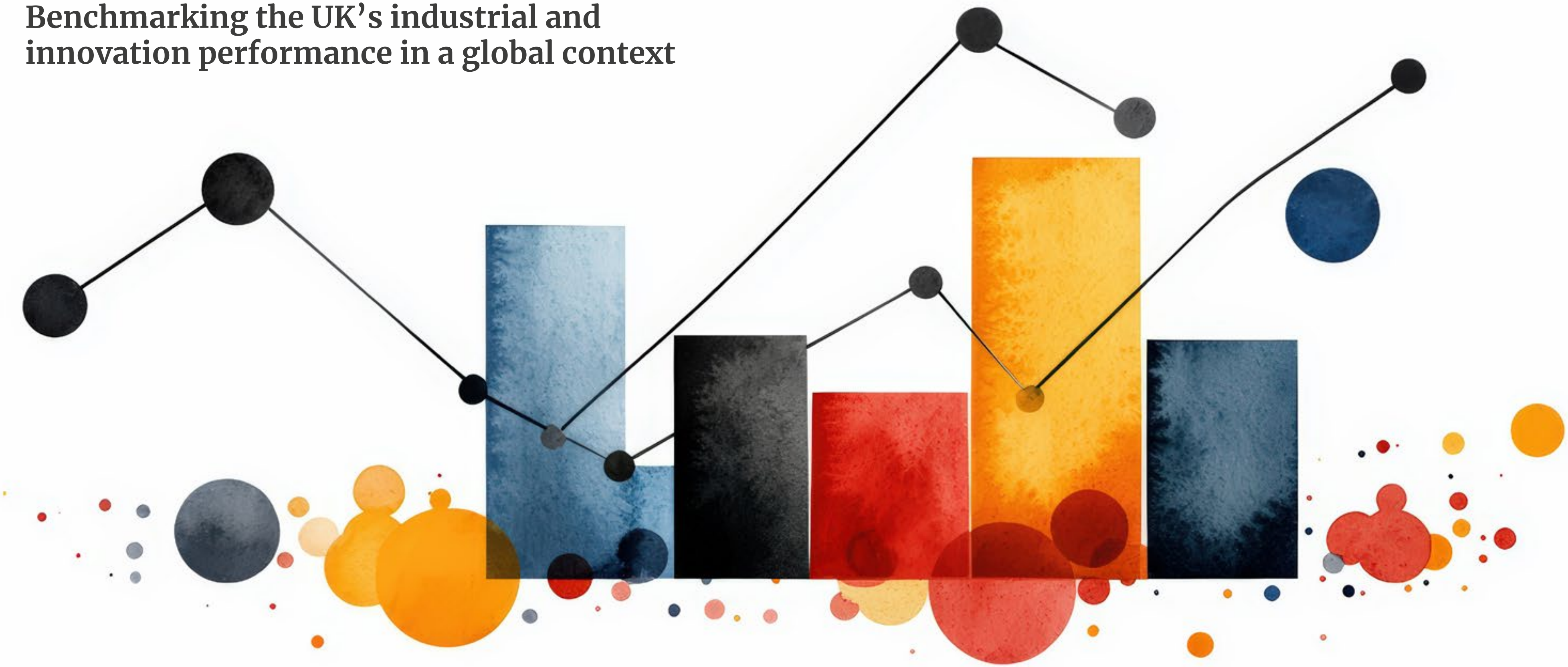
UNIVERSITY OF CAMBRIDGE

Cambridge Industrial Innovation Policy

UK INNOVATION REPORT 2026

Benchmarking the UK's industrial and innovation performance in a global context



Institute for Manufacturing, University of Cambridge

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What makes the report different?

The aim of the *UK Innovation Report* is to facilitate policy discussions on innovation and industrial performance – and the interplay between them. While numerous sources of data on the topic of innovation exist, the *UK Innovation Report* makes a contribution by bringing together, in a single place, innovation and value-added indicators in a concise and accessible format.

Instead of structuring the report according to traditional input and output indicators, the intention with the report is to include data that provides rich quantitative representations of the vitality of both the UK's innovation activity and its industrial performance in an international context.

An important theme throughout the report is the analysis of sectoral data to better understand the drivers of national performance and provide more granular policy insights. While the report does not make specific policy recommendations, it does highlight areas where additional evidence and policy action may be required.

Motivation

- To review the UK's innovation and industrial performance and compare it with that of other selected countries;
- To facilitate discussions on the relation between innovation and sectoral competitiveness; and
- To contribute to the evidence base that is available to inform industrial and innovation policy.

Please reference this report as: Cambridge Industrial Innovation Policy (2026). *UK Innovation Report 2026*. IfM Engage. Institute for Manufacturing, University of Cambridge.

Introduction

The *UK Innovation Report 2026* is published at a moment of institutional transition and heightened pressure on the UK innovation system. Leadership changes at key organisations such as UK Research and Innovation (UKRI) and Innovate UK have coincided with renewed debate about how public funding for research and innovation is structured and deployed. The government has begun to articulate a clearer – albeit evolving – framing of public research and development (R&D) investment around four broad “buckets”. The announced distribution of the £9.2 billion UKRI budget for 2026/27 is as follows: the first bucket supports curiosity-driven, investigator-led research that underpins the UK’s scientific base (£3.65 billion); the second bucket focuses on targeted R&D aligned with national priorities such as clean energy, health resilience, and national security (£1.92 billion); the third bucket supports innovative company growth, helping firms scale and commercialise new technologies (£1.64 billion); and the fourth bucket supports cross-cutting foundations of the innovation system, including skills, infrastructure, and research facilities (£2 billion).

While this framing clarifies policy intent, it also raises questions about balance, coordination, and delivery. Long-standing concerns about fragmented “buckets of funding” remain, particularly as policy attention shifts from allocation towards implementation within the Industrial Strategy’s eight priority sectors (IS-8). Recent evidence presented in this report suggests that while tax credits may increase overall R&D spending, they don’t necessarily translate into higher economic growth if funding is misallocated. From this perspective, effectiveness depends on not only the scale of public support but also how well it is targeted and aligned with expected economic returns. Together, these issues highlight whether funding streams operate as a coherent innovation pathway, shaping the extent to which public R&D investment translates into industrial capability, productivity growth, and economic impact.

The *UK Innovation Report 2026* arrives at a more demanding phase of industrial strategy implementation. The publication of sector plans marks a shift from high-level ambition to delivery, sharpening questions about institutional readiness, coordination across policy domains, and the capacity to support sector-level transformation. This report contributes evidence to that debate, highlighting areas of progress alongside persistent gaps, bottlenecks, and uneven outcomes across sectors.

The report also reflects insights from recent policy reviews, including the *Technology Adoption Review*. Despite leading internationally in research, startup formation, and spinout activity, the UK continues to fall short on domestic production, export capability, and economic diversification. This points to a structural weakness in translating technological capability and early-stage innovation into widespread adoption, scaling, and sustained industrial impact. The challenge is not the supply of innovation but how research and innovation more effectively support the competitiveness of existing sectors and the rebuilding of industrial capability in line with the UK’s Industrial Strategy.

At a time of economic uncertainty, rapid technological change, and increasing geopolitical pressure, the demand for robust, policy-relevant evidence continues to grow. The *UK Innovation Report 2026* responds by providing new data, analysis, and perspectives to support more informed decision-making across the UK innovation system – and to inform a more effective approach to industrial strategy and long-term economic transformation.

What's new in the 2026 edition of the UK Innovation Report?

This year's *UK Innovation Report* builds on recent policy developments and introduces new indicators and analysis to assess how effectively the UK innovation system supports industrial competitiveness and economic transformation. It is published at a time of institutional change and renewed focus on how public R&D funding is structured and deployed, alongside the implementation of the Industrial Strategy and its priority sectors. The report provides a deeper focus on the relationship between innovation investment, industrial performance, skills, and the scaleup of new technologies. The report is organised as follows:

- **Section 1** examines changes in the **UK's economic structure**, with a focus on the contribution of the **manufacturing sector**.
- **Section 2** provides an overview of the **UK's research and development (R&D) funding and expenditure landscape,** and how the UK performs globally in innovation outputs and outcomes.
- **Section 3** analyses the industrial performance of the **UK's electronics and electrical equipment sectors.**
- **Section 4** explores **qualification and skills mismatches in the UK,** along with wage dynamics across educational disciplines.
- **Section 5** reviews **technology scaleup activity across sectors in the UK.**

Contributors and acknowledgements

Cambridge Industrial Innovation Policy

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, offering new evidence, insights, and tools grounded in the latest academic thinking and international best practices. This report was delivered through IfM Engage, the knowledge-transfer arm of the IfM, University of Cambridge.

IfM Engage, 17 Charles Babbage Road, Cambridge, CB3 0FS, the UK
www.ciip.group.cam.ac.uk

Contributors
The contributors to this report are Jennifer Castañeda-Navarrete, Zongshuai Fan, Mateus Labrunie, David Leal-Ayala, Carlos López-Gómez, and Michele Palladino. Design by Ella Whellams and Deborah Harward. Copy-editing and review by Francisco Pereira, Elizabeth Tofaris and Amanda George.

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For further details, please contact ifm-policy-links@eng.cam.ac.uk

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Executive summary

UK INNOVATION REPORT 2026

UK Innovation Report 2026: data highlights

The UK is a leading global research and R&D investor. It spends 2.68% of GDP on R&D (3.5% of global spending) and ranked fourth worldwide for scientific publications in 2022, behind China, the USA, and India.

In 2022 **basic research** accounted for 14% of UK business R&D and 39% of government R&D, above OECD averages of 8% and 28%, respectively.

Research output has risen, but high-tech export share has fallen. Publications per capita increased 40% between 2007 and 2022, while high-technology exports declined from 8.7% to 6.4% of total exports.

Among the UK's top R&D-investing firms, **pharmaceuticals** account for over half of R&D spending, while tech **hardware** and **software** represent just 1.1% and 4%, far below the EU and USA.

UK electronics and electrical equipment account for 10% of manufacturing value added and 13% of exports, yet **employment has halved since 2000**, versus a 30% decline across manufacturing.

Despite its **historic earnings premium**, manufacturing now records median earnings (£38,956) below the national median (£39,040).

The STEM gender pay gap remains high in the UK. Women with STEM degrees earn around 21% less than men, compared with an OECD average gap of 18%.

In 2024 **skills-shortage vacancies** (i.e. they are hard to fill because of a lack of relevant skills, experience, or qualifications among applicants) accounted for 27% of all vacancies.

The UK ranks fourth globally by number of unicorns (57) and third by total value, with UK-based unicorns valued at US$223 billion in 2025, behind only the USA and China and close to the EU total of US$298 billion.

Most UK high-value startups are in **financial services** (20), **enterprise tech** (13), and **insurance** (7), with far fewer in **industrial sectors**.

Since 2012, 80% of UK **university spinout IPOs** have taken place overseas, mostly on the US NASDAQ, reversing the early 2000s when 80% listed in the UK.

Around 60% of **spinouts from the UK's top 15 universities** exiting through acquisition (2012–21) were bought by foreign firms. Meanwhile, **foreign acquisitions of UK companies** have increased 6.8x since 2014.

Key messages

1

Across leading innovation economies, there is growing concern that excellence in research and innovation doesn't automatically translate into industrial competitiveness. The UK leads in research and startup and spinout creation, yet falls short on domestic production, export capability, and economic diversification.

Implications

Competitiveness should be the test of success. The central challenge is not the supply of innovation but how research and innovation can more effectively support the competitiveness of existing sectors, strengthen industrial capability, and deliver sustained economic growth in line with the UK's Industrial Strategy.

Success should be evaluated at the sector level, not through individual firm outcomes. Industrial strategy must focus less on the number or valuation of high-growth firms and more on whether innovation helps to regain competitiveness in priority sectors, including growth in value added, employment, and global market share, benchmarked against international leaders.

Innovation policy instruments require rebalancing towards deployment. Greater emphasis is needed on later-stage, deployment-oriented support – particularly supporting national sector priorities.

Key messages

2

UK technology scaleup is concentrated in a narrow set of sectors, notably health and financial services, while many research spinouts that reach maturity are acquired by foreign firms or relocate overseas.

Implications

Relocation decisions are shaped by structural factors beyond finance. Policy debate and evidence have focused heavily on investment levels and domestic capital markets. Far less is known about the role of other structural factors – such as proximity to key supply chains and innovation partners, access to technical skills, regulatory conditions, and market access – that may be equally important in shaping scaleup decisions, industrial location, and competitiveness.

Sectoral concentration weakens system-wide impact. The concentration of UK scaleup activity in health and financial services helps to explain why strong innovation performance has translated unevenly into competitiveness across manufacturing-intensive and other strategic sectors.

The UK is not alone. The acquisition or relocation of maturing spinouts is common across advanced economies, with a large share ultimately attracted to the United States. The UK's highly open and internationalised economy further increases the attractiveness of its innovative firms to foreign investors, reinforcing these dynamics.

Key messages

3

The electronics and electrical equipment sectors illustrate how UK manufacturing is changing: away from scale and volume, and towards highly productive, knowledge-intensive niches embedded in global value chains.

Implications

Competitiveness depends on specialisation rather than cost. UK competitiveness increasingly rests on niche strengths – such as metrology, photonics, medical technologies, and specialised grid-related equipment – rather than high-volume, cost-competitive manufacturing, reinforcing the importance of targeted industrial strategy.

Productivity gains no longer translate into employment growth. Despite strong productivity and value-added growth in electronics, both sectors have seen a long-term decline in employment, reflecting automation, offshoring, and skills constraints.

Innovation strength does not automatically deliver domestic economic capture. Strong innovation capabilities and rising R&D investments could underpin future growth, but translating these into domestic scale, resilience, and reduced trade deficits will require more effective support for technology adoption and scaleup.

Key messages

4

The UK has a strong pipeline of science, engineering, and technology skills, but alignment with labour-market demand remains uneven. Despite easing vacancy levels overall, persistent and structural skills shortages in priority occupations continue to constrain innovation, productivity, and growth.

Implications

Skills shortages remain structural rather than cyclical. In 2024 skills-shortage vacancies accounted for over a quarter of all vacancies, indicating that recruitment difficulties reflect underlying mismatches in skills, experience, and qualifications rather than short-term labour-market tightness.

Innovation-critical occupations face persistent capacity constraints. Shortages in scientific, engineering, medical, and education-related skills affect occupations central to innovation and long-term growth, including engineers, health professionals, and educators.

Engineering and sustainability skills are emerging as strategic bottlenecks. By 2025, over three-quarters of engineering employers reported recruitment difficulties, with specialist sustainability skills emerging as a particular constraint as decarbonisation-related demand increases.

THEME 1

Structure and performance of the UK economy

What are the top-performing UK industries by labour productivity?

What are the top-performing UK industries by earnings?

How has their performance evolved in recent decades?

Theme 1: Structure and performance of the UK economy

KEY FINDINGS

Knowledge-intensive services and manufacturing industries are key drivers of UK innovation, exports, and productivity growth:

- Economic activities contribute to the UK economy in different ways: while labour-intensive services account for more than half of the UK value added and employment, knowledge-intensive services and manufacturing together account for 90% of business investment in research and development; manufacturing also accounts for 90% of goods exports, and knowledge-intensive services account for almost 70% of service exports.
- Knowledge-intensive services and manufacturing include 12 of the 20 most productive sectors (identified from granular analysis of 65 UK SIC 2-digit industries), including pharmaceutical manufacturing, finance and insurance, manufacturing of refined petroleum products, information and communication, and scientific research and development.

Over the last 3 decades, the UK has experienced stagnant productivity growth and a shift in employment towards services, while telecommunications and selected manufacturing industries have driven productivity gains:

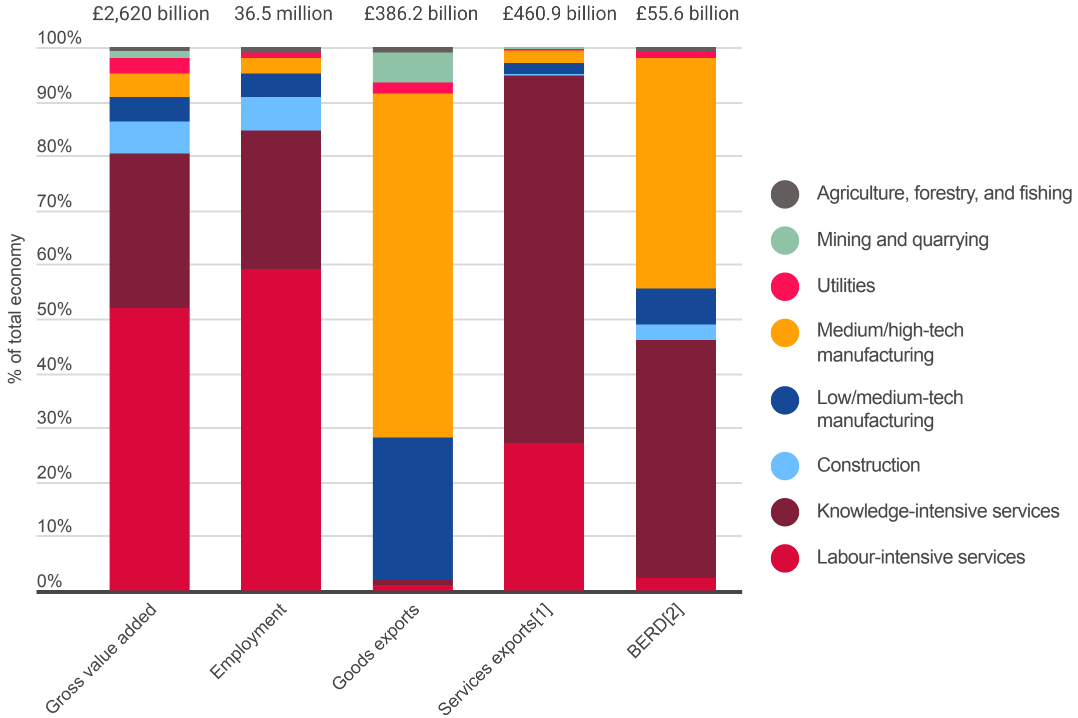
- Between 1997 and 2024, manufacturing industries recorded strong productivity growth (2.8%–11.0% annually), and telecommunications was the fastest- growing productivity sector (23.3%); telecommunications, electronics manufacturing, insurance, computer programming, wholesale trade, and pharmaceuticals were among the industries that made the largest aggregate contributions to productivity growth.
- Over the same period, employment growth was concentrated in knowledge- and labour-intensive services, while manufacturing employment declined overall, despite a post-COVID-19 rebound in sectors such as the manufacture of electrical equipment and the manufacture of computer, electronic, and optical products.

Despite its historic earnings premium, manufacturing now records median earnings below the national level:

- In 2025 the highest median gross annual earnings were seen in financial and insurance activities (£58,488), energy supply (£55,469), information and communication (£52,264), mining and quarrying (£50,943), and professional, scientific, and technical activities (£46,208), sectors that were also among the most productive in the economy and which accounted for 17% of the workforce.
- The lowest-paid industries experienced the fastest earnings growth over the past decade. In contrast, manufacturing, which has traditionally offered earnings above the economy-wide level, saw weaker earnings growth from 2022 relative to the all-industry median, placing the sector (£38,956) slightly below the national level in 2025 (£39,040).

Chart 1.1. Structure of the UK economy, 2024

Gross value added, employment, exports, and business enterprise R&D



Note: [1] Services exports data corresponds to 2023; goods and exports percentages don't include the "unknown industry" category.
[2] Business enterprise research and development by detailed product group.
Source: Office for National Statistics (ONS).

- In 2024 **knowledge-intensive**[3] and **labour-intensive services**[3] contributed to approximately 80% of the **UK** economy's gross value added and employment.
- **Manufacturing** (both low/medium-tech and medium/high-tech[3]) accounted for nearly half of the R&D performed in UK businesses (BERD) and 90% of goods exports**.** Top goods-exporting industries included **automotive, other transport equipment, pharmaceutical products, machinery and equipment,** and **computer, electronic, and optical products**.
- **Knowledge-intensive services** accounted for the largest shares of services exports (67.8%) and 43.6% of BERD. Top service-exporting industries included **financial activities, computer programming, management consultancy, education,** and **legal and accounting activities**.

Note: [3] Appendix 1.1 defines these sectoral group classifications.

Chart 1.2. Top 20 industries by labour productivity, 2007 and 2024

Value added per person engaged, chained volume measures (£)

Rank	Sectoral group	Industry	Productivity level: Pre-financial crisis (2007)	Productivity level: Post-pandemic (2024)	Productivity level: Compound annual growth rate	Value added share (2024)
1	Other production	Mining and quarrying	1,247,475	535,769	-4.9%	1.1%
2	Manufacturing	Manufacture of basic pharmaceutical products and pharmaceutical preparations	369,400	510,821	1.9%	1.0%
3	Labour-intensive services	Real-estate activities	534,168	496,033	-0.4%	14.5%
4	Utilities	Water transport	461,278	445,797	-0.2%	0.3%
5	Knowledge-intensive services	Insurance, reinsurance, and pension funding, except compulsory social security	207,061	409,780	4.1%	1.8%
6	Utilities	Electricity, gas, steam, and air conditioning supply	1,658,550	351,839	-8.7%	2.0%
7	Manufacturing	Manufacture of coke and refined petroleum products	162,087	278,233	3.2%	0.1%
8	Labour-intensive services	Rental and leasing activities	131,933	186,767	2.1%	1.2%
9	Knowledge-intensive services	Financial service activities, except insurance and pension funding	320,733	176,549	-3.5%	3.7%
10	Knowledge-intensive services	Telecommunications	6,655	174,738	21.2%	1.3%
11	Knowledge-intensive services	Scientific research and development	123,308	167,952	1.8%	1.2%
12	Knowledge-intensive services	Programming and broadcasting activities	306,491	158,432	-3.8%	0.4%
13	Manufacturing	Other manufacturing	161,790	143,282	-0.7%	0.8%
14	Manufacturing	Manufacture of computer, electronic, and optical products	66,164	127,039	3.9%	0.6%
15	Knowledge-intensive services	Information service activities	124,726	126,732	0.1%	0.5%
16	Utilities	Water supply; sewerage, waste management, and remediation activities	170,163	120,591	-2.0%	1.2%
17	Other production	Activities auxiliary to financial services and insurance activities	89,211	119,416	1.7%	2.5%
18	Labour-intensive services	Travel agency, tour operator, and other reservation service and related activities	105,325	115,165	0.5%	0.5%
19	Manufacturing	Manufacture of chemicals and chemical products	75,843	114,143	2.4%	0.5%
20	Knowledge-intensive services	Advertising and market research	105,954	107,509	0.1%	1.0%
Total economy			73,714	69,129	-0.4%	36.1%

Note: Red represents the lowest values, white represents values close to the 50th percentile (median), and green represents the highest values. A total of 65 industries was analysed at 2-digit SIC level.
Source: Office for National Statistics (ONS). GDP output approach, low-level aggregates; JOBS03 Employee jobs by industry; JOBS04 Self Employed jobs by industry.

- Sector performance was assessed at a granular level using data for 65 industries defined at the 2-digit UK SIC level. We then identified the 20 industries with the highest productivity levels, which together account for over one-third of total economy value added. Of these, 12 were in the **knowledge-intensive services and manufacturing sectoral groups,** including **pharmaceutical manufacturing, financial and insurance, the manufacture of coke and refined petroleum products, information and communication industries,** and **scientific research and development**.
- Industries with the highest productivity levels also saw some of the largest gains in labour productivity between the pre-financial-crisis period (2007) and the post-pandemic period (2024), especially **telecommunications, computer and electronics manufacturing, insurance and pension funding, coke and refined petroleum, chemicals, and pharmaceutical manufacturing**.
- By contrast, labour productivity (in real terms) declined in **mining and quarrying** and in **real-estate activities** over the same period, although these industries continued to exhibit some of the highest absolute productivity levels.

Note: Productivity measures for real-estate activities should be interpreted with caution. Value added in this sector includes imputed rents for owner-occupied housing, which are not directly linked to market production or labour input. As a result, measured labour productivity in real estate can seem artificially high.

