and creative engineers and other specialists. The success of these individuals spills over to wages, housing wealth and quality in public services.

It can be crucial to distinguish between the regions and countries that already are hotbeds for knowledge-intensive sectors, and those that are likely to become hotbeds over the coming years. The latter are more promising for investors and entrepreneurs,since the wages and costs of doing business is typically lower in upstart regions. Typically, regulatory regimes and tax systems are also more conductive to investment and businesses in upstart regions. Talents might instead choose regions that are already hotbeds, since the wages tend to be higher there. Some talented workers might also prefer upstart regions, drawn there by lower costs of living and the lower tax levels often found outside of Northern and Western Europe.

The data and analysis provided in this report will help answer questions like: What parts of Europe have the largest concentration of people working in programming? In which countries do jobs in research and development abound? Where are the design centers of Europe? These questions are not only relevant for the business community and those seeking employment abroad, but finding answers offers insights for policy makers who wish to gain a better understanding of the new geography of jobs in Europe.

The analysis shows that some old structures remain in Europe. It also shows that change is on the way. Overall, the Northern European countries have the highest share of brain business jobs, followed by Western Europe. One would expect Southern Europe to take the third position, followed by Central and Eastern Europe at the bottom. After all, Southern Europe has been open for commerce, enterprise and technological influx from the world market for a long time, while the Central and Eastern Europe region was weighed down by communism until the beginning of the 1990s. Yet, on average, the Central and East European countries now have a higher concentration of brain business jobs than Southern European countries. This is testament of how the former planned economies of Europe have embraced enterprise and fostered growth, while swathes of Southern Europe have stagnated.

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Some countries defy gravity.Estonia has a higher concentration of brain business jobs than France and Belgium. […] Another example is Malta. The island nation, which used to be a backwards, albeit pleasant, place, has become the most knowledge-intensivecenter of Southern Europe.

Some countries defy gravity. Estonia has a higher concentration of brain business jobs than France and Belgium. This is striking, given that the two latter countries have been on the forefront of development since the industrial revolution, while the Estonian economy was in shatters when the planned economy of the Soviet Union collapsed. Since then, Estonia has adopted one of the most business friendly policies and efficient governments in the world.

The development in the small Baltic country should be an inspiration for the rest of Europe.

Another example is Malta. The island nation, which used to be a backwards, albeit pleasant, place, has become the most knowledge-intensive center of Southern Europe. By attracting international businesses and talents, the country strives to become a miniature Singapore of the Mediterranean.

During recent years however, Malta has lost part of its competitive edge, falling three positions to 18th position overall. The Brain Business Jobs concentration of Malta has however increased from 53.6 to 55.1 between 2014 and 2016. The country is still the best performing in Southern Europe, scoring even above France. Estonia has increased the Brain Business Jobs concentration from 56.1 to 60.1 during the same period, rising one ranking to 12th overall (table 2).

Switzerland has the highest concentration of Brain Business Jobs in Europe, followed closely by Sweden. As shown in the detailed comparison in table 4, Switzerland relies on being a leading tech-nation (1st rank) and has some strengths in advanced services (7th rank) and ICT (11th rank), while it is relatively weak in creative professions (16th rank). Sweden has more overall strengths, with strong performance in ICT (2nd rank), tech (3rd rank), creative professions (4th rank) as well as advanced services (5th rank).

Between 2014 and 2016, the concentration of Brain Business Jobs grew from 8.71 to 8.96 percent of the working age population in Sweden, while it fell from 92.5 to 90.6 in Switzerland (table 2). If this trend continues, Sweden will soon overtake the top position. This is notable, for while the two countries are often mistaken for one another, they have widely different distribution of Brain Business Jobs.

Switzerland is relying strongly on the tech-sector including research and development. Sweden has much more broadly dispersed strengths, being a leading nation in all four categories. In a time when the traditional tech-sector is growing slower than ICT, advanced services and creative professions in terms of Brain Business Jobs, Switzerland might soon be overtaken by Sweden.

It might come as a surprise that Sweden is such a well-rounded knowledge capital, since a common view is that Sweden pursues a socialist model. While the Swedish economy is burdened by high taxes, the country has for decades compensated with extensive market-oriented reforms and high R&D spending. During recent decades, significant tax reductions as well as liberalizations have taken place in Sweden. Private businesses have a long tradition of investing in research and development, paving the road for blooming knowledge-intensive.

While many large multinational Swedish companies are gradually transitioning their businesses to other parts of the world, notably China, the country

fills the gaps by giving birth to new entrepreneurial firms. Sweden benefits from having an advanced private equity sector that invest heavily in new ventures, such as Fintech, computer games and environmental technology.

While brain business jobs are more evenly distributed geographically in Sweden than in some other countries, the capital region Stockholm still manages to be something of a hidden Silicon Valley of Europe, and yet excels also in other knowledge-intensive segments, such as high-tech industrial engineering and advanced services. Denmark, which has a record high tax level but still manages to be one of the most market-friendly countries in Europe, has fallen behind in the development. So have also Finland and Iceland.

There are many examples of this trend, in which single countries defy the traditional North-South and West-East divisions of Europe. The Czech Republic, a former planned economy, for example has outpaced Austria in Brain Business Jobs. Belgium has fallen behind a number of formerly planned economies: Estonia, the Czech Republic, Hungary as well as Slovania.

The geography of successful enterprise in Europe is complex, and shifting due to a simple fact: companies and investments are mobile across Europe, and in search of qualified workers. Those regions and countries in which young talents are educated, or to which young talents move, attract the investments and businesses. The lower wages, combined with the lower costs of living, in Eastern and Central European capital regions, have made these regions the hotspots for Brain Business Jobs expansion.

The lower wages, combined with the lower costs of living, in Eastern and Central European capital regions, have made these regions the hotspots for Brain Business Jobs expansion.

Table 4. Detailed Brain Business Jobs Ranking Jobs per 1 000 working age population

Cumulative ranking		All knowledge intensive sectors	Tech-sector ranking	Tech-sector per capita
1	Switzerland	90.6	1	44.7
2	Sweden	89.6	3	25.6
3	Luxembourg	86.7	14	17.9
4	Netherlands	81.0	10	19.4
5	UK	80.6	8	20.5
6	Denmark	77.0	2	25.6
7	Germany	69.4	4	24.6
8	Ireland	67.6	11	18.6
9	Iceland	67.1	17	15.3
10	Norway	65.3	5	22.5
11	Finland	60.9	6	22.2
12	Estonia	60.1	15	16.5
13	Czech Republic	57.5	7	20.9
14	Austria	57.2	12	18.2
15	Hungary	56.9	9	19.6
16	Slovenia	56.3	13	18.1
17	Belgium	55.3	23	12.0
18	Malta	55.1	29	8.2
19	Latvia	53.4	26	10.1
20	France	52.7	18	15.1
21	Slovakia	48.6	19	13.0
22	Lithuania	47.4	22	12.1
23	Portugal	40.9	25	10.7
24	Bulgaria	40.4	30	7.9
25	Spain	40.3	21	12.4
26	Cyprus	38.9	31	5.2
27	Italy	38.1	24	11.5
28	Croatia	36.7	20	12.4
29	Greece	36.2	16	15.6
30	Poland	34.6	28	8.8
31	Romania	32.3	27	9.1

ICT ranking	ICT per capita	Advanced services ranking	Advanced services per capita	Creative professions ranking	Creative professions per capita
11	21.3	7	16.4	16	8.3
2	30.7	5	18.8	4	14.6
1	40.6	3	20.9	22	7.2
6	23.5	1	25.4	6	12.7
4	25.5	4	20.8	5	13.8
5	24.8	16	12.0	3	14.6
14	19.0	8	16.3	10	9.5
7	23.5	13	13.0	7	12.5
3	28.4	22	8.4	2	15.1
13	19.9	26	7.6	1	15.3
10	21.6	25	8.1	15	9.0
9	21.9	20	11.3	9	10.4
16	16.7	21	9.1	8	10.8
20	16.0	9	16.2	25	6.9
17	16.7	18	11.4	12	9.2
21	15.6	10	14.5	17	8.1
19	16.0	2	22.4	30	5.0
12	20.3	6	17.3	11	9.4
8	22.7	17	11.5	13	9.2
18	16.2	14	12.4	14	9.1
23	15.2	11	14.3	27	6.2
22	15.2	15	12.4	20	7.7
27	11.9	19	11.4	24	6.9
15	18.5	30	6.2	18	7.8
26	12.5	24	8.2	21	7.3
24	13.2	12	13.3	23	7.2
25	12.9	31	6.0	19	7.7
30	11.1	28	6.7	26	6.5
31	8.4	29	6.4	28	5.8
28	11.8	23	8.3	29	5.6
29	11.7	27	6.9	31	4.5

4. Mapping the Europe's brain business jobs

For an investor, a business or employee choosing where to locate, the characteristics of regions and countries matter. Previous studies attempting to identify knowledge-intensive industries tend to end up with the following four knowledge-intensive types of business, namely the tech-sector, ICT, advanced services and creative professions. These broad fields are in the data analysis divided into eleven subfields, as shown below. These, in turn, fall into a large number of subcategories.

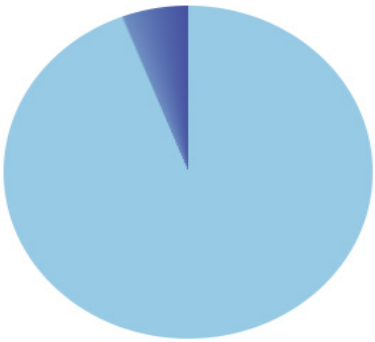
Table 5.Division of Brain Business Jobs

Tech-sector	High-tech Manufacturing Engineering/Architecture Research and Development
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

This comprehensive way of defining knowledge 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. The source of the data is the most detailed structural business statistics data, published by the European statistics agency Eurostat.[5]

Statistician have gone through great pains to classify each local unit of each business, measuring how many people work in highly specialized knowledge-intensive work places or local units of firms. Thus, employees of local units of larger companies, focused, for example, on high tech manufacturing, are counted as brain business jobs. A potential shortcoming of this approach is that, for example, administrators working in specialized IT-companies are counted as brain business workers, while IT-specialists in sectors such as construction are not. For some purposes, for example determining how many people belong to different professions, this might constitute a measurement error. For the purposes of this report, however, mapping how many people work in advanced knowledge-intensive firms is the more interesting metric since it reflects the size of brain business.

National and regional data for 31 countries is included in this study. These countries are the 28 EU member-states plus Switzerland, Norway and Iceland. Regional data is based on the 2016 distribution of Brain Business Jobs, while national data ranges from 2014 to 2016 distribution. 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 2, 5.6 percent of the working age population of the 31 studied European countries fit the definition of Brain Business Workers. An important note is that latest regional data is for 2015 in this study, compared to latest national data which is for 2016.



17.6 millions of brain business workers

314 million working-aged individuals

17.6 millions of brain business job workers are employed in knowledge intensive firms in 31 european countries studied in this report, this is about 5,5% of working aged individuals who live in thee countries.

The regression analysis has the concentration of Brain Business Jobs per region as the variable to be explained. The explanatory variables are three subindexes gathered by Eurostat for regional competition: the *Basic competitiveness sub-index* (an aggregated score based on the assessment of the regional quality of institutions, infrastructure and health), the *Efficiency sub-index* (an aggregated score based on higher education and lifelong learning, labour market efficiency and market size) and the *Innovation sub-index* (aggregate of measures relating to the level of technological readiness of enterprises and households, business sophistication and innovation). A fourth measure is *Disposable Income (PPS) per capita*. Lastly, a measure which shows if the region is a capital or not (including smaller countries, such as Estonia, which are single NUTS2-regions) is included.[6] The results of regression analysis is shown in figure 3, with all factors normalized.

Regression Statistics	
Multiple R	0.86
R Square	0.73
Adjusted R Square	0.73
Standard Error	0.21
Observations	258

Significance				
	df	SS	MS	F
Regression	5	31.44	6.29	139.06
Residual	252	11.39	0.05	
Total	257	42.83		

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	3.81E-16	1.32E-02	2.88E-14	1.00E+00	-2.61E-02	2.61E-02
Basic competitiveness sub-index	-4.61E-01	6.83E-02	-6.76E+00	9.61E-11	-5.96E-01	-3.27E-01
Efficiency sub-index	5.47E-01	7.42E-02	7.37E+00	2.44E-12	4.00E-01	6.93E-01
Innovation sub-index	5.98E-01	8.33E-02	7.18E+00	7.70E-12	4.34E-01	7.63E-01
Disposable Income, PPS	-4.31E-02	5.21E-02	-8.28E-01	4.08E-01	-1.46E-01	5.95E-02
Capital region?	3.21E-01	3.63E-02	8.85E+00	1.57E-16	2.50E-01	3.93E-001

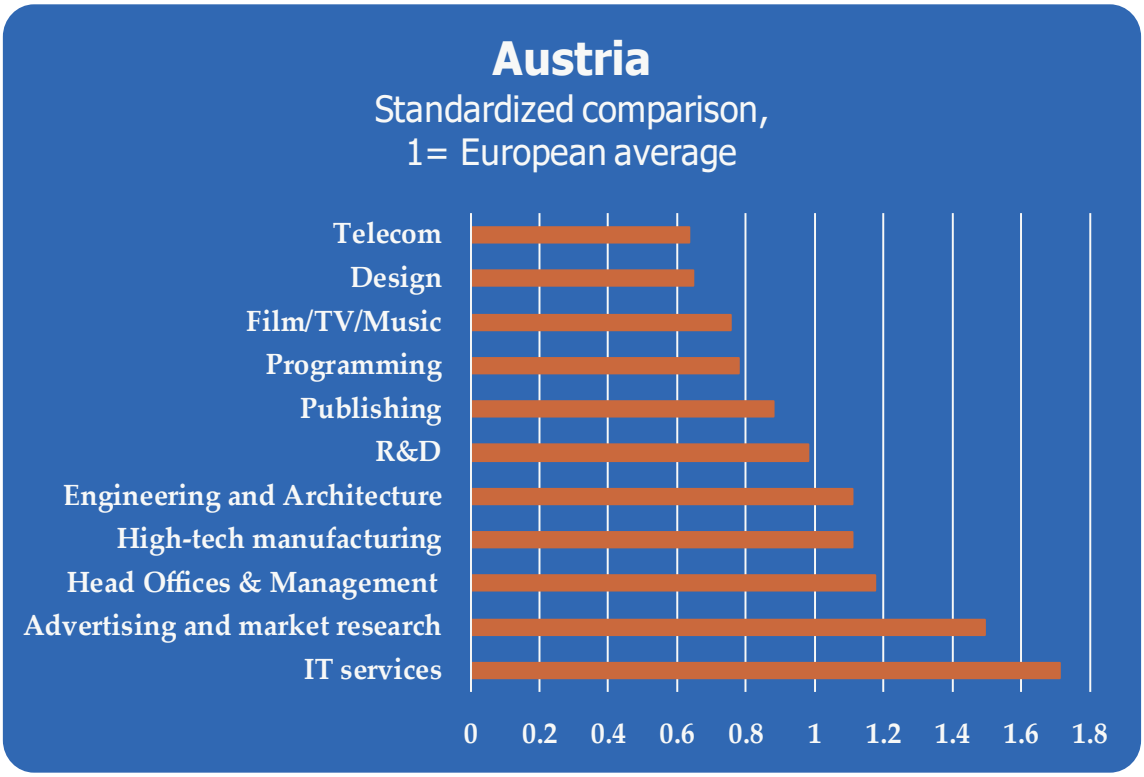
Country analysis: Austria

In Austria, the number of employees of the most knowedge-intensive firms has grown from 299,570 in 2014 to 308,004 in 2016. As a share of the working age population, 5.7 percent worked in Brain Business Jobs in 2016. This is higher than theEuropean average of 5.6 and a slight increase over time.

Compared to the rest of Europe, Austria has a number of strengths. The main strength is in IT-services, followed by advertising and market research. The country also has a strong concentration of head offices as well as high-tech manufacturing and engineering. On the other hand, Austria lags behind the rest of Europe when it comes to areas such as telecom, design, film/TV/music as well as programming. On the whole, creative professions is the weakness of Austria while its strength lies in advanced services and tech.

The strongest region in Austria is the capital region of Vienna. Here, 10.1 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. Other strong performers are Salzburg and Steiermark (both 5.5 percent). The lowest share of Brain Business Jobs is found in Burgenland (2.7 percent) and Niederösterreich (3.4 percent).

Amongst 283 European regions, Vienna ranks as the 21st in Brain Business Jobs comparison. The capital region has a slightly higher concentration of knowledge-intensive jobs and considerably higher score than Berlin, Lisbon and Rome. Bratislava, the capital region of Slovakia which is geographically close to Vienna, has the highest concentration in all of Europe. Vienna has the opportunity to strengthen its position by forming stronger cooperation bonds with Bratislava.


