

OECD Main Science and Technology Indicators

Highlights - March 2022

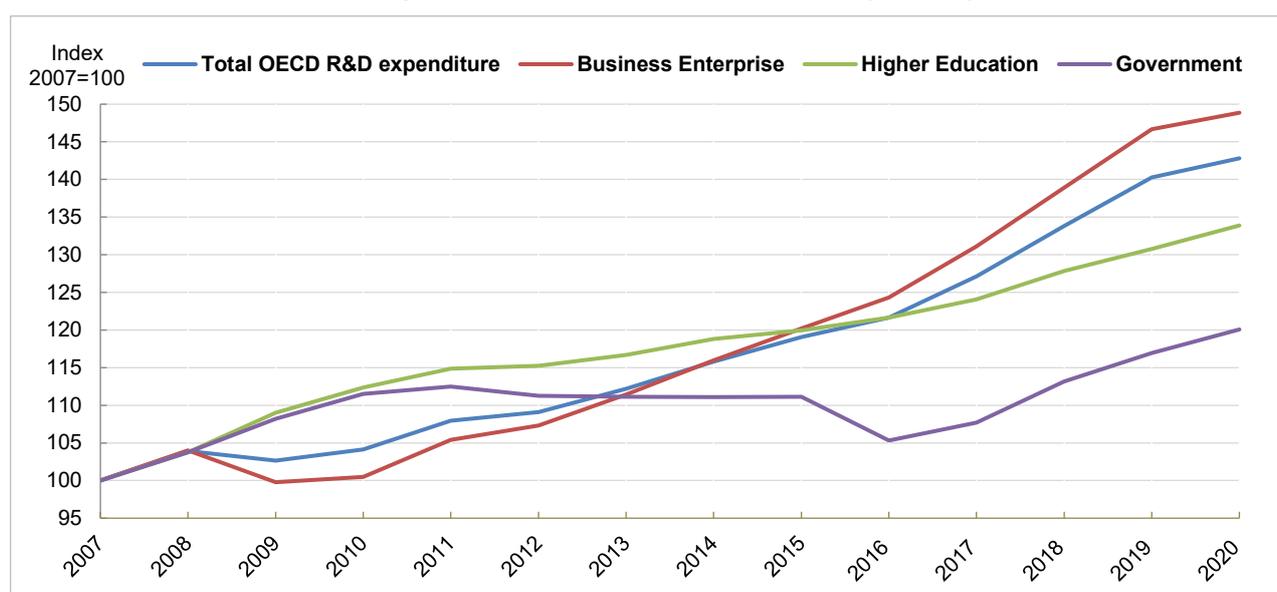
R&D investment in the OECD area demonstrated unprecedented resilience in the wake of the COVID-19 pandemic, becoming a central part of the policy response

As a group, OECD economies continued to increase investments in research and development (R&D) in 2020 despite the sharp decline in economic activity due to the COVID-19 pandemic. According to the latest data published in the [OECD Main Science and Technology Indicators \(MSTI\) database](http://oe.cd/msti), R&D expenditure in the OECD area grew by 1.8% in real terms in 2020. While this represents a sharp slowdown compared to previous years when R&D was growing at ca 5% annually, it marks the first time on record in which a global recession did not translate into a drop in R&D expenditures. This reflects how investments in R&D have been an integral part of the response to the crisis.

R&D growth in government institutions outpaced R&D in universities and businesses

Since the global financial crisis in 2009, businesses have accounted for nearly three quarters of total expenditure on R&D performance in the OECD area and have been leading OECD R&D growth. However, the business sector trailed other sectors in terms of R&D expenditure growth in 2020. R&D in the Higher Education sector rose by 2.4%, while R&D expenditures in the Government sector increased by 2.7%. R&D in the business enterprise sector still managed to grow by 1.5% despite the pro-cyclical nature of R&D and adverse economic conditions.

R&D expenditure trends in OECD countries, 2007-20 (2007=100)