Chart 1.3. Top 20 industries by productivity growth, 1997-2024

Value added per person engaged, chained volume measures (average annual growth rates)

Rank	Sectoral group	Industry	1997–2007	2008–2011	2012–2019	2020–2021	2022–2024	1997–2024
1	Knowledge-intensive services	Telecommunications	25.8%	28.7%	23.1%	19.3%	10.4%	23.3%
2	Labour-intensive services	Air transport	5.6%	3.9%	13.2%	-25.9%	152.9%	21.1%
3	Manufacturing	Manufacture of computer, electronic, and optical products	21.5%	9.6%	3.7%	6.5%	-3.1%	11.0%
4	Manufacturing	Manufacture of textiles, wearing apparel, and leather products	13.7%	5.6%	8.4%	-0.8%	4.7%	9.1%
5	Manufacturing	Manufacture of basic pharmaceutical products and pharmaceutical preparations	9.4%	3.3%	1.1%	16.6%	-3.0%	5.4%
6	Manufacturing	Manufacture of other transport equipment	10.5%	6.0%	-3.1%	2.8%	9.2%	5.3%
7	Labour-intensive services	Water transport	7.3%	17.3%	-0.7%	-19.8%	14.4%	5.3%
8	Manufacturing	Manufacture of chemicals and chemical products	7.2%	-0.2%	11.1%	3.2%	-10.6%	5.1%
9	Manufacturing	Manufacture of coke and refined petroleum products	-4.2%	-1.3%	21.8%	9.5%	-1.6%	4.9%
10	Knowledge-intensive services	Insurance, reinsurance, and pension funding, except compulsory social security	4.6%	9.3%	2.9%	14.8%	-1.3%	4.9%
11	Manufacturing	Manufacture of wood and paper products; printing	9.1%	1.0%	4.6%	3.8%	-6.4%	4.6%
12	Manufacturing	Manufacture of motor vehicles, trailers, and semi-trailers	5.1%	7.9%	-0.8%	5.8%	11.2%	4.5%
13	Other production	Agriculture	7.0%	4.2%	1.8%	5.3%	1.7%	4.4%
14	Manufacturing	Manufacture of electrical equipment	8.1%	-2.6%	3.7%	21.6%	-13.7%	4.0%
15	Labour-intensive services	Activities of households as employers	-4.8%	28.0%	9.8%	-20.3%	2.9%	3.8%
16	Manufacturing	Manufacture of machinery and equipment n.e.c	8.5%	2.8%	-2.2%	11.5%	-5.0%	3.4%
17	Knowledge-intensive services	Scientific research and development	4.5%	0.8%	1.1%	11.0%	2.1%	3.2%
18	Labour-intensive services	Services to buildings and landscape activities	2.8%	3.2%	2.7%	0.2%	6.6%	3.0%
19	Knowledge-intensive services	Publishing activities	5.9%	1.7%	0.8%	2.4%	0.2%	3.0%
20	Manufacturing	Manufacture of basic metals and metal products	3.3%	4.4%	2.1%	-1.1%	3.0%	2.8%
Total economy			0.5%	-1.0%	0.1%	-1.0%	-0.02%	-0.005%

Note: Red represents the lowest values, white represents values close to the 50th percentile (median), and green represents the highest values. A total of 65 industries was analysed at 2-digit SIC level. **Source:** Office for National Statistics (ONS). GDP output approach, low-level aggregates; JOBS03 Employee jobs by industry; JOBS04 Self Employed jobs by industry.

- Between 1997 and 2024, UK productivity remained broadly stagnant, although performance varied substantially across sectors. **Manufacturing** industries recorded relatively strong productivity growth both before and after the financial crisis and during the COVID-19 pandemic, with average annual growth rates between 1997 and 2024 ranging from 2.8% to 11.0%.
- **Telecommunications** consistently recorded the highest productivity growth, with an average annual growth rate of 23.3% from 1997 to 2024. But these results should be read with caution, as they may reflect changes in the methodology used by the ONS to compute the deflator for this industry.[1] Using productivity measured at current prices, the implied growth from 1997 to 2024 was much lower, at 3.1%.
- The pandemic shock generated sharp short-term volatility. But several industries recorded positive productivity growth during 2020–21, particularly the **manufacture of electrical equipment** (21.6%), **telecommunications** (19.3%), **basic pharmaceutical manufacturing** (16.6%), **insurance and pension funding** (14.8%), the **manufacture of machinery and equipment** (11.5%), and **scientific research and development** (11.0%).
- This period of disruption was followed by an uneven rebound in 2022–24, with several sectors that had seen productivity gains during the pandemic subsequently experiencing negative growth rates, particularly the **manufacture of electrical equipment** (-13.7%), **chemicals manufacturing** (-10.6%), and **the manufacture of machinery and equipment** (-5.0%).

Note: [1] See ONS (2021). Double deflation methods and deflator improvements to UK National Accounts: Blue Book 2021.

Chart 1.4. Top 20 industries by contribution to productivity growth, 1997-2024

Within effect, percentage points

Rank	Sectoral group	Industry	1997–2007	2008–2011	2012–2019	2020–2021	2022–2024	1997–2024
1	Knowledge-intensive services	Telecommunications	0.504	0.533	0.414	0.332	0.154	0.433
2	Manufacturing	Manufacture of computer, electronic, and optical products	0.210	0.069	0.028	0.049	-0.021	0.102
3	Knowledge-intensive services	Insurance, reinsurance, and pension funding, except compulsory social security	0.081	0.204	0.049	0.231	-0.024	0.089
4	Knowledge-intensive services	Computer programming, consultancy, and related activities	0.082	0.008	0.002	0.112	0.044	0.047
5	Labour-intensive services	Wholesale trade, except of motor vehicles and motorcycles	0.087	0.056	0.005	0.152	-0.093	0.045
6	Manufacturing	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0.080	0.027	0.004	0.157	-0.033	0.044
7	Manufacturing	Manufacture of wood and paper products; printing	0.089	0.009	0.032	0.022	-0.037	0.043
8	Manufacturing	Manufacture of textiles, wearing apparel, and leather products	0.080	0.013	0.025	-0.009	0.011	0.041
9	Manufacturing	Manufacture of basic metals and metal products	0.061	0.047	0.027	-0.012	0.031	0.041
10	Manufacturing	Manufacture of chemicals and chemical products	0.067	0.000	0.065	0.014	-0.059	0.040
11	Knowledge-intensive services	Financial service activities, except insurance and pension funding	0.337	-0.177	-0.108	-0.222	-0.208	0.038
12	Manufacturing	Manufacture of other transport equipment	0.082	0.032	-0.022	0.017	0.053	0.037
13	Other production	Agriculture	0.069	0.018	0.011	0.040	0.013	0.037
14	Manufacturing	Manufacture of machinery and equipment n.e.c	0.091	0.018	-0.019	0.081	-0.034	0.035
15	Manufacturing	Manufacture of food products, beverages, and tobacco	0.068	-0.039	0.019	0.034	0.037	0.033
16	Labour-intensive services	Air transport	0.018	0.000	0.032	-0.101	0.190	0.029
17	Labour-intensive services	Public administration and defence; compulsory social security	-0.012	0.111	0.055	-0.151	0.094	0.026
18	Knowledge-intensive services	Activities auxiliary to financial services and insurance activities	0.011	-0.002	0.078	0.078	-0.059	0.026
19	Manufacturing	Manufacture of rubber and plastic products, and other non-metallic mineral products	0.052	0.008	0.015	0.033	-0.032	0.025
20	Manufacturing	Manufacture of motor vehicles, trailers, and semi-trailers	0.033	0.040	-0.009	0.025	0.063	0.025
Total within effect			1.697	0.452	0.660	-0.099	0.331	0.948

Note: Red represents the lowest values, white represents values close to the 50th percentile (median), and green represents the highest values. A total of 65 industries was analysed at 2-digit SIC level.
Source: Office for National Statistics (ONS). GDP output approach, low-level aggregates, UK; JOBS03 Employee jobs by industry (UK totals); JOBS04 Self Employed jobs by industry (UK totals).

- How an industry contributes to aggregate productivity growth depends on its productivity level, its rate of productivity growth, and its relative size in the economy. To capture these dimensions, we computed the sectoral within effect for each of the 65 industries examined, which weights industry-level productivity growth by each sector's share of value added in the economy (See Appendix 1.2).
- **Telecommunications** made the largest contribution to aggregate productivity growth. Its within-industry effect was around four times larger than the **manufacture of computer, electronic, and optical products**, which ranked second on this measure. But these results should be read with caution, as they reflect changes in the ONS deflator methodology.[1]
- A sharp weakening in within effects followed the financial crisis of 2008/9, particularly in **financial services**. Although several **manufacturing** industries continued to make positive within contributions, these were generally smaller than in the pre-crisis period.
- In the post-pandemic period, the largest contributions were seen in **air transport, telecommunications, public administration and defence,** and **the manufacture of motor vehicles and other transport equipment**.

Note: [1] See ONS (2021). Double deflation methods and deflator improvements to UK National Accounts: Blue Book 2021.

Chart 1.5. Top and bottom 10 industries by employment growth, 1997-2024

People engaged (employees and self-employed people), annual average growth rate

Top 10 industries

Rank	Sectoral group	Industry	1997–2007	2008–2011	2012–2019	2020–2021	2022–2024	1997–2024
1	Knowledge-intensive services	Activities of head offices; management consultancy activities	6.9%	4.8%	4.4%	1.2%	3.9%	5.1%
2	Knowledge-intensive services	Veterinary activities	2.9%	4.6%	7.2%	-6.8%	8.9%	4.3%
3	Knowledge-intensive services	Computer programming, consultancy, and related activities	6.6%	0.8%	4.0%	-0.7%	4.9%	4.3%
4	Knowledge-intensive services	Programming and broadcasting activities	3.3%	7.0%	4.7%	-1.2%	5.9%	4.2%
5	Labour-intensive services	Warehousing and support activities for transportation	3.9%	2.8%	4.3%	7.8%	2.3%	3.9%
6	Knowledge-intensive services	Other professional, scientific, and technical activities	4.0%	7.2%	4.7%	-3.7%	1.6%	3.8%
7	Labour-intensive services	Real-estate activities	4.6%	1.1%	3.1%	2.3%	3.7%	3.4%
8	Knowledge-intensive services	Activities auxiliary to financial services and insurance activities	4.1%	5.7%	1.2%	5.5%	-2.1%	2.9%
9	Labour-intensive services	Employment activities	6.5%	-1.5%	2.3%	2.0%	-2.0%	2.9%
10	Knowledge-intensive services	Information service activities	3.8%	-7.3%	4.8%	9.8%	2.6%	2.8%

Bottom 10 industries

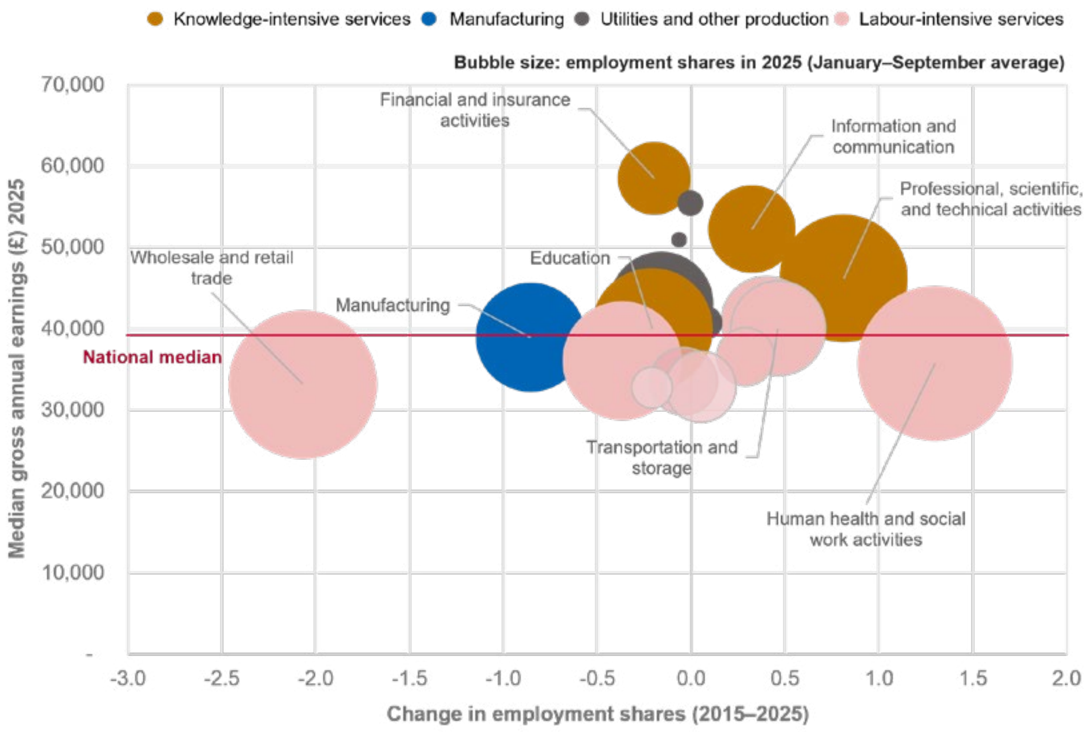
Rank	Sectoral group	Industry	1997–2007	2008–2011	2012–2019	2020–2021	2022–2024	1997–2024
1	Manufacturing	Manufacture of textiles, wearing apparel, and leather products	-9.9%	-4.9%	0.7%	-6.3%	-2.2%	-5.1%
2	Manufacturing	Manufacture of computer, electronic, and optical products	-4.0%	-5.3%	-0.9%	-3.3%	2.9%	-2.5%
3	Manufacturing	Manufacture of wood and paper products; printing	-2.9%	-5.2%	-1.0%	-5.5%	1.7%	-2.4%
4	Knowledge-intensive services	Insurance, reinsurance, and pension funding, except compulsory social security	-2.6%	-8.7%	1.2%	-2.9%	-1.4%	-2.3%
5	Manufacturing	Manufacture of machinery and equipment n.e.c	-3.0%	-4.2%	0.2%	-6.1%	0.2%	-2.1%
6	Manufacturing	Manufacture of electrical equipment	-4.2%	-0.5%	-1.9%	-6.9%	5.7%	-2.1%
7	Manufacturing	Manufacture of basic metals and metal products	-3.3%	-3.3%	0.2%	-3.1%	-0.8%	-2.0%
8	Manufacturing	Manufacture of other transport equipment	-3.4%	-7.1%	3.3%	-0.6%	-4.5%	-1.9%
9	Manufacturing	Manufacture of chemicals and chemical products	-2.9%	-4.5%	-0.4%	-0.2%	0.6%	-1.9%
10	Manufacturing	Manufacture of rubber and plastic products, and other non-metallic mineral products	-2.6%	-5.7%	1.0%	-3.8%	-0.2%	-1.8%

Source: Office for National Statistics (ONS). JOBS03 Employee jobs by industry (UK totals); JOBS04 Self Employed jobs by industry (UK totals).

- From 1997 to 2024, **service activities** recorded the largest increases in employment, whereas **manufacturing** industries and **insurance** saw the most pronounced declines. But some manufacturing industries saw renewed employment growth in the period following the COVID-19 pandemic.
- During the pre-financial-crisis period (1997–2007), the strongest employment gains were seen in **management consultancy activities** (6.9%), **computer programming** (6.6%), and **employment activities** (6.5%). In contrast, the largest declines occurred in the **manufacture of textiles, wearing apparel, and leather products** (-9.9%), the **manufacture of electrical equipment** (-4.2%), and **computer, electronic, and optical products** (-4.0%).
- In the post-financial crisis period (2012–19), employment growth was strongest in **professional services** (4.7–7.2%) and **information and communication services** (4.0–4.8%).
- During the COVID-19 pandemic, employment declined in most industries, with exceptions including **information services** (9.8%), **warehousing** (7.8%), and **activities auxiliary to financial and insurance services** (5.5%).
- In the subsequent period, manufacturing industries experienced employment growth, particularly in the **manufacture of electrical equipment** (5.7%) and **computer, electronic, and optical products** (2.9%).

Chart 1.6. Annual earnings and employment shares by industry, 2015-2025

Median gross annual earnings (£) and employment shares (%)

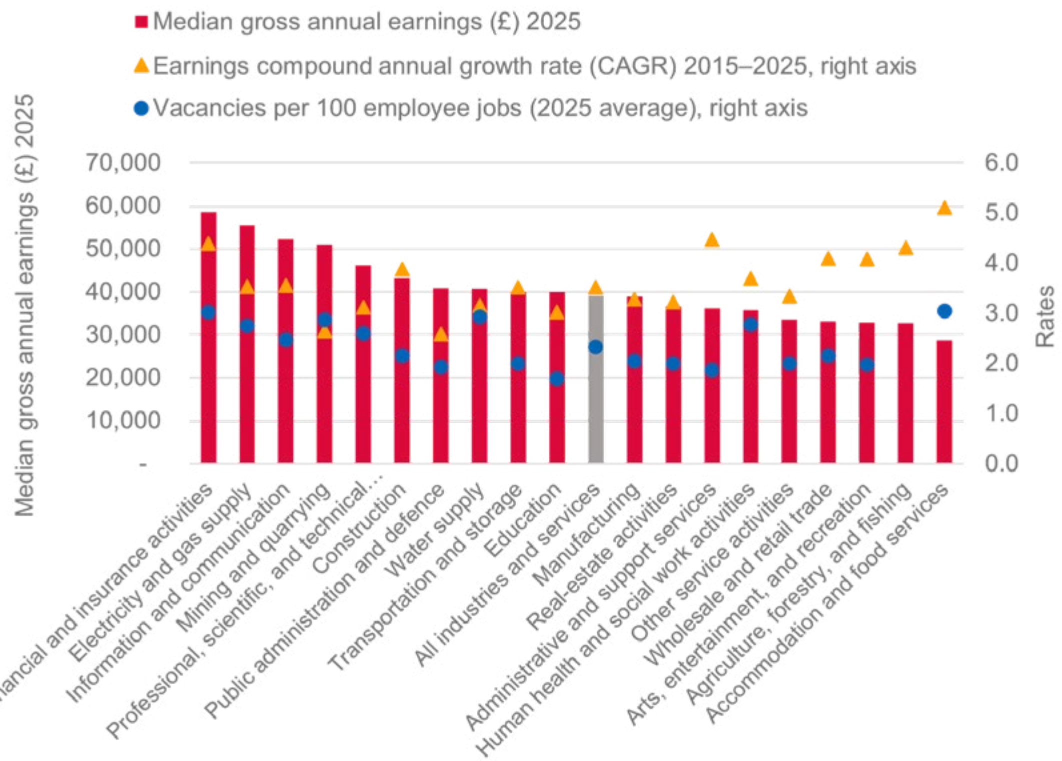


Source: Office for National Statistics (ONS). Annual Survey of Hours and Earnings (ASHE); ONS. JOBS05 Workforce jobs by region and industry.

- Between 2015 and 2025, employment growth was concentrated primarily in **knowledge-intensive services**, some of which offer among the highest earnings, and in certain **labour-intensive service industries**, which tend to provide earnings below the national median.
- In 2025 the industries reporting the highest median gross annual earnings included **financial and insurance activities** (£58,488), **electricity, gas, steam, and air conditioning supply** (£55,469), **information and communication** (£52,264), **mining and quarrying** (£50,943), and **professional, scientific, and technical activities** (£46,208). These industries accounted for 17% of the UK workforce.
- As shown in Chart 1.2, these industries were also among those with higher productivity levels. In addition, **information and communication** and **professional, scientific, and technical activities** were among the sectors that saw the largest expansions in employment during this period.
- By contrast, the industries reporting the lowest median gross annual earnings included **accommodation and food service activities** (£28,687), **agriculture, forestry, and fishing** (£32,784), **arts, entertainment, and recreation** (£32,871), **wholesale and retail trade repair of motor vehicles and motorcycles** (£33,158), **other service activities** (£33,537), and **human health and social work activities** (£35,744). Several of these industries also accounted for large employment shares. Taken together, these six industries employed 40% of the workforce.

Chart 1.7. Earnings dynamics, 2015-2025

Median gross annual earnings (£) and vacancies per 100 employee jobs



Source: Office for National Statistics (ONS). Annual Survey of Hours and Earnings (ASHE); ONS. VACS02 Vacancies by industry.

- The lowest-paid industries experienced the fastest growth in earnings over the past decade.
- Between 2015 and 2025, **agriculture, forestry, and fishing** (4.3%) and labour-intensive service industries – particularly **accommodation and food service activities** (5.1%) and **administrative and support service activities** (4.5%) – recorded earnings growth above the national average.
- Vacancy rates remained comparatively high in labour-intensive sectors, especially **accommodation and food service activities**. In contrast, higher-paid industries tended to exhibit lower vacancy rates and more moderate earnings growth, except for financial and insurance activities.
- **Manufacturing** has traditionally recorded earnings above the economy-wide level. But from 2022, its earnings fell behind the all-industry median, placing the sector (£38,956) slightly below the national level in 2025 (£39,040).

Appendix 1.1. Sectoral group classification and statistical codes

Classification of sectors based on the UK Standard Industrial Classification (SIC)

Sectoral group	Section	Division	Description
Low/medium-tech manufacturing	C	10–12	Food products, beverages, and tobacco
	C	13–15	Textiles, wearing apparel, leather, and related products
	C	16–18	Wood and paper products; printing
	C	19	Coke and refined petroleum products
	C	22–23	Rubber and plastics products and other non-metallic mineral products
	C	24–25	Basic metals and fabricated metal products, except machinery and equipment
	C	31–33	Furniture; other manufacturing; repair and installation of machinery and equipment
Medium/high-tech manufacturing	C	20	Chemicals and chemical products
	C	21	Basic pharmaceutical products and pharmaceutical preparations
	C	26	Computer, electronic, and optical products
	C	27	Electrical equipment
	C	28	Machinery and equipment n.e.c.
	C	29	Motor vehicles, trailers, and semi-trailers
	C	30	Other transport equipment
Other production	A	01–03	Agriculture, hunting, forestry, and fishing
	B	05–09	Mining and quarrying
	F	41–43	Construction

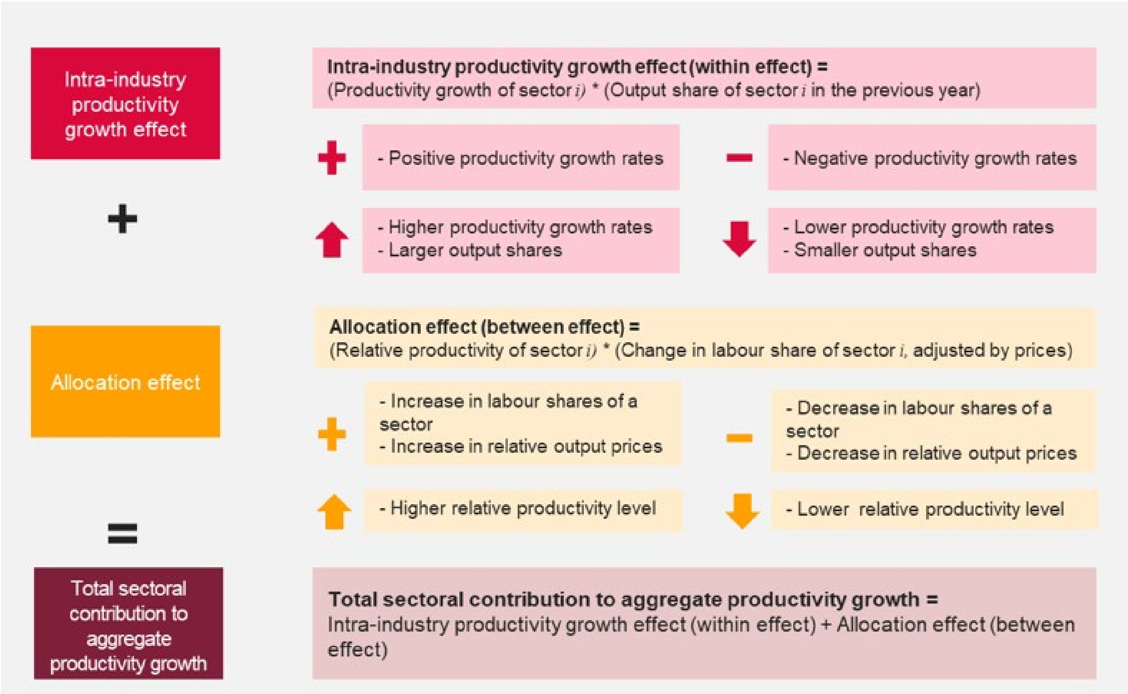
Sectoral group	Section	Division	Description
Knowledge-intensive services	J	58–63	Information and communication
	K	64–66	Financial and insurance activities
	M	69–75	Professional, scientific, and technical activities
	P	85	Education
Labour-intensive services	G	45–47	Wholesale and retail trade, repair of motor vehicles and motorcycles
	H	49–53	Transportation and storage
	I	55–56	Accommodation and food service activities
	L	68	Real-estate activities
	N	77–82	Administrative and support service activities
	O	84	Public administration and defence; compulsory social security
	Q	86–88	Human health and social work activities
	R	90–93	Arts, entertainment, and recreation
	S	94–96	Other service activities
	T	97–98	Activities of households as employers; undifferentiated activities of households for own use
Utilities	D	35	Electricity, gas, steam, and air conditioning supply – utilities
	E	36–39	Water supply; sewerage, waste management, and remediation activities – utilities

Appendix 1.2. Decomposition of productivity growth

Economic sectors contribute disparately to aggregate productivity growth, depending on their productivity gains over time, as well as their relative weight in the total economy and relative productivity differences.

