

OECD Main Science and Technology Indicators

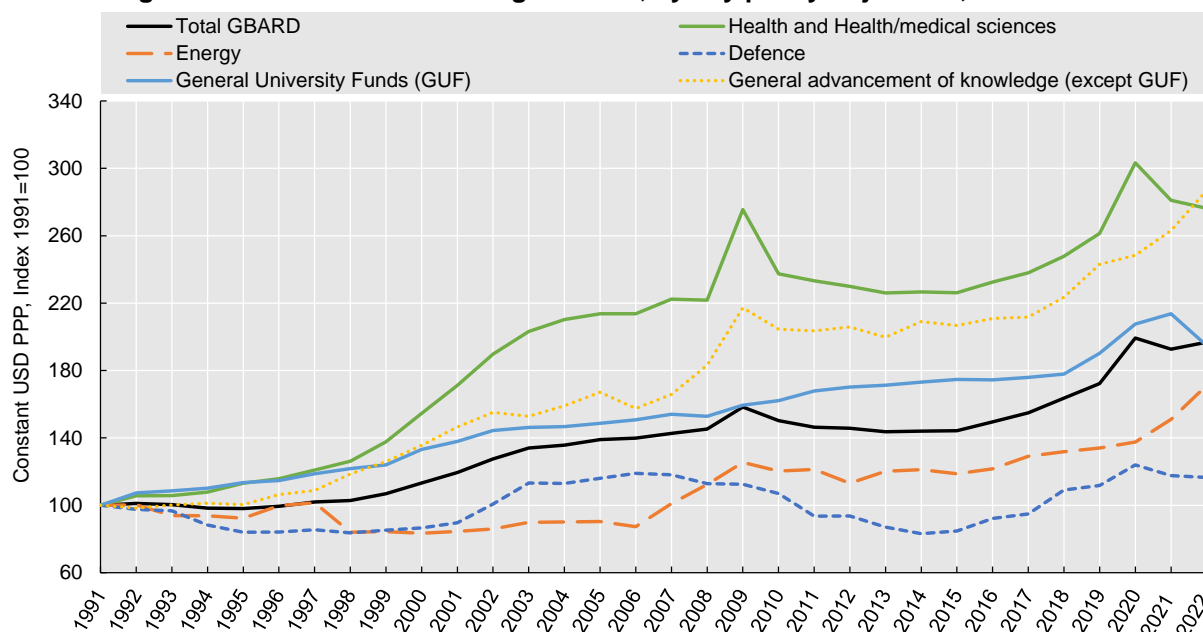
Highlights of the September 2023 edition

The OECD Main Science and Technology Indicators (**MSTI**) are the key reference OECD publication and database for the latest international statistics on R&D --drawing on the OECD R&D statistics database compiled with contributions from OECD members and other selected economies-- and other selected key STI indicators. MSTI is published twice each year, in March and September. Based on data reporting patterns by countries to the OECD and review procedures, the **March edition** revises previous data and contains the most timely but provisional aggregate indicators. The indicators in the **September edition** typically draw on data confirmed by countries as final as well as more disaggregated indicators reviewed by the Secretariat over the year. The September edition is also characterised by more complete reporting of indicators on Government Budgets for R&D by OECD member countries.

In 2021, Research and Experimental Development (R&D) expenditures in the OECD area resumed their growth trajectory prior to the COVID-19 crisis. According to data published in the [OECD Main Science and Technology Indicators \(MSTI\)](#) on 29 September 2023, **R&D expenditure in the OECD area grew in 2021 by 4.9%** in inflation-adjusted terms, a very slight revision compared to the 4.7% growth estimates in the March 2023 edition. This confirms a return to pre-COVID crisis trends after it had slowed down to 2% growth in 2020.

After falling by 3% in real terms in 2021, **government R&D budgets for the entire OECD area increased by 2% in 2022**, less than the 3% growth estimated in March. Data on the orientation of government R&D budgets for the entire OECD (Fig1) area indicate that the increase of total GBARD in 2022 was principally explained by growth in undirected R&D funding (other than the general university funds). Budgets for R&D on defence fell in 2022, driven by R&D budget cuts in the United States (Fig2). Fiscal packages introduced in 2021 and 2022 boosted support for **Energy R&D** programmes, which had been lagging behind for decades.

