UNIVERSITY OF CAMBRIDGE

Cambridge Industrial Innovation Policy

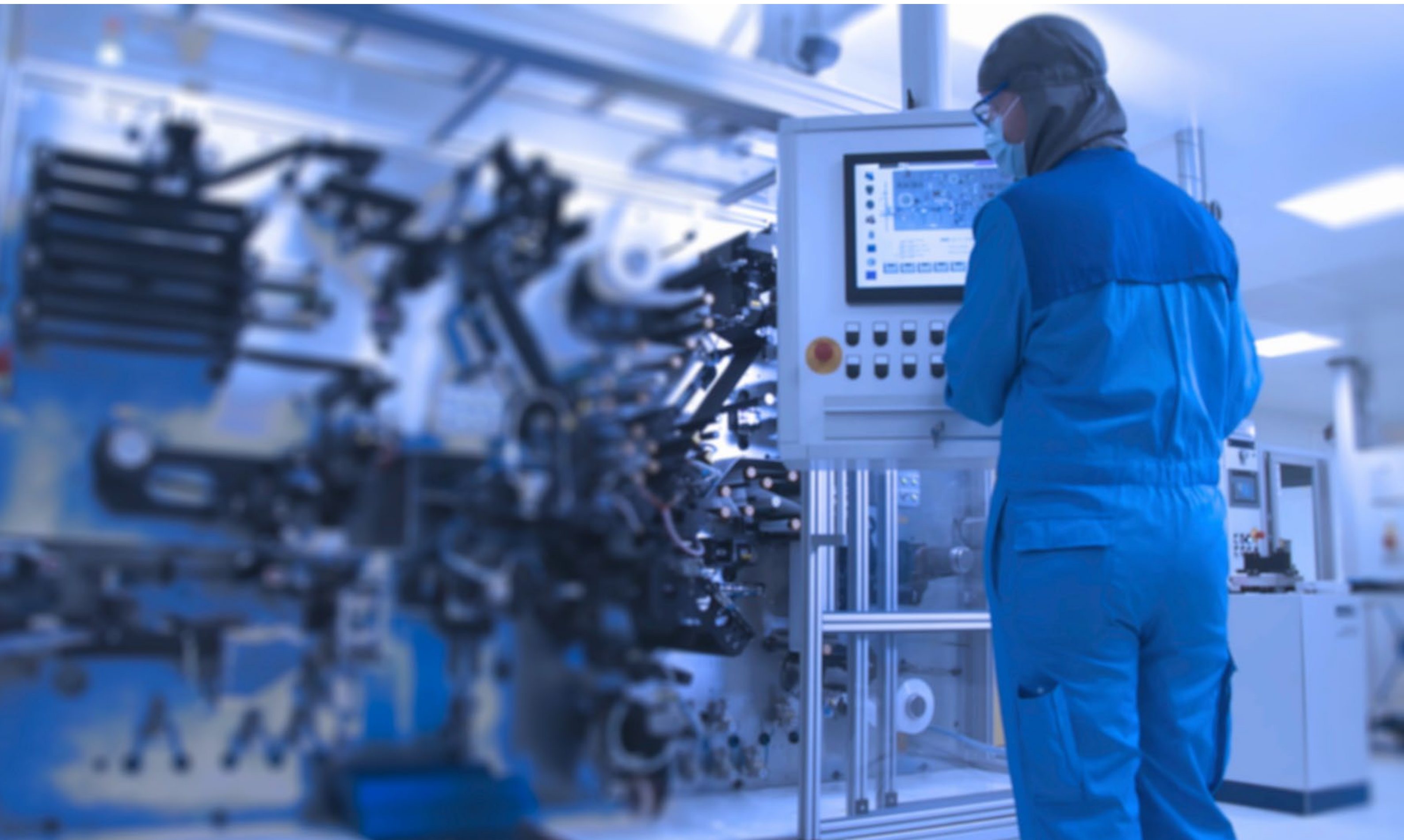
What makes the UK industrial innovation system different?

Strengths and opportunities revealed through UK R&D expenditure and technology scale-up performance

SUMMARY REPORT

Cambridge Industrial Innovation Policy, Institute for Manufacturing, University of Cambridge

SEPTEMBER 2025



About this report

This summary report highlights the key findings from the *UK value capture from innovation* and *UK performance in technology scale-up* studies produced by Cambridge Industrial Innovation Policy (CIIP), commissioned by the Department for Science, Innovation and Technology (DSIT) to inform the work of the National Technology Adviser, Dr Dave Smith. Further detail on methods, disaggregated findings, and results are available in two accompanying technical reports.

This report is based on the authors' interpretation and analysis of the evidence reviewed, including insights and data shared by the consulted stakeholders. These findings do not necessarily represent the view of the Department for Science, Innovation and Technology (DSIT) and the National Technology Adviser – nor do they imply the expression of any opinion on their behalf.

Department for Science, Innovation & Technology

REPORT COMMISSIONED BY THE DEPARTMENT FOR SCIENCE, INNOVATION AND TECHNOLOGY (DSIT), OFFICE OF THE NATIONAL TECHNOLOGY ADVISER

Contributors

The contributors to this report are: David Leal-Ayala, Jennifer Castañeda-Navarrete, Carlos López-Gómez, Eoin O'Sullivan, Zongshuai Fan, and Viktória Döme.

Acknowledgements

The authors would like to thank the interviewees for their valuable inputs to this study. The report benefited from guidance from Oliver Grant and Dave Smith from DSIT, which helped to realise this project by providing guidance, comments, suggestions, and information.

Please reference this report as: Cambridge Industrial Innovation Policy (2025). *What makes the UK industrial innovation system different?* IfM Engage. Institute for Manufacturing, University of Cambridge.

Table of contents

Foreword

The UK is rightly recognised as a global technology leader. We have a world-class academic research base, a vibrant ecosystem of global companies, and a record of attracting substantial venture capital into innovative new businesses. Our start-ups are exceptional; the UK is the only European country with a technology sector valued at around $1 trillion. We are first in the world for research quality, second for university spinout investment, and fourth for the number of tech unicorns.

This government is already addressing key gaps: implementing an Industrial Strategy, expanding finance for scale-ups, reforming UKRI and Innovate UK, focusing on AI capability and adoption, and launching mission-led R&D to tackle national challenges. However, the world does not stand still, and neither does technology.

Persistent concerns remain. Our ability to scale high-tech businesses is not keeping pace with our research strengths. University resilience is under pressure. Some sectors, most notably chemicals, are in decline.

My career has centred on turning research into innovation and developing world-leading products. Since I took on this advisory role, it has been a privilege to use that experience to help forge international technology partnerships and to see first-hand how R&D systems operate in different countries. Each system has its own characteristics, with strengths and weaknesses. In that spirit, I asked the Institute for Manufacturing (IfM) to deliver a data-driven, international comparison of the UK's innovation system, which differs significantly from many others.

In this timely report, the IfM has examined themes related to the journey from science, via applied research, to product – the point at which technology research becomes useful to citizens and the economy. The summary of their findings is given in this paper, and they detail the analysis in two companion technical reports.

My clear impression from the data is that we ask a great deal of our outstanding university sector. There is no optimum system, of course, and our emphasis on university research is partly why our university sector is so remarkably powerful. Among the many data sets in this work that I commend to you, a few stand out. The ratio of papers per £ and patents per £ across the world is insightful, as is the evidence of the critical role large companies have in creating value from science in a sector. And as Sir Paul Nurse's *Independent Review* highlighted, a broader mix of R&D institutions, with distinct incentives and infrastructure, would strengthen the UK's innovation ecosystem.

This is a start. While more data will yield further insights, we cannot analyse forever: there is more than enough here to point at the actions we need to take to grow the UK economy.

Dr Dave Smith, National Technology Adviser

Introduction

The UK's industrial innovation system is a globally recognised leader in innovation and research excellence. Built around a world-renowned research base, well-established industrial sectors, a vibrant spinout ecosystem, and a strong flow of investment into early-stage technologies, the UK continues to perform exceptionally well in global aggregated innovation rankings.

At the same time, the UK's model also presents opportunities for improvement. The system seems weighted towards early-stage discovery and academic excellence, while the later stages of technology development – particularly experimental prototyping, manufacturing scale-up, and commercial deployment – often face structural and financial barriers. The reliance on a relatively narrow set of sectors and institutions, and a high level of foreign ownership in strategic R&D-intensive industries, could limit the UK's ability to retain and grow the economic value of its innovations.

Against this background, this summary report presents a synthesis of the key findings from two studies commissioned by the Department for Science, Innovation and Technology (DSIT): *UK value capture from innovation* and *UK performance in technology scale-up*. Together, these studies provide a detailed and evidence-based picture of the UK's industrial innovation system, including key strengths and opportunities to better translate innovation into long-term economic value. The insights summarised in this report will inform the work of the National Technology Adviser, Dr Dave Smith, and support strategic decision-making to enhance the UK's innovation performance.

The first study, *UK value capture from innovation*, examines the key characteristics of UK national expenditure on R&D, including the balance between basic versus applied research and sectoral orientation foci. The second, *UK performance in technology scale-up*, explores how effectively the UK transforms emerging technologies into commercial products and viable industrial capabilities, with a focus on the role and effectiveness of spinouts, startups, and established firms in driving the technology scale-up process, as well as the UK's ability to retain value from these processes.

This summary report is intended to highlight policy-relevant facts and characteristics of the UK's industrial innovation system, drawing on evidence from the two detailed studies. Its purpose is to provide a clear, accessible overview of the system's strengths and where key opportunities or gaps may exist, particularly in relation to R&D expenditure, technology scale-up, and value capture. While the findings are designed to support policy thinking and strategic decision-making, the report does not seek to prescribe solutions or recommend specific interventions. Instead, it provides a foundation for further exploration, discussion, and policy development.

A key takeaway from the report is that the UK research and innovation ecosystem differs more from leading comparator economies than is often assumed—and these differences matter. Ecosystem and R&D portfolio configurations can provide either advantage or disadvantage, particularly in critical technologies or during industrial scale-up. This underscores the need for better data and analysis to reveal national capabilities and sources of comparative advantage, and cautions against complacency—both the assumption that all leading innovation economies are alike, and the belief that early scientific leadership will inevitably translate into sustained industrial success.

1) The UK excels in curiosity-driven science, placing more emphasis on basic research than its OECD peers

Key message: The UK is widely recognised for the excellence of its research and its dynamic early-stage innovation ecosystem, consistently performing well in global innovation indices, especially in terms of scientific publications and startup valuation. Business and government R&D demonstrate a comparatively strong emphasis on basic research relative to their international peers, with a significant share of UKRI funding directed through mechanisms more typically associated with early-stage research.

What the data tells us:

- The UK ranked fifth among the 133 economies featured in the Global Innovation Index (GII) 2024. Its performance is particularly strong in terms of the volume and impact of scientific publications, venture capital investment, and the valuation of unicorn firms. In the 2024 GII, the UK ranked first by the number of citable H-index publications, first by unicorn valuation as a percentage of GDP, ninth by venture capital received, and eleventh by R&D expenditure.[1]

- But the UK underperforms in intellectual property (IP) outputs against comparator countries. For example, UK design applications are just 34% of the EU average. Similarly, UK resident patent applications per US$100 billion GDP are roughly 10% of China's (**Table 1**).

- But the UK underperforms in intellectual property outputs against comparator countries. For example, UK design applications are just 34% of the EU average. Similarly, UK resident patent applications per US$100 billion GDP are roughly 10% of China's (**Table 1**).