Austria
Standardized comparison,
1= European average
Telecom
Design
Film/TV/Music
Programming
Publishing
R&D
Engineering and Architecture
High-tech manufacturing
Head Offices & Management
Advertising and market research
IT services
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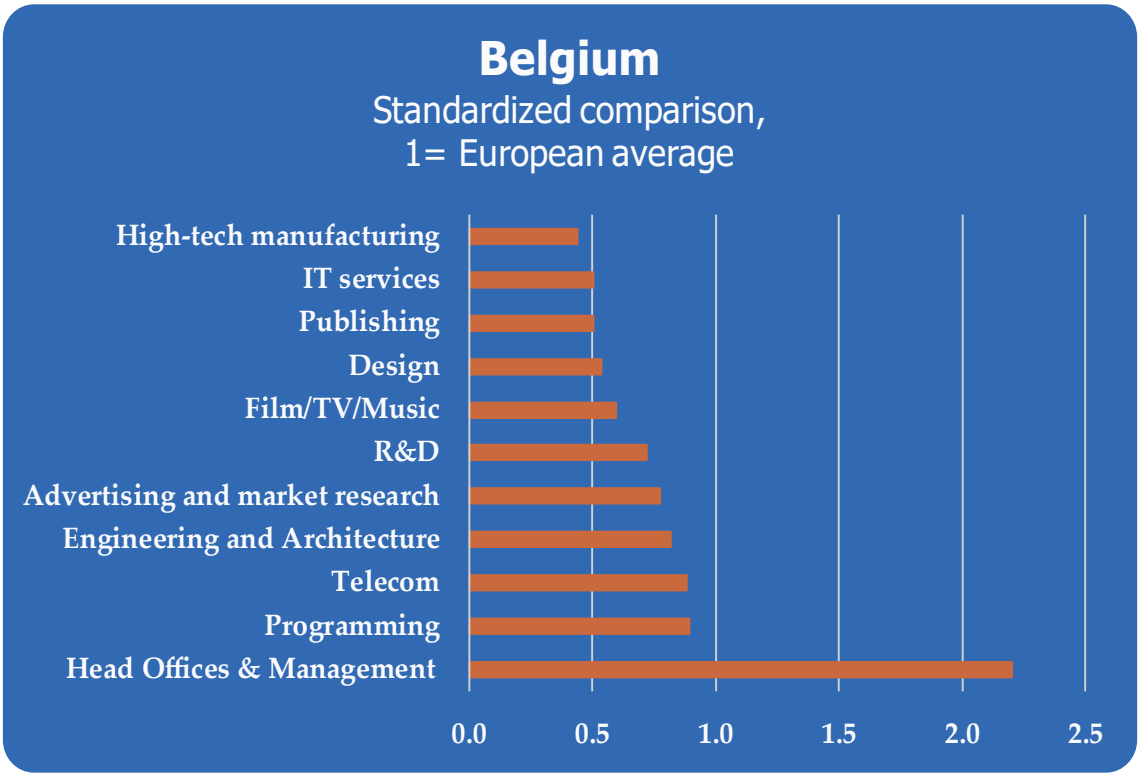
Country analysis: Belgium

In Belgium, the number of employees of the most knowledge-intensive firms has increased from 352,272 in 2014 to 370,073 in 2016. Compared to the whole working age population, the share employed in Brain Business Jobs has increased from below 5.3 to above 5.5 percent. In this sense, Belgium has gone from having a slightly higher share than the European average in 2014 to a slightly lower share than the European average in 2016.

Belgium relies very strongly on head offices & management, where it has a concentration of Brain Business Jobs more than twice as high as the European average. This is in fact the highest rate in all of Europe. In other areas, however it falls behind the European average. Particular weaknesses are high-tech manufacturing, IT services, publishing and design.

Besides head offices & management, strengthsa found in programming and telecom.The strongest region in Belgium is the capital region of Brussels. Here, 10.2 percent of the working age population is employed in Brain Business Jobs, which is close to twice the national average. Other strong performers are the province of Brabant Wallon (9.0 percent), the province of Vlaams-Brabant (8.6 percent) and the province of Antwerpen (6.6 percent). The lowest share of Brain Business Jobs are found in the province of Luxembourg (1.3 percent) and the province of Hainaut (2.1 percent).

Amongst 283 European regions, Brussels ranks as the 18th in Brain Business Jobs comparison. The capital region has a higher concentration of knowledge-intensive jobs than Vienna, Madrid and Berlin but a slightly lower one than Helsinki and Budapest.


Belgium
Standardized comparison,
1= European average
High-tech manufacturing
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Design
Film/TV/Music
R&D
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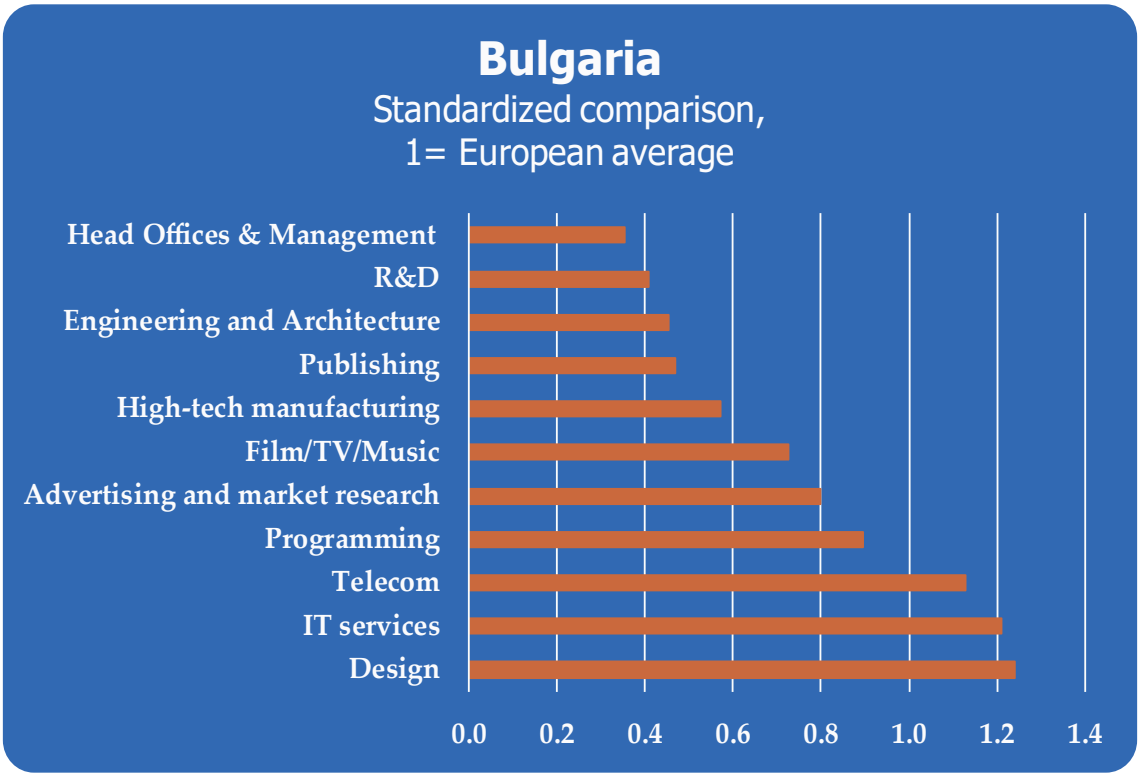
Country analysis: Bulgaria

In Bulgaria, the number of employees of the most knowledge-intensive firms has grown from 163,799 in 2014 to 177,188 in 2016. Also a share of the working age population a significant growth has occurred, from below 3.7 to above 4.0 percent. Bulgaria ranked at spot 24 amongst 31 European countries based on 2016 data – a rise of 4 positions compared to the ranking based on 2014 data.

Compared to the rest of Europe, Bulgaria has strength in design, IT-services as well as telecom. In fact, the concentration of highly knowledge-intensive jobs in these sectors is higher in Bulgaria than the European average. Programming is another strength, although Bulgaria falls just short of the European average in this sector. Weaknesses are found in head offices & management, R&D, engineering & architecture as well as publishing.

The strongest region in Bulgaria is the capital region of Sofia. Here, 9.0 percent of the working age population is employed in Brain Business Jobs, which is more than twice the national average. Severoiztochen has the second highest concentration, with 2.0 percent. At the bottom is Severozapaden wioth merely 0.8 percent of working age population employed in Brain Business Jobs.

Amongst 283 European regions, Sofia ranks as the 28th in Brain Business Jobs comparison. The capital region has a slightly higher concentration of knowledge-intensive jobs and considerably higher score than Lisbon, Rome and Warsaw but is behind Berlin, Madrid and Vienna. Sofia is increasingly viewed as an alternative to Bratislava for ICT-localization. This is important, as Bratislava is the leading region in all of Europe, with a Brain Business Jobs concentration of 18.4 percent of the working age population.


Bulgaria
Standardized comparison,
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Head Offices & Management
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Engineering and Architecture
Publishing
High-tech manufacturing
Film/TV/Music
Advertising and market research
Programming
Telecom
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Design
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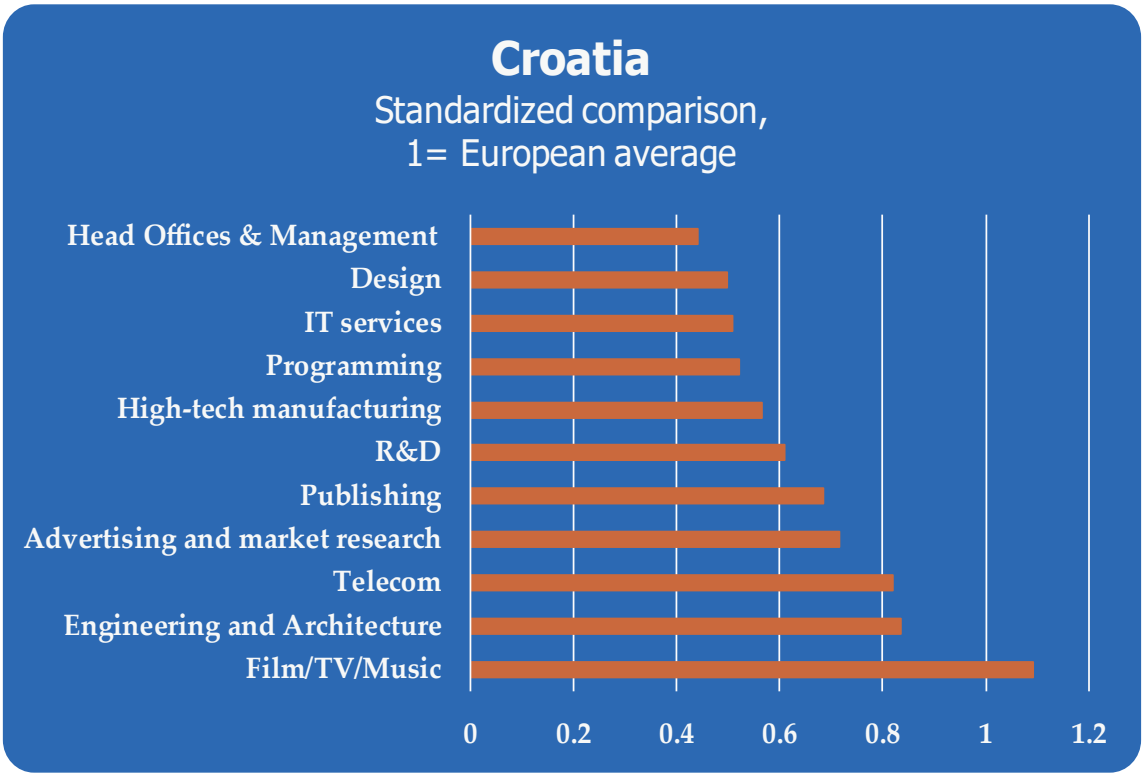
Country analysis: Croatia

In Croatia, the number of employees of the most knowledge-intensive firms has grown from 90,749 in 2014 to 93,187 in 2016. As a share of the working age population, 3.7 percent worked in Brain Business Jobs in 2016. This is higher than 3.5 in 2014. Yet, Croatia has fallen from 26th to 28th position in a comparison of 31 European countries during the same time. The reason is that other nations have experienced a more rapid increase.

Compared to the rest of Europe, Croatia has a strength in film/TV/music. In this field, the country has a higher share of Brain Business Jobs than the rest of Europe. Also in engineering & architecture and telecom Croatia finds strengths. The country however has a low share of employment in head office& management firms, design firms, IT services and programming.

A boost in programming-related activities is needed in order for Croatia to prosper, in a time when IT and communication services is a driver for knowledge-intensive jobs in Europe.

Croatia is made up of two large regions according to European Union classification. The first is where the capital region of Zagreb is located. In this region, 4.2 percent of the working age population works in Brain Business Jobs. The second region is Jadranska Hrvatska, where the same rate is 2.7 percent.


Croatia
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Engineering and Architecture
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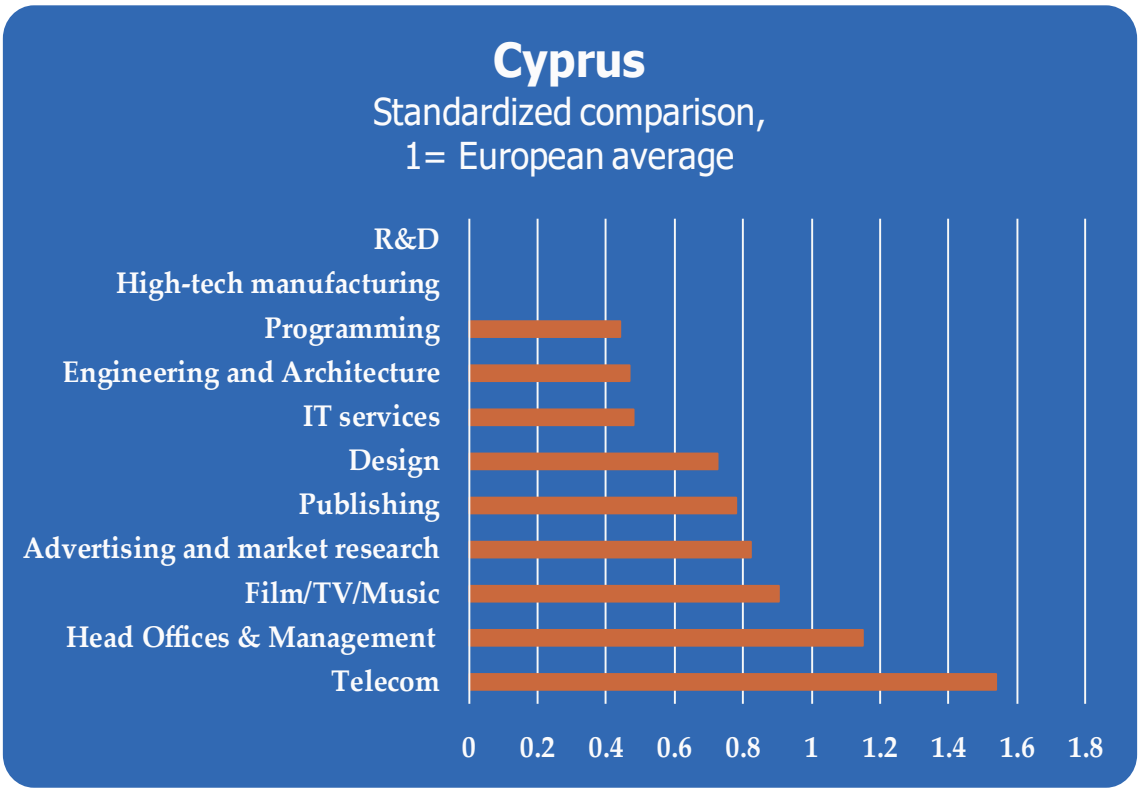
Country analysis: Cyprus

In Cyprus, the number of employees of the most knowledge-intensive firms has grown from 19,326 in 2014 to 20,555 in 2016. As a share of the working age population, 3.9 percent worked in Brain Business Jobs in 2016, an increase from 3.5 percent two years earlier.

Compared to the rest of Europe, Cyprus has a strong presence in telecom. Also in head offices & management the island nation has a competitive edge compared to other parts of the continent. Specialized research and development and high-tech manufacturing is not present in the region, which can be attributed to the relatively small size of Cyprus. Film/TV/music and advertising and market research are other relative strengths, while programming, engineering & architecture and IT-services are weaknesses.

Cyprus has fallen from 25th position among 31 European countries in Brain Business Jobs concentration to 24th position between 2014 and 2016. The reason is that the country is not strong enough in IT and communication, during a time when digitalization is a strong driver for change. Much like Malta, Cyprus could grow by relying on competitive business climate combined with a presence in IT and communication.


Cyprus
Standardized comparison,
1= European average
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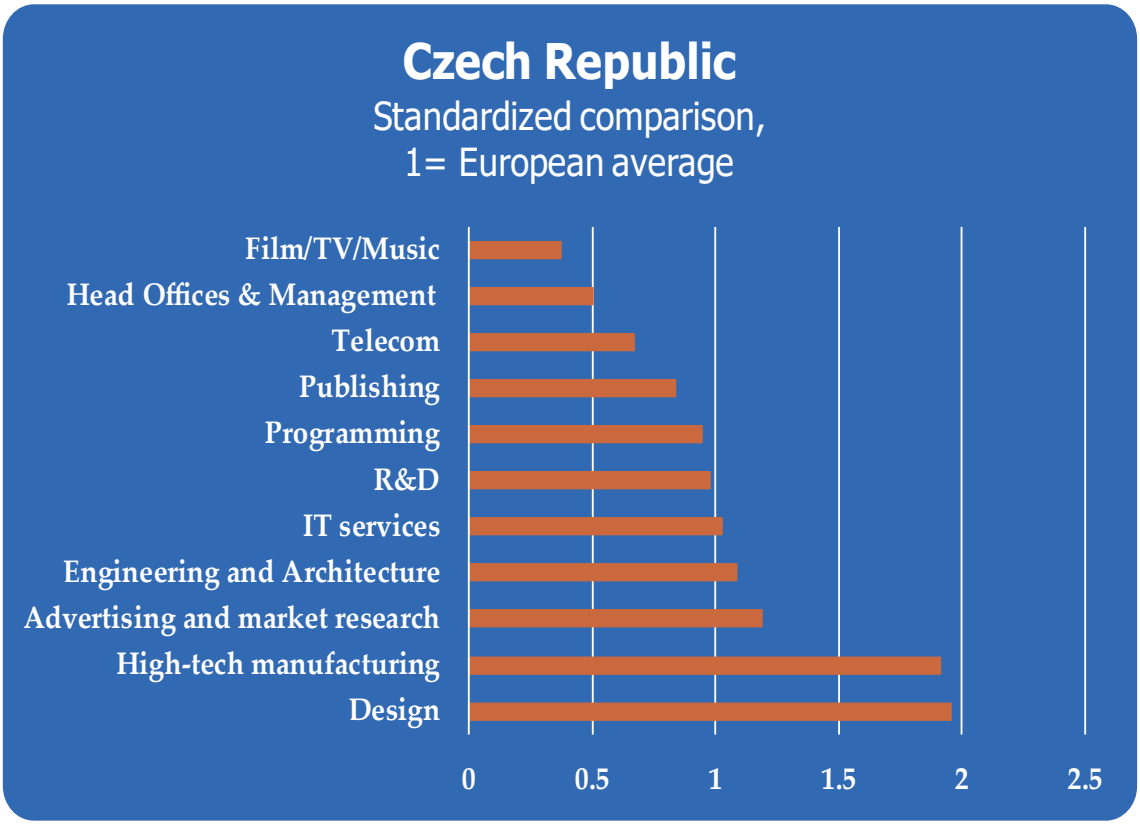
Country analysis: Czech Republic

In the Czech Republic, the number of employees of the most knowlAlso in advertising and market research, engineering & architecture and IT services the nation scores above the European average. The weaknesses exist in film/TV/music, head offices & management and telecom.

