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CONTENTS

ABSTRACT

This study aims to compare R&D intensity at industry level between the UK and top performing OECD countries. The UK Government has set the target of spending 2.4% of GDP in R&D by 2027 and aims to place the UK in the top quartile of OECD countries. Increasing business expenditure on R&D (BERD) is pivotal to achieve this ambitious target. Industries have very different R&D intensities and the higher the R&D intensity of an industry, the greater its potential to increase BERD. From a policy perspective, it is important to know how R&D intensities of UK industries compare with those of the top performing OECD countries. The study uses data from the OECD ANBERD and STAN databases to calculate R&D intensity (R&D as percentage of value added) for more than 40 industries and for 17 OECD countries over a period of 10 years. The results show that more than 60% of BERD comes from the service sector in the UK while in 11 of the top performing OECD countries the manufacturing sector represents between 51% and 87.5% of BERD. The structure of BERD appears to be an important factor in explaining the stagnation of R&D intensity in the UK in recent decades. Concerning the high and medium R&D intensity industries, the UK's R&D intensity performance is mixed: relatively good in industries like *air and spacecraft and related machinery*, *weapons and ammunition* or *motor vehicles, trailers and semi-trailers*; but relatively poor in industries such as *pharmaceuticals, medicinal chemical and botanical products*, *computer, electronic and optical products*, *software publishing*, *medical and dental instruments and supplies*, *chemicals and chemical products* or *electrical equipment*.

Keywords: R&D intensity, industry, BERD, R&D target, United Kingdom.

1. INTRODUCTION

Rresearch and development (R&D) intensity targets have become widely used across the European Union and OECD countries in recent decades (Carvalho, 2018). Governments set R&D intensity targets (Gross Domestic Expenditure on R&D (GERD) as a percentage of Gross Domestic Product (GDP)) to foster innovation and, ultimately, increase competitiveness and economic growth. This relation is complex and not linear, and the effects may take several years to unfold. The analysis of this relation is beyond the scope of this study, but it is worth noting that Governments believe that increasing R&D intensity has multiplying effects in the economy, and increasing R&D spending, both public and private, is key to face the structural economic and societal changes in the coming years related to digitalization, climate change or energy transition. Therefore, the challenge of any Government is to be able to increase R&D intensity to the desired level.

In 2017 the UK Government has set the target of spending 2.4% of GDP in R&D by 2027 and 3% in the longer term, aiming to place the UK in the top quartile of OECD countries (The UK Government, 2017, p.66). It is a challenging target to achieve since the UK's global R&D intensity has been stagnant at around 1.6% - 1.7% of GDP for more than two decades.[1] No explicit R&D target was set for the business sector, but business expenditure on R&D (BERD) is pivotal to achieve the 2.4% target. An unwritten economic law supported by empirical evidence and followed by many Governments indicates that BERD should be at least two thirds of GERD, preferably higher, particularly if a country aims to be among the top R&D performing countries as the UK does. A country's industrial structure is an important factor in its ability to increase R&D intensity.

Industries have very different R&D intensities (R&D as a share of value added) (Galindo-Rueda & Verger, 2016), and the potential contribution of high R&D intensity industries (e.g., pharmaceutical or chemical) to increase business R&D intensity is much higher than low R&D intensity industries (e.g., construction or transportation industries). So, it is expected that countries specializing in high and medium-high R&D intensity industries will have higher business R&D intensities than those that do not. Sheehan and Wyckoff (2003, p.20)

[1] On 29 September UK's Office for National Statistics published an article pointing towards a very substantial upward revision in Business Expenditures on R&D between 2018-2020 due to a methodological improvement. This revision suggests the "value of expenditure on R&D performed by UK businesses according to ONS' BERD survey were £15.0 billion, £15.6 billion, and £16.1 billion higher in 2018, 2019 and 2020 respectively than previously estimated" (Office for National Statistics, 2022, p.3).

conclude that “countries with high R&D intensities have a high share of their business R&D and a significant part of their economic output in high technology sectors”.

How do R&D intensities of UK industries compare with those of the top performing OECD countries? An answer to this question allows a more targeted intervention of the UK R&D policy to increase business R&D spending. So, the purpose of this article is to compare business R&D intensity at the industry level in the UK with those of the OECD countries that exhibit a GERD to GDP ratio above 2% to inform policy thinking. It is aimed to compare R&D intensity (R&D as a share of value added) by industry in the UK with the top five OECD countries with the highest R&D intensity in each industry. To do that, we will use data from the OECD ANBERD database (BERD data by industry), and STAN database (value added data by industry) for 16 OECD countries with R&D intensities above 2% plus the UK and for more than forty industries. This hopefully will help policymakers to identify industries with relative low levels of R&D intensity that might be the target of specific measures to stimulate R&D spending. The study does not aim to address the causes for the observed differences in R&D intensity performance across industries and countries.

The structure of the paper is as follows. Section 2 briefly addresses the concept of R&D intensity, the limitations of aggregate R&D intensity indicators and the importance of industrial structure to increase business R&D spending. Section 3 describes the methodology employed in this study. Section 4 compares the structure of BERD in the UK with the other OECD countries to identify structural and industry differences that might be relevant for R&D policy. Section 5 compares the R&D intensity (BERD as a share of value added) in the UK with the other OECD countries by industry and level of R&D intensity to understand the relative performance of each industry in relation to the top performing countries. A set of tables with detailed data on R&D intensity by industry is provided in the Appendix.

2. R&D INTENSITY: MORE THAN A BUZZWORD

R&D intensity is more than a buzzword. Governments across the European Union and OECD countries have set R&D intensity targets over recent decades because R&D is seen as a key driver of innovation. Prior research found some support for a positive correlation between the two (Becker & Pain, 2008.), but if the main rationale for setting R&D intensity targets is that it is considered “a proxy for innovation performance” (OECD, 2021, p.5) it may lead to the misuse of this R&D policy instrument due to lack of understanding of the innovation process and the role the composition of R&D may play in that process, namely

the composition of business R&D. R&D is an important input to the innovation process, more important in some industries than others, but it is one of several sources of innovation. R&D targets should be a part of a larger strategy to foster innovation in a country and be set taking into consideration a country's industrial structure and the differences in R&D spending across industries. Otherwise, it may prove difficult to achieve the policy targets (Carvalho, 2018). This section makes a brief overview of three issues: the definition of R&D intensity, the limitations of aggregate R&D indicators and the importance of industrial structure to business R&D.

The concept of R&D intensity

R&D intensity is a widely used concept for setting R&D targets, for making international comparisons and for researching purposes. Generally, it refers to the ratio of R&D expenditure to an output variable, and can be measured at different levels (Smith, 1994). At the country level, R&D intensity is the ratio of a country's R&D expenditure (GERD) to its GDP or, for the business sector, the ratio of a country's business R&D expenditure (BERD) to its GDP (or gross value added). At the industry level, R&D intensity is the ratio of an industry's R&D expenditure to its gross value added (GVA) (hereafter, value added or VA) or the ratio of an industry's R&D expenditure to its gross output. At the enterprise level, R&D intensity is the ratio of a firm's R&D expenditure to its sales. Here, we are mostly using the concept of R&D intensity at the industry level and value added as the output variable. According to OECD, GVA "is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector". Value added is a better variable than gross output because is "less sensitive to sector specific reliance on material inputs like raw goods" (Galindo-Rueda & Verger, 2016, p.7).

Limitations of aggregate R&D indicators

Governments normally set R&D intensity targets at country level, less frequently at sector level, namely for the business sector, and rarely (if ever) at industry level. R&D intensity targets are often used as a flagship of a country's science, technology and innovation strategy. Statistics show that in top R&D performing countries more than two thirds of GERD comes from the business sector.[2] So, when a Government sets national R&D

[2] The ratio of BERD to GERD in 14 of the 17 countries under analysis in this study ranged from 66.4% (France) to 79.2% (Korea) in 2020. In Israel it was 90.3 percent.

intensity targets (GERD/GDP) is implicitly assuming a business R&D target too, particularly when it has the ambition to become a world innovation leader or a top R&D spending country. But, national R&D intensity targets, namely business R&D targets, have some drawbacks, For van Pottelsberghe de la Potterie (2008) there is "no basis" for setting business R&D targets at the country level since there are "critical aspects that aggregate R&D indicators do not capture" (OECD, 2021, p.6) and "it diverts attention from the vast differences in R&D spending across industries" (Mazzucato & Lazonick, 2010). R&D tends to be concentrated in a small number of firms, sectors and/or regions but the aggregate R&D measure does not capture this trend (Rakic *et al*., 2021). Direct comparisons of business R&D intensities are flawed because aggregate business R&D spending is heavily influenced by the industrial structure of each country (Reinstaller & Unterlass, 2012; Kayal, 2015), that is, the mix of low and high-R&D industries it possesses (Smith, 1994). Low aggregate R&D intensity in a country does not reflect low R&D intensity within all industries (Iorwerth, 2005). However, despite these important limitations of aggregate R&D intensity indicators, there is no systematic production of statistics on R&D intensity by industry to allow international comparison as it is frequently done with business R&D intensity (BERD as share of GDP), and the available data to carry out such analysis are quite incomplete, as will see below. As a result, R&D policy analysis and R&D reports are still very much based on the comparison of R&D intensity indicators at the country level (e.g., by performing sector, by type of R&D), and much less based on the comparison of R&D intensity by industry.

R&D intensity and industry structure

A country's sectoral composition of economic activity is likely to have an important influence on BERD and R&D intensity indicators. The study by Mathieu and van Pottelsberghe de la Potterie (2010, p.59) concluded that business R&D intensity is strongly linked to a country's industrial structure. Industries have very different R&D intensities and the aggregate business R&D intensity of a country will reflect its particular composition of industries (Cincera & Veugelers, 2013). High R&D intensity industries such as *air and spacecraft and related machinery* may have R&D intensities of 30% or more, while low R&D intensity industries such as *construction* have R&D intensities most likely lower than 1% (Galindo-Rueda & Verger, 2016). Countries with high R&D intensities tend to have a high percentage of their business R&D in high technology industries (Sheehan & Wyckoff, 2003). The experience of Australia exemplifies how a country's industrial mix affects the level of BERD and aggregate R&D intensity: "Given Australia's industrial structure – significant mining and rural sectors and less high-tech manufacturing – [has] relatively low overall R&D

relative to GDP. [A]djusting for its industrial structure Australia's R&D spending is not a significantly smaller share of GDP than the OECD average" (Parliament of Australia, 2007, p.142). The issue is also important at sector level, particularly the manufacturing and service sectors, which account for most of business R&D expenditure in OECD and EU countries. Typically, service industries tend to invest less in R&D because it is more difficult to scale service activities for a global market and companies in sectors with lower degrees of competition or those that produce commoditized products have less need/capability to differentiate themselves from rivals (BEIS, 2020, p.11, 23). This helps to explain why in the top performing OECD countries most business R&D expenditure comes from the manufacturing sector.

To increase overall R&D spending and reach policy targets, R&D policy needs to take into consideration the country's industrial structure and the many determinants of business R&D (Becker & Pain, 2008; Moncada-Paternò-Castello, 2016) whose importance varies from industry to industry. According to Sheehan and Wyckoff (2003, p.9, 35), achieving R&D targets "can demand significant structural and regulatory change beyond those that are immediately apparent in what appears to be a straightforward financial goal", whose implementation "require policy initiatives across a broad range of domains".

3. DATA AND METHODS

This study aims to calculate and compare R&D intensity by industry in the UK with 16 other OECD countries. For an industry, R&D intensity is defined as the ratio of an industry's R&D expenditure to its gross value added (GVA). Industries are classified according to the International Standard Industrial Classification (ISIC), Revision 4 (United Nations, 2008) (See Table A1 in the Appendix). The level of industry disaggregation and the number of industries covered by this study is related to the availability of data on R&D by industry and value added in OECD ANBERD and STAN databases. The study analyses 47 industries at 2-digit and 3-digit level ISIC Rev.4.[3] Industries are grouped by R&D intensity according to Galindo-Rueda and Verger's (2016) taxonomy.

The data source is the OECD. Data on business R&D (BERD) by industry comes from the ANBERD database (http://oe.cd/anberd) and data on gross value added (GVA), at current prices, by industry comes from the STructural ANalysis (STAN) database

[3] We use the word industry to refer to segments of the economy with different levels of disaggregation (2-digit and 3-digit ISIC codes). Industry and sector are used here indistinctively.

(http://oe.cd/stan). All data were accessed on 6 July 2022. To calculate R&D intensity (R&D as a share of GVA) it is necessary to use the ANBERD and STAN databases together. As the STAN database has data up to the year 2019, and not for all countries, the calculation of R&D intensity is limited to 2019 or the most recent year for which data are available. Data were processed using Excel software.

The UK has set the target of spending 2.4% of GDP in R&D by 2027. For comparison purposes, we have considered appropriate to select all the OECD countries with R&D intensities (GERD/GDP) of 2% or more in 2020, which resulted in the following list of countries (acronym): Austria (AUT), Belgium (BEL), Denmark (DNK), Finland (FIN), France (FRA), Germany (DEU), Iceland (ISL), Israel (ISR), Japan (JPN), Korea (KOR), the Netherlands (NLD), Norway (NOR), Slovenia (SVN), Sweden (SWE), Switzerland (CHE), United Kingdom (GBR), United States (USA). To compare R&D intensity by industry between the UK with the other 16 OECD countries, two types of analysis have been carried out. First, R&D intensity of each of the 47 industries was calculated for a ten-year period, from 2010 to 2019, with the purpose of trend analysis. Second, five-year average R&D intensity was calculated for the 2015-2019 period (or latest years) with the purpose of ranking countries.

The study has some limitations that should be noted. One is that the most recent data are from 2019, which does not allow to capture the recent evolution of the variables used. Another limitation is that the value added data is not available for all countries up to 2019, implying that the comparative analysis between countries for a given industry is not always done for the same years for all countries. Yet another limitation has to do with the impossibility of comparing all 17 countries for all industries due to lack of data. In several countries there are no data for specific industries implying that the analysis is carried out with a smaller number of countries, which in some cases is less than half of the total number of countries under analysis. The lack of data is particularly significant in the cases of Israel, Sweden and Switzerland. Finally, it is important to note that the R&D to value added ratio may vary depending on the change in the numerator (R&D expenditure), the denominator (added value) or both. For example, R&D intensity may increase only because value added has decreased and R&D expenditure has remained constant. It is a general problem of ratios. The study somewhat minimizes this issue by doing a 5-year average R&D intensity analysis.

4. STRUCTURE OF BERD

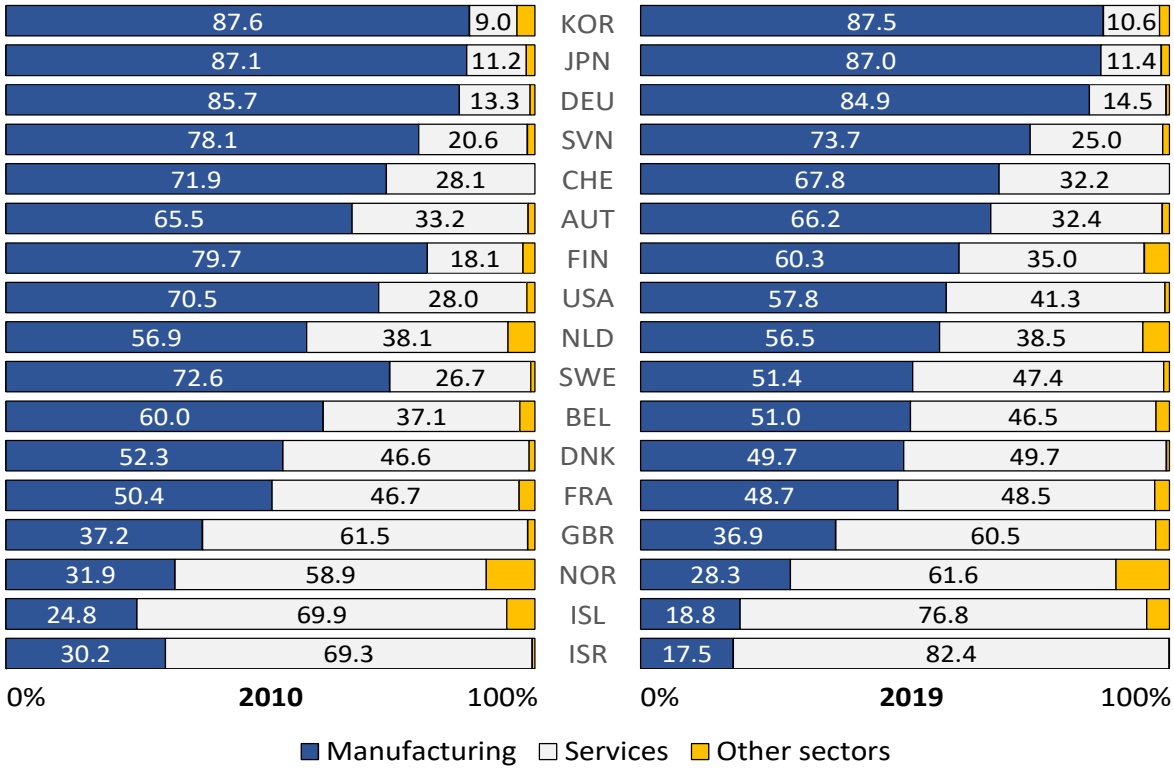
This section looks at the composition of business expenditure on R&D (BERD) and examines the relative contribution of each industry to the total R&D spending by the business sector in the UK and the other OECD countries under analysis. First, it looks at the contribution of major economic sectors to BERD, then it breaks down business R&D spending by level of R&D intensity, and finally compares the contribution of industries to BERD in the UK with the top five OECD countries.

Structure of BERD by sector

Figure 1 compares the structure of BERD broken down by major economic sector at two points in time, ten years apart, in 17 OECD countries. Some conclusions can be drawn: in 2019, the manufacturing sector and the service sector together accounted for more than 90% of BERD in all countries and 97% in 13 of the 17 countries; the other sectors (agriculture and forestry, mining and quarrying, electricity and water, construction) account together for a small percentage of BERD, except Norway (9-10%), Iceland and the Netherlands (around 5% each); in 2019, the manufacturing sector represented more than 50% of BERD in 11 countries; the relative weight of the service sector in total business R&D spending increased in all the countries in 2019 compared to 2010; in 2019, the service sector represented 60.5% of BERD in the UK and only in three other countries – Norway, Iceland and Israel – that percentage was higher, all of them much smaller economies; in 2019, the relative weight of the manufacturing sector in total business R&D spending exceeded that of the United Kingdom in 13 countries by between 32 and 137 percent.

In the UK the weight of the manufacturing and service sectors R&D in total business R&D spending is inverse to that of most of the OECD countries with R&D intensities (GERD/GDP) of 2% or more. The fact that most of business R&D spending comes from the service sector in the UK is not new but it is a structural factor that may help to explain the recent evolution of the R&D intensity indicator. Sheehan and Wyckoff (2003, p.21) consider that in the UK “declines in manufacturing R&D intensity (…) were not matched by increases in the service sector”; “services sectors tend to invest less in traditional R&D activities than manufacturing industries”, which is compatible with highly innovative service sectors, as is the case of UK (OECD, 2021, p. 6,15).

Figure 1: Structure of BERD by major economic sector in 17 OECD countries in 2010 and 2019* (%)

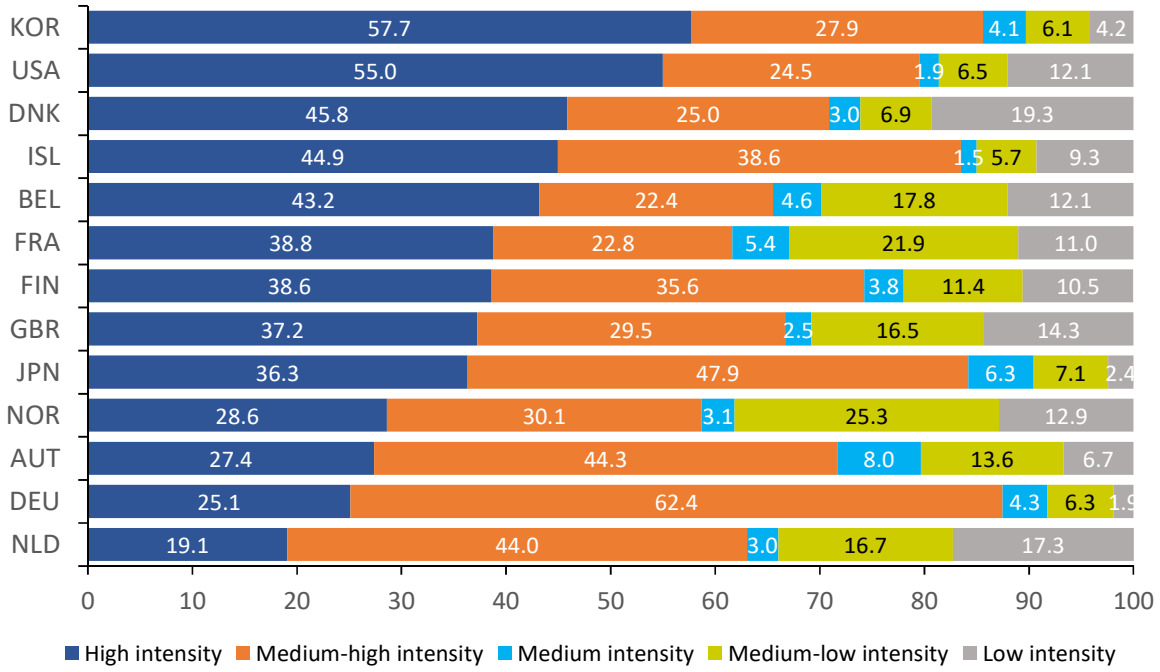


Source: Table A2 in the Appendix. The values for Switzerland, United States, Iceland and Israel do not take into account the missing data for some sectors (see Table A2 in the Appendix).