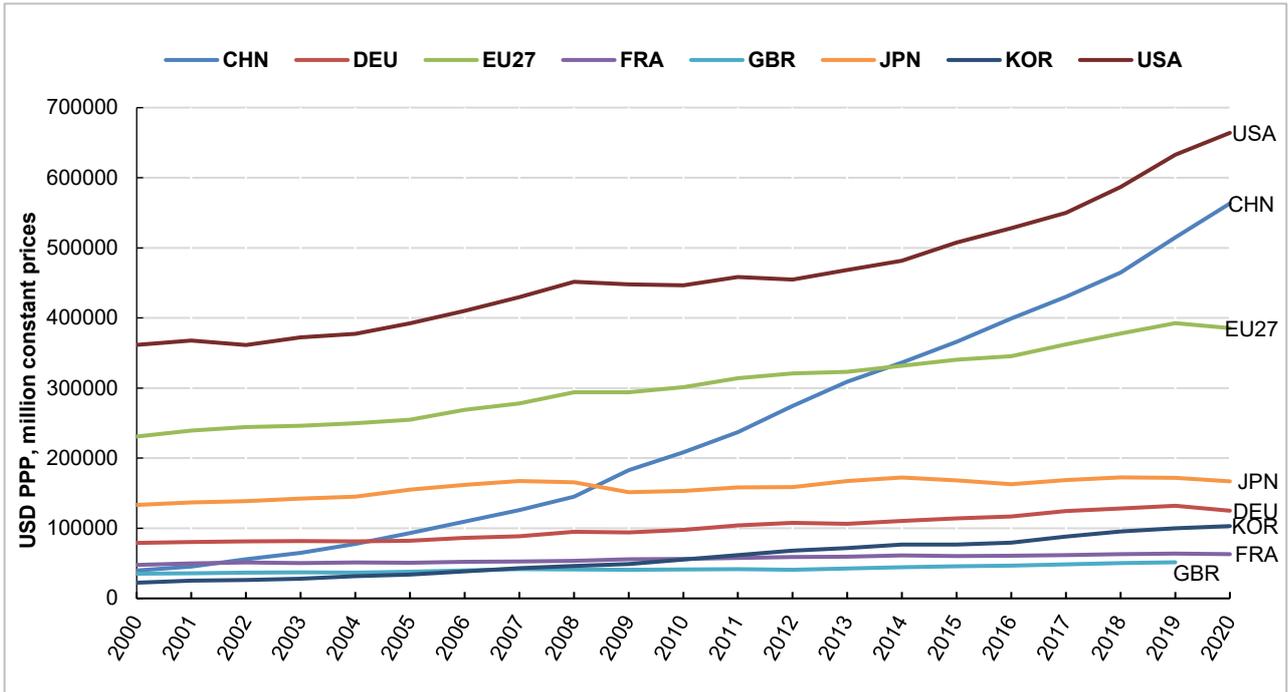


Source: OECD Main Science and Technology Indicators (MSTI) Database, March 2022. <http://oe.cd/msti>

The US and China consolidated their positions as R&D powers while the EU lost some ground

Real growth in R&D in the OECD area in 2020 was primarily driven by growth in the United States at 5%, in contrast with R&D expenditures in Germany and Japan, which declined at -5.3% and -2.7% respectively. In the EU27 area, business R&D performance was the principal source of the aggregate fall in R&D. In other words, if European business R&D performance had been on a par with the United States, its overall R&D performance would have been more similar. The structure of business R&D in the EU is more concentrated in industries that have been more negatively impacted by the COVID-19 crisis, as noted further below. China's reported R&D expenditure grew by 9% in 2020, a figure comparable with previous years. The implications for comparisons with respect to the United States depend on how figures in different countries are adjusted for differences in purchasing power (PPP) for R&D investments. If forthcoming revisions to PPP conversion rates turn out as on previous occasions, China's R&D expenditure gap with respect to the United States would have remained stable, with China's R&D expenditure at close to 74% of that of the United States.

Gross domestic expenditure on R&D, selected economics, 2000-2022
USD million in constant PPP prices