The strongest region in the country is the capital region of Prague. Here, 16.6 percent of the working age population is employed in Brain Business Jobs, which is three times the national average. Other strong performers are Jihovýchod (5.5 percent) and Severovýchod (4.3 percent). The lowest share of Brain Business Jobs are found in Severozápad (2.2 percent) and Strední Cechy (3.2 percent).

Amongst 283 European regions, Prague ranks as the 4th in Brain Business Jobs comparison. This places the region above leading locations such as Paris, London, Copenhagen and Oslo. In fact, the only capital region in Northern and Western Europé which has a stronger performance as Prague is Stockholm. The challenge for the Czech Republic is to continue on its impressive growth trajectory, continue to develop Prague as a Brain Business hob and also to expand the success to the other parts of the countryedge-intensive firms has grown from 341,255 in 2014 to 376,162 in 2016. As a share of the working age population, 5.8 percent worked in Brain Business Jobs in 2016, compared to 5.4 in 2014. This rapid development now places the Czech Republic also in advertising and market research, engineering & architecture and IT services the nation scores above the European average. The weaknesses exist in film/TV/music, head offices & management and telecom.

The strongest region in the country is the capital region of Prague. Here, 16.6 percent of the working age population is employed in Brain Business Jobs, which is three times the national average. Other strong performers are Jihovýchod (5.5 percent) and Severovýchod (4.3 percent). The lowest share of Brain Business Jobs are found in Severozápad (2.2 percent) and Strední Cechy (3.2 percent).


Czech Republic
Standardized comparison,
1= European average
Film/TV/Music
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Programming
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IT services
Engineering and Architecture
Advertising and market research
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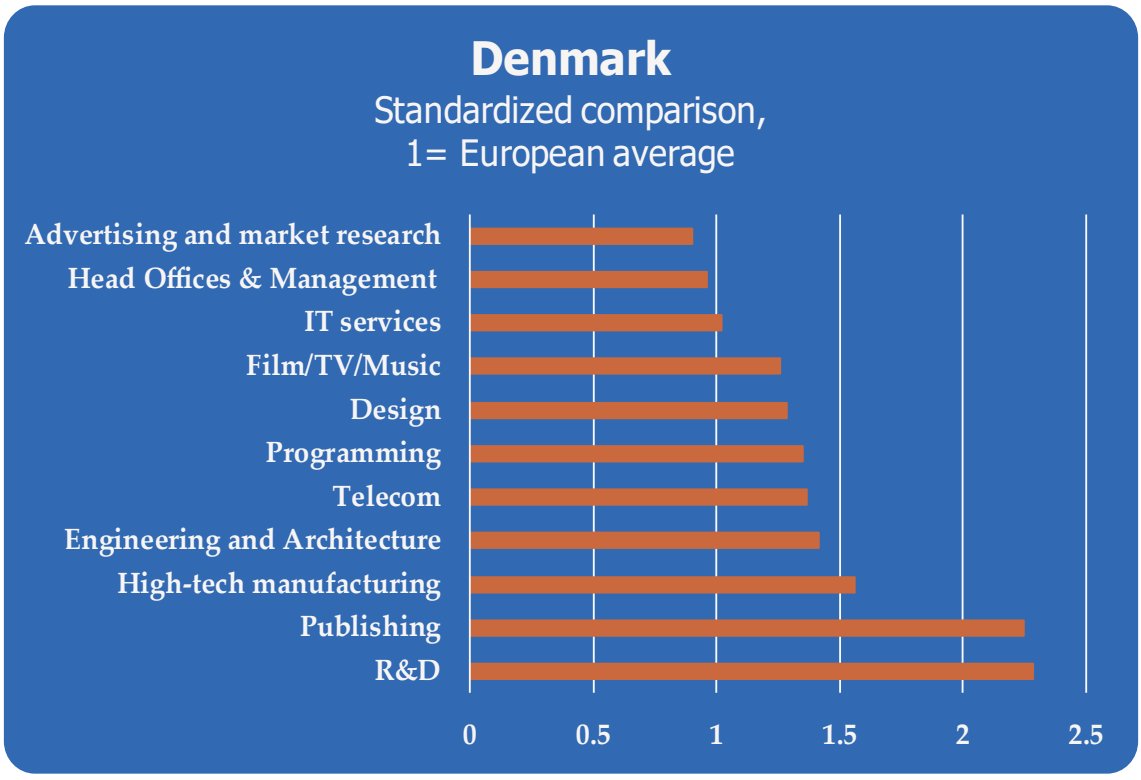
Country analysis: Denmark

Denmark is a leading nation when it comes to knowledge-intensive sectors, but has seen a loss of Brain Business Jobs lately. The number of employees of the most knowledge-intensive firms was 262,295 in 2014 and fell to 255,654 in 2016. As a share of the working age population, 7.7 percent worked in Brain Business Jobs in 2016, compared to 8.0 percent two years earlier. Denmark is still far above the European average (5.6 percent) but needs to address this fall.

Compared to the rest of Europe, Denmark has a number of strengths. The main strength is in R&D and publishing. In these two areas, the concentration of Brain Business Jobs in Denmark is more than twice the European average. In R&D, the nation has the highest share of working age population employed in all of Europe. Denmark is also strong in high-tech manufacturing, engineering & architecture, telecom, programming, design and film/TV/music.

The weaknesses exist in advertising and market research and head offices & management. The high tax levels of Denmark might explain why head offices are less than eager to locate to this otherwise leading knowledge-nation.

The strongest region in Denmark is the capital region of Copenhagen. Here, 13.5 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. The other strong performer is Midtjylland (7.1 percent). Nordjylland (4.8 percent) and Syddanmark also perform well (4.6 percent) while Sjælland is considerably below the national average (2.7 percent). Amongst 283 European regions, Copenhagen ranks as the 8th in Brain Business Jobs comparison. This is above Oslo, Helsinki and Berlin but below Stockholm.


Denmark
Standardized comparison,
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Advertising and market research
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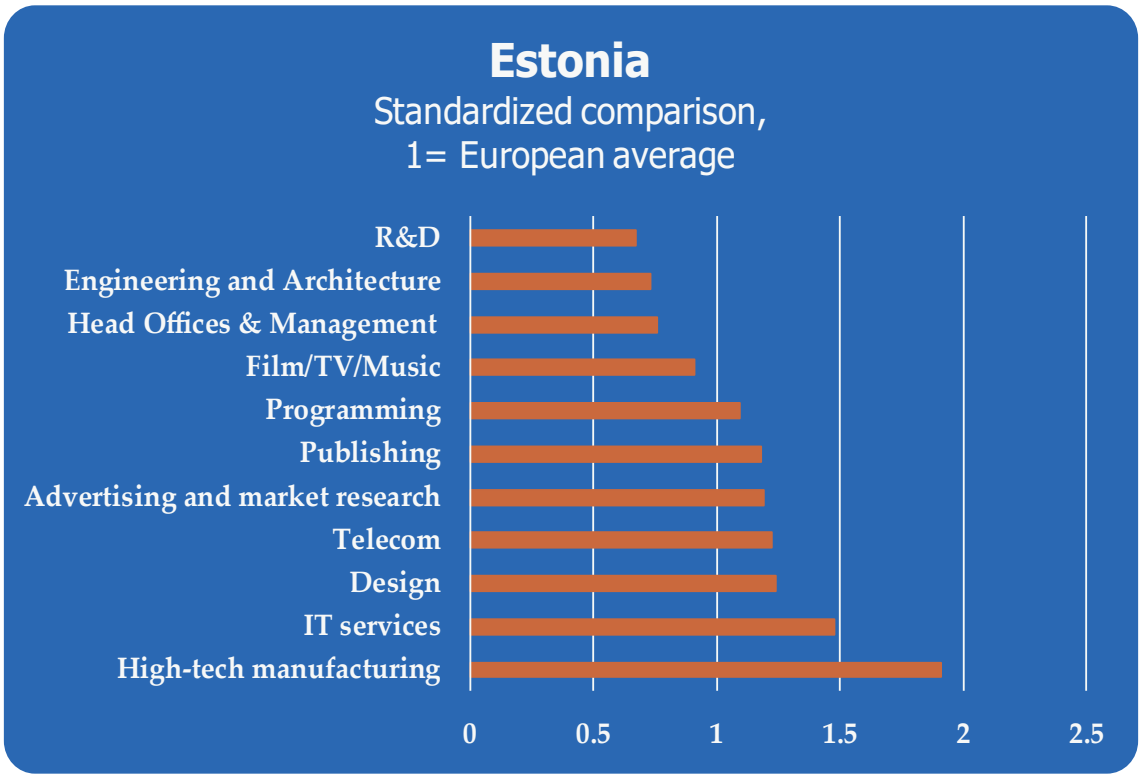
Country analysis: Estonia

In Estonia, the number of employees of the most knowledge-intensive firms has grown from 45,153 in 2014 to 47,759 in 2016. As a share of the working age population, 6.0 percent worked in Brain Business Jobs in 2016. This is higher than the European average of 5.6 and an increase over time. In comparison with 31 European countries, Estonia ranks at 12th place, only slightly below Finland, in Brain Business comparison. No other Eastern or Central European country has as high percentage of the population working in knowledge-intensive companies.

In 2014 the gap between Finland and Estonia was significant, with 6.7 percent of the working age population in Finland occupied in Brain Business Jobs compared to 5.6 percent in Estonia. By 2016, the share in Finland had shrunk to 6.1 percent while that in Estonia had grown to 6.0 percent. If the trend continues, Estonia will soon surpass Finland. Estonia is not far from Norway (6.5 percent), Iceland (6.7 percent) and Germany (6.9 percent). If the impressive growth in Estonia continues, it might surpass these countires. Sweden, with 9.0 percent of the working age population employed in highly knowledge-intensive enterprises, however still has a commanding lead.

Compared to the rest of Europe, Estonia has a number of strengths. The main strength is in high-tech manufacturing, where Estonia has nearly twice the concentration of Brain Business Jobs than the European average. Second is IT-services, where Estonia has almost 50 percent higher concentration than the average for Europe. Design, telecom, advertising and market research, publishing and programming are the other areas in which this country has a higher share of Brain Business Jobs than the rest of Europe. Weaknesses exists in R&D, engineering & architecture and head offices & management.


Estonia
Standardized comparison,
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Head Offices & Management
Film/TV/Music
Programming
Publishing
Advertising and market research
Telecom
Design
IT services
High-tech manufacturing
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Country analysis: Finland

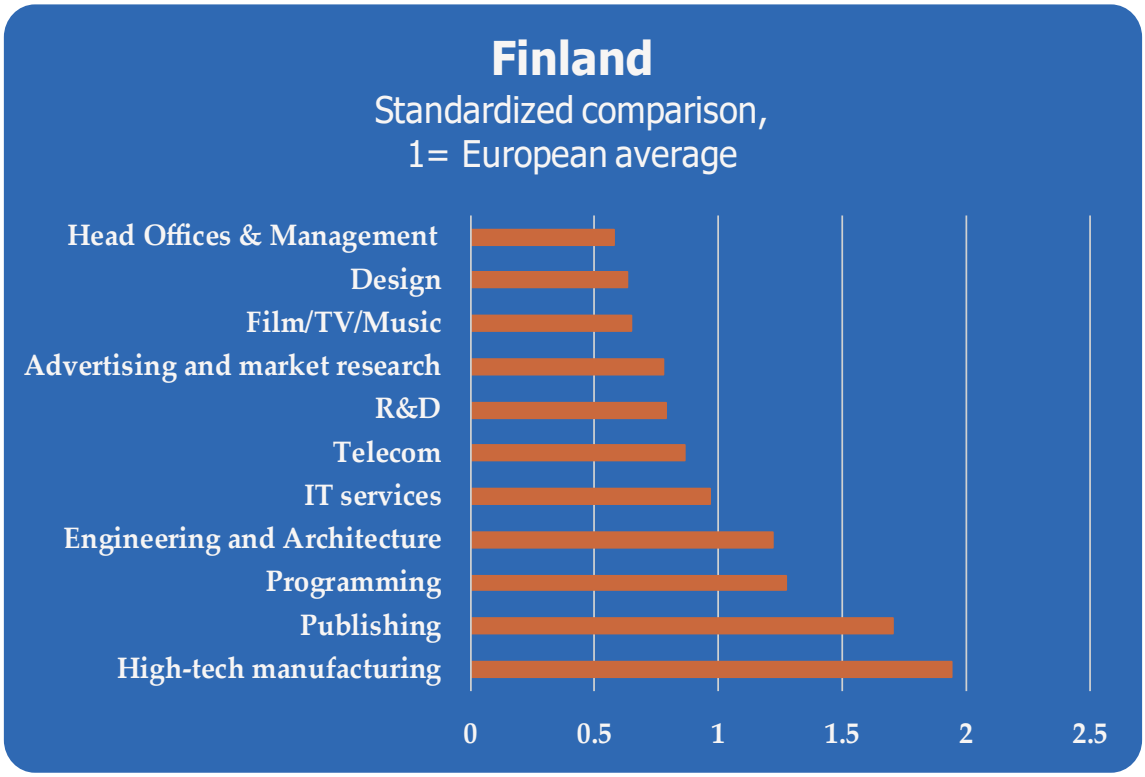
In Finland, the number of employees of the most knowledge-intensive firms has been reduced from 213,210 in 2014 to 192,990 in 2016. As a share of the working age population, 6.1 percent worked in Brain Business Jobs in 2016. This is higher than the European average of 5.6, but lower than 6.7 percent in 2014. The downward trend means that Finland has fallen from 8th to 11th position.

The negative trend of Finland stands in contrast to much else of Europe which have experienced an increase in Brain Business Jobs concentration. Still, Finland has many strengths. The main strength is high-tech manufacturing, where the concentration of Brain Business Jobs is nearly twice that of the European average. Publishing, programming as well as engineering & architecture are other strengths. Weaknesses exist in head offices & management, design and film/TV/music.

Finland has an average score in IT services, telecom and R&D. In a time of significant progress in new research, when the business world is increasingly dependent on digitalization, Finland needs to strengthen these areas. Other countries which are relying on high-tech manufacturing are much like Finland falling behind the rest of Europe, since this area is not experiencing as good development as the ICT-sector or advanced services.

The strongest region in Finland is the capital region of Helsinki. Here, 10.4 percent ofthe working age population is employed in Brain Business Jobs, which is nearly twice the national average. Other strong performers are Åland (4.7 percent) and Länsi-Suomi (4.4 percent). The country does not have any particularly weak regions, with the lowest performing region Etelä-Suomi still having a respectable concentration of 3.5 percent. The strongest region in Finland is the capital region of Helsinki. Here, 10.4 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. Other strong performers are Åland (4.7 percent) and Länsi-Suomi (4.4 percent). The country does not have any particularly weak regions, with the lowest performing region Etelä-Suomi still having a respectable concentration of 3.5 percent.

Amongst 283 European regions, Helsinki ranks as the 17th in Brain Business Jobs comparison. This is higher than Brussels, Vienna, Madrid and Berlin. Stockholm, Oslo and Copenhagen however rank above Helsinki. Even Budapest has a slightly higher concentration. This might come as a surprise, but Eastern and Central European capital regions in Europe have a strong concentration of Brain Business Jobs since they have a good supply of programmers, engineers and other knowledge workers, and also lower wages for these workers than in more developed parts of Europe. Overall Finland is a strong knowledge-economy, but needs to rise up to face the increased competition climate in Europe.



Country analysis: France

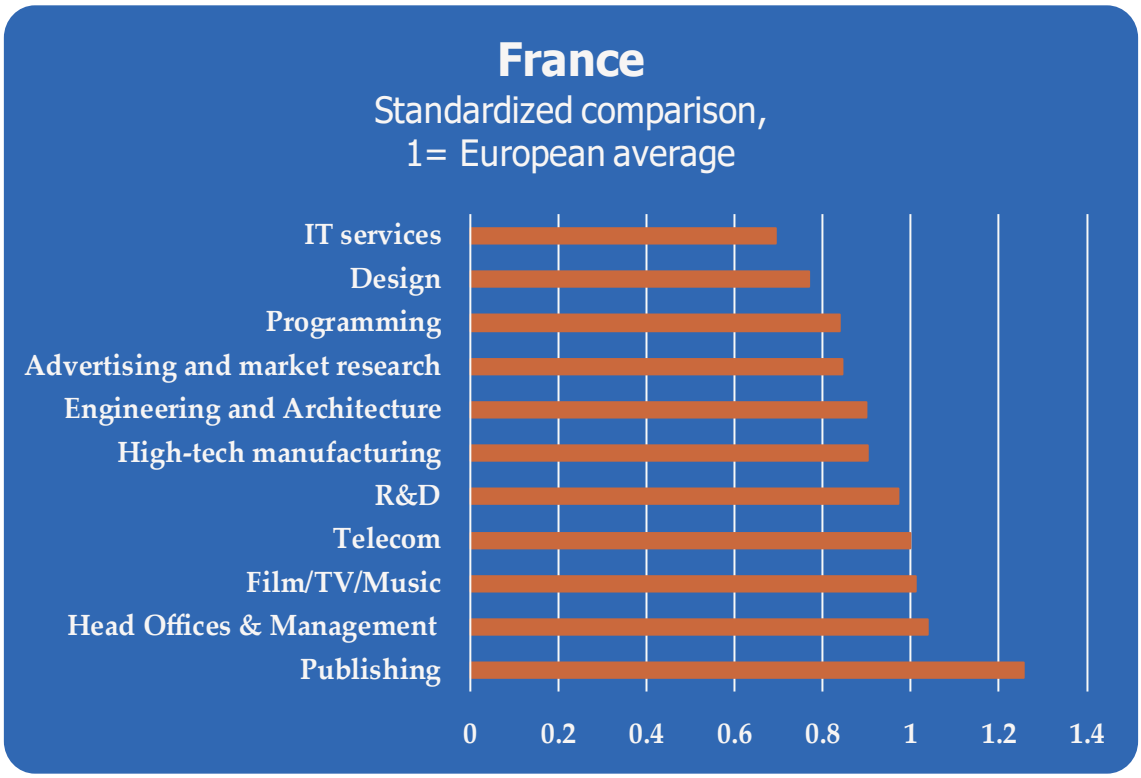
In France, the number of employees of the most knowledge-intensive firms was 1,985,733 in 2014 and increased slightly to 1,990,610 in 2016. As a share of the working age population, 5.3 percent worked in Brain Business Jobs in 2016, slightly higher than 5.2 percent two years ago. Paris in particular is a strong Brain Business Jobs, as fully 1,181,483 Brain Business Jobs exist in the capital region. This amounts to 16.3 percent of the working age population. As a comparison, the London region has 875,385 Brain Business Jobs, in which 15.7 percent of the working age population work.