In order to understand the extent and nature of these contributions, we decompose labour productivity growth rates into sectoral contribution effects, as described in Tang and Wang (2004):

- An **intra-industry productivity growth effect** (within effect) that captures the productivity growth of each economic sector, given its relative importance in the economy. The intra-industry productivity growth effect of a given sector i takes positive (negative) values whenever the sector shows positive (negative) productivity growth. Its magnitude depends on the productivity growth rate and how large the sector is in relation to other sectors in the economy.
- An **allocation effect** (between-industries effect) that captures the effects of changes in the relative size of sectors. The allocation effect takes positive (negative) values if the sector increases (decreases) in size. The relative size is determined by changes in labour shares and relative output prices of sector i. By changes in relative output prices, we mean how much the output prices in sector i change in relation to changes in the output prices of the whole economy.



THEME 2

Investment in innovation

Is the UK spending enough on research and development?

How does the UK perform globally in innovation outputs and outcomes?

How does the UK compare with other leading countries?

Theme 2: Investment in innovation

KEY FINDINGS

The UK remains a top global investor in R&D, but its investment intensity lags behind leading international competitors:

- In 2023 the UK ranked sixth globally in R&D investment, accounting for 3.5% of world spending, behind Japan (7%), Germany (5.8%), Korea (4.8%), and – notably – China (28.1%) and the USA (29.7%), which co-led the global R&D expenditure landscape.
- UK R&D expenditure stood at 2.68% of GDP, below the OECD average (2.70%) and leading R&D-intensive economies but above several G7 peers and China.
- Government support for business R&D has increased over the past 2 decades in the UK and across the OECD, with a strong shift towards tax-based instruments (notably R&D tax credits), but recent literature has questioned the efficiency of broad tax relief and pointed to stronger returns from targeted support.

The UK stands out internationally for the scale and quality of innovation output indicators such as scientific publications and patents, ranking among the top countries for high-impact research and patents in critical technologies:

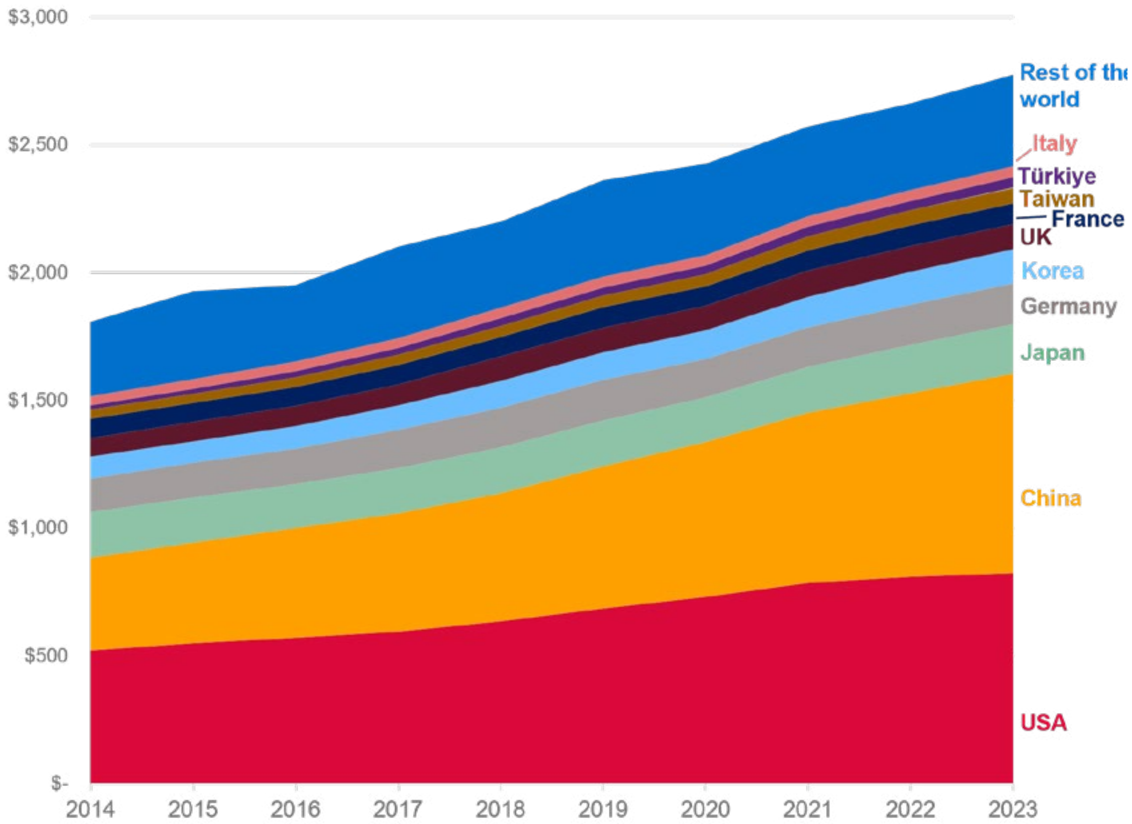
- The UK is a global research leader, ranking fourth worldwide in 2022 for total publications, behind only China, the USA, and India, and among the top five for highly cited outputs in technology fields in the areas of physical sciences and life sciences.
- The UK ranks in the global top 10 for patenting in areas such as AI, semiconductors, and biotechnology but lags well behind leading patenting nations, including the USA, China, Japan, and Korea.
- In 2025 the UK ranked fourth globally by number of unicorns and third by total unicorn valuation, accounting for nearly three-quarters of total EU-based unicorn value.

Despite its strong position as a global knowledge leader, the UK underperforms internationally on innovation outcomes, with weaker translation of research excellence into high-technology exports and globally leading R&D-intensive firms:

- The UK has a relatively low share of high-technology exports in total trade, reflecting limited value capture from innovation and an export structure increasingly oriented towards services rather than advanced manufacturing.
- In 2024 the UK ranked fifth globally for top R&D-investing companies, but its representation has more than halved since 2012, in line with trends in other advanced economies.
- While the USA remains dominant, China has rapidly expanded its base of R&D-intensive firms, signalling a sustained shift in innovation and production capacity towards East and Southeast Asia.

Chart 2.1. Global expenditure on R&D

Top 10 economies in 2023, US$ billion PPP, 2014-2023



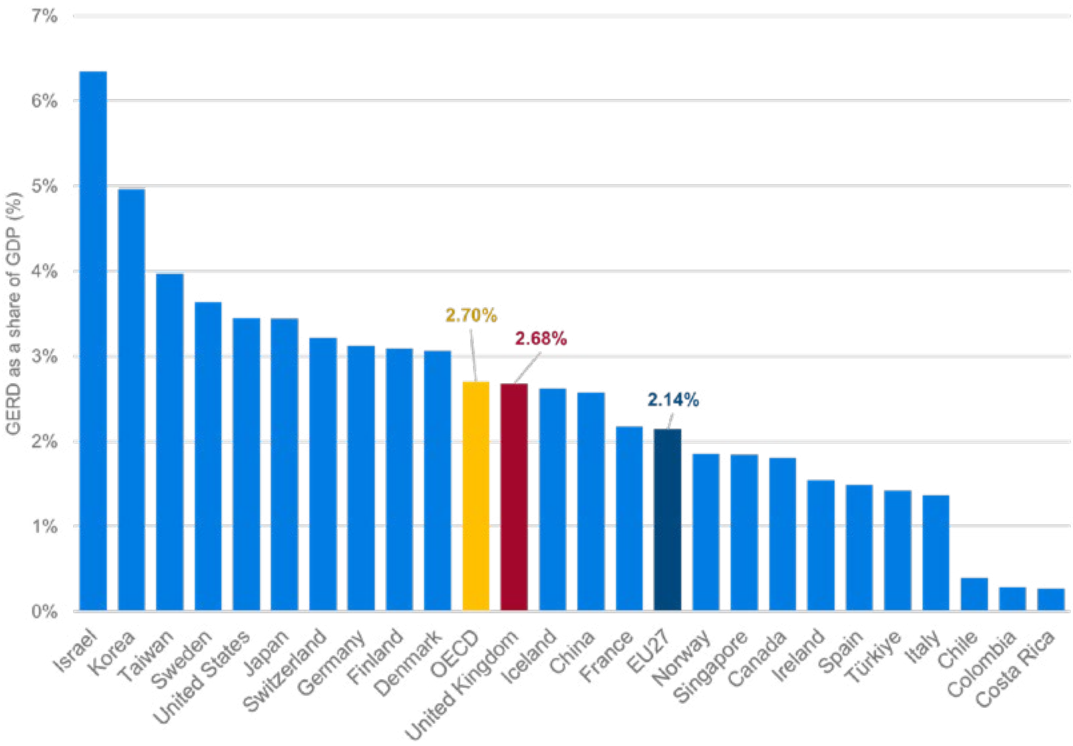
Note: Only countries in the OECD database are included. Data for Russia is not available after 2020.
Source: OECD (2025). Main Science and Technology Indicators.

- In 2023 global R&D expenditure reached approximately US$2.8 trillion, an increase of 54% from 2014.[1] The **USA** (US$823.4 billion) and **China** (US$780.7 billion) led global R&D spending.
- In 2023 the top 10 economies accounted for 87% of global R&D expenditure. The **UK** ranked sixth worldwide, accounting for 3.5% of total R&D expenditure.
- Between 2014 and 2023, **China**'s R&D expenditure grew by 116%, increasing its share of global R&D from 20.0% to 28.1%. By contrast, **G7** countries recorded much slower growth of 36.7% and saw their share of global R&D decline from 58% to 52%.
- The **USA** was the only **G7** country to increase its share in global R&D, from 28.8% to 29.7%, in the last decade.
- The contribution of other **G7** countries to global R&D declined from 2014, including **Japan** (-3 percentage points (pp)), **Germany** (-1.5 pp), **France (**-1.3 pp), the **UK** and **Italy** (-0.5 pp each), and **Canada** (-0.3 pp).

Note: [1] as measured in constant US$ PPP. Only countries in the OECD database are included.

Chart 2.2. R&D intensity: international comparison

Gross domestic expenditure on R&D (GERD) as a share of GDP, selected economies, 2023 or latest

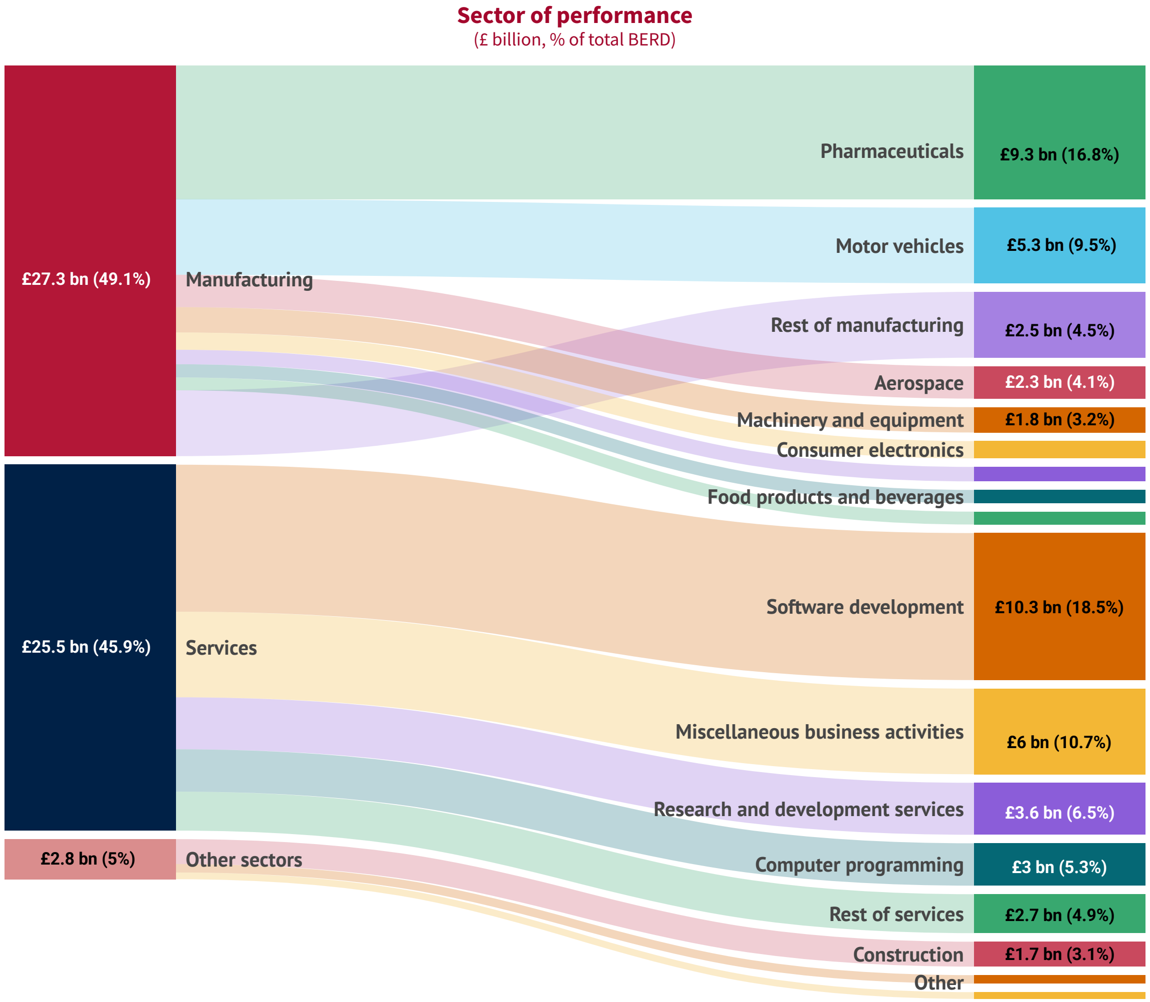


Source: OECD (2025). Main Science and Technology Indicators.

- Measured as a share of GDP, the **UK** underperforms relative to the **OECD** average and other leading R&D-intensive economies.
- In 2023 the **UK**'s R&D intensity was 2.68%, below that of countries such as **Korea** (4.96%), **Taiwan** (3.97%), the **USA** (3.45%), **Japan** (3.44%), and **Germany** (3.13%).
- In the same year the **UK**'s R&D intensity exceeded that of other **G7** countries, including **France** (2.18%), **Canada** (1.81%), and **Italy** (1.37%).

Chart 2.3. UK business research and development

Business enterprise research and development, by source of funding and performing sector, 2024

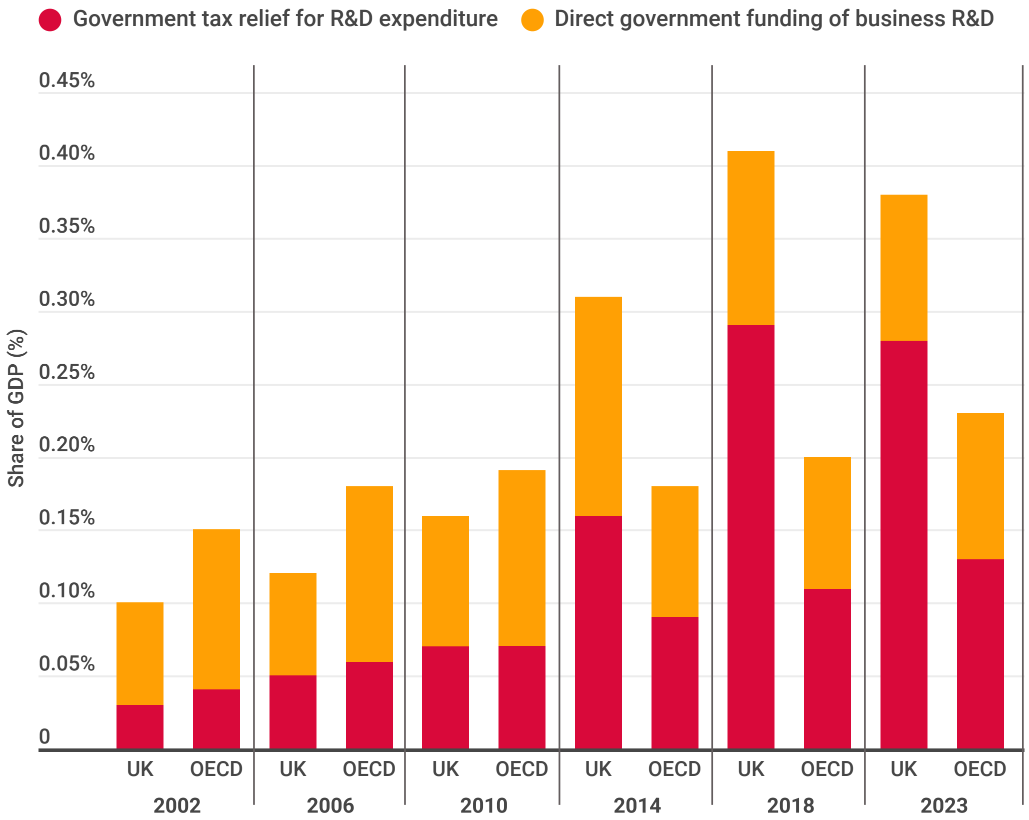


Source: ONS (2025). Business enterprise research and development, UK: 2024.

- In most economies the business sector is the largest contributor to total national R&D expenditure.
- In 2024 **UK** business enterprise research and development (BERD) amounted to £55.6 billion.
- **UK** business R&D was funded predominantly using **own funds**, accounting for 76.3% of total BERD. A significant contribution came **from overseas businesses and other organisations abroad** (15.0%), while **UK government funding** played a smaller but still important role, at 6.8%.
- **Manufacturing** performed just under half of **UK** BERD (49.1%), closely followed by **services,** at 45.9%, with **other sectors** contributing the remaining 5.0%.
- Four sectors accounted for 55.5% of total **UK** BERD, namely **software development** (18.5%), **pharmaceuticals** (16.8%), **miscellaneous business activities** (10.7%), and **motor vehicles** (9.5%).

Chart 2.4. Government financial support for business R&D

Direct government funding and government tax relief for business R&D expenditure, share of GDP, UK and OECD, selected years

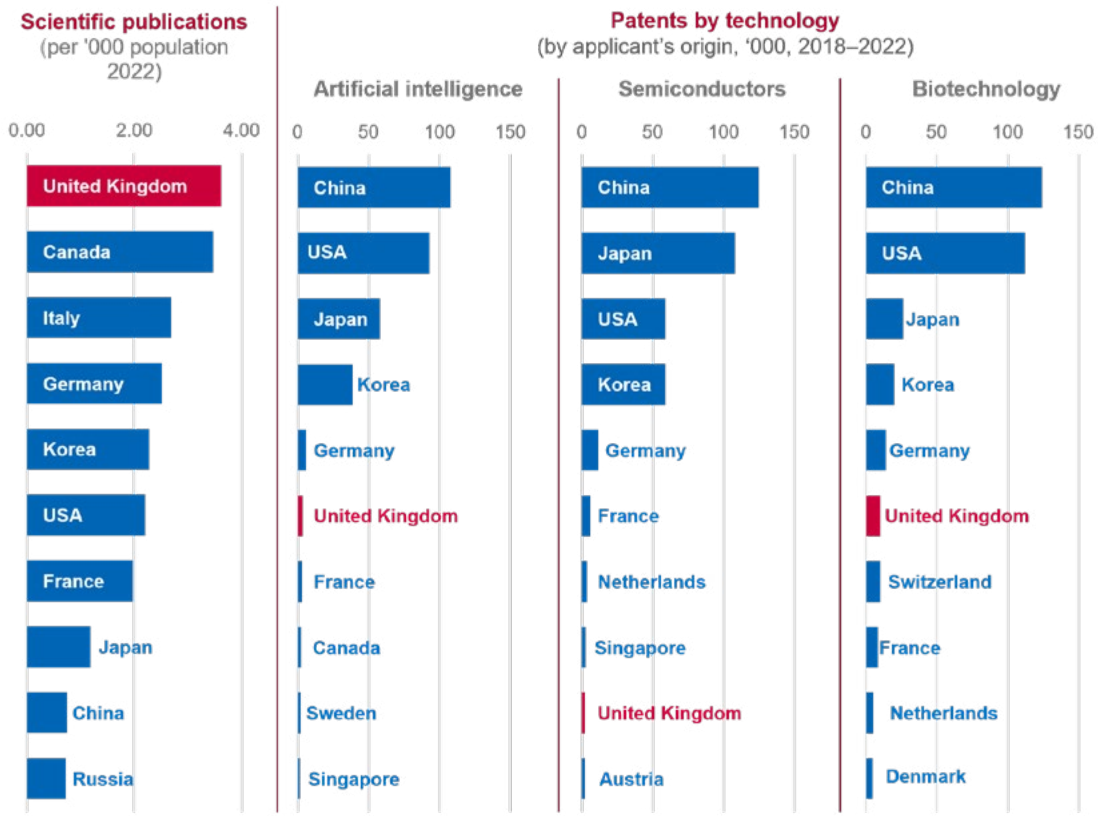


Source: OECD (2025). R&D tax expenditure and direct government funding of BERD.

- Chart 2.4. summarises the government policy mix supporting business R&D, measured as a share of GDP, comparing the **UK** with the **OECD** average.
- Between 2002 and 2023, total government financial support for business R&D increased in both the **UK** (from 0.10% to 0.38% of GDP) and **OECD** (from 0.15% to 0.23%).
- Over the same period, the policy mix shifted markedly towards tax relief, such as R&D tax credits:
  - By 2023, tax credits accounted for 74% of government support for business R&D in the **UK** and 58% in the **OECD**, up from 32% and 25%, respectively, in 2002.
- Recent IMF analysis suggests that while tax credits may increase overall R&D spending, they don't necessarily boost economic growth if funding is misallocated. For example, some resources may be directed towards firms with lower potential impact, while the most promising, high-impact innovators struggle to attract the investment needed to scale up.
- The IMF argues that governments could achieve greater efficiency by targeting R&D support at firms with high expected returns rather than relying on uniform tax credits or subsidies.[1]

Source: [1] Lehr, N. H. (2025). R&D Misallocation and the Productivity Growth Slowdown. *IMF Research Perspective*, 27, International Monetary Fund.

Chart 2.5. World rank of selected innovation outputs



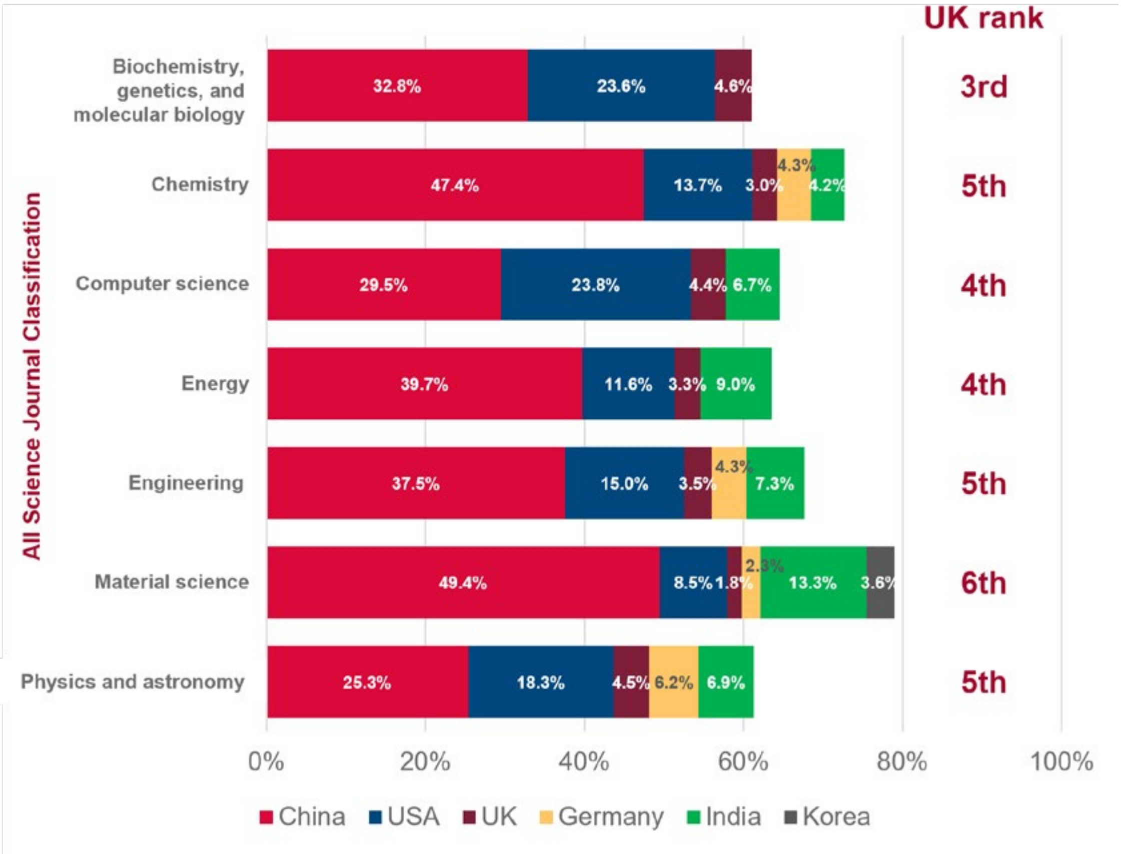
Source: DSIT (2025). International comparison of the UK research base, 2025; WIPO (2025). IP Statistics data centre; and UNIDO (2025). National accounts (population data).