Structure of BERD by level of R&D intensity

Figure 2 shows the 2015–2019 average business R&D spending by level of R&D intensity in 13 OECD countries according to the Galindo-Rueda and Verger's (2016) taxonomy. Some conclusions can be drawn from Figure 2: the UK ranks below average in business R&D spending in high R&D intensity industries (8th), medium-high R&D intensity industries (9th), and medium R&D intensity industries (12th); it ranks 9th if one adds up the shares of high and medium-high R&D intensity industries; the UK is the fifth country with the highest share of business R&D expenditure in the medium-low plus low R&D intensity industries. On average, between 2015 and 2019 66.7% of BERD came from high or medium-high R&D intensity industries, which is higher than France (61.7%), the Netherlands (63.0%) or Belgium (65.5%), but much lower than Germany (87.5%), Korea (85.6%), Japan (84.2%), Iceland (83.5%) or the United States (79,5%).

Figure 2: Business R&D spending by level of R&D intensity and country, 2015-2019* average (%)



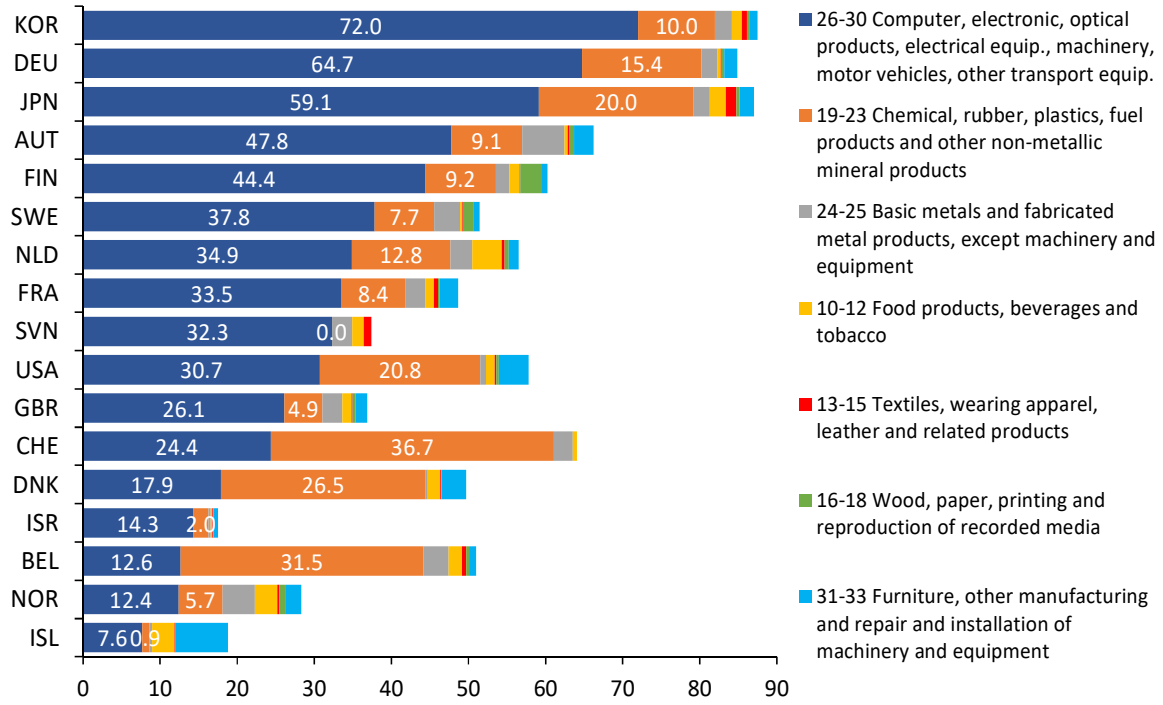
Source: Calculations based on OECD ANBERD data (accessed on 6 July 2022). (*) Except for France and the Netherlands (2013-2017). Israel, Sweden, Switzerland and Slovenia were excluded due to missing data.

Structure of BERD by industry

As seen above, the manufacturing and service sectors are the two major sources of business R&D, which together accounted for at least 95% of BERD in 16 of the 17 OECD countries in 2019. Within the manufacturing sector, two industries – *chemical, rubber and plastics* (ISIC 19–23) and *computer, electronic, electrical equipment, machinery and motor vehicles* (ISIC 26–30) – together accounted for between 84.2% (UK) and 95.4% (Switzerland) of total R&D in manufacturing in 2019, except Island (45.6%) and Norway (63.8%). Figure 3 shows that, in 2019, the *computer, electronic, electrical equipment, machinery and motor vehicles* industry (ISIC 26–30) is the main source of R&D in the manufacturing sector in 14 countries, accounting for between 7.6% (Iceland) and 72.0% (Korea) of BERD, while the *chemical, rubber and plastics* industry (ISIC 19–23) is the main source of I&D in the manufacturing sector in Denmark (26.5% of BERD), Belgium (31.5%) and Switzerland (36.7%). Table 1 breaks down these two broad sectors by industry and shows the 5-year average percentage of R&D spending of each industry in the top five

OECD countries and the UK. The far right column (Avg) in Table 1 shows the 2010-2019 average percentage of R&D spending of each industry for the top five OECD countries. Table 1 shows that the UK's performance is rather poor in comparison to the other 16 OECD countries and the top five in particular. The UK's *chemical, rubber and plastics* (ISIC 19–23) sector accounted for an average of 4.7% of BERD between 2015 and 2019, placing the UK in 15th place only ahead of Israel and Iceland, while the top five countries accounted for between 20.5% and 36.9% of BERD, having a ten-year average around 28%. The UK's *computer, electronic, electrical equipment, machinery and motor vehicles* sector (ISIC 26–30) accounted for an average of 28.5% of BERD between 2015 and 2019, ranking 11 out of 17 countries, while the top five countries accounted for between 45.3% and 72.8% of BERD, having a ten-year average around 58.7%.

Figure 3: Breakdown of BERD by manufacturing industries (ISIC 10-33) in 2019 (%)



Source: Author's calculations based on ANBERD database (accessed on 6 July 2022).

Within the *chemical, rubber and plastics* sector (ISIC 19–23) stands out the *chemical and pharmaceutical* industry (ISIC 20 and 21) in all the countries under analysis in 2019 (see Table A3 in the Appendix). In the UK it accounted for 3.7% of BERD in 2019 which compares to 36.7% in Switzerland, 29.0% in Belgium, 20.5% in Denmark, 19.6% in the US and 16.1% in Japan. Within the *computer, electronic, electrical equipment, machinery and motor vehicles* sector (ISIC 26–30), the *computer, electronic and optical* industry (ISIC 26) accounted for 50.8% of BERD in Korea in 2019, 24.6% in Finland, 18.7% in Japan, 17.3% in the US and 4.9% in the UK; the *motor vehicles, trailers and semi-trailers* industry (ISIC 29) accounted for 37.3% of BERD in Germany in 2019, 27.1% in Japan, 15.6% in Sweden, 11.8% in Korea, 9.8% in the UK and 7.5% in Austria; the *electrical equipment* industry (ISIC 27) accounted for 14.9% of BERD in Slovenia in 2019, 10% in Austria, 6.1% in the Netherlands, 5.5% in Finland and 0.7% in the UK; the *other transport equipment* industry (ISIC 30) accounted for 10.4% of BERD in Sweden in 2019, 8.8% in France, 7.6% in the UK, 4.3% in the US, and 3.6% in Austria (see Table A3 in the Appendix for detailed data).

Table 1: Business R&D expenditure by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

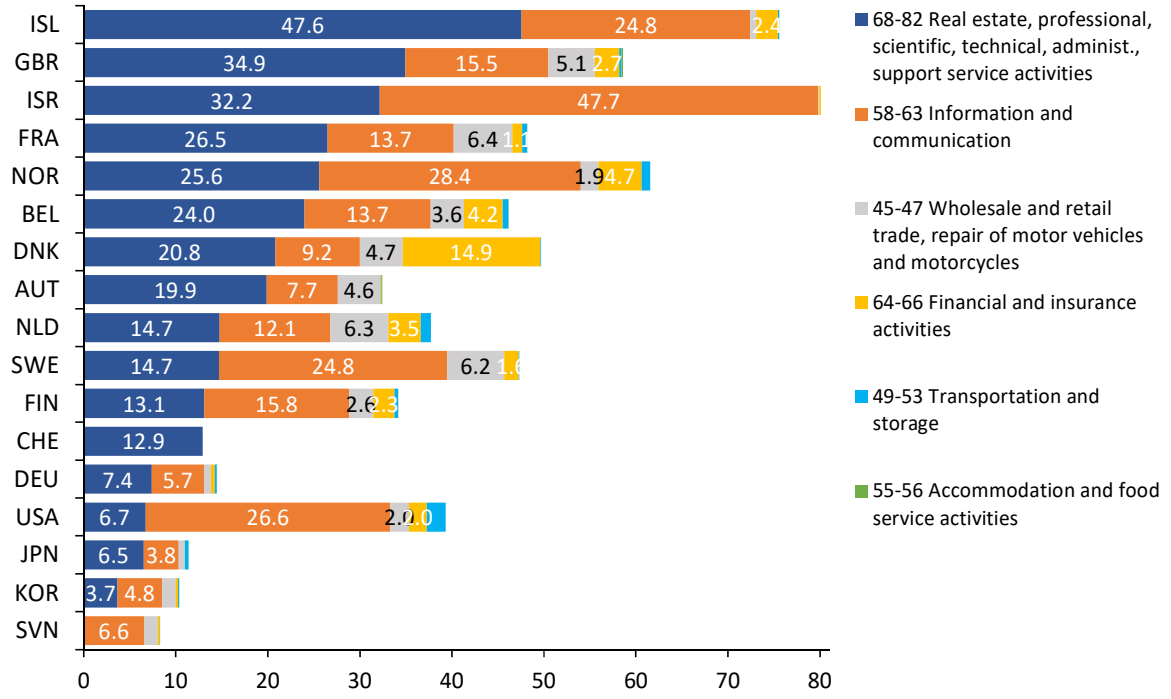
	ISIC | Industries	Industry R&D / BERD (%)						Avg**
Manufacturing sector	10-12 | Food products, beverages and tobacco	NLD 4.6	NOR 3.3	BEL 2.2	ISL 2.2	JPN 1.9	GBR 1.3	2.8
	13-15 | Textiles, wearing apparel, leather and related products	JPN 1.2	SVN 1.0	KOR 0.8	BEL 0.7	FRA 0.4	GBR 0.1	0.8
	16-18 | Wood, paper, printing and reproduction of recorded media	FIN 2.6	SWE 1.4	NOR 0.9	SVN 0.8	AUT 0.7	GBR 0.3	1.2
	19-23 | Chemical, rubber, plastics, fuel products and other non-metallic mineral products	CHE 36.9	BEL 32.6	SVN 31.1	DNK 29.3	USA 20.5	GBR 4.7	28.0
	24-25 | Basic metals and fabricated metal products, except machinery and equipment	AUT 5.3	NOR 4.9	BEL 3.2	SVN 3.1	SWE 3.0	GBR 2.5	4.3
	26-30 | Computer, electronic and optical products, electrical equi-pment, machinery, motor vehicles and other transport equipment	KOR 72.8	DEU 64.4	JPN 59.2	FIN 47.0	AUT 45.3	GBR 28.5	58.7
	31-33 | Furniture, other manufacturing and repair and installation of machinery and equipment	ISL 7.8	USA 3.9	DNK 2.9	AUT 2.5	FRA 2.2	GBR 1.7	3.7
Service sector	45-47 | Wholesale and retail trade, repair of motor vehicles and motorcycles	NLD 6.3	SWE 6.2	FRA 5.7	DNK 4.9	AUT 4.7	GBR 4.4	4.9
	49-53 | Transportation and storage	NLD 1.4	NOR 1.1	USA 0.6	BEL 0.5	FRA 0.4	GBR 0.2	0.6
	58-63 | Information and communication	ISR 44.0	NOR 27.0	USA 24.1	SWE 17.4	ISL 15.7	GBR 15.0	22.9
	64-66 | Financial and insurance activities	DNK 12.8	NOR 4.2	BEL 3.9	NLD 3.2	FIN 2.7	GBR 2.3	4.8
	68-82 | Real estate activities; professional, scientific, technical, administrative and support service activities	GBR 34.8	ISR 33.7	FRA 27.1	ISL 26.8	NOR 25.9	BEL 22.9	31.8
	84-99 | Community, social and personal services	ISR 1.8	GBR 1.8	ISL 1.6	FIN 0.8	NLD 0.6	DNK 0.4	1.3

Source: Calculations based on OECD ANBERD data (accessed on 6 July 2022). (*) Except for France and the Netherlands (2013-2017), and Slovenia (2012-2016 for ISIC 19-23). (**) 2010-2019 average for the top five OECD countries.

The service sector is divided in two major groups of industries: *services of the business enterprise* (ISIC 45-82), which accounted for between 96.8% (UK) and 99.9% (Denmark) of the business R&D of the service sector in 2019, and *community, social and personal services* (ISIC 84-99), which accounted for a tiny share of the business R&D of the service sector in 2019 in all the countries under analysis. The performance of the UK is better in the service sector than in the manufacturing sector, though perhaps less than expected as more than 60% of business R&D in 2019 came from the service sector. Of the six industries presented in Table 1, the UK is among the top five countries in just two of them, ranking 1st place in both of them. The UK's *real estate activities; professional, scientific, technical, administrative and support service activities* (ISIC 68-82) accounted for an average of 34.8% of BERD between 2015 and 2019, which is above the three countries that have a higher percentage of BERD coming from the service sector, Israel (33.7%), Iceland (26.8%) and Norway (25.9%), and higher than the ten-year average of 31.8% for the top five countries. In the UK and in Israel the *community, social and personal services* (ISIC 84-99) accounted for 1.8% of BERD between 2015 and 2019, which is higher than the ten-year average of 1.3% for the top five countries.

Figure 4 breaks down the *services of the business enterprise* (ISIC 45-82) by services industries for 2019. In 2019 the *real estate activities; professional, scientific, technical, administrative and support service activities* (ISIC 68-82) and *information and communication* (ISIC 58-63) industries accounted together for most of the business R&D expenditure of the *services of the business enterprise* (ISIC 45-82) in all the countries under analysis except Denmark (Figure 4).

Figure 4: Breakdown of BERD by service industries (ISIC 45-82) in 2019 (%)



Source: Table A3 in the Appendix.

The *real estate activities; professional, scientific, technical, administrative and support service activities* industry (ISIC 68-82) accounted for 47.6% of BERD in Iceland in 2019, 34.9% in the UK, 32.2% in Israel, 26.5%% in France, 25.6% in Norway and 24% in Belgium. The *information and communication* industry (ISIC 58-63) accounted for 47.7% of BERD in Israel in 2019, 28.4% in Norway, 26.6% in the US, 24.8% in Sweden, 24.8% in Iceland and 15.5% in the UK. The *wholesale and retail trade, repair of motor vehicles and motorcycles* industry (ISIC 45–47) accounted for 6.4% of BERD in France in 2019, 6.3% in the Netherlands, 6.2% in Sweden, 5.1% in the UK and 4.7% in Denmark; the *financial and insurance* industry (ISIC 64–66) accounted for 14.9% of BERD in Denmark in 2019, 4.7% in Norway, 4.2% in Belgium, 3.5% in the Netherlands, 2.7% in the UK and 2.4% in Iceland; the *transportation and storage* industry (ISIC 49–53) accounted for 2.1% of BERD in the US in 2019, 1.1% in the Netherlands, 1% in Norway, 0.7% in Belgium, 0.5% in France and 0.2% in the UK.

5. BUSINESS R&D INTENSITY

This section looks at the business R&D intensity (R&D as a percentage of value added) by industry and examines how much of the value added generated by each industry is spent in R&D activities in the UK and other 16 OECD countries. It addresses the issue in three ways. First, by comparing the ten-year average business R&D intensity in major economic sectors in the UK and other OECD countries; second, by determining the percent difference between the UK's five-year average R&D intensity and the five-year R&D intensity of all the countries under analysis by industry (ISIC 2-digit and 3-digit codes); and, by comparing the UK's five-year average R&D intensity with the top five OECD countries by industry and level of R&D intensity.

R&D intensity by sector

Table 2 shows the ten-year average business R&D intensity (R&D as a share of value added) of major economic sectors in all the OECD countries under analysis. As expected, there is a large disparity in R&D intensity values between sectors and, within each sector, between countries. The manufacturing sector has by far the highest R&D intensity of all sectors in all countries except Israel. Between 2010 and 2019, the R&D intensity of the manufacturing sector in the US was 11.4% on average, 10.9% in Japan, 10.7% in Sweden, 10.1% in Korea, 9.9% in Finland and 4.5% in the UK. The service sector has the second highest R&D intensity and Israel stands out with an average score of 7.1% between 2010 and 2019, followed by Iceland (2.6%), Denmark (2.3%), Sweden (2%), Norway (2%) and the UK (1.5%). With very few exceptions, the R&D intensity of *agriculture, hunting, forestry and fishing* (ISIC 01–03), *electricity, gas and water* (ISIC 35–39), and *construction* (ISIC 41–43) sectors was below 1% on average in the period 2010-2019. The overall R&D intensity (BERD/value added) reached 6% in Israel, 4.4% in Korea, 3.7% in Finland, 3.6% in Sweden and about 1.8% in the UK.

Table 2: R&D intensity of major economic sectors in 17 OECD countries, 2010-2019* average (%)

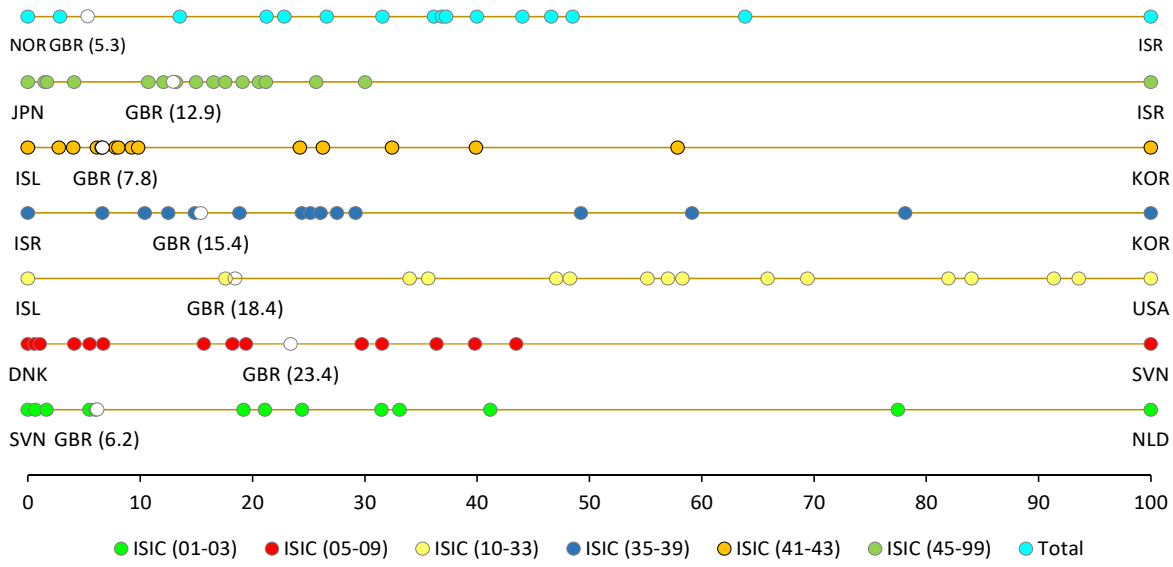
Sector / Country	01-03 Agriculture, hunting, forestry and fishing	05-09 Mining and quarrying	10-33 Manufacturing	35-39 Electricity, gas and water supply; sewerage, waste management and remediation activities	41-43 Construction	45-99 Services (**)	Total (**)
ISR	–	0.23	7.05	0.02	0.09	7.11	6.02
KOR	0.12	1.03	10.06	1.39	1.09	0.78	4.39
FIN	0.06	1.31	9.88	0.17	0.64	1.80	3.70
SWE	0.32	0.74	10.67	0.42	0.11	2.04	3.62
JPN	0.05	1.22	10.86	0.38	0.45	0.67	3.50
DNK	0.40	0.19	8.83	0.40	0.05	2.33	3.32
AUT	0.12	0.64	7.89	0.28	0.30	1.90	3.19
USA	–	1.08	11.40	0.11	0.09	1.52	3.18
DEU	0.64	0.38	8.53	0.23	0.06	0.77	3.15
CHE	–	–	7.78	–	–	1.45	2.94
BEL	0.50	1.42	7.63	0.83	0.28	1.64	2.72
SVN	0.04	3.01	5.99	0.20	0.09	1.36	2.55
FRA	0.52	0.71	6.95	0.70	0.12	1.74	2.47
ISL	0.35	0.35	2.99	1.09	0.02	2.61	2.13
GBR	0.13	0.85	4.54	0.23	0.10	1.51	1.76
NLD	1.51	0.21	5.85	0.36	0.37	0.94	1.65
NOR	1.18	0.31	4.47	0.37	0.13	2.00	1.52

Source: Based on OECD ANBERD and STAN data (accessed on 6 July 2022). (*) 2019 or latest year available. (**) It excludes the value added of the ISIC (68 84-88, 97-98) industries as recommended by OECD (2022). (–) Missing data.