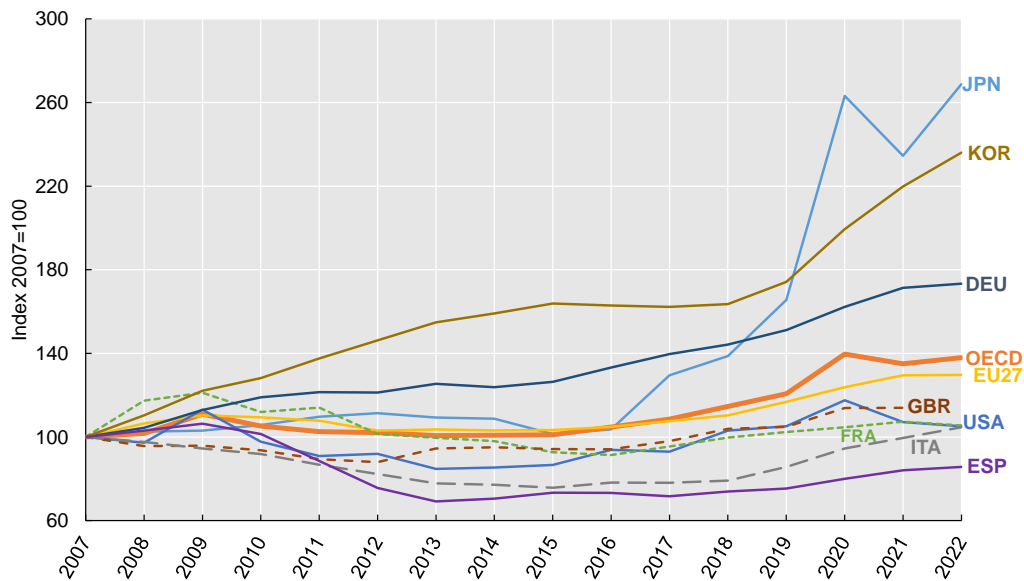
Figure 1. Government R&D budget trends, by key policy objectives, 1991-2022



Source: OECD calculations based on OECD, Main Science and Technology Indicators (MSTI) Database, September 2023. <http://oe.cd/msti>

As of September 2023, data on R&D budgets for 2023 are only available for reporting for a small group of OECD countries. In 2023, R&D budgets increased in real terms in Korea (2%), the Netherlands (10%), Sweden (1.5%) and the United States (8%). Cuts in real terms were reported for Austria (-0.2%) and the Czech Republic (-8%). The OECD continues to work with countries to ensure more timely reporting of in-year R&D budgets to inform the international community.

Figure 2. Government R&D budget trends, selected economies, 2007-2022



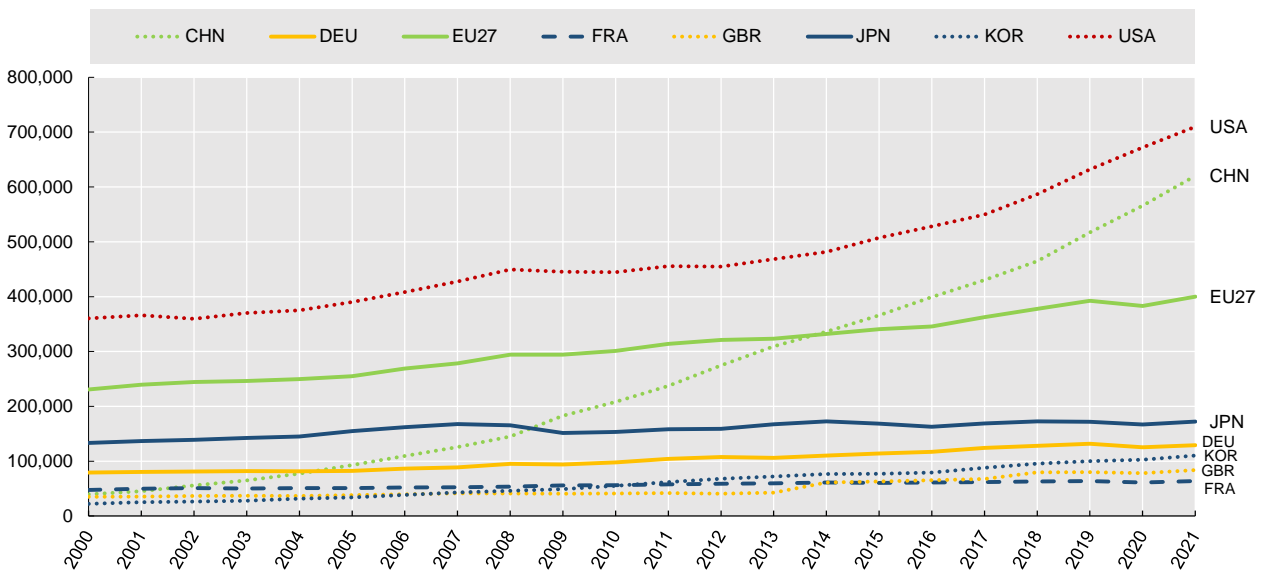
Note: Trend estimates are inflation-adjusted. Base year 2007=100.