- The UK also lags behind the EU in scaling up market-facing technology, as measured by revenue generated from improved products, whether new to the enterprise or new to the market.[2]

- These patterns are reflected in the distribution of research effort between basic, applied, and experimental development. In 2022, 14% of UK business enterprise R&D (BERD) was directed towards basic research, above the OECD average of 8%.[3]

- From 2017 to 2022, 39% of R&D performed by the UK government (GOVERD) was on basic research, compared to an OECD average of 28%, and above the levels seen in industrialised countries such as the USA (18%) and Korea (26%). In comparison, 20% of UK GOVERD went to experimental development (versus the 33% OECD average) (**Figure 1**).[4]

- In contrast, the most recent available higher education R&D (HERD) data from 2017 showed 33% of UK higher education R&D focused on basic research, 52% on applied research, and only 15% on experimental development. In the UK, 15% of HERD is conducted in engineering and technology, well below countries with a substantial industrial base, such as Korea (44%), Singapore (38%), Germany (25%), and Japan (22%). The share of HERD directed to engineering and technology in the UK is similar to that seen in countries such as France (11%) and Norway (12%) (**Figure 2**).[5]

- Between 2018 and 2022, nearly half of UKRI grant funding was allocated via research councils, and 62% of all programme funding went to mechanisms typically supporting curiosity-driven research. About one-quarter of UKRI funding went through Innovate UK and 11% through the

Industrial Strategy Challenge Fund, which more commonly support applied or company-led R&D.[6]

- For more information on innovation input and output metrics, see Section 2 of the accompanying *UK value capture from innovation* study report.[7]

What the data does not tell us:

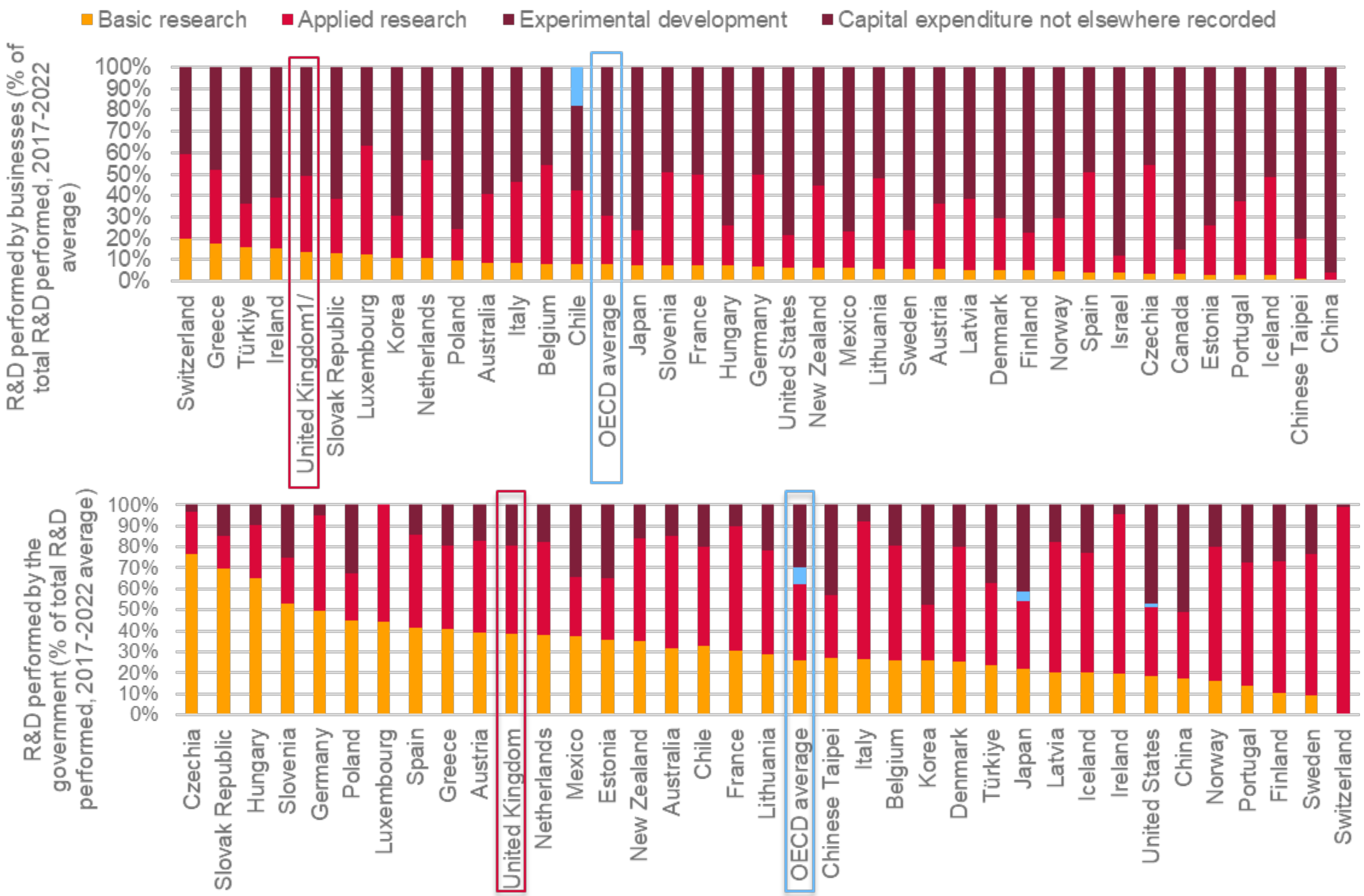
- An opportunity exists to enhance the evidence base for R&D by collecting and analysing data by research type, technological maturity, and sectoral breakdown.
- The Transparent Approach to Costing (TRAC) system used to collect UK HERD does not capture data by type of research. The most recent HERD data, by type of research, dates back to 2017 and was collected using the HESA survey, which has been discontinued.
- UKRI grant data has revealed the potential to be useful for analysing the UK's technology portfolio by sectoral impact, but stricter compliance with data submissions is needed. There is also potential to track the evolution of technology portfolios over time by collecting relevant data on technology readiness levels (TRLs).
- International comparisons should be treated with caution. Data by type of research is based on self-reporting from organisations such as businesses, government agencies, and universities. Variations in how such information is reported between countries can result in inconsistencies, meaning international comparisons should be treated with caution.

TABLE 1. THE UK RANKS AS A LEADER IN INNOVATION CAPABILITIES BASED ON COMPOSITE MEASURES ACROSS A RANGE OF INPUTS AND OUTPUTS

	Selected innovation inputs				Selected innovation outputs			
	Gross domestic expenditure on R&D, as % of GDP, 2022	Higher education expenditure on R&D, as % of GDP, 2022 or latest year	Business enterprise expenditure on R&D, as % of GDP, 2022	Government expenditure on R&D, as % of GDP, 2022	Resident patent applications per US$100 billion GDP (2017 PPP), 2023	Resident design count per US$ 100 billion GDP (2017 PPP), 2023	Publication per '000 population, 2022	Value added per worker in medium/high-tech manufacturing (PPP), 2021
UK	2.8%	0.7%	2.0%	0.1%	470.5	962	3.5	$178,763
USA	3.6%	0.4%	2.8%	0.3%	1118.7	79.5	2.1	$203,073
Japan	3.4%	0.4%	2.7%	0.3%	3973.8	361.6	1.1	$134,979
Canada	1.7%	0.6%	1.0%	0.1%	183.1	35.3	3.3	$127,084
Italy	1.3%	0.3%	0.8%	0.2%	437	1645.6	2.6	$142,946
France	2.2%	0.5%	1.4%	0.3%	650	933.3	1.8	$195,353
Germany	3.1%	0.6%	2.1%	0.4%	1213.5	830.4	2.4	$169,685
China	2.6%	0.2%	2.0%	0.4%	4875	2575.1	0.7	N.A.

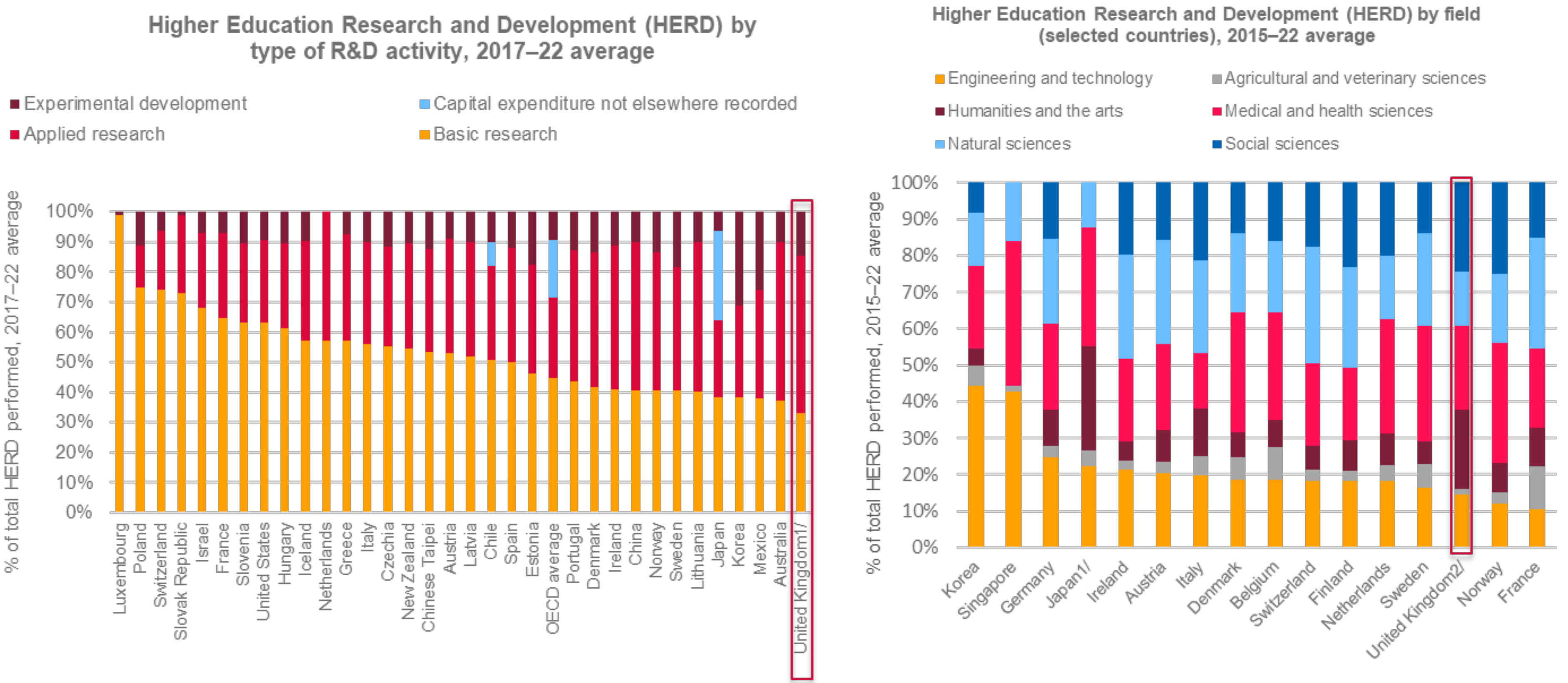
SOURCE: OECD (2024). MAIN SCIENCE AND TECHNOLOGY INDICATORS (MSTI DATABASE); ONS (2024). GROSS DOMESTIC EXPENDITURE ON RESEARCH AND DEVELOPMENT, UK: 2022; WIPO. IP STATISTICS DATA CENTER; DSIT (2022). INTERNATIONAL COMPARISON OF THE UK RESEARCH BASE, 2022; NATIONAL SCIENCE FOUNDATION (2024). RESEARCH AND DEVELOPMENT: U.S. TRENDS AND INTERNATIONAL COMPARISONS; OECD (2024). NATIONAL ACCOUNTS.

FIGURE 1. THE UK PLACES MORE EMPHASIS ON BASIC RESEARCH THAN OECD COUNTRIES



NOTE: [1/]2022 DATA. **SOURCE:** OECD (2024). GROSS DOMESTIC EXPENDITURE ON R&D BY SECTOR OF PERFORMANCE AND TYPE OF R&D; ONS (2024). BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT (R&D), UK: 2022.

FIGURE 2. UK HIGHER EDUCATION R&D PLACES MORE EMPHASIS ON APPLIED RESEARCH THAN ITS OECD PEERS, BUT ONLY A SMALL PROPORTION FOCUSES ON ENGINEERING AND TECHNOLOGY



NOTE: [1]/FOR JAPAN, THE HUMANITIES AND ARTS CATEGORY ALSO INCLUDES SOCIAL SCIENCES. 2/ 2015–17 DATA FOR THE UK. **SOURCE:** OECD (2024). GROSS DOMESTIC EXPENDITURE ON R&D BY SECTOR OF PERFORMANCE AND TYPE OF R&D, AND BY FIELD.

2) International peers have broader networks of research, development, and innovation (RDI) institutions than the UK, particularly public organisations

Key message: International peers have a critical mass of research, development, and innovation (RDI) institutions that include well-funded applied research organisations and national labs with mandates better suited to later-stage technology development. These institutional differences contribute to a UK system that excels in early-stage scientific research – mostly driven by universities – but struggles to advance technologies through demonstration and commercial application.