Figure 5 shows the relative position of UK 's R&D intensity on a 0-100 points scale by economic sector, where zero (0) corresponds to the lowest value of R&D intensity of a given economic sector and one hundred (100) corresponds to the highest value of R&D intensity of that sector. In the *agriculture, hunting, forestry and fishing* sector (ISIC 01-03), for instance, the lowest value is 0.04% (Slovenia = 0) and the highest is 1.51% (Netherlands = 100). The UK's R&D intensity of 0.13% corresponds to 6.2 points on this new scale, that is, the value of UK's R&D intensity of the *agriculture, hunting, forestry and fishing* sector (ISIC 01-03) is just 6.2% above the country with the worst performance. Overall, the performance of UK is quite poor in all individual sectors and the economy as a whole since its best position is 23.4 points (manufacturing sector), but there may be outliers that may affect the interpretation of the results. The observations of the manufacturing sector (ISIC 10–33) are distributed along the scale and the UK's score (18.4) is likely to assess well its performance compared to the other OECD countries. In the case of the

service sector (ISIC 45–99), however, most observations are located in the first third of the scale and then there is an outlier (Israel) which affects significantly the overall analysis. In principle, the results would be more consistent if Israel was taken out of the analysis. But, on the other hand, in Israel like in the UK much of the business R&D comes from the service sector and thus Israel might be seen as an example of what the UK might do to increase business R&D intensity. The same reasoning can be done for the overall R&D intensity (variable "Total" in Figure 5).

Figure 5: UK's R&D intensity relative position on a 0-100 points scale, by economic sector



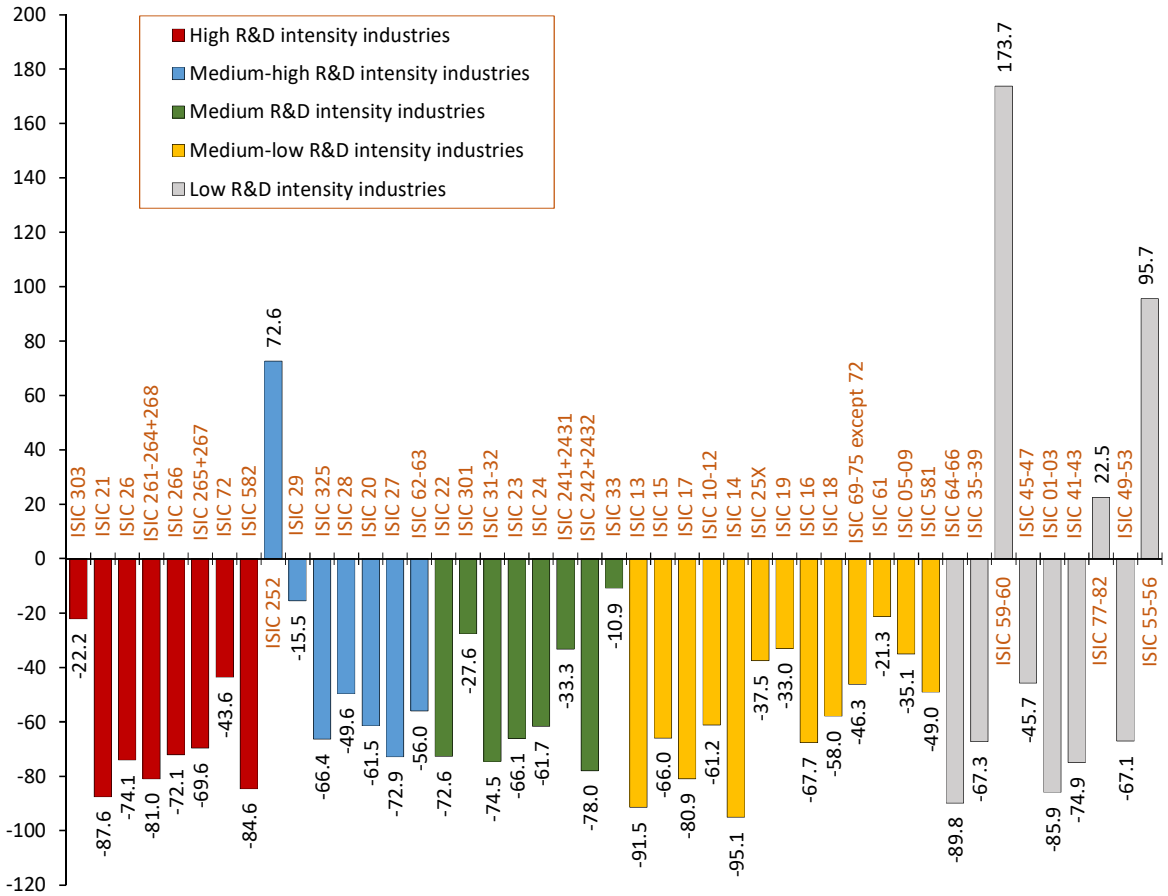
Source: Based on data from Table 2.

Percent difference between the UK's R&D intensity and top five OECD countries average by industry

Figure 6 shows the percent difference between five-year average R&D intensity in the UK and five-year average R&D intensity in the top five OECD countries by industry and level of R&D intensity, for the 2015-2019 period or the latest years available for each country (see Tables A4 to A50 in the Appendix). The UK's average R&D intensity (R&D/value added) was higher than that of the top five OECD countries in just 4 of the 45 industries, one medium-high R&D intensity industry – *weapons and ammunition* (ISIC 252), 72.6% higher – and three low R&D intensity industries – *audiovisual and broadcasting activities* (ISIC 59–60), 137.7% higher, *administrative and support service activities* (ISIC 77–82),

22.5% higher, and *accommodation and food service activities* (ISIC 55–56), 95.7% higher. All the high R&D intensity industries in the UK had lower R&D intensity than those of the top five OECD countries, and the percent variation ranging from –20.8% (*air and spacecraft and related machinery*, ISIC 303) to –87.4% (*pharmaceuticals, medicinal chemical and botanical products*, ISIC 21). Six of the seven medium-high R&D intensity industries also had a relative bad performance in the period, with percentage variations between – 9.9% (*motor vehicles, trailers and semi-trailers*, ISIC 29) and –73% (*electrical equipment*, ISIC 27). However, this does not mean that R&D intensity of high and medium-high intensity R&D industries in the United Kingdom is lower than the cut-off point for each industry (see below), as the cases of *scientific research and development* (42.4% R&D intensity) and *motor vehicles, trailers and semi-trailers* (16.5%) industries show.

Figure 6: Percent difference between 5-year average R&D intensity* in the UK and in the top five OECD countries, by industry and level of R&D intensity (%)



Source: Based on data from Tables A4 to A50 in the Appendix. (*) In the 2015-2019 period or latest years available. Information is missing for two medium-high R&D intensity industries: *military fighting vehicles* (ISIC 304) and *railroad equipment and transport equipment n.e.c.* (ISIC 302+309).

It should be noted that similar percent differences of R&D intensity in industries with different R&D intensity correspond to decreasing absolute differences from high to low R&D intensity industries. For example, a difference of –87.6% in the *pharmaceuticals, medicinal chemical and botanical products* industry (ISIC 21) correspond to –25.3 percentage points difference in R&D intensity while a difference of –88.9% in the *financial and insurance* industry (ISIC 64–66) correspond to –3.1 percentage points difference in R&D intensity. This is important from a policy perspective because high-technology industries offer considerably more room than low-technology industries for increasing R&D intensity (Sheehan & Wyckoff, 2003, p.22).

R&D intensity by industry in the UK and top five OECD countries

The Galindo-Rueda and Verger's (2016) study suggest the following cut-off points of R&D intensity (R&D as a percentage of value added) to classify industries: R&D/VA > 20% (high R&D intensity industry); 5% < R&D/VA ≤ 20% (medium-high R&D intensity industry); 2% < R&D/VA ≤ 5% (medium R&D intensity industry); 0.5% < R&D/VA ≤ 2% (medium-low R&D intensity industry); and, 0% < R&D/VA ≤ 0.5% (low R&D intensity industry). See page 10 (Table 1) of Galindo-Rueda and Verger's (2016) study for information on average R&D as a percentage of value added by industry. Tables 3 to 7 below group industries by level of R&D intensity and compare the five-year average R&D intensity by industry in the UK with the top five OECD countries. Tables A4 to A50 in the Appendix complement the results shown in Tables 3 to 7 by presenting detailed results about the R&D intensity of each industry for the 2010-2019 period and for all the countries under analysis.

High R&D intensity industries

Table 3 compares five-year average R&D intensity of high R&D intensity industries in the UK with the top five OECD countries.[4] The ratio of R&D to value added of these industries is expected to be at least 20%. In the UK, average R&D intensity in the *air and spacecraft and related machinery* (ISIC 33) and *scientific research and development* (ISIC 72) industries, 18.2% and 42.4% respectively, are within the expected range, but in the other high R&D intensity industries the performance is quite poor compared to the top five

[4] Figure A1 in the Appendix shows the evolution of R&D intensity in the 2010 -2019 period of each high R&D intensive industry for the top 5 countries plus the UK.

countries and the expected results for these industries. R&D intensity of *air and spacecraft and related machinery* industry (ISIC 33) showed a tendency to decrease between 2010 and 2019 in countries like Austria, France, the US and Germany (see Table A4 in the Appendix). Germany's average R&D intensity in this industry declined steadily from 32.4% in 2011 to 13.1% in 2019 and the US's average R&D intensity reached a minimum of 14% in 2019, both figures well below the cut-off point for this industry. On the other hand, Korea's average R&D intensity showed a tendency to increase in recent years, more than tripling the value between 2014 and 2018. The UK's average R&D intensity in this industry increased up to 2014, reaching a peak of 23.5%, then declined to a minimum of 14.3% in 2017, and increased again thereafter. The UK's R&D intensity in the *scientific research and development* industry (ISIC 72) showed a slight tendency to decline in recent years but its value has been in the range of 40-45% (see Table A10 in the Appendix), even so lower than the average of the top five.

The UK's *pharmaceuticals* industry (ISIC 21) average R&D intensity was 3.6% in the 2015-2019 period, which is rather lower than the cut-off point for this industry and compares negatively with 28.9% of the top five countries average. Japan's and Belgium's average R&D intensity was around 30% in that period and the US's average R&D intensity in this industry increased steadily from 35.9% in 2011 to 49.5% in 2019 (see Table A5 in the Appendix). The UK's *software publishing* industry (ISIC 582) average R&D intensity was 2.8% between 2014 and 2018 with a slight tendency to increase. This compares negatively with the average of 18.3% of the top five countries, but the real figure is likely higher due to missing data. For methodological reasons, Iceland was not included in the analysis, but Iceland's R&D intensity in this industry increased from 36.5% in 2015 to 52.4% in 2018 (see Table A11 in the Appendix).

Table 3: High R&D intensity industries: R&D intensity by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

ISIC | Industries	R&D / Value added (%)						Avg**
303 | Air and spacecraft and related machinery	AUT	FRA	USA	GBR	KOR	DEU	
	39.4	24.1	19.7	18.2	15.5	15.3	23.4
21 | Pharmaceuticals, medicinal chemical and botanical products	USA	JPN	BEL	SVN	DEU	GBR	
	44.0	30.9	30.2	20.1	19.6	3.6	28.9
26 | Computer, electronic and optical products	ISL	FRA	SWE	BEL	FIN	GBR	
	41.2	32.7	32.7	32.3	32.2	8.9	34.2
261-264+268 | ICT manufacturing	USA	FRA	BEL	JPN	AUT	GBR	
	46.7	37.5	34.3	29.7	28.2	6.7	35.3
266 | Irradiation, electromedical and electrotherapeutic equipment	BEL	ISR	DEU	DNK	FRA	GBR	
	71.3	38.0	28.3	25.3	19.9	10.2	36.6
265+267 | Other electronic and optical products	KOR	JPN	FRA	DNK	NOR	GBR	
	57.2	41.4	29.5	18.2	18.0	10.0	32.9
72 | Scientific research and development	ISR	AUT	ISL	BEL	GBR	NOR	
	100.0	91.7	75.4	66.3	42.4	40.5	75.1
582 | Software publishing	SVN	NOR	USA	FRA	DNK	GBR	
	29.1	17.7	17.3	14.9	12.6	2.8	18.3

Source: Tables A4 to A11 in the Appendix. (*) Or latest years available. (**) Average R&D intensity of the top five countries.

The average R&D intensity of the *computer, electronic and optical products* industry (ISIC 26) in the UK was 8.9% in the 2015-2019 period, placing the UK last among the 17 OECD countries and far from the average of 34.2%. While Iceland's average R&D intensity in this industry showed a tendency to increase, reaching a peak of 50% in 2018, Sweden's R&D intensity plummeted from 86.4% in 2015 to 9.9% in 2019, and Finland's R&D intensity fell from 72.4% in 2012 to 31.8% in 2018 (see Table A6 in the Appendix). The average R&D intensity of the *ICT manufacturing* industry (ISIC 261 to 264+268) in the UK is rather low (6.7%) compared to the cut-off point and the top five countries average (34.2%). The US's R&D intensity increased from 33.1% in 2010 to 48.9% in 2019 but France's, Belgium's, Japan's and Austria's R&D intensity in this industry was in the 28%-35% average range over the last five years (see Table A7 in the Appendix). The UK's average R&D spending as a share of value added in the *irradiation, electromedical and electrotherapeutic equipment* (ISIC 266)[5] and *other electronic and optical products* (ISIC 265+267) industries was also low (around 10%) compared to the top five countries average (above 32%). In

[5] The R&D intensity of this industry (ISIC 266) recorded very abnormal values in countries such as Belgium, Iceland and the Netherlands, reaching values well above 100% in some years (see Table A8 in the Appendix). This can happen, for example, at an early stage of industry development in a country or when a country's industry lags far behind the most competitive countries and, to catch up, R&D spending tends to be disproportionally high in comparison to the added value generated by the industry.

both industries, most data for 2018 and 2019 of the top five countries are missing (see Tables A8 and A9 in the Appendix).

Medium-high R&D intensity industries

Table 4 compares five-year average R&D intensity of medium-high R&D intensity industries in the UK with the top five OECD countries. R&D as a share of value added of these industries is generally expected to be in the range of 5% to 20%, of which the ISIC (29 and 252) industries are expected to fall in the range of 15% to 20% and the other industries in the range of 5% to 10%. There are not enough data to assess and compare the *military fighting vehicles* industry (ISIC 304) and the *railroad equipment and transport equipment n.e.c.* industry (ISIC 302+309) (see Tables A18 and A19 in the Appendix). All the industries listed in Table 4 are manufacturing industries except the *IT and other information services* industry (ISIC 62-63).

The UK's average R&D intensity in the *weapons and ammunition* industry (ISIC 252) was 28%, placing the UK first amongst the countries under analysis and well above the 16.2 % average of the top five countries. However, these results should be treated with caution because data is missing and, as a consequence, Austria (1.8% R&D intensity) and Japan (0.1%) are ranked in the top five countries. For instance, there are no data for the United States and France from 2014 onwards. However, France's average R&D intensity in this industry was around 38% between 2010 and 2013 (see Table A12 in the Appendix), The UK's *motor vehicles, trailers and semi-trailers industry* (ISIC 29) average R&D intensity was 16.5% in the 2015-2019 period, which is within the expected range for this industry, but three percentage points below the top five countries average. The leading countries showed a tendency to increase the share of the value added spent in R&D in this industry between 2010 and 2019.The UK's R&D intensity in this industry increased from 11.4% in 2010 to 17.8% in 2018, but declined to 14.5% in 2019, and Japan's R&D intensity increased around 50 percent in that period, going from 20.8% in 2010 to 31.4% in 2019 (see Table A13 in the Appendix).

The average R&D intensity of the *medical and dental instruments and supplies* industry (ISIC 325) in the UK was 4.5% between 2014 and 2018, which is lower than the cut-off point (around 10%) and far from the top five countries average (13.4%). The US and Korea are the leading countries in this industry with R&D intensities above 20% in recent years and a steady increase in R&D intensity in the 2010-2019 period (see Table A14 in the Appendix). There are no data for 2018 and 2019 for Denmark, Norway and Austria, but the

results suggest the R&D intensities of these countries should be currently around 10%. The average R&D intensity of the *machinery and equipment n.e.c.* industry (ISIC 28) in the UK was 5.9% in the 2015-2019 period, placing the UK last but one among 15 OECD countries. At least since 2010, the UK's R&D intensity in this industry is one of the lowest among the OECD countries under analysis (see Table A15 in the Appendix). The results for the *chemicals and chemical products* industry (ISIC 20) are also poor: the UK's average R&D intensity in this industry in the 2015-2019 period was 3.3%, which is about half the cut-off point and around 40% of the top five countries average, placing the UK last among the 12 OECD countries for which data is available (see Table A16 in the Appendix). In relation to *electrical equipment* industry (ISIC 27) the results are not better. The UK's average R&D intensity between 2015 and 2019 was 4.1%, which is about two thirds of the cut-off point for this industry and less than 30% of the top five countries average, placing the UK last among the 15 OECD countries for which data is available (see Table A17 in the Appendix). In three countries the average R&D intensity was above 15%: the Netherlands (18.9%), but it showed a tendency to decrease in the 2010-2017 period, Sweden (15.7%) and Austria (15.5%). In the *IT and other information services* industry (ISIC 62-63), the UK's average R&D intensity between 2015 and 2019 was 4.2%, which is below the cut-off point for this industry and far from the top five countries average (9.5%). Unlike Denmark, R&D intensities of Iceland, Norway, Finland and Belgium showed a tendency to increase between 2014 and 2019. The UK's R&D intensity stabilized around 4.3% in that period (see Table A20 in the Appendix).

Table 4: Medium-high R&D intensity industries: R&D intensity by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

ISIC | Industries	R&D/Value added (%)						Avg**
252 | Weapons and ammunition	GBR	NOR	DEU	KOR	AUT	JPN	
	28.0	24.0	17.9	9.3	1.8	0.1	16.2
29 | Motor vehicles, trailers and semi-trailers	JPN	DEU	KOR	GBR	FRA	USA	
	28.1	18.7	17.9	16.5	16.4	15.7	19.5
325 | Medical and dental instruments and supplies	USA	KOR	DNK	NOR	AUT	GBR	
	23.5	18.2	8.7	8.3	8.2	4.5	13.4
28 | Machinery and equipment n.e.c.	ISL	NLD	AUT	DNK	SWE	GBR	
	14.1	12.8	12.4	9.8	9.5	5.9	11.7
20 | Chemicals and chemical products	JPN	DEU	KOR	AUT	ISL	GBR	
	12.0	8.7	7.6	7.1	6.9	3.3	8.5
27 | Electrical equipment	NLD	SWE	AUT	FIN	BEL	GBR	
	18.9	15.7	15.5	13.5	11.3	4.1	15.0
304 | Military fighting vehicles	KOR	USA				GBR	
	19.4	0.7					–
302+309 | Railroad equipment and transport equipment n.e.c.	KOR	DEU	JPN	SVN	AUT	GBR	
	11.6	7.5	3.8	3.8	2.8		5.9
62-63 | IT and other information services	ISL	NOR	FIN	DNK	BEL	GBR	
	13.2	9.8	9.0	7.9	7.7	4.2	9.5

Source: Tables A12 to A20 in the Appendix. (*) Or latest years available. (**) Average R&D intensity of the top five countries.