- The **UK** is a global leader in innovation output indicators such as scientific publications and patents.
- In 2022 the **UK** ranked fourth worldwide for total publications, behind only **China,** the **USA**, and **India**. Together, these four countries accounted for 56.6% of global scientific publications that year.
- The **UK** also ranked among the top 10 countries for total patent applications filed between 2018 and 2022 in critical technologies such as artificial intelligence, semiconductors, and biotechnology.[1]
- Despite these strengths, for patent applications the gap between the UK and leading countries, including **Japan**, **Korea**, **China**, and the **USA**, remains significant.

Note: [1] Analysis conducted by CIIP in previous innovation reports shows the UK is also among the top 10 applicants in the world for patents filed in quantum and telecommunications technologies, identified as "critical technologies" by the UK Science and Technology Framework, together with artificial intelligence, semiconductors, and biotechnology.

Chart 2.6. Scientific publications by science field

Share of scientific publications in the world's 10% top-cited scientific publications, 2020-2023



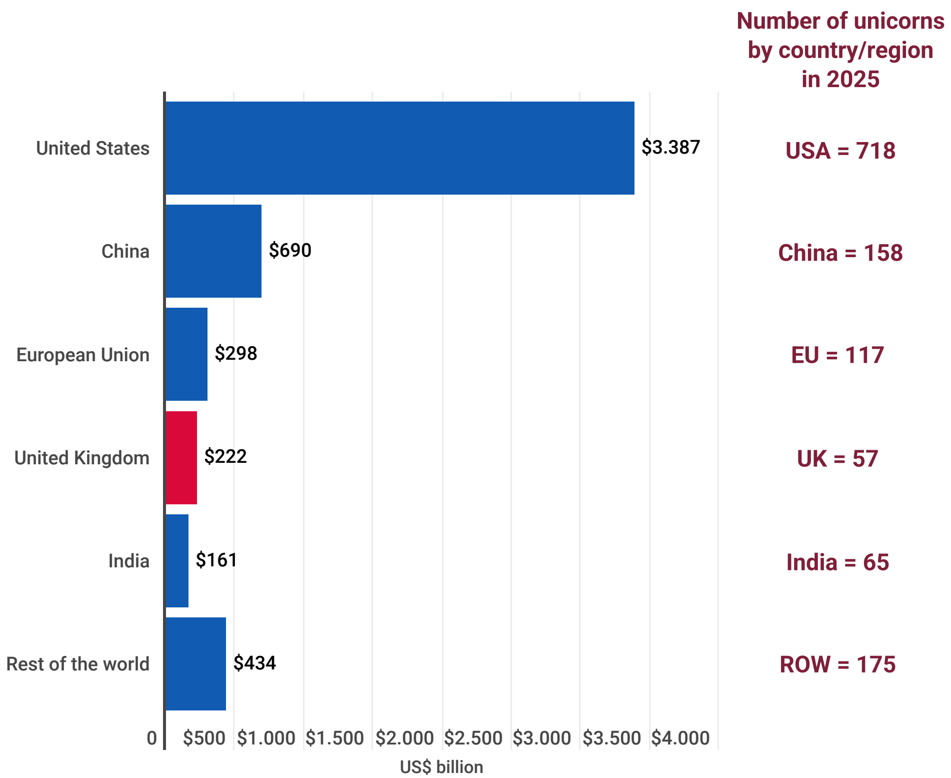
Source: OECD (2025). Bibliometric indicators, by field database.

- All Science Journal Classification is a system used by Scopus to classify academic publications across four broad subject areas: **physical sciences**, **health sciences**, **social sciences**, and **life sciences**.[1]
- The **UK's** position as a leading science location can be better understood by looking at specific technology fields in the areas of **physical sciences** and **life sciences** and the top 10% most-cited scientific publications.
- In several critical scientific fields, the **UK** ranks among the world's top five countries for publications in the top 10% by citations, in a landscape dominated by **China**, with the **USA** accounting for almost 60% of total publications.

Source: [1] Scopus (2026). "What are Scopus subject area categories and ASJC codes?" Elsevier.

Chart 2.7. Unicorns in the world

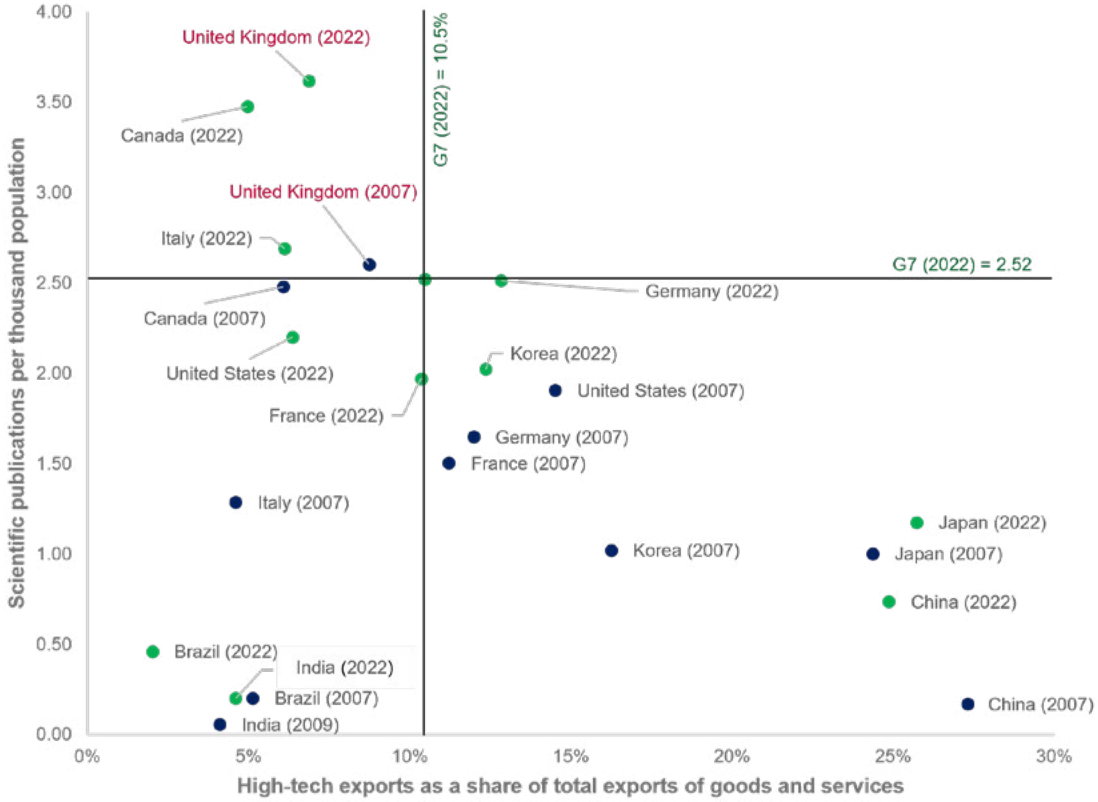
Distribution of unicorns, by valuation in US$ billion, 2025



Source: CB Insights (2025). The Complete List Of Unicorn Companies.

- Unicorns are startup companies valued at US$1 billion.
- In 2025 the **UK** ranked fourth in the world for the total number of unicorns still active, with a total of 57 companies, behind the **USA** (718), **China** (158), and **India** (65).
- In the same year the **UK** ranked third in the world for the value of its unicorns, behind only the **USA** and **China**.
- Unicorns based in the **UK** were valued at US$222 billion, compared with US$298 billion for those based across the EU.

Chart 2.8. From research to market: scientific publications versus high-tech exports performance

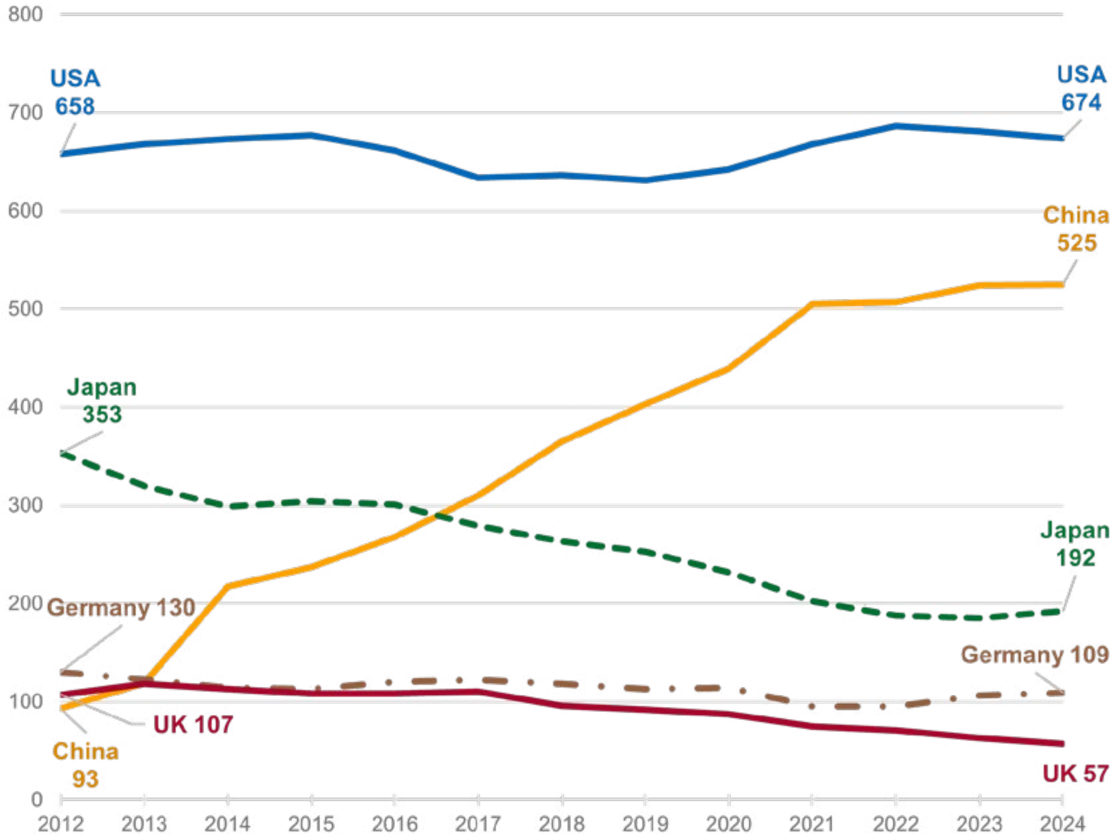


Note: In the World Development Indicators database, *high technology products* are defined according to SITC Rev.4 as the sum of the following products: aerospace, computers–office machines, electronics–telecommunications, pharmacy, scientific instruments, electrical machinery, chemistry, non-electrical machinery, armament. **Source:** DSIT (2025). International comparison of the UK research base, 2025; UNIDO (2025). National accounts (population data); World Bank (2025). World development indicators database.

- The **UK**'s leadership as a science location hub doesn't always translate into value-capture opportunities.
- While the **UK** produces a high volume of scientific publications, it lags behind in technology outputs, as reflected in the relatively low share of high-technology exports in total exports of goods and services.
- While the number of scientific publications per thousand people increased by around 40% between 2007 and 2022, the share of high-technology exports in total exports declined from 8.7% to 6.4%.

Chart 2.9. Top R&D-investing companies in the world

Top 5 countries in 2024, by number of companies in the top 2,000 R&D investing companies, 2012-2024



Source: European Commission (2025). The 2025 EU Industrial R&D Investment Scoreboard.

- The EU Industrial R&D Investment Scoreboard benchmarks the EU's top corporate R&D investors against their global peers. In 2024 the top 2,000 R&D-investing companies included in the scoreboard represented 45 countries investing €1,446 billion in R&D, and accounting for over 90% of global business R&D.
- In 2024 the **UK** was fifth in the world for the number of companies among the top 2,000 R&D-investing companies, with a total of 57 companies, behind the **USA** (674), **China** (525), **Japan** (192), and **Germany** (109).
- Between 2012 and 2024, the **UK** lost over 50% of companies among the top R&D-investing companies in the world, a trend similar to other advanced countries such as **Japan** and **Germany**.
- While the **USA** still led with 674 companies, **China**'s headquartered companies increased by 465%, from 93 to 525 between 2012 and 2024.
- These trends reflect the shift that took place in recent decades in production and innovation patterns from Western countries to **East and Southeast Asian countries**.

THEME 3

Industrial performance – UK electronics and electrical equipment

How are UK electronics and electrical equipment (E&E) sectors performing in terms of productivity, value added, and employment?

Are UK E&E sectors becoming more or less competitive internationally?

How have R&D investments in UK E&E sectors evolved over time?

Theme 3: Industrial performance – UK electronics and electrical equipment (E&E) manufacturing sectors

KEY FINDINGS

A highly productive UK electronics and electrical equipment (E&E) sector, shaped by specialisation rather than scale:

- Crucial for digitalisation and the net zero transition, the UK's E&E sectors together represent 10% of UK manufacturing value added and 13% of UK manufacturing exports. While small compared to other G7 countries and China, they consistently perform strongly on labour productivity.
- This reflects a long-term shift away from price-based competition in high-volume manufacturing towards high-value, specialised, and regulated niches.

Diverging growth paths: electronics expands through niches while electrical equipment faces growth challenges:

- The electronics sector has grown rapidly (5.8% CAGR) in value added since 2000, significantly outperforming UK manufacturing as a whole (1.6% CAGR), driven by sub-sectors such as metrology, photonics, and medical technologies. This growth has occurred alongside major global shifts in electronics manufacturing towards Asia, followed more recently by tariff-driven trade diversion, partial reshoring, and supplier consolidation.
- By contrast, electrical equipment has experienced slower and more volatile growth (0.4% CAGR) since 2000. Recent momentum given by the decarbonisation trend in batteries, grid-related equipment, and energy-efficient equipment has been offset by unmet policy expectations and supply chain constraints.

Productivity gains with employment reductions, persistent trade deficits, and a more contested global market:

- Both sectors have experienced a 50% reduction in employment since 2000, despite rising value added in electronics. This reflects automation and digitalisation of processes, offshoring, consolidation of global suppliers, and acute domestic skills shortages.
- The UK runs large trade deficits – £29 billion for electronics, and £16 billion in electrical equipment – underscoring a limited domestic manufacturing footprint within increasingly competitive international markets.
- While global electronics export shares have begun to rebalance since the mid-2010s, the UK's challenge remains translating R&D strength and emerging investments into domestic scale, resilience, and export competitiveness.

Electronics and electrical equipment (E&E) manufacturing sectors– statistical definition by the Office for National Statistics (ONS) UK SIC 2007

In this report we refer to SIC Divisions 26 and 27 as the **electronics and electrical equipment (E&E)** manufacturing sectors

Division 26: Manufacture of computer, electronic, and optical products, including the following:

- Group 26.1: Manufacture of electronic components and boards – electronic components; loaded electronic boards
- Group 26.2: Manufacture of computers and peripheral equipment
- Group 26.3: Manufacture of communication equipment
- Group 26.4: Manufacture of consumer electronics
- Group 26.5: Manufacture of instruments and appliances for measuring, testing, and navigation; watches and clocks
- Group 26.6: Manufacture of irradiation, electromedical, and electrotherapeutic equipment
- Group 26.7: Manufacture of optical instruments and photographic equipment
- Group 26.8: Manufacture of magnetic and optical media

Characteristics:

The production processes of this division are characterised by the **design and use of integrated circuits** and the application of highly specialised miniaturisation technologies.

Source: ONS. UK SIC 2007 (accessed in December 2025).

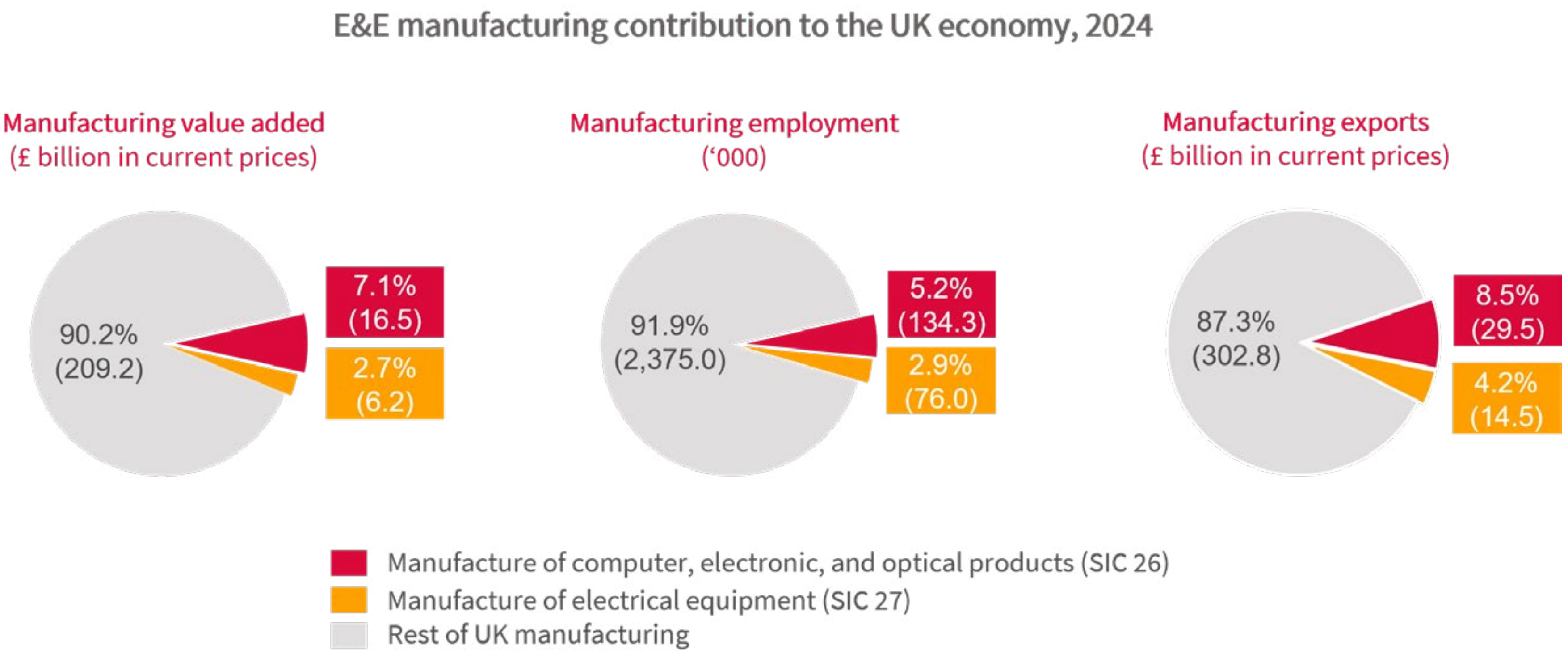
Division 27: Manufacture of electrical equipment, including the following:

- Group 27.1: Manufacture of electric motors, generators, transformers, and electricity distribution and control apparatus
- Group 27.2: Manufacture of batteries and accumulators
- Group 27.3: Manufacture of wiring and wiring devices – fibre-optic cables, other electronic and electric wires and cables, wiring devices
- Group 27.4: Manufacture of electric lighting equipment
- Group 27.5: Manufacture of domestic appliances – electric domestic appliances, non-electric domestic appliances
- Group 27.9: Manufacture of other electrical equipment – battery chargers, solid-state; door opening and closing devices, electrical; electric bells; extension cords made from purchased insulated wire; ultrasonic cleaning machines (except laboratory and dental); solid-state inverters, rectifying apparatus, fuel cells, regulated and unregulated power supplies; uninterruptible power supplies (UPS); surge suppressors (except for distribution level voltage); appliance cords, extension cords, and other electrical cord sets with insulated wire and connectors; carbon and graphite electrodes, contacts, and other electrical carbon and graphite; particle accelerators; electrical capacitors, resistors, condensers, and similar components; electromagnets; sirens; electronic scoreboards; electrical signs; electrical signalling equipment such as traffic lights and pedestrian signalling equipment; electrical insulators (except glass or porcelain), base metal conduit and fittings; electrical welding and soldering equipment, including hand-held soldering irons.

Characteristics:

This division includes the manufacture of products that **generate, distribute, and use electrical power.**

Chart 3.1. UK electronics and electrical equipment (E&E) manufacturing sectors – contribution to the UK economy



Source: ONS (2025). *GDP output approach – low-level aggregates*; ONS (2025). *JOBS03: Employee jobs by industry*; ONS (2025). *JOBS04: Self-employment jobs by industry*; ONS (2025). *UK trade in goods by classification of product by activity time series.*

Chart 3.2. Electronics and electrical equipment (E&E) manufacturing sectors – value added, employment, and productivity

China and G7 countries, ranked by value added, 2022

Country	Manufacture of computer, electronic, and optical products (SIC 26)			Country	Manufacture of electrical equipment (SIC 27)		
	Value added (billion US$)	Employment (thousand persons)	Labour productivity (value added per employee – thousand US$)		Value added (billion US$)	Employment (thousand persons)	Labour productivity (value added per employee – thousand US$)
China	394.3	NA	NA	China	261.8	NA	NA
USA	352.3	367.0	959.9	USA	77.5	1,033.0	75.0
Japan	70.1	592.0	118.4	Japan	54.7	601.0	91.0
Germany	52.4	376.0	139.4	Germany	50.2	506.0	99.2
UK	17.9	116.2	154.0	Italy	14.2	152.7	93.0
France	12.5	88.0	142.0	France	8.3	86.8	95.6
Italy	12.3	104.8	117.4	UK	7.5	69.4	108.1
Canada	6.7	60.7	110.4	Canada	3.9	35.1	111.1

Source: OECD (2025). *Trade in Value Added (TiVA) 2025 edition: Principal Indicators, levels*; OECD (2025). *Annual employment by detailed economic activity, domestic concept.*

Electronics

- In 2022 the **UK** ranked fifth among G7 countries and China in terms of value added (US$18 billion), behind the **USA** (US$352 billion), **China** (US$394 billion), **Japan** (US$70 billion), and **Germany** (US$52 billion).
- But **UK** labour productivity in the electronics sector (at US$154,000 per employee) was higher than that of **Japan** (US$118,400) and **Germany** (US$139,400). These were all dwarfed by the **USA's** productivity in the sector (US$959,900).
- **China** is well known as the largest manufacturer of electronics in the world, which explains its leading value-added position in 2022. The **USA** has a leading position in R&D, design, and manufacturing process technology in electronics. Its semiconductor leadership (50% global market share) is driven by large-scale fabs, which are extremely capital-intensive, explaining its very high value added per worker in 2022.[1]

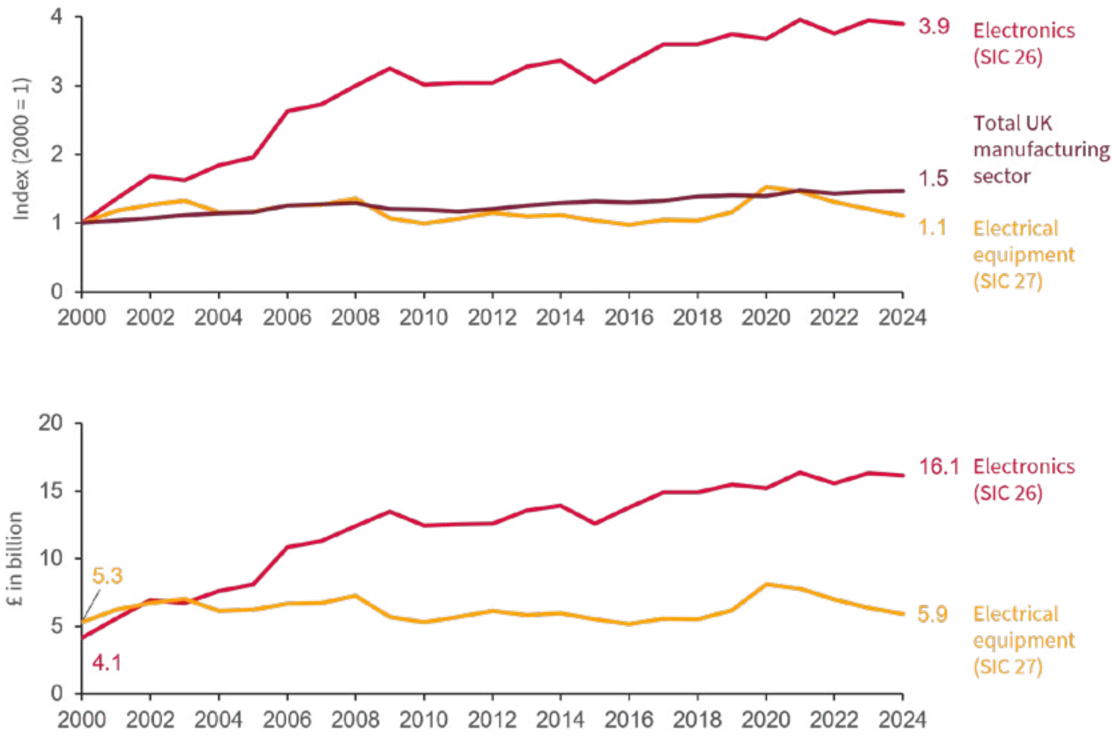
Electrical equipment

- The **UK** had the second-smallest electrical equipment sector in the **G7** in terms of value added (US$7 billion), ahead of **Canada** alone (4 billion).
- **China** dominated the sector in value-added terms, with US$262 billion, followed by the **USA** with US$77 billion.
- But in terms of productivity, the **UK** performed second best of the **G7** countries, with US$108,100 per employee, behind only **Canada** (US$111,100 per employee).