Source: OECD Main Science and Technology Indicators (MSTI) Database, September 2023. <http://oe.cd/msti>

R&D growth in the OECD area was pervasive but unevenly distributed across countries in 2021

As reported in March 2023, pervasive growth in inflation-adjusted R&D expenditure in the OECD area in 2021 was led by intensified R&D growth in the United States at 5.6% and Korea at 7.1%, supported by a noteworthy recovery in countries like France, Germany and Japan, where R&D expenditure grew at close to 3% after negative growth in 2020. R&D expenditure in the EU27 area rose by 4.4% after a decline of 2.4% in 2020. Several OECD economies reported growth rates over 10% in 2021 and China’s reported R&D expenditure (see Box below on coverage changes) grew by 10% in 2021. In purchasing power adjusted terms, China’s total R&D expenditure stood in 2021 at 83% of total R&D performed in the United States (Fig 3). While previous reporting errors for China’s GERD have been addressed since the latest edition, this comparative estimate is somewhat unreliable based on experience of recurrent major revisions to PPP conversion rates (see Box below on data updates).

Figure 3. Gross domestic expenditure on R&D, selected economies, 2000-2021
USD million in constant PPP prices

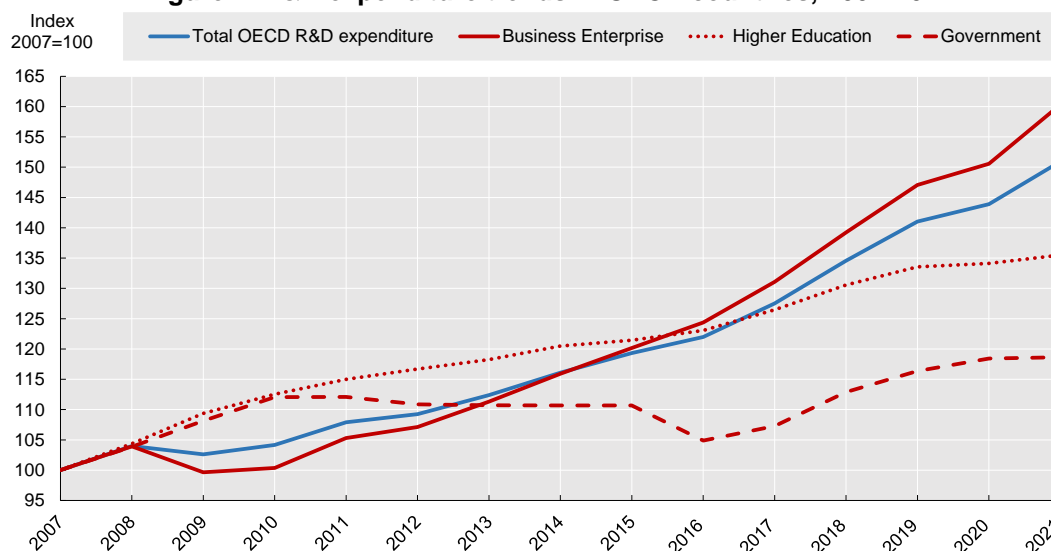


Source: OECD Main Science and Technology Indicators Database, September 2023. <http://oe.cd/msti>

The business sector resumed in 2021 its role as main driver of R&D growth

Since the 2009 global financial crisis and up until the COVID-19 crisis, businesses have seen their share of total expenditure on R&D performance in the OECD area increase to almost three quarters, leading R&D growth in the OECD area. After temporarily trailing other sectors in terms of R&D expenditure growth in 2020, growth in R&D expenditure in the business sector in 2021 was confirmed at 6.5%. R&D in the Higher Education sector increased by 1% while it did not change for Government sector institutions.

Figure 4. R&D expenditure trends in OECD countries, 2007-2021



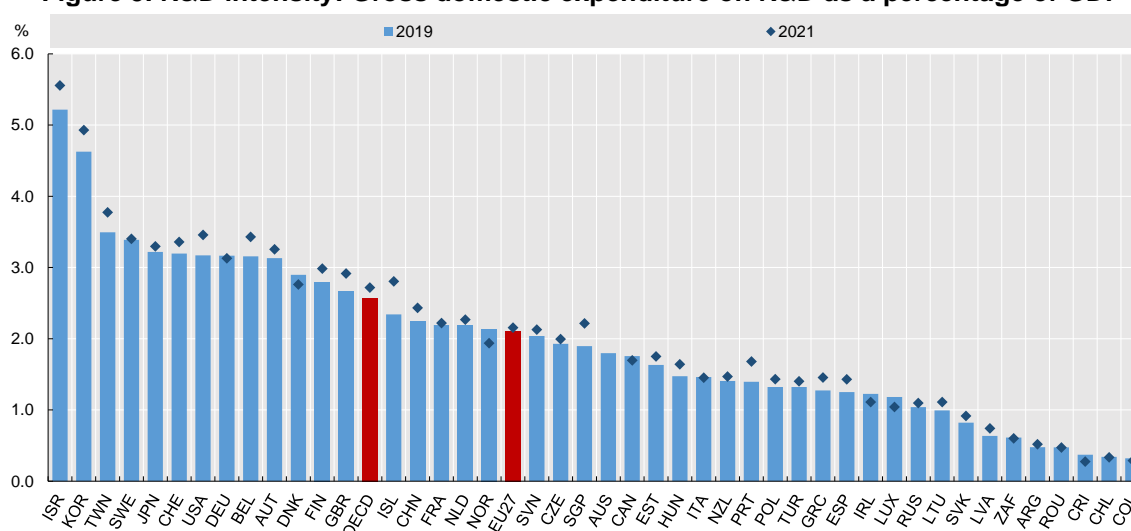
Note: Estimates adjusted for inflation. Base year 2007=100.

