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Working Party of National Experts on Science and Technology Indicators

OECD R&D tax incentives database, 2022 edition

This report presents the 2022 edition of the OECD R&D tax incentive indicators database, which comprises statistics and policy design information on expenditure-based R&D tax incentives for 38 OECD countries and 11 other selected economies. The report supports and complements the indicators in the OECD R&D tax incentives database published on 7 April 2023, available via the OECD.STAT and the STI.Scoreboard platform.

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# **OECD R&D** tax incentives database, 2022 edition

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#### Abstract

This report presents the 2022 edition of the OECD database on indicators and policy design information on expenditure-based R&D tax incentives for 38 OECD countries and 11 other selected economies, drawing on data collected through the 2022 OECD R&D tax incentives survey. The database contains the latest available evidence on the design of R&D tax incentives, as well as indicators on the expected tax relief per unit of R&D spending from a business perspective and the total cost of R&D tax relief to governments, facilitating a timely and integrated view of government support for business R&D across countries as well as key trends. Several exploratory indicators presented in this report provide a complementary picture on the structure and evolution of tax support for business R&D, namely on the numbers of beneficiaries and qualifying expenditures for tax relief. This report also documents the launch of the OECD INNOTAX portal in March 2022, a new and interactive OECD tool that provides a single access point to the latest policy design information, quantitative indicators and OECD analysis on R&D tax incentives.

<sup>&</sup>lt;sup>1</sup> This report has been prepared by Silvia Appelt, Lukas Günner and Fernando Galindo-Rueda, OECD Directorate for Science, Technology and Innovation. The report draws on quantitative and qualitative data provided by national country representatives in the 2022 OECD-NESTI R&D tax incentive survey. The contributions of official contacts from OECD countries and other major economies to this OECD data collection effort are gratefully acknowledged. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

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# Executive summary

### **This report**

For several decades, tax incentives have risen in prominence as policy instruments of choice for governments wishing to provide financial support for business to engage in R&D and other innovation activities in their territories. The OECD is at the forefront of efforts to provide a reliable internationally comparable picture of tax-based support for innovation in the OECD area and beyond.

This report presents the 2022 edition of the OECD R&D tax incentive indicators database, which comprises statistics and policy design information on expenditurebased R&D tax incentives for 38 OECD countries and 11 other selected economies. Drawing on data collected through the 2022 and previous editions of the OECD R&D tax incentives survey, the database published on 7 April 2023 contains the latest available evidence on the design of R&D tax incentives, the generosity of R&D tax incentives from a business perspective and the cost of R&D tax relief to governments.

### **Highlights**

- 33 out of 38 OECD countries offered tax relief for R&D expenditures in 2022, up from 19 OECD countries in 2000. In the EU, 22 out of 27 member states offered R&D tax support in 2022, doubling up the number of EU countries offering such support compared to 2000.
- OECD estimates of tax subsidy rates for R&D show that OECD average tax subsidies declined in 2022 for the first time since 2009 but still exceeded pre-COVID-19 tax subsidy levels by some margin. This reduction in 2022, while small in scale, applied across all the modelled scenarios, regardless of business size and profit situation. Profitable SMEs can on average expect to receive a 20% subsidy on eligible R&D expenses, compared with large firms at close to 16%.
- The latest OECD estimates of government tax relief for R&D expenditures for 2020 show that tax incentives maintain a preeminent role in the business R&D support policy mix in OECD and EU countries. Tax incentives accounted for close to 55% of total (direct and tax) support for business R&D in the OECD and EU-27 area. For one in four OECD countries, more than 70% of public support for business R&D was provided in the form of tax relief in 2020.
- In 2020, in a context of economic contraction due to the COVID-19 crisis, the total (direct and tax) amount of government support for business R&D increased in absolute, inflation-adjusted levels in the OECD area. While the estimated volume of government tax relief for R&D expenditures continued to rise in the first year of the COVID-19 crisis, the level of direct funding rose sharply outpacing the growth in tax support.
- In 2020, the EU-27 area experienced for the first time a decrease in total R&D tax support, leading to a reduction in the total amount of government support for business R&D. While direct funding of business R&D increased in 2020, this increase was in absolute terms not large enough to offset the decline in R&D tax support.

- The analysis of country-specific changes in the level of tax, direct and total support for BERD suggests that around one in two countries increased tax and/or direct support from 2019 to 2020 with a view to supporting business R&D in the first year of the COVID-19 crisis. The volume of tax (direct) support (Const USD bn) increased in 17 (24) out of 31 (35) countries for which data are available. A net increase in the total (direct and tax) government support for BERD was observed in 12 out of 23 countries for which changes in both tax and direct support over this period have been documented.
- Over the 2000-2020 period, total government support for business R&D increased by 50% in the OECD area, from 0.14% of GDP in 2000 to 0.22 % of GDP in 2020 as R&D tax support steadily increased, surpassing direct funding in 2016. In the EU-27 area, total support for business R&D grew by 80% over this period, from 0.10% of GDP to 0.18% of GDP in 2020 with R&D tax incentives surpassing direct funding in 2015.

### New structural insights on tax support for R&D

- Leveraging the **more granular industry-level information** collected for twelve selected R&D intensive industry sectors, this report provides new insights into the distribution of R&D tax relief by main economic activity for eighteen OECD countries. There is significant cross-country variation in the distribution of R&D tax support across these twelve industry sectors. Firms in the Information and communication and Computer and electronics industries often account for a large share of R&D tax benefits.
- An exploratory indicator of **R&D tax support by economic ownership**, reported for the first time in 2021 and currently available for seven OECD countries, points to a large variation in the share of R&D tax benefits attributable to domestic standalone enterprises and foreign-controlled affiliates across countries reflecting the role of foreign multinationals within countries' R&D.
- Several exploratory indicators presented in this report provide a complementary picture on the structure and evolution of tax support for business R&D, for example on the **numbers of R&D tax relief beneficiaries and qualifying expenditures for R&D tax relief.** These can be highly relevant for informing and interpreting official R&D statistics.

### Accessing the data and complementary information

The OECD R&D tax incentives database is available via <u>OECD.STAT</u> and the <u>STI.Scoreboard platform</u>.

The <u>OECD INNOTAX portal</u> launched in March 2022 is a new and interactive OECD tool that provides a single access point to the latest policy design information, quantitative indicators and OECD analysis on R&D tax incentives. It contains:

- Interactive charts with evidence on the use, generosity and cost of R&D tax relief in the OECD area and beyond.
- Interactive dashboards visualising key design features of R&D tax incentives.
- **Sophisticated interactive tools with smart filtering** to facilitate policy discovery, analysis and comparison.

# OECD R&D tax incentives database, 2022 edition

### **1. Introduction**

Investment in research and development (R&D) is a key factor driving innovation and economic growth. Governments worldwide adopt various financial support instruments to promote R&D by businesses and increasingly rely on tax incentives to incentivise business R&D investment. As of 2022, 33<sup>2</sup> of the 38 OECD countries, 22<sup>3</sup> of 27 EU member states and several other major economies<sup>4</sup> offer tax relief for R&D expenditure at central or subnational government level.<sup>5</sup> In the OECD area alone, this corresponds to an increase of more than 50% in the number of countries that provide R&D tax relief to businesses relative to the year 2000, where governments in 20 out of the 38 OECD countries offered this form of support. A similar pattern can be observed in the share of tax relief in total government support for R&D in the OECD area, which increased on average from 36% in 2006 to 55% in 2020. The shift in the policy mix is even more pronounced in the European Union (EU-27), with R&D tax support doubling up from 27% of total government support in 2006 to 54% in 2020.

Since 2007, the OECD has worked to extend the international evidence on R&D tax incentives, developing methodologies and data infrastructures that have been met with considerable interest and have become widely used in the policy, statistical and academic arenas. The latest evidence is now available on the OECD INNOTAX portal (https://stip.oecd.org/innotax) – a new thematic portal on expenditure-based R&D tax incentives, launched by the OECD Directorate for Science Technology and Innovation in March 2022. This new and interactive OECD tool, developed with support from the EU Horizon 2020 Programme and hosted by the <u>OECD-EC</u> <u>STIP Compass policy database</u>, builds upon and extends the existing <u>OECD research infrastructure on R&D tax incentives</u> (OECD, 2023), allowing users to visualise, explore and compare the design and administration of R&D tax incentives across OECD countries and other

 $<sup>^2</sup>$  In 2022, the exceptions are Costa Rica, Estonia, Israel, Latvia and Luxembourg. Israel offers an accelerated depreciation provision for R&D capital assets which is not specific to R&D and not considered as an R&D tax incentive. Israel: The Statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

<sup>&</sup>lt;sup>3</sup> In 2022, the exceptions are Bulgaria, Estonia, Latvia, Luxembourg and Malta.

Footnote by Türkiye: The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Türkiye shall preserve its position concerning the "Cyprus issue".

Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognized by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

<sup>&</sup>lt;sup>4</sup> In response to Russia's large-scale aggression against Ukraine, the OECD Council decided on 8 March 2022 to immediately suspend the participation of Russia and Belarus in OECD bodies. In view of this decision, the OECD suspended its solicitation of official statistics on R&D and R&D tax incentives from Russian authorities, leading to the absence of more recent R&D and R&D tax relief statistics for this country in the OECD database, while previously compiled data are still available. Estimates of implied marginal R&D tax subsidy rates reported for Russia in 2022 draw on information collected through OECD desk-based research and are not based on officially transmitted information.

<sup>&</sup>lt;sup>5</sup> Governments may also provide tax relief for the income derived from R&D and innovation, alone (e.g. Israel, Luxembourg and Malta) or in combination with expenditure-based tax incentives. Income-based tax incentives for R&D and innovation are beyond the scope of this report due to the lack of comprehensive and internationally comparable data on the design and cost of such incentives. The OECD KNOWINTAX project aims to fill this evidence gap in collaboration with OECD countries and other major economies. Appelt et al. (2023) and González Cabral et al., (2023) present the first findings from the OECD KNOWINTAX project.

major economies. INNOTAX provides a single access point to the latest policy design information, quantitative indicators and OECD analysis on R&D tax incentives.

Progress in the measurement of expenditure-based R&D tax incentives is the result of more than 10 years of close collaboration within the OECD expert network on R&D tax incentives. This informal network was developed to contribute to and oversee the OECD data collection on tax incentives for R&D expenditures. Its membership draws on contacts from the OECD Committee for Science Technology and Policy (CSTP), its Working Party of National Experts on Science Technology Indicators (NESTI) and the Committee for Fiscal Affairs' Working Party No 2 (WP2) on Tax Policy Analysis and Tax Statistics. With support from the European Union's Horizon 2020 Programme, this work has been intensified by means of an increased frequency of data collection, extended country coverage and analysis and a decidedly more user-oriented dissemination of qualitative and quantitative OECD R&D tax incentive survey outputs through the creation of the OECD INNOTAX portal.

This report focusses on expenditure-based tax incentives provided at central or subnational government level. It presents the latest evidence on the design of R&D tax incentives, the generosity of R&D tax incentives from the firm perspective and cost of R&D tax relief to governments, drawing on the data collected and validated by official contacts within countries as part of the 2022 OECD-NESTI R&D tax incentives survey completed in December 2022<sup>6</sup>. The report complements the existing evidence in the OECD INNOTAX portal by providing a comprehensive and more detailed description of the latest OECD indicators on R&D tax incentives featuring in the <u>OECD R&D tax incentive database</u><sup>7</sup> and OECD <u>Corporate Tax Statistics Database</u> following the database update in April 2023 and showcasing some novel and exploratory statistics collected via the OECD R&D tax incentives survey.

The statistical database covered in this report brings together time-series indicators of <u>implied</u> marginal R&D tax subsidy rates (by firm size and profitability scenario) for the period 2000-22 and government tax relief for R&D tax expenditure (GTARD) for the 2000-20 period (central and subnational government level). As in previous OECD work, this report presents GTARD estimates (i.e. foregone tax revenues and refunded amounts) combined with data on direct funding (i.e. R&D grants and purchases), as compiled by official national providers of R&D statistics based on reports from firms, in order to provide a more complete picture of government efforts to promote business R&D. These two R&D tax incentives indicators facilitate a better integrated view of government support for business R&D across countries and over time.

In addition to statistics on the cost of R&D tax relief, the OECD R&D tax incentives survey has collected information on the number of R&D tax relief beneficiaries since 2016 and further extended its scope in 2020 to collect information on the amount of qualifying expenditures for R&D tax relief. While the number of countries reporting figures on the numbers of beneficiaries has steadily increased over the last years, reaching 37 in 2022, data availability is still limited for certain breakdowns and for data on business expenditures qualifying for R&D tax relief. These new indicators, which need to be considered as experimental in nature, draw attention to the relevance and feasibility of this type of information with a view to progressively improve data coverage and comparability.

 $<sup>^{6}</sup>$  This data collection attempts to identify and address subtle differences in the tax treatment of R&D expenditures in firms. National experts on science and technology indicators have collaborated with public finance and tax authorities to provide the most up-to-date information using a common approach towards describing the various features that are relevant for describing the nature and generosity of tax support for R&D. From 2007 to 2015, the OECD-R&D tax incentive survey was carried out on a bi-annual bias and on an annual basis since 2015.

<sup>&</sup>lt;sup>7</sup> OECD (2019) presents the new R&D tax incentive time-series data available in the OECD R&D tax incentive database, highlighting its potential for descriptive and quantitative analyses at cross-country level.

Refining the survey tool used by OECD and the concepts included therein is part of this ongoing process. Key changes in the scope and structure of the 2022 OECD R&D tax incentives survey include the collection of more comprehensive information on the administration of R&D tax incentives, as well as more granular information on the distribution of R&D tax relief by industry and economic ownership. The preliminary results presented in this report for a subset of OECD countries provide additional insights into the directionality of R&D tax relief.

This report is structured as follows:

- Section 2 provides a summary overview of the key design features of R&D tax incentives and main R&D tax relief administration models in the OECD area and beyond a new component in the 2022 edition of this OECD report, building upon the evidence provided in the new OECD INNOTAX portal. This is followed by a synthesis of recent policy changes in the availability, design and implementation of R&D tax incentives in 2022, and brief outline of the possible implications of the recent global tax agreement on minimum taxes for government support for business R&D and innovation.
- Section 3 presents evidence on the notional tax subsidy per unit of R&D in OECD, EU and other major economies in 2022 and changes in implied marginal R&D tax subsidy rates over the past decade. The indicators presented allow for an examination of the distribution of R&D tax subsidy rates across countries by firm size and profit scenario and of aggregate trends in implied R&D tax subsidy rates across OECD and EU countries over the 2000-22 period.
- Section 4 provides an overview of the levels of central (federal) and subnational R&D tax support in 2020, compared to direct funding of business R&D from national and international government sources. It examines the structure of central government tax support for business R&D by firm size, main economic activity and economic ownership and presents novel statistics on the number of R&D tax relief beneficiaries and amount of business expenditures qualifying for R&D tax relief. This is followed by an outline of trends in the relative and absolute importance of government tax relief for business R&D over the 2000-20 period, and the evolution of R&D tax relief beneficiaries and business expenditures qualifying for R&D tax relief beneficiaries and business expenditures qualifying for R&D tax relief across countries over time. Drawing on the new data on GTARD business expenditures qualifying for R&D tax relief available for 2020, the report also offers some initial insights into changes in tax and direct support for business R&D and changes in business expenditures qualifying for R&D tax relief in the first year of the COVID-19 crisis.
- Section 5 concludes with a summary of the main findings of the report and an outlook on future OECD work in this area.

# 2. R&D tax incentives in the OECD area and beyond

More countries currently rely on tax support to encourage business R&D than a decade ago. **Figure 1** shows how the number of OECD countries and EU countries offering R&D tax incentives has evolved over time. In 2022, 33 out of 38 OECD countries offer R&D tax incentives at central or subnational government level, and this number reaches 22 in the EU-27 area. This implies an increase of around 75% in OECD and 100% increase in EU countries that provide R&D tax relief to businesses relative to the year 2000, where governments in 19 out of the 38 OECD countries and 11 out of 27 EU countries offered this form of support.

While the number of jurisdictions offering R&D tax incentives notably increased from the mid-2000s onward, **Figure 1** also displays cases where countries repealed their R&D tax relief provisions such as New Zealand and Mexico in 2009, Finland in 2015, Latvia in 2018 and Malta in 2021. However, New Zealand and Mexico reintroduced R&D tax incentives in the form of

an R&D tax credit in 2015 and 2017 respectively, and Finland in form of an R&D tax allowance in 2021. Most recently, Cyprus introduced for the first time an R&D tax allowance in 2022.

# Figure 1. R&D tax incentives in the OECD and EU area, 2000-2022



Number of OECD-38 and EU-27 countries offering tax support for R&D

Changes in the availability of R&D tax relief provisions have been accompanied by various changes in the design and scope of R&D tax incentives in OECD countries and other major economies over time<sup>8</sup> The design of R&D tax incentives shapes the generosity, business uptake and effectiveness of R&D tax incentives in encouraging business R&D. A recent cross-country analysis (OECD, 2020a,b) based on micro-aggregated data for 20 OECD countries provides new insights into the effect of R&D tax incentives and direct funding in spurring business R&D investment, and the heterogeneity of the effect of R&D tax incentives across different types of firms (e.g. by firm size, level of R&D, industry).<sup>9</sup>

This section presents the main design features of R&D tax incentives and common R&D tax relief administration models in OECD countries and other major economies, including outline of existing tax relief provisions for R&D in specific priority areas such as green or energy related R&D. It further highlights the most recent changes in the availability, design and administration of R&D tax incentives in OECD countries and other surveyed economies. This is complemented by a brief outline of the implications of the recent global tax agreement on minimum taxes for government support for business R&D and innovation.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

<sup>&</sup>lt;sup>8</sup> The data presented for Thailand in this report draw upon Thailand's response to the 2021 OECD R&D tax incentives survey. In 2021, the extension of the R&D tax allowance in Thailand was pending government approval. At the time of reporting, no additional details on the status of the R&D tax allowance in Thailand were available.