[1] **Source**: Semiconductor Industry Association, 2024 State of the U.S. Semiconductor Industry.

Chart 3.3. UK electronics and electrical equipment (E&E) manufacturing sectors – value added

Billion pounds (£) in chained volume measures (CVM), 2000-2024



Source: ONS (2025). *GDP output approach – low-level aggregates.*

Electronics

- From 2000 to 2024, the **electronics** sector grew at an annual average of 5.8% (CAGR), quadrupling in size from £4.1 billion to £16.1 billion.
- This was higher than the UK manufacturing sector as a whole, which grew at an annual average (CAGR) of 1.6%.
- This sector's growth was driven by an increased global demand for these products, and a restructuring of the sector from price-sensitive, high-volume electronics manufacturing (e.g. consumer electronics, computers) to niches of knowledge-intensive, specialist, low-volume, regulated markets, such as compound semiconductors and photonics.[1]

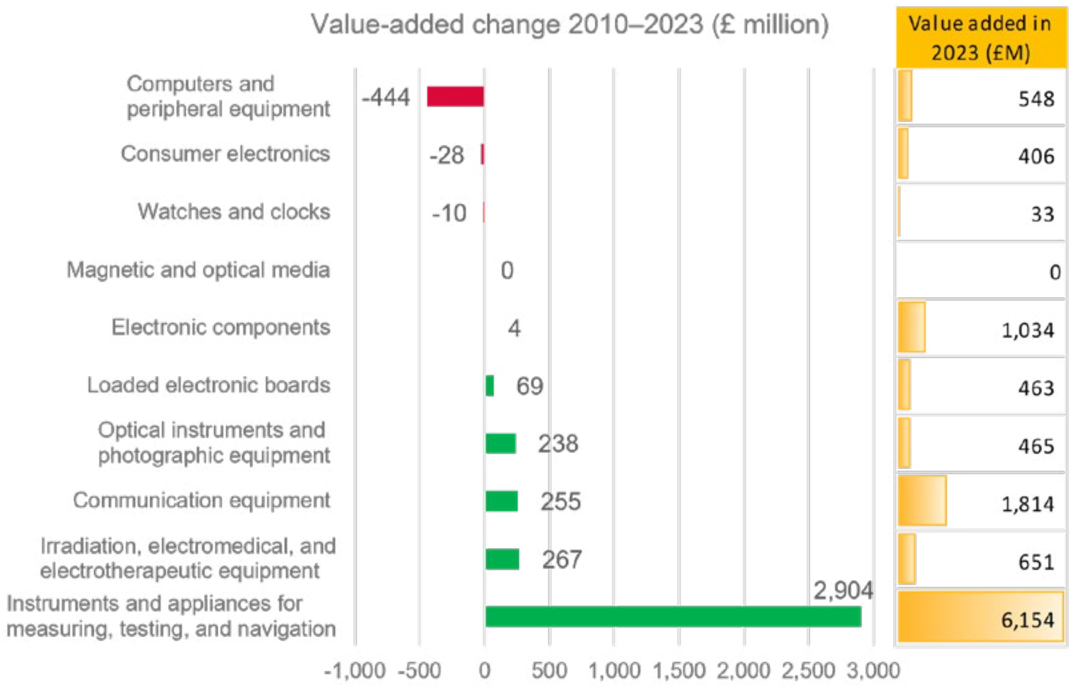
Electrical equipment

- The **electrical equipment** sector, on the other hand, grew at a slower pace than the UK manufacturing sector, at an annual average (CAGR) of 0.4% from 2000 to 2024.
- The sector was relatively stable from 2000 to 2018, and grew significantly from 2018 to 2020, going from £5.5 billion to £8.1 billion. But the COVID-19 pandemic halted this growth spurt, and the sector has been shrinking ever since.
- Competition from China,[2] policy uncertainty, skills shortages,[3] and global equipment supply constraints[4] are among the reasons highlighted for this stagnation.

[1] **Source**: House of Commons (2017). Electronics and Machinery Sector Report.
[2] **Source**: Bank of England (2024). A portrait of the UK's global supply chain exposure.
[3] **Source**: BEAMA (2022). BEAMA – Written evidence – UK energy supply and investment
[4] **Source**: *Financial Times* (2025). How years of waiting for parts is holding up the UK's energy transition.

Chart 3.4. UK electronics manufacturing sector – value added

UK manufacture of computer, electronic, and optical products (SIC 26), current prices



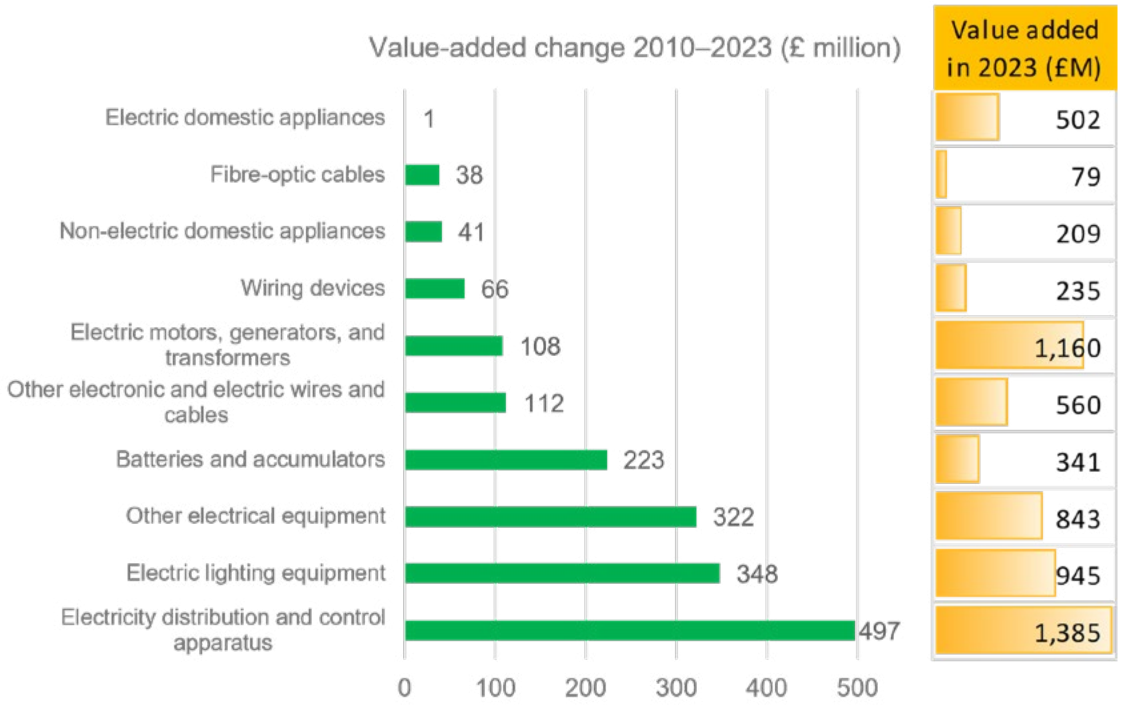
Source: ONS (2025). *Annual business survey.*

- The observed growth in the **electronics** sector was mainly driven by the growth of the **instruments and appliances for measuring, testing, and navigation** sub-sector, whose value added grew by £2.9 billion (5.0% CAGR) between 2010 and 2023.
- This was driven by competitive **UK** manufacturing firms, such as Renishaw and Oxford Instruments. In 2022 Renishaw announced a £50 million investment in two new manufacturing halls at its Miskin (South Wales) site to increase manufacturing capacity.[1]
- Other sub-sectors with significant growth were **irradiation, electromedical, and electrotherapeutic equipment** (4.1% CAGR), **communication equipment** (1.2% CAGR), and **optical instruments and photographic equipment** (5.7% CAGR)
- The decline of the UK **computers and peripheral equipment** sector can be explained by the shift towards specialist contract manufacturers, which concentrated production in large-scale facilities, alongside the global relocation of electronics manufacturing to Asia. Together, these changes intensified cost-based price competition in mass-market hardware, undermining the viability of UK-based manufacturing.[2],[3]

[1] **Source**: Renishaw (2022). Renishaw announces investment of over £50 million for UK manufacturing site.
[2] **Source**: Kawakami (2011). Inter-firm Dynamics in Notebook PC Value Chains and the Rise of Taiwanese Original Design Manufacturing Firms.
[3] **Source**: UK Parliament (2017). Electronics and Machinery Sector Report.

Chart 3.5. UK electrical equipment manufacturing sector – value added

UK manufacture of electrical equipment (SIC 27), current prices



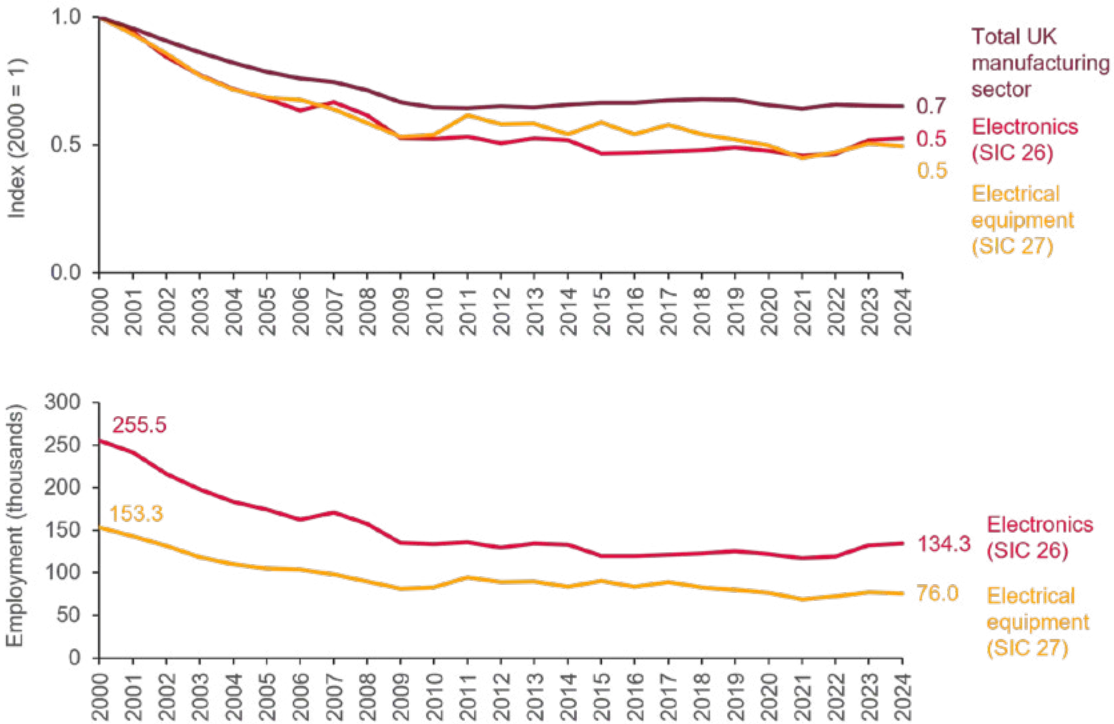
Source: ONS (2025). *Annual business survey.*

- All sub-sectors in the **electrical equipment** sector experienced an increase in value added between 2010 and 2023, despite modest aggregate growth (0.4% CAGR).
- The most significant gainers in absolute terms were **electricity distribution and control apparatus** (3.5% CAGR), **electric lighting equipment** (3.6% CAGR), and **other electrical equipment** (3.8% CAGR).
- The growth in **electricity distribution and control apparatus** was driven by rising demand from the energy transition and electric vehicle market. For example, in 2023 Schneider Electric announced a £7.2 million expansion investment of its switchgear production facility in Leeds to accommodate increased demand.[1]
- But the sector with the highest growth *rate* in the period was **batteries and accumulators** (8.5% CAGR). There have been many recent big-ticket battery gigafactory announcements: Agratas £4 billion gigafactory in Somerset, AESC building a second Sunderland plant, and West Midlands Gigafactory plans.[2] In addition, the UK Battery Innovation Programme – a manufacturing scaleup and skills platform – has supported more than 140 UK battery developers and raised more than £1 billion in VC investments since 2018.[3]

[1] **Source**: Schneider Electric (2023). Schneider Electric Announces Expansion in Leeds
[2] **Source**: The Faraday Institution (2024). UK gigafactory outlook (September 2024).
[3] **Source**: The Faraday Institution (n.d.). The Battery Innovation Programme.

Chart 3.6. UK electronics and electrical equipment (E&E) manufacturing sectors – employment

Thousand employees, 2000-2024



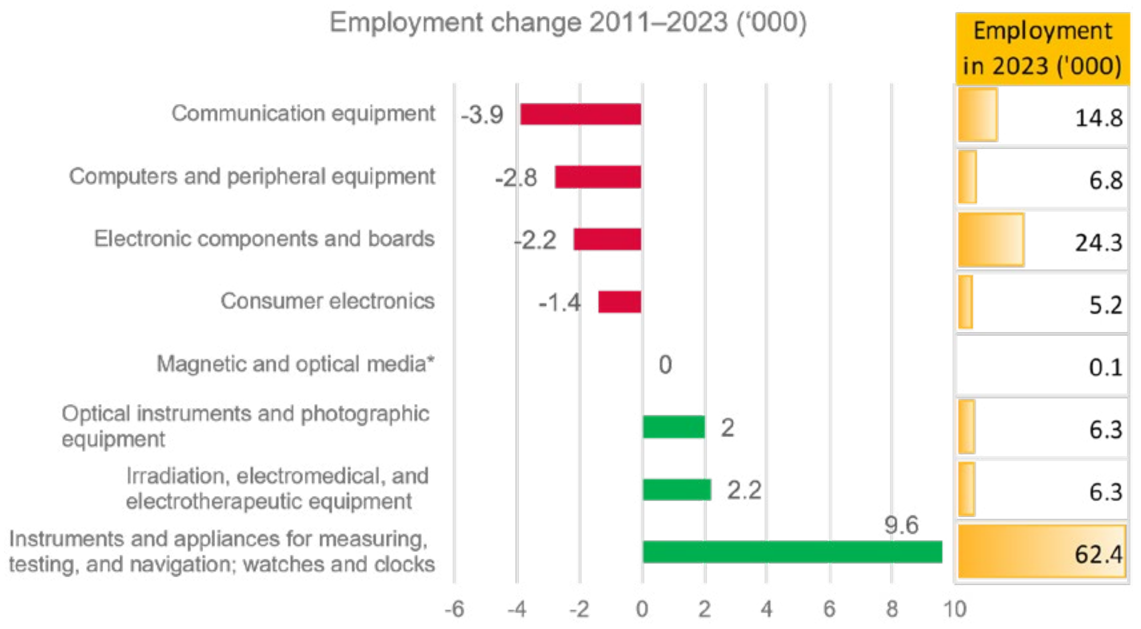
Note: Data from 2019 onwards has been reweighted, causing a step change discontinuity. Please see ONS explanation for further detail.
Source: ONS (2025). *JOBS03: Employee jobs by industry*; ONS (2025). *JOBS04: Self-employment jobs by industry.*

- Both the **electronics** and **electrical equipment** sectors lost roughly half of their employees between 2000 and 2024.
- This sharp decrease was steeper than the reduction that occurred in the manufacturing sector as a whole, which saw a 30% reduction in workers in the same period.
- In **electronics** this reduction in employment, despite a growth in value added, can be explained by the fact that a large part of the sector's growth is in very high productivity activities, while there has been a reduction in more labour-intensive electronic manufacturing activities. Also, this sector is increasingly automated, adding to the negative employment trend.[1]
- In **electrical equipment** the more modest growth rates of value added in the period, allied with the outsourcing/offshoring trend of the sector, help to explain the employment reduction.
- Finally, stakeholders in both sectors have been very vocal about the serious skills gaps in the UK workforce,[2],[3] which makes recruitment difficult and increases automation efforts.

[1] **Source**: UK Parliament (2017). Electronics and Machinery Sector Report.
[2] **Source**: BEAMA (2022). BEAMA – Written evidence – UK energy supply and investment
[3] **Source**: MTC (2022). The UK semiconductor industry: current landscape and future opportunities.

Chart 3.7. UK electronics manufacturing sector – employment

UK manufacture of computer, electronic, and optical products (SIC 26), GB only#



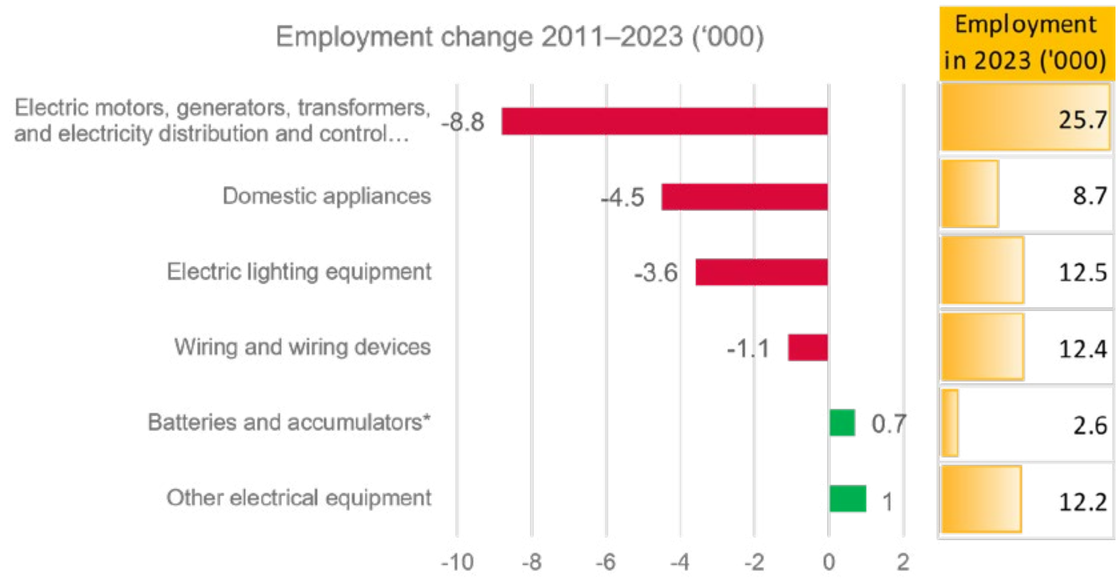
Note: *Data for the manufacture of magnetic and optical media is for 2019; #employment data for Great Britain (GB) only; data for Northern Ireland is unavailable.
Source: ONS (2011 and 2023). *Business register and employment survey.*

- In terms of employment in the **electronics** sector, the biggest increase in absolute terms was in **instruments and appliances for measuring, testing, and navigation; watches and clocks**, in which employment grew by 9,600 between 2011 and 2023.
- Other sub-sectors also had significant employment growth, such as **irradiation, electromedical, and electrotherapeutic equipment** and **optical instruments and photographic equipment**.
- Four sub-sectors reduced their employment in absolute terms from 2011 to 2023: **communication equipment, computers and peripheral equipment, electronic components and boards,** and **consumer electronics**.
- These employment trends mirror the value-added trends and can therefore be explained by the business dynamics of each sub-sector.
- The only exception was **communication equipment**, in which, despite significant value-added growth, there was the largest reduction in employment in absolute terms. In this period there was a consolidation of 5G equipment suppliers (from 10 to 2 – Nokia and Ericsson), which could have been accompanied by increased imported content of domestic UK manufacturing, leading to growth without domestic employment.[1]

[1] **Source**: UK Parliament (2021). The 5G supply chain diversification strategy.

Chart 3.8. UK electrical equipment manufacturing sector – employment

UK manufacture of electrical equipment (SIC 27), GB only#

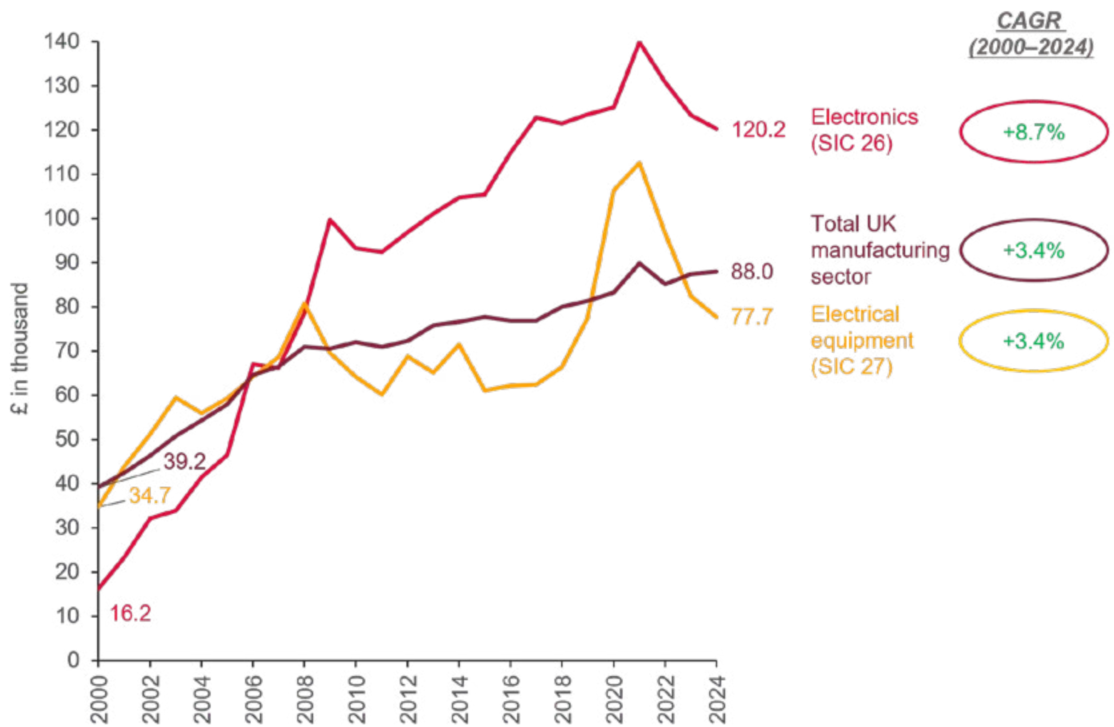


Note: *Data for the manufacture of batteries and accumulators (SIC 27.2) is for 2019; #employment data for Great Britain (GB) only; data for Northern Ireland is unavailable.
Source: ONS (2011 and 2023). *Business register and employment survey.*

- For employment in the **electrical equipment** sector, the picture is less positive across sub-sectors.
- The only two positive performers were **other electrical equipment** and **batteries and accumulators**.
- Other sub-sectors had significant reductions, such as **electric motors, generators, transformers, and electricity distribution and control apparatus** (8,800 reduction), domestic appliances (4,500), and **electric lighting equipment** (3,600).
- This declining employment trend reflects the modest growth performance of the sector in the period, combined with automation and digitalisation of processes. Skills shortages and difficulties filling vacancies (which can take 6–12 months) contribute to this push towards the rationalisation of production.