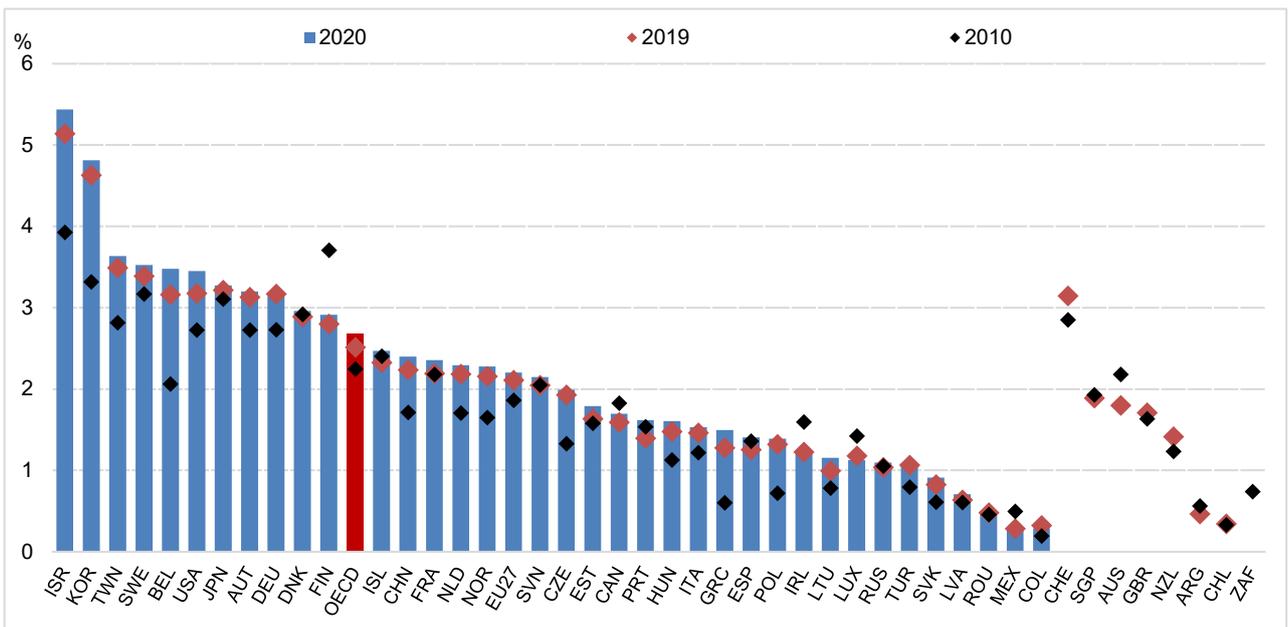


Source: OECD Main Science and Technology Indicators Database, March 2022. <http://oe.cd/msti>

R&D intensity increased in most OECD and partner economies because of falling GDP and not necessarily growing R&D

OECD R&D intensity (a headline measure of domestic expenditure on R&D expressed as a percentage of GDP) rose from 2.5% in 2019 to nearly 2.7% in 2020. This increase was the combined result of exceptional real growth in R&D expenditure (+1.8%) and the major decline in real GDP (-4.5%). For most countries in which R&D expenditure declined in 2020, increases in R&D intensity rates can be principally explained by the drop in GDP. For this reason, shifts in R&D intensity within the context of the COVID-19 crisis should be interpreted with caution.

R&D intensity: Gross domestic expenditure on R&D as a percentage of GDP



Source: OECD Main Science and Technology Indicators Database, March 2022. <http://oe.cd/msti>

In the case of Germany, R&D intensity did not change in 2020 because similar falls in R&D and GDP offset each other. Across the OECD, Israel and Korea continued to display the highest levels of R&D intensity, at 5.4% and 4.8% of GDP respectively. China’s R&D intensity went from 2.2% to 2.4%. R&D intensity in the EU27 area increased from 2.1 to 2.2% of GDP.

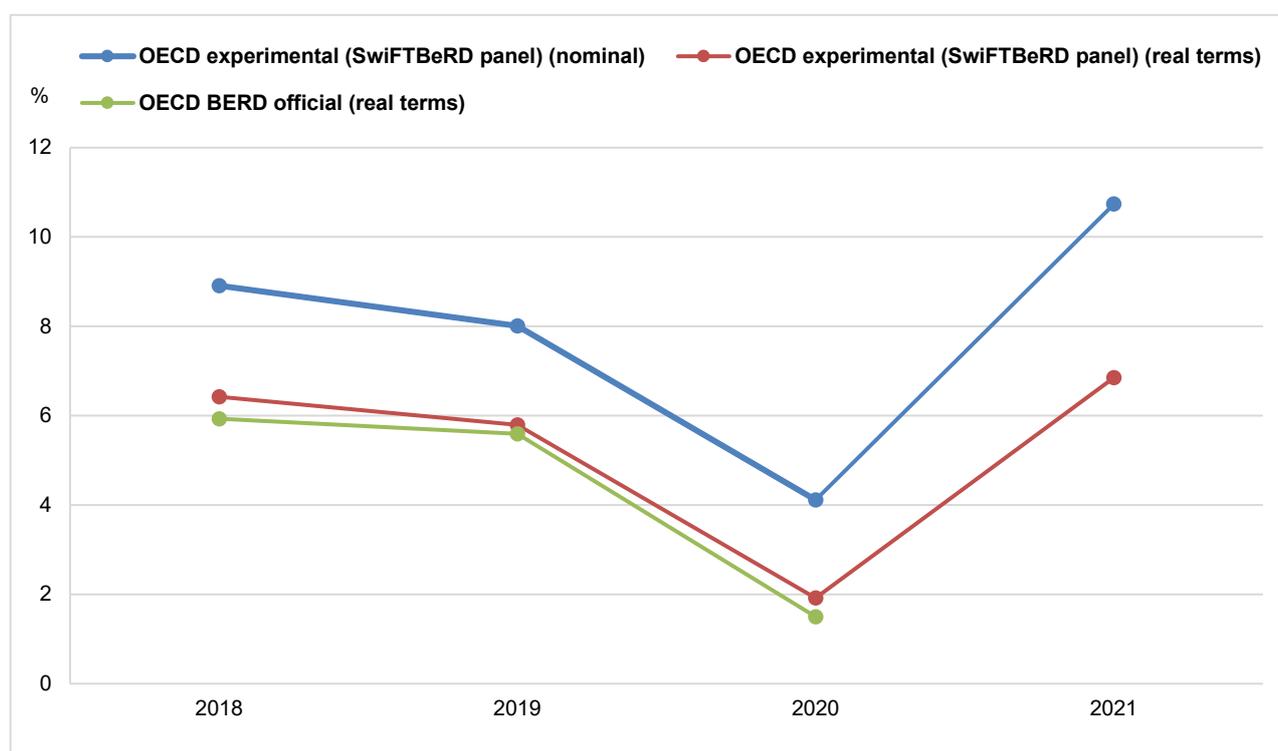
Signs of a return to normal in 2021 for R&D investment by businesses and governments are emerging