<sup>&</sup>lt;sup>9</sup> For a literature survey, see OECD (2016).

# 2.1. Main design features

Countries differ in the extent to which they rely on tax measures to support R&D, and those that do design tax relief measures in substantially different ways. Key R&D tax incentive design features (**Figure 2**) relate to the scope and definition of R&D for tax purposes, the choice of eligible R&D expenditure and tax instrument, provisions for firms with insufficient tax liability and for a limitation of R&D tax benefits as well as targeted tax relief provisions.





#### Source: OECD.

These design features influence the extent to which firms can make use of tax benefits in the loss-making vis-à-vis profit case and the degree to which specific types of firms such as SMEs, young firms, and start-ups benefit from a preferential tax treatment. **Table A.1** provides a summary overview of the main design features of R&D tax incentives available in OECD countries and other major economies. The information on policy design (**5.Annex A**), policy implementation (**5.Annex B**) and policy changes (**5.Annex C**) contained in this report is also retrievable from the new OECD INNOTAX portal launched in March 2022.

# 2.1.1. R&D and eligible activities

Definitions of R&D or other types of expenditures eligible for tax relief differ across jurisdictions and with respect to the OECD Frascati Manual definition (OECD, 2015b) and explanatory guidance but in general most attempt to be consistent with it. Only a few countries extend tax relief beyond R&D to other innovation activities, and when they do so, it is typically under much stricter and less generous terms. R&D in the social sciences can sometimes be excluded, possibly because of the difficulty to distinguish from market research and related activities.

The target of tax relief is often more closely aligned to the financial cost of R&D to the firm (expense), regardless of who carries out the R&D, than the cost of the R&D activity incurred within the firm (i.e. intramural R&D, regardless of who funds the work). R&D carried out

internally on own account and R&D expenditure subcontracted to off-site consultants, contractors and other third-parties, tend to be eligible under most R&D tax incentive provisions available in OECD, EU and other major economies. **Table A.2** outlines which countries allow the funder or performer of R&D to claim tax benefits in the case of subcontracting. The most common approach is to restrict the eligibility for tax relief to the contracting or purchasing party (funder). In only few countries (Belgium, Colombia, France, Norway), firms are able to trade or exchange R&D tax benefits with third parties or use them as a security, e.g. in order to obtain advances from lenders on the anticipated tax relief to be received at a later date (**Table A.3**).

Some R&D tax incentive schemes explicitly target specific types of R&D costs. Overall, there is a general preference for considering within the scope of eligible R&D costs those relating to labour and other current expenditures. R&D personnel costs account for the largest share of intramural R&D costs, and in principle, the focus on R&D personnel does incentivise investment in human resources based in the domestic economy. Acquisition of capital assets to be used for R&D is less typically supported as assets may be subsequently disposed of or used for other purposes.

# 2.1.2. Types and key features of tax support instruments for R&D

### Tax credits versus allowances

Any form of tax relief can be provided as an allowance, exemption, deduction or credit. Tax allowances, exemptions and deductions effectively subtract from the tax base before the tax liability is computed, reducing the taxable amount before assessing the tax. A tax credit is an amount subtracted directly from the tax liability due from the beneficiary unit after the liability has been computed. The choice between credits and allowances is largely a formal rather than substantive one, as they can be converted into each other to be made equivalent. However, the value of the tax benefit will react differently to changes in the tax rate, since the value of R&D tax allowances is directly linked to the level of the corporate income tax rate which may change over time. In the case of R&D, the normal default or benchmark position is to allow R&D expenses to be fully deducted, regardless of the fact that they represent (risky) investments in knowledge assets.<sup>10</sup> Therefore, the term "enhanced allowance" is used to identify provisions that represent a deduction rate of more than 100% over eligible expenses.

### Tax base

Tax relief measures can also be distinguished according to whether they are redeemable against corporate income vis-à-vis payroll (e.g. withholding) taxes or social security contributions. Most countries provide corporate income tax offsets: payroll withholding tax credits and social security exemptions were offered in only eight OECD countries in 2022. Some countries target tax credits (e.g. United States) to R&D expenditures over and above of a pre-defined baseline amount. Such type of incentive is commonly described as "incremental". Some countries offer a hybrid system comprising both a volume and an incremental tax credit (Korea, Portugal and Spain) or allowance (Czech Republic and Slovak Republic).

### Temporary vs permanent schemes

The use and impact of tax incentives can be influenced by the temporary or permanent nature of these programmes, as well as by how the business community expect R&D tax support to continue to be provided and under which terms (OECD, 2016). Most R&D tax support schemes initially came into being as temporary measures so there is some uncertainty attached to them. Finland introduced a scheme on a temporary basis over the 2013-14 biennium that was not extended beyond this period. Awareness of plans not to extend the scheme appears to have

<sup>&</sup>lt;sup>10</sup> In the United States, R&D expenses are no longer expensed but capitalized and deducted over a five-year period from 2022 onwards. Legislation delaying the implementation of amortization has not been enacted yet.

contributed to limited take up of the scheme (Kuusi et al., 2016). The United States introduced the Federal Research and Experimentation (R&E) credit as a temporary measure in 1981, which after 17 extensions became permanent with effect from 2016.

### Taxability of tax relief

Tax credits represent taxable income in Canada and the United Kingdom (R&D tax credit for large companies) or are effectively taxable (Australia, Chile and the United States) because, in order to claim the headline credit rates, the taxpayer has to renounce to the deductibility of the R&D expenses that are claimed. As payroll and social security related incentives reduce the expense base and increase the taxable income of businesses, such incentives are effectively taxable as well.

# 2.1.3. Provisions for firms with insufficient tax liability

Some countries address the limited incentive effect of tax relief instruments based on foregoing due tax for firms with limited or no tax liabilities (e.g. for start-ups with no profits) by providing for the carry-over of tax benefits or even allowing for offsetting payments (refunds) to be made by the tax authority to the firm within for relevant period.

### Carry overs

While carry-over provisions are in place in most OECD and other major economies, the period of time over which unused tax incentive claims can be carried forward differs notably across countries. In 2022, firms can carry over unused claims for three years in the Czech Republic, for instance, six years in Poland, 8 years in Portugal, 18 years in Spain, and 20 years in the United States. Carry-overs over an indefinite time horizon are further available in several OECD countries (e.g. Australia, Chile, Denmark, Lithuania, Türkiye) and other selected economies (e.g. Argentina, South Africa). Different provisions may also be in place for different schemes within a country. In Belgium, for instance, unused tax credits are carried forward for five years until any excess amounts are made payable to firms. Under the Belgian R&D tax allowance scheme, by contrast, an indefinite carry-forward is available to firms.

### Refunds

A tax credit becomes "payable" or refundable, as mentioned above, when any credit excess on top of the tax liability can be paid in full or in part to the taxpayer. Refundability can be particularly beneficial for young, R&D active firms, at the stage of investing in developing and launching their products. A potential downside of such provisions is that they can also be used by firms with the ability to shift profits to other jurisdictions. Increased awareness of the importance of refundability for firms without revenues such as start-ups and the experience of the global financial crisis appears to have resulted in an increased provision of refund and carry over possibilities.

### Tax relief redeemable against payroll and related taxes

Tax offsets redeemable against payroll tax or social security contributions generally provide an alternative means to address the limited income tax liability problem. Such incentives, while they may be limited to the payroll tax and social security liability of the corresponding tax period, unless alternative restrictions apply, are disconnected from the corporate tax liability of the firm and thus are in principle payable in both profit and loss-making scenarios. In their original design limited to labour costs for R&D, payroll tax and social security related incentives may be extended to cover other qualifying current or capital expenditure. The Netherlands, for instance, merged its payroll withholding tax credit (WBSO) and R&D tax allowance (RDA) scheme for non-labour related R&D expenditure, providing a broad-based payroll tax offset with effect from 2016.

### 2.1.4. Limitation of R&D tax benefits

A firm's ability to benefit from R&D tax relief may not only be reduced in in the context of insufficient taxable profits but may also arise as a result of additional provisions that authorities include to manage the overall financial burden on the public finances and assure a more equitable distribution of tax benefits. On this basis, several countries introduce different types of thresholds or upper ceilings for eligible R&D volumes or tax benefits (**Table A.1**). Ceilings may be defined in absolute monetary or relative terms (e.g. as a percentage of business expenditures qualifying for R&D tax relief or corporate tax liability). Offsets against payroll withholding taxes and social security contributions, by construction, are limited to the payroll withholding tax or social security contributions liability of the tax period unless additional restrictions (e.g. minimum required level of social security contributions) apply.