Compared to the rest of Europe, France is particularly strong in publishing. Other strengths exist in head offices & management, film/TV/music, telecom and R&D. Relative weaknesses exist in IT services, design and programming.

In a time when much of the development of Brain Business Jobs is occurring in the ICT-sector, a challenge for France is to strengthen this area.

No single region in Europa has as many Brain Business Jobs as Paris. In fact, only three countries - Germany, UK and France itself outrank Paris. This is driven by the fact that Paris combines a high percentage of highly knowledge-intensive jobs with having a large population. But while the capital region is strong, the rest of France has relatively few Brain Business Jobs.

The second most important region of France is Rhône-Alpes with 159,420 people (4.3 percent) work in Brain Business Jobs, followed by Provence-Alpes-Côte d'Azur with 111,715 Brain Business Jobs (4.0 percent). France stands out as being the most centralized of the larger European countries. In the UK and in Germany for example, there are strong Brain Business Centers outside of the capital region.


France
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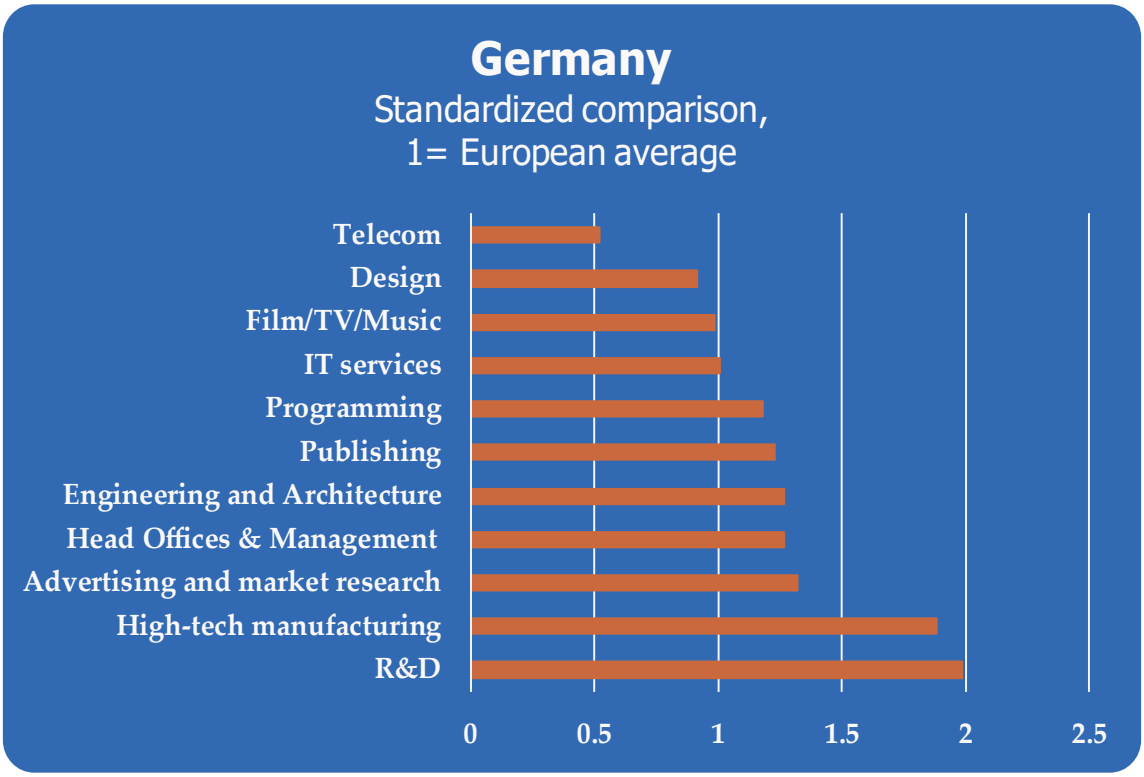
Country analysis: Germany

In Germany, the number of employees of the most knowledge-intensive firms has grown from 3,237,993 in 2014 to 3,458,021 in 2016. In total amounts, this is the highest rate of highly knowledge-intensive firm occupation in all of Europe. The UK comes in on second place with 3,085,838 Brain Business Jobs. As a share of the working age population, 6.9 percent of Germans worked in Brain Business Jobs in 2016, an increase compared to 6.6 percent two years earlier.

Compared to the rest of Europe, Germany has a number of strengths. The main strength is in R&D and high-tech manufacturing. In these fields, the concentration of Brain Business Jobs in Germany is nearly double the European average. Advertising and market research, head offices & management, as well as engineering & architecture are other strengths. On the other hand, Germany lags behind the rest of Europe when it comes to areas such as telecom, design, film/TV/music as well as IT-services. The weaknesses are similar to those found in Austria, although Germany has an overall higher share of Brain Business Jobs (6.9 percent of working age population compared to 5.7 in Austria).

Most countries have Brain Business Jobs focused to the capital region. Germany however has numerous top-ranking regions. One such region is Hamburg, with 154 261 Brain Business Jobs, or 13.7 percent of the working age population. This high concentration is ranked at 7th place amongst 283 European regions. Oberbayern, which has 370,733 Brain Business jobs or 13.1 percent of the workforce, ranks as having the 9th highest concentration in Europe. On 15th place on the same list Oberbayern is found, with 253,152 Brain Business Jobs, corresponding to 10.5 percent of the workforce.

Köln has a slightly lower concentration (10.1 percent) and a total of 275,020 Brain Business Jobs, ranking at 20th position in Europe. Berlin has 217,738 Brain Business Jobs, and with a concentration of 9.8 percent ranks at 23rd spot in Europe. Stuttgart ranks at 27th position, with a concentration of 9.2 and 227,200 Brain Business Jobs. Finally Mittelfranken, with a concentration of 9.0 and 95,917 Brain Business Jobs in total. No part of Europe has as many leading Brain Business Jobs centers as Germany.


Germany
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Engineering and Architecture
Head Offices & Management
Advertising and market research
High-tech manufacturing
R&D
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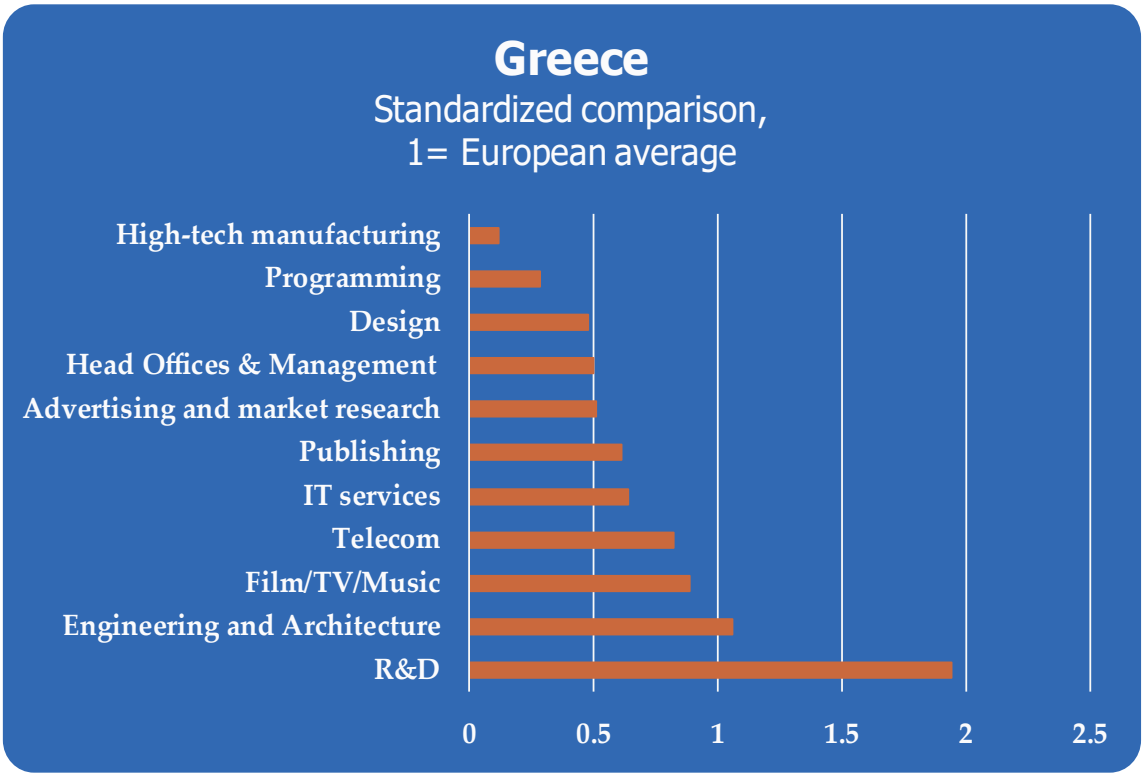
Country analysis: Greece

In Greece, the number of employees of the most knowledge-intensive firms has grown from 223,284 in 2014 to 231,593 in 2016. As a share of the working age population, 3.6 percent worked in Brain Business Jobs in 2016, an increase from 3.4 two years before.

Compared to the rest of Europe, Greece has an impressive strength in R&D, with nearly twice as high concentration of Brain Business Jobs in this area compared to the European average. Also in engineering & architecture Greece scores above the European average. On the other hand, Greece lags behind the rest of Europe when it comes to areas such as high-tech manufacturing and programming.

The strongest region in Greece is the capital region of Athens. Here, 6.1 percent of the working age population is employed in Brain Business Jobs, close to twice the national average. Other strong performers are Dytiki Ellada and Kiri (both 2.6 percent) and Kentriki Makedonia (2.5 percent). The lowest share of Brain Business Jobs are found in Sterea Ellada (1.3 percent) and Peloponnisos (1.6 percent).


Greece
Standardized comparison,
1= European average
High-tech manufacturing
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Advertising and market research
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Country analysis: Hungary

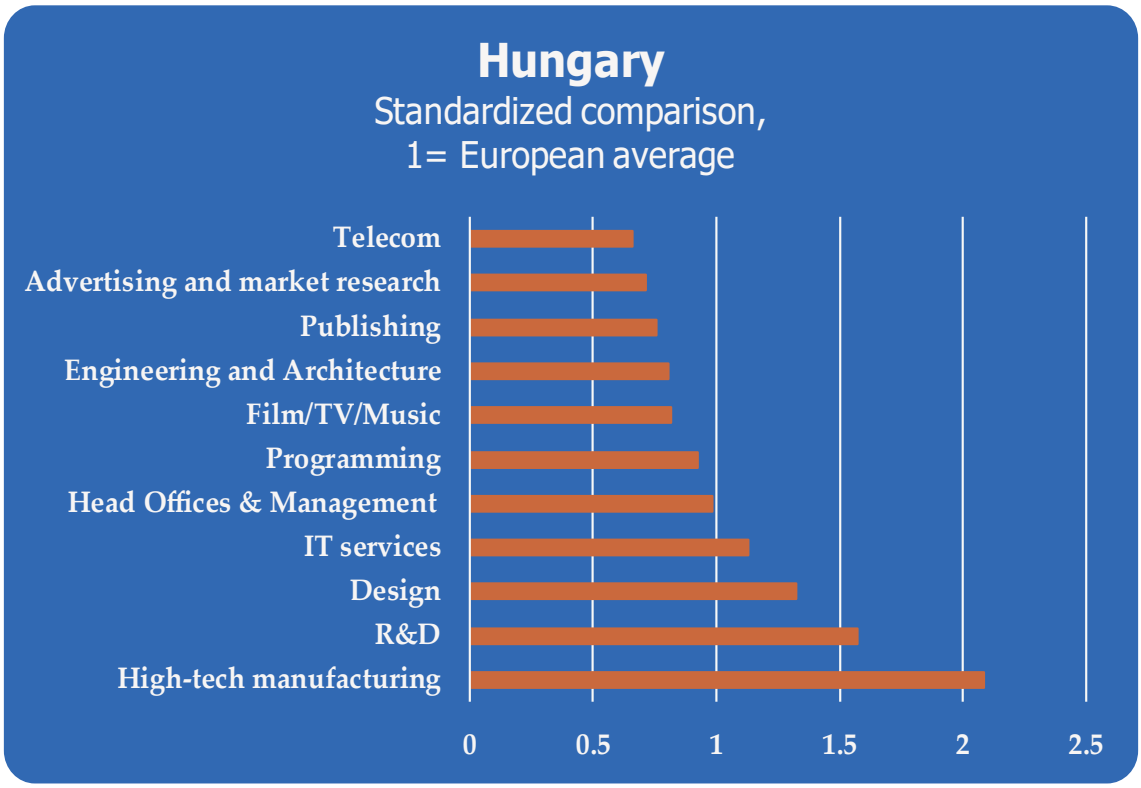
In Hungary, the number of employees of the most knowledge-intensive firms has grown from 312,073 in 2014 to 347,114 in 2016. As a share of the working age population, 5.7 percent worked in Brain Business Jobs in 2016. This is higher than the European average of 5.6 and a slight increase over time. In 2014 the share was 5.1 percent in Hungary compared to 5.2 percent in Europe on average.

In comparison with 31 European countries, Hungary ranked on 15th place based on the 2016 performance. This is a great leap compared to 19th place ranking based on 2014 data. The country has a higher share of Brain business jobs than Belgium, France, Portugal, Spain and Italy. The strong rise of Brain Business Jobs in Hungary is a prime example of the rapid changes in the geography of successful enterprise in Europe.

Compared to the rest of Europe, Hungary is a top-performer when it comes to high-tech manufacturing. The concentration of Brain Business Jobs in this sector is more than twice the European average. Another strength is R&D, where Hungary now has more than 50 percent higher concentration of Brain Business Jobs than the European average. Also in design and IT services Hungary has a stronger than average performance. On the other hand, Hungary lags behind the rest of Europe when it comes to areas such as telecom, advertising and market research and publishing.

The strongest region in Hungary is the capital region of Budapest. Here, 10.5 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. Budapest has a slightly higher Brain Business Jobs concentration than Helsinki. It also ranks higher than Brussels, Vienna, Madrid, Berlin, Sofia, Lisbon, Rome and Warsaw.

The other regions of Hungary have lower Brain Business Jobs concentration. In Közép-Dunántúl the concentration is 3.7 percent, followed by Nyugat-Dunántúl where it is 3.5 percent. Észak-Alföld and Dél-Alföld are at the bottom, with 2.6 percent of the working age population employed in highly knowledge-intensive enterprises.


Hungary
Standardized comparison,
1= European average
Telecom
Advertising and market research
Publishing
Engineering and Architecture
Film/TV/Music
Programming
Head Offices & Management
IT services
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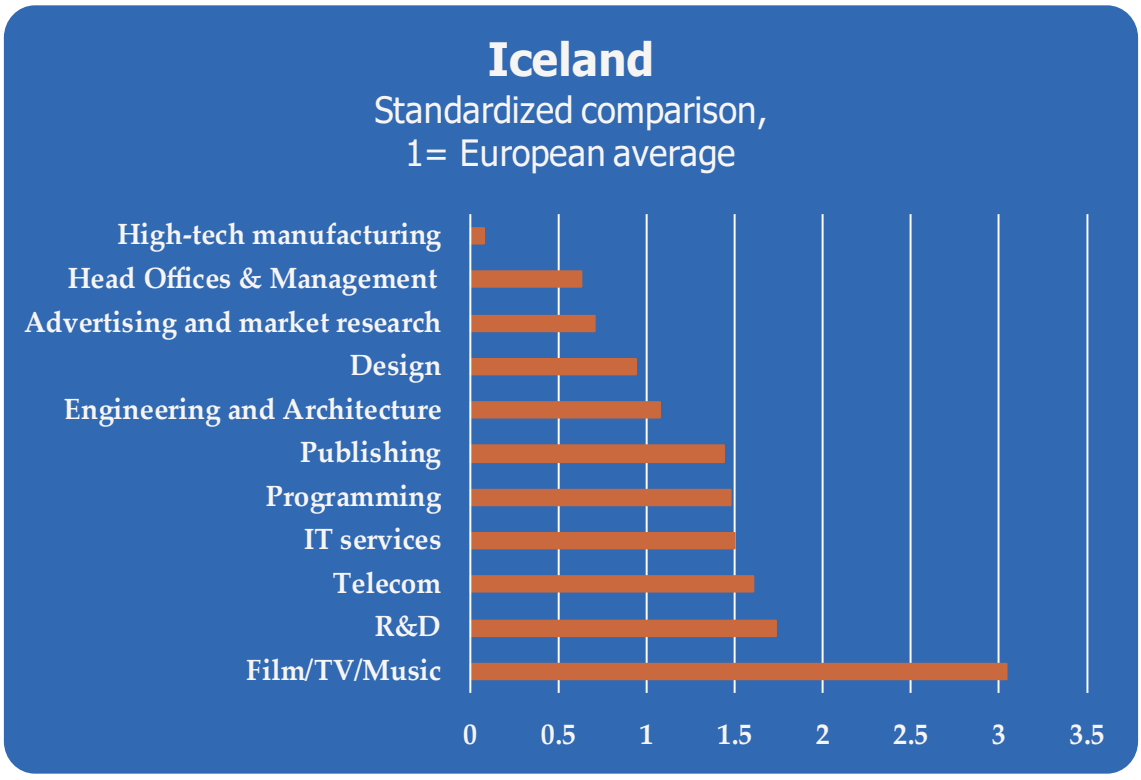
Country analysis: Iceland

In Iceland, the number of employees of the most knowledge-intensive firms has fallen from 14,321 in 2014 to 13,279 in 2016. As a share of the working age population, 6.7 percent worked in Brain Business Jobs in 2016. This is considerably lower than 7.4 percent two years earlier. Iceland continues to be a leading European knowledge-nation, but has fallen three places from 6th to 9th in the Brain Business Jobs ranking due to the reduction of employment in highly knowledge-intensive firms.