Although official statistics on R&D expenditures for 2021 will only be available in the first quarter of 2023 for most countries, the OECD develops and monitors a number of leading indicators to provide more timely insights into R&D investment. To do this, the OECD has developed a preliminary view of R&D spending in 2021 by combining data from government budgets for R&D, provided by official contacts within countries, with exploratory analysis of published quarterly reports and accounts for a panel of large business R&D investors.

Business R&D expected to have grown at larger than pre-crisis levels in 2021

The OECD Short-term Financial Tracker of Business R&D (SwiFTBeRD) dashboard reports quarterly and annual R&D data for several of the world's major R&D investors, providing company-specific and sectoral insights to deliver the timeliest possible view of R&D data reported by companies. Estimates of real growth in R&D expenses for the ensemble of firms in the OECD SwiFTBeRD panel map very closely the evolution of official Business Expenditure on R&D (BERD) estimates over periods in which the latter are available. The March 2022 MSTI release confirms the “nowcasts” made in the March 2021 release for 2020. The implied SwiFTBeRD nowcast for 2021 is positive real annual growth in the order of 7% compared to 2% in 2020, suggesting that a significant recovery in business R&D spending was under way in 2021.

Official and experimental estimates of annual business R&D growth, 2018-21



Source: OECD calculations, based on OECD Short-term Financial Tracker of Business R&D (SwiFTBeRD) dashboard, March 2022, <https://oecd-main.shinyapps.io/swiftberd>.