Overall, few countries adopt a floor (minimum threshold) as a means of determining tax relief eligibility and steering the minimum level of R&D expenditure. Only firms that incur a level of qualified R&D expenditure greater or equal to the floor amount qualify for tax support. Some countries offer incremental tax incentives with a specified base amount, i.e. the baseline level of R&D spending for which the firm cannot claim tax relief – only excess amounts qualify for support, hence their description as "incremental". Base amounts are typically defined as a function of past R&D expenditure (rolling average over previous n years) but alternative specifications have also been adopted. Countries use different base amount definitions and revise them over time.

Threshold-dependent rates imply a discrete reduction in the size of the R&D tax credit or allowance rate once qualified R&D spending surpasses a pre-defined threshold amount. France and the Netherlands offer such incentives alongside Canada where enhanced tax credit rates are made available to eligible small companies, so called Canadian-Controlled Private Corporations (CCPCs), up to a pre-defined threshold amount. In the case of France and the Netherlands, this threshold amount represents a fixed value. In Canada, by contrast, this threshold amount ("expenditure limit") of CAD 3 million is gradually reduced to zero, i.e. fully phased out, as prior-year taxable capital rises from CAD 10 to CAD 50 million.

While reducing the overall cost of support, the presence of thresholds or upper ceilings may reduce the incentive effect at the margin among firms with higher levels of R&D. Aggregation rules can play an important role, as some groups may be able to break down their R&D tax support claims across separate enterprises to optimise their tax bill. Aggregation rules for related companies can also matter if there are beneficial terms for SMEs since, in the absence of such rules, firms may have incentives to offload their R&D to smaller affiliates. In order to ensure that tax support accrues to the intended beneficiaries and to avoid unintended behaviours, tax authorities often impose aggregation and independence rules (e.g. Canada, United Kingdom). Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Table A.4. Aggregation rules applicable in determining R&D tax benefits, 2021 shows that countries differ in the extent to which they rely on a joint or separate assessment of the tax benefits of affiliated companies. In Australia, Japan and the United States, for instance, members of consolidated groups act as a single taxpayer for tax purposes. Denmark and New Zealand, which offer tax credits for deficit related R&D expenditure, require the taxable income of the group to be negative in order to qualify for relief.<sup>11</sup> Aggregation rules may also apply in

<sup>&</sup>lt;sup>11</sup> In New Zealand individual companies that are part of a group may still be eligible if the group has an overall net loss position. Other requisites apply at the individual level. The firm needs to be resident in New Zealand, be in a tax loss position in the year, needs to have eligible tax expenditure and sufficient R&D wage intensity. In the case of a firm being part of a group, the R&D wage intensity calculation is based on the entire group's total R&D labour expenditure, divided by the total labour expenditure for the entire group.

the assessment of refunds (Spain, Canada), application of thresholds (e.g. expenditure limit for CCPCs in Canada <sup>12</sup>) and classification of SMEs (e.g. United Kingdom).

# 2.1.5. Targeted relief measures

Although tax incentives are generally seen as the more market-based, non-discretionary alternative to provide support for business R&D, a number of countries target R&D tax incentives to particular types of firms, industries or activities. Targeted measures may be motivated by evidence or the belief that some groups of firms with observable characteristics, e.g. firm size or age, can be more responsive to a given unit of financial support. Tax provisions may imply a more favourable treatment (Table A.1) for SMEs and young firms in the form of more generous rates of tax support or a refund provision that is exclusively available to these firms. Likewise, few countries reported as part of the 2022 OECD R&D tax incentives data collection to have in place any **special, temporary or emergency tax relief provision for R&D in specific priority areas** such as green or energy related R&D. This includes the cases of:

- **Italy:** Special provision of a higher tax credit rate for technological innovation aimed at 4.0 innovation or ecological transition.
- **Portugal:** Expenses related to the making of eco-design products are increased by 10% upon submission and approval of the project by the Portuguese Environment Agency.
- **Korea:** enhanced tax credit rates apply in the case of R&D aimed at New Growth and Basic technologies (235 technologies in 12 areas, incl. future cars, next generation electronic information devices, energy and environment) and National Strategy Technologies.

### 2.2. Administration and monitoring of R&D tax incentives

The OECD R&D tax incentives survey collects information on the implementation of R&D tax incentives, including the relevant stages and responsible authorities in the administration and monitoring of R&D tax incentives. For the first time in 2022, this information has been collected by the OECD on a scheme-by-scheme basis (previously country-basis). This more granular information is important as the administration of different R&D tax incentives within one country may vary and facilitates the mapping of the main R&D tax relief administration models in the OECD area and beyond, including the prevalence of pre-approval mechanisms. **Figure 3** - a visualisation adopted from the new <u>OECD INNOTAX portal</u> – summarises the latest results for 2022, while **Table B.1** provides additional details on the adoption of different R&D tax relief administration models across countries, including use of pre-approval mechanisms.

The administration and monitoring of R&D tax Incentives may rely on a single, dual or a multiple agency model, depending on the distribution of responsibilities and number of institutions involved in the administration and monitoring of R&D tax incentives. While one single institution (e.g. tax office) is in charge of the administration and monitoring of R&D tax incentives in the case of single agency models, dual agency models rely on the contribution and inter-institutional coordination of two institutions (e.g. STI ministry and tax office) that share responsibility for specific stages (e.g. pre-approval, evaluation of R&D tax relief claims, audit) in the administration and monitoring of national R&D tax incentive schemes. As **Figure 3** shows (Panel A), the administration of R&D tax incentives relies in most cases on a single administration model in 2022. Responsibilities are in the case of single administration models typically assigned to the national tax authority.

<sup>&</sup>lt;sup>12</sup> In Canada, the applicable ceiling and refundability of the tax credit is a function of prior-year taxable capital.

Furthermore, it shows (Panel B) that for a majority of R&D tax incentive schemes in OECD countries and other major economies, a pre-approval of R&D tax projects is mandatory or available on an optional basis in 2022 with a view to ensuring that projects are quality-assured on an ex-ante basis by an accredited organisation. Responsibility often falls on the main R&D funding agency, so as to reduce the risks that companies mistakenly expect to claim tax relief for projects that fail to meet the criteria required for an eligible R&D project. While entailing additional administrative costs, the main upside of having pre-approval procedures is that they reduce business uncertainty as to the likelihood of receiving tax support for the R&D activities, allowing them to commit resources at an earlier stage.



# Figure 3. Administration of R&D tax incentives in the OECD area and beyond, 2022

Note: Panel A provides information on the number of institutions involved in the administration of R&D tax incentive schemes. Single / dual / multiple means that one / two / three or more institutions are involved in the administration and monitoring of the R&D tax incentive. Panel B provides information on the availability of a pre-approval or registration (certification) process. Optional means that that pre-approval/ registration is not mandatory but available to firms on an optional basis upon request. Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

# 2.3. Recent policy developments

Across OECD countries and other surveyed economies, regular reforms of R&D tax incentives have led to a continuous change in the availability, scope and generosity and implementation of R&D tax relief measures over the past decade. Such reforms relate to the launch of new tax incentives, the R&D definition adopted for tax purposes, changes in tax credit and allowance rates, adjustments of thresholds or upper ceilings on the amount of business expenditures qualifying for R&D tax relief or value of R&D tax relief, changes in the terms and availability of refunds. New Zealand, for example, reintroduced R&D tax relief in the form of a tax credit for research and development tax losses<sup>13</sup> and Japan complemented its R&D tax credit regime with a new special tax credit for collaborative R&D. Furthermore, many countries have been progressively replacing relatively complex incremental/hybrid tax incentives with simpler and more generous volume-based tax incentives, such as France in 2008 and Ireland in 2015.

<sup>&</sup>lt;sup>13</sup> This tax credit represents a concessionary loan against tax losses associated with R&D, allowing eligible firms in New Zealand to obtain a refund for tax losses caused by qualifying R&D expenditure.

**Table C.1** provides a summary overview of the latest reforms in 2022. Noteworthy policy changes in  $2022^{14}$  include the following:

- Changes in the availability of R&D tax incentives:
  - Introduction of a new R&D tax relief measure (Cyprus, France, Italy);
  - Extension of an existing R&D tax relief measure (Finland, Iceland, Italy, Japan, South Africa);
  - Expansion of the scope an existing measure (Austria, Korea, United Kingdom)
- Changes to R&D tax credit/enhanced R&D tax allowance rates:
  - Increase of rate (China, Finland, Poland);
  - Decrease of rate (France, Hungary, Italy, Netherlands, Slovak Republic);
- Changes to threshold/ceiling on amount of eligible R&D or value of R&D tax relief:
  - Increase in existing ceiling (United Kingdom);
  - Ceiling reduced (Iceland).
- Changes to the administration of R&D tax incentive schemes:
  - Change in process of claiming tax relief (Ireland, United Kingdom)
  - Change in the terms of claiming tax relief (Austria).