It remains to be seen if this is a short-term shift that will be overturn, or a long-term trend. Iceland has a higher concentration of Brain Business Jobs than Norway, Finland, Austria, Belgium as well as France.

Compared to the rest of Europe, Iceland has a number of strengths. The main strength is in film/TV/music. In this sector, Iceland has three times the concentration of employment than the European average. This is by far the highest share in Europe. Iceland is also highly developed in R&D, telecom and IT services – with 50 percent of higher rate of employment in these sectors compared to the rest of Europe.

On the other hand, Iceland lags behind the rest of Europe when it comes to areas such as high-tech manufacturing, head offices & management and advertising & market research. The explanation for this is Iceland's small size and distant geographical location. In the years to come, the challenge for Iceland is to foster more knowledge-intensive jobs and again climb.


Iceland
Standardized comparison,
1= European average
High-tech manufacturing
Head Offices & Management
Advertising and market research
Design
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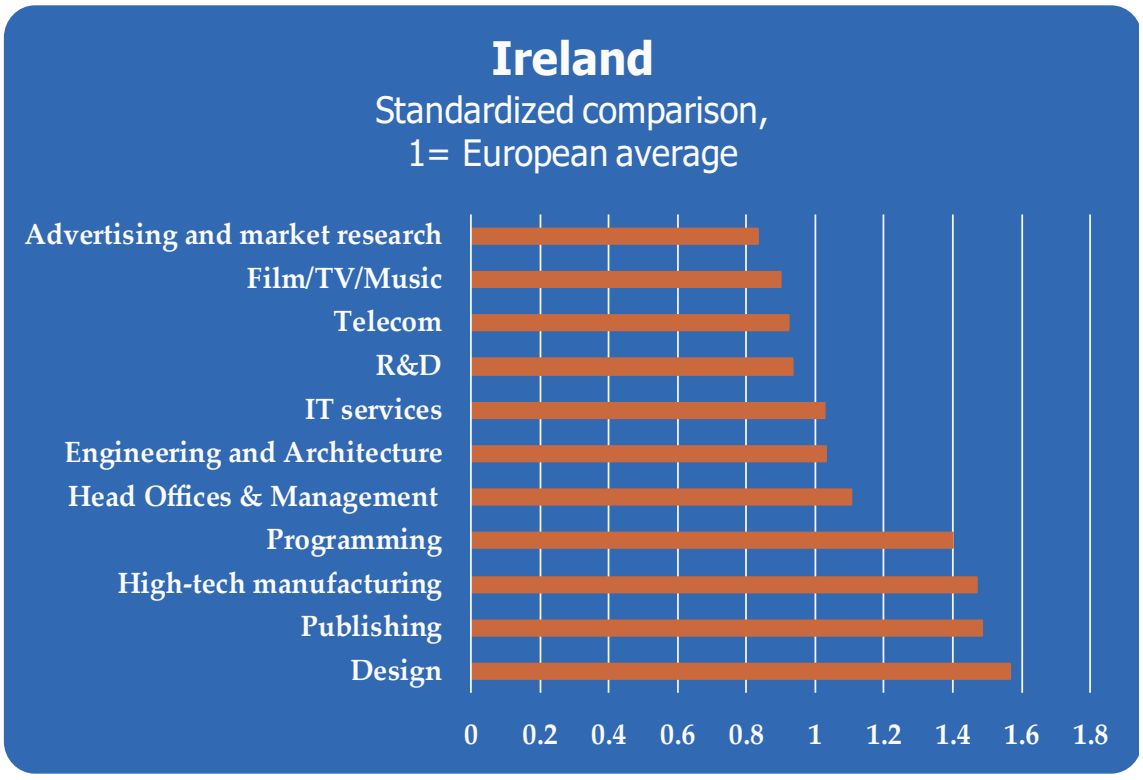
Country analysis: Ireland

In Ireland, the number of employees of the most knowledge-intensive firms has grown from 167,188 in 2014 to 188,976 in 2016. As a share of the working age population, 6.8 percent worked in Brain Business Jobs in 2016. This is higher than the European average of 5.6 and a increase over time. Two years earlier, the share in Ireland was 6.0 percent.

Ireland has the 8th highest Brain Business Jobs concentration in Europe, according to the latest data which is for 2016. The country has a higher share of highly knowledge-intensive jobs than Norway, Finland, Austria, Belgium and France. While the overall trend is that Eastern and Central European nations are catching up, Ireland has experienced a strong growth of Brain Business Jobs during the short period between 2014 and 2016. This has allowed the nation to climb from 11th to 8th position. If this trend continues, Ireland can soon climb to the very top of Europe.

Compared to the rest of Europe, Ireland has a number of strengths. The main strength is in design, followed by publishing and high-tech manufacturing. On the other hand, Ireland lags behind the rest of Europe when it comes to areas such as advertising & market research, film/TV/music and telecom. Regional data of good quality does unfortunately not exist as of yet for Switzerland, but will hopefully be included in future studies of Brain Business Jobs concentration.


Ireland
Standardized comparison,
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Advertising and market research
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Engineering and Architecture
Head Offices & Management
Programming
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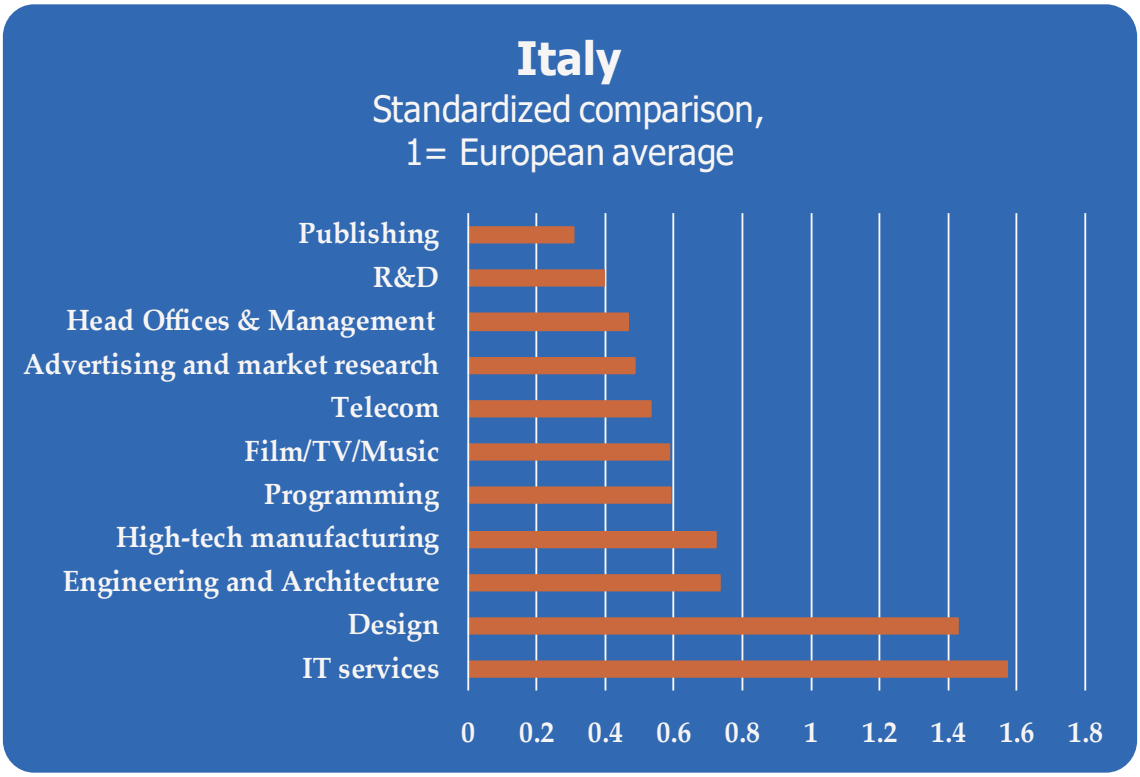
Country analysis: Italy

In Italy, the number of employees of the most knowledge-intensive firms has grown from 1,322,533 in 2014 to 1,377,268 in 2016. In total numbers, only Germany, the UK and France have more jobs in highly knowledge-intensive firms. As a share of the working age population, 3.8 percent worked in Brain Business Jobs in 2016, slightly higher than 3.6 percent two years earlier.

Compared to the rest of Europe, Italy has a number of strengths. The main strength is in IT-services, followed by design. In these two areas Italy has a concentration of Brain Business Jobs around 50 percent higher than the European average.

On the other hand, Italy lags behind the rest of Europe when it comes to areas such as publishing, R&D as well as head offices & management.

The strongest region in Italy is the capital region of Rome. Here, 7.7 percent of the working age population is employed in Brain Business Jobs, which is twice the national average. Another strong performer is Lombardia with 6.3 percent of the workforce employed in Brain Business Jobs. Piemonte follows next (4.8 percent). On the other hand, there are also weak performing regions in Italy. Siciila has only 1.5 percent of the population occupied in highly knowledge-intensive firms while Calabria has an even lower share of 1.3 percent.


Italy
Standardized comparison,
1= European average
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Head Offices & Management
Advertising and market research
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Film/TV/Music
Programming
High-tech manufacturing
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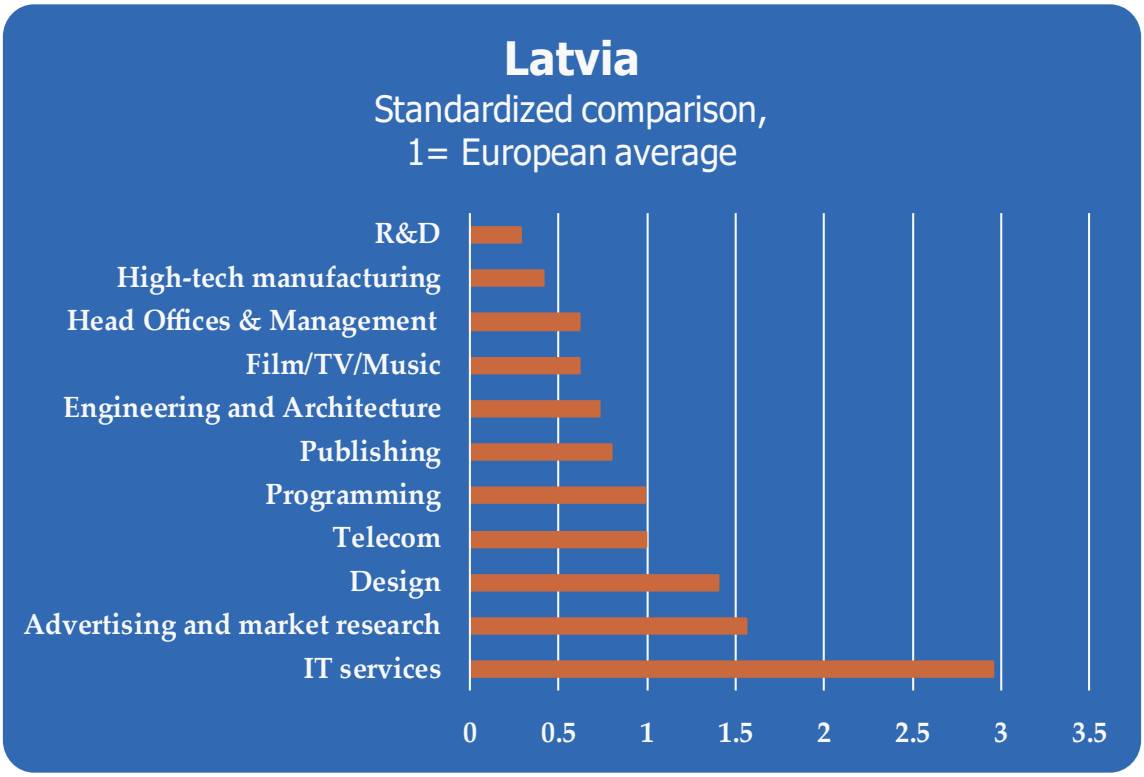
Country analysis: Latvia

In Latvia, the number of employees of the most knowledge-intensive firms has grown from 56,834 in 2014 to 63,913 in 2016. As a share of the working age population, 5.3 percent worked in Brain Business Jobs in 2016, slightly lower than the European average of 5.6 and a slight increase over time. In 2014 the share in Latvia was 4.6 percent, considerably lower than the 5.2 percent average of Europe at the time. During this short time, Latvia has caught up significantly to the rest of Europe.

Amongst 31 European countries, Latvia ranked as 19th position based on 2016 Brain Business Jobs data. This is an increase from 20th position based on two years earlier data. The latest available data shows Latvia having a higher share of the workforce employed in highly knowledge-intensive jobs than France, Slovakia, Lithuania, Portugal, Bulgaria, Spain and Italy.

Compared to the rest of Europe, Latvia has a dominating position in IT services, with a concentration of Brain Business Jobs in this field three times as high as the European average. This, in fact, is the highest share in all of Europe. Other strengths lie in advertising and market research and design. On the other hand, Latvioa lags behind the rest of Europe when it comes to areas such as R&D, high-tech manufacturing and head offices & management.


Latvia
Standardized comparison,
1= European average
R&D
High-tech manufacturing
Head Offices & Management
Film/TV/Music
Engineering and Architecture
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Telecom
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Advertising and market research
IT services
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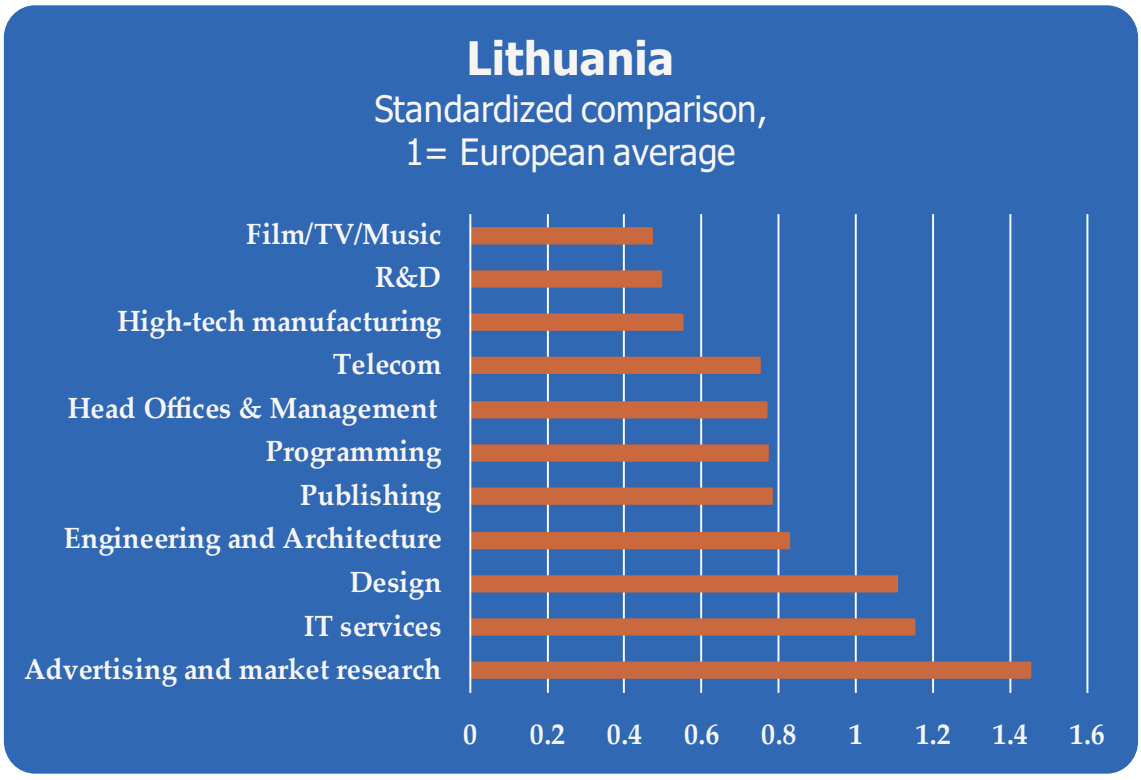
Country analysis: Lithuania

In Lithuania, the number of employees of the most knowledge-intensive firms has grown from 75,704 in 2014 to 83,183 in 2016. As a share of the working age population, 4.7 percent worked in Brain Business Jobs in 2016. This is lower than the European average of 5.6. Two years earlier, the share in Lithuania was 4.2 percent compared to a European average of 5.2 percent. Lithuania is thus catching up to the rest of Europe. It already has a higher concentration of occupation in highly knowledge-intensive firms than Portugal, Spain and Italy.

Compared to the rest of Europe, Lithuania has a number of strengths. The main strengths are in advertising and market research, IT services and design. In these three areas, Lithuania scores above the European average. On the other hand, Lithuania lags behind the rest of Europe when it comes to areas such as film/TV/music, R&D and high-tech manufacturing.