Medium R&D intensity industries

Table 5 compares five-year average R&D intensity of medium R&D intensity industries in the UK with the top five OECD countries. R&D as a share of value added of these industries is expected to fall in the range of 2% to 5%. All the industries listed in Table 5 are manufacturing industries. The average R&D intensity of the *rubber and plastic products* industry (ISIC 22) in the UK was 1.6% between 2015 and 2019, placing the UK last among 15 OECD countries. This is rather lower than the expected result for this industry and the top five countries average, even though this indicator registered an upward trend between 2010 and 2019. R&D intensities of the top five countries did not change much in this period, but the average share of value added spent on R&D was higher than that in the UK by between 2.5 and 5.5 percentage points in the 2015-2019 period (see Table A21 in the Appendix). The average R&D intensity of the *building of ships and boats industry* (ISIC 301) in the UK was 6.3% between 2015 and 2019, which is about twice as much as the expected result for this industry and placed the UK fourth out of the top five countries. These results should be treated with caution because the Slovenia's R&D intensity is unstable, plummeting from 87.7% in 2011 to 0.71% in 2016, and because there is information for only 9 of the 17 countries under analysis. It is possible that some of these 8 countries have higher R&D intensities (see Table A22 in the Appendix). The UK's

average R&D intensity in the *furniture and other manufacturing industry* (ISIC 31-32) was 2.7%, which is about the expected result for this industry but it is much lower than the top five countries average (10.5%). Average R&D intensities of these countries were higher than the UK's by between 3.2 (Norway) and 13.4 (Iceland) percentage points in the 2015-2019 period. R&D intensities in the first three of top five countries, Iceland (16.1% in 2019), the US (15.8% in 2019) and Korea (11.3% in 2018), were rather higher than expected for this industry, and this indicator registered an upward trend between 2010 and 2019 in all of these countries (see Table A23 in the Appendix).

The UK's R&D intensity performance was rather well in the *repair and installation of machinery and equipment* industry (ISIC 33) in relation to the expected result for this industry and the top five countries average, but rather poor in the *other non-metallic mineral products* industry (ISIC 23) where the UK's average R&D intensity of 1.1% compares to 3.4% of the top five countries. In relation to the *basic metals* industry (ISIC 24), the UK's average R&D intensity of 1.9% in the 2015-2019 period is within the expected range for this industry, but it is rather lower than the top five countries average (4.9%). The UK is one of the five countries out of 15 that spent on average less than 2% of the value added generated by this industry in R&D between 2015 and 2019 (see Table A25 in the Appendix). Within the basic metals sector, the UK's R&D intensity performance in the *iron and steel* industry (ISIC 241+2431) is much better than the *non-ferrous metals* industry (ISIC 242+2432). R&D intensity of the former registered an upward trend between 2013 and 2019 while the latter showed a tendency to decrease in that period (see Tables A26 e A27 in the Appendix).

Table 5: Medium R&D intensity industries: R&D intensity by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

ISIC | Industries	R&D/Value added (%)						Avg**
22 | Rubber and plastic products	AUT	FRA	JPN	BEL	FIN	GBR	
	7.1	6.9	6.4	5.0	4.1	1.6	5.9
301 | Building of ships and boats	SVN	DEU	FRA	FIN	GBR	DNK	
	13.4	8.4	8.3	7.0	6.3	4.3	8.7
31-32 | Furniture, other manufacturing	ISL	USA	KOR	DNK	NOR	GBR	
	16.1	14.2	10.2	6.3	5.9	2.7	10.5
23 | Other non-metallic mineral products	JPN	AUT	SVN	FIN	BEL	GBR	
	4.9	4.0	2.7	2.7	2.5	1.1	3.4
24 | Basic metals	SWE	BEL	AUT	NLD	NOR	GBR	
	6.2	5.2	5.2	4.0	3.6	1.9	4.9
241+2431 | Iron and steel	BEL	AUT	FRA	FIN	GBR	KOR	
	5.3	5.0	3.4	3.3	2.6	2.6	3.9
242+2432 | Non-ferrous metals	AUT	BEL	NOR	JPN	DEU	GBR	
	6.6	5.1	4.3	3.4	3.2	1.0	4.5
33 | Repair and installation of machinery and equipment	DEU	GBR	FRA	NOR	SVN	BEL	
	3.8	1.8	1.7	1.5	1.4	1.4	2.0

Source: Tables A21 to A28 in the Appendix. (*) Or latest years available. (**) Average R&D intensity of the top five countries.

Medium-low R&D intensity industries

Table 6 compares five-year average R&D intensity of medium-low R&D intensity industries in the UK with the top five OECD countries. R&D as a share of value added of these industries is expected to fall in the range of 0.5% to 2%. The UK underperformed at least in 6 of the 13 industries listed in Table 6 in the period under analysis. The UK's average R&D intensity in the *textiles* industry (ISIC 13) was 0.6% in the 2015-2019 period. The UK's underperformance contrasts sharply with the Japan's average R&D intensity of 22.9% in that period, which is higher than the rate of value added spent in R&D in some high and medium-high R&D intensity industries, and a steady increase in R&D intensity from 16.7% in 2010 to 25.5% in 2019. R&D intensities of France and Norway are also high compared to the expected result for this industry and showed a tendency to increase in the period under analysis (see Table A29 in the Appendix). Belgium's 3.4% R&D intensity in 2013 suggests it is one of the top R&D investors in the textile industry. In the *paper and paper products* industry (ISIC 17), the UK's average R&D intensity of 0.5% places the country last among 14 countries. Sweden's R&D intensity of 3.6% in 2019 places the country in the top R&D investors in this industry, along with Norway and Finland. Unlike the Netherlands, the R&D intensities of Norway, Finland and the US showed a tendency to decrease between 2010 and 2019 (see Table A31 in the Appendix).

The UK's *wearing apparel* industry (ISIC 14) average R&D intensity was 0.1% in the 2015-2019 period, which is far lower than the expected result for this industry, and 2.6 percentage points below the top five countries average. R&D intensities of the *wearing apparel* industry in leading countries showed divergent trends from 2010 to 2018: the share of value added invested in R&D decreased in Finland but increased in Korea and Slovenia (see Table A33 in the Appendix). In the *wood and products of wood and cork, except furniture* industry (ISIC 16) the UK's average R&D intensity was 0.3%, which is about half the expected result for this industry and rather lower than the top five countries average, but the R&D intensity increased from 0.2% in 2015 to 0.5% in 2019 (see Table A36 in the Appendix). In the *printing and reproduction of recorded media* industry (ISIC 18), the UK's average R&D intensity in the 2015-2019 period was 0.6%, which is close to the expected result for this industry but it is rather smaller than the top five countries average of 1.5%, and the Norway's average R&D intensity (1.8%), Germany's (1.6%) and Finland's (1.6%) average R&D intensity. However, the share of value added spent in R&D in the UK increased steadily from 0.1% in 2010 to 0.8% in 2019 (see Table A37 in the Appendix).

Table 6: Medium-low R&D intensity industries: R&D intensity by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

ISIC | Industries	R&D/Value added (%)						Avg**
13 | Textiles	JPN	FRA	NOR	SVN	AUT	GBR	
	22.9	4.8	3.3	2.9	2.4	0.6	7.2
15 | Leather and related products	NLD	JPN	KOR	AUT	SVN	GBR	
	4.7	3.4	2.8	1.6	1.6	1.0	2.8
17 | Paper and paper products	NOR	FIN	NLD	USA	AUT	GBR	
	4.3	2.7	1.8	1.7	1.4	0.5	2.4
10-12 | Food products, beverages and tobacco	KOR	NOR	NLD	USA	FIN	GBR	
	3.4	2.6	2.5	2.4	2.2	1.0	2.6
14 | Wearing apparel	FIN	KOR	SVN	FRA	AUT	GBR	
	3.9	3.3	2.5	2.0	1.7	0.1	2.7
25X | Fabricated metal products except weapons and ammunition	AUT	NOR	KOR	GBR	DEU	JPN	
	3.2	3.0	1.4	1.3	1.3	1.0	2.0
19 | Coke and refined petroleum products	FIN	DEU	FRA	ISR	KOR	GBR	
	5.3	2.9	2.8	2.8	2.3	2.2	3.2
16 | Wood and of products of wood and cork, except furniture	NOR	SVN	AUT	KOR	BEL	GBR	
	1.3	1.1	1.0	1.0	0.9	0.3	1.1
18 | Printing and reproduction of recorded media	NOR	DEU	FIN	KOR	JPN	GBR	
	1.8	1.6	1.6	1.4	1.1	0.6	1.5
69-75 except 72 | Professional, scientific and technical activities except scientific R&D	AUT	FRA	NOR	BEL	SWE	GBR	
	4.5	4.0	3.0	2.3	2.2	1.7	3.2
61 | Telecommunications	FRA	NOR	JPN	BEL	GBR	KOR	
	3.4	3.3	3.2	2.5	2.3	1.9	2.9
05-09 | Mining and quarrying	SVN	FIN	BEL	USA	GBR	JPN	
	2.6	1.4	1.4	1.2	1.0	1.0	1.5
581 | Publishing of books, periodicals and other publishing activities	SVN	KOR	NOR	DNK	GBR	FRA	
	1.4	1.3	1.3	1.2	0.6	0.3	1.2

Source: Tables A29 to A41 in the Appendix. (*) Or latest years available. (**) Average R&D intensity of the top five countries.

The UK's average R&D intensity in most of the other industries is just under or above the expected results for those industries, but it is quite lower than that of the leading R&D investors in each industry. This is the case of the *leather and related products* industry (ISIC 15), the *food products, beverages and tobacco* industry (ISIC 10-12), the *professional, scientific and technical activities except scientific R&D* industry (ISIC 69-75 except 72) or the *telecommunications* industry (ISIC 61).

Low R&D intensity industries

Table 7 compares five-year average R&D intensity of low R&D intensity industries in the UK with the top five OECD countries. R&D as a share of value added of these industries is expected to fall in the range of 0% to 0.5%. All the industries listed in Table 7 are non-manufacturing industries, and six of them are service industries. The UK's performance was better than average performance of the top five countries in three industries: *audiovisual and broadcasting activities* (ISIC 59-60), *administrative and support service activities* (ISIC 77-82), and *accommodation and food service activities* (ISIC 55-56). In the *audiovisual and broadcasting activities* industry (ISIC 59-60), the UK's average R&D intensity of 2.3% was well above the expected result for this industry and was higher than the other top four countries by between 1.7 (Belgium) and 1.9 (France) percentage points in the 2015-2019 period. The UK's R&D intensity in this industry increased steadily from 2011 to 2015, had an exponential growth of 188% in 2016, and stabilized around 2.7% between 2016 and 2019 (see Table A44 in the Appendix). In the *financial and insurance activities* industry (ISIC 64-66), the UK's R&D average R&D intensity of 0.3% is close to the expected result, but it is far from the average R&D intensity of leading countries such as Denmark (4.5%), Germany (4%) and Slovenia (5.6%), although in the latter case there was an irregular evolution of the R&D intensity between 2010 and 2018 (see Table A42 in the Appendix). In other industries the UK's average R&D intensity was lower than that of the first of the top five countries in the 2015-2019 period by between 3 percentage points in the *transportation and storage* industry (ISIC 49-53) and 1.6 percentage points in the *agriculture, hunting, forestry and fishing* industry (ISIC 01-03).

Table 7: Low R&D intensity industries: R&D intensity by industry in the top five OECD countries plus the UK, 2015-2019* average (%)

ISIC | Industries	R&D/Value added (%)						Avg**
64-66 | Financial and insurance activities	SVN	DNK	DEU	FIN	BEL	GBR	
	5.6	4.5	4.0	1.8	1.2	0.3	3.4
35-39 | Electricity, gas and water supply; sewerage, waste management and remediation activities	KOR	ISL	BEL	FRA	SWE	GBR	
	1.3	1.1	0.9	0.8	0.6	0.3	0.9
59-60 | Audiovisual and broadcasting activities	GBR	BEL	KOR	NOR	FRA	AUT	
	2.3	0.6	0.5	0.4	0.4	0.4	0.8
45-47 | Wholesale and retail trade, repair of motor vehicles and motorcycles	SWE	AUT	FRA	DNK	BEL	GBR	
	1.5	1.0	0.9	0.8	0.8	0.5	1.0
01-03 | Agriculture, hunting, forestry and fishing	NLD	NOR	DEU	FRA	DNK	GBR	
	1.7	1.5	0.7	0.6	0.6	0.1	1.0
41-43 Construction	KOR	FIN	JPN	NLD	AUT	GBR	
	0.9	0.8	0.5	0.4	0.3	0.1	0.6
77-82 | Administrative and support service activities	ISL	GBR	BEL	SWE	NLD	FRA	
	0.5	0.5	0.4	0.3	0.2	0.2	0.4
49-53 | Transportation and storage	USA	NLD	NOR	JPN	FIN	GBR	
	0.4	0.4	0.2	0.2	0.2	0.1	0.3
55-56 | Accommodation and food service activities	GBR	DNK	KOR	ISL	NLD	FRA	
	0.1	0.1	0.0	0.0	0.0	0.0	0.0

Source: Tables A42 to A50 in the Appendix. (*) Or latest years available. (**) Average R&D intensity of the top five countries.

6. CONCLUSION AND POLICY IMPLICATIONS

This study is aimed at comparing the UK's business R&D intensity with top performing OECD countries by industry. BERD accounts for between 65% and 80% of GERD in most of these countries and any successful R&D policy to increase a country's R&D intensity must take into consideration its industrial structure and the performance of its industries, namely high and medium-high R&D intensity industries which account for a large share of BERD. The findings of this research are important for all actors of the science and innovation system, and in particular for policy makers in their ongoing efforts to increase the global R&D spending and business R&D intensity.

More than 60% of BERD comes from the service sector in the UK while in 11 of the top performing OECD countries the manufacturing sector represents between 51% and 87.5% of BERD. This is nothing new. In a reference to the 1990s, Sheehan and Wyckoff (2003, p.21) concluded that in the UK "declines in manufacturing R&D intensity […] were not matched by increases in the service sector". And the situation has not changed since then because "it is rather unlikely that the service sector will play the leading role in reaching the 2.4% target" (Brassel & Cookson, 2020, p.11). It suggests the structure of BERD is an important factor in explaining the stagnation of R&D intensity in the UK in recent decades.

Norway, Iceland and Israel, the three countries where between 61.6% and 82.4% of BERD comes from the service sector, may be a good source of learning, even though these are rather smaller economies. In general, manufacturing industries have greater potential than service industries to increase R&D expenditure and, as so, a long-term policy aiming at increasing the R&D share of the manufacturing sector in total business R&D would be justified as a way to reach a sustained increase of business R&D intensity.

On average, 66.7% of BERD comes from high and medium-high R&D intensity industries, which places the UK 9th among 13 countries and between 13 and 21 percentage points lower than the United States, Iceland, Japan, Korea and Germany. This is a significant difference because these industries have the highest potential to increase BERD and business R&D intensity and the great majority of high and medium-high R&D intensity industries are from the manufacturing sector. From a policymaker perspective, stimulating high and medium-high R&D intensity industries to increase R&D spending is a necessary condition to achieve the UK's R&D target, which also contributes to increase the R&D share of the manufacturing sector in BERD. At the industry level, the UK's performance is rather poor in comparison to the other 16 OECD countries in two industries that account for most of the manufacturing R&D, *chemical, rubber and plastics* (ISIC 19–23) and *computer, electronic, electrical equipment, machinery and motor vehicles* (ISIC 26–30). The performance of the UK is better in the service sector, though perhaps less than expected as more than 60% of business R&D came from the service sector in 2019. In 2019, the *real estate activities; professional, scientific, technical, administrative and support service activities* (ISIC 68-82) and *information and communication* (ISIC 58-63) industries accounted together for most of the business R&D of services of the business enterprise (ISIC 45-82) in all but one country. While on average 35% of BERD comes from the former, which places the UK 1st among the 17 countries, only 15% of BERD comes from the latter, placing the UK behind Iceland (16%), Norway (27%), and Israel (44%). Within the service sector, the attention should be focused on those industries with higher potential to increase R&D. The *information and communication* industry (ISIC 58-63) appears to be a case in point.

A ten-year analysis shows that the manufacturing sector has by far the highest average R&D intensity of all sectors in all countries except Israel. On average, the manufacturing sector in the UK spent 4.5% of the value added in R&D between 2010 and 2019, just better than Iceland and Norway, but less than half of that of the United States, Japan, Sweden, Korea, and Finland. The service sector has the second highest R&D intensity and Israel's average R&D intensity of 7.1% is much higher than Iceland's (2.6%), Denmark's (2.3%),

Sweden's (2%), Norway's (2%) and the UK's (1.5%) R&D intensity. On average, the service sector spent more than 1.5% of the value added in R&D in the 2010-2019 period in 10 of the 17 countries. More than 60% of BERD comes from the service sector in the UK but the UK's R&D intensity of the service sector is lower than most other countries. It may be related to the fact that one third of BERD comes from the *real estate activities; professional, scientific, technical, administrative and support service activities* (ISIC 68-82).

Percent difference between 5-year average R&D intensity in the UK and in the top five OECD countries was positive only in 4 of the 45 industries, one medium-high R&D intensity and three low R&D intensity industries. The UK's R&D intensity of high R&D intensity industries were lower than those of the top five OECD countries by between –20.8% and –87.4%. Six of the seven medium-high R&D intensity industries had a similar bad performance in the 2015-2019 period. All but one high and medium-high R&D intensity industries in the UK spent on average a lower percentage of the value added in R&D than the top five countries average. This is important for R&D policy because these industries have a higher potential to increase business R&D intensity and should be the focus of policymakers' attention.

The fact that the UK's business R&D intensity (BERD/GDP) was last but one among the OECD countries under analysis in 2020 does not mean this is true for every industry. Indeed, the UK's R&D intensity (R&D as a percentage of value added) was relatively higher than most other countries in industries such as *air and spacecraft and related machinery* (ISIC 303), *scientific research and development* (ISIC 72), *weapons and ammunition* (ISIC 252), *motor vehicles, trailers and semi-trailers* (ISIC 29), or *building of ships and boats* (ISIC 301). But, the UK's R&D intensity performance was poor in industries such as *pharmaceuticals, medicinal chemical and botanical products* (ISIC 21), *computer, electronic and optical products* (ISIC 26), *ICT manufacturing* (ISIC 261-264+268), *other electronic and optical products* (ISIC 265+267), *software publishing* (ISIC 582), *medical and dental instruments and supplies* (ISIC 325), *machinery and equipment n.e.c.* (ISIC 28), *chemicals and chemical products* (ISIC 20), *electrical equipment* (ISIC 27), or *rubber and plastic products* (ISIC 22). From a policy perspective, it may be appropriate to think of different R&D intensity targets for each group of industries, and design suitable policy measures to achieve them.

Overall, the results suggest that to increase R&D intensity in a sustained manner the UK needs to increase the R&D share of the manufacturing sector in BERD, increase the R&D spending of most high and medium-high R&D intensity industries and focus on services

industries with higher potential to increase R&D. It should be bared in mind, however, that these findings are only based on the analysis of the structure of BERD and R&D intensity indicator (R&D/Value added). Policymakers should also take into consideration that these methodological approaches and interpretation of results have limitations of robustness and they should use data from complementary sources when available (Moncada-Paternò-Castello, Amoroso, & Cincera, 2020) to better interpret the results and formulate R&D policies.

The study has some limitations. Besides the limitations referred to in the methodology section, the analysis is only based on BERD and R&D intensity indicators, but there are other ways firms can get involved in R&D projects which may not be reflected in the R&D intensity of a particular industry or BERD of a given country (e.g., foreign subsidiaries, university-industry cooperation, R&D partnerships between firms). The high level of industry aggregation (3-digit ISIC codes) allows the analysis of industry groupings but a lower level of data aggregation (2-digit ISIC codes) would permit a more analytical analysis of industries. The fact that an industry has low R&D intensity does not mean that all companies in that industry have low R&D intensity. Within an industry it is normal to have companies with very different levels of R&D intensity, but the study does not capture this phenomenon.