In 2022, changes in the availability and scope of R&D tax incentives and adjustments to headline R&D tax credit and allowance rates represent the most frequent type of policy reform. Overall, there were three introductions (Cyprus, France, Italy) and five extensions (Finland, Iceland, Italy, Japan and South Africa) of R&D tax relief provisions in 2022. In addition, an expansion in the scope of existing R&D tax relief measures was noted in three cases (Austria, Korea and United Kingdom). Tax credit/allowance rates were increased in 2022 in the case of three countries (China, Finland and Poland) and reduced in five cases (France, Hungary, Italy, the Netherlands, and the Slovak Republic). By contrast, there were only a few changes to ceilings on the amount of eligible R&D expenditure or value of R&D tax relief: the ceiling was increased in one case (the United Kingdom), compared to one reduction (Iceland). In 2022 - two years following the outbreak of the COVI9 pandemic – only few policy changes are connected to the COVID-19 crisis. This includes Iceland's extension of the enhanced R&D tax credit rates introduced at the onset of the COVID-19 crisis.<sup>15</sup>

Changes to the international tax system may affect the way in which governments provide financial support for innovation. For example, in 2015, the OECD/G20 Base Erosion and Profit Shifting project, in particular Action 5, introduced common rules in the design of intellectual property (IP) regimes to ensure a connection between tax benefits and economic substance (OECD, 2015a; González Cabral et al., 2023). Most recently, the international tax agreement

<sup>&</sup>lt;sup>14</sup> In 2021, Hungary did not undertake any changes in its R&D tax relief provisions. However, Hungary lowered the rate for Social Contribution Tax and related tax advances from 17.5% to 15.5% with effect of 1 July 2020 (19% and 17% respectively, including training levy), and the rate of the small business tax (KIVA) and related tax advances was reduced from 12% to 11% with effect of 1 January 2021. These tax rate reductions influence the value of social security and KIVA exemptions and credits available to R&D performing firms in Hungary. From 1 January 2022, the rate for Social Contribution Tax was decreased to 13% and training levy was abolished, thus, the total rate of employer's SSC decreased by 4 percentage points. The rate of KIVA was also reduced from 11% to 10% with effect of 1 January 2022.

<sup>&</sup>lt;sup>15</sup> The expiry of a temporary COVID-19 measure in Spain is not considered here as the measure applied only to technological innovation activities in one specific sector and did not affect the general R&D&I tax credit rates. The temporary measure foresaw higher tax credit rates for expenses in technological innovation activities aiming at new or relevant improvements in the production processes in the value chain of the automotive industry in Spain during fiscal years 2021 and 2022.

on a two-pillar solution to address the challenges arising from the digitalisation of the economy, in particular Pillar Two, establishes a minimum level of effective taxation for large MNEs OECD (2021a). **Box 1** spells out key features of the Global Minimum Tax and outlines, in broad terms, its potential impact on R&D and innovation support. Changes in the international tax arena, and in particular those stemming from the Global Minimum tax, are important factors that will contribute to shaping future tax support for R&D and innovation. The joint STI-CTPA work on tax incentives in this area will play an important role in monitoring changes to innovation support as countries adapt to the implementation of the Global Minimum Tax.

# Box 1. The Global Minimum Tax: Considerations for government support for business R&D and innovation

# The global corporate tax agreement will contribute to shaping future public support for R&D and innovation

In 2021, more than 135 countries and jurisdictions agreed to a landmark deal involving a two-pillar solution to address the tax challenges arising from the digitalisation and the globalisation of the economy (OECD, 2021a). "Pillar 2" of this agreement, in particular through the Global Anti-Base Erosion (GloBE) rules, establishes a global minimum effective corporate tax rate of 15% for large multinational enterprises (MNEs). The GloBE rules will change the global environment for business support in general and tax incentives in particular, as where certain tax incentives reduce an MNE's effective tax rate (ETR) below 15%, a top-up tax may be due. This may impact the efficacy of some tax incentives, including those for R&D. The GloBE rules will help protect domestic tax bases, by reducing MNEs profit shifting incentives and placing multilaterally agreed limits on tax competition. Governments may wish to evaluate and consider their innovation support mix as part of the implementation of the global minimum tax.

#### Impact of the GloBE Rules on the use of tax incentives

The GloBE Rules will not affect all jurisdictions, MNEs and tax incentives in the same manner. A recent OECD report prepared under the request of the G20 Indonesian Presidency explores the impact of GloBE Rules on tax incentive use (OECD, 2022). The impact of the GloBE Rules on tax incentives will depend on their design, on the jurisdiction's tax system (its baseline tax system and its use of base narrowing provisions), as well as the characteristics of MNEs and the activities they perform in the jurisdiction.

### Key considerations

The report recommends governments exercise caution and careful consideration of GloBE implications when reviewing financial support arrangements, including tax incentives, in the period leading up to the implementation of the GloBE rules. As they consider tax incentive and broader business support reform, jurisdictions should examine which taxpayers benefit from different existing incentives, and how the GloBE Rule will re-shape them and their impacts, nothing that:

• Tax incentives can continue to provide similar benefits for firms that are not inscope of GloBE Rules, such as domestic firms or subsidiaries of MNEs with revenues below EUR 750 million.

- The GloBE Rules treat grants and refundable tax credits as GLOBE Income rather than reductions in covered taxes, implying that these types of incentives are less likely to be affected.
  - This may create an additional motivation for R&D tax incentives to be made entirely refundable. It should be recalled that the broader tax policy rationale for refundability is to encourage stable R&D investment among start-ups and companies experiencing transitory profit shocks.
- Firms with higher levels of substantive economic activity in a given jurisdiction will be less affected, as they may benefit from the substance-based income exclusion (SBIE) that may translate into smaller increases in effective taxation. The SBIE excludes a portion of profits from top-up taxes based on the level of tangible assets and payroll of the MNE in the jurisdiction. This means that MNEs with higher levels of tangible assets and payroll relative to profit will likely be less affected by the GloBE Rules. Expenditure-based tax incentives that target payroll or tangible assets may be less affected than income-based tax incentives.
  - Since the largest component of R&D expenditure relates to payroll cost, the implications for R&D tax incentives are moderated by SBIE. The GloBE rules treat equally all payroll incentives regardless of the nature of the underlying activity (e.g., R&D). Income-based incentives for innovation, especially those that lower the tax due on income connected with innovation activities, may be more affected. As the profits within scope of the GloBE Rules increase beyond the profitability levels provided for in the SBIE, the impact of the GloBE Rules will rise.
- Tax incentives that allow the faster recovery of the cost of tangible assets will be unaffected by the GloBE Rules. These include immediate expensing or accelerated depreciation for investment in tangible assets.
- Tax incentives that are better targeted are likely to be less affected by the GloBE Rules than incentives that are very broad, all else equal. Incentives that are narrowly targeted to certain categories of income or expenditure may be less affected due to the blending of MNEs' income within a jurisdiction.

Source: OECD, building on multiple sources, including OECD (2022).

### **3.** Generosity of R&D tax support

Measures of tax subsidy rates such as those based on the *B-index* provide a convenient proxy for examining the implications of tax relief provisions, "quantifying" a number of qualitative features of a national tax system in the form of estimates of implied R&D tax subsidy that apply to generic or "model" types of firms.<sup>16</sup> The B-index specifies the pre-tax income needed for a "representative" company to break even on a marginal, monetary unit of R&D outlay (OECD, 2013; Warda, 2001), taking into account provisions in the tax system that allow for an enhanced treatment of R&D expenditures. This includes preferential tax relief provisions in the form of more favourable tax credit or allowance rates that apply to SMEs in some countries. A

<sup>&</sup>lt;sup>16</sup> The B-Index indicator is conceptually linked to new R&D Tax Incentive indicators on corporate effective tax rates (ETR) for R&D, developed by the OECD Centre for Tax Policy and Administration and OECD Directorate for Science, Technology and Innovation (González Cabral et al. 2021).

"representative firm" is typically defined for convenience as one with sufficiently large profits (tax liability) to be able to fully make use of earned tax credits in the reporting period. It is customary to present this indicator in the form of an implied subsidy rate, namely one minus the B index. More generous provisions imply a lower "breakeven" point and therefore a higher tax subsidy.