Source: OECD Main Science and Technology Indicators (MSTI) Database, September 2023. <http://oe.cd/msti>

R&D intensity in the OECD area declined in 2021 as GDP outpaced growth in R&D expenditure

In contrast to 2020, R&D growth in the OECD area in 2021 (4.9%) fell short of GDP growth (5.8%). As economic growth resumed in 2021, R&D intensity – a headline measure of domestic expenditure on R&D expressed as a percentage of GDP – can be meaningfully compared with pre-COVID-19 crisis levels. In the OECD area, R&D intensity stood in 2021 at 2.7%, while it was 2.6% in 2019. For the EU27 it remained at 2.1%. Israel and Korea continued to report the highest OECD levels of R&D intensity, at 5.6% and 4.9% of GDP, respectively.

Figure 5. R&D intensity: Gross domestic expenditure on R&D as a percentage of GDP



Note: 2018 instead of 2019 for Costa Rica; 2020 instead of 2021 for Chile, Colombia, the Russian Federation, Singapore and South Africa.

Source: OECD Main Science and Technology Indicators Database, September 2023. <http://oe.cd/msti>

Main coverage changes and major revisions to R&D data in the latest edition

MSTI coverage is defined by the reporting by countries to OECD of R&D data that are consistent with the guidance in the OECD Frascati Manual. The statistics compiled by OECD are based on data provided by responsible national bodies to the OECD annual call for R&D data from OECD member countries and selected non-member economies. In its latest available edition, MSTI reports indicators on all 38 OECD Member countries with most recent data typically reaching up to 2021 (2022 in the case of R&D budgets).

Notes on member countries:

Costa Rica, which became the 38th member of the OECD in May 2021, has been included in MSTI for the first time in the September 2023 edition. Costa Rica is covered for all indicators except those on Government R&D budgets.

Mexico clarified that the biennial National Survey on Research and Technological Development (ESIDET) has not been conducted since 2017 and data reported to OECD had been extrapolated. Accordingly, the OECD decided to suppress R&D estimates from Mexico from reference year 2018 until further confirmation that data collection and estimation procedures consistent with Frascati Manual guidance have been resumed.

In the March 2023 edition of MSTI, indicators for the **United Kingdom** were significantly and provisionally revised compared to previous editions. While the UK Office for National Statistics continues its process of full review and update of data collection and estimation methods in 2023, the notes on OECD processing and release of UK data present in the March 2023 note remain applicable.

Notes on non-members:

As reported in previous editions, in alignment with the OECD Council decision in response to **Russia's** large-scale aggression against Ukraine, the OECD suspended its solicitation of official statistics on R&D from Russian authorities, leading to the absence of more recent R&D statistics for this country in the OECD database.

In the March 2023 edition, the OECD suppressed and put on hold the publication of several R&D indicators for **China** because of concerns about the coherence of expenditure and personnel data. Chinese officials have since confirmed errors in the business R&D data submitted to OECD in February 2023 and revised figures subsequently. While the revised breakdowns between manufacturing and other sectors is now deemed coherent, few details are available about the structure of China's R&D in the service sector which has been significantly increasing in size. China provided additional explanations on the growth rates in the higher education and government sectors in 2019, as well as the discrepancies between personnel and expenditure trends in both sectors. Total estimates of GERD and its institutional sector components (BERD, HERD, GOVERD) for 2019 to 2021 have not been modified by China and have been published as reported to OECD. The OECD continues to encourage China and other non member economies to engage in comprehensive reporting of R&D statistics and metadata.

MSTI data users should exercise particular care in interpreting statistical comparisons of R&D expenditures accounting for **international differences in purchasing power**, especially for non OECD and non EU countries since these data have been the object in the past of very significant revisions. The 2021 Cycle of the International Comparison Program of the World Bank is currently underway and benchmark updates are expected halfway in 2024. See <https://www.worldbank.org/en/programs/icp>.

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