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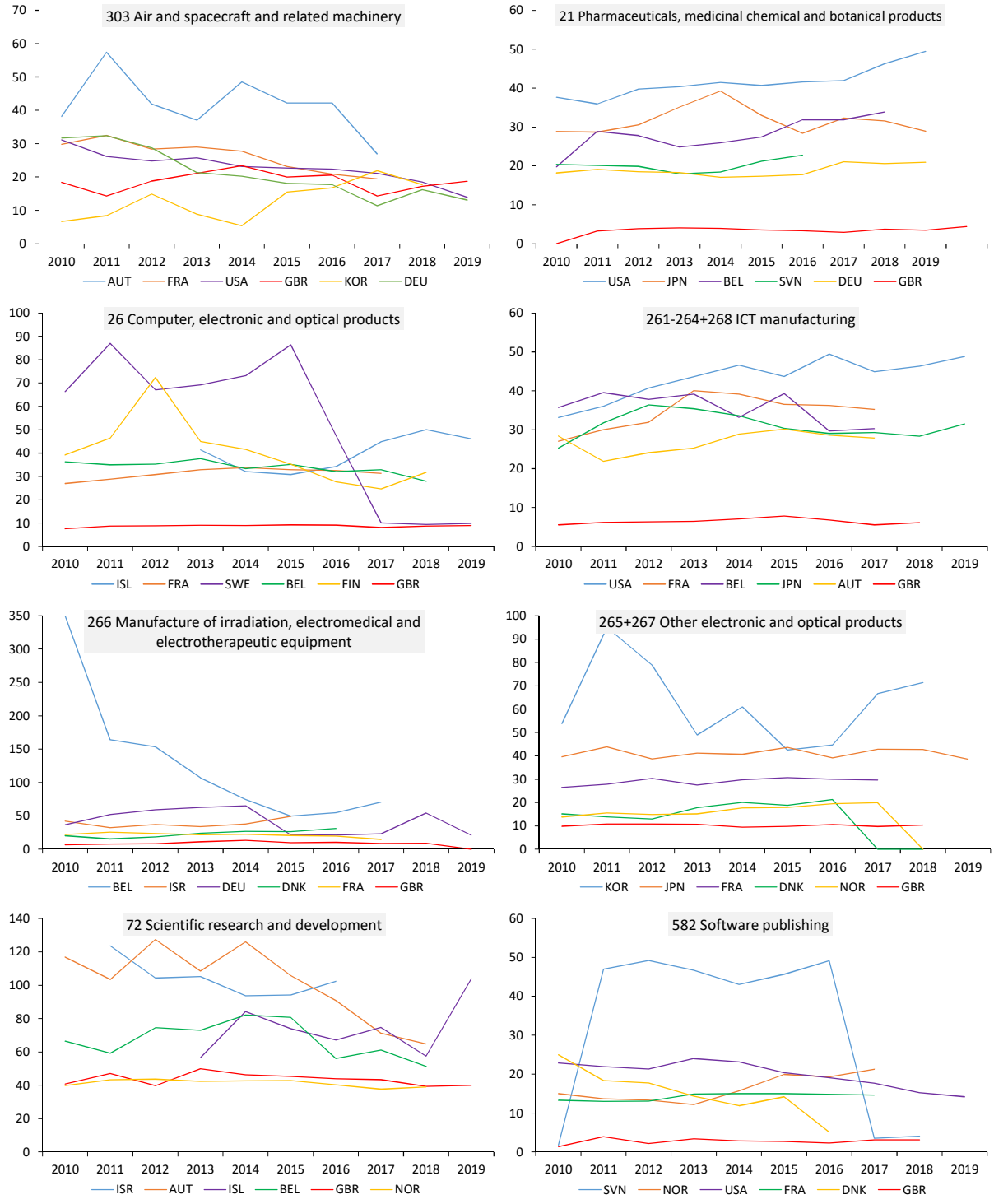
APPENDIX

Table A1: ISIC industries

01-03	Agriculture, hunting, forestry and fishing
05-09	Mining and quarrying
10-33	Manufacturing
10-12	Food products, beverages and tobacco
10-11	Food products and beverages
12	Tobacco products
13-15	Textiles, wearing apparel, leather and related products
13	Textiles
14	Wearing apparel
15	Leather and related products, footwear
16-18	Wood, paper, printing and reproduction of recorded media
16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials
17	Paper and paper products
18	Printing and reproduction of recorded media
19-23	Chemical, rubber, plastics, fuel products and other non-metallic mineral products
19	Coke and refined petroleum products
20-21	Chemical and pharmaceutical products
20	Chemicals and chemical products
21	Pharmaceuticals, medicinal chemical and botanical products
22	Rubber and plastic products
23	Other non-metallic mineral products
24-25	Basic metals and fabricated metal products, except machinery and equipment
24	Basic metals
241,2431	Iron and steel
242,2432	Non-ferrous metals
25	Fabricated metal products, except machinery and equipment
252	Weapons and ammunition
25X	Fabricated metal products except weapons and ammunition
26-30	Computer, electronic and optical products, electrical equipment, machinery, motor vehicles and other transport equipment
26	Computer, electronic and optical products
261-264+268	ICT manufacturing
266	Manufacture of irradiation, electromedical and electrotherapeutic equipment
265+267	Other electronic and optical products
27	Electrical equipment
28	Machinery and equipment n.e.c.
29	Motor vehicles, trailers and semi-trailers
30	Other transport equipment
301	Building of ships and boats
303	Air and spacecraft and related machinery
304	Military fighting vehicles
302,309	Railroad equipment and transport equipment n.e.c.
31-33	Furniture, other manufacturing and repair and installation of machinery and equipment
31-32	Furniture, other manufacturing
325	Medical and dental instruments and supplies
33	Repair and installation of machinery and equipment
35-39	Electricity, gas and water supply; sewerage, waste management and remediation activities
41-43	Construction
45-99	Total services
45-82	Services of the business economy
45-47	Wholesale and retail trade, repair of motor vehicles and motorcycles
49-53	Transportation and storage
55-56	Accommodation and food service activities
58-63	Information and communication
58-60	Publishing, audiovisual and broadcasting activities
58	Publishing activities
581	Publishing of books, periodicals and other publishing activities
582	Software publishing
59-60	Audiovisual and broadcasting activities
61	Telecommunications
62-63	IT and other information services
64-66	Financial and insurance activities
68-82	Real estate activities; professional, scientific, technical, administrative and support service activities
68	Real estate activities
69-82	Professional, scientific, technical, administrative and support service activities
72	Scientific research and development
69-75	Professional, scientific and technical activities (except scientific research and development)
77-82	Administrative and support service activities
84-99	Community, social and personal services

Source: United Nations (2008), Galindo-Rueda, F. & Verger, F. (2016), ANBERD and STAN databases terminology.

Figure A1: High R&D intensity industries: top five OECD countries plus the UK, 2010-2019 (%)



Source: Tables A4 to A11 in the Appendix.

Table A2: Structure of BERD by major economic sectors in 2010 and 2019 (%)

	2010						2019					
ISIC	01-03	05-09	10-33	35-39	41-43	45-99	01-03	05-09	10-33	35-39	41-43	45-99
KOR	0.08	0.06	87.61	0.96	2.27	9.03	0.09	0.01	87.48	0.90	0.92	10.60
JPN	0.04	0.08	87.14	0.55	0.95	11.23	0.02	0.02	87.05	0.38	1.13	11.40
DEU	0.30	0.03	85.75	0.42	0.16	13.34	0.24	0.03	84.87	0.25	0.15	14.45
SVN	0.05	1.05	78.06	0.20	0.08	20.56	0.20	0.27	73.67	0.44	0.38	25.05
CHE	–	–	71.91	–	–	28.09	–	–	67.80	–	–	32.20
AUT	0.03	0.10	65.47	0.32	0.78	33.23	0.05	0.18	66.22	0.38	0.52	32.42
FIN	0.07	0.17	79.66	0.85	1.19	18.06	0.13	0.23	60.25	1.71	2.67	35.01
USA	–	0.91	70.51	0.15	0.39	28.04	–	0.61	57.82	0.09	0.18	41.31
NLD	2.54	0.42	56.87	0.59	1.50	38.07	3.13	0.12	56.53	0.78	1.00	38.45
SWE	0.23	0.19	72.58	0.13	0.20	26.66	0.18	0.15	51.45	0.60	0.20	47.43
BEL	0.50	0.10	59.99	1.01	1.27	37.14	0.09	0.15	51.00	1.20	1.08	46.47
DNK	0.15	0.12	52.33	0.67	0.16	46.57	0.11	0.03	49.71	0.37	0.07	49.72
FRA	0.50	0.05	50.36	1.83	0.60	46.66	0.63	0.05	48.65	1.72	0.40	48.54
GBR	0.08	0.85	37.15	0.19	0.24	61.49	0.05	0.64	36.87	0.91	1.03	60.51
NOR	1.59	5.92	31.94	1.00	0.63	58.92	2.82	4.99	28.33	1.34	0.95	61.57
ISL	1.03	0.03	24.79	4.24	–	69.91	0.78	0.03	19.55	1.61	–	78.03
ISR	–	0.05	30.18	–	–	69.30	–	0.02	17.49	0.03	0.02	82.44

Source: Author's calculations based on ANBERD database (accessed on 6 July 2022). See Table A1 in the Appendix for ISIC codes. (–) Missing data.

Table A3: R&D expenditure as a percentage of BERD by industry in 2019* (%)

ISIC	19	20-21	22	23	26	27	28	29	30	45-47	49-53	55-56	58-63	64-66	68-82
AUT	0.11	5.89	2.03	1.12	11.70	9.95	15.08	7.51	3.56	4.61	0.07	0.00	7.71	0.12	19.90
BEL	0.23	29.03	1.22	1.01	5.03	1.54	3.33	1.76	1.00	3.61	0.65	0.01	13.70	4.22	23.99
CHE	–	36.71	–	–	13.15	–	–	–	–	–	–	–	–	–	12.94
DEU	0.21	12.98	1.76	0.50	11.50	3.55	9.82	37.26	2.61	0.74	0.18	0.00	5.66	0.44	7.41
DNK	–	20.48	0.45	0.07	8.74	1.76	7.12	0.10	0.18	4.65	0.09	0.02	9.19	14.92	20.82
FIN	0.81	6.78	0.92	0.68	24.62	5.50	12.23	1.28	0.76	2.62	0.39	0.01	15.75	2.30	13.08
FRA	0.14	5.58	2.21	0.46	11.39	2.53	3.46	7.28	8.81	6.37	0.53	0.00	13.71	1.07	26.48
GBR	0.32	3.72	0.55	0.32	4.86	0.74	3.15	9.75	7.62	5.08	0.20	0.18	15.53	2.66	34.95
ISL	0.16	0.58	0.17	0.03	2.18	0.24	5.19	–	0.04	0.70	0.12	–	24.80	2.36	47.59
ISR	0.56	1.09	–	–	11.23	–	–	–	–	0.11	–	–	47.66	0.18	32.15
JPN	0.34	16.13	2.47	1.09	18.68	3.03	9.50	27.13	0.79	0.61	0.44	–	3.79	0.04	6.52
KOR	0.37	7.76	1.43	0.41	50.77	3.01	5.26	11.76	1.20	1.47	0.13	0.03	4.81	0.26	3.69
NLD	2.13	9.32	1.15	0.19	7.98	6.10	17.46	2.26	1.07	6.27	1.10	0.02	12.08	3.51	14.74
NOR	–	1.06	0.42	0.43	5.26	1.51	3.89	0.53	1.23	1.92	0.95	–	28.40	4.71	25.59
SVN	–	–	–	0.62	4.74	14.87	5.45	6.39	0.83	1.45	0.06	–	6.58	0.21	–
SWE	–	5.69	0.22	0.11	2.02	2.50	7.33	15.62	10.37	6.18	0.05	–	24.83	1.58	14.69
USA	0.28	19.62	0.63	0.30	17.31	1.11	3.09	4.89	4.31	2.01	2.05	–	26.56	1.97	6.74

Source: Author's calculations based on ANBERD database (accessed on 6 July 2022). See Table A1 in the Appendix for ISIC codes. (*) 2017 for France and the Netherlands. (–) Missing data.

Table A4: R&D intensity of the *air and spacecraft and related machinery* industry (ISIC 303) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
AUT	38.13	57.45	41.89	37.02	48.51	42.23	42.24	26.88	–	–	39.4
FRA	29.79	32.50	28.39	28.99	27.73	23.21	20.84	19.49	–	–	24.1
USA	31.12	26.15	24.78	25.79	23.19	22.69	22.39	21.09	18.51	13.96	19.7
GBR	18.45	14.30	18.78	21.11	23.45	20.00	20.59	14.31	17.24	18.74	18.2
KOR	6.61	8.43	14.89	8.90	5.44	15.47	16.77	21.93	17.70		15.5
DEU	31.71	32.38	28.76	21.34	20.21	18.12	17.73	11.41	16.22	13.10	15.3
SVN	36.80	30.01	8.96	27.70	14.92	11.97	8.71	–	–	–	14.4
JPN	2.95	3.85	6.55	7.68	8.03	10.60	8.11	10.46	10.52	8.75	9.7
FIN	4.89	5.59	6.58	5.38	5.28	9.50	6.32	9.45	–	–	7.2
NOR	4.60	3.26	2.90	2.15	1.64	1.18	0.84	0.80	–	–	1.3
BEL	21.62	17.48	15.11	18.93	–	–	–	–	–	–	
NLD	9.50	10.22	13.84	15.32	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A5: R&D intensity of the *pharmaceuticals, medicinal chemical and botanical products* industry (ISIC 21) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
USA	37.67	35.94	39.74	40.37	41.45	40.68	41.60	41.94	46.28	49.45	44.0
JPN	28.83	28.70	30.56	35.12	39.24	33.02	28.42	32.35	31.61	28.91	30.9
BEL	19.76	28.86	27.81	24.85	25.95	27.44	31.86	31.89	33.90	–	30.2
SVN	20.40	20.11	19.89	17.96	18.45	21.25	22.82	–	–	–	20.1
DEU	18.20	19.12	18.51	18.31	17.09	17.35	17.76	21.08	20.60	20.96	19.6
SWE	–	–	13.51	14.51	15.90	15.93	19.66	24.16	19.68	–	19.1
KOR	15.47	16.69	20.74	20.63	19.59	20.17	17.55	17.53	18.36	–	18.6
DNK	20.63	18.13	18.07	17.01	16.49	15.02	15.79	14.44	12.85	–	14.9
CHE	17.11	16.64	15.15	14.34	14.72	14.41	14.19	14.38	–	–	14.4
AUT	9.32	9.08	12.10	14.40	14.25	13.42	13.57	13.25	13.38	–	13.6
NLD	13.35	11.20	8.09	12.01	12.66	10.65	8.68	9.16	–	–	10.6
ISR	–	9.37	8.32	12.05	10.41	8.66	11.76	–	–	–	10.2
FIN	10.72	11.37	11.08	10.40	10.24	9.89	9.35	9.32	9.57	–	9.7
FRA	7.08	7.01	6.86	6.68	7.42	7.17	6.78	6.66	–	–	6.9
NOR	9.68	14.00	8.61	7.49	6.48	5.09	4.67	4.76	–	–	5.7
GBR	3.27	3.88	4.07	3.96	3.55	3.33	2.94	3.76	3.49	4.45	3.6
ISL	–	–	–	–	0.61	3.47	6.09	–	–	4.76	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A6: R&D intensity of the *computer, electronic and optical products* industry (ISIC 26) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISL	–	–	–	41.38	32.13	30.80	34.24	44.88	50.00	46.05	41.2
FRA	26.97	28.88	30.79	32.94	33.75	32.89	32.50	31.35	–	–	32.7
SWE	66.36	87.06	67.07	69.24	73.16	86.40	47.50	10.06	9.45	9.85	32.7
BEL	36.31	35.02	35.30	37.61	33.31	35.19	32.04	32.94	27.95	–	32.3
FIN	39.16	46.43	72.40	44.98	41.55	35.23	27.74	24.60	31.77	–	32.2
JPN	26.82	32.78	35.91	35.69	33.83	31.77	30.49	30.97	30.14	32.06	31.1
USA	24.73	26.13	26.71	27.26	29.19	26.79	28.65	27.88	27.28	28.11	27.7
KOR	19.57	20.62	22.95	24.03	26.40	25.16	25.02	23.31	23.97	–	24.8
AUT	24.50	19.25	21.11	21.23	23.62	25.43	23.84	23.57	23.65	–	24.0
DNK	17.19	15.97	18.21	18.89	19.73	20.20	21.02	20.54	20.22	–	20.3
NOR	16.55	18.23	17.38	16.53	17.17	18.40	20.15	21.44	23.47	–	20.1
DEU	20.00	20.33	23.40	22.66	22.03	19.77	18.94	19.15	19.13	20.20	19.4
ISR	–	23.21	16.06	17.90	17.36	17.36	18.11	–	–	–	17.4
NLD	11.52	13.00	14.24	15.27	15.99	12.99	16.83	16.92	–	–	15.6
SVN	16.08	16.47	15.74	16.63	16.75	17.09	13.45	11.82	9.55	–	13.7
CHE	9.28	8.65	8.65	9.01	9.07	9.99	10.09	9.51	–	–	9.5
GBR	7.58	8.73	8.91	9.10	9.02	9.27	9.14	8.13	8.77	9.04	8.9