Chart 3.9. UK electronics and electrical equipment (E&E) manufacturing sectors – labour productivity

Value added per employee (£ thousand in chained volume measure, CVM), 2000-2024



Source: ONS (2025). *GDP output approach – low-level aggregates*; ONS (2025). *JOBS03: Employee jobs by industry*; ONS (2025). JOBS04: *Self-employment jobs by industry.*

- The evolution of labour productivity in the E&E sector has been heterogenous.
- The **electronics** sector had an excellent performance, with 8.7% annual average growth (CAGR) between 2000 and 2024, but with a negative trend after the COVID-19 pandemic.
- The **electrical equipment** sector had a more volatile trajectory: growth on par with the UK manufacturing sector from 2000 to 2008; sub-par performance from the 2009 global financial crisis until 2018; a growth spurt from 2018 until the COVID-19 pandemic; and a sharp decrease after 2021.
- The reduction in productivity after the pandemic was driven by a significant increase in employment without an equivalent increase in value added. This can be related to new projects (e.g. new semiconductor or battery fabs) being developed but not reaching their potential in terms of value added. Some anticipation of growth in future demand due to the digitalisation and electrification trends may also be evident, as companies seek to secure the workforce in advance to allow for fast ramp-up.

Chart 3.10. Electronics and electrical equipment (E&E) manufacturing sectors – trade balance

Ranked by trade balance, 2023

Manufacture of computer, electronic, and optical products (SIC 26)		
Rank (out of 163)	Economy	US$ billion
1	Taiwan*	138.4
2	China	63.4
3	Malaysia	53.9
4	Korea	46.0
5	Singapore	33.3
...		
160	Canada	-23.6
161	UK	-28.9
162	India	-67.4
163	USA	-194.2

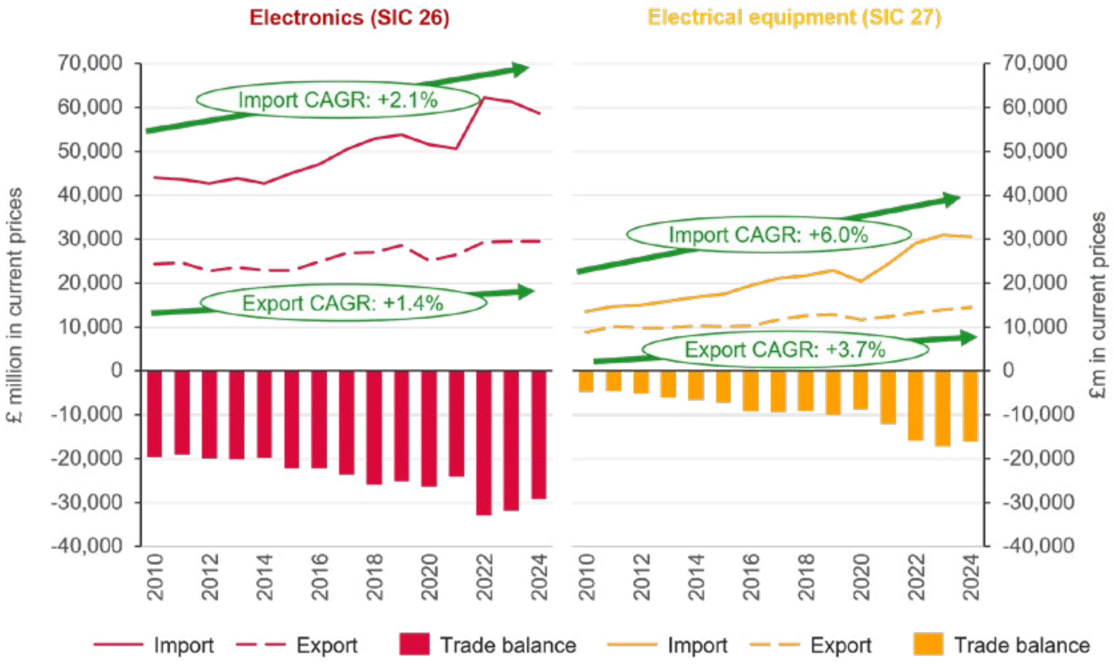
Manufacture of electrical equipment (SIC 27)		
Rank (out of 163)	Economy	US$ billion
1	China	239.0
2	Germany	20.5
3	Japan	11.3
4	Mexico	10.6
5	Italy	6.4
...		
160	Australia	-12.3
161	Canada	-16.8
162	UK	-17.8
163	USA	-112.8

Note: In UNCOMTRADE, Taiwan's trade data is classified as "Other Asia, nes". In practice, only Taiwan data is included under this code.
Source: UN Comtrade (accessed in December 2025).

- The **UK** has a significant trade deficit in both the **electronics** and **electrical equipment** sectors, according to UN Comtrade data.
- By international comparison, this means the **UK** had the third-largest deficit in **electronics** in 2023, smaller only than that of the **USA** and **India**.
- In **electrical equipment**, the **UK** had the second-largest trade deficit in the world in 2023, smaller only than that of the **USA**.
- The sectoral trade deficits of the **USA** can be explained by the sheer size of its domestic market, as imports trump exports despite a high sectoral value added. In the **UK** the negative trade balance reflects its reliance on imported consumer electronics (e.g. smartphones and computers) and electronic components (e.g. microchips).

Chart 3.11. UK electronics and electrical equipment (E&E) manufacturing sectors – trade balance

£ million in current prices, 2010-2024

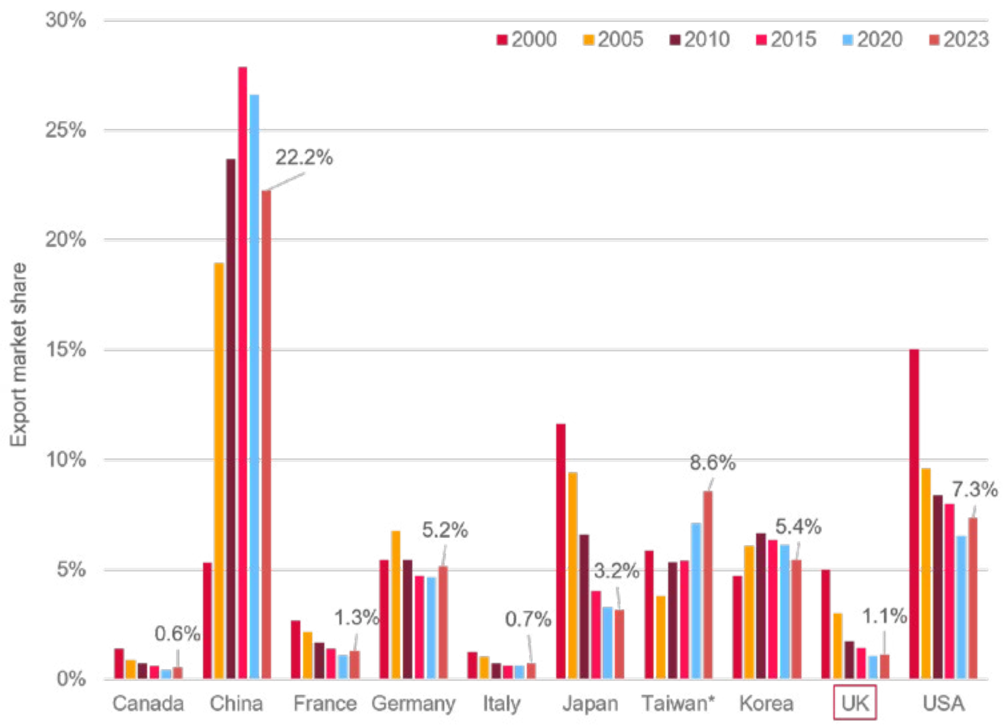


Source: ONS (2025). *UK trade in goods by classification of product by activity time series.*

- According to ONS data, the UK's trade deficits in both **electronics** and **electrical equipment** have been increasing since 2010.
- Exports have increased in both sectors, but at a faster rate in **electrical equipment** (3.7% CAGR) than **electronics** (1.4% CAGR).
- But imports in both sectors have risen at a faster pace (6.0% CAGR in electrical equipment and 2.1% CAGR in electronics), increasing the gap over time.

Chart 3.12. Electronics manufacturing sector – global export market share

Manufacture of computer, electronic, and optical products (SIC 26), selected economies, 2000-2023



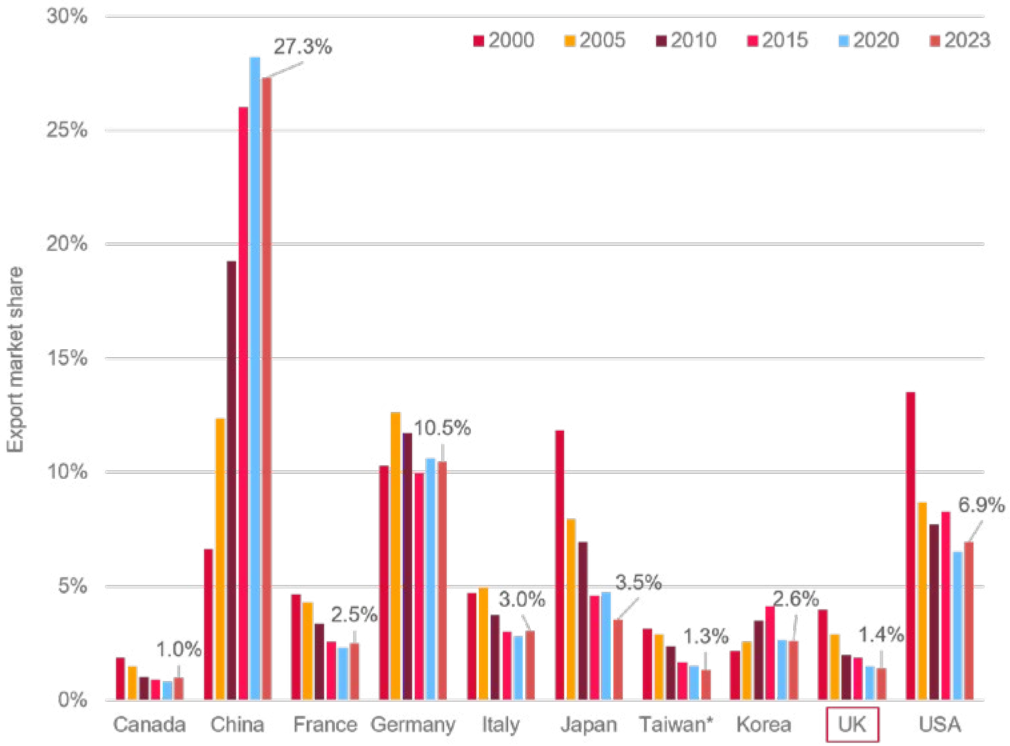
Note: In UNCOMTRADE, Taiwan's trade data is classified as "Other Asia, nes". In practice, only Taiwan data is included under this code.
Source: UN Comtrade (accessed in December 2025).

- The **UK** global export market in **electronics** went from 5% in 2000 to 1.1% in 2023.
- Globally, the export market in 2023 was dominated by **China** (22.2%), **Taiwan** (8.6%), the **USA** (7.3%), **Korea** (5.4%), **Germany** (5.2%), and **Japan** (3.2%).
- But there have been important changes in the market since 2000. From 2000 to 2015, many leading countries, including **Japan**, the **USA**, the **UK**, **Germany**, **France**, **Canada**, and **Italy** lost market shares to **China –** and to a lesser extent to **Taiwan** and **Korea**.
- Since 2015, however, there has been a slight reversal of this trend, with the **USA**, **Germany**, **France**, the **UK**, **Italy**, and **Canada** (and other non-G7 countries) recovering market shares from **China** and **Korea**.
- The exceptions are **Taiwan**, which continuously gained market shares from 2005, and **Japan**, which continuously lost market share from 2000, albeit stabilising after 2015.
- A meaningful part of **China's** loss of market share can be explained by trade diversion after the USA began imposing tariffs and restrictions (from 2018 onwards). Since then, market shares increased in the **USA, EU countries**, and **Taiwan**.[1],[2] **China's** increasing wages might also explain some of the reduction in exports as companies seek to relocate to other countries.[3]

[1] **Source**: UNCTAD (2019). Trade and trade diversion effects of United States tariffs on China.
[2] **Source**: Federal Reserve (2024). Global trade patterns in the wake of the 2018-2019 U.S.-China tariff hikes.
[3] **Source**: Xing (2018). Rising wages, yuan's appreciation and China's processing exports.

Chart 3.13. Electrical equipment manufacturing sector – global export market share

Manufacture of electrical equipment (SIC 27), selected economies, 2000-2023



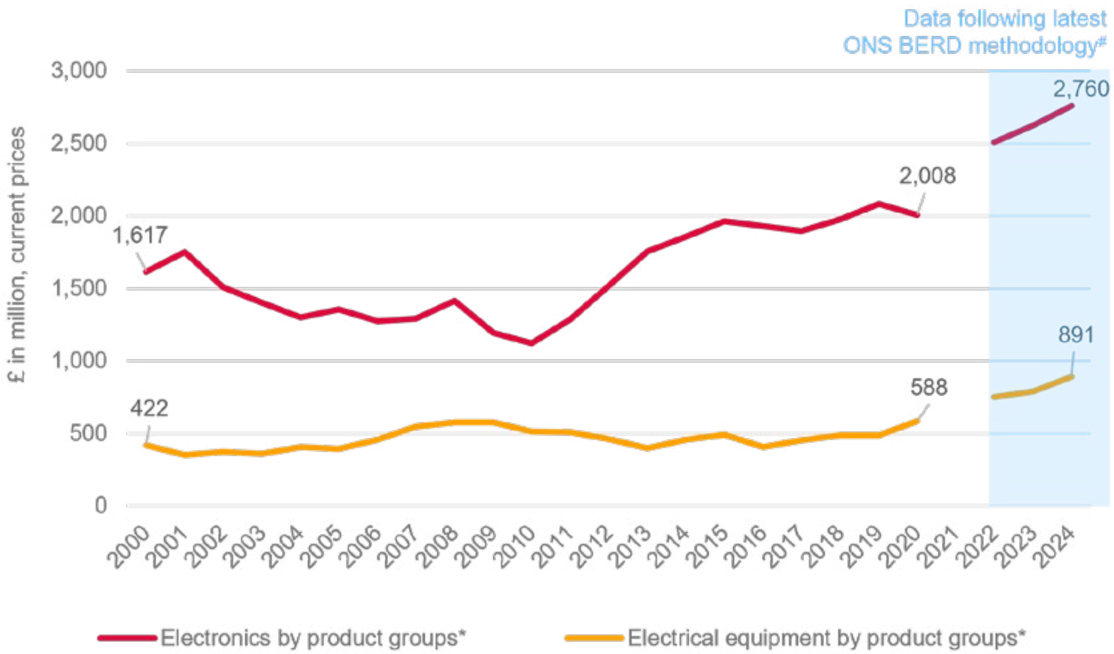
Note: In UNCOMTRADE, Taiwan's trade data is classified as "Other Asia, nes". In practice, only Taiwan data is included under this code.
Source: UN Comtrade (accessed in December 2025).

- The **UK** has a small share of the global **electrical equipment** export market (1.4% in 2023).
- **China** dominates global exports in this sector, with a 27.3% export share in 2023. Other globally dominant countries include **Germany**, the **USA**, and, to a lesser extent, **Japan**, **Italy**, **Korea**, and **France**.
- The trend for this sector was less convoluted than that of **electronics**. The general trend was a loss of market share to China. While in the early 2000s Chinese companies were competing mostly on lower prices, since then they have caught up on quality. Sector experts explained that as many key patents in the sector expired, Chinese companies were able to legally produce electrical equipment with state-of-the-art technology.
- From 2020 there was a slight recovery from some countries, such as **Germany**, the **USA**, **Italy**, **France**, and **Canada.** This could have been driven by the higher demands of clients and more stringent regulations on the sustainability of products, clean power, and energy efficiency, such as the Ecodesign for Sustainable Products Regulation (ESPR)[1] implemented by the EU and UK.

[1] **Source**: European Commission (2024). Ecodesign for Sustainable Products Regulation.

Chart 3.14. UK electronics and electrical equipment (E&E) manufacturing sectors – business spending on R&D (BERD)

£ million in current prices, 2000-2024



Note: Developed by the ONS, the term "product group" refers to business R&D expenditure allocated to the product group that best describes the subject type of R&D activities carried out by firms, rather than being based on the economic activities SIC classification.
*The product group of electronics includes *computers and peripheral equipment*; *consumer electronics and communication equipment and precision instruments and optical products*; *photographic equipment*; and the product group of electrical equipment includes *electrical equipment.*
#The ONS has revised the methodology for BERD since 2022. Please see ONS (2023). Update on transformation of research and development statistics: November 2023.
Source: ONS (2025). *Business enterprise research and development, UK: 2024*; ONS (2021). *Business enterprise research and development time series.*

- The R&D expenditure of the **electronics** sector fell between 2000 and 2010 (the global financial crisis) but has been on a growth trend since then.
- This growth in R&D investments after 2010[1] may be explained by the more generous (or heightened awareness of) R&D incentives with the transformation of the Technology Strategy Board into Innovate UK in 2007 and the consolidation of the Catapult Centres in 2011.
- The **electrical equipment** sector, on the other hand, remained relatively stable between 2000 and 2019. But since the COVID-19 pandemic, R&D investments in the sector have grown.

[1] **Source**: DSIT (2023). 2023 Update to the 'Catapult Network Review'.

UNIVERSITY OF CAMBRIDGE

Cambridge Industrial Innovation Policy

THEME 4

Science and engineering workforce

Is the UK producing enough scientists and engineers?

Are there skills shortages in the UK job market?

How does this compare with other countries?

Theme 4: Science and engineering workforce

KEY FINDINGS

Delivering the UK's Industrial Strategy will require a rapid expansion and better alignment of post-secondary education in science, technology, engineering, and mathematics (STEM) disciplines to meet the future demand for qualified professionals:

- The eight priority sectors (IS-8) identified in the 2025 UK Industrial Strategy already rely on graduates for 64% of their workforce, compared with 52% across total UK employment.
- Between 2025 and 2030, around 82% of new jobs in priority occupations will require post-secondary education.
- Despite strong overall STEM output, the UK lags behind its international peers in terms of engineering, manufacturing, and construction graduates.

The UK graduate labour market is characterised by strong wage returns for STEM disciplines, but also by skills imbalances and persistent gender pay gaps:

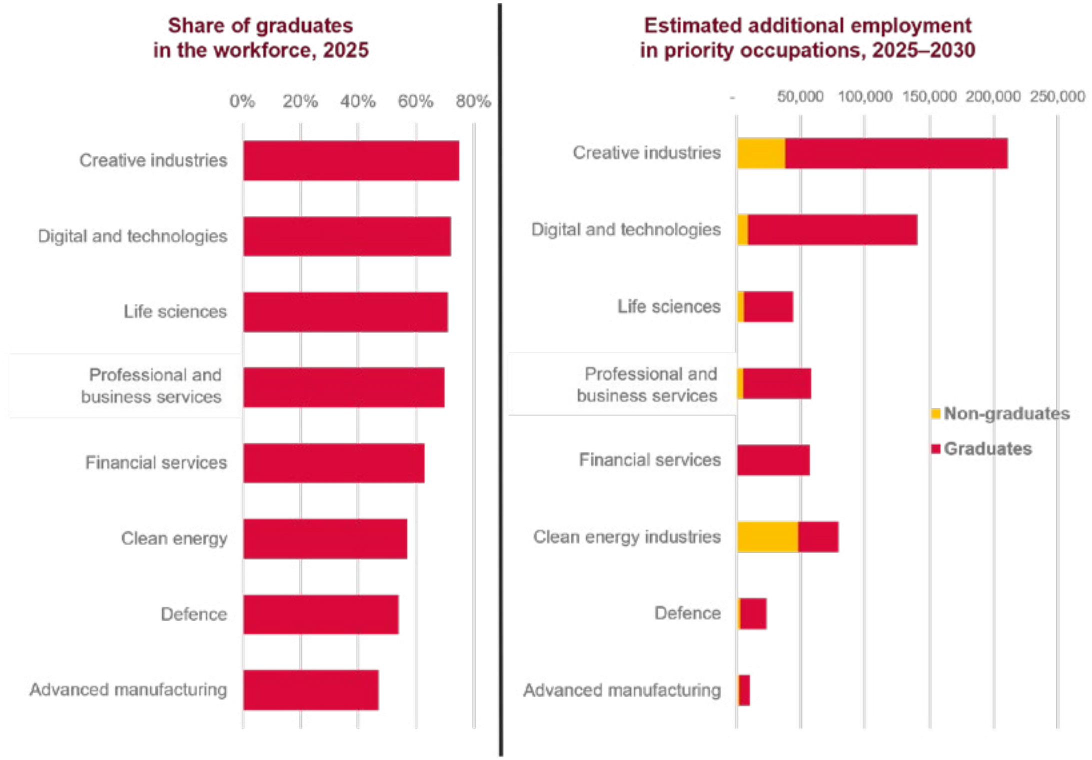
- In 2024, 25% of UK adults aged 25–64 with tertiary education held a degree in STEM disciplines, similar to the OECD average (26%) but below countries such as Germany (34%) and Switzerland (30%).
- The UK was among the OECD countries with the highest wage premiums for STEM graduates in 2023, with workers holding a STEM degree earning 18% more than the average worker, comparable to the USA (20%) and higher than Germany (10%).
- The average gender pay gap for tertiary-educated women in STEM disciplines was 18% across OECD countries in 2023, while UK women with a STEM degree earn roughly 21% less than men with the same qualification.

Despite easing vacancy levels, the UK labour market faces persistent and structural skills shortages, with employers struggling to recruit suitably qualified workers for priority occupations critical to future growth:

- In 2024 skills-shortage vacancies (i.e. they are hard to fill because of a lack of relevant skills, experience, or qualifications among applicants) accounted for 27% of all vacancies.
- In the same year the UK presented a relatively high skills shortage in training and education, medicine knowledge, and scientific knowledge, impacting professions such as teachers, health professionals, and engineers.
- In 2025, 76% of engineering employers reported difficulties recruiting personnel with the required skills, with specialist sustainability skills most frequently cited as the main challenge.