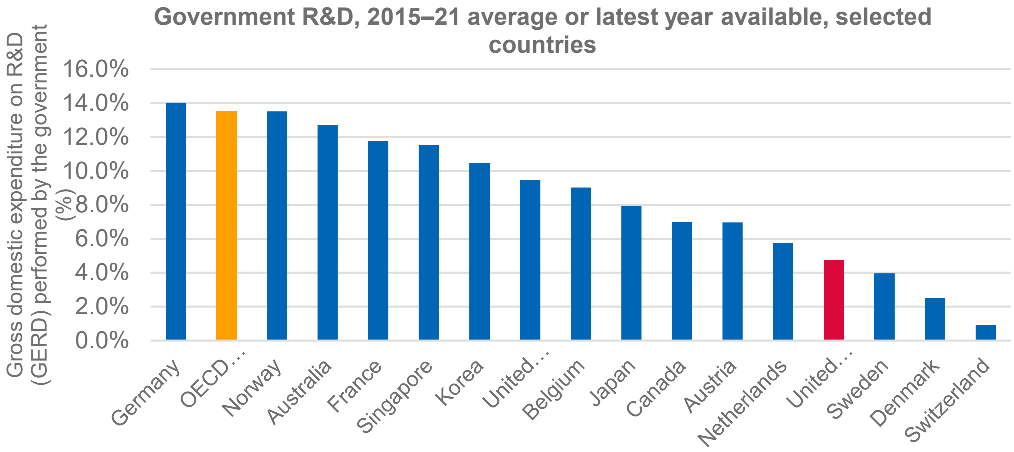
What the data tells us:

- Sir Paul Nurse's *Independent Review of the Research, Development and Innovation Organisational Landscape* highlights that UK universities are "a major strength of the UK RDI ecosystem", receiving the largest proportion of public RDI funding. But public sector research establishments (PSREs) have reduced their prominence and are valued and resourced less than similar networks funded by international peers.[8]
- As emphasised in Nurse's *Independent Review*, the value of PSREs is sometimes overlooked. Indeed, they possess specialist knowledge and fulfil a crucial role in sustaining sovereign expertise and delivering mission-oriented scientific programmes. They frequently de-risk early-stage technologies in which private sector investment may be insufficient, perform essential regulatory functions, and operate RDI infrastructures that are vital for national resilience.[9]
- In the UK, 4.7% of R&D is conducted by government organisations, well below the OECD average (13.5%) and the levels seen in countries such as Germany (14%), Singapore (11.5%), Japan (7.9%), and Austria (7%) (**Figure 3**).[10]
- UK publications in some of the emerging technologies prioritised by the UK government (e.g. quantum, synthetic biology, semiconductors) are concentrated on early TRLs and dominated by universities. In comparison, international counterparts frequently produce outputs that are more focused on engineering challenges and industrial applications.[11]
- Applied research institutions such as Germany's Fraunhofer Society, Japan's NEDO and AIST, and Singapore's A*STAR receive around twice as much core government funding as the UK Catapult Network. Countries like Japan and Germany support additional institutions with large-scale budgets, including Kosetsushi and the Helmholtz Association (**Figure 4**).[12]
- In the US, Manufacturing USA Institutes benefit from flexible core funding and can access additional government resources from agencies like the Department of Defense and Department of Energy for demonstration and skills programmes.[13]
- For more information on international public research organisations and emerging technologies, see Section 2 of the accompanying study report, *UK value capture from innovation*.[14]

What the data does not tell us:

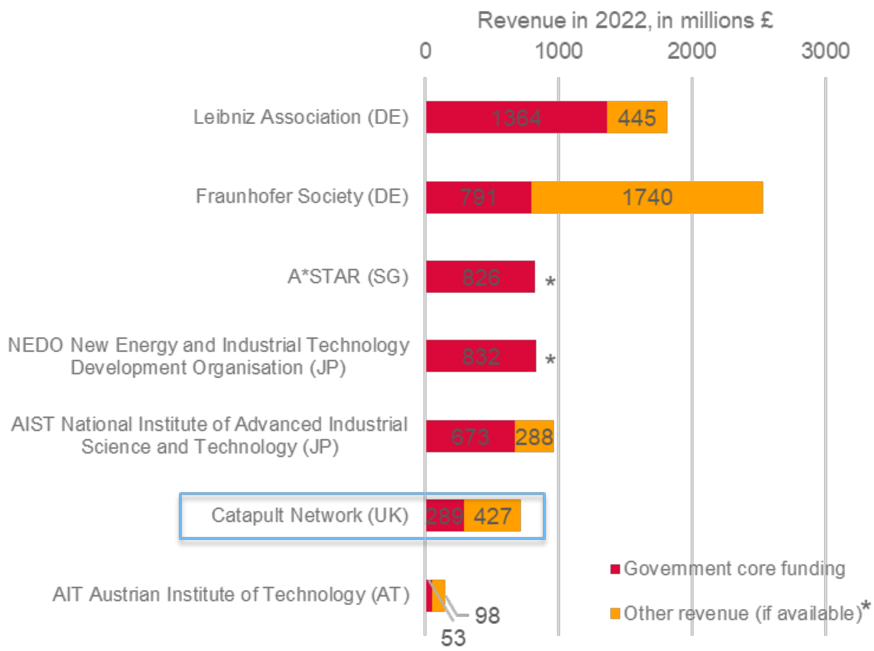
- The data described above focuses on institutional R&D spending, but it does not describe governance structures or effectiveness in terms of outputs such as commercialisation success, industrial competitiveness, or societal benefits.
- The analysis presents averages from recent years but does not capture long-term trends.

FIGURE 3. GOVERNMENT R&D IN THE UK REPRESENTS A SMALLER SHARE THAN THE OECD AVERAGE



SOURCE: OECD (2025). GROSS DOMESTIC EXPENDITURE ON R&D BY SECTOR OF PERFORMANCE AND TYPE OF R&D.

FIGURE 4. THE CATAPULT NETWORK RECEIVES LESS CORE GOVERNMENT FUNDING THAN COMPARABLE NATIONAL APPLIED RESEARCH ORGANISATIONS



NOTE: *NO VALUES FOR "OTHER REVENUE" INDICATE MISSING DATA. CONVERSION RATES USED ON 25 FEB 2024: 1 EUR = 0.83 GBP; 1 JPY = 0.0053 GBP; 1 SGD = 0.59 GBP. **SOURCE:** LEIBNIZ ASSOCIATION (2024); FRAUNHOFER (2022); AIST (2023); AUSTRIAN INSTITUTE OF TECHNOLOGY (2022); ASTAR (2023).; NEDO (2023).

3) The UK offers a high level of support to industry, principally through tax incentives – this support is uneven, with high uptake in information and communication services

Key message: In 2021 the UK provided the highest level of public support to business R&D as a share of GDP among OECD countries, driven primarily by R&D tax relief. UK business R&D support via this route saw the largest increase across OECD countries between 2011 and 2021. However, indirect support instruments such as R&D tax relief are, by definition, less targeted towards national priorities than direct funding mechanisms.

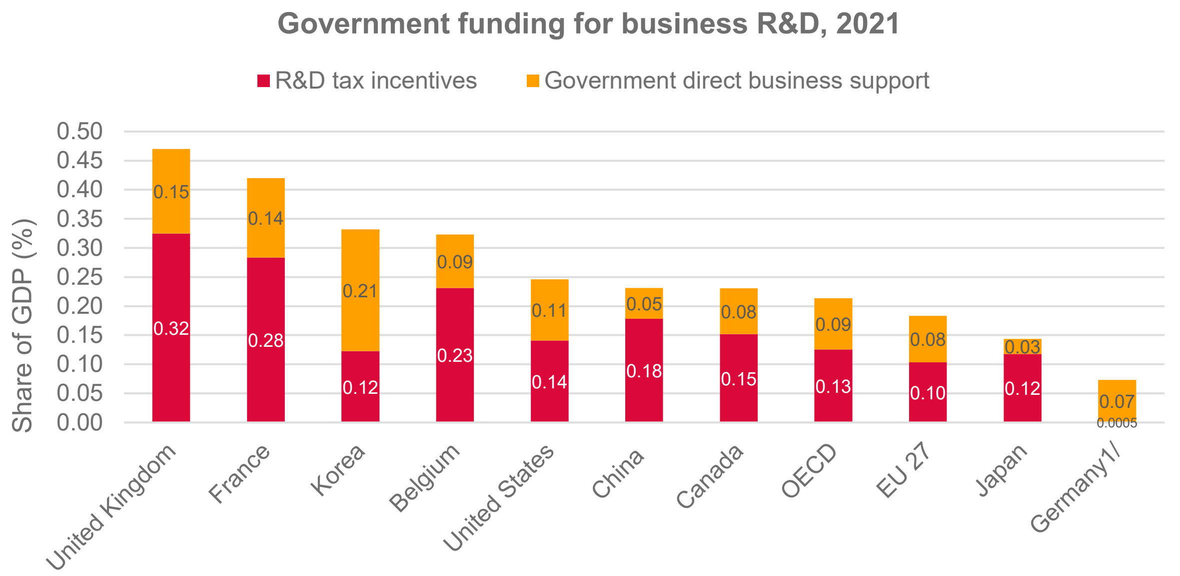
What the data tells us:

- In 2021 the UK provided the most government support to business R&D among OECD countries, at 0.48% of GDP, more than double the OECD average of 0.21%. Over two-thirds of this support (0.33% of GDP) came in the form of R&D tax relief (**Figure 5**),[15] while the rest was direct government funding through R&D grants and public procurement of R&D services.
- The UK's R&D tax incentives grew significantly, rising from 0.07% of GDP in 2011 to 0.33% in 2021, the largest increase across OECD countries. This shift reflects a broader trend across OECD countries, where the use of R&D tax incentives has nearly doubled over the past decade (**Figure 6**).[16]
- This trend reflects a broader shift seen across OECD countries, where there has been a significant change in the business R&D support policy mix over the past 2 decades. Most countries have moved away from direct funding instruments and towards a greater reliance on R&D tax incentives. In 2021, R&D tax incentives accounted for approximately 58% of total government support for business R&D across OECD countries, compared to 35% in 2006.
- Sectors benefiting the most from R&D tax relief include (year 2022–23): information and communication (24%), professional, scientific and technical activities (24%), and manufacturing (22%). However, this distribution is not proportional to their contributions to value added and overall R&D investment, where manufacturing outperforms the other two sectors.[17]
- Indirect support instruments such as R&D tax relief are, by definition, less targeted towards national priorities than direct funding mechanisms such as R&D grants and public procurement of R&D services. Evidence from the USA and EU suggests R&D tax incentives have a relatively small impact on attracting R&D investment and are less effective for large and R&D-intensive firms.[18]
- For more information, see Sections 1 and 3 of the accompanying study report, *UK value capture from innovation.*[19]

What the data does not tell us:

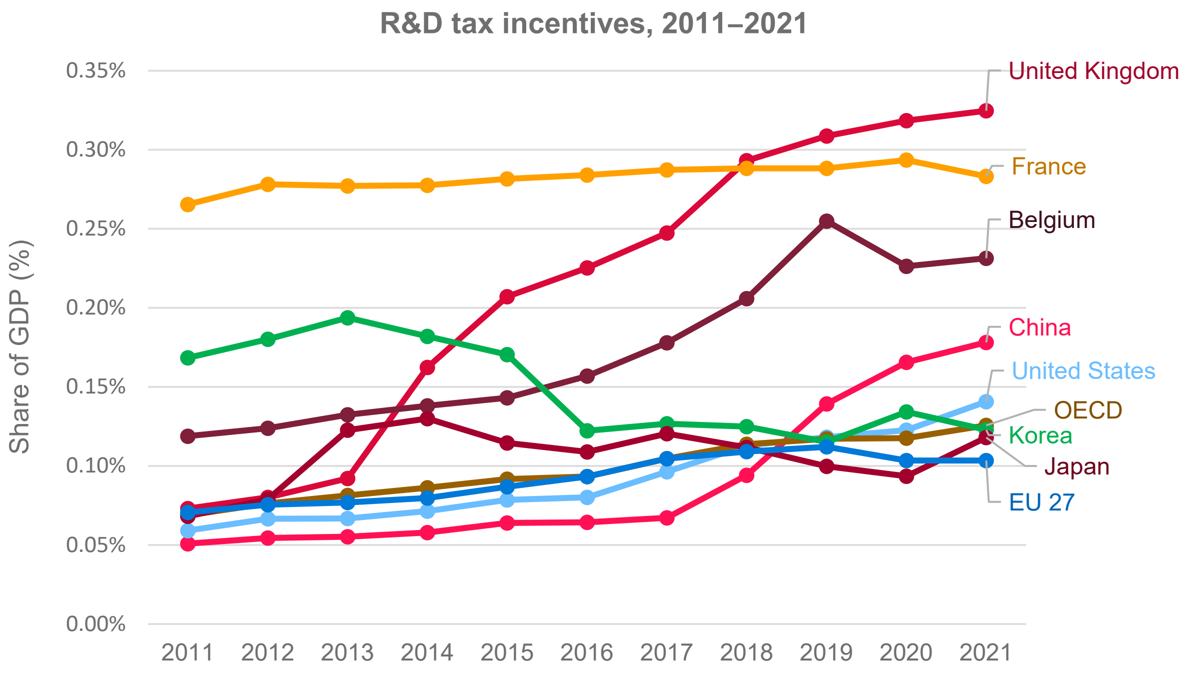
- Further analysis is required to evaluate the effectiveness and additionality of government tax relief for R&D expenditure in the UK, including through comparative assessment of similar measures implemented internationally, as such questions extend beyond the scope of the data examined in this study.

FIGURE 5. AMONG OECD COUNTRIES, THE UK PROVIDES THE MOST GOVERNMENT FINANCIAL SUPPORT TO BUSINESS R&D AS A SHARE OF GDP



NOTE: 1/ GERMANY ONLY INTRODUCED ITS NATIONAL R&D TAX INCENTIVE IN 2020, WHICH EXPLAINS WHY UPTAKE AND SCALE REMAIN MODEST. **SOURCE:** OECD (2025). R&D TAX EXPENDITURE AND DIRECT GOVERNMENT FUNDING OF BERD.

FIGURE 6. THE UK HAS SEEN THE LARGEST INCREASE IN R&D TAX INCENTIVES AS A PERCENTAGE OF GDP IN THE PAST DECADE



SOURCE: OECD (2025). R&D TAX EXPENDITURE AND DIRECT GOVERNMENT FUNDING OF BERD.