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A7: R&D intensity of the *ICT manufacturing* industry (ISIC 261-264+268) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
USA	33.09	36.03	40.73	43.63	46.64	43.70	49.47	44.93	46.36	48.86	46.7
FRA	27.05	30.02	31.96	40.07	39.16	36.55	36.27	35.25	–	–	37.5
BEL	35.69	39.55	37.81	39.18	33.19	39.31	29.67	30.30	–	–	34.3
JPN	25.29	31.78	36.39	35.41	33.61	30.38	29.04	29.29	28.30	31.47	29.7
AUT	28.38	21.87	24.12	25.29	28.88	30.15	28.64	27.87	–	–	28.2
KOR	19.54	20.58	22.99	24.44	26.94	25.87	25.78	23.82	24.47	–	25.4
DEU	21.54	25.18	31.81	27.25	25.22	24.01	22.20	21.09	20.80	21.37	21.9
NOR	19.46	20.84	20.97	19.25	21.10	18.88	21.21	22.95	–	–	20.7
ISR	24.07	13.29	16.25	14.56	14.46	13.86	–	–	–	–	14.5
SVN	17.45	19.97	19.90	20.28	18.53	17.42	12.00	12.55	8.71	–	13.8
DNK	7.73	9.54	12.74	10.98	10.88	12.91	10.20	–	–	–	11.5
GBR	5.56	6.22	6.35	6.48	7.08	7.86	6.82	5.55	6.15	–	6.7
FIN	–	–	–	–	–	76.52	32.95	27.67	–	–	
NLD	–	8.62	11.19	12.08	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A8: R&D intensity of the *irradiation, electromedical and electrotherapeutic equipment* industry (ISIC 266) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
BEL	350.36	164.10	153.59	106.98	74.44	49.59	54.61	70.67	–	–	71.3
ISR	42.08	32.30	36.92	33.93	37.80	49.23	–	–	–	–	38.0
DEU	36.57	52.25	59.32	62.68	65.16	21.58	21.23	23.29	54.32	21.12	28.3
DNK	20.20	15.62	18.58	23.89	26.61	26.52	31.05	–	–	–	25.3
FRA	21.92	25.70	23.71	21.67	22.45	20.62	19.73	14.79	–	–	19.9
AUT	20.61	14.76	18.18	14.20	17.60	22.10	19.75	25.32	–	–	19.8
JPN	17.24	16.56	18.77	21.87	19.20	16.94	21.99	19.11	18.28	19.52	19.2
NOR	26.79	30.52	23.08	15.83	6.67	19.80	19.37	24.61	–	–	17.3
GBR	6.62	7.74	8.41	11.16	13.55	9.74	10.36	8.47	8.86	–	10.2
USA	15.00	16.34	13.67	7.54	12.24	7.95	7.42	7.02	7.10	7.11	7.3
KOR	3.49	2.76	3.14	3.04	2.58	2.66	3.03	1.84	2.31	–	2.5
FIN	–	–	–	–	–	1.60	1.90	1.68	–	–	
ISL	–	–	–	–	–	468.67	588.24	173.56	106.28	–	
NLD	–	221.17	227.25	462.55	–	–	–	–	–	–	
SVN	19.86	–	–	17.22	13.27	14.94	14.24	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A9: R&D intensity of the *other electronic and optical products* industry (ISIC 265+267) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	53.85	94.98	78.91	48.96	60.94	42.45	44.67	66.58	71.40	–	57.2
JPN	39.52	43.85	38.66	41.20	40.65	43.65	39.19	42.84	42.77	38.60	41.4
FRA	26.52	27.87	30.26	27.54	29.74	30.68	30.00	29.66	–	–	29.5
DNK	15.15	13.85	13.00	17.79	20.12	18.82	21.27	–	–	–	18.2
NOR	13.81	15.55	14.91	15.13	17.68	17.92	19.46	19.93	–	–	18.0
ISR	–	18.97	17.41	16.24	18.09	17.15	17.64	–	–	–	17.3
DEU	17.29	14.79	15.96	17.02	17.04	16.19	16.12	17.04	15.42	19.27	16.8
FIN	–	–	–	–	–	11.43	19.18	18.11	–	–	16.2
AUT	16.80	15.05	15.54	15.80	15.64	16.91	15.61	14.43	–	–	15.7
BEL	13.05	8.23	8.73	13.90	17.49	16.91	10.14	10.12	–	–	13.7
SVN	12.55	12.01	11.73	10.61	14.28	17.02	15.96	10.19	8.38	–	13.2
USA	14.18	13.98	12.72	13.05	12.42	11.17	11.32	11.72	11.54	12.24	11.6
GBR	9.86	10.82	10.80	10.72	9.45	9.79	10.58	9.72	10.35	–	10.0
ISL	–	–	–	–	–	27.09	28.36	36.17	41.15	–	
NLD	12.28	14.10	11.63	10.08	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A10: R&D intensity of the *scientific research and development* industry (ISIC 72) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISR	–	123.59	104.37	105.19	93.65	94.18	102.37	–	–	–	100.0
AUT	116.98	103.40	127.38	108.54	126.04	105.70	90.83	71.18	64.78	–	91.7
ISL	–	–	–	56.58	84.25	73.91	67.16	74.66	57.46	103.92	75.4
BEL	66.42	59.22	74.52	72.93	82.17	80.69	56.07	61.06	51.32		66.3
GBR	40.79	47.18	39.73	49.86	46.30	45.34	43.90	43.35	39.29	39.99	42.4
NOR	39.84	43.27	43.69	42.38	42.58	42.80	40.31	37.68	38.95		40.5
CHE	22.51	28.08	30.94	35.23	35.75	34.13	25.89	24.11	–	–	31.0
NLD	13.29	20.02	25.04	25.19	27.46	31.43	32.92	35.39	–	–	30.5
DNK	31.55	41.49	47.65	45.03	37.87	34.48	24.44	16.60	21.01	–	26.9
SVN	14.66	27.35	41.91	38.53	31.36	23.54	17.97	16.86	18.80	–	21.7
FIN	8.14	16.16	17.88	19.68	19.09	12.44	15.12	16.16	19.99	–	16.6
USA	16.63	16.17	17.33	14.54	12.43	14.16	13.09	14.85	15.72	15.64	14.7
SWE	17.65	20.04	17.54	13.28	11.91	13.00	15.16	16.80	14.81	–	14.3
JPN	12.43	11.86	10.42	10.12	11.24	11.95	11.29	11.58	12.57	11.62	11.8
DEU	9.64	9.51	8.87	8.38	8.37	9.54	9.85	12.06	12.04	11.15	10.9
FRA	12.34	11.86	11.76	10.96	10.78	11.11	10.99	10.74	–	–	10.9
KOR	–	0.68	0.60	0.82	0.55	0.80	1.04	1.07	1.30	–	1.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A11: R&D intensity of the *software publishing* industry (ISIC 582) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SVN	1.76	46.96	49.21	46.66	43.07	45.63	49.11	3.49	4.04	–	29.1
NOR	15.00	13.66	13.34	12.17	15.68	19.92	19.29	21.29	–	–	17.7
USA	22.86	21.96	21.34	24.01	23.14	20.36	19.10	17.65	15.19	14.16	17.3
FRA	13.28	12.97	13.03	14.90	14.98	14.98	14.86	14.61	–	–	14.9
DNK	24.99	18.33	17.70	14.34	11.88	14.19	5.08	–	–	–	12.6
KOR	–	7.84	11.29	9.07	9.57	10.32	8.88	10.78	–	–	9.7
GBR	1.36	3.89	2.18	3.41	2.84	2.70	2.29	3.11	3.11	–	2.8
ISL	–	–	–	–	–	36.50	43.92	45.30	52.41	–	
BEL	6.91	22.42	96.49	117.94	–	–	–	–	–	–	
FIN	–	–	–	–	–	–	9.34	–	–	–	
DEU	–	–	–	–	–	–	–	0.95	1.68	1.52	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A12: R&D intensity of the *weapons and ammunition* industry (ISIC 252) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
GBR	45.79	39.23	29.23	33.47	28.14	29.43	30.38	27.86	25.75	26.42	28.0
NOR	14.77	17.65	17.86	19.88	23.32	26.14	25.83	24.89	–	–	24.0
DEU	5.63	14.68	12.80	12.49	13.48	20.50	18.06	19.61	15.23	16.21	17.9
KOR	3.06	17.30	11.30	18.76	9.32	7.35	5.15	19.05	5.62	–	9.3
AUT	2.21	3.21	2.04	1.48	2.36	2.23	1.53	1.43	–	–	1.8
JPN	–	–	–	–	–	0.07	0.07	0.10	0.31	0.19	0.1
BEL	5.43	5.32	18.20	19.99	–	–	–	–	–	–	
FIN	–	–	–	–	–	5.97	–	–	–	–	
FRA	37.91	38.96	38.59	37.72	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A13: R&D intensity of the *motor vehicles, trailers and semi-trailers* industry (ISIC 29) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
JPN	20.80	26.47	22.91	25.76	27.33	26.76	27.43	26.72	28.42	31.41	28.1
DEU	17.76	17.11	17.69	17.19	17.35	17.77	16.51	18.56	19.61	21.20	18.7
KOR	13.91	14.07	13.42	13.96	15.49	15.83	15.78	19.90	22.38	–	17.9
GBR	11.44	13.72	14.55	12.96	13.42	15.14	17.52	17.53	17.82	14.53	16.5
FRA	12.57	13.58	14.81	15.14	15.29	15.93	18.11	17.49	–	–	16.4
USA	12.08	11.92	13.55	14.68	14.97	14.03	15.09	15.86	17.08	16.48	15.7
SWE	14.75	13.67	17.45	18.82	16.45	12.93	14.12	16.59	16.34	17.26	15.4
AUT	12.42	11.88	11.91	12.46	12.82	14.36	15.68	17.40	16.41	–	15.3
NOR	6.05	9.29	9.49	9.54	11.68	8.40	8.25	9.06	–	–	9.4
NLD	4.05	6.72	7.72	8.35	8.82	7.95	7.49	7.40	–	–	8.0
FIN	5.05	4.44	5.10	6.12	5.70	8.18	8.12	6.99	7.23	–	7.2
SVN	6.33	8.48	10.46	7.27	8.20	5.41	5.26	4.44	4.90	–	5.6
BEL	3.29	4.13	4.65	5.26	4.05	5.64	6.09	6.46	–	–	5.5
DNK	3.34	4.02	4.77	5.38	3.82	3.03	3.52	3.02	2.25	–	3.1

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A14: R&D intensity of the *medical and dental instruments and supplies* industry (ISIC 325) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
USA	12.24	13.27	15.85	21.77	20.46	22.48	21.21	23.49	23.86	26.49	23.5
KOR	9.67	10.84	10.37	9.75	11.68	13.75	21.35	21.96	22.11	–	18.2
DNK	5.86	7.08	8.89	9.63	7.81	9.61	7.67	–	–	–	8.7
NOR	7.58	7.29	8.25	6.13	8.02	10.42	6.95	10.20	–	–	8.3
AUT	8.56	7.22	7.69	7.58	7.74	7.86	8.68	9.25	–	–	8.2
FRA	5.56	7.21	7.17	6.67	6.99	7.19	6.60	8.58	–	–	7.2
DEU	4.08	4.18	4.05	4.92	4.99	4.92	4.72	5.39	5.16	7.21	5.5
GBR	4.72	3.63	3.18	3.25	3.83	5.61	4.46	3.74	4.86	–	4.5
BEL	2.35	2.22	3.55	4.63	4.06	3.86	2.99	3.84	–	–	3.9
SVN	1.67	6.40	6.89	1.69	2.15	2.35	2.00	2.97	2.23	–	2.3
FIN	–	–	–	–	–	7.68	–	–	–	–	
ISL	–	–	–	–	–	17.40	18.09	25.45	26.44	–	
NLD	–	–	–	–	–	0.81	1.06	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A15: R&D intensity of the *machinery and equipment n.e.c.* industry (ISIC 28) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISL	–	–	–	6.88	6.18	16.98	13.96	14.59	14.28	10.46	14.1
NLD	8.91	8.85	11.09	10.84	12.52	12.95	14.22	13.37	–	–	12.8
AUT	10.07	9.27	11.04	11.56	12.53	12.38	12.85	12.02	12.32	–	12.4
DNK	14.13	13.63	12.46	10.15	10.49	9.91	6.47	12.45	9.47	–	9.8
SWE	7.86	7.53	8.02	10.30	9.27	9.39	9.61	9.57	9.15	9.77	9.5
FIN	8.15	8.66	10.31	11.75	10.15	9.19	8.97	8.75	9.16	–	9.2
USA	7.77	10.11	9.39	8.05	7.57	8.86	8.77	8.61	9.17	9.33	8.9
FRA	8.46	8.28	8.71	8.53	8.08	8.54	9.16	9.85	–	–	8.8
BEL	6.92	6.68	8.29	8.72	7.18	8.05	9.13	9.21	9.00	–	8.5
JPN	7.96	7.93	7.64	9.01	8.82	8.25	8.52	7.96	8.08	7.92	8.1
KOR	6.41	6.70	8.44	7.90	8.08	7.67	7.38	7.06	8.26	–	7.7
NOR	3.43	3.86	4.03	4.90	4.96	5.26	7.68	8.32	8.83	–	7.0
DEU	6.07	5.76	5.97	6.14	6.14	5.82	5.86	6.94	6.71	7.30	6.5
GBR	5.34	4.89	5.60	4.94	4.96	5.87	5.96	5.86	6.36	5.42	5.9
SVN	4.87	6.93	3.16	4.25	4.05	4.10	3.61	3.88	4.30	–	4.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A16: R&D intensity of the *chemicals and chemical products* industry (ISIC 20) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
JPN	12.29	12.94	13.30	12.96	12.85	11.95	11.74	11.81	11.59	12.93	12.0
DEU	7.79	8.11	8.78	8.38	8.66	8.33	8.23	8.18	8.98	9.75	8.7
KOR	6.03	6.48	6.29	7.20	6.56	7.06	7.08	8.74	8.79	–	7.6
AUT	10.56	10.05	11.77	8.71	7.42	6.52	5.71	7.29	8.54	–	7.1
ISL	–	–	–	12.97	12.07	7.48	7.24	9.32	7.18	3.21	6.9
FIN	7.22	6.37	6.56	7.12	5.92	6.00	6.13	5.42	5.11	–	5.7
NLD	8.40	6.24	5.97	6.44	6.53	5.45	5.25	4.82	–	–	5.7
FRA	7.44	5.27	5.67	5.32	5.12	4.81	5.21	4.93	–	–	5.1
USA	5.02	5.36	5.03	4.92	5.12	5.15	4.51	4.37	4.54	4.84	4.7
SVN	6.04	5.46	5.53	5.07	4.54	4.92	4.94	3.64	3.70	–	4.3
BEL	3.88	4.48	4.98	4.87	4.33	3.98	3.67	3.89	3.47	–	3.9
GBR	4.17	3.08	2.98	3.42	3.28	2.57	4.23	3.04	3.49	2.96	3.3

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A17: R&D intensity of the *electrical equipment* industry (ISIC 27) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NLD	22.69	21.16	20.97	22.35	20.10	17.65	17.12	17.46	–	–	18.9
SWE	11.65	10.70	12.59	14.62	17.59	15.38	15.97	17.58	14.81	14.83	15.7
AUT	17.11	16.88	14.82	15.13	15.43	15.42	15.68	15.51	15.65	–	15.5
FIN	14.15	15.83	16.41	18.58	17.12	12.96	12.50	12.06	12.97	–	13.5
BEL	11.37	13.01	9.34	9.44	10.05	10.46	10.01	10.32	15.76	–	11.3
SVN	7.82	10.61	7.06	13.09	11.24	11.09	12.14	9.12	10.94	–	10.9
FRA	8.96	9.34	9.41	9.29	9.59	9.95	10.24	12.02	–	–	10.2
ISL	–	–	–	0.13	0.99	8.75	12.91	6.69	6.84	4.68	8.0
USA	6.43	7.28	5.84	7.08	7.99	6.79	8.14	7.04	6.88	8.60	7.5
NOR	5.13	5.33	5.62	5.68	6.61	7.38	7.32	7.03	7.33	–	7.1
DNK	7.97	8.41	8.27	8.34	7.54	5.52	6.80	6.08	7.46	–	6.7
KOR	3.88	4.09	4.55	4.02	4.24	5.24	6.78	6.68	7.12	–	6.0
DEU	3.45	3.89	4.26	5.19	5.03	5.45	5.35	6.02	6.07	6.27	5.8
JPN	5.91	5.64	5.66	5.89	5.32	5.33	5.48	5.31	5.06	5.89	5.4
GBR	3.56	3.56	3.72	3.66	3.77	4.29	3.73	4.01	4.49	3.86	4.1

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A18: R&D intensity of the *military fighting vehicles* industry (ISIC 304) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	6.24	1.58	1.08	7.03	7.22	8.60	7.49	40.65	32.87	–	19.4
USA	0.89	1.10	1.46	0.51	1.93	1.19	0.66	0.28	0.49	1.10	0.7

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A19: R&D intensity of the *railroad equipment and transport equipment n.e.c.* industry (ISIC 302+309) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	5.82	12.67	11.57	12.42	16.48	12.02	7.67	10.29	11.77	–	11.6
DEU	3.66	8.01	8.37	8.02	6.53	5.72	5.68	5.96	6.08	13.83	7.5
JPN	2.05	1.75	1.92	2.40	4.64	2.74	2.64	3.12	4.49	6.18	3.8
SVN	4.25	7.80	2.94	4.16	4.52	4.96	2.35	–	–	–	3.8
AUT	5.71	5.22	6.26	2.44	2.44	2.94	2.53	3.61	–	–	2.8
BEL	9.82	10.29	–	–	–	–	–	–	–	–	
FIN	–	–	–	–	–	4.44	4.29	1.53	–	–	
NLD	1.46	3.03	2.61	4.35	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A20: R&D intensity of the *IT and other information services* industry (ISIC 62-63) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISL	–	–	–	–	9.34	13.24	12.30	13.06	13.23	14.22	13.2
NOR	6.53	7.03	7.93	8.36	8.19	9.07	10.08	10.75	10.70	–	9.8
FIN	8.89	8.91	8.99	9.96	8.24	8.80	9.54	9.58	8.66	–	9.0
DNK	13.47	14.21	10.72	7.71	7.66	7.64	10.67	6.40	6.97	–	7.9
BEL	5.46	5.26	6.12	6.44	7.11	6.98	7.34	8.06	9.05	–	7.7
AUT	5.62	6.01	7.10	6.86	6.94	7.13	6.81	6.73	7.25	–	7.0
USA	4.52	5.22	4.57	4.11	4.88	5.29	5.60	5.57	6.65	8.27	6.3
SVN	3.90	7.00	5.49	4.91	5.84	6.22	4.58	5.28	4.35	–	5.3
NLD	3.72	4.95	4.76	4.58	4.69	4.93	5.17	4.79	–	–	4.8
GBR	3.13	3.81	3.98	4.25	4.33	4.20	3.65	4.42	4.32	4.32	4.2
DEU	4.32	4.37	4.31	4.28	4.10	4.21	4.29	4.10	3.90	4.33	4.2
FRA	3.67	3.88	3.90	4.07	4.05	3.93	3.72	4.19	–	–	4.0
JPN	2.34	2.33	2.13	1.59	2.67	2.24	2.06	2.62	2.62	2.04	2.3
KOR	1.21	1.88	1.34	1.33	1.27	1.16	2.11	1.83	2.01	–	1.7

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A21: R&D intensity of the *rubber and plastic products* industry (ISIC 22) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
AUT	6.20	5.91	7.59	7.99	8.08	8.07	7.04	6.22	6.30	–	7.1
FRA	6.42	6.38	7.23	6.92	6.97	7.01	6.87	6.73	–	–	6.9
JPN	5.50	6.31	5.93	6.24	7.02	6.37	6.60	6.53	6.50	5.86	6.4
BEL	4.41	4.59	4.78	4.74	5.34	5.47	4.15	5.23	–	–	5.0
FIN	3.40	3.17	3.28	3.80	3.48	3.66	3.65	5.17	4.39	–	4.1
DEU	3.61	3.80	3.83	3.76	3.81	3.87	3.94	3.87	3.97	4.47	4.0
USA	3.43	3.64	5.19	5.32	5.35	3.26	4.71	4.82	3.38	3.81	4.0
NOR	3.09	2.51	3.36	3.33	3.45	3.93	3.81	4.65	–	–	3.8
KOR	2.55	2.75	2.64	3.31	3.33	3.12	4.37	3.85	3.81	–	3.7
SWE	1.45	1.37	1.58	1.85	2.32	3.08	4.01	4.73	3.01	1.55	3.3
NLD	1.60	4.09	3.44	3.41	2.61	2.96	3.04	3.22	–	–	3.0
ISL	–	–	–	1.30	1.37	2.37	2.72	2.88	4.27	2.26	2.9
DNK	4.85	5.88	5.57	5.66	4.39	4.88	1.34	1.44	1.84	–	2.8
SVN	2.28	2.20	2.27	2.02	2.70	2.14	1.84	1.57	–	–	2.1
GBR	1.00	1.16	1.37	1.17	1.44	1.59	1.60	1.48	1.68	1.71	1.6

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A22: R&D intensity of the *building of ships and boats* industry (ISIC 301) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SVN	57.08	87.68	19.09	36.33	1.14	9.98	0.71	–	–	–	13.4
DEU	7.32	8.54	8.75	6.64	7.00	11.17	6.89	6.86	8.69	8.16	8.4
FRA	9.95	9.54	8.15	7.67	9.31	7.55	8.41	8.79	–	–	8.3
FIN	7.67	16.06	19.64	10.90	3.51	4.12	6.70	9.73	–	–	7.0
GBR	1.26	4.00	2.01	1.27	3.27	6.05	6.35	6.90	5.62	6.53	6.3
DNK	–	1.46	3.42	4.65	5.59	4.47	3.31	–	–	–	4.3
KOR	2.96	2.88	4.21	4.40	5.34	4.82	3.17	2.98	3.45	–	4.0
NOR	1.98	1.97	2.65	2.41	2.80	4.18	2.82	4.27	–	–	3.3
JPN	1.64	1.52	2.16	2.14	2.58	2.07	2.61	2.73	2.27	3.08	2.6
BEL	2.35	–	–	–	–	–	–	–	–	–	
NLD	1.64	5.95	5.44	3.96	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A23: R&D intensity of the *furniture, other manufacturing* industry (ISIC 31-32) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISL	–	–	–	15.14	13.53	13.51	13.65	18.53	19.74	14.96	16.1
USA	8.87	9.45	11.38	14.17	13.05	13.60	12.86	13.95	14.54	15.80	14.2
KOR	4.18	6.89	6.48	6.88	7.87	8.97	11.81	10.86	11.27	–	10.2
DNK	6.66	6.01	6.66	7.71	8.29	10.25	6.88	2.02	3.85	–	6.3
NOR	4.06	3.94	4.53	4.43	5.18	5.62	5.03	6.03	7.81	–	5.9
SWE	5.07	5.05	5.72	7.10	5.60	5.77	4.71	5.12	5.07	4.41	5.0
FRA	3.43	4.10	4.41	4.53	4.66	4.70	4.43	5.13	–	–	4.7
AUT	4.52	4.73	4.39	4.15	3.59	3.57	3.52	3.99	4.44	–	3.8
FIN	3.08	3.16	4.08	3.25	3.38	3.03	3.56	3.22	–	–	3.3
DEU	2.41	2.60	2.50	2.94	2.99	2.78	2.57	3.18	3.33	4.27	3.2
ISR	–	2.94	3.15	2.44	1.89	3.04	3.45	–	–	–	2.8
GBR	2.16	2.07	1.74	2.23	1.93	2.48	2.32	2.61	3.22	2.78	2.7
BEL	1.56	1.67	2.14	2.38	1.87	2.05	2.15	2.90	–	–	2.3
SVN	2.34	3.61	3.38	2.19	2.02	1.87	1.87	–	1.33	–	1.9
NLD	0.56	2.06	0.81	0.69	0.73	0.83	1.15	1.25	–	–	0.9