OECD Short-term Financial Tracker of Business R&D (SwiFTBeRD) dashboard

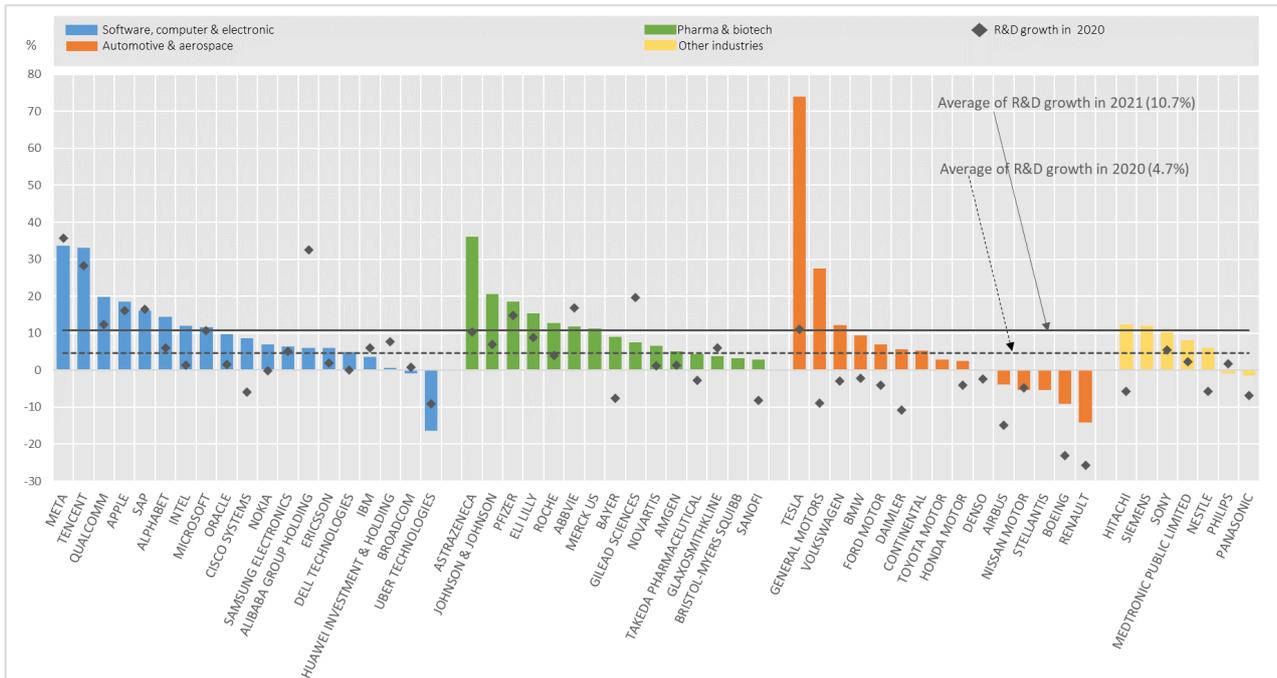
SwiFTBeRD is an initiative of the OECD Directorate for Science, Technology and Innovation that seeks to provide timely business R&D trends indicators based on data publicly disclosed by companies. This new tool complements the OECD reporting of official R&D statistics published in the OECD Research and Development Statistics and the OECD Main Science and Technology Indicators (MSTI) databases. Although official R&D data, principally based on statistical surveys, serve as a basis for the most robust and internationally comparable variable breakdowns and structural indicators, they suffer from a lack of timeliness that results from regular collection and reporting cycles designed to ensure comprehensiveness. R&D figures reported in companies' financial accounts (often reported on a quarterly basis shortly after completion) help provide a timelier picture that can complement insights survey-based data. The SwiFTBeRD data are collected by OECD from companies' financial statements accessed directly from their websites. The SwiFTBeRD dashboard includes data on R&D expenditures and total revenues.

Find out more <https://www.oecd.org/sti/swiftberd.htm>
 Make your own charts <https://oecd-main.shinyapps.io/swiftberd/>

Recovery in R&D investment growth in 2021 across most firms in the SwiFTBeRD panel

Analysis of R&D expense growth in 2021 by the firms in the SwiFTBeRD panel confirms a widespread improvement across the board for most companies. ICT and pharma industry groups continue to drive most of the growth while automotive and aerospace, as well as other industries, were still lagging in 2021. Countries with a business R&D structure more reliant on these industries appear to have experienced the largest declines in official R&D expenditure in 2020, as already anticipated in the March 2021 release.

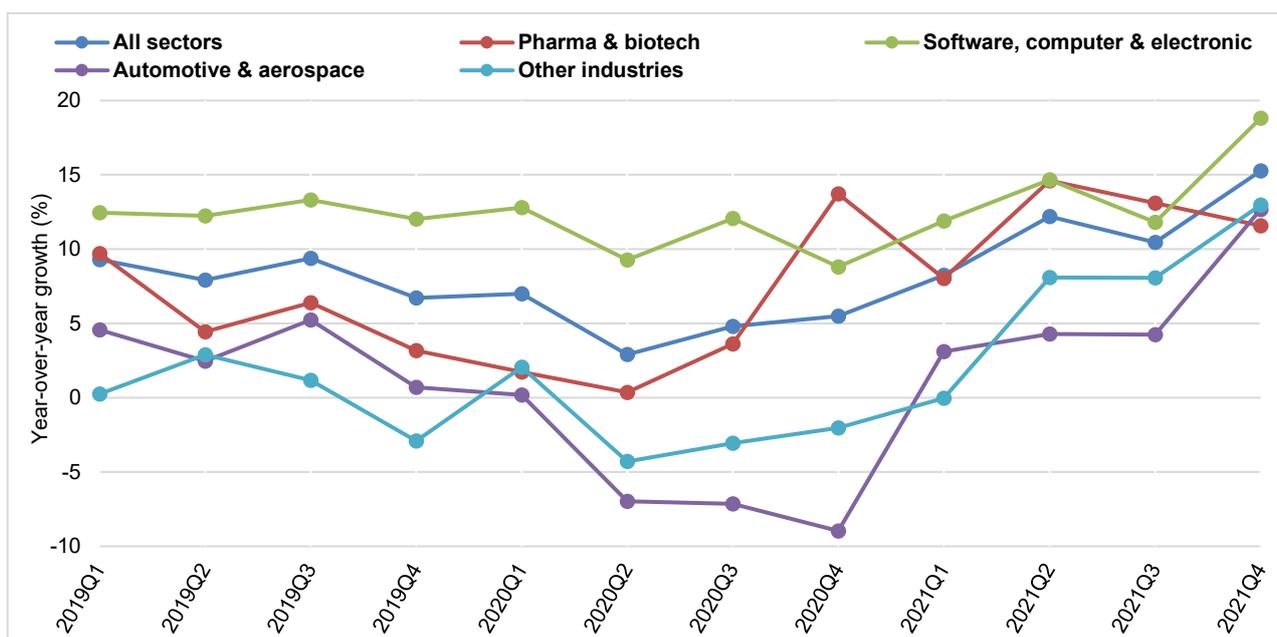
Nominal R&D expense growth in the OECD SwiFTBeRD panel, 2021 vs 2020