4) Public UK investment in research and development is high in a small number of sectors

Key message: The distribution of UK government R&D funding reflects a concentration in traditionally high and medium/high-R&D-intensity industries, such as machinery and equipment and aerospace. However, sectors with strong R&D potential and economic importance, such as food and drinks manufacturing and motor vehicles, receive less public investment than their international peers.

What the data tells us:

- In 2022 the UK government funded £2.56 billion of business expenditure on R&D (BERD). Six sectors accounted for three-quarters of this investment: machinery and equipment (19.3%); business activities (18%); computer, electronic, and optical products (13%); aerospace (12.6%); IT and other information services (8.4%); and pharmaceuticals (4.5%) (**Figure 7**).[20]

- The manufacture of food and drinks (0.1%) and motor vehicles (1.5%),[21] both key sectors of the UK economy, received a lower share of government funding than the OECD average (**Figure 8**).

- The food and drinks sector is the UK's largest manufacturing sector and 2.5 times more R&D-intensive than the OECD average (measured as the ratio of business R&D expenditure to value added). But the sector receives 0.1% of the UK government's R&D funding for businesses, well below the OECD average of 5% seen between 2015 and 2021 (**Figure 9**).[22]

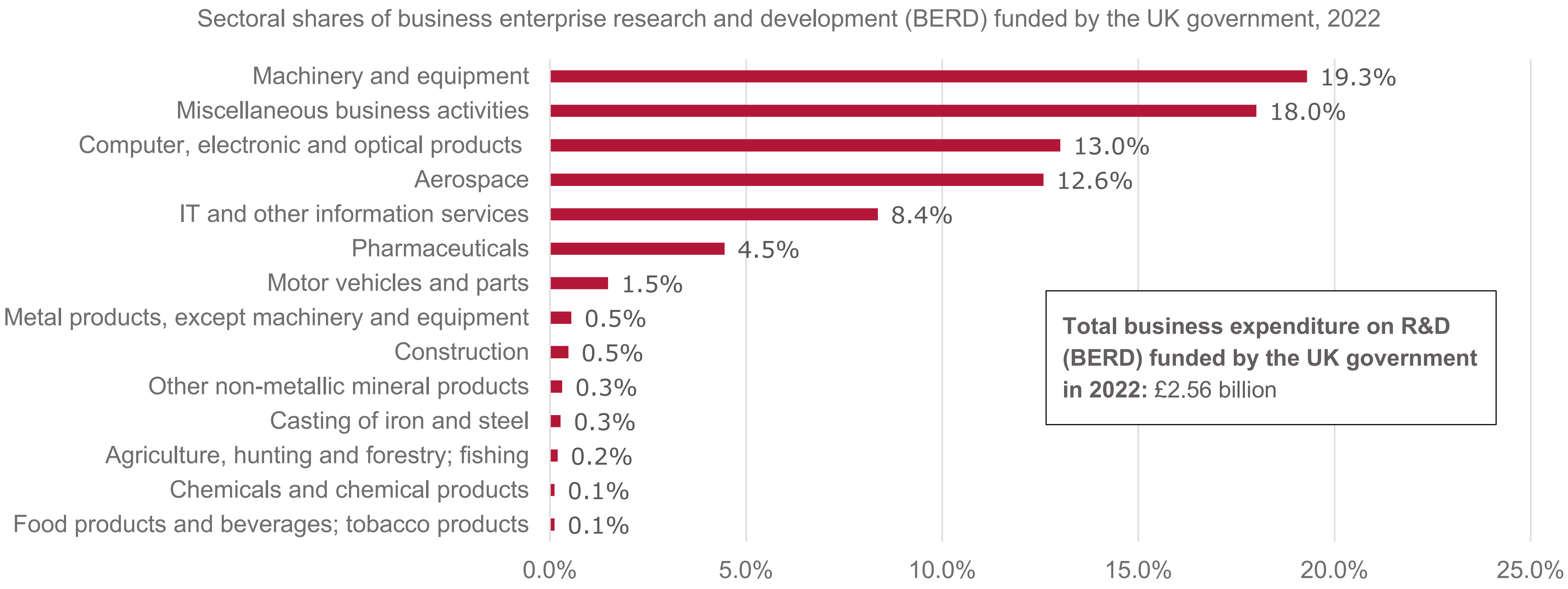
- Company-led UKRI grants in 2022 were concentrated in professional, scientific, and technical activities (35%) and manufacturing (28%). Within professional, scientific, and technical activities, funding was mainly directed towards natural sciences and engineering R&D and biotechnology-related research. Within manufacturing, funding was focused on aerospace, motor vehicles, machining, and turbine/engine manufacturing (excluding aircraft/vehicle/cycle engines).[23]

- Further information on R&D intensity and funding allocation by economic activity can be found in Section 3 of the accompanying study report, *UK value capture from innovation.*[24]

What the data does not tell us:

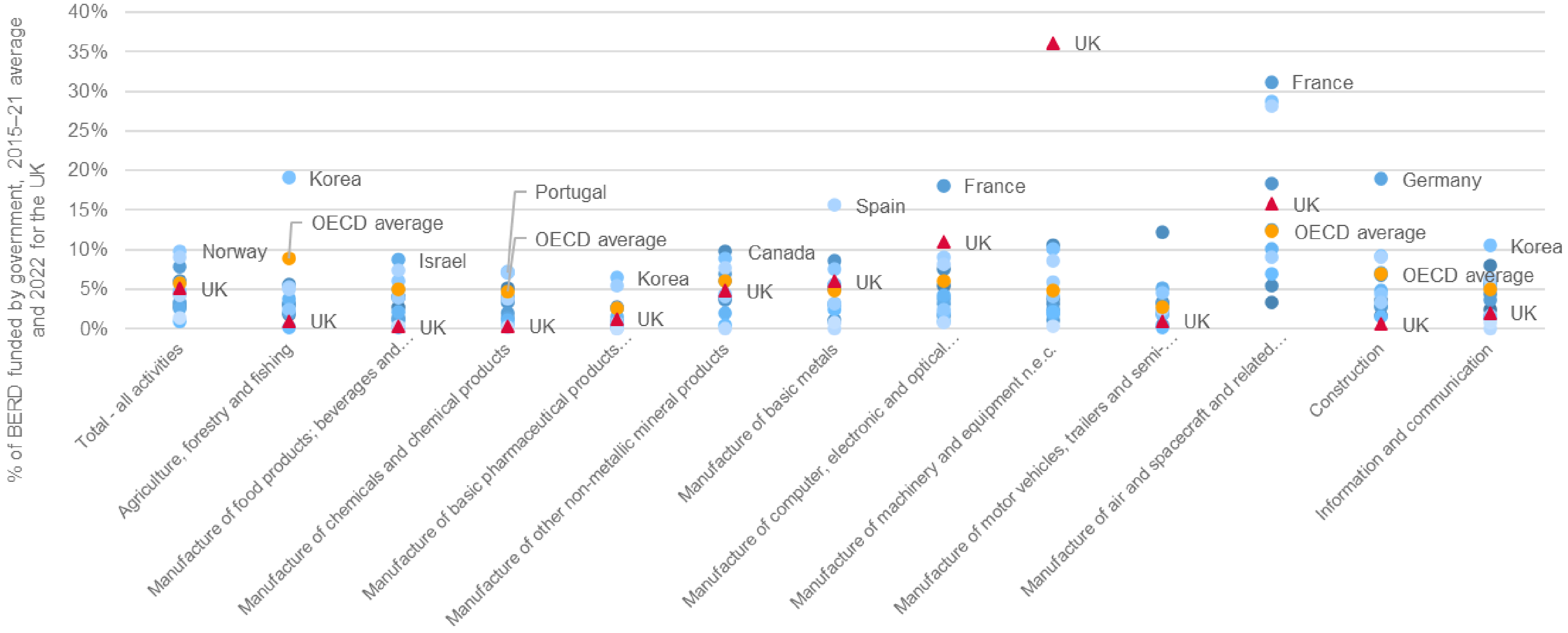
- The RDI data examined does not explain why certain sectors receive more or less funding, such as strategic decisions or historical funding patterns.
- The analysis does not capture changes over time – nor does it consider how government R&D in one sector may benefit other sectors.

FIGURE 7. SIX SECTORS ACCOUNT FOR THREE-QUARTERS OF BUSINESS R&D FUNDED BY THE UK GOVERNMENT



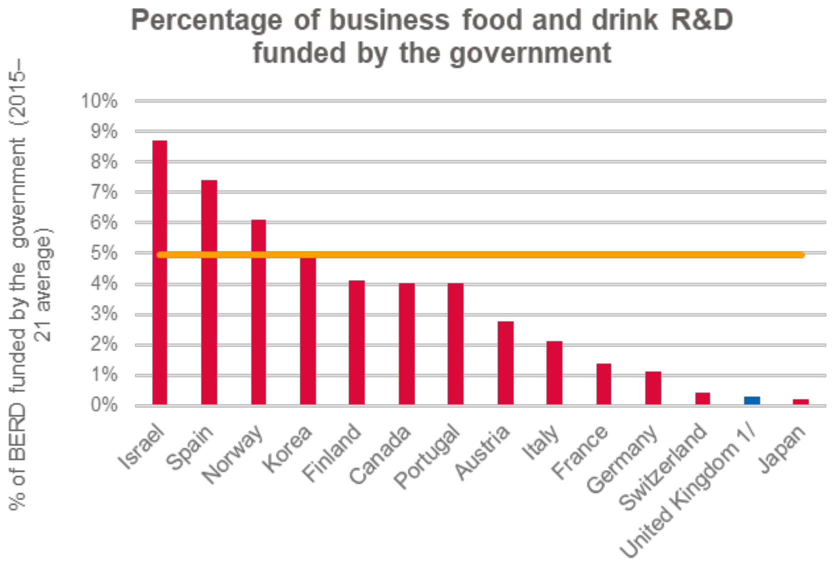
SOURCE: ONS (2024). GROSS DOMESTIC EXPENDITURE ON RESEARCH AND DEVELOPMENT, UK: 2022.

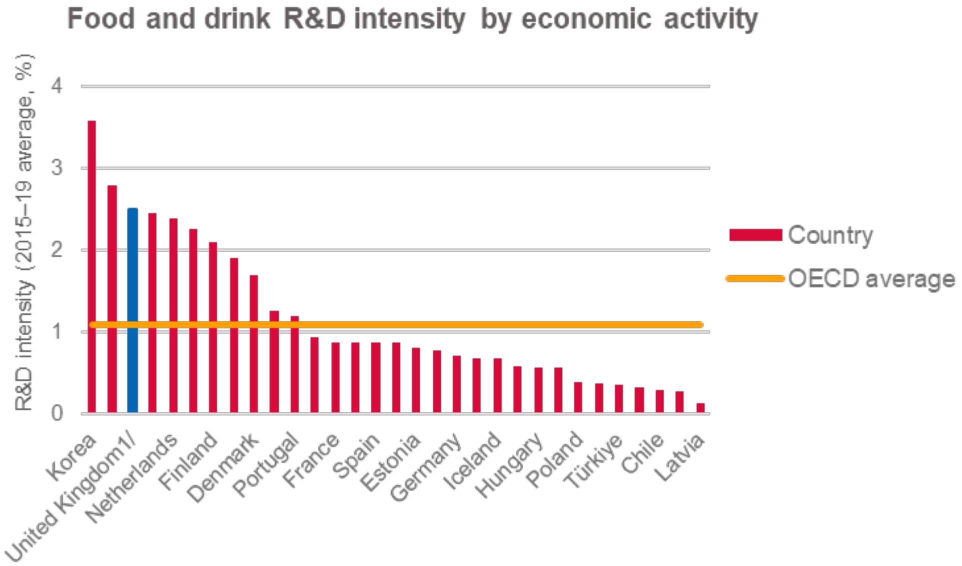
FIGURE 8. THE SHARE OF UK BUSINESS R&D FUNDED BY GOVERNMENT IS HIGHER THAN THE OECD AVERAGE IN SECTORS INCLUDING MACHINERY AND EQUIPMENT, AEROSPACE, COMPUTERS, AND BASIC METALS



NOTE: 2022 DATA FOR THE UK, BY PRODUCT GROUP. OECD AVERAGE INCLUDES: AUSTRALIA, AUSTRIA, CANADA, CHILE, CZECHIA, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, ISRAEL, ITALY, JAPAN, KOREA, LATVIA, LITHUANIA, NORWAY, POLAND, PORTUGAL, THE SLOVAK REPUBLIC, SLOVENIA, SPAIN, SWEDEN, SWITZERLAND, AND TÜRKIYE. **SOURCE:** OECD (2024). BUSINESS ENTERPRISE R&D EXPENDITURE BY MAIN ACTIVITY (FOCUSED) AND SOURCE OF FUNDS; ONS (2024). BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT (R&D), UK: 2022.