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A24: R&D intensity of the *other non-metallic mineral products* industry (ISIC 23) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
JPN	4.77	5.01	5.50	5.37	5.34	4.52	4.76	5.03	5.04	4.93	4.9
AUT	3.52	3.80	4.11	3.81	3.90	4.17	4.24	3.99	3.77	–	4.0
SVN	1.21	1.19	2.38	5.58	2.26	2.17	2.46	–	1.18	–	2.7
FIN	2.94	2.61	3.06	2.52	2.86	2.79	2.79	2.42	2.69	–	2.7
BEL	2.61	2.61	2.44	2.50	2.69	2.72	2.17	2.29	–	–	2.5
FRA	2.16	2.27	2.39	2.48	2.36	2.46	2.79	1.90	–	–	2.4
USA	2.74	2.60	2.68	2.46	2.41	1.91	2.08	2.07	2.12	2.21	2.1
KOR	1.69	2.25	3.25	3.00	2.15	1.84	1.66	2.00	1.96	–	1.9
DEU	2.04	1.87	1.87	1.86	1.80	1.89	1.86	1.81	1.81	2.04	1.9
DNK	0.70	0.48	2.36	2.40	2.29	2.35	0.48	1.70	0.98	–	1.6
NOR	1.24	1.40	1.28	1.31	1.10	1.03	1.15	1.16	–	–	1.1
GBR	0.91	0.94	0.70	0.73	0.94	0.75	0.90	1.22	1.49	1.33	1.1
NLD	0.85	1.26	1.38	1.14	1.03	1.14	1.00	0.82	–	–	1.0
SWE	0.93	0.84	0.86	1.07	0.96	1.00	0.92	0.88	0.89	0.85	0.9
ISL	–	–	–	–	–	0.70	0.58	0.05	0.03	0.12	0.3

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A25: R&D intensity of the *basic metals* industry (ISIC 24) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SWE	5.58	5.30	6.91	7.81	6.60	7.22	6.08	5.88	5.52	6.54	6.2
BEL	4.14	5.12	5.96	5.04	5.46	5.45	5.04	5.20	–	–	5.2
AUT	3.60	3.39	4.99	6.66	6.01	4.56	5.09	5.24	5.15	–	5.2
NLD	4.10	4.57	4.00	4.41	3.14	4.35	3.99	4.35	–	–	4.0
NOR	3.18	2.21	3.18	3.82	2.82	4.23	4.22	3.40	3.32	–	3.6
FRA	1.91	3.28	4.09	4.08	4.23	3.35	2.56	2.26	–	–	3.3
DEU	2.84	2.55	2.58	2.61	2.60	2.52	2.62	2.78	2.53	2.75	2.6
KOR	1.91	1.94	2.49	2.17	2.29	2.43	2.32	2.55	2.53	–	2.4
JPN	2.43	3.04	2.51	2.53	2.65	2.50	2.34	2.32	2.35	2.58	2.4
FIN	4.90	3.93	4.24	3.20	2.53	2.39	2.60	1.68	1.75	–	2.2
GBR	1.26	2.34	1.63	1.22	1.66	1.42	1.57	2.37	2.20	1.78	1.9
SVN	3.42	2.86	1.97	3.12	2.90	1.79	1.34	0.97	1.47	–	1.7
DNK	1.21	1.08	1.10	0.96	0.86	0.80	1.06	1.20	0.92	–	1.0
USA	1.05	0.87	0.95	0.83	0.88	0.86	0.85	1.05	1.05	0.91	0.9
ISL	–	–	–	0.19	0.18	0.12	0.60	0.80	1.65	1.17	0.9

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A26: R&D intensity of the *iron and steel* industry (ISIC 241+2431) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
BEL	4.71	6.14	7.07	5.28	5.57	5.79	4.99	5.07	–	–	5.3
AUT	3.97	3.67	5.14	6.42	5.64	3.89	4.38	4.62	–	–	5.0
FRA	1.89	4.01	5.50	5.01	4.42	2.80	2.58	2.09	–	–	3.4
FIN	6.28	5.26	5.36	4.48	3.34	3.53	3.02	2.06	–	–	3.3
GBR	1.37	1.73	1.76	1.08	1.87	1.93	1.80	3.02	3.72	2.62	2.6
KOR	2.05	1.99	2.67	2.26	2.47	2.59	2.55	2.82	2.64	–	2.6
DEU	2.75	2.27	2.39	2.31	2.27	2.20	2.35	2.48	2.20	2.37	2.3
SVN	3.53	3.08	2.21	2.57	2.24	2.07	2.43		1.98	–	2.3
JPN	1.99	2.68	2.08	1.92	1.96	2.05	2.07	2.07	2.05	2.33	2.1
NOR	0.97	1.11	1.42	1.47	1.95	2.13	2.07	1.26	–	–	1.8
DNK	1.10	0.95	0.57	0.76	0.79	0.70	0.96	–	–	–	0.8
ISL	–	–	–	–	–	–	–	2.03	3.60	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A27: R&D intensity of the *non-ferrous metals* industry (ISIC 242+2432) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
AUT	2.84	2.81	4.66	7.22	6.80	6.07	6.53	6.50	–	–	6.6
BEL	3.25	3.53	4.52	4.67	5.26	4.82	5.14	5.47	–	–	5.1
NOR	4.07	2.51	3.75	4.73	3.07	4.82	4.84	4.17	–	–	4.3
JPN	3.84	4.01	3.89	5.05	5.38	4.06	3.20	3.13	3.34	3.35	3.4
DEU	3.01	3.11	2.94	3.16	3.23	3.08	3.05	3.29	3.09	3.30	3.2
FRA	1.93	1.82	2.02	2.58	3.98	4.08	2.53	2.51	–	–	3.1
SVN	3.23	2.42	1.55	3.97	3.86	1.44	0.53	–	1.08	–	2.2
KOR	1.32	1.76	1.83	1.85	1.66	1.88	1.63	1.70	2.09	–	1.8
DNK	1.43	1.35	2.33	1.41	1.00	1.00	1.26	–	–	–	1.4
FIN	2.14	1.21	2.34	1.08	1.27	0.73	1.88	0.90	–	–	1.2
GBR	1.13	3.65	1.37	1.50	1.29	0.55	1.21	1.51	0.92	0.77	1.0
ISL	–	–	–	–	–	–	–	0.69	1.19	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A28: R&D intensity of the *repair and installation of machinery and equipment* industry (ISIC 33) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
DEU	4.14	4.44	4.02	4.27	4.47	8.01	7.12	1.31	1.32	1.16	3.8
GBR	2.56	1.28	1.19	1.33	1.59	2.14	1.89	1.94	1.67	1.46	1.8
FRA	1.01	1.34	1.46	1.41	1.66	1.76	1.56	1.95	–	–	1.7
NOR	1.09	1.17	1.23	1.11	1.03	1.62	1.73	1.73	1.53	–	1.5
SVN	2.02	1.97	0.75	1.86	1.62	0.47	1.46	1.61	1.86	–	1.4
BEL	0.82	0.82	1.53	1.63	1.01	1.18	1.63	1.43	–	–	1.4
NLD	0.70	0.76	0.87	1.03	1.23	1.22	1.14	1.30	–	–	1.2
ISL	–	–	–	0.04	0.40	1.29	1.06	1.16	1.09	1.11	1.1
SWE	4.88	3.14	1.90	0.81	0.78	0.88	0.74	0.80	0.68	0.67	0.8
FIN	0.82	0.80	0.72	0.74	0.51	0.66	0.68	0.66	–	–	0.6
DNK	0.12	0.00	0.18	0.00	0.00	0.05	0.01	0.00	0.03	–	0.0
KOR	–	–	–	–	–	–	0.21	0.15	0.18	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A29: R&D intensity of the *textiles* industry (ISIC 13) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
JPN	16.67	20.00	17.65	19.74	19.74	17.59	19.70	25.93	25.61	25.48	22.9
FRA	4.34	3.60	3.67	3.96	4.22	4.38	5.24	6.06	–	–	4.8
NOR	2.54	3.09	3.10	2.87	3.04	3.42	3.35	3.63	–	–	3.3
SVN	4.30	4.97	4.64	5.74	2.90	2.98	3.15	2.42	2.89	–	2.9
AUT	2.09	2.05	2.68	2.67	2.59	2.36	2.38	2.34	2.40	–	2.4
KOR	1.19	1.58	1.43	1.48	1.51	1.86	2.07	2.16	2.27	–	2.0
NLD	1.46	1.30	1.96	1.64	1.61	1.68	1.63	2.34		–	1.8
FIN	0.64	0.45	0.35	0.84	0.36	2.08	2.36	1.77	–	–	1.5
DEU	1.79	1.54	1.63	1.42	1.34	1.27	1.30	1.27	1.21	1.52	1.3
DNK	1.20	0.72	0.81	0.94	0.85	0.89	1.41	–	–	–	1.0
GBR	0.32	1.02	0.88	0.52	0.56	0.50	0.55	0.74	0.60	0.70	0.6
BEL	3.32	3.77	3.06	3.40	–	–	–	–	–	–	
ISL	–	–	–	–	–	–	–	0.88	0.90	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A30: R&D intensity of the *leather and related products* industry (ISIC 15) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NLD	0.88	0.51	2.24	3.42	2.79	5.60	6.34	5.34	–	–	4.7
JPN	3.77	2.63	2.83	3.12	2.80	2.84	2.75	2.52	3.10	5.76	3.4
KOR	0.92	1.44	1.69	1.92	2.03	2.44	2.87	3.29	3.39	–	2.8
AUT	1.19	1.10	1.23	1.48	1.21	1.17	1.69	1.95	2.15	–	1.6
SVN	2.14	1.23	1.34	1.34	2.15	1.80	1.65	1.12	1.24	–	1.6
GBR	0.25	0.49	0.54	0.79	0.56	0.59	0.58	1.02	1.39	1.22	1.0
DEU	0.75	0.66	0.72	0.74	0.72	0.54	0.51	0.56	0.45	0.53	0.5
FRA	0.80	0.44	0.40	0.36	0.28	0.29	0.44	0.47	–	–	0.4
FIN	0.06	0.08	0.12	0.12	0.03	0.15	0.05	0.05	–	–	0.1
BEL	4.89	9.42	11.12	10.49	–	–	–	–	–	–	
DNK	–	–	–	–	–	–	0.09	–	–	–	
ISL	–	–	–	–	–	6.60	24.44	–	–	–	
NOR	1.55	–	–	–	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A31: R&D intensity of the *paper and paper products* industry (ISIC 17) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NOR	4.82	12.45	4.62	4.77	5.38	4.84	4.09	3.86	3.23	–	4.3
FIN	3.31	2.48	3.04	2.96	2.68	2.89	2.75	2.65	2.64	–	2.7
NLD	0.96	0.37	1.06	1.09	1.37	1.51	2.84	1.99	–	–	1.8
USA	2.26	2.50	1.42	1.63	1.28	1.29	1.46	2.39	1.58	1.88	1.7
AUT	1.19	1.36	1.39	1.30	1.28	1.34	1.35	1.45	1.49	–	1.4
BEL	0.91	1.09	1.07	1.19	1.65	1.55	1.19	1.33	–	–	1.4
SVN	2.36	1.20	0.83	0.88	0.81	1.38	1.00	–	2.07	–	1.2
JPN	1.77	1.53	1.20	0.99	1.40	1.11	1.10	1.16	1.27	1.14	1.2
KOR	0.61	0.76	1.10	0.76	0.80	0.84	0.93	1.18	1.14	–	1.0
DEU	0.79	0.64	0.57	1.00	0.97	0.90	0.92	0.95	0.85	0.84	0.9
FRA	0.69	0.98	0.93	1.04	0.91	0.74	0.75	0.93	–	–	0.9
DNK	1.03	1.03	0.82	0.90	1.39	0.29	0.30	0.38	0.37	–	0.5
GBR	0.23	0.23	0.19	0.28	0.30	0.31	0.28	0.43	0.56	0.69	0.5
SWE	–	2.52	–	3.58	–	–	–	3.45	–	3.55	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A32: R&D intensity of the *food products, beverages and tobacco* industry (ISIC 10-12) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	2.00	2.52	2.89	2.61	2.61	4.93	2.89	3.06	3.45	–	3.4
NOR	1.67	1.70	1.86	1.72	1.87	2.61	2.97	2.77	2.79	–	2.6
NLD	2.90	3.22	3.05	2.91	2.64	2.20	2.46	2.07	–	–	2.5
USA	2.30	2.76	2.50	2.88	2.90	2.45	2.43	2.36	2.37	2.19	2.4
FIN	2.46	2.48	2.22	2.55	2.68	2.31	1.88	2.13	2.08	–	2.2
BEL	1.61	1.78	1.53	1.48	1.74	1.84	2.31	2.45	2.59	–	2.2
JPN	1.91	1.88	1.82	1.96	1.72	1.66	1.66	2.02	1.99	2.19	1.9
DNK	1.29	1.86	2.34	1.71	1.41	1.56	1.61	1.75	1.82	–	1.6
SVN	0.32	0.79	0.81	1.37	1.28	1.48	1.12	–	1.21	–	1.3
GBR	0.87	1.06	1.04	1.16	1.18	0.90	1.14	1.06	0.94	1.02	1.0
FRA	1.02	0.85	0.87	0.87	0.89	0.90	0.85	0.85	–	–	0.9
SWE	0.93	0.99	1.04	1.02	0.89	0.89	0.89	0.99	0.82	0.75	0.9
AUT	0.61	0.58	0.69	0.84	0.81	0.78	0.81	0.80	0.73	–	0.8
DEU	0.88	0.82	0.81	0.79	0.78	0.73	0.68	0.69	0.69	0.73	0.7
ISL	–	–	–	0.53	0.61	0.49	0.59	0.61	0.57	1.12	0.7
CHE	0.45	0.41	0.49	0.56	0.61	0.62	0.59	0.56	–	–	0.6
ISR	–	0.62	0.72	0.51	0.45	0.33	0.40	–	–	–	0.5

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A33: R&D intensity of the *wearing apparel* industry (ISIC 14) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
FIN	4.28	3.45	2.73	3.48	6.43	5.56	2.09	1.90	–	–	3.9
KOR	1.04	2.00	2.35	2.65	2.65	2.87	3.18	3.92	3.86	–	3.3
SVN	0.26	0.28	1.89	2.07	2.21	2.21	1.93	2.93	3.18	–	2.5
FRA	2.56	1.77	1.73	2.18	1.69	1.45	2.53	2.31	–	–	2.0
AUT	2.12	1.79	1.81	1.55	1.31	1.08	1.44	2.08	2.49	–	1.7
DEU	2.21	2.02	2.12	2.10	1.96	1.45	1.46	1.69	1.56	1.86	1.6
DNK	–	–	1.30	0.47	0.45	0.61	0.27	–	–	–	0.6
NLD	–	0.37	0.36	0.66	0.80	0.48	0.34	–	–	–	0.5
JPN	0.49	0.61	0.43	0.45	0.60	0.33	0.28	0.32	0.72	0.36	0.4
GBR	0.05	0.09	0.18	0.16	0.14	0.10	0.07	0.22	0.15	0.11	0.1
BEL	2.12	2.41	2.99	3.57	–	–	–	–	–	–	
ISL	–	–	–	–	–	0.71	1.01	–	–	–	
NOR	2.93	–	–	–	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A34: R&D intensity of the *fabricated metal products except weapons and ammunition* industry (ISIC 25X) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
AUT	3.18	3.01	3.37	3.19	3.35	3.27	3.23	3.21	–	–	3.2
NOR	1.64	2.05	2.19	2.22	2.55	3.24	3.55	3.31	–	–	3.0
KOR	0.86	1.17	1.23	1.07	1.13	1.36	1.42	1.51	1.71	–	1.4
GBR	0.74	0.87	0.69	0.58	1.23	1.05	0.93	1.55	1.38	1.46	1.3
DEU	1.53	1.22	1.26	1.21	1.18	1.16	1.13	1.27	1.27	1.45	1.3
JPN	–	–	–	–	–	0.97	0.98	1.12	1.03	1.12	1.0
BEL	2.27	2.23	2.18	2.30	–	–	–	–	–	–	
FIN	–	–	–	–	–	1.34	–	–	–	–	
FRA	1.74	1.79	1.90	1.88	–	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A35: R&D intensity of the *coke and refined petroleum products* industry (ISIC 19) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
FIN	7.83	6.17	4.85	5.84	6.21	5.87	6.17	3.85	4.50	–	5.3
DEU	1.67	2.83	2.47	2.04	3.39	2.47	2.60	2.65	3.33	3.51	2.9
FRA	5.87	4.82	2.99	4.10	3.94	2.32	2.07	1.69	–	–	2.8
ISR	–	1.74	3.01	2.76	2.84	3.05	2.32	–	–	–	2.8
KOR	1.85	2.20	1.88	1.91	1.68	1.77	1.53	2.53	4.02		2.3
GBR	0.54	1.51	1.79	0.95	1.74	2.65	1.24	2.25	2.55	2.14	2.2
JPN	1.00	1.08	1.04	0.90	0.85	0.84	0.80	0.81	0.81	0.83	0.8
BEL	0.44	0.83	0.81	1.07	1.19	0.60	0.75	0.48	0.79	–	0.8
USA	1.00	0.98	0.59	0.17	0.16	0.16	0.47	0.25	0.70	0.87	0.5
NLD	2.24	12.91	25.06	44.26	–	15.08	11.50	11.75	–	–	---
AUT	4.38	4.70	3.89	24.25	256.45	1.19	1.26	1.50	0.87	–	---
ISL	–	–	–	127.27	100.00	–	454.55	23.95	51.62	47.58	---

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A36: R&D intensity of the *wood and products of wood and cork, except furniture* industry (ISIC 16) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NOR	0.75	0.81	0.85	0.90	0.77	1.05	1.24	2.05	1.62	–	1.3
SVN	0.74	0.81	0.54	0.32	0.37	0.49	1.44	1.90	1.27	–	1.1
AUT	0.88	0.73	0.85	0.97	1.15	1.15	1.08	0.92	0.68	–	1.0
KOR	0.42	0.98	0.79	0.81	0.68	1.03	0.89	1.07	1.17	–	1.0
BEL	0.60	0.67	1.56	1.91	0.63	0.62	0.67	0.68	–	–	0.9
JPN	1.32	1.21	1.38	1.15	1.00	0.82	0.88	0.86	0.77	0.83	0.8
FIN	0.87	0.83	0.72	0.65	0.67	0.43	0.69	0.65	0.60	–	0.6
FRA	0.53	0.43	0.60	0.58	0.67	0.68	0.55	0.49	–	–	0.6
USA	1.06	0.89	1.79	0.72	1.17	0.60	0.53	0.46	0.52	0.48	0.5
NLD	0.50	0.23	0.38	0.25	0.34	0.81	0.63	0.40	–	–	0.5
GBR	0.17	0.06	0.11	0.28	0.23	0.20	0.27	0.40	0.35	0.50	0.3
DEU	0.38	0.36	0.33	0.32	0.31	0.28	0.31	0.32	0.31	0.33	0.3
DNK	0.22	0.27	0.29	8.24	0.41	0.32	0.23	0.28	0.26	–	0.3