Source: OECD Short-term Financial Tracker of Business R&D (SwiFTBeRD) dashboard, March 2022, <https://oecd-main.shinyapps.io/swiftberd/>.

There are signs of changes in momentum. Data for the last quarter of 2021 compared with the same quarter in the previous year suggest that “ICT industries” are recovering their leading position as drivers of business R&D growth after a period in which this role was shared with “pharma and biotech”, for which there are already signs of deceleration. Data for the last quarter of 2021 also point to a swift recovery in the industries whose R&D was the most impacted by the crisis. If sustained throughout 2022, this could lead to a partial reversal in some of the aggregate trends.

Year-on-year R&D growth in the OECD SwiFTBeRD panel industry groups

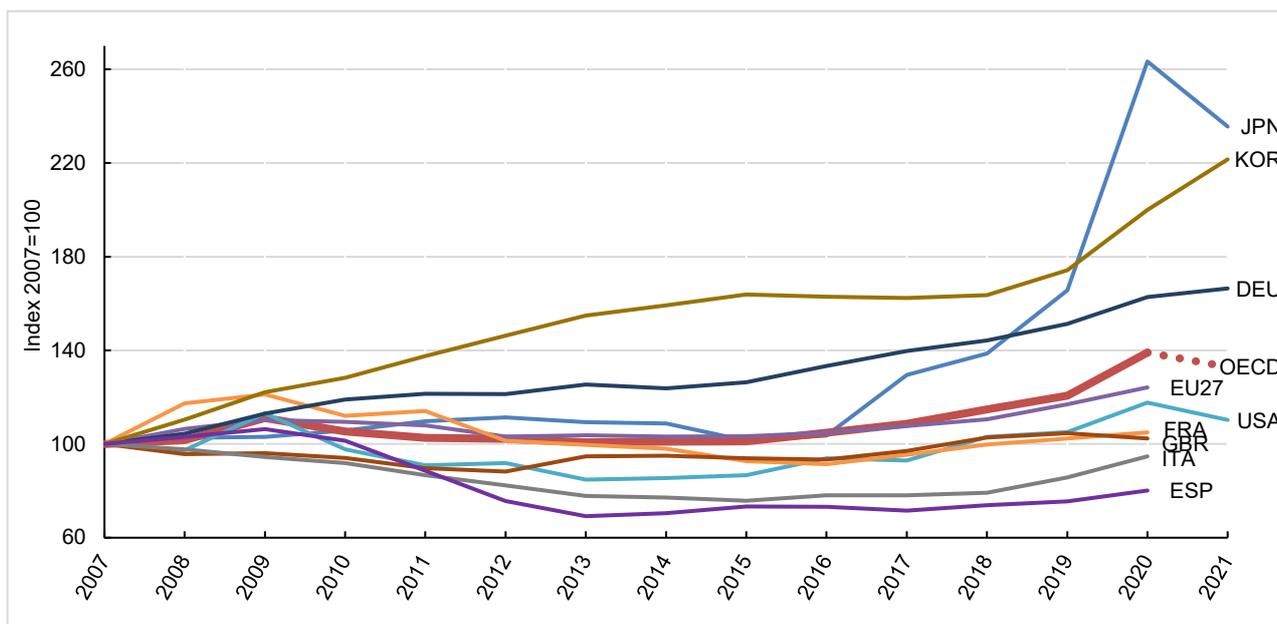


Note: Growth rates correspond to a reference quarter compared to the same quarter in the previous year (year-on-year)
 Source: OECD Short-term Financial Tracker of Business R&D (SwiFTBeRD) dashboard, March 2022, <https://oecd-main.shinyapps.io/swiftberd/>

Government R&D budgets experienced a significant correction in 2021 after a major rise in 2020

Government R&D budget indicators for the OECD area present the amounts that governments agree to allocate for R&D as part of their budgetary processes, rather than actual expenditure reported by R&D performers. In addition to shedding light on governmental R&D funding intentions, these figures provide early insights into R&D performance in sectors that are highly reliant on government support, such as higher education and government research institutions. After a significant 15% growth in real terms in 2020, government R&D budgets for the entire OECD area are estimated to have decreased by 4.4% in 2021 compared to 2020. This decline is not large enough to offset the gains in 2020, but it signals a retrenchment in government R&D support just as business R&D appears to be recovering.