FIGURE 9. UK FOOD AND DRINK MANUFACTURING IS AMONG THE MOST R&D-INTENSIVE IN THE OECD





NOTE: [1/] 2022 DATA FOR THE UK, ONS DATA FOR VALUE ADDED. MANUFACTURE OF FOOD PRODUCTS; BEVERAGES AND TOBACCO PRODUCTS. R&D INTENSITY MEASURED AS THE RATIO OF BUSINESS R&D EXPENDITURE TO VALUE ADDED. **SOURCE:** OECD (2024). ANALYTICAL BUSINESS ENTERPRISE R&D BY ISIC REV.4 INDUSTRY (ANBERD DATABASE); OECD (2024). STRUCTURAL ANALYSIS DATABASE; OECD (2024). BUSINESS ENTERPRISE R&D EXPENDITURE BY MAIN ACTIVITY (FOCUSED) AND SOURCE OF FUNDS; ONS (2024). BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT (R&D), UK: 2022; ONS (2024). GDP OUTPUT APPROACH, LOW LEVEL AGGREGATES, UK, QUARTER 2 (APR TO JUN) 2024.

5) A few sectors dominate technology scale-up and innovation metrics across UK business and academia

Key message: Life sciences, software, and fintech dominate technology scale-up and innovation metrics across the UK business and academic sectors. This sectoral concentration boosts national innovation indicators but may limit the resilience and diversity of the UK's innovation economy. While these leading sectors demonstrate excellence in patents, spinouts, venture capital, and R&D activity, this concentration may mask opportunities in other high-potential industries.

What the data tells us:

- Spinouts and universities exhibit very similar field profiles, underscoring the direct link between academic research and creation of these companies. For example, pharmaceuticals and biotechnology are the most used patent technology fields for both UK universities and spinouts (**Table 2**).[25] Overall, 47% of higher education institution (HEI) patent publications fall under chemistry, compared to 21% globally.[26]
- Pharma makes up the largest number of UK spinouts among standard industrial classification (SIC) sector codes, whereas AI is the largest emerging sector not captured by SIC codes (**Table 3**).[27]
- In 2023, 57% of UK venture capital (VC) investment was concentrated in three main categories: fintech, ICT, and healthcare.[28] The UK ranked third globally for venture capital value but only tenth in deep-tech intensity in Europe.[29,30]
- Pharmaceuticals and software development represent 33% of R&D performed in the UK by domestic and foreign-owned businesses of all sizes (**Figure 10**).[31]
- Similarly, the top technology focus of all UK-origin patents are computer technology (software), pharmaceuticals/biotechnology, and medical technology (**Figure 11**).[32]
- The top 2000 firms invested €1,257 billion – over 85% of all business-funded R&D worldwide in 2023. There were 63 UK-owned companies among them investing €35.4 billion. UK pharmaceutical firms accounted for 49% of this figure and 7.5% globally. UK firms had minimal presence in key global tech sectors: just 0.6% in software, 0.45% in electronic/electrical hardware, and 0.046% in tech hardware, which together make up nearly 42% of global business R&D (**Figure 12**).[33]
- Despite a low presence of large UK-owned software firms, computer programming/software was the top industry by R&D tax credits received in 2022–23, followed by scientific research and development.[34]
- Further data on technology scale-up and innovation metrics sectoral concentration can be found in Sections 3 and 4 of the accompanying study report, *UK performance in technology scale-up*.[35]

What the data does not tell us:

- Further exploration is required around the causal dynamics behind the strength of dominant sectors. For example, is the strength of UK life sciences a consequence of the strength of the academic research base? Or is it a consequence of the investment, directionality, and resource spillovers from the industrial base?
- There may be plausibility arguments that both parts of the industrial innovation system contribute to the success of UK life sciences "scale-up" activities, in a mutually reinforcing virtuous cycle.

TABLE 2. PHARMACEUTICALS AND BIOTECH ARE THE MOST PATENTED TECHNOLOGY FIELDS BY UK UNIVERSITIES AND SPINOUTS – PATENT APPLICATIONS FROM 1999 TO 2018 SPLIT BY WIPO TECHNOLOGY FIELD

Rank	WIPO technology field	Number of patents 1999–2008	Number of patents 2009–2018	Total
UK HEIs (higher education institutions)				
1	Pharmaceuticals	4,804	5,382	10,186
2	Biotechnology	4,890	4,845	9,735
3	Analysis of biological materials	2,213	2,051	4,264
4	Organic fine chemistry	1,837	2,413	4,250
5	Medical technology	1,716	2,372	4,088
6	Measurement	1,815	2,202	4,017
7	Chemical engineering	1,064	1,361	2,425
8	Computer technology	1,007	1,185	2,192
9	Optics	1,012	961	1,973
10	Basic materials chemistry	751	1,099	1,850
Spinouts				
1	Pharmaceuticals	260	2,283	2,543
2	Biotechnology	352	1,928	2,280
3	Measurement	252	1,064	1,316
4	Organic fine chemistry	113	1,189	1,302
5	Medical technology	176	872	1,048
6	Computer technology	154	797	951
7	Chemical engineering	88	721	809
8	Electrical machinery, apparatus, energy	67	738	805
9	Analysis of biological materials	166	625	791
10	Basic materials chemistry	75	509	584

SOURCE: UKIPO (2020). IP FILING HABITS OF UK HIGHER EDUCATION INSTITUTIONS.

TABLE 3. PHARMACEUTICALS MAKE UP THE LARGEST NUMBER OF UK SPINOUTS AMONG STANDARD INDUSTRIAL CLASSIFICATION (SIC) SECTOR CODES, WHEREAS AI IS THE LARGEST EMERGING SECTOR NOT CAPTURED BY EXISTING SIC CODES – UK SPINOUTS TRACKED BY BEAUHURST SINCE 2011 (1,880 TOTAL)

Top sectors by number of spinouts (Jan 2024)

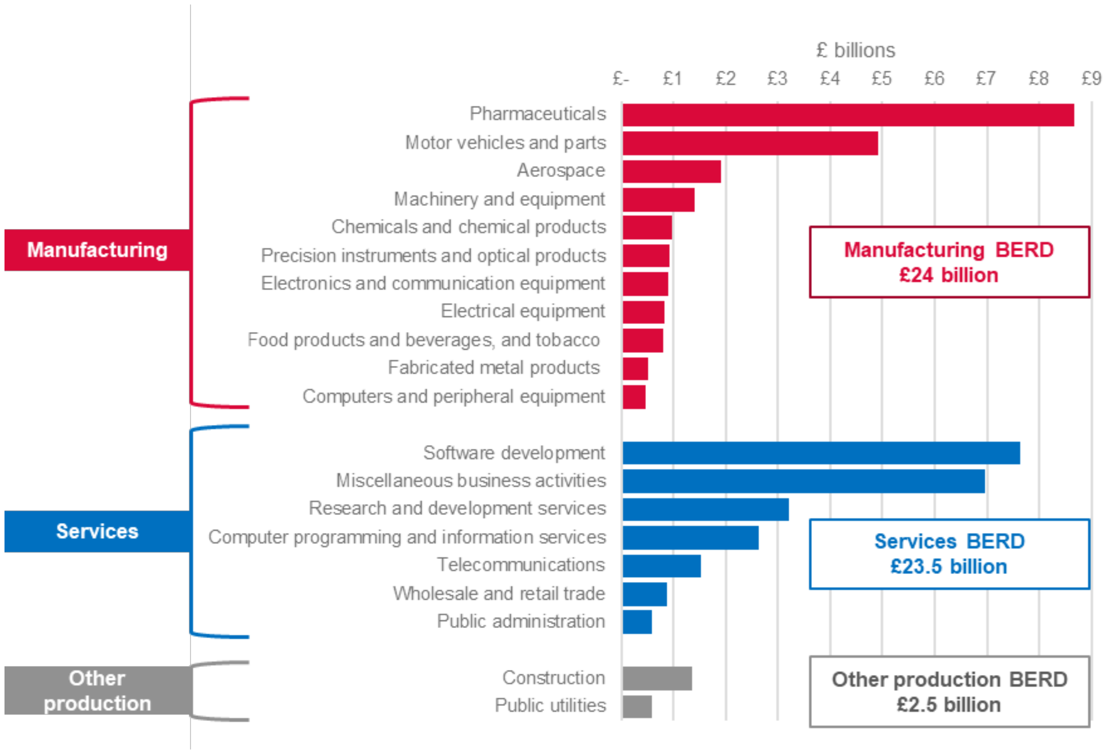
Rank	Sector	Number of spinouts
1	Pharmaceuticals	331
2	Research tools and reagents	302
3	Analytics, insight, tools	270
4	Clinical diagnostics	173
5	Cleantech	162
6	Software-as-a-service (SaaS)	144
7	Medical devices	139
8	Materials technology	114
9	Mobile apps	78
10	Internet platform	76
11	Nanotechnology	70
12	Medical instrumentation	66
13	Security services (physical and virtual)	60
14	Educational services	52
15	Healthcare products	51
16	Desktop software	48
17	Chemicals	47
18	Electrical components	41
19	Waste management services	36
20	Semiconductors	35

Top emerging sectors by number of spinouts (Jan 2024)

Rank	Emerging sector	Number of spinouts
1	Artificial intelligence	184
2	Genomics	101
3	Precision medicine	94
4	eHealth	60
5	Big data	45
6	Digital security	44
7	Wearables	41
8	Internet of things	40
9	Regenerative medicine	37
10	Edtech	28
11	3D printing	27
12	Graphene	26
13	Virtual reality	24
14	Quantum	22
15	Synthetic biology	21
16	Augmented reality	19
17	Robotics	17
18	Cloud computing	17
19	Image and voice recognition	16
20	Preventive care	15

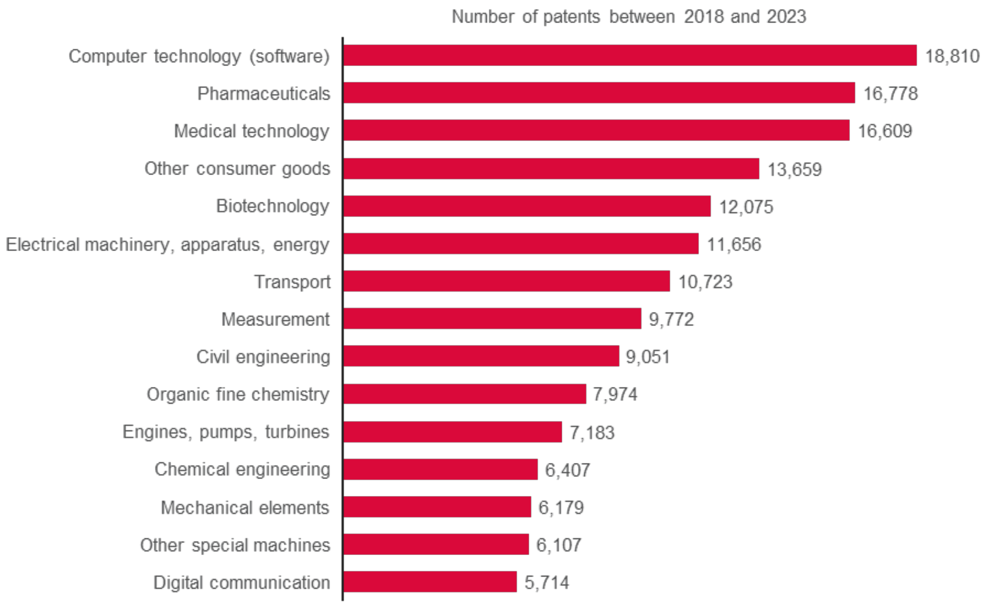
SOURCE: BEAUHURST (2024). SPOTLIGHT ON SPINOUTS APRIL 2024, UK ACADEMIC SPINOUT TRENDS.