Lithuania
Standardized comparison,
1= European average
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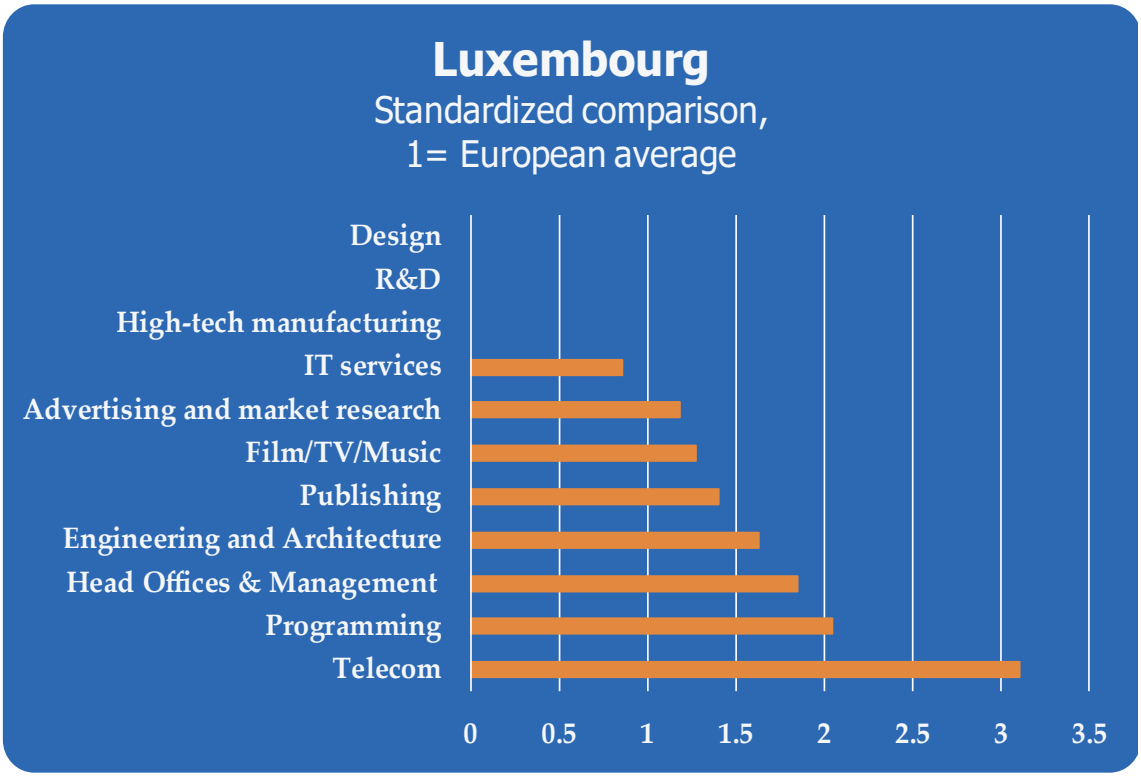
Country analysis: Luxembourg

In Luxembourg, the number of employees of the most knowledge-intensive firms has grown from 28,601 in 2014 to 31,740 in 2016. As a share of the working age population, 8.7 percent worked in Brain Business Jobs in 2016. This is considerably higher than the European average of 5.6 and an increase over time. Two years earlier, 8.2 percent of the workforce of Luxembourg worked in Brain Business Jobs.

A comparison of 31 European countries shows that Switzerland, Sweden and Luxembourg outpace all others in Brain Business Jobs concentration. In the two first countries, around 9 percent of the working age population is employed in highly knowledge-intensive firms, while the rate is slightly below that in Luxembourg.

Compared to the rest of Europe, Luxembourg has a number of strengths. The main strength is in Telecom, in which the share of Brain Business Jobs of Luxembourg is more than three times the European average. In the Telecom sector, no other of the European countries compares with Luxembourg. The country also has the highest share of programming workers.

Other strengths are programming as well as head offices & management, where Luxembourg has around twice the share of Brain Business Jobs than the European average. The small country however lags behind in design, R&D and high-tech manufacturing. Understandably, countries of the size of Luxembourg tend to have specialized business sectors.


Luxembourg
Standardized comparison,
1= European average
Design
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Advertising and market research
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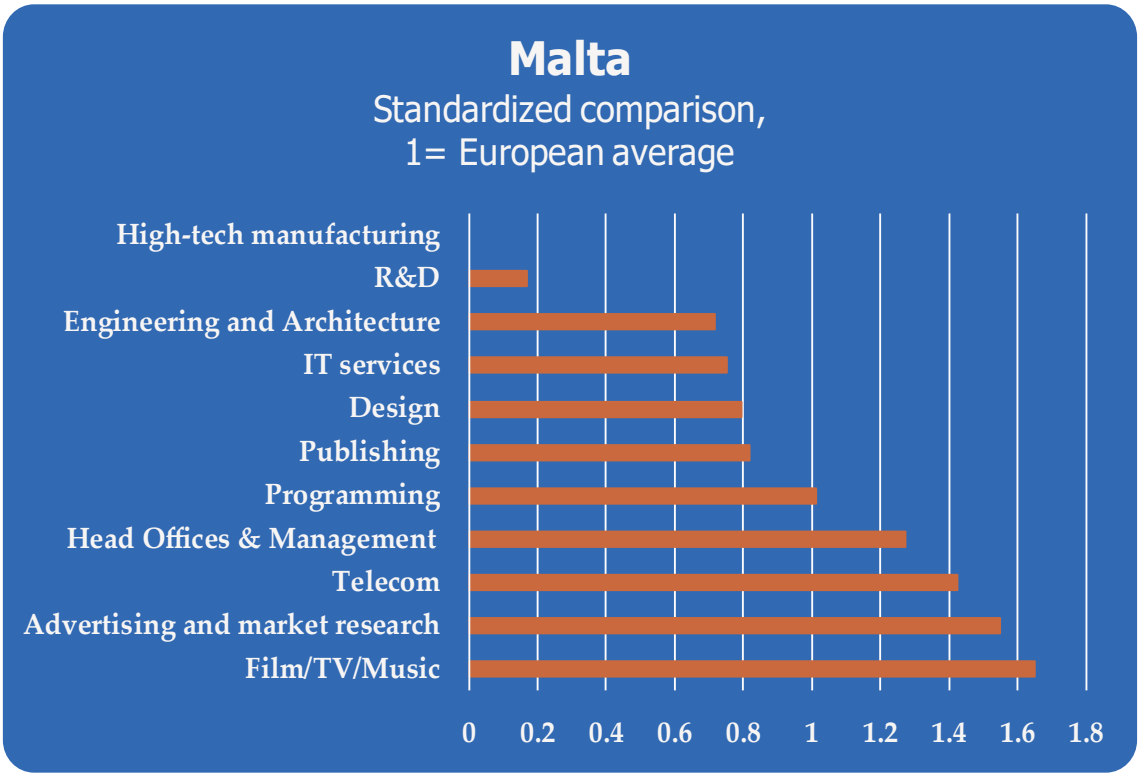
Country analysis: Malta

In Malta, the number of employees of the most knowledge-intensive firms has grown from 14,284 in 2014 to 15,370 in 2016. As a share of the working age population, 5.5 percent worked in Brain Business Jobs in 2016, a slight increase from 5.4 two years earlier. This is higher than the European average of 5.6 and a slight increase over time.

Amongst the countries in Southern Europe, Malta is the leading Brain Business hub. The concentration of occupations in highly knowledge-intensive firms is higher than in France, Portugal, Spain, Cyprus, Italy and Greece – in that order. However, the rate of growth between 2014 and 2016 has been slower than in the rest of Europe.

Compared to the rest of Europe, Malta has a number of strengths. The main strength is in film/TV/music followed by advertising and market research, telecom, head offices & management and programming. In these areas, Malta has a higher share of knowledge-intensive firm occupation than the European average.

On the other hand, Malta lags behind the rest of Europe when it comes to areas such as high-tech manufacturing and R&D. Understandably, countries of the size of Malta tend to have specialized business sectors. The challenge for Malta is to continue expanding knowledge-intensive business sectors, in order to strengthen its role as the leading Brain Business Jobs hub of Southern Europe – a region which is overall behind other parts of Europe.


Malta
Standardized comparison,
1= European average
High-tech manufacturing
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Country analysis: Netherlands

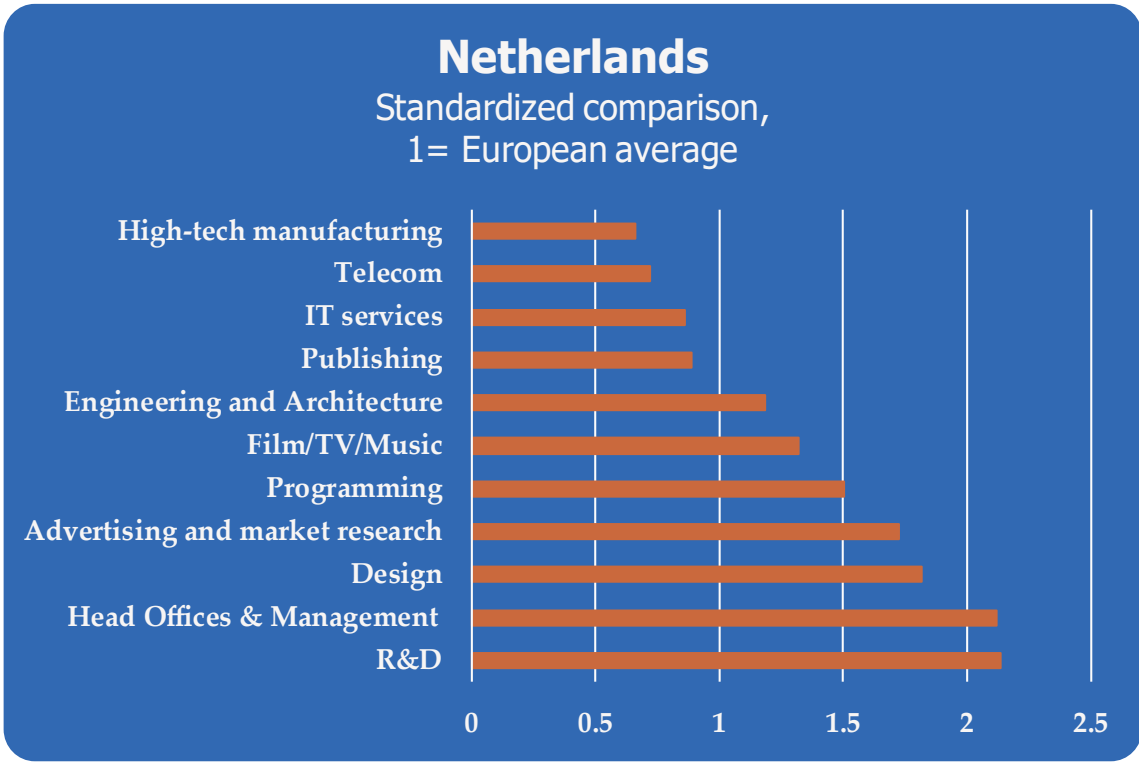
In the Netherlands, the number of employees of the most knowledge-intensive firms has grown from 775,644 in 2014 to 815,804 in 2016. As a share of the working age population, 8.1 percent worked in Brain Business Jobs in 2016. This is higher than the European average of 5.6 and a increase over time. Two years earlier the share in the Netherlands was 7.7 percent compared to a European average of 5.2.

The Netherlands has the 4th highest concentration of Brain Business Jobs in comparison with 31 European countries – with a higher score than the UK, Denmark, Germany, Ireland, Norway and Finland. It does not however reach up to Switzerland, Sweden and Luxembourg. In these three leading countries around 9 percent of the workforce are employed i highly knowledge-intensive firms.Compared to the rest of Europe, the Netherlands has a number of strengths.

The main strengths lie in R&D as well as head offices & management. In these two areas, the concentration of Brain Business Jobs is above two times the European average. Except Denmark, no country has as high concentration of R&D jobs as the Netherlands. Only Belgium has a higher concentration of head office and management employment. In both areas, the Netherlands is only narrowly behind the first-place holder.
In advertising & market research, the Netherlands has the highest share of working age population employed in all of Europe. Design, advertising and market research as well as programming are other strengths. On the other hand, the Netherlands lags behind the rest of Europe when it comes to areas such as high-tech manufacturing, telecom and IT services.

The region with the highest concentration of employment in highly knowledge-intensive firms in most European countries is the capital region. In the Netherlands however, Utrecht with a total of 99,514 Brain Business Jobs has a higher concentration (13.0 percent) of the workforce. In terms of concentration, Utrecht scores above Oslo,Helsinki, Brussels, Vienna, Madrid and Berlin.

The capital region of Amsterdam has a higher total of 197,870 Brain Business Jobs, but a lower concentration (11.7 percent). Noord-Brabant with 110,178 Brian Business Jobs (7.5 percent) and Zuid-Holland with 160,365 Brain Business Jobs (7.4 percent) are other strong regions. The lowest share is found in Zeeland, with 6,887 Brain Business Jobs (3.2 percent) followed by Drenthe with 10,835 Brain Business Jobs (4.0 percent). The challenge for the Netherlands is to climb to the very top of the European Brain Business league, and to strengthen its underperforming regions.

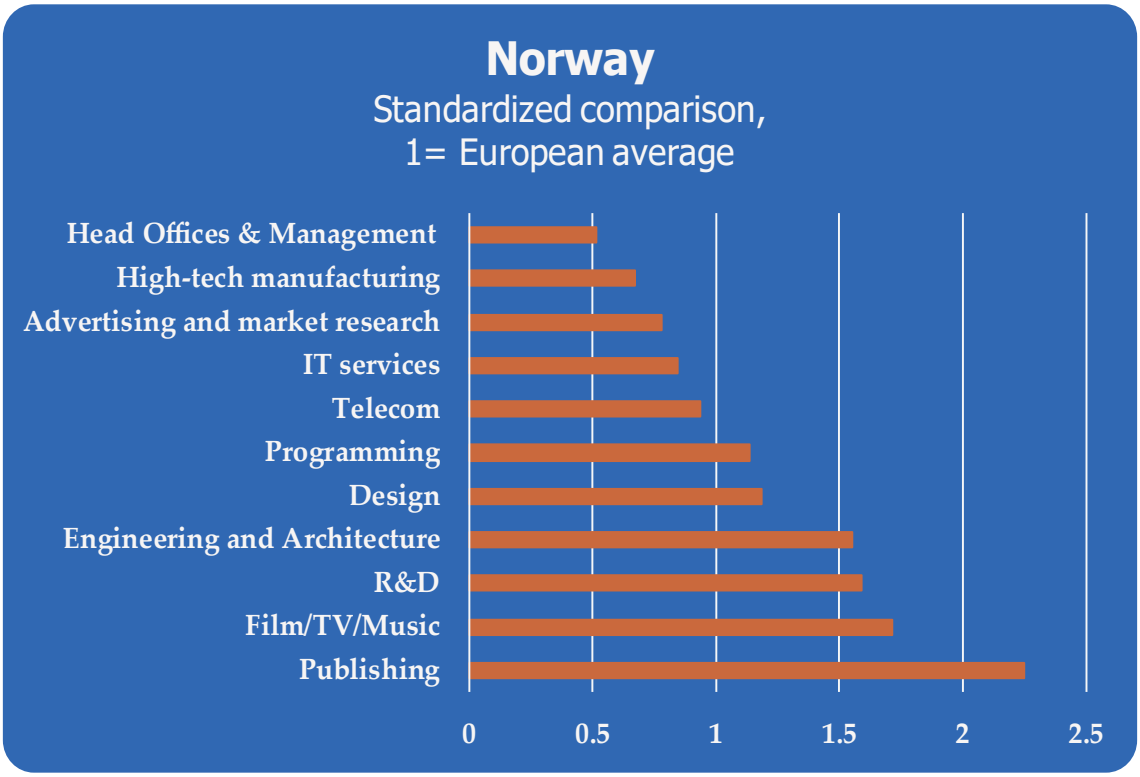


Country analysis: Norway

In Norway, the number of employees of the most knowledge-intensive firms has grown from 196,200 in 2014 to 202,005 in 2016. As a share of the working age population, 6.5 percent worked in Brain Business Jobs in both years. The country scores above Finland, Austria, Belgium and France but not quite as high as Sweden and Denmark. A reason is that Norway relies on the highly value-creating oil-sector instead of highly knowledge-intensive firms. Comparing capital regions, Oslo has a higher share of Brain Business jobs than Amsterdam, Helsinki, Brussels, Vienna and Berlin.

In relation to the rest of Europe, Norway has a number of strengths. The main strength is in publishing, followed by film/TV/music, R&D as well as engineering & architecture. In fact, no other European country has as high concentration of publishing firm occupations than Norway – Denmark is a close second. On the other hand, Norway lags behind the rest of Europe when it comes to areas such as head offices & management, high-tech manufacturing and advertising and market research.

The strongest region in Norway is the capital region of Oslo. Here, 12.6 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. Other strong performers are Trøndelag (6.3 percent) and Agder og Rogaland (5.4 percent). The lowest share of Brain Business Jobs are found in Hedmark og Oppland (2.8 percent) and Nord-Norge (2.9 percent). The geography of Norway explains the regional disparities.


Norway
Standardized comparison,
1= European average
Head Offices & Management
High-tech manufacturing
Advertising and market research
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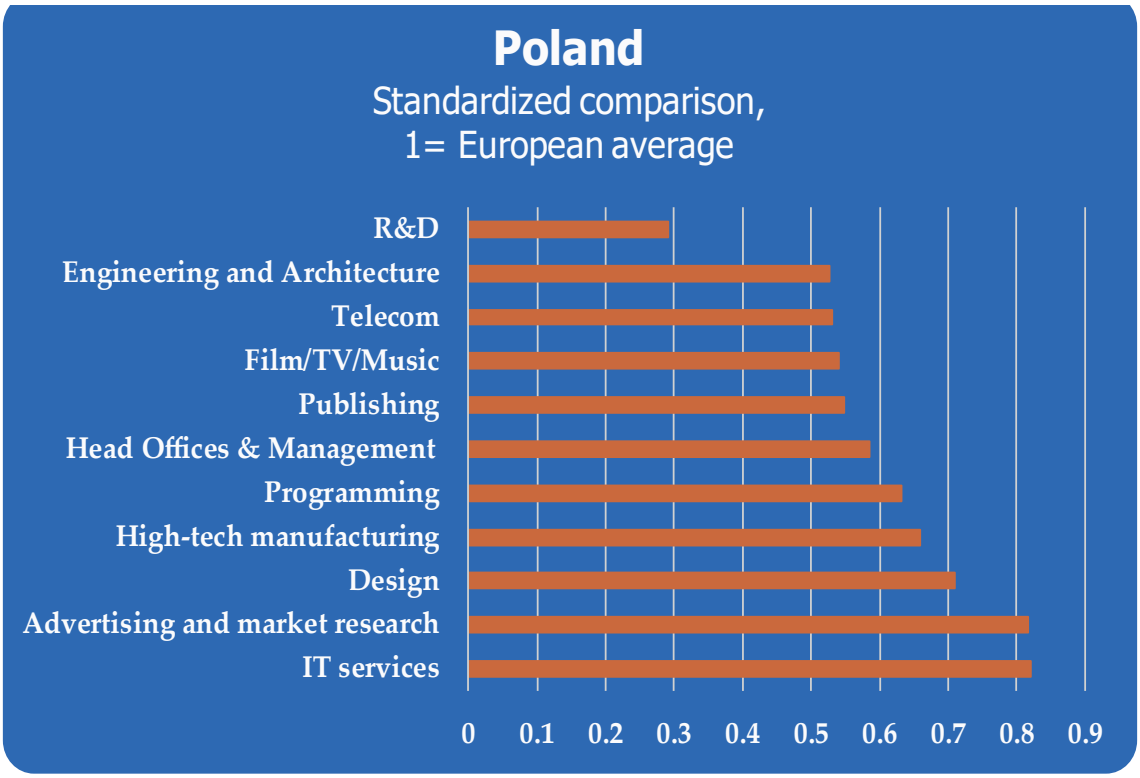
Country analsis: Poland

In Poland, the number of employees of the most knowledge-intensive firms has grown from 738,065 in 2014 to 837,719 in 2016. As a share of the working age population, 3.5 percent worked in Brain Business Jobs in 2016. This is higher than 3.0 percent two years earlier.