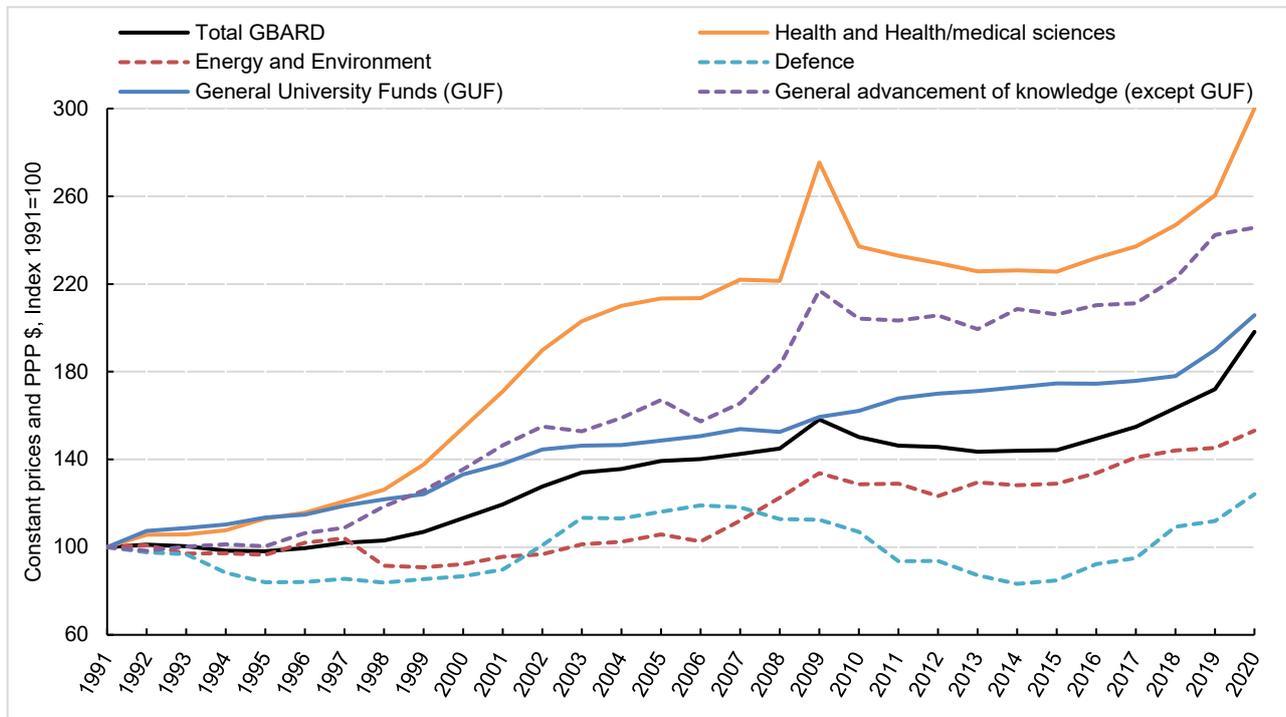
Government R&D budget trends, selected economies, 2007-2021



Source: OECD Main Science and Technology Indicators (MSTI) Database, March 2022. <http://oe.cd/msti>

While there are no details available about the orientation of government R&D budgets in 2021 for the entire OECD area, data for 2020 indicate that the rise in R&D budgets was particularly focused on health. Although this funding objective attracted much of the major funding increase, governments also propped up R&D investments across different areas and sectors, compensating for the overall shortfall in demand. Defence R&D, which grew the least in real terms since 1991, has been experiencing a sustained recovery in recent years.