FIGURE 10. PHARMACEUTICALS AND SOFTWARE DEVELOPMENT REPRESENT 33% OF R&D PERFORMED IN THE UK BY DOMESTIC AND FOREIGN-OWNED BUSINESSES OF ALL SIZES – R&D PERFORMED IN UK BUSINESSES (BERD), TOP 20 PRODUCT GROUPS, 2023



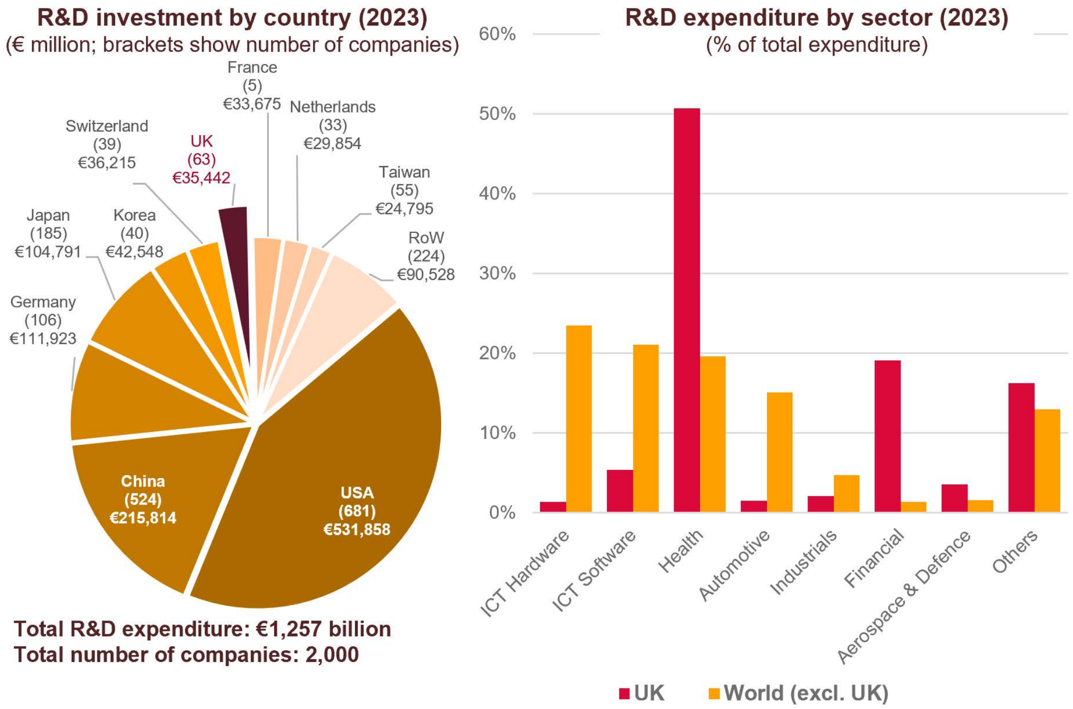
NOTE: OTHER FUNDS INCLUDE FUNDS FROM UK PRIVATE NON-PROFIT ORGANISATIONS AND HIGHER EDUCATION ESTABLISHMENTS AND INTERNATIONAL ORGANISATIONS. **SOURCE:** ONS (2024). BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT, UK: 2023. (2020). IP FILING HABITS OF UK HIGHER EDUCATION INSTITUTIONS.

FIGURE 11. THE TOP TECHNOLOGY FOCUS OF UK-ORIGIN PATENTS ARE COMPUTER TECHNOLOGY (SOFTWARE), PHARMACEUTICALS, AND MEDICAL TECHNOLOGY – UK-ORIGIN PATENT DISTRIBUTION BY WIPO TECHNOLOGY FIELD, 2018–2023



SOURCE: WIPO. WIPO IP STATISTICS.

FIGURE 12. PHARMACEUTICALS ACCOUNT FOR 49% OF UK-OWNED BUSINESS GLOBAL R&D AMONG THE WORLD'S TOP 2,000 R&D INVESTORS, WHILE UK FIRMS ARE LARGELY ABSENT IN SOFTWARE, TECH HARDWARE, AND ELECTRONIC AND ELECTRICAL HARDWARE



Aerospace and defence	Aerospace; defence	**Others**	Beverages
Automotive	Automobiles and parts		Food and drug retailers
Financial	Banks		Food producers
	Financial services		Forestry and paper
	Non-life insurance		General retailers
	Real estate investment and services		Household goods and home construction
Health	Healthcare equipment and services		Leisure goods
	Pharmaceuticals and biotechnology		Media
ICT hardware	Electronic and electrical equipment		Personal goods
	Technology hardware and equipment		Support services
ICT software	Fixed line telecommunications		Tobacco
	Mobile telecommunications		Travel and leisure
	Software and computer services		Chemicals
Industrials	General industrials		Construction and materials
	Industrial engineering		Alternative energy
	Industrial metals and mining		Electricity
	Industrial transportation		Gas, water, and multi-utilities
	Mining		Oil and gas producers
			Oil equipment, services, and distribution

NOTE: TOP 2,000 COMPANIES BY GLOBAL R&D EXPENDITURE. ROW = REST OF THE WORLD. IN 2023 THE WORLD'S TOP 2,000 R&D INVESTORS COLLECTIVELY INVESTED €1,257 BILLION IN R&D. THIS ACCOUNTED FOR OVER 85% OF GLOBAL BUSINESS-FUNDED R&D. **SOURCE:** EUROPEAN COMMISSION (2024). EU INDUSTRIAL R&D INVESTMENT SCOREBOARD.

6) Strong industry networks, mature value chains, and the presence of primes enable the UK to capture value from research

Key message: The UK's strength in life sciences, software, and fintech seems to be closely linked to the existence of well-established sectoral innovation ecosystems where a robust academic foundation connects with a strong industrial base. These sectors may benefit from a critical mass of science and industry partners, established regulatory pathways, large anchor firms, and mature value chains that may include translational infrastructure, specialist suppliers, and talent pipelines nurtured by careers in corporates. This correlation suggests that successful technology scale-up is about not just innovation but also the system in which that innovation is embedded – one that links knowledge, skills, capital, production capability, and market access through strong, established institutional and industrial frameworks.

What the data tells us:

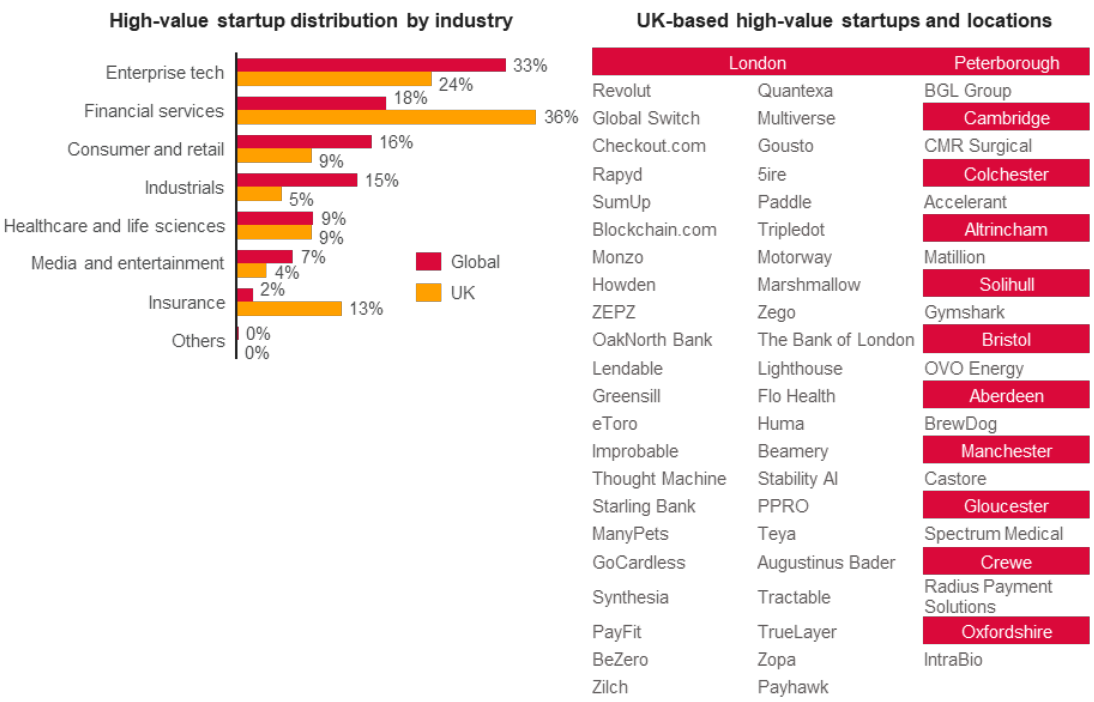
- Research council data indicates that 1 in 38 UKRI research grants that started between 2010 and 2020 resulted in formal IP protection (i.e. published patent application, granted patent, or trademark registration). Almost half (49%) were associated with private sector collaboration. Recipients of research council grants between 2010 and 2020 most frequently reported collaborations with AstraZeneca (374 collaborations), GlaxoSmithKline (320 collaborations), Rolls-Royce Group (151 collaborations), National Biofilms Innovation Centre (149 collaborations), and Unilever (112 collaborations).[36]
- By the end of 2024, the UK ranked fourth globally in terms of high-value startups, with 52 unicorns and 3 decacorns. But the most successful UK high-value startups are not university spinouts, and they tend to be created by former employees of established companies with expertise from a career in startups, corporates, consulting, or banking.[37] UK high-value startups tend to focus on service-oriented sectors such as financial services (20 companies), enterprise tech (13 companies), and insurance (7 unicorns each) rather than hardware-related firms, aligning with London's role as a global financial hub (**Figure 13**).[38]
- Introduced in 2013, the Patent Box offers a 10% corporation tax rate on profits from patented products. Large firms dominate Patent Box use, accounting for 94% of tax relief claims. In terms of sectors, manufacturing dominates with 42%. This suggests that manufacturing primes lead in commercialising patented innovations (**Figure 14**).[39]
- Over the past decade, venture capital (VC) firms have consistently made up between 40% and 50% of the total VC funding in the UK startup ecosystem. Other sources of investment include corporates, private equity firms, and angels. In particular, 28% of UK VC in 2024 originated from corporate businesses.[40]
- Among the world's top 2,000 firms by R&D expenditure, just 26 UK-owned companies – comprising 15 pharmaceutical firms, 4 banks, and 7 software and computer services firms – account for 70.1% of the UK's total business R&D performed globally.[41] Pharmaceuticals dominate, contributing 49% of UK-owned business R&D, which equals 7.5% of the world total. Banking contributes 17% of UK R&D, representing a substantial 41% of global R&D in that sector. In contrast, software and computer services make up just 3.8% of UK R&D, corresponding to only 0.6% of global R&D in that field (**Figure 15**).[42]

- An analysis of the Cambridge cluster suggests that almost every new STEM-based company established since 1970 that has grown to employ over a thousand people has either followed the "soft start-up" model (i.e. limited founder investments and early revenue from consulting, contract R&D, or systems integration projects for different customers, based on their founders' expertise) or spun out from a company that had done so. This approach allowed founders to avoid, reduce, or postpone the need for venture capital, retaining managerial control. Notable UK businesses that followed the soft start-up model include Dyson, Oxford Instrument, Lotus, McClaren, Renishaw, and Vodafone (the latter being a spinout from Racal Electronics plc).[43]
- Recent analysis shows that the average age of UK founders raising Series A funding is 42.7, rising to 44.7 for those at Series B. While the age range spans 23 to 74, the most common age among funded founders is 34, with just 5% of Series A/B recipients being under 30. These findings suggest that successful fundraisers typically bring years of industry experience, domain knowledge, and professional networks to their ventures.[44]
- Further data can be found in Sections 2, 3, and 4 of the accompanying study report, *UK performance in technology scale-up*.[45]

What the data does not tell us:

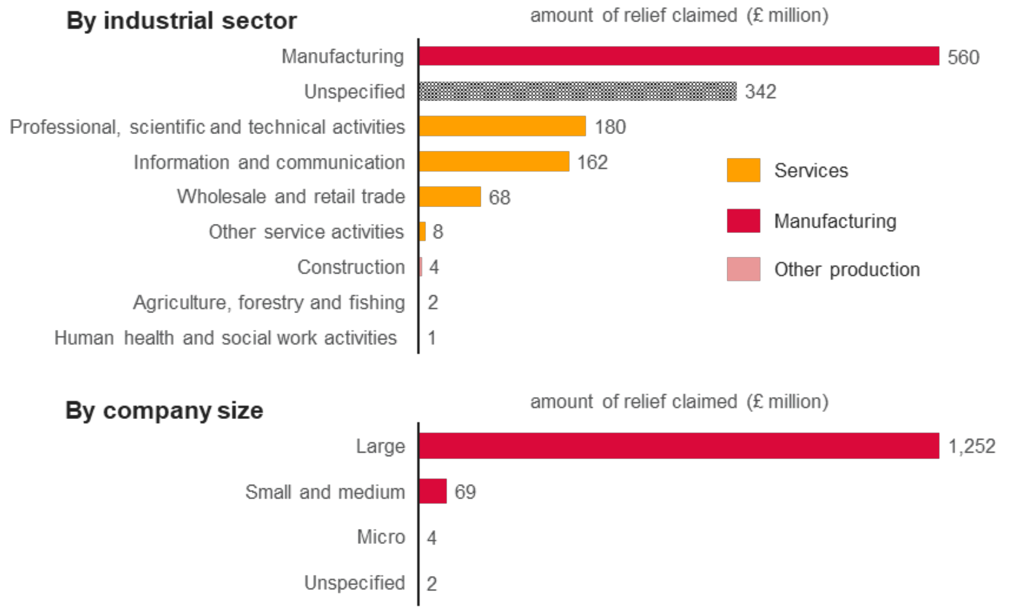
- Given the success of "scale-up" ecosystems involving established industrial value chains, the viability of other innovation pathways to scale up (and industrial value capture) in the absence of large R&D-intensive firms and their supply chains remains unclear.
- The absence of sectoral scale-up ecosystems may, in principle, support the mobility of UK-developed innovations at key phases of "scale-up" activity. This requires further investigation.