Compared to the rest of Europe, Poland has a number of strengths. The main strength is in IT-services, followed by advertising and market research, design and high-tech manufacturing. On the other hand, Poland lags behind the rest of Europe when it comes to areas such as R&D, engineering & architecture and telecom.

The strongest region in Poland is the capital of Warsaw, where 7.7 percent of the working age population are employed in Brain Business Jobs. This is more than twice the national average. Other strong regions are Dolnoslaskie (4.0 percent) and Malopolskie (3.9 percent). There are also a number of low-performing regions in Poland.

In Opolskie, Podlaskie and Lubelskie for example only 1.4 percent are employed in highly knowledge-intensive firms. The rates in Swietokrzyskie and Warminsko-Mazurskie (1.3 and 1.2 percent respectably) is even lower. While it is a common theme that the Brain Business Jobs are focused to the capital region, Poland is quite extreme in this concentration. A challenge ahead is to stimulate Brain Business Jobs also outside of the capital region.


Poland
Standardized comparison,
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R&D
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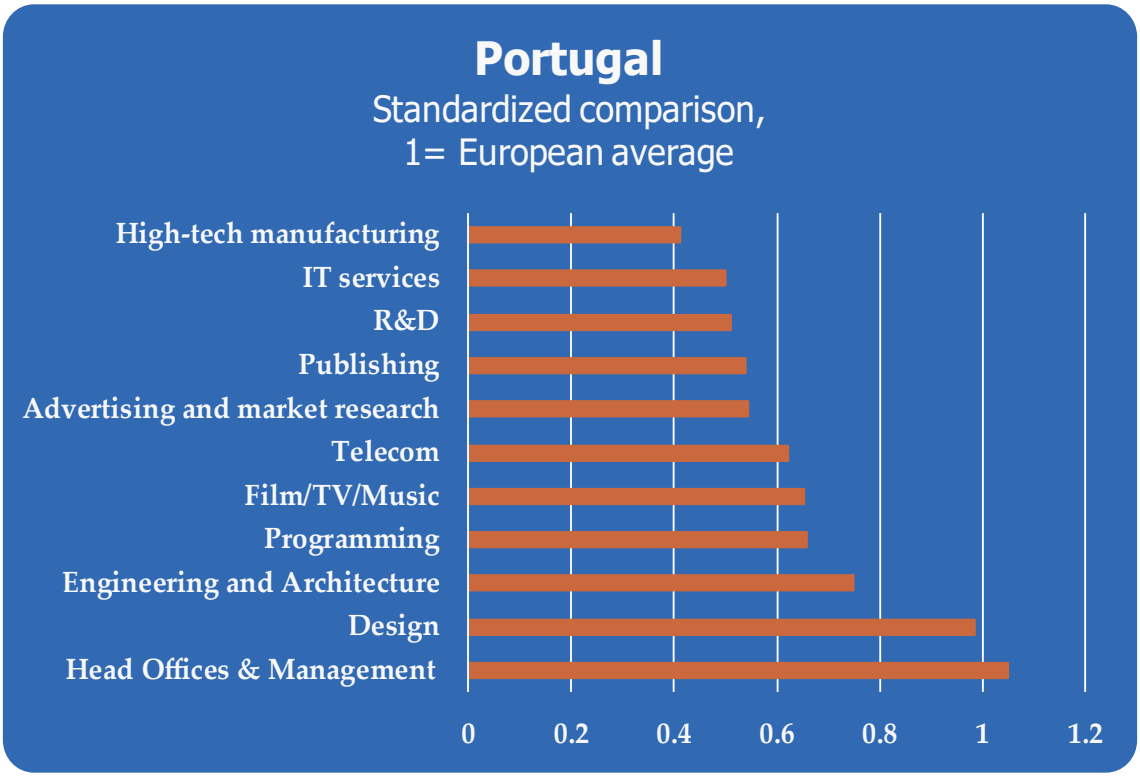
Country analysis: Portugal

In Portugal, the number of employees of the most knowledge-intensive firms has grown from 234,427 in 2014 to 252,524 in 2016. As a share of the working age population, 4.1 percent worked in Brain Business Jobs in 2016. This is higher than 3.7 percent two years earlier.

Compared to the rest of Europe, Portugal has a number of strengths. The main strength is in head offices & management, design as well as engineering & architecture.On the other hand, Portugal lags behind the rest of Europe when it comes to areas such as high-tech manufacturing, IT-services and R&D.

The strongest region in Portugal is the capital region of Lisbon. Here, 8.1 percent of the working age population is employed in Brain Business Jobs, which is twice the national average. Other strong performers are in the north (Norte region with 2.9 percent) and central (Centro region with 2.4 percent). Alentejo with only 1.9 percent of the workforce employed in highly knowledge-intensive firms however lags behind the rest of the country.


Portugal
Standardized comparison,
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High-tech manufacturing
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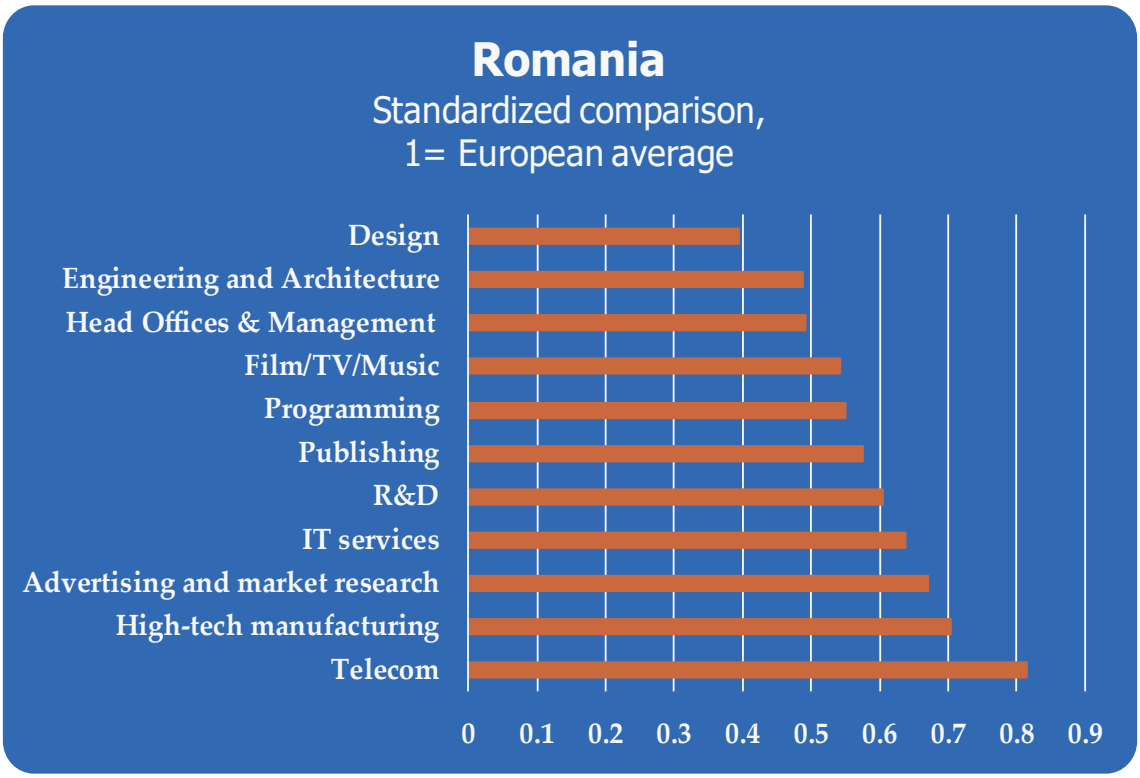
Country analysis: Romania

In Romania, the number of employees of the most knowledge-intensive firms has grown from 358,640 in 2014 to 392,751 in 2016. As a share of the working age population, 3.2 percent worked in Brain Business Jobs in 2016. This is higher than 2.9 percent two years earlier. As a nation, Romania lies behind the rest of Europe. Yet, Bucharest is a top-performing knowledge-hub. In fact, amongst 283 European regions, Bucharest ranks on the 13th place in terms of the percentage of the population employed in highly knowledge-intensive firms. This is slightly above Amsterdam and also higher than Helsinki, Brussels, Vienna, Madrid, Berlin, Lisbon and Rome.

Compared to the rest of Europe, Romania has a number of relative strengths. The main strength is in Telecom, followed by high-tech manufacturing and advertising & market research. On the other hand, Romania lags behind when it comes to areas such as design, engineering & architecture as well as head offices & management.

In Romania, the Brain Business jobs are highly focused to the Bucharest area. Here, 11.7 percent of the working age population works in highly knowledge-intensive firms. Vest, with 3.3 percent of the population employed in the same sectors follows on second place. Nord-Vest (2.9 percent) also does comparably well. The rest of the country has a low concentration of Brain Business jobs. The lowest shares are found in Sud-Vest Oltenia (1.2 percent) as well as Sud-Muntenia, Nord-Est and Sud-Est (all 1.3 percent). The challenge ahead for Romania is to develop more Brain Business Jobs, and to encourage development also outside of the capital region.


Romania
Standardized comparison,
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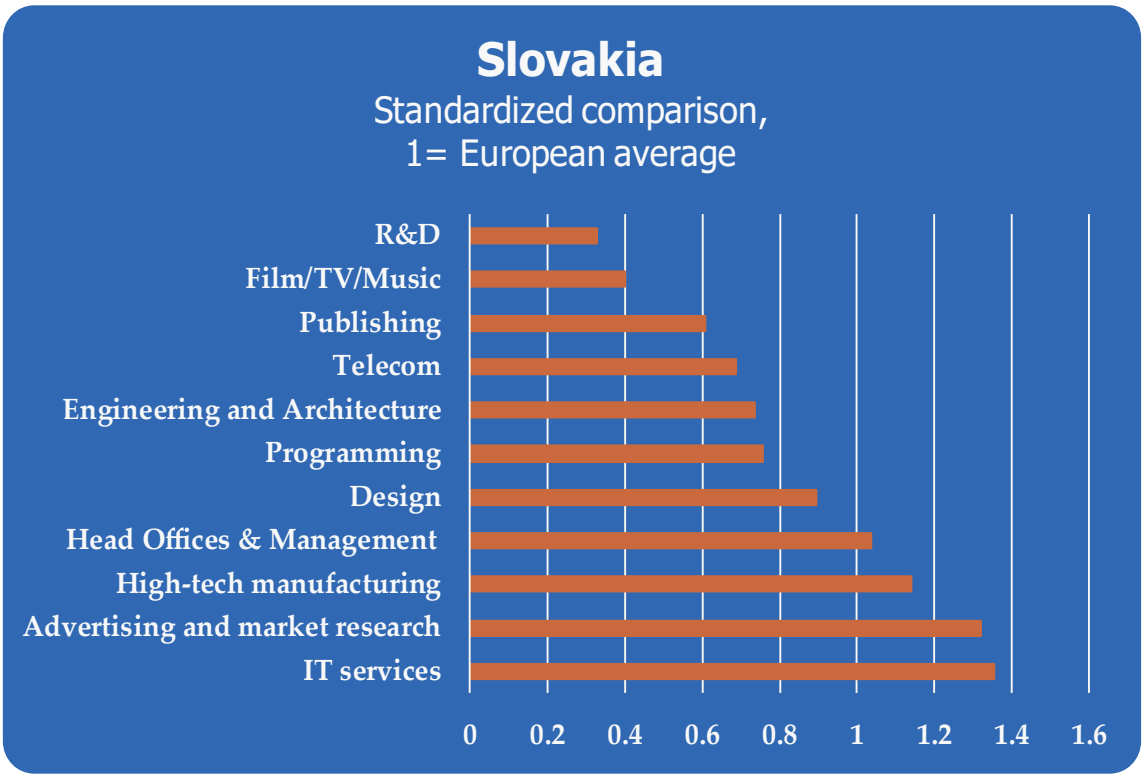
Country analysis: Slovakia

In Slovakia, the number of employees of the most knowledge-intensive firms has grown from 153,855 in 2014 to 171,234 in 2016. As a share of the working age population, 4.3 percent worked in Brain Business Jobs in 2016. This is higher than 4.3 percent two years earlier. Slovakia is also home to the region of Bratislava, which has the highest rate of Brain Business Jobs in all of Europe.

Compared to the rest of Europe, Slovakia has a number of strengths. The main strength is in IT-services, followed by advertising & market research and high-tech manufacturing. On the other hand, Slovakia lags behind the rest of Europe when it comes to areas such as R&D, film/TV/music and publishing.

The strongest region in Slovakia is the capital region of Bratislava. Here, 18.4 percent of the working age population is employed in Brain Business Jobs. This is in fact the highest rate of all 283 regions in Europe. The second highest concentration is found in the region in the UK where Oxford University and accompanying knowledge intensive firms are located. Here, the concentration is 17.1. On third place comes Stockholm with 16.6 percent of the working age population employed in Brain Business Jobs. The concentration of knowledge jobs in Bratislava also outranks Paris, London, Copenhagen, Brussels and Berlin.

The explanation is that Bratislava is a relatively small region, with a large presence of knowledge intensive jobs. In the rest of the country, the concentration of Brain Business Jobs is less strong. The second-ranking region is Západné Slovensko (3.8 percent), Stredné Slovensko (3.1 percent) and lastly Východné Slovensko (2.5 percent).


Slovakia
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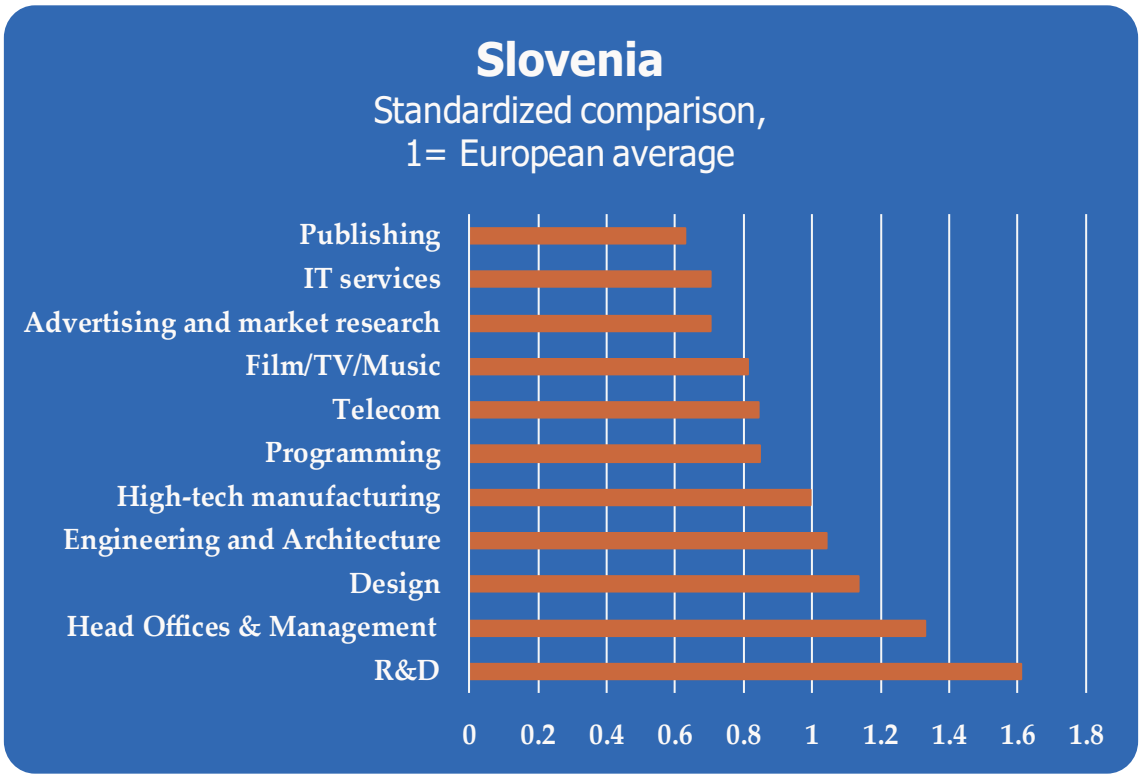
Country analysis: Slovenia

In Slovenia, the number of employees of the most knowledge-intensive firms has grown from 70,701 in 2014 to 72,235 in 2016. As a share of the working age population, 5.6 percent worked in Brain Business Jobs in 2016. This is higher than two years ago, when 5.4 percent were employed in highly knowledge-intensive firms.

Slovenia ranks on 16th position amongst 31 European nations. Based on 2014 data however, the rank of the nation was 14th place. The fall reflects that the growth of knowledge-intensive jobs has been somewhat lower in Slovenia than in the rest of Europe. The country still has a higher Brain Business jobs concentration than Belgium, France, Portugal, Spain and Italy.

Compared to the rest of Europe, Slovenia has a number of strengths. The main strength is in R&D, followed by head offices & management and design. On the other hand, Slovenia lags behind the rest of Europe when it comes to areas such as publishing, IT services and advertising & market research.