### Implied marginal R&D tax subsidy = 1 minus B-Index

To provide a more accurate representation of different, relevant, scenarios, B-indices can be calculated for "representative" firms according to whether they can claim tax benefits against their tax liability in the reporting period. There are significant differences in the provisions made by countries for scenarios in which companies cannot immediately realise the entire value of tax incentives on R&D. By estimating the implied marginal R&D tax subsidy rate for four firm profiles (profitable large firms, profitable SMEs, loss-making large firms, loss-making SMEs), a more detailed assessment of the generosity of R&D tax incentives across OECD countries and other major economies becomes feasible. **5.Annex D** documents the B-Index methodology and estimation of R&D tax subsidy rates presented in the subsequent section.

### 3.1. Implied marginal R&D tax subsidy rates in 2022

**Figure 4** presents the notional levels of tax support (before tax) per additional unit of R&D to which firms with defined characteristics are in principle entitled to in 2022.<sup>17</sup> This edition of R&D tax subsidy rates focuses on R&D tax incentives offered at central government level<sup>18</sup> and is calculated based on headline tax credit and allowance rates, facilitating a comparison of R&D tax subsidy rates in 38 OECD and 10<sup>19</sup> selected economies by firm size and profit scenario.<sup>20</sup>

In the case of SMEs, R&D tax subsidy rates are highest for Colombia, Iceland and Portugal in the profit-making scenario (Panel A) while the SME tax subsidy rates are highest for Colombia, Iceland and France in the loss-making (Panel B) scenario (insufficient tax liability). The high ranking of Colombia and Iceland is attributable to recent policy changes. While Colombia introduced an SME specific R&D tax credit at very favourable rates in 2020, Iceland increased the rates of the R&D tax credit rates in 2020, and those for SMEs more strongly than those for large companies. The gap in the implied R&D tax subsidy rates for SMEs between Colombia, Iceland, Portugal and France is less pronounced in the loss-making scenario.

Refunds and carry-forward provisions are used by some countries to promote R&D in firms that may not otherwise use their credits or allowances. Such provisions can be exclusively available to or more generous for SMEs and young firms as opposed to large enterprises. This is the case for France as well as Australia and Canada. In the Netherlands, tax offsets are redeemable against payroll taxes and disconnected from the corporate tax liability of the firm. As a result, the implied marginal R&D tax subsidy rates for profitable and loss-making firms are nearly identical, with a very small gap arising from the availability and modelling of an indefinite carry forward provision (rather than refund) for baseline tax deductions in the loss case.

<sup>&</sup>lt;sup>17</sup> In the case of China, the estimates of implied marginal R&D tax subsidy rates reported for 2018 to 2022 draw on information collected through OECD desk-based research and are not based on officially transmitted information.

<sup>&</sup>lt;sup>18</sup> Switzerland has introduced R&D tax incentives on an optional basis at cantonal level in 2020. These incentives are not accounted for in the modelling which focuses on tax relief from central government.

<sup>&</sup>lt;sup>19</sup> At the time of reporting, details on the status of the R&D tax allowance in Thailand were not available.

<sup>&</sup>lt;sup>20</sup> For general and country-specific notes, see <u>http://www.oecd.org/sti/rd-tax-stats-bindex-notes.pdf</u>

# Figure 4. Implied marginal R&D tax subsidy rates, 2022

1 minus B-Index, by firm size and profit scenario





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*Note*: Figures reflect the tax treatment of R&D expenditure for SMEs and large enterprises in OECD, EU and other major economies, some of which, but not all, offer tax incentive support for business R&D expenditure. Figures do not reflect preferential provisions for start-ups, young firms or a specific subset of SMEs (e.g. innovative SMEs).

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

In countries where R&D tax incentives entail neither a carry-over nor a refund option (Brazil<sup>21</sup> and Japan), loss-making firms experience a full loss of R&D tax benefits (Panel C). Large firms receive the highest (lowest) R&D tax subsidy rate in Portugal, France and Poland (Argentina, Costa Rica and Malta) in the profit and loss-making scenario. Since 2018, Argentina has not carried out any calls for R&D tax support and Malta<sup>22</sup> repealed its R&D tax allowance in 2020 with retroactive effect from 2019. Overall, there is large cross-country variation in R&D tax subsidy rates across the four scenarios considered.

The marginal tax subsidy rates presented for 2022 reflect the magnitude of marginal R&D tax credit rates applicable to an extra unit of R&D spend across a segment of the business population (e.g. SMEs or large enterprises). They are calculated based on headline tax credit and allowance rates that help to provide an upper bound and potentially useful benchmark for comparing the generosity of R&D tax relief measures but do not account for the effect of thresholds and ceilings. Where data or proxy measures for the distribution of eligible R&D spending are available, it is possible to account for the effect of such limitations in the modelling of R&D tax subsidy rates. A comparison of implied R&D tax subsidy rates (profit-scenario) based on weighted vs. non-weighted marginal tax credit and allowance rates is currently available for 12 OECD countries altogether (Figure 5) - Australia, Canada, Chile, Colombia, Denmark, France, Hungary, the Netherlands, New Zealand, Norway, Portugal and Sweden – and highlights the importance of modelling ceilings and thresholds.

### Figure 5. Weighted vs. non-weighted implied tax subsidy rates on R&D expenditures, 2022



1 minus B-Index, by firm size (profit scenario)

Note: NW=non-weighted, W=weighted. Figures reflect the effect of applying weighted marginal tax credit (allowance) rates, where relevant weights are available, to account for ceilings and thresholds in the calculation of implied marginal tax subsidy rates. Figures do not reflect preferential provisions for startups, young firms or a specific subset of SMEs (e.g. innovative SMEs).

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

<sup>&</sup>lt;sup>21</sup> In the case of Brazil, the rates for SMEs may also fall below those of large firms when R&D tax incentives are not available to SMEs. In Brazil, R&D tax incentives can only be used by companies in the real profit regime (lucro real) primarily large companies- that are subject to corporate and social security taxes.

<sup>&</sup>lt;sup>22</sup> Malta repealed the enhanced R&D tax allowance, available at a rate of 50%, with retroactive effect from 2019. Malta offers additional R&D tax credits in 2021. Due to their very limited uptake, they are not accounted for in the modelling.

Implied marginal tax subsidy rates based on weighted tax credit (allowance) rate often imply a lower level of subsidy compared to their unweighted counterparts, especially in the case of large enterprises where upper ceilings on business expenditures qualifying for R&D tax relief are more likely to be binding due to their large-scale R&D investments. This holds true for all countries considered with the exception of Canada and the Netherlands. Implied marginal tax subsidy rates based on weighted and unweighted tax credit rates coincide in the case of large companies in Canada where the expenditure limit (threshold) is only applicable in the case of SMEs (CCPCs). In the Netherlands, the weighted tax subsidy rate for large firms slightly exceeds its unweighted counterpart, the latter being based upon the lower headline rate applicable for R&D above the threshold amount rather than a weighted average reflecting the distribution of firms' R&D expenditure relative to this cut-off point. For SMEs the change in non-weighted vs weighted implied marginal tax subsidy rates tends to be less pronounced, if not nil (e.g. Australia, France and New Zealand) when ceilings or thresholds are not binding. In the case of New Zealand, weights are only applied in the modelling of the tax subsidy rates for SMEs. Separate weights for SMEs and large firms, for the latter of which ceilings and thresholds are more likely to be binding, are currently not available for the new R&D tax credit introduced by New Zealand in 2021. Future OECD work aims to apply this weighting approach more broadly in order to more fully capture the effect of thresholds and ceilings across OECD countries and other major economies over time.

# 3.2. Trends in implied R&D tax subsidy rates, 2000-2022

Time-series estimates of marginal R&D tax subsidy rates allow for an analysis of country specific and aggregate trends in the provision and generosity of R&D tax support by firm size and profit scenario. **Figure 6** compares the implied marginal R&D tax subsidy rates for large profitable firms (Panel A) and profitable SMEs (Panel C) in 2022 and 2010.<sup>23</sup> Profitable firms are those with a sufficient tax liability to fully make use of earned tax credits/allowances in the current period. The corresponding estimates for loss-making large firms and SMEs are presented in Panel B and D respectively. Estimates throughout all panels are sorted in descending order by the size of countries' marginal tax subsidy rate provided in 2022 for the type of firm under consideration. **Figure 6** provides a basis for identifying the onset of different tax relief provisions and the role of design features in influencing the generosity of R&D tax support for profitable large firms and profitable SMEs respectively.

Among the most generous R&D tax incentives for profitable large firms as of 2021 (Panel A), Poland, Chile and Colombia stand out as their implied marginal tax subsidy rates increased notably over the last decade. The Slovak Republic introduced a hybrid R&D tax allowance in 2015 and increased applicable tax allowance rates significantly in 2018 (volume-based and incremental rate) and 2020 (volume-based rate only). Poland introduced a volume-based R&D tax allowance in 2016 and increased the allowance rate at several instances, most recently in 2022. In that year, the R&D tax allowance rates for R&D labour expenditures doubled from 100% to 200% while those for other qualifying R&D expenditures remained unchanged at 100%. Likewise, Colombia increased the rate of its volume-based R&D tax allowance from 25% to 50% and maintained this level of generosity when replacing the volume-based R&D tax allowance by a volume-based tax credit in 2017. Chile introduced an R&D tax credit for extramural R&D in 2008, extending its scope in 2012 to cover intramural R&D expenditure, leading to an increase in the estimated marginal R&D tax subsidy rates for large profitable firms.