Chart 4.1. The UK Industrial Strategy skills need

Contribution of graduates to the UK Industrial Strategy growth-driving (IS-8) sectors



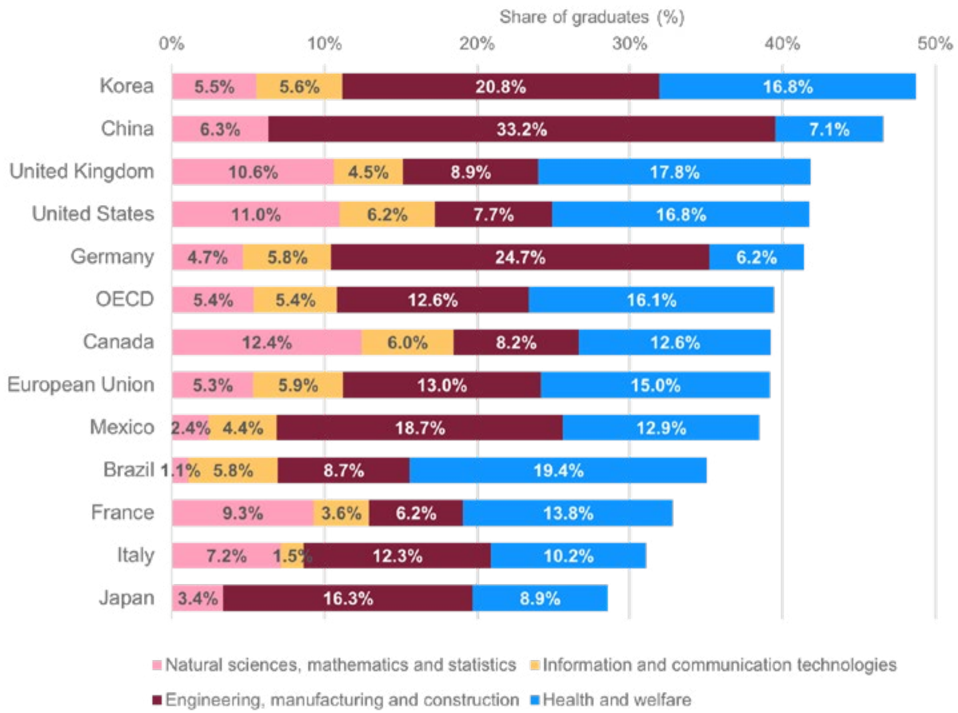
Note: Graduates have a qualification corresponding to Level 4 or above of the Frameworks for Higher Education Qualifications of UK degree-Awarding Bodies, such as post-secondary technical education and short-cycle tertiary education; Bachelor's degrees, Master's courses, and PhDs. **Sources:** *left* – Universities UK (2025). Industrial Strategy – Supporting Evidence; *right* – Skills England (2025). Assessment of priority skills to 2030.

- The **UK** Modern Industrial Strategy, launched in 2025, identifies eight sectors (IS-8) with the highest potential to drive economic growth.
- In 2025 graduates accounted for an average 64% of employment in the IS-8, against 52% of the total employment in the **UK**.
- Skills England estimates that IS-8 sectors will demand an additional 623,000 jobs between 2025 and 2030 in the so-called "priority occupations" – "*occupations which are expected to see growth in employment over the next five years; currently face skills shortages; are in high demand; or have high importance to the sector*".[1]
- Between 2025 and 2030, an average 82% of new jobs in priority occupations will require a post-secondary level of education or above.
- Achieving the objectives of the **UK** Industrial Strategy will require close coordination with further education and higher education organisation providers in the UK to ensure the supply of graduates meets future demand.

[1] **Source**: Skills England (2025). Assessment of priority skills to 2030.

Chart 4.2. Graduates in STEM and health disciplines

Bachelor's or equivalent level, share of total graduates, selected countries, 2023 or latest



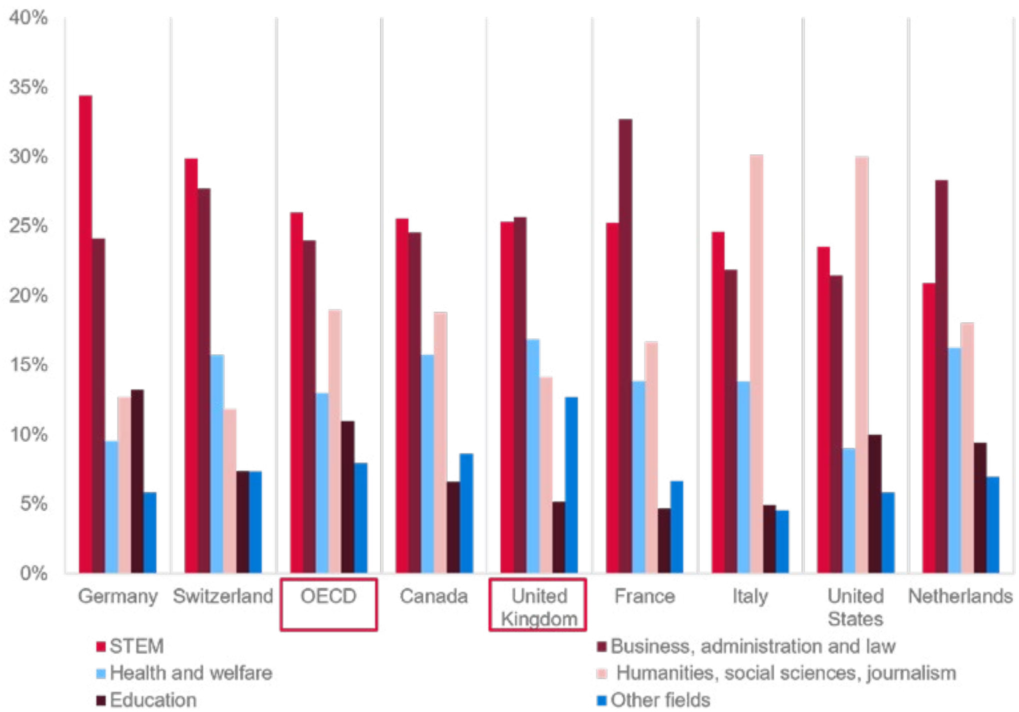
Note: STEM = science, technology, engineering, mathematics. China data refers to 2022. "Information and communication technologies" data is not available for China and Japan.
Source: OECD (2025). Education at a Glance 2025 database; China Innovation Economy Information Net – CEE (2025). Number of regular undergraduate students by academic discipline.

- In 2023, 41.3% of new graduates with a Bachelor's degree in the **UK** were from a STEM (science, technology, engineering, and mathematics) or health discipline, a share similar to that in the **USA** (41.7%) and **Germany** (41.4%).
- This figure was above the **OECD** average (39.4%) but below that of countries such as **Korea** (48.8%) and **China** (46.6%).
- The share of **UK** Bachelor's degree graduates in engineering, manufacturing, and construction (8.9%) was low relative to both the **OECD** average (12.6%) and countries such as **China** (33.2%), **Germany** (24.7%), **Korea** (20.8%), **Mexico** (18.7%), and **Japan** (16.3%).
- In 2023 the UK produced around 53,000 engineering, manufacturing, and construction graduates,[1] while Skills England estimates that there will be a demand for approximately 180,000 qualified workers in these priority occupations between 2025 and 2030.[2]
- Demand for engineering skills will continue to be strong,[3] suggesting the need to both increase the number of graduates in this field and align the skills offer with employer demand.

[1] **Source**: OECD (2025). Education at a Glance 2025 database.
[2] **Source**: Skills England (2025). Assessment of priority skills to 2030.
[3] **Source**: National Engineering Policy Centre (2025). Engineers 2030.

Chart 4.3. Field of study among tertiary-educated adults

Share of adults aged 25–64 with tertiary attainment, selected countries, 2024



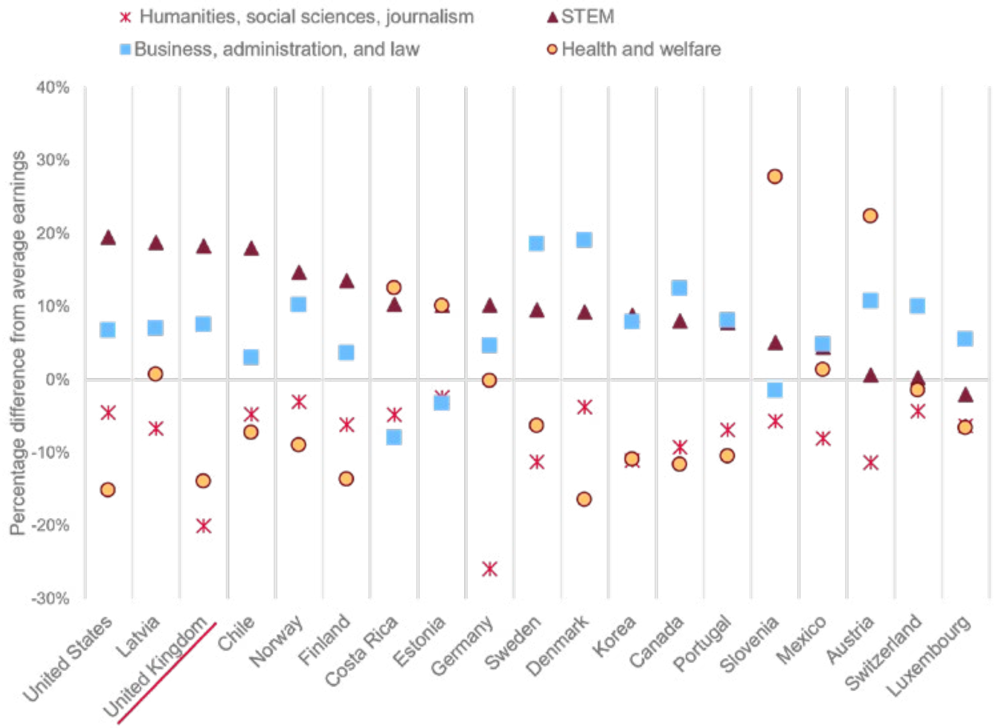
Note: STEM = science, technology, engineering, mathematics. Other fields include disciplines that don't belong to the other categories as per International Standard Classification of Education (ISCED) **Source:** OECD (2025). Education at a Glance 2025 database.

- The **UK** has one of the most highly educated workforces in the world. In 2023, 53% of adults aged 25–64 held a tertiary education qualification, well above the **OECD** average of 41%.[1]
- In 2024, when comparing the field of study of tertiary-educated adults in the **UK** with the **OECD** average, the UK showed a broadly similar distribution in STEM (25% in the UK versus 26% in the **OECD**) and in business, administration, and law (26% versus 24%).
- But the **UK** has a much smaller share of tertiary-educated adults in the area of education than the **OECD** average (5% versus 11%), while it has a much larger share in "other fields" (13% versus 8%).
- By contrast, countries with a relatively high contribution of manufacturing to GDP, such as Germany and Switzerland, have a higher share of tertiary-educated adults in STEM disciplines than both the **OECD** average and the **UK**.

[1] **Source**: OECD (2025). Population with tertiary education indicator.

Chart 4.4. Relative earnings of tertiary-educated adults

By field of study, tertiary-educated, full-time, full-year workers aged 25–64, selected countries, 2023



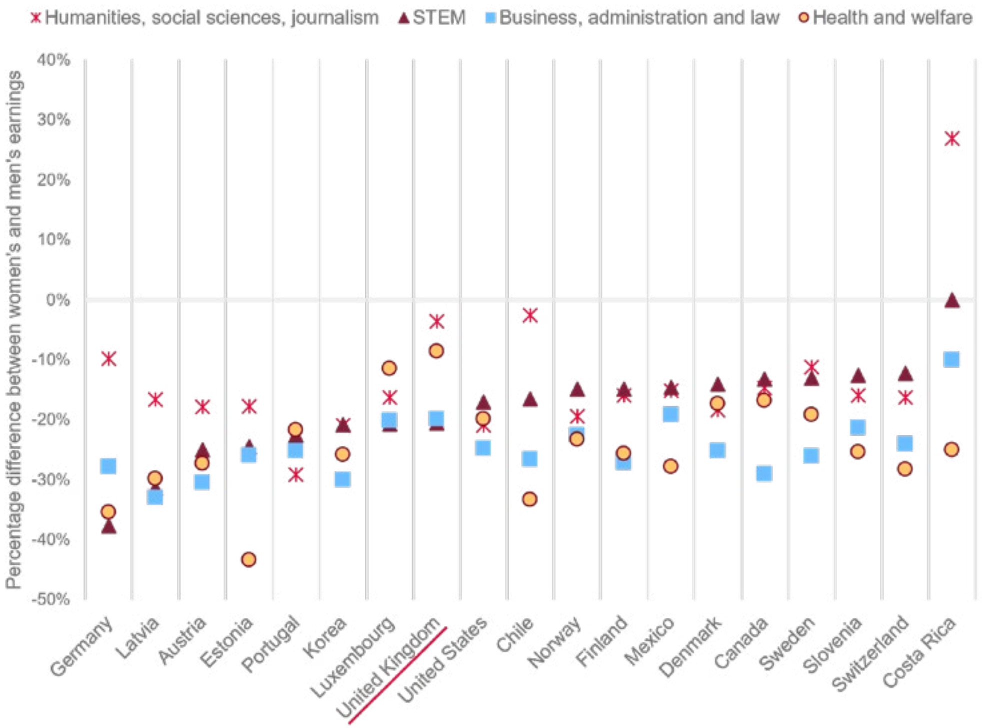
Note: STEM = science, technology, engineering, mathematics.
Source: OECD (2025). Education at a Glance 2025.

- The **UK** is among the countries with the highest wage premium for graduates in STEM disciplines, as measured by the percentage difference in earnings of a STEM graduate from the average earnings.
- In 2023 a **UK** worker with a STEM degree earned 18% more than the average worker, a premium similar to that in the **USA** (20%) and higher than **Germany** (10%) and **Switzerland** (0%).
- Degrees in business, administration, and law also offered a relatively high wage premium: 8% in the **UK** compared with 7% in the **USA**, 5% in **Germany**, and 10% in **Switzerland**.
- These patterns may reflect sectoral wage dynamics. In 2022/23, only 51% of **UK** engineering and technology graduates entered **manufacturing** (30%) or **professional, scientific,** and **technical services** (21%), with the remainder spread across sectors with different wage profiles. [1]

[1] **Source**: HESA (2025). Figure 11 - Standard industrial classification of graduates entering work in the UK by subject area of degree.

Chart 4.5. Gender pay gap by field of study

Tertiary-educated, full-time, full-year workers aged 25–64, selected countries, 2023



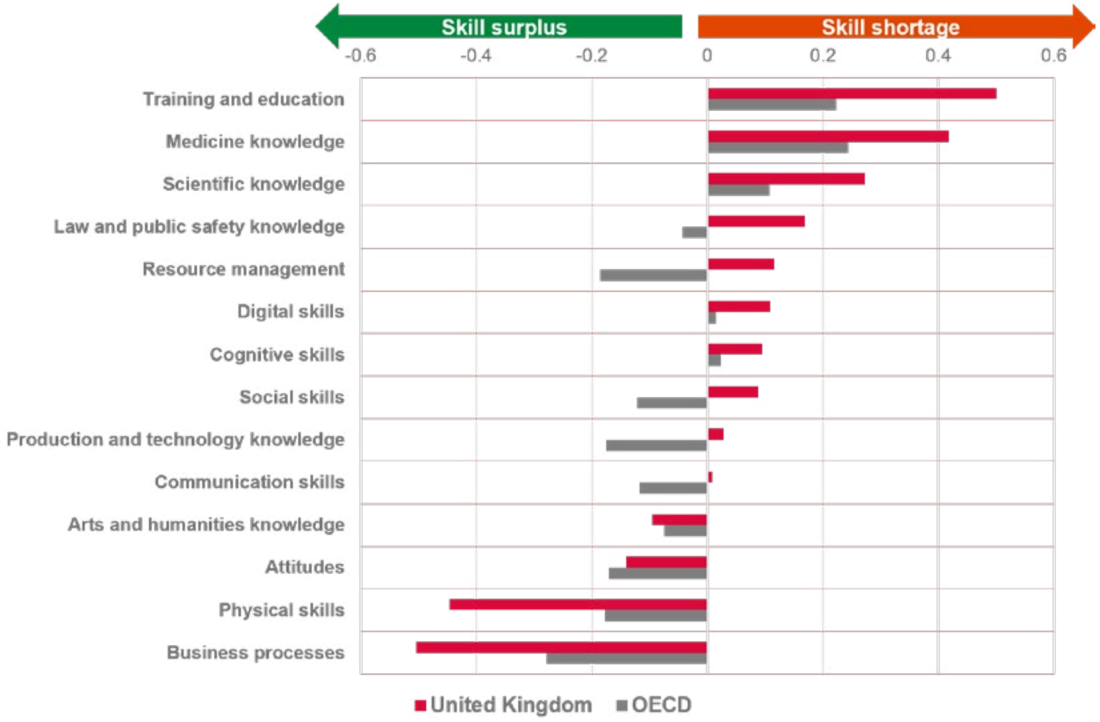
Note: STEM = Science, Technology, Engineering, Mathematics.
Source: OECD (2025). Education at a Glance 2025.

- Across all fields of education and in almost every country, a substantial gender pay gap persists, measured as the percentage difference in earnings between women and men within the same field of study.
- In the **UK**, STEM disciplines had the largest gender pay gap relative to the rest of the adult population: women with a STEM degree earned about 21% less than men with the same qualification.
- Across the countries in the **OECD** sample, the average gender pay gap for tertiary educated women in STEM disciplines is 18%, ranging from 38% in **Germany** to less than 1% in **Costa Rica**.
- For health and welfare disciplines, the gender pay gap ranges between 9% in the **UK** and 43% in **Estonia**.
- The persistent gender pay gap exists partly because women are less likely to receive promotions or significant pay increases, more likely to take career breaks for childcare, and often choose more flexible but lower-paid roles to balance family responsibilities.[1]

[1] **Source**: OECD (2025). Education at a Glance 2025 database.

Chart 4.6. Skills needs

Index, UK and OECD average, 2024



Note: *Index* – The index ranges from −1 to 1, where a value of 1 indicates the greatest skills shortage and a value of −1 indicates the greatest skills surplus. *Definitions* – In the OECD Skills for Jobs database: "Skills are defined as hard-to-find (or in shortage) when employers are unable to recruit staff with the required skills in the accessible labour market and at the going rate of pay and working conditions. Skills surpluses arise in the opposite case, when the supply exceeds demand for a given skill. The indicators measuring skills shortage and surplus are constructed on the basis of signals extracted from five sub-indices: wage growth; employment growth; hours worked growth; unemployment rate; under-qualification growth." See OECD (2022). OECD Skills for Jobs database: Measuring skill needs in the new era of work. **Source:** OECD (2025). Skill needs by country database.

- At the end of 2025, there were 734,000 job vacancies in the **UK**, below the peak reached in March–May 2022 (1.3 million vacancies).[1]
- Half of all job vacancies were concentrated in four sectors: **human health and social work activities** (16%); **wholesale and retail trade, including the repair of motor vehicles and motorcycles** (13%); **professional, scientific, and technical activities** (10%); and **accommodation and food service activities** (10%).[1]
- According to the **UK** Employer skills survey 2024, skills-shortage vacancies accounted for 27% of all vacancies. These were roles that were hard to fill in 2024 because of a "lack of relevant skills, experience, or qualifications among applicants".[2]
- In 2024, compared to the **OECD** average, the **UK** had a relatively high shortage in the following skills (and associated professions using those skills):
  - Training and education (i.e. teaching professionals)
  - Medicine knowledge (i.e. health professionals, personal care workers)
  - Scientific knowledge (i.e. science and engineering professionals).

[1] **Source**: ONS (2026). VACS02: Vacancies by industry.
[2] **Source**: Department for Education (2025). Employer skills survey 2024.

Chart 4.7. Missing skills in the UK engineering sector

Survey data, percentage of respondents, 2025

Note: Data refers to the percentage of employers that answered the following survey question: "In general, which, if any, of the following skills do you struggle to find within the external labour market when you try and recruit? Please select all that apply."
Source: The Institution of Engineering and Technology (2025). UK Engineering and Technology Skills (Figure 3).

- Skills England identifies engineering professions as "priority occupations" expected to experience sustained growth between 2025 and 2030. These professions include manufacturing production managers and directors, civil engineers, mechanical engineers, electrical and electronics engineers, and aerospace engineers.[1]
- Survey data from employers recruiting for engineering roles shows that in 2025 76% reported difficulties recruiting personnel with the required skills. Specialist sustainability skills were the most frequently cited challenge (30%), followed by the ability to solve complex problems (27%) and innovative thinking (27%).[2]

[1] **Source**: Skills England (2025). Assessment of priority skills to 2030.
[2] **Source**: The Institution of Engineering and Technology (2025). UK Engineering and Technology Skills.

THEME 5

Technology scaleup

Is UK investment in technology R&D more focused on early-stage research than its peers?

How concentrated is technology scaleup activity across sectors in the UK?

To what degree are the UK's research outputs being developed or commercialised within other countries?

Theme 5: Technology scaleup

KEY FINDINGS

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

- In 2022, 14% of UK business enterprise R&D (BERD) was directed at basic research, above the OECD average of 8%.
- BERD in the UK also places less emphasis on experimental development (50.9%) than the OECD average (69.3%) and leading countries like the USA (78.7%).
- From 2017 to 2022, 39% of R&D performed by the UK government 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%).

A few sectors dominate technology scaleup and innovation metrics across UK business and academia:

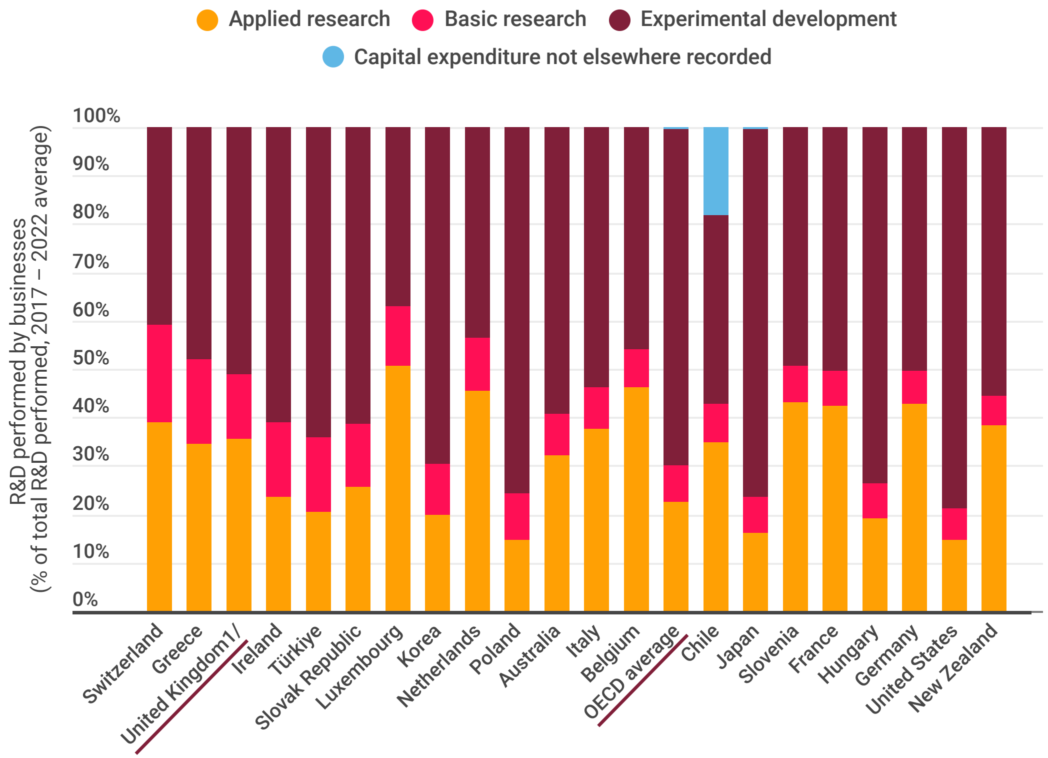
- Life sciences, software, and fintech dominate technology scaleup and innovation metrics across the UK business and academic sectors. This sectoral concentration boosts national innovation indicators but may limit the resilience and diversity of the UK's innovation economy.
- For example, the top 2,000 firms invested €1,446 billion – over 90% of all business-funded R&D worldwide in 2024. Among them, 57 UK-owned companies invested €38.7 billion. UK pharmaceutical firms accounted for 52.4% of this figure. Compared to the EU and the USA, UK firms are largely absent in the tech hardware and software sectors, which represent just 1.1% and 4% of R&D expenditure of UK-headquartered firms.

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

- The majority of UK university spinouts' initial public offerings (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.
- Similarly, 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.
- Acquisitions of UK firms by foreign companies have accelerated since 2014 – up 6.8 times by 2024. Many deals target high-value companies, raising concerns about local job retention, IP ownership, and strategic decision-making shifting overseas.