Slovenia is divided into two large regions, for which detailed business data can be gathered. They are Zahodna Slovenija with a Brain Business Jobs concentration of 8.3 percent of the working age population and Vzhodna Slovenija with a lower concentration of 3.4 percent.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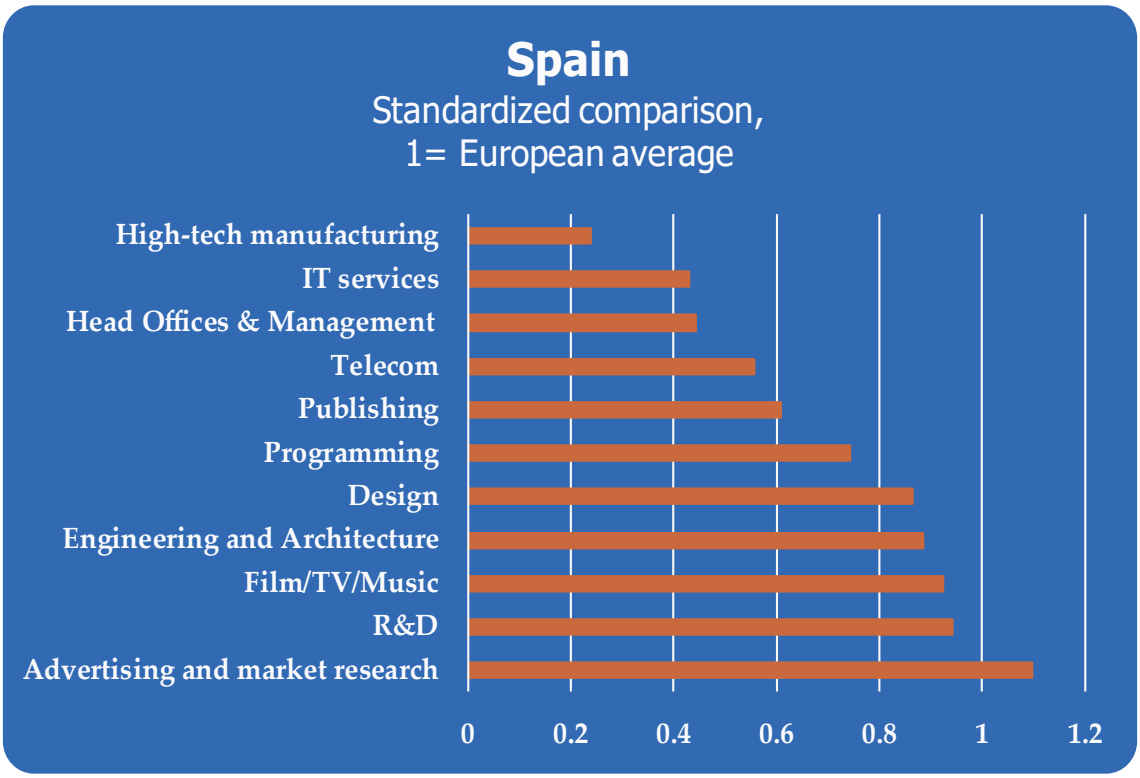
Country analysis: Spain

In Spain, the number of employees of the most knowledge-intensive firms has grown from 1,009,214 in 2014 to 1,151,359 in 2016. As a share of the working age population, 4.0 percent worked in Brain Business Jobs in 2016. This is higher than 3.5 percent two years earlier.

Compared to the rest of Europe, Spain has a number of strengths. The main strength is in advertising & market research, R&D and film/TV/music. On the other hand, Spain lags behind the rest of Europe when it comes to areas such as high-tech manufacturing, IT services and head offices & management.

The strongest region in Spain is the capital region of Madrid. Here, 10.1 percent of the working age population is employed in Brain Business Jobs, which is more than twice the national average. Other strong performers are País Vasco (5.1 percent) and Comunidad Foral de Navarra (3.2 percent). The lowest share of Brain Business Jobs are found in La Rioja (1.9 percent) and Cantabria (2.1 percent).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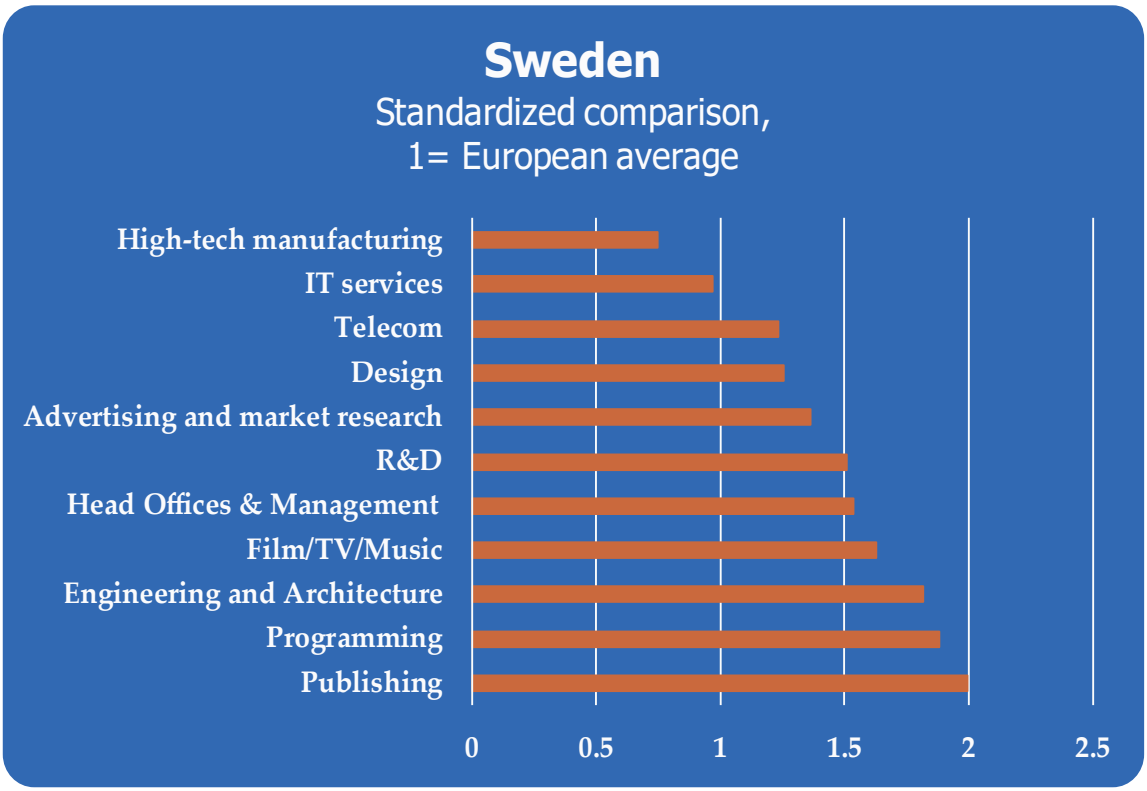
Country analysis: Sweden

In Sweden, the number of employees of the most knowledge-intensive firms has grown from 486,513 in 2014 to 507,719in 2016. As a share of the working age population, 9.0 percent worked in Brain Business Jobs in 2016. This is higher than 8.7 percent two years earlier. In the past edition of the Brain Business Jobs study, Switzerland was not included and Sweden thus gained the first spot. In this study, Switzerland is included, pushing down Sweden to a narrow second place.

Yet, the data for Switzerland which has now been obtained shows that Sweden is catching up to the first spot. In 2014, Switzerland was quite a bit ahead with 9.3 percent of the workforce employed in highly knowledge-intensive firms compared to 8.7 percent in Sweden. The latest date for 2016 show that the gap has narrowed, to 9.1 percent in Switzerland compared to 9.0 percent in Sweden. If current trends continue, Sweden will overtake Switzerland as having the highest share of Brain Business Jobs per capita. The reason is that Sweden has overall strengths, while Switzerland is focused on the tech-sector, which is stagnating relative to ICT and advanced services. It should be noted that while Sweden has strengthened its Brain Business Jobs lead, the other Nordic countries have stagnated or experienced a loss of jobs in highly knowledge-intensive firms.

Compared to the rest of Europe, Sweden stands out as having strengths in almost all Brain Business areas, with the exception of high-tech manufacturing and IT services. In all other nine Brain Business Jobs areas, Sweden outpaces the average European country. This combination of depth and strength is unusual in Europe.

The strongest region in Sweden is the capital region of Stockholm. Here, 16.6 percent of the working age population is employed in Brain Business Jobs, which is nearly twice the national average. Other strong performers are Västsverige (8.0 percent) and Sydsverige (7.5 percent). The lowest share of Brain Business Jobs are found in Norra Mellansverige (4.3 percent) and Småland med öarna (4.7 percent). The challenge for Sweden ahead is to remain on top and continue to grow, in a time when the Nordic region as a whole is stagnating.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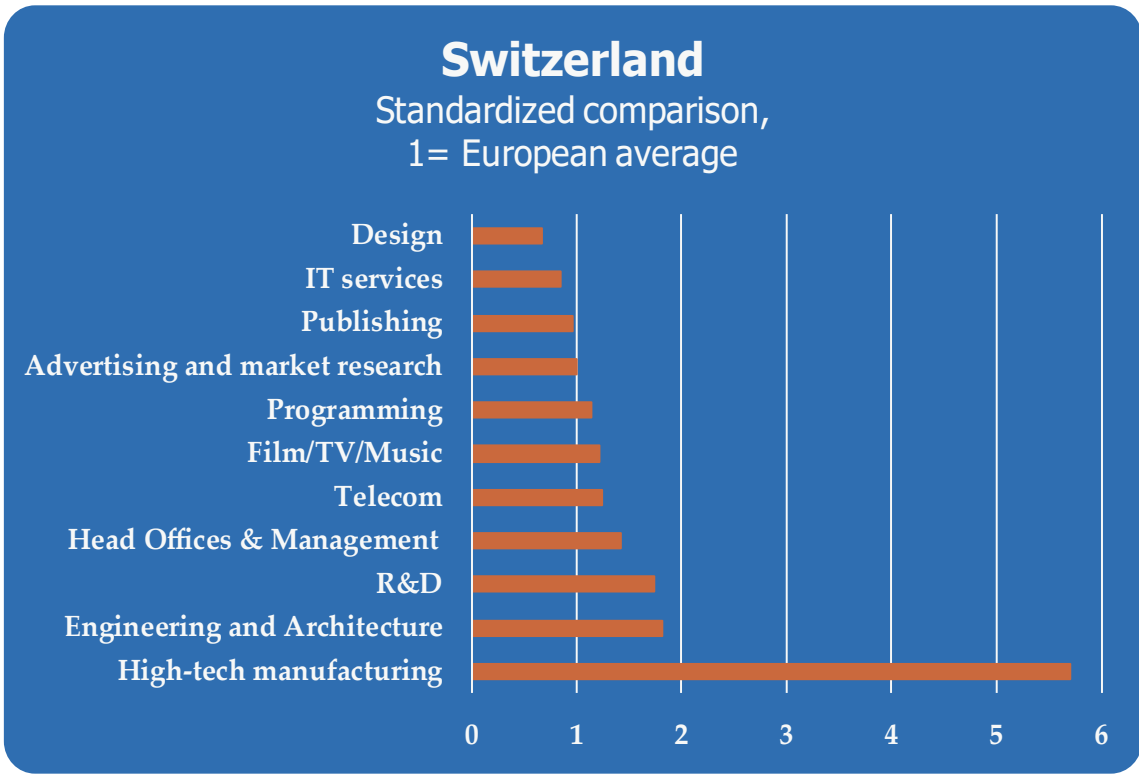
Country analysis: Switzerland

In Switzerland, the number of employees of the most knowledge-intensive firms was 467,491 in 2014 and fell slightly to 467,398 in 2016. As a share of the working age population, 9.1 percent worked in Brain Business Jobs in 2016. This is the highest rate in all of Europe. In 2014, the rate was even higher at 9.3 percent. If this stagnating development continues, Sweden might catch up to the first stop.

In 2014, Switzerland was quite a bit ahead with 9.3 percent of the workforce employed in highly knowledge-intensive firms compared to 8.7 percent in Sweden. The latest date for 2016 show that the gap has narrowed, to 9.1 percent in Switzerland compared to 9.0 percent in Sweden. If current trends continue, Sweden will overtake Switzerland as having the highest share of Brain Business Jobs per capita. The reason is that Sweden has overall strengths, while Switzerland is focused on the tech-sector, which is stagnating relative to ICT and advanced services.

Compared to the rest of Europe, Switzerland has a number of strengths. The main strength is in high-tech manufacturing, where the nation has a staggering lead. The concentration of high-tech manufacturing jobs in Switzerland is close to six times the European average. This is by far the highest share, and in fact is the largest lead any country has in any area. Other strengths are engineering & architecture, R&D and head offices & management. In engineering & architecture Switzerland again has the highest concentration of workers, narrowly ahead of Sweden. On the other hand, Switzerland lags behind the rest of Europe when it comes to areas such as design, IT services and publishing.

Regional data of good quality does unfortunately not exist as of yet for Switzerland, but will hopefully be included in future studies of Brain Business Jobs concentration. The big question is if Sweden or Switzerland will be on top in next years index – or if perhaps the two leading nations will surprisingly both fall behind the top position.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Country analysis: UK

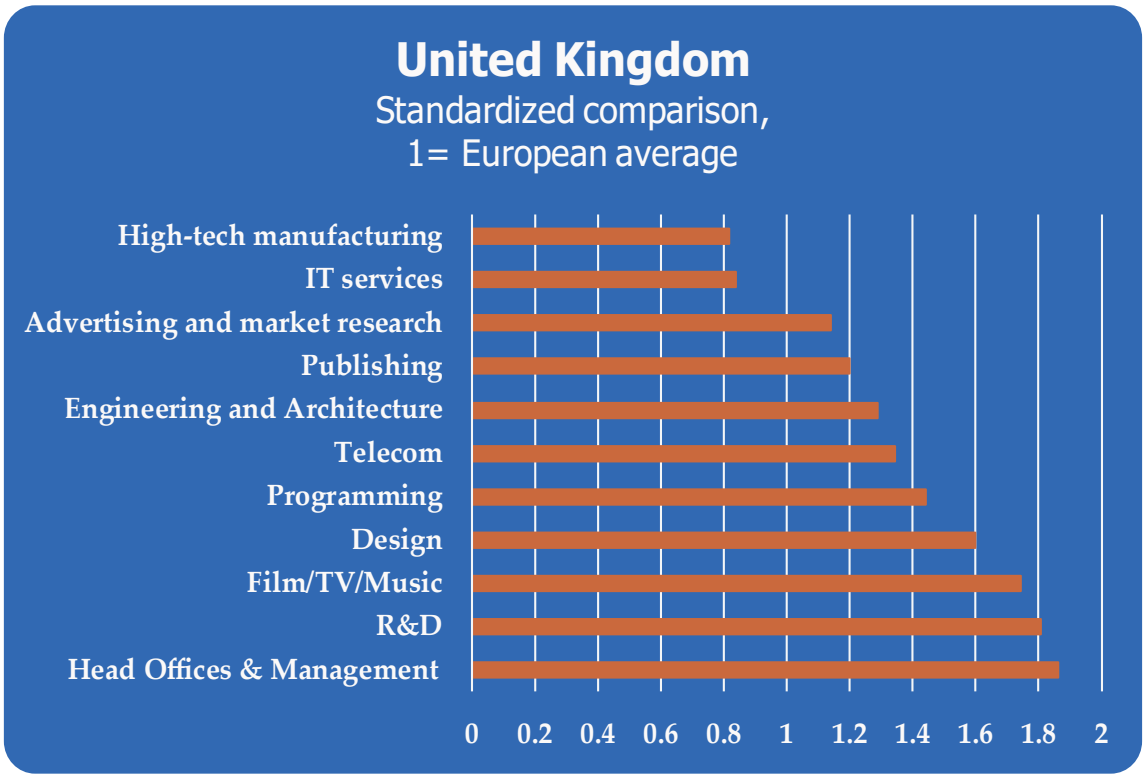
In the UK, the number of employees of the most knowledge-intensive firms has grown from 2,681,420 in 2014 to 3,085,838 in 2016. As a share of the working age population, 8.1 percent worked in Brain Business Jobs in 2016. This is almost an entire percentage point higher than 7.1 percent two years earlier.

The trend in Europe as a whole is that Central and Eastern European nations are rapidly catching up to the rest of the continent. It is surprising that the fastest rate of growth is actually occurring in the UK, which is already a well-developed knowledge-economy. Since it takes time to gather detailed business statistics, the latest data in this study comes from the year in which the Brexit vote was undertaken in the UK. Next year's index, with data for 2017, will show if the exit of the UK from the EU will lead to a significant outflow of knowledge-intensive jobs from the country.

Compared to the rest of Europe, the UK has a number of strengths. The main strength is in head offices & management, followed by R&D, film/TV/music and design. On the other hand, the UK lags behind the rest of Europe when it comes to areas such as high-tech manufacturing, IT services and advertising & market research.

The strongest region in the UK in terms of concentration is Berkshire, Buckinghamshire and Oxfordshire. Here 236,908 Brain Business Jobs are located, corresponding to 17.1 percent of the working age population. This is the second highest rate in all 283 European regions studied. London has a higher total number of Brain Business Jobs, 875,385. This amounts to 15.7 per working age population. North Eastern Scotland (12.6 percent) is another top-performing region, as is Bedfordshire and Hertfordshire (10.2).

The lowest share of Brain Business Jobs are found in West Wales and The Valley (28.4 percent), East Yorkshire and Northern Lincolnshire (33.2 percent) and Lincolnshire (34.1 percent).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Endnotes

1. Due to improved data-research, Switzerland, Ireland and Iceland are new additions to this index compared to the first 2017 edition.

2. The countries are the EU-28 members plus Switzerland, Norway and Iceland. These countries are referred to as Europe in this study. NUTS2-regional division of Europe is used. The methodology is described in the section: Mapping Europe's brain business jobs.

3. See Fang (2015).

4. For example, Holtz-Eakin and Kao (2003) show that variations in the birth rate and the death rate for firms are related to positive changes in productivity. Audretsch and Fritsch (2002) found that regions with a higher startup rate exhibited higher growth rates. See also Fölster (2000) as well as Braunerhjelm and Borgman (2004) established a positive impact of entrepreneurs on regional growth measured as labor productivity.

5. These statistics takes time for the statistical agencies to compile, and therefore the latest high-quality data available lags one year. The data for this study ranges from 2014 to 2016. The technical source of data is: Eurostat: 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.

6. Regional sub-index data exists in the Eurostat Regional Yearbook 2014 edition. The regression analysis has thus been performed for Brain Business Jobs concentration data for 2014, for the 258 regions for which all input data needed for regression exists (regions lacking input-data have been excluded).

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