FIGURE 13. MOST SUCCESSFUL UK HIGH-VALUE STARTUPS ARE NOT SPINOUTS AND TEND TO BE CONCENTRATED IN FINANCIAL SERVICES AND INSURANCE, WITH LESS EMPHASIS ON HARDWARE – HIGH-VALUE STARTUP DISTRIBUTION BY INDUSTRY AND UK LOCATION, 2024



SOURCE: CBINSIGHTS (2025). THE COMPLETE LIST OF UNICORN COMPANIES.

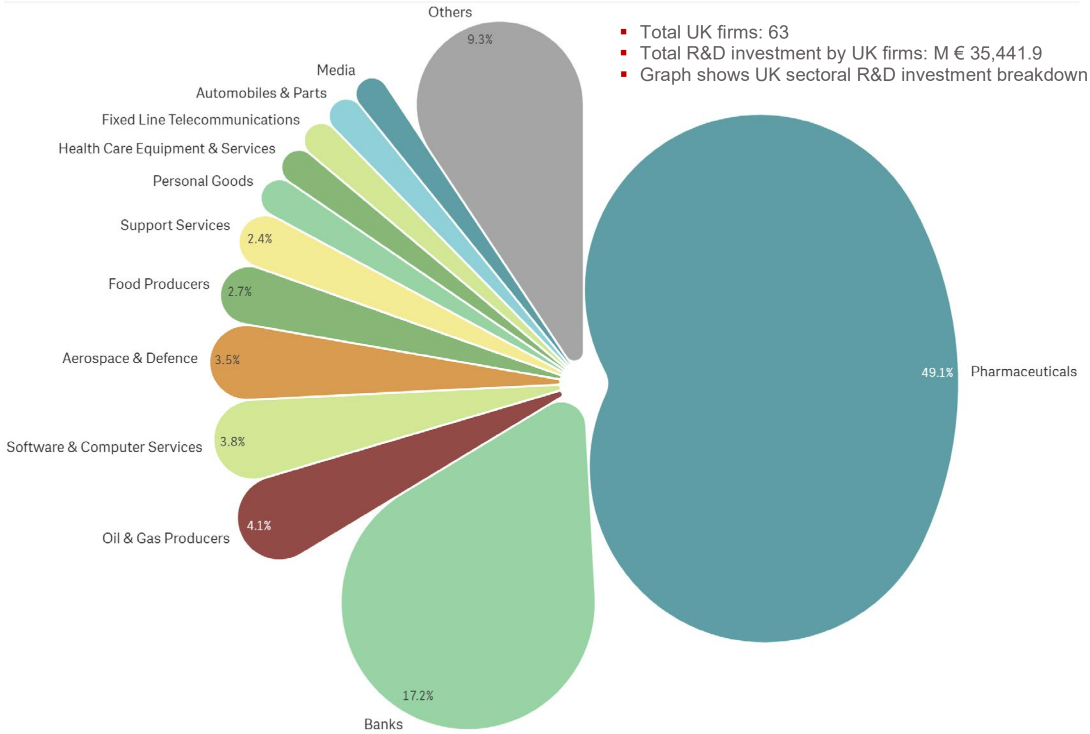
FIGURE 14. LARGE COMPANIES PLAY A KEY ROLE IN THE UK'S PATENT FILING AND COMMERCIALISATION OF PATENTED INNOVATION, REPRESENTING 94% OF UK PATENT BOX TAX RELIEF VALUE CLAIMED – UK PATENT BOX TAX RELIEF CLAIMED, TAX YEAR 2021–2022



SOURCE: HMRC (2024). PATENT BOX RELIEF STATISTICS: SEPTEMBER 2024.

FIGURE 15. LIST OF 63 UK-OWNED FIRMS AMONG THE WORLD'S TOP 2,000 R&D INVESTORS AND THEIR SECTORAL BREAKDOWN BY GLOBAL R&D INVESTMENT (MILLION EUROS, 2023)

1. ASTRAZENECA, M € 9502.8
2. GSK, M € 6229.9
3. HSBC, M € 2100.0
4. LLOYDS BANKING, M € 1730.0
5. BARCLAYS, M € 1393.0
6. SHELL, M € 1172.0
7. ROLLS-ROYCE, M € 975.0
8. UNILEVER, M € 949.0
9. NATWEST, M € 882.4
10. EXPERIAN, M € 642.9
11. BT, M € 551.2
12. RELX, M € 517.6
13. LONDON STOCK EXCHANGE, M € 422.7
14. SAGE, M € 396.0
15. RECKITT BENCKISER, M € 390.2
16. ASTON MARTIN LAGONDA GLOBAL HOLDINGS, M € 346.5
17. HALEON, M € 343.9
18. AMDOCS, M € 341.4
19. BAT, M € 296.4
20. SMITH & NEPHEW, M € 292.3
21. BAE SYSTEMS, M € 277.9
22. BP, M € 271.4
23. INDIVIOR, M € 248.6
24. RIO TINTO, M € 223.1
25. DYSON TECHNOLOGY, M € 222.3
26. EYGS, M € 218.6
27. INTERNATIONAL GAME TECHNOLOGY, M € 213.1
28. JOHNSON MATTHEY, M € 206.1
29. NOVOCURE, M € 201.2
30. CHANEL, M € 177.9
31. LIVANOVA, M € 175.9
32. SENSATA TECHNOLOGIES HOLDING, M € 162.9
33. PLAYTECH, M € 159.6
34. IMMUNOCORE, M € 150.1
35. OXFORD NANOPORE TECHNOLOGIES, M € 142.9
36. BICYCLE THERAPEUTICS, M € 142.5
37. EXSCIENTIA, M € 142.5
38. REVOLUT, M € 141.6
39. RSA INSURANCE, M € 137.8
40. HIKMA PHARMACEUTICALS, M € 135.7
41. RED BULL TECHNOLOGY, M € 134.0
42. ANGLO AMERICAN, M € 133.9
43. HALMA, M € 124.1
44. DELIVEROO, M € 122.3
45. AUTOLUS THERAPEUTICS, M € 118.8
46. ALPHAWAVE, M € 113.3
47. TRITON, M € 110.2
48. SYNAMEDIA, M € 109.1
49. SMITHS, M € 108.8
50. AMCOR, M € 96.5
51. CONVATEC GROUP, M € 94.2
52. SPIRENT COMMUNICATIONS, M € 92.6
53. ACCESS UK, M € 86.7
54. PURETECH HEALTH, M € 85.3
55. MELROSE INDUSTRIES, M € 84.5
56. IMI, M € 84.0
57. COMPASS PATHWAYS, M € 79.7
58. ADAPTIMMUNE THERAPEUTICS, M € 76.5
59. GENUS, M € 76.1
60. ORCHARD THERAPEUTICS, M € 73.1
61. CRODA INTERNATIONAL, M € 72.1
62. TI FLUID, M € 70.4
63. OXFORD BIOMEDICA, M € 68.7



SOURCE: EUROPEAN COMMISSION (2024). EU INDUSTRIAL R&D INVESTMENT SCOREBOARD.

7) The high mobility of spinouts, startups, and industrial R&D risks eroding UK value capture

Key message: Whether through foreign acquisition of industrial R&D, overseas initial public offerings (IPOs) of UK spinouts, or the relocation of high-value startups, the UK's innovation system shows a high degree of mobility in the firms and technologies it generates. This trend reflects the success, openness, and attractiveness of the UK to global investors, but it also invites reflection about the long-term retention of economic value, strategic IP, and decision-making within the UK.

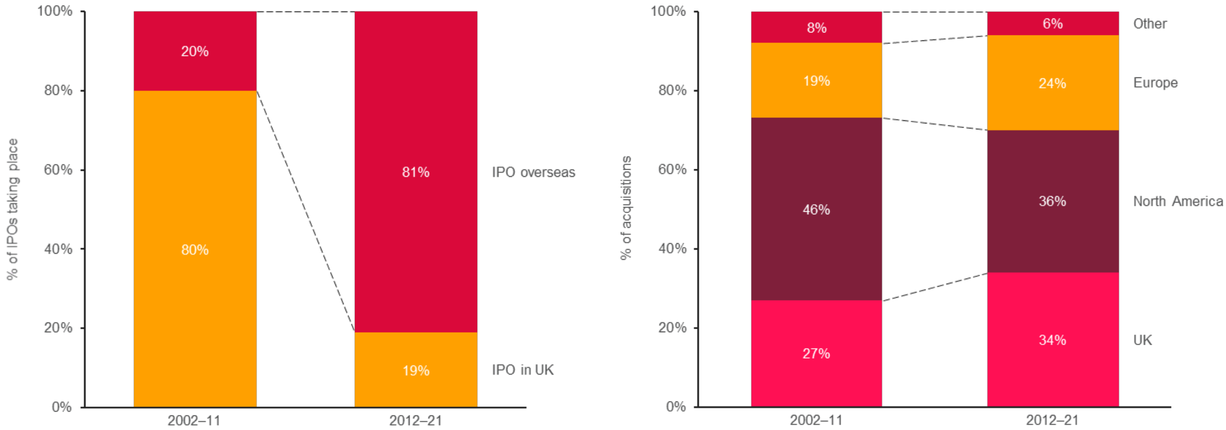
What the data tells us:

- The UK's startup emigration rate (5.9%) is comparable to Europe's average (6%), with 91% of migrating UK startups going to the USA. Despite the UK being the largest importer of European startups, overall the country records a net outflow of startups.[46]
- Between 2014 and 2023, a total of 188 UK spinouts achieved successful exits (10% of the total population), 30 via initial public offerings (IPOs), and 158 via acquisition.[47]
- The majority of UK spinout IPOs since 2012 have occurred overseas (80% total, with the majority on the US NASDAQ), a reversal from the early 2000s, when 80% of spinout IPOs took place on UK-based stock exchanges (**Figure 16**).[48]
- The majority of spinouts that achieved exit through acquisition between 2012 and 2021 were acquired by foreign firms: ~36% by US-headquartered acquirers and ~24% by European-headquartered acquirers. About one-third were acquired by UK-headquartered businesses (**Figure 16**).[49]
- Between 2012 and 2021, smaller spinout investment deals in the UK (up to £1 million and excluding grants) were mostly driven by UK-based investors (75%). As deal sizes increased, many more deals began to involve overseas investors. For deals up to £100 million, this happened mostly alongside UK-based investors. For the largest deals (above £100 million), just over half of the deals were driven by overseas investors alone, while the rest were a mix of UK and overseas investors.[50]
- Around 68% of UK VC investments in 2024 came from foreign sources, with 41% coming from the USA (**Figure 17**).[51]
- The main technology scale-up challenges mentioned by the consulted stakeholders are related to access to finance, the cost and complexity of new technology manufacturing, securing skilled labour, and navigating an unpredictable and often unsupportive policy environment for manufacturing. In this regard, foreign markets, particularly the USA and Germany, are seen as offering more attractive conditions and incentives for manufacturing and commercialisation.[52]
- Roughly half (48%) of UK business R&D in 2023 was performed by foreign-owned companies, 5% higher than the year before (**Figure 18**).[53]
- Acquisitions of UK firms by foreign companies have accelerated since 2015 – up 4.5 times by 2023 (**Figure 19**).[54] For example, the proportion of foreign-controlled companies in the aerospace supply chain rose from 14% in 1990 to 41% in 2014. Many deals target high-value companies, raising concerns about local job retention, IP ownership, and strategic decision-making shifting overseas.[55]
- Further data can be found in Sections 3 and 4 of the accompanying study report, *UK performance in technology scale-up*.[56]

What the data does not tell us:

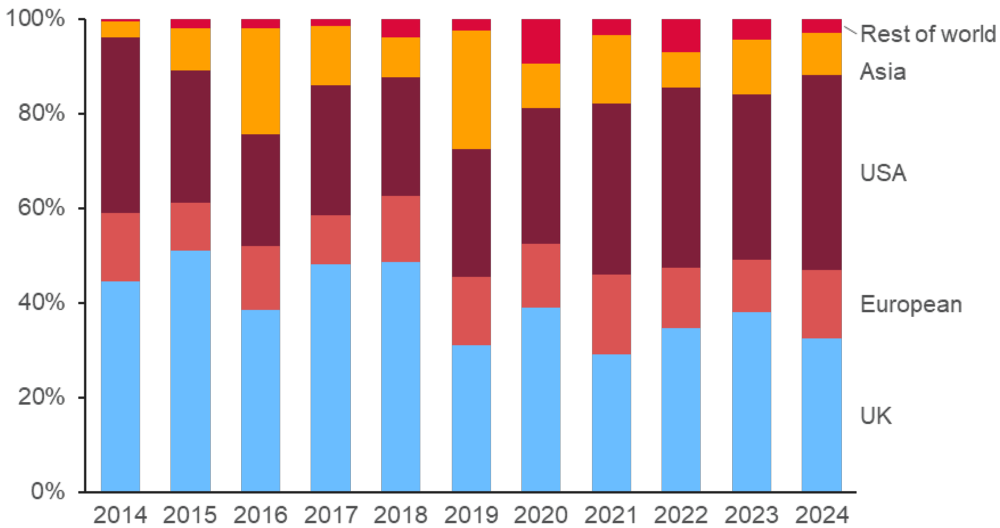
- The consequences of UK innovation and firms moving abroad needs to be better quantified and understood.
- For example, foreign acquisitions may result in facility closures and production shifting abroad, leading to job losses, IP erosion, and negative balance-of-trade effects. Returns from foreign-owned subsidiaries count towards GDP (but not GNP), potentially overstating national income figures. However, foreign ownership could also play a positive role by providing scale-up funding as well as by opening access to overseas markets. Together, these factors could strengthen a specific company, and in practice we might expect a combination of both.