Government R&D budget trends, broad spending categories, 1991-2020



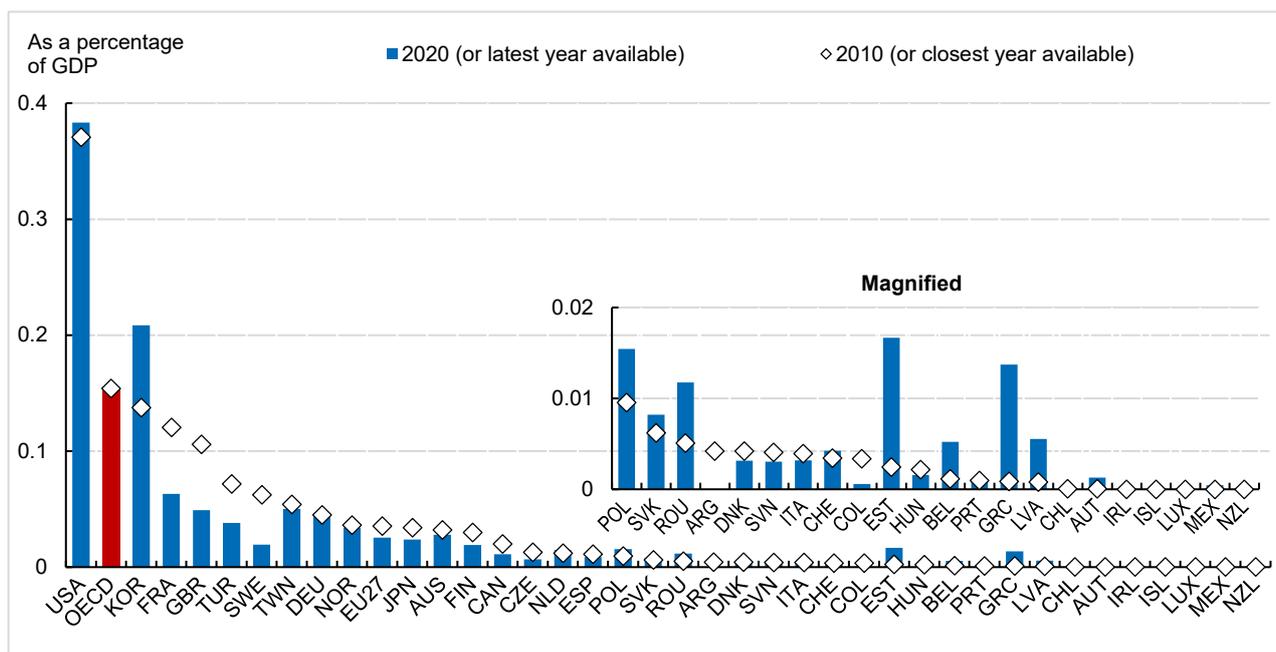
Source: OECD Main Science and Technology Indicators (MSTI) Database, March 2022. <http://oe.cd/msti>

March 2022 spotlight: Measuring government defence R&D budgets

The recent Russian invasion of Ukraine cast a spotlight on the role of science and technology in defence. Discovering, developing and utilising advanced knowledge and cutting-edge systems is fundamental to maintaining or achieving a technological edge for defensive and deterrence purposes. The OECD statistics on government budgets for R&D provide some insights into the extent to which governments direct public funds to R&D with military purposes.

Across the OECD, it is estimated that 0.15% of GDP is dedicated to defence R&D budgets. To put this figure in context, this represents about 7.5% of the North Atlantic Treaty Organisation (NATO) guideline for total defence expenditure as a share of GDP. Distinguishing R&D from other military expenditures is challenging, partly because public procurement contracts for defence systems may not allow disentangling sums allocated for R&D purposes from sums for actual deliveries. Spending on classified military R&D projects is also likely to go unreported, leading some OECD countries not to report any defence R&D figures at all. The distribution of military R&D budgets is highly skewed. The United States is the OECD country with the largest reported R&D budget support for defence as a percentage of GDP, followed by Korea, France and the United Kingdom. For a majority of OECD countries, defence R&D budgets have been falling in recent years, with exceptions such as Estonia, Lithuania and Korea.

Government budget allocations for defence R&D



Source: OECD Main Science and Technology Indicators (MSTI) Database, March 2022. <http://oe.cd/msti>

Celebrating 60 years of R&D statistics at the OECD

The OECD has been working since its creation on the collection and dissemination of statistics on R&D under the auspices of its [Working Party of National Experts on Science and Technology Indicators](#) (NESTI). 2022 marks the 60th anniversary of seminal efforts to develop a common methodology across OECD member countries and to conduct comparative studies of R&D investments and human resources across different economies around the world. The first edition of the [OECD Frascati Manual](#), published in 1963, responded to the demand of OECD member countries to monitor the latest developments in R&D during turbulent times. This subsequently gave rise to the OECD R&D statistics database that provides the backbone to the OECD Main Science and Technology Indicators (<http://oe.cd/msti>).

The **STI Scoreboard platform** (<http://www.oecd.org/sti/scoreboard.htm>) allows visualising and downloading the MSTI data alongside other statistical indicators of science, technology and innovation (STI) systems across OECD countries and several other economies.

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