Chart 5.1. Business enterprise expenditure on R&D (BERD) by type of research

2017–2022 average, OECD countries + China and Taiwan

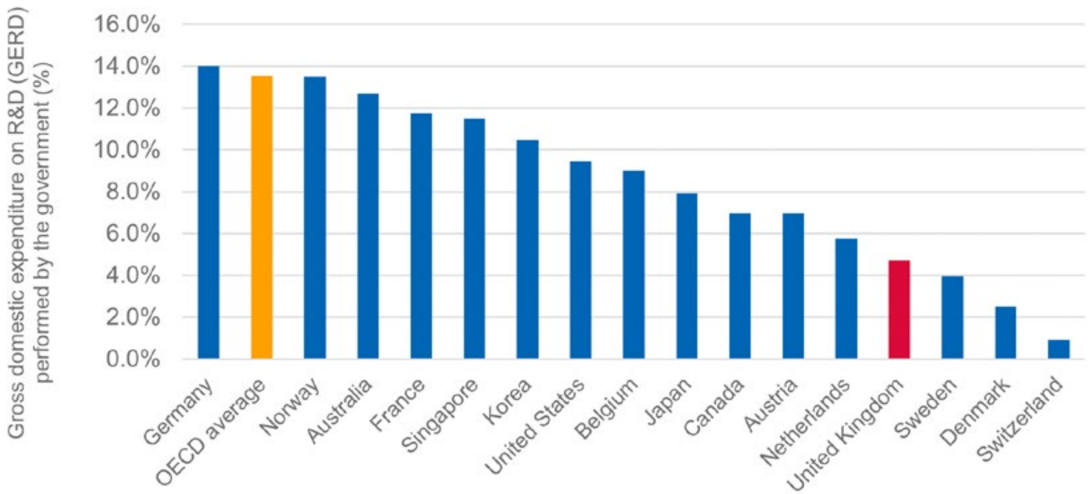


Note: 2022 data for the UK.
Source: OECD (2024). *Gross domestic expenditure on R&D by sector of performance and type of R&D*; ONS (2024). *Business enterprise research and development (R&D), UK: 2022.*

- Three types of research can be identified:
  - Basic research seeks to generate new knowledge about fundamental principles and underlying phenomena, without a practical goal in mind.
  - Applied research also creates new knowledge but is focused on solving a practical problem or achieving a specific objective.
  - Experimental development builds on research using existing knowledge to create new products or processes, or improve existing ones.
- Business R&D in the **UK** placed more emphasis on basic research than other **OECD** countries. From 2017 to 2022, 13.6% of R&D performed by businesses in the **UK** (BERD) was on basic research, compared to an **OECD** average of 7.7%.
- This was above the levels seen in industrialised countries such as **France** (7.2%), **Germany** (6.6%), and the **USA** (6.5%).
- Business R&D in the **UK** also placed less emphasis on experimental development (50.9%) compared to the **OECD** average (69.3%) and leading countries like the **USA** (78.7%).

Chart 5.2. Gross domestic expenditure on R&D (GERD) performed by the government

% of total GERD, selected countries, 2015–2021 average or latest year available

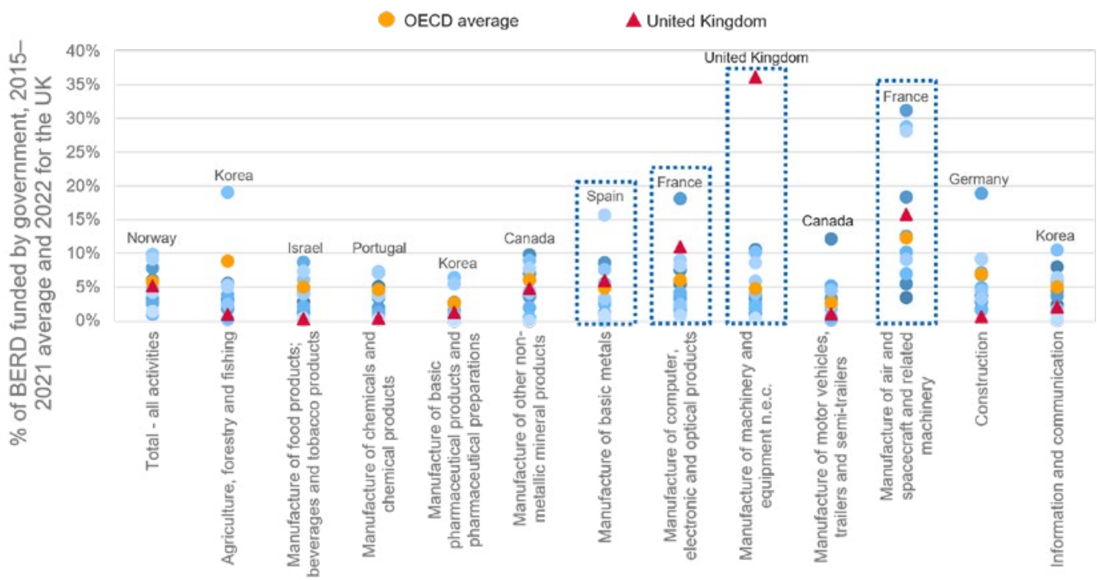


Source: OECD (2025). Gross domestic expenditure on R&D by sector of performance and type of R&D.

- Only 4.7% of R&D in the **UK** was conducted by government organisations, with an emphasis on basic research.
- This was below the OECD average (13.5%) and the levels seen in countries such as **Germany** (14%), **France** (11.8%), the **USA** (9.5%), and **Japan** (7.9%).
- 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%.
- This was above the levels seen in industrialised countries such as the **USA** (18%) and **Korea** (26%).

Chart 5.3. Share of business enterprise expenditure on R&D (BERD) funded by government

Selected sectors, UK (2022 data) and OECD countries (2015–2021 average)

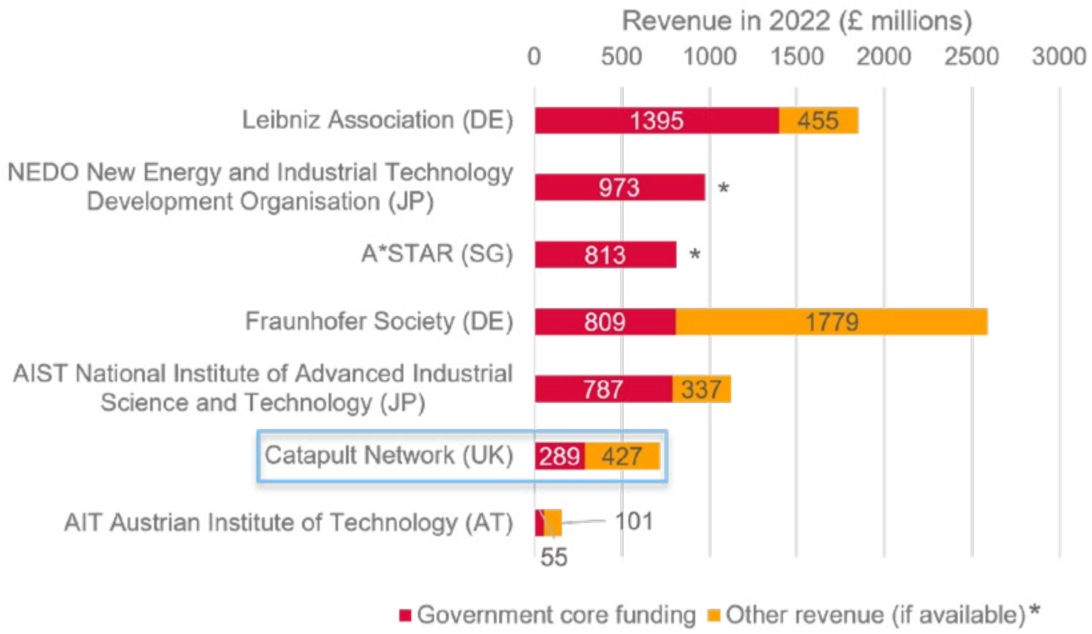


Note: 2022 data for the UK, by product group. OECD average includes: Australia, Austria, Canada, Chile, Czechia, Estonia, Finland, France, Germany, Greece, Israel, Italy, Japan, Korea, Latvia, Lithuania, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and Türkiye.
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.

- Public **UK** investment in research and development as a share of BERD was high in a few sectors:
  - the manufacture of basic metals
  - the manufacture of computer, electronic, and optical products
  - the manufacture of machinery and equipment, and
  - the manufacture of air and spacecraft and related machinery.
- But sectors with strong R&D potential and economic importance for the **UK**, such as the manufacture of **food products, beverages, and tobacco, and the manufacture of motor vehicles, trailers, and semi-trailers**, received less public investment than their international peers.

Chart 5.4. National applied research organisations by total funding

Selected organisations, revenue in 2022, £ millions

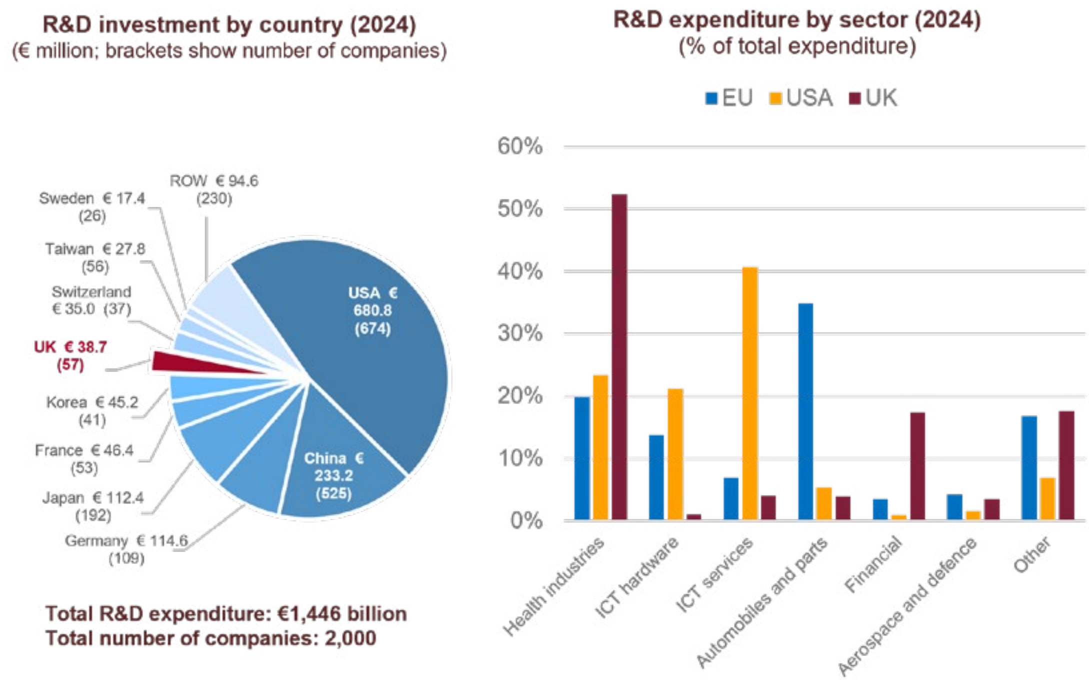


Note: *No values for "other revenue" indicate missing data. Average annual exchange rates for 2022 (HMRC): 1 EUR = 0.8489 GBP; 1 JPY = 0.0062 GBP; 1 SGD = 0.5807 GBP. **Sources:** Leibniz Association (2024); Fraunhofer (2022); AIST (2023); Austrian Institute of Technology (2022); ASTAR (2023); NEDO (2023); and UK government data request.

- The **UK** Catapult Network's core government funding of £289 million was around two times lower than that received by internationally comparable applied research organisations in 2022. Catapult's core funding increases to around £320 million per year between 2023 and 2028.
- Comparator countries have additional organisations (beyond the ones shown in this chart) with significant budgets, such as Kosetsushi in **Japan** and the Helmholtz Association in **Germany**.
- Across all organisations, a significant portion of other revenue is represented by industrial contract R&D, publicly funded contract R&D, and collaborative R&D, as well as intellectual property (IP) revenue and technical consulting, among other revenue streams.

Chart 5.5. R&D expenditure by the world's top 2,000 firms

Country and sectoral breakdowns, 2024

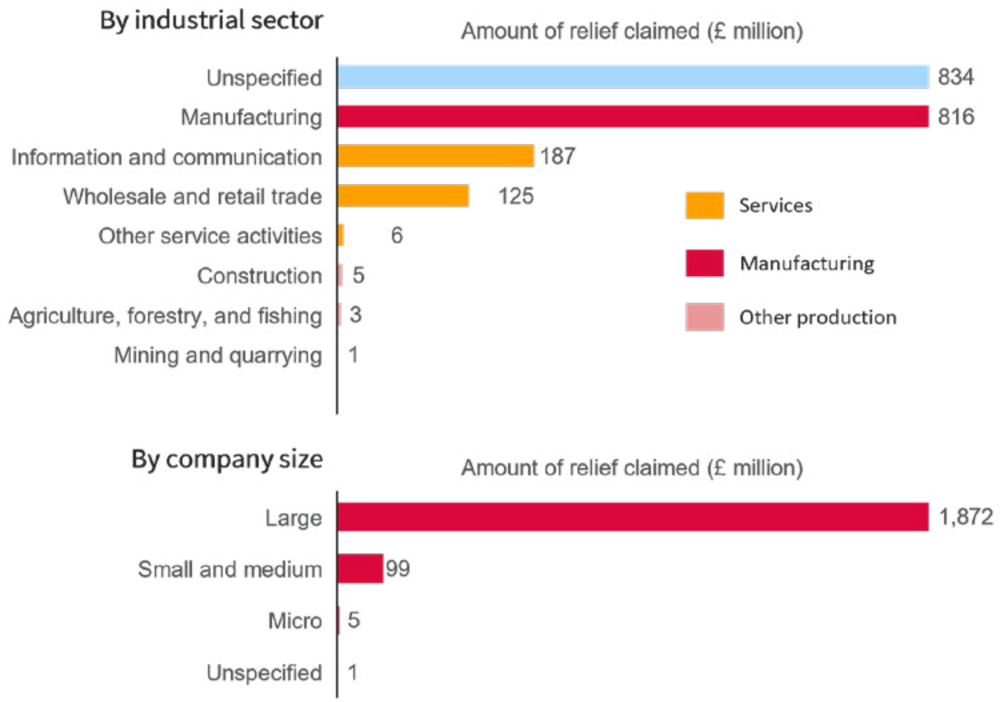


Note: ROW = rest of the world; "Other" includes chemicals, construction and materials, energy, industrials, and others. See European Commission (2025) – Table 10 for sector classification.
Source: European Commission (2025). The 2025 EU Industrial R&D Investment Scoreboard.

- A few sectors dominate technology scaleup and innovation metrics across **UK** business and academia.
- In 2024 the world's top 2,000 R&D investors collectively invested €1,446 billion in R&D, which accounted for more than 90% of global business-funded R&D.
- In the same year 15% of the total R&D in the EU Industrial R&D Investment Scoreboard was conducted by five **US** giant tech companies: Amazon, Alphabet, Meta, Microsoft and Apple.
- The top 2,000 included 57 **UK-based** firms (2.85%), and there were just 2 **UK** companies in the top 100 (AstraZeneca and GSK).
- **UK-owned** businesses specialised in health industries and financial, accounting for 52.4% and 14.5% of **UK** R&D expenditure, respectively.
- Compared to the **EU** and **USA**, **UK** firms were largely absent in the tech hardware and software sectors, which represented just 1.1% and 4% of R&D expenditure of **UK-headquartered** firms.

Chart 5.6. UK Patent Box tax relief claimed, tax year 2023–2024

Amount of relief claimed (£ million)



Source: HMRC (2024). Patent Box relief statistics: September 2025.

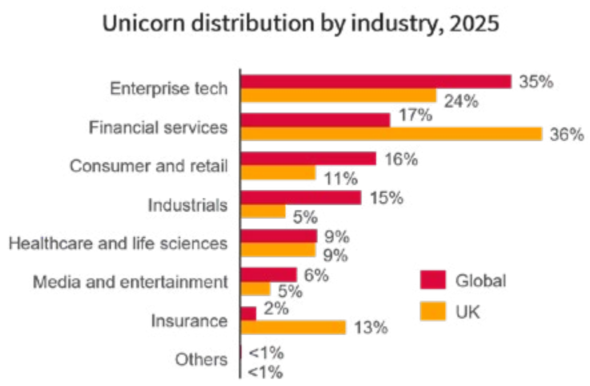
- The Patent Box is a UK tax regime that applies a reduced 10% corporation tax rate to profits derived from patented products.
- Using the amount of Patent Box tax relief claimed by eligible UK companies as a proxy for the exploitation of intellectual property, we see that large manufacturers in the UK dominated the commercialisation of patented innovations.
- In the 2023–24 tax year, large firms accounted for 94% of total Patent Box tax relief claims.
- In terms of sectors, manufacturing accounted for 42% of total Patent Box claims in the same year.
- Large companies generally outpaced SMEs and micro-sized companies in patent applications.

Chart 5.7. Number and sectoral distribution of unicorns in the world, 2025

Unicorns defined as startups with a valuation between US$1 billion and US$10 billion

Number of unicorns in 2025

Country	Number of startups valued at over US$1 billion
USA	718
China	158
India	65
UK	**57**
Germany	33
France	29
Israel	22
Canada	21
Brazil	18
Singapore	17
Korea	15
Netherlands	10
Australia	9
Mexico	9
Ireland	9
Hong Kong	8
Japan	8
Other countries	84
Total	1,290



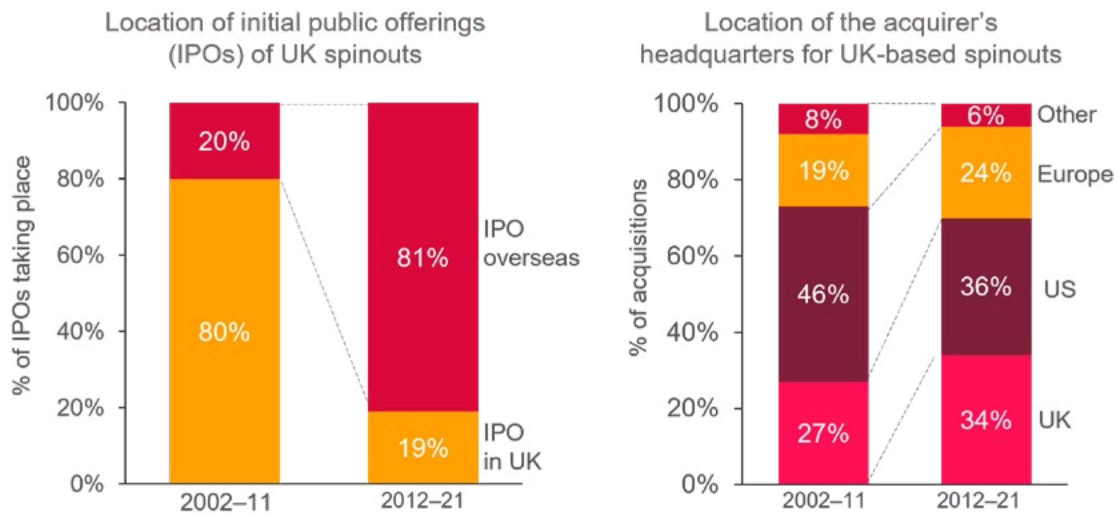
Source: CBINSIGHTS (2025). The Complete List Of Unicorn Companies.

- At the end of 2025, the UK was the fourth country in the world in terms of high-value startups, with 57 unicorns and 3 decacorns (startups with a valuation exceeding US$10 billion).
- The sectors with more high-value startups were financial services (20 companies), enterprise tech (13 companies), and insurance (7 firms).
- But the **UK's** high-value startups placed less emphasis on industrial sectors. Compared to industry-focused startups in competitor countries – such as SpaceX in the **USA** and DJI in **China** – the **UK's** industrial startups were more service-oriented, exemplified by companies like OVO Energy and Motorway, an online second-hand-car sales platform.[1]
- As per the venture capital investments in recent years, most of the high-value startups (46) were headquartered in London.
- The **UK's** startup ecosystem was also home to a further five "exited" unicorns (i.e. sold to larger corporates or admitted to a public stock exchange). Two of them were eventually acquired by **Chinese** and **US** investors.[2]

[1] **Source**: CBINSIGHTS (2025). The Complete List Of Unicorn Companies.
[2] **Source**: Beauhurst (2019). UK Unicorn companies – a free report on £1b businesses.

Chart 5.8. Location of initial public offerings (IPOs) and acquirer's headquarters for UK-based university spinouts

Shares for 2002-2011 and 2012-2021 time periods

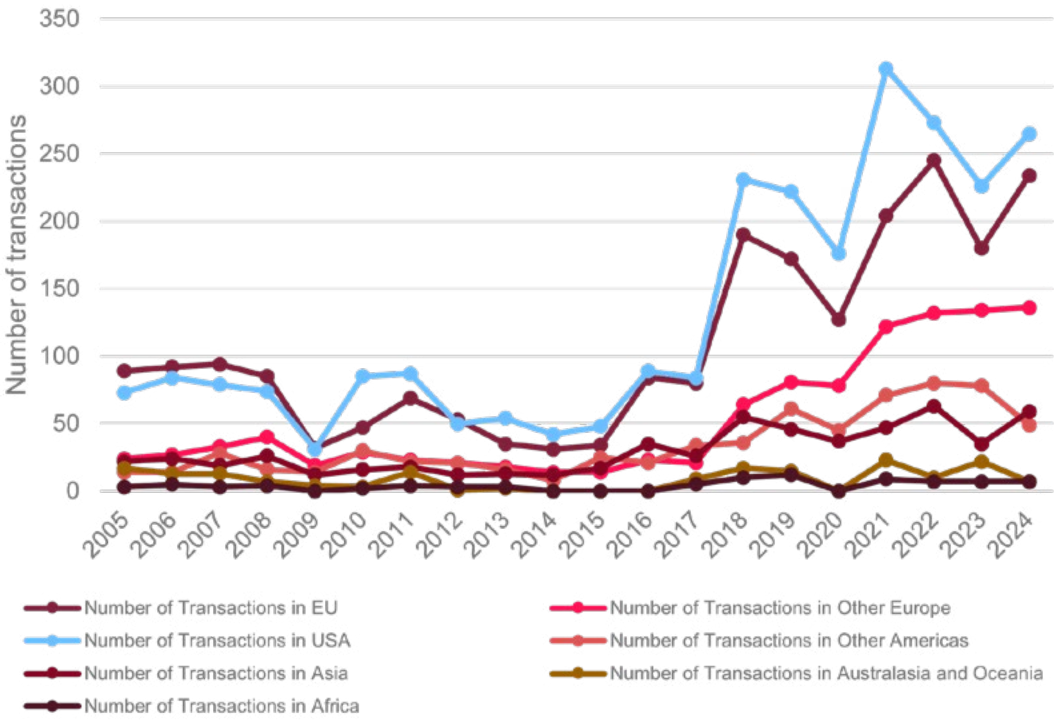


Source: Roupakia, Z. and Coates Ulrichsen, T. (2025). Universities and the Spinout Scale-Up Challenge: Securing Value in a Changing World. Apollo - University of Cambridge Repository.

- The high mobility of spinouts, startups, and industrial R&D risks eroding **UK** value capture.
- The University Commercialisation and Innovation (UCI) unit at the University of Cambridge collected data from 884 spinouts across 15 top **UK** universities.
- Using this sample, the report leveraged information provided by PitchBook and other sources to identify whether these spinouts had listed on a stock exchange, identifying where they (first) listed globally. A total of 36 IPOs (4%) and 117 acquisitions (13%) were reported in the data sample.
- Results show that during the early period, 2002–11, 80% of spinout IPOs took place on **UK-based** stock exchanges. This reverses for the more recent period, 2012–21, with 80% of IPOs taking place overseas (the majority on the **US** NASDAQ).
- For the 10 years from 2012 to 2021, roughly a third of acquisitions of spinouts from the 15 universities that participated in the study were by **UK-headquartered** companies. A further 36% were acquired by **US-headquartered** companies, and 24% by **European-headquartered** companies.

Chart 5.9. Acquisitions in the UK by foreign companies

Number of transactions, 2005–2024 aggregate



Source: ONS (2025). Mergers and acquisitions (M&A) involving UK companies.

- The high mobility of business R&D risks eroding **UK** value capture.
- Acquisitions of **UK** firms by foreign companies accelerated from 2014 – up 6.8 times by 2024.
- For example, the proportion of foreign-controlled companies in the aerospace supply chain rose from 14% in 1990 to 41% in 2014.[1]
- Many deals target high-value companies, raising concerns about local job retention, IP ownership, and strategic decision-making shifting overseas.[2]

[1], [2] **Source:** Civitas (2015). Losing Control. A study of mergers and acquisitions in the British aerospace supply chain.

Cambridge Industrial Innovation Policy

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, offering new evidence, insights, and tools grounded in the latest academic thinking and international best practices. This report was delivered through IfM Engage, the knowledge-transfer arm of the IfM, University of Cambridge.

IfM Engage, 17 Charles Babbage Road, Cambridge, CB3 0FS, the UK
www.ciip.group.cam.ac.uk

For further details, please contact ifm-policy-links@eng.cam.ac.uk

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