FIGURE 16. THE MAJORITY OF UK SPINOUT IPOS HAPPEN OVERSEAS, WHILE THE MAJORITY OF SPINOUT ACQUIRERS ARE FROM ABROAD: LOCATION OF INITIAL PUBLIC OFFERINGS (IPOS) OF UK SPINOUTS FOR DIFFERENT TIME PERIODS; AND LOCATION OF THE ACQUIRER'S HEADQUARTERS FOR UK-BASED SPINOUTS FOUNDED IN DIFFERENT TIME PERIODS THAT HAVE BEEN ACQUIRED



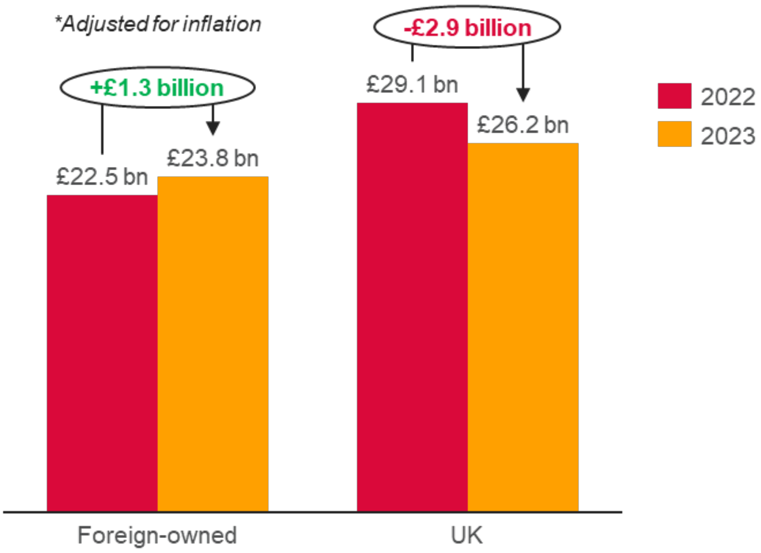
SOURCE: ROUPAKIA, Z. AND COATES ULRICHSEN, T. (2025). *UNIVERSITIES AND THE SPINOUT SCALE-UP CHALLENGE: SECURING VALUE IN A CHANGING WORLD*. APOLLO - UNIVERSITY OF CAMBRIDGE REPOSITORY.

FIGURE 17. 68% OF UK VC INVESTMENT CAME FROM FOREIGN SOURCES IN 2024, WITH 41% COMING FROM THE USA – UK GLOBAL VENTURE CAPITAL BY SOURCES OF CAPITAL, 2014–2024



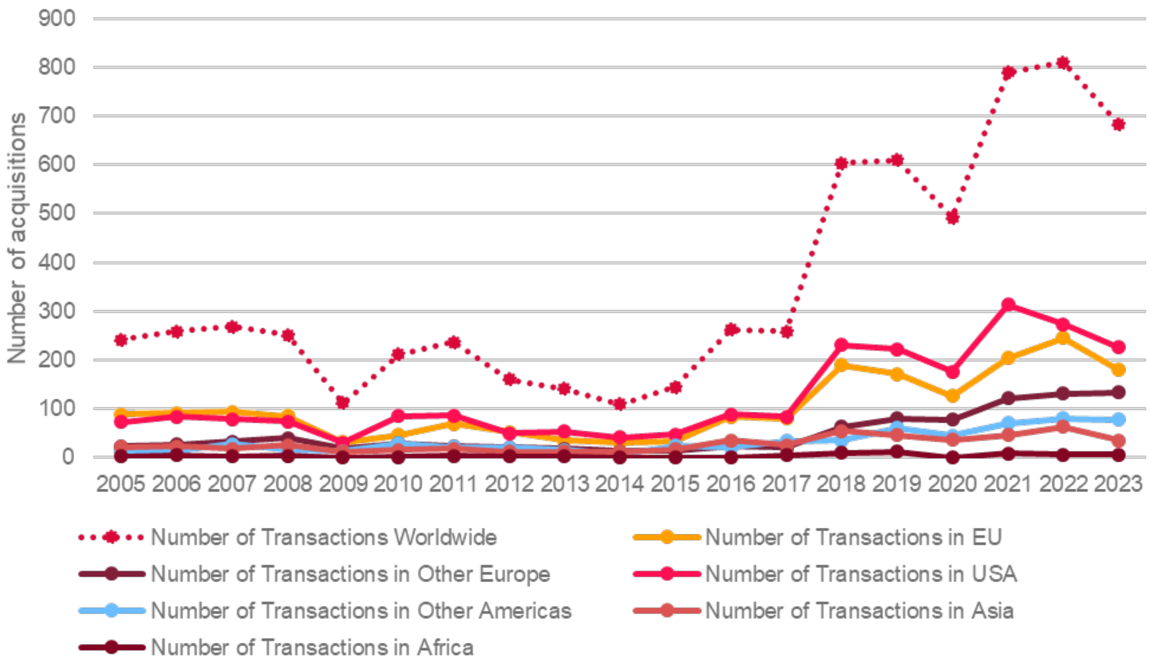
SOURCE: DEALROOM (2025). UNITED KINGDOM.

FIGURE 18. ROUGHLY HALF OF BUSINESS R&D PERFORMED IN THE UK IS DONE BY FOREIGN-OWNED COMPANIES – TOTAL BUSINESS R&D EXPENDITURE BY COMPANY OWNERSHIP COUNTRY OF ORIGIN



SOURCE: NCUB (2024). UK BUSINESS R&D: A WORRYING DECLINE.

FIGURE 19. THE ACQUISITION OF UK FIRMS BY FOREIGN COMPANIES HAS ACCELERATED IN RECENT YEARS, BASED ON DATA FROM THE ONS – ACQUISITIONS IN THE UK BY FOREIGN COMPANIES (2005–23)



SOURCE: ONS (2024). MERGERS AND ACQUISITIONS (M&A) INVOLVING UK COMPANIES.

Footnotes

---

[1] WIPO (2025). Global Innovation Index 2024.
[2] EU (2024). European Innovation Scoreboard.
[3] OECD (2024). Gross domestic expenditure on R&D by sector of performance and type of R&D; ONS (2024). Business enterprise research and development (R&D), UK: 2022.
[4] OECD (2024). Gross domestic expenditure on R&D by sector of performance and type of R&D.
[5] OECD (2024). Gross domestic expenditure on R&D by sector of performance and type of R&D.
[6] UKRI GtR (2024). All data: Project search.
[7] Cambridge Industrial Innovation Policy (2025). *UK value capture from innovation*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[8] Nurse (2023). *Independent Review of the UK's Research, Development and Innovation Organisational Landscape. Final report and Recommendations*.
[9] Nurse (2023). *Independent Review of the UK's Research, Development and Innovation Organisational Landscape. Final report and Recommendations*.
[10] OECD (2024). Gross domestic expenditure on R&D by sector of performance and type of R&D.
[11] CSTI (forthcoming). Emerging technology case studies: UK in an international comparative context. Policy brief.
[12] Leibniz Association (2024); Fraunhofer (2022); AIST (2023); Austrian Institute of Technology (2022); ASTAR (2023); NEDO (2023).
[13] Anzolin, G. and O'Sullivan, E. (2025). Innovation intermediaries in the digital transformation process.
[14] Cambridge Industrial Innovation Policy (2025). *UK value capture from innovation*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[15] OECD (2025). R&D tax expenditure and direct government funding of BERD.
[16] OECD (2025). R&D tax expenditure and direct government funding of BERD.
[17] HMRC (2024). Research and Development Tax Credits Statistics: September 2024.
[18] Connell, D. (2021). *Is the UK's flagship industrial policy a costly failure?* Cambridge Judge Business School, University of Cambridge; Appelt, S., et al (2025). *How effective are R&D tax incentives? Reconciling the micro and macro evidence*. Centre for Economic Performance, The London School of Economics and Political Science.
[19] Cambridge Industrial Innovation Policy (2025). *UK value capture from innovation*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[20] ONS (2024). Gross domestic expenditure on research and development, UK: 2022.
[21] ONS (2024). Gross domestic expenditure on research and development, UK: 2022.
[22] OECD (2024). Analytical Business Enterprise R&D by ISIC Rev.4 industry (ANBERD database); OECD (2024). Structural Analysis Database; OECD (2024). Business enterprise R&D expenditure by main activity (focused) and source of funds; ONS (2024). Business enterprise research and development (R&D), UK: 2022; ONS (2024). GDP output approach, low level aggregates, UK, Quarter 2 (Apr to Jun) 2024.
[23] UKRI GtR (2024). All data: Project search.
[24] Cambridge Industrial Innovation Policy (2025). *UK value capture from innovation*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[25] UKIPO (2020). IP filing habits of UK Higher Education Institutions.
[26] UKIPO (2020). IP filing habits of UK Higher Education Institutions.
[27] Beauhurst (2024). Spotlight on spinouts April 2024, UK academic spinout trends.
[28] Dealroom (2025). United Kingdom.
[29] Example deep-tech areas include: quantum computing; health technologies; space technologies; photonics technologies; climate technologies; AR and VR; blockchain infrastructure; artificial intelligence; semiconductors; and other defence technologies.
[30] Dealroom (2025). United Kingdom; Dealroom (2023). *The 2023 European Deep Tech report.*
[31] ONS (2024). Business enterprise research and development, UK: 2023.
[32] WIPO. WIPO IP Statistics.
[33] European Commission (2024). EU Industrial R&D Investment Scoreboard; Soft Machines (2025). The world of business R&D (and the UK's place in that world).
[34] HMRC (2024). Research and Development Tax Credits: Supplementary tables 2024.
[35] Cambridge Industrial Innovation Policy (2025). *UK performance in technology scale-up*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[36] UKIPO (2023). From public research spend to innovation: the role of registered IP.
[37] Antler (2023). Europe's new tech founders 2023. The changing demographics of a new generation of European tech founders.
[38] CBINSIGHTS (2025). The Complete List Of Unicorn Companies.
[39] HMRC (2024). Patent Box relief statistics: September 2024.
[40] Dealroom (2025). United Kingdom.
[41] European Commission (2024). EU Industrial R&D Investment Scoreboard.
[42] European Commission (2024). EU Industrial R&D Investment Scoreboard; Soft Machines (2025). The world of business R&D (and the UK's place in that world).
[43] Connell, David (2021). *Is the UK's flagship industrial policy a costly failure*? University of Cambridge.
[44] DQVentures (2025). Ages of UK Startup Founders That Raised Series A & B – 2025.
[45] Cambridge Industrial Innovation Policy (2025). *UK performance in technology scale-up*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[46] Weik, S., Achleitner, A. K. and Braun, R. (2024). Venture capital and the international relocation of startups.
[47] Beauhurst (2024). Spotlight on spinouts April 2024, UK academic spinout trends.

[48] Roupakia, Z. and Coates Ulrichsen, T. (2025). *Universities and the Spinout Scale-Up Challenge: Securing Value in a Changing World*. Apollo - University of Cambridge Repository.
[49] Roupakia, Z. and Coates Ulrichsen, T. (2025). Universities and the Spinout Scale-Up Challenge: Securing Value in a Changing World. Apollo - University of Cambridge Repository.
[50] Roupakia, Z. and Coates Ulrichsen, T. (2025). Universities and the Spinout Scale-Up Challenge: Securing Value in a Changing World. Apollo - University of Cambridge Repository.
[51] Dealroom (2025). United Kingdom.
[52] Cambridge Industrial Innovation Policy (2025). *UK performance in technology scale-up*. IfM Engage. Institute for Manufacturing, University of Cambridge.
[53] NCUB (2024). UK Business R&D: A worrying decline**.**
[54] ONS (2024). Mergers and acquisitions (M&A) involving UK companies.
[55] Civitas (2015). Losing Control, A study of mergers and acquisitions in the British aerospace supply chain.
[56] Cambridge Industrial Innovation Policy (2025). *UK performance in technology scale-up*. IfM Engage. Institute for Manufacturing, University of Cambridge.

Cambridge Industrial Innovation Policy (CIIP) is a global, not-for-profit policy group based at the Institute for Manufacturing (IfM), University of Cambridge. CIIP works with governments and global organisations to promote industrial competitiveness and technological innovation. We offer new evidence, insights and tools based on the latest academic thinking and international best practices.

This report was delivered through IfM Engage, the knowledge-transfer arm of the Institute for Manufacturing (IfM), University of Cambridge.

Cambridge Industrial Innovation Policy, 17 Charles Babbage Road, Cambridge, CB3 0FS, United Kingdom

ciip.group.cam.ac.uk

REPORT PREPARED FOR:

Department for Science, Innovation & Technology