<sup>&</sup>lt;sup>23</sup> For the full time-series of B-Index estimates, see https://stats.oecd.org/Index.aspx?DataSetCode=RDSUB

# Figure 6. Implied marginal R&D tax subsidy rates, 2022 and 2010

### 1 minus B-Index



*Note:* Figures reflect the tax treatment of R&D expenditure for SMEs and large enterprises in OECD, EU and other major economies, most of which but not all, offer tax incentive support for business R&D expenditure. Figures do not reflect preferential provisions for start-ups, young firms or a specific subset of SMEs (e.g. innovative SMEs). For Thailand there are currently no estimates for 2022, while for Argentina and Croatia, no estimates are currently available for 2010.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

In the case of profitable SMEs (Panel C), Colombia and Poland stand out once again in terms of level of tax support as countries with notable increases in marginal tax subsidy rates from 2010 to 2022. However, a larger-scale increase is also observable for Iceland where R&D tax subsidy rates increased more strongly for profitable SMEs (Panel C) vis-à-vis large firms (Panel A) from 2010 to 2022. This effect is attributable to the recent reform of the R&D tax credit in Iceland in 2020, introducing enhanced rates for SMEs. The three countries (Portugal, France, Poland) with the largest marginal R&D tax subsidy rate for large firms in 2022 (Panel A) are also different from those (Colombia, Iceland, Portugal) that provide the highest rates for SMEs in 2022 (Panel C). In general, a number of changes in position are noticeable throughout all ranks, when comparing the marginal R&D tax subsidy rates for large firms and SMEs in the profit-making scenario (Panel A and C). Those changes are in turn related to the more generous tax treatment that some countries (e.g. Australia, Canada, Colombia, Iceland, and United Kingdom) provide to SMEs in the form of enhanced tax credit or allowance rates, for example.

A number of first-time introductions and re-introductions of R&D tax incentives are also apparent since 2010 (Panel A and C). This includes the first-time introduction of R&D tax relief provisions in Iceland in 2011, Latvia and Sweden in 2014, the Slovak Republic in 2015, Poland in 2016 and Germany in 2020. Italy had experimented with various temporary tax credits over the last decade and introduced a new incremental R&D tax credit in 2015, while Mexico re-introduced R&D tax incentives in the form of a volume-based R&D tax credit in 2015.

Some countries also increased the generosity of existing schemes, complemented their tax relief regime with additional incentives or replaced existing schemes with new and more generous incentives. The latter applies to Australia, which replaced its previous R&D tax allowance scheme with a new R&D tax incentive from 1 July 2011, offering more generous rates for SMEs vis-à-vis large companies, and Greece which converted it incremental R&D tax allowance into a volume-based scheme in 2013. Slovenia increased the rates of its volume-based R&D tax allowance in 2012. The Netherlands complemented the existing payroll-withholding tax credit (WBSO) with an R&D tax allowance for non-labour related expenditures in 2012 (merged with the WBSO scheme in 2016).<sup>24</sup> Denmark (2018) and New Zealand (2019) also recently introduced additional R&D tax incentives. It is also worth noting how changes in CIT rates directly influence the value of R&D tax allowances. For instance, the decrease in tax subsidy rates for SMEs in China (Panel C) can be linked to a reduction in SME CIT rates, while tax allowance rates increased for both SMEs and large firms from 2010 to 2022.

While the majority of countries increased the generosity of R&D tax support between 2010 and 2022 through the adaption of existing R&D tax relief provisions or introduction of new incentives, there are also cases, where the generosity of R&D tax support declined or simply remained unchanged over this period. In the case of Korea, for instance, the incremental tax credit rate for large firms was lowered in 2017 and adjustments to the definition of the base amount were undertaken, leading to a decrease in the R&D tax subsidy rate estimated for large

<sup>&</sup>lt;sup>24</sup> This extension in the scope of R&D tax relief in the Netherlands led to an increase in the R&D tax subsidy rate estimated for profitable large firms and maintenance of the corresponding levels for profitable SMEs. While the headline rates for R&D expenditure above the threshold amount (modelled in the case of large firms) declined slightly from 18% in 2010 to 16% in 2020, the headline rates below this cut-off point (modelled in the case of SMEs) decreased from 50% in 2010 to 32% in 2020.

firms (Panel A), while those for SMEs (Panel C) remained unaffected.<sup>25</sup> The decline in the tax subsidy rates of large firms in Canada (Panel A and B) is similarly related to a reduction in the R&D tax credit rate in 2014, combined with an exclusion of machinery and equipment related spending from qualifying R&D expenditure.<sup>26</sup> Malta in turn abolished its enhanced R&D tax allowance with retroactive effect from 2019, the main R&D tax incentive in place until then. In the case of the United States, the drop in implied R&D tax subsidy rates is not connected to changes in the design of the US R&D tax credit but driven by changes in baseline tax treatment of R&D. From 2022 onwards, R&D expenses are no longer expensed in the year they are incurred but capitalized and deducted over a five-year period (2017 Tax Cuts and Jobs Act).

No discernible changes in R&D tax subsidy rates are observable in countries that did not provide any form of tax support at central government level during the 2000-2022 period (Bulgaria, Costa Rica, Estonia, Luxembourg and Switzerland), or offered R&D tax incentives only on a temporary basis such as Latvia (2014-17). Finally, no or only minimal changes in R&D tax subsidy rates are observable in countries that already offered generous R&D tax incentives back in 2010. This includes Spain where volume-based and incremental R&D tax credit rates have remained unchanged since 2008, and Portugal which significantly increased the volume-based rate of this hybrid tax credit scheme in 2009 after a temporary suspension of the SIFIDE tax credit in 2004-2005. Likewise, no discernible changes in implied R&D tax subsidy rates between 2010 and 2022 are observable for Finland which offered a temporary R&D tax allowance during the years 2013-2014 and reintroduced R&D tax support in form of an R&D tax allowance for R&D-related research cooperation expenditures in 2021. Owing to the small weight attached to such expenditure in the overall R&D cost structure of firms, the implied R&D tax subsidy generated by this incentive is effectively close to zero. Finally, in the case Cyprus which introduced R&D tax incentives in form of an R&D tax allowance in 2022, the change in implied R&D tax subsidy rates is close to nil due to the comparatively low headline rate of 20% coupled with a corporate income tax (CIT) rate of 12.5%, the value of tax deductions being closely linked to the magnitude of the CIT rate.

Similar breaks (e.g. R&D tax incentive introductions and repeals) and trends in the generosity of tax support are visible in the loss-making vis-à-vis profit making case (Panel B and D). In most cases, the loss-making estimates for SMEs and large firms are lower than those estimated for the profit-making firms (Panel A and C). Most countries offer firms with insufficient tax liability the option to carry-over unused tax credits/allowances. This implies a discount in the net present value of tax benefits. Exceptions are found in countries that offer refundable (payable) tax incentives, either exclusively to SMEs or the broader firm population. In 2022, SME-specific refunds are provided by Australia, Canada and France, for instance, whereas Austria, Belgium (after 5 years), Denmark, Germany, Iceland, Ireland, New Zealand, Norway, Spain, and the United Kingdom offer payable incentives to both large firms and SMEs. It is important to keep in mind that tax offsets redeemable against payroll tax or social security contributions are disconnected from the corporate tax liability of the firm and are thus in principle also payable in both the profit and loss-making scenario.

An analysis of aggregate trends can help shed light on the overall trends in the generosity of R&D tax support across countries over time. **Figure 7** displays the aggregate trends in implied

 $<sup>^{25}</sup>$  These estimates focus on the hybrid R&D tax credit and the R&D investment credit in Korea. If the modelling accounts for the maximum volume-based tax credit rate available to SMEs (30-40%) and large firms (20-30%) under the Growth Industry and Basic Technology scheme – one component of the hybrid R&D tax credit, the implied R&D tax subsidy rate for SMEs is equal to 0.41 (0.33) in the profit (loss case) and the one for profitable (loss-making) large firms amounts to 0.37 (0.29).

<sup>&</sup>lt;sup>26</sup> In 2014, only the headline tax credit rate for large companies changed in Canada. This is why there is little movement in the figures for SMEs (Panel C and D) which were only affected by the removal of capital expenditures from eligible spending. Given the comparatively small weight attached to capital expenditures in the modelling (see <u>B-Index notes</u>), no larger-scale drop in tax subsidy rates can be observed in the case of SMEs.

marginal tax subsidy rates across OECD (Panel A) and EU (Panel B) countries for which available design information enabled computing of the R&D tax subsidy rates for the four scenarios under consideration. The evolution of the average or mean (unweighted) marginal R&D tax subsidy rate for this group of 38 OECD and 27 EU countries is presented by firm size and profit scenario.