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A37: R&D intensity of the *printing and reproduction of recorded media* industry (ISIC 18) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NOR	0.76	0.57	0.72	0.79	0.96	1.12	2.08	2.05	3.01	–	1.8
DEU	1.34	1.21	1.14	1.36	1.36	1.30	1.42	1.67	1.89	1.75	1.6
FIN	0.68	0.87	0.96	1.13	1.07	1.67	1.59	1.72	1.77	–	1.6
KOR	0.76	0.83	1.04	1.12	1.10	1.48	1.34	1.39	1.56	–	1.4
JPN	1.26	1.41	1.42	1.14	0.90	0.87	1.05	1.11	1.17	1.16	1.1
AUT	1.75	1.41	1.49	1.57	1.38	1.00	0.81	0.70	0.68	–	0.9
USA	0.59	0.45	0.67	0.65	0.60	0.49	0.53	0.57	0.59	1.04	0.6
GBR	0.11	0.10	0.23	0.37	0.42	0.53	0.51	0.61	0.65	0.84	0.6
NLD	0.10	0.72	0.38	0.31	0.41	0.76	0.77	0.58	–	–	0.6
SVN	0.83	0.50	0.52	0.55	0.69	0.46	0.33	–	–	–	0.5
FRA	0.35	0.25	0.38	0.35	0.43	0.48	0.29	0.44	–	–	0.4
BEL	0.26	0.29	0.31	0.37	0.23	0.28	0.41	0.62	–	–	0.4
DNK	0.25	0.05	–	–	–	–	–	0.63	0.44	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A38: R&D intensity of the *professional, scientific and technical activities except scientific R&D* industry (ISIC 69-75 except 72) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
AUT	4.06	4.11	4.49	4.60	5.05	4.97	4.42	3.85	3.99	–	4.5
FRA	4.28	4.50	4.42	4.18	4.14	4.05	3.75	3.65	–	–	4.0
NOR	2.87	2.98	2.46	2.22	2.59	2.94	3.24	3.23	2.96	–	3.0
BEL	1.91	1.88	1.96	2.03	2.08	2.20	2.32	2.43	2.44	–	2.3
SWE	1.55	1.60	1.83	2.12	2.02	2.23	2.19	2.31	2.17	–	2.2
FIN	2.73	2.24	2.45	1.92	1.74	2.26	2.12	1.83	2.21	–	2.0
KOR	–	1.64	1.67	1.70	2.23	1.69	1.56	1.67	1.77	–	1.8
DNK	1.59	1.66	1.64	1.63	1.44	2.10	1.81	1.77	1.74	–	1.8
GBR	0.94	1.04	1.32	1.48	1.78	1.63	1.48	1.70	1.86	1.86	1.7
DEU	1.10	1.22	1.08	1.08	0.97	1.70	1.80	1.62	1.49	1.40	1.6
SVN	1.36	2.29	1.99	1.74	1.84	1.70	1.41	1.31	1.29	–	1.5
ISL	–	–	–	1.99	1.48	0.87	1.15	0.79	0.92	1.27	1.0
NLD	0.53	1.41	1.18	1.14	1.04	0.94	0.87	0.91	–	–	1.0
USA	0.76	0.90	0.58	0.65	0.59	0.62	0.54	0.46	0.61	0.71	0.6

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A39: R&D intensity of the *telecommunications* industry (ISIC 61) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
FRA	2.19	2.05	2.63	3.19	3.43	3.10	3.19	3.93	–	–	3.4
NOR	2.94	2.58	2.44	2.48	2.72	3.17	3.98	3.43	3.08	–	3.3
JPN	2.77	3.19	3.17	2.95	4.03	3.93	3.37	2.91	2.79	2.93	3.2
BEL	2.96	3.73	1.66	1.47	1.40	1.41	2.51	2.72	4.35	–	2.5
GBR	3.15	2.56	2.49	2.59	2.68	2.34	2.27	2.23	2.31	2.35	2.3
KOR	1.58	1.69	1.90	1.91	2.05	1.92	1.81	1.82	1.89	–	1.9
FIN	1.97	1.76	1.15	1.58	1.70	1.49	1.41	1.20	1.09	–	1.4
AUT	1.77	1.86	1.87	1.60	1.41	1.30	1.20	1.21	1.29	–	1.3
USA	0.69	0.82	1.08	1.04	1.33	1.19	1.27	1.21	1.15	1.20	1.2
DNK	1.30	1.88	2.45	1.85	1.20	1.47	1.02	0.59	0.62	–	1.0
SVN	0.89	0.52	0.31	0.30	1.32	1.48	0.41	0.45	0.50	–	0.8
DEU	2.23	2.14	2.38	1.54	1.48	0.75	0.47	0.49	0.53	0.68	0.6
NLD	0.58	0.71	0.59	0.38	0.62	0.57	0.63	0.66	–	–	0.6
ISL	–	–	–	–	–	–	–	0.04	0.05	0.23	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A40: R&D intensity of the *mining and quarrying* industry (ISIC 05-09) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SVN	3.81	3.93	3.12	3.64	2.66	2.44	2.99		1.48	–	2.6
FIN	1.00	1.01	1.21	1.43	1.16	1.06	1.38	1.78	1.81	–	1.4
BEL	2.02	2.36	0.51	0.80	1.70	2.81	0.54	0.62	1.40	–	1.4
USA	0.87	0.80	0.82	1.08	1.18	1.60	1.57	1.18	0.63	1.09	1.2
GBR	0.53	0.63	0.66	0.79	0.93	1.22	1.34	0.94	0.73	0.77	1.0
JPN	3.20	1.01	0.98	1.21	0.94	1.00	1.11	0.91	0.94	0.88	1.0
AUT	0.48	0.40	0.27	0.20	0.49	0.95	1.13	0.87	0.94	–	0.9
KOR	0.96	1.12	1.84	1.20	0.97	1.09	0.83	0.51	0.76	–	0.8
SWE	0.57	0.58	0.69	0.90	0.87	1.01	0.97	0.67	0.62	0.52	0.8
FRA	0.67	0.53	0.67	0.71	0.67	0.74	0.76	0.91	–	–	0.8
DEU	0.24	0.19	0.18	0.30	0.25	0.46	0.51	0.58	0.55	0.57	0.5
ISL	–	–	–	0.32	0.25	0.83	0.66	0.00	0.00	0.38	0.4
NOR	0.25	0.19	0.24	0.31	0.32	0.35	0.47	0.35	0.31	–	0.4
DNK	0.09	0.07	0.02	0.10	0.21	0.35	0.36	0.35	0.20	–	0.3
ISR	–	0.14	0.30	0.28	0.25	0.19	0.20	–	–	–	0.2
NLD	–	0.15	0.27	0.26	0.41	0.12	0.13	0.13	–	–	0.2

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A41: R&D intensity of the *publishing of books, periodicals and other publishing activities* industry (ISIC 581) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SVN	0.82	1.86	1.78	1.72	1.29	1.62	0.67	–	–	–	1.4
KOR	–	0.35	0.48	0.50	0.62	1.33	2.36	1.62	–	–	1.3
NOR	–	0.35	0.48	0.50	0.62	1.33	2.36	1.62	–	–	1.3
DNK	0.48	0.77	0.73	0.71	1.13	1.16	2.22	–	–	–	1.2
GBR	0.38	0.20	0.31	0.50	0.47	0.47	0.47	0.77	0.76	–	0.6
FRA	0.15	0.19	0.16	0.27	0.24	0.23	0.36	0.28	–	–	0.3
USA	1.10	0.70	0.36	0.55	0.14	0.17	0.14	0.13	0.23	0.12	0.2
BEL	1.19	1.08	1.75	1.70	–	–	–	–	–	–	
DEU	–	–	–	–	–	–	–	0.07	0.05	0.04	
FIN	–	–	–	–	–	–	0.50	–	–	–	
ISL	–	–	–	–	–	0.15	0.22	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A42: R&D intensity of the *financial and insurance activities* industry (ISIC 64-66) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SVN	2.86	26.95	13.73	16.00	6.71	1.69	0.74	–	3.00	–	5.6
DNK	4.01	4.22	4.00	4.03	3.90	4.35	4.62	4.46	5.15	–	4.5
DEU	7.55	6.25	6.26	5.73	6.12	5.06	4.58	3.51	2.96	3.79	4.0
FIN	1.47	1.46	1.73	1.41	1.64	2.17	1.56	1.80	1.63	–	1.8
BEL	0.53	0.55	0.86	0.86	1.11	1.07	1.05	1.36	1.58	–	1.2
NOR	1.05	1.40	1.07	1.04	1.01	1.01	0.74	1.01	1.05	–	1.0
SWE	0.54	0.58	0.56	0.57	0.57	0.65	0.66	0.74	0.91	1.13	0.8
USA	0.21	0.34	0.31	0.38	0.33	0.40	0.51	0.51	0.47	0.60	0.5
NLD	0.05	0.40	0.51	0.48	0.37	0.48	0.51	0.62	–	–	0.5
GBR	0.28	0.23	0.20	0.24	0.26	0.29	0.26	0.36	0.41	0.42	0.3
FRA	0.27	0.33	0.32	0.30	0.28	0.28	0.34	0.45	–	–	0.3
ISL	–	–	–	0.05	0.05	0.04	0.09	0.19	0.25	0.74	0.3
AUT	0.39	0.23	0.14	0.09	0.11	0.14	0.12	0.07	0.07	–	0.1
KOR	–	–	–	–	0.01	0.01	0.10	0.19	0.16	–	0.1
ISR	0.01	0.02	0.06	0.07	0.05	0.08	0.09	0.20	0.03	–	0.1
JPN	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.04	0.02	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A43: R&D intensity of the *electricity, gas and water supply; sewerage, waste management and remediation activities* industry (ISIC 35-39) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	1.22	1.74	1.69	1.21	1.03	0.94	1.24	1.58	1.87	–	1.3
ISL	–	–	–	0.79	1.28	1.06	1.33	0.98	0.83	1.38	1.1
BEL	0.54	0.55	0.91	1.05	0.87	0.91	0.80	0.64	1.23	–	0.9
FRA	0.49	0.64	0.69	0.62	0.73	0.79	0.70	0.91	–	–	0.8
SWE	0.09	0.08	0.17	0.28	0.41	0.63	0.66	0.71	0.65	0.55	0.6
NOR	0.30	0.29	0.33	0.31	0.31	0.42	0.49	0.44	0.42	–	0.4
NLD	–	0.35	0.26	0.18	0.36	0.40	0.37	0.56	–	–	0.4
DNK	0.58	0.70	0.26	0.25	0.25	0.47	0.33	0.39	0.38	–	0.4
AUT	0.21	0.24	0.23	0.20	0.24	0.30	0.36	0.39	0.37	–	0.3
JPN	0.46	0.46	0.49	0.45	0.36	0.31	0.26	0.36	0.33	0.32	0.3
GBR	0.07	0.08	0.18	0.24	0.22	0.27	0.26	0.30	0.28	0.44	0.3
DEU	0.25	0.27	0.23	0.28	0.26	0.21	0.19	0.20	0.17	0.20	0.2
SVN	0.09	0.23	0.35	0.22	0.22	0.18	0.10	0.12	0.25	–	0.2
FIN	0.19	0.20	0.18	0.17	0.12	0.16	0.17	0.17	0.14	–	0.2
USA	0.14	0.13	0.12	0.10	0.10	0.15	0.11	0.09	0.08	0.12	0.1
ISR	–	–	–	0.02	0.01	0.01	0.01	0.02	0.08	–	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A44: R&D intensity of the *audiovisual and broadcasting activities* industry (ISIC 59-60) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
GBR	0.17	0.15	0.10	0.19	0.64	0.90	2.59	2.65	2.73	2.68	2.3
BEL	0.40	0.50	0.29	0.35	0.93	0.96	0.39	0.37	–	–	0.6
KOR	0.70	0.52	0.48	0.58	0.49	0.42	0.39	0.53	0.59	–	0.5
NOR	0.13	0.14	0.17	0.33	0.34	0.27	0.66	0.49	–	–	0.4
FRA	0.97	0.54	0.66	0.51	0.41	0.40	0.36	0.37	–	–	0.4
AUT	0.09	0.15	0.16	0.16	0.21	0.30	0.46	0.53	0.46	–	0.4
DNK	0.82	0.21	0.10	0.28	0.32	0.66	0.13	0.07	0.22	–	0.3
FIN	0.22	0.32	0.19	0.12	0.35	0.30	0.23	0.24	0.22	–	0.3
DEU	–	–	–	–	–	–	–	0.01	0.02	0.02	
NLD	–	0.50	0.62	0.35	–	–	–	–	–		
ISL	–	–	–	–	–	0.02	0.02	–	–	0.56	
SVN	–	0.04	6.21	–	–	0.06	0.04	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A45: R&D intensity of the *wholesale and retail trade, repair of motor vehicles and motorcycles* industry (ISIC 45-47) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
SWE	0.98	1.35	1.40	1.46	1.31	1.40	1.44	1.58	1.60	1.60	1.5
AUT	0.84	0.83	0.93	0.96	0.95	0.92	0.96	0.98	0.98	–	1.0
FRA	0.64	0.76	0.78	0.83	0.82	0.84	0.98	0.99	–	–	0.9
DNK	0.70	0.93	0.86	0.55	0.74	0.76	0.76	0.99	0.88	–	0.8
BEL	0.34	0.32	0.65	0.66	0.74	0.76	0.79	0.84	0.80	–	0.8
ISL	–	–	–	0.48	0.39	0.64	0.71	0.46	0.94	0.95	0.7
KOR	0.51	0.53	0.56	0.58	0.61	0.50	0.53	0.56	0.72	–	0.6
NLD	0.46	0.52	0.56	0.50	0.52	0.61	0.70	0.59	–	–	0.6
GBR	0.47	0.48	0.43	0.42	0.40	0.51	0.46	0.55	0.57	0.62	0.5
FIN	0.47	0.54	0.67	0.49	0.43	0.51	0.52	0.42	0.50	–	0.5
NOR	0.25	0.31	0.27	0.35	0.36	0.37	0.46	0.40	0.36	–	0.4
USA	0.14	0.17	0.20	0.11	0.10	0.18	0.11	0.52	0.64	0.49	0.4
SVN	0.15	0.16	0.15	0.20	0.24	0.15	0.15	0.10	0.15	–	0.2
DEU	0.10	0.11	0.12	0.11	0.10	0.10	0.08	0.15	0.16	0.18	0.1
JPN	0.06	0.05	0.07	0.07	0.10	0.11	0.11	0.10	0.13	0.13	0.1
ISR	–	–	–	0.13	0.07	0.18	0.20	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A46: R&D intensity of the *agriculture, hunting, forestry and fishing* industry (ISIC 01-03) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
NLD	0.72	1.72	1.32	1.19	1.47	1.81	1.94	1.94	–	–	1.7
NOR	0.86	0.78	0.89	0.79	1.15	1.54	1.19	1.64	1.80	–	1.5
DEU	0.69	0.51	0.59	0.54	0.52	0.72	0.72	0.63	0.77	0.74	0.7
FRA	0.42	0.45	0.46	0.57	0.54	0.52	0.64	0.59	–	–	0.6
DNK	0.24	0.21	0.14	0.21	0.18	0.25	0.15	1.24	0.95	–	0.6
ISL	–	–	–	0.17	0.17	0.28	0.25	0.71	0.53	0.33	0.4
SWE	0.31	0.32	0.34	0.36	0.31	0.30	0.31	0.31	0.31	0.31	0.3
BEL	0.90	1.06	0.51	0.62	0.24	0.38	0.23	0.27	0.31	–	0.3
AUT	0.04	0.05	0.08	0.09	0.04	0.06	0.21	0.30	0.26	–	0.2
GBR	0.14	0.11	0.13	0.09	0.10	0.12	0.19	0.20	0.10	0.09	0.1
KOR	0.09	0.12	0.08	0.08	0.09	0.09	0.13	0.11	0.25	–	0.1
FIN	0.08	0.11	0.04	0.06	0.03	0.03	0.03	0.08	0.08	–	0.1
JPN	0.08	0.06	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.05	0.0
SVN	0.04	0.05	0.08	0.00	0.00	0.07	0.01	–	–	–	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A47: R&D intensity of the *construction* industry (ISIC 41-43) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
KOR	1.17	1.42	1.51	1.37	1.35	0.92	0.72	0.67	0.66	–	0.9
FIN	0.54	0.44	0.44	0.39	0.69	0.85	0.78	0.84	0.79	–	0.8
JPN	0.49	0.47	0.47	0.42	0.37	0.38	0.43	0.41	0.51	0.53	0.5
NLD	0.18	0.35	0.48	0.42	0.43	0.40	0.40	0.28	–	–	0.4
AUT	0.25	0.27	0.24	0.22	0.29	0.39	0.42	0.36	0.28	–	0.3
BEL	0.36	0.30	0.19	0.21	0.21	0.27	0.33	0.37	0.29	–	0.3
NOR	0.11	0.08	0.07	0.11	0.12	0.14	0.14	0.17	0.18	–	0.2
GBR	0.05	0.04	0.07	0.07	0.10	0.08	0.11	0.14	0.17	0.21	0.1
FRA	0.15	0.12	0.13	0.13	0.11	0.09	0.11	0.12	–	–	0.1
SWE	0.09	0.08	0.10	0.12	0.13	0.15	0.13	0.10	0.09	0.08	0.1
ISR	–	–	–	0.02	0.12	0.12	0.10	0.14	0.05	–	0.1
SVN	0.02	0.07	0.08	0.10	0.12	0.13	0.10	0.08	–	–	0.1
USA	0.21	0.15	0.14	0.04	0.03	0.07	0.03	0.07	0.08	0.10	0.1
DEU	0.08	0.06	0.06	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.1
DNK	0.08	0.05	0.06	0.07	0.05	0.04	0.05	0.03	0.03	–	0.0
ISL	–	–	–	–	0.15	–	–	–	–	–	

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A48: R&D intensity of the *administrative and support service activities* industry (ISIC 77-82) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
ISL	–	–	–	0.41	0.30	0.36	0.42	0.50	0.39	0.65	0.5
GBR	0.23	0.31	0.44	0.37	0.56	0.54	0.52	0.46	0.41	0.33	0.5
BEL	0.21	0.20	0.28	0.27	0.64	0.61	0.18	0.20	0.25	–	0.4
SWE	0.09	0.10	0.23	0.36	0.31	0.30	0.28	0.29	0.31	0.37	0.3
NLD	0.05	0.29	0.25	0.34	0.33	0.17	0.17	0.19	–	–	0.2
FRA	0.12	0.14	0.16	0.20	0.18	0.14	0.15	0.18	–	–	0.2
KOR	0.17	0.16	0.17	0.18	0.17	0.15	0.17	0.16	0.18	–	0.2
NOR	0.23	0.25	0.19	0.17	0.08	0.12	0.12	0.14	0.10	–	0.1
FIN	0.06	0.07	0.08	0.06	0.10	0.09	0.16	0.06	0.12	–	0.1
DNK	0.15	0.17	0.12	0.07	0.15	0.05	0.14	0.08	0.06	–	0.1
SVN	0.06	0.00	0.00	0.09	0.06	0.07	0.11	0.11	0.10	–	0.1
AUT	0.09	0.09	0.07	0.05	0.05	0.07	0.09	0.08	0.08	–	0.1
DEU	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.0
USA	0.05	0.06	0.06	0.01	0.01	0.01	0.00	0.02	0.00	0.00	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A49: R&D intensity of the *transportation and storage* industry (ISIC 49-53) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
USA	0.02	0.02	0.04	0.08	0.13	0.07	0.08	0.18	0.14	1.47	0.4
NLD	0.07	0.46	0.44	0.36	0.37	0.42	0.36	0.29	–	–	0.4
NOR	0.12	0.11	0.14	0.12	0.13	0.25	0.25	0.29	0.30	–	0.2
JPN	0.13	0.14	0.17	0.20	0.21	0.16	0.16	0.19	0.19	0.21	0.2
FIN	0.13	0.18	0.20	0.18	0.17	0.19	0.17	0.13	0.14	–	0.2
FRA	0.04	0.06	0.06	0.05	0.14	0.20	0.17	0.18	–	–	0.1
BEL	0.06	0.08	0.07	0.09	0.13	0.13	0.11	0.10	0.27	–	0.1
SWE	0.08	0.08	0.12	0.17	0.16	0.17	0.14	0.13	0.07	0.03	0.1
DEU	0.06	0.10	0.11	0.08	0.08	0.11	0.09	0.09	0.10	0.10	0.1
KOR	0.16	0.28	0.15	0.23	0.08	0.07	0.05	0.07	0.17	–	0.1
GBR	0.05	0.05	0.02	0.05	0.07	0.08	0.06	0.07	0.08	0.06	0.1
AUT	0.04	0.04	0.05	0.06	0.08	0.09	0.06	0.03	0.02	–	0.1
DNK	0.16	0.07	0.14	0.07	0.05	0.07	0.07	0.04	0.04	–	0.1
ISL	–	–	–	0.03	0.03	0.01	0.02	0.02	0.03	0.03	0.0
SVN	0.08	0.11	0.04	0.01	0.01	0.01	0.00	0.03	–	–	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

Table A50: R&D intensity of the *accommodation and food service activities* industry (ISIC 55-56) (%)

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5Y avg*
GBR	0.05	0.06	0.07	0.04	0.06	0.08	0.12	0.11	0.09	0.08	0.1
DNK	0.02	0.01	0.00	0.05	0.03	0.08	0.04	0.06	0.04	–	0.1
KOR	0.00	0.02	0.00	0.03	0.02	0.04	0.06	0.04	0.05	–	0.0
ISL	–	–	–	0.04	0.03	0.14	0.07	0.00	0.00	0.00	0.0
NLD	0.00	0.11	0.02	0.02	0.01	0.01	0.01	0.01	–	–	0.0
FRA	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	–	–	0.0
FIN	0.02	0.02	0.03	0.02	0.00	0.00	0.00	0.01	0.01	–	0.0
BEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	–	0.0
SVN	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	–	–	0.0
DEU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
SWE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ISR	–	0.00	0.00	0.00	0.00	0.00	0.00	–	–	–	0.0

Source: Author's calculations based on ANBERD and STAN databases (accessed on 6 July 2022). (*) Five-year average of latest years available. (–) Missing data.

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