# Figure 7. Implied marginal R&D tax subsidy rates, 2000-22

1 minus B-Index, OECD and EU countries (unweighted average)





2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

*Note:* Figures reflect the tax treatment of R&D expenditure for SMEs and large enterprises in OECD, EU and other major economies, most of which but not all, offer tax incentive support for business R&D expenditure. Estimates are available for selected years in the case of Greece (2004-2022), Croatia (2000-02, 2015-22) and Türkiye (2008-22) when sufficient detail is available to carry out calculations for representative firms in the relevant categories. Figures do not reflect preferential provisions for start-ups, young firms or a specific subset of SMEs (e.g. innovative SMEs).

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Looking at the mean OECD and EU R&D tax subsidy rates over the 2000-22 period, a marked increase in the notional level of tax subsidy is noticeable in OECD and EU countries with the increasing adoption of tax incentives from mid-2000 onwards, a slowdown at the onset of the global economic and financial crisis, and a reversion back to this growing trend afterwards. While a stabilisation in the level of notional tax support for R&D is visible in the years 2013-19, average OECD and EU tax subsidy rates spike in 2020 with the first-time introduction of an R&D tax incentive in Germany and enhancement of R&D tax relief provisions in a number of OECD countries and EU member states. With the reduction of R&D tax allowance and R&D tax credit rates in a several OECD and EU countries in 2022 (Section 2.3; Table C.1), average OECD and EU tax subsidy rates dropped slightly from 2021 to 2022.

Overall, implied marginal tax subsidy rates increased significantly for SMEs and large firms in the OECD and EU area between 2000 and 2022, independently of their profit situation. In OECD countries (Panel A), implied marginal subsidy rates increased on average from approximately 0.05 to 0.20 in the case of profitable SMEs (0.04 to 0.17 for loss-making SMEs), and from approximately 0.04 to 0.16 in the case of large profitable firms (0.02 to 0.13 for large loss-making firms). Throughout this period, SMEs faced on average a higher marginal tax subsidy rate than large firms, comparing either profit-making or loss-making firms. It is worthwhile noting that from 2009 onwards, the mean R&D tax subsidy rate for loss-making SMEs sMEs essentially coincides with the one for large profitable firms.

In EU countries (Panel B), implied marginal subsidy rates increased on average from approximately 0.03 to 0.16 in the case of profitable SMEs (0.02 to 0.14 in the case of loss-making SMEs), and for large profitable firms from approximately 0.03 to 0.16 (0.02 to 0.13 for large loss-making firms). Like in the OECD area, profitable (loss-making) SMEs faced on average a higher marginal tax subsidy rate than profitable (loss-making) large firms in the EU area. However, from 2005 onwards, average R&D tax subsidy rates for loss-making SMEs fall below those of large profitable firms.

# 4. Government tax relief for business R&D

Measuring how much governments dedicate to R&D support schemes through R&D tax incentives involves several conceptual and practical challenges, especially when attempting to do so in an internationally comparable fashion. Measuring tax expenditures for R&D requires agreement on a common benchmark on what represents a baseline tax treatment of R&D expenditures. Tax expenditures are deviations from a benchmark tax system (OECD, 2010). Establishing a common scope is the first requirement for comparability. **5.Annex D** describes the methodology adopted by OECD in measuring and reporting government tax relief for business R&D (OECD, 2015c).

In addition to statistics on the cost of tax support for R&D, this section highlights exploratory statistics on the number of R&D tax relief beneficiaries and the amount of qualifying expenditures for R&D tax relief purposes. Compared to statistics on the cost of government tax relief for R&D (GTARD), these indicators pose additional challenges for international comparisons. This report draws attention to the relevance and usability of these indicators with a view to improve data coverage and comparability.

### 4.1. Government tax support for business R&D in 2020

### 4.1.1. Statistics on government tax relief for R&D expenditure (GTARD)

This section lays out the most recently available evidence on the cost of central government support for business R&D<sup>27</sup> through tax relief and direct funding, and the magnitude of subnational R&D tax support when relevant data are available (Canada, Japan, Hungary). Data correspond to 2020<sup>28</sup> for 37 countries (including those providing no tax support), 2019 for 6 countries (Australia, Germany, the Russian Federation, South Africa, Switzerland and the United States), 2018 for 1 country (Spain), and 2017 for 2 countries (Brazil and China).<sup>29</sup> At the time or reporting, data on government-financed business expenditure on R&D (BERD) are not available for Costa Rica and Thailand. More recent values of GTARD for 2020 are available for Australia, Brazil, South Africa and Thailand, if presented alone and not combined with figures of government-financed BERD. No R&D tax relief was provided in 2020 by six OECD countries (Costa Rica, Estonia, Finland, Latvia, Luxembourg, and Switzerland) and two non-OECD EU countries (Cyprus, Bulgaria). Reliable data on R&D tax support is subject to timeliness problems because it needs to be based on tax returns for completed tax years. Budgetary data can be timelier, but it is also subject to a greater degree of error.

### Tax support for business R&D compared to direct government funding

Figure 8 presents the latest statistics on government support for business R&D, comparing the magnitude of tax support (central and subnational) and direct government funding of BERD.

Based on available estimates of direct funding (**Figure 8**, Panel A, Korea, Hungary and the United Kingdom provided the most direct funding for business R&D as a percentage of GDP in 2020 in the OECD area. The weighted average rate in the OECD (EU-27) area was slightly above 0.10% (0.08%). Direct support accounts for the equivalent of around 5.11% (5.83%) of BERD in the OECD (EU-27) area. The compilation of data on tax support for business R&D indicates levels of support which are not accounted for in direct funding statistics but which are on a very similar order of magnitude if not larger for a majority of countries that use this form of support (**Figure 8**, Panel B). The average rate of tax support in the OECD (EU-27) area - including countries that do not provide this type of support - is around 0.12% (0.10%). Tax support accounts for 6.2% (6.9%) of BERD in the OECD (EU-27) area.

As a percentage of GDP, tax relief for R&D expenditures in 2020 was largest for the United Kingdom, France and Austria, followed by Portugal and Belgium. New Zealand reintroduced R&D tax support in the form of an R&D tax credit for deficit-related R&D tax expenditure in 2015, complemented by a new and broader R&D tax credit (not limited to deficit related R&D expenditure) in 2019. This recent reform is reflected in the tax expenditure estimates presented in this report. Countries where tax incentives are provided for business R&D at both national and subnational level include Canada, China, Hungary, Japan, Spain, and the United States. Canada, Hungary and Japan are able to report estimates of the cost of R&D tax support at

<sup>&</sup>lt;sup>27</sup> In this latest edition, the OECD has decided to put under review data on government tax relief for R&D expenditures (GTARD) and government-financed BERD for Iceland for the years 2011-2020 and 2015-2020 respectively, suppressing the publication of these headline indicators for those years until a number of questions on the coherence of these data have been effectively addressed.

<sup>&</sup>lt;sup>28</sup> In 2020 (or closest year), estimates of direct funding for Austria, Belgium, Denmark, Ireland, Luxemburg, and Sweden are based on imputing the share of direct government-financed BERD in the previous year to the current ratio of BERD to GDP. In 2017, estimates of direct funding of BERD for Brazil are based on imputing the share of direct government-financed BERD to GDP. Direct support figures refer only to intramural R&D expenditures, except for Brazil where estimates of direct funding are derived based on the share of business R&D expenditures financed by government and business-funded R&D expenditures.

<sup>29</sup> For general and country specific notes, see http://www.oecd.org/sti/rd-tax-stats-gtard-notes.pdf

subnational government level. While provinces account for close to 30% of total tax support in Canada in 2020, subnational R&D tax incentives in Hungary and Japan account for a comparatively smaller share of total tax support of around 20% and less than 1% respectively.

# Figure 8. Direct government funding and government tax support for business R&D, 2020

### As percentage of GDP





Panel B. Government tax relief for business R&D (GTARD)



Panel C. GovFundBERD and GTARD combined



*Note*: Data on subnational tax support for business R&D are only available for a group of countries. *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

Combining both types of support (direct and tax support, Panel C), the United Kingdom, France and Austria provided the most combined support for business R&D as a percentage of GDP in 2020 in the OECD area. By taking into account R&D tax support, it is possible to get a better sense of the full extent of government support for R&D across the OECD and EU areas as well as other major economies. It is also possible to see how some countries, which appear to give little support on the sole basis of direct funding, were in fact providing significant assistance through the tax system. This is the case for Australia, Austria, Belgium, Canada, France, Ireland, Italy, Japan, Portugal and the United Kingdom.

**Figure 9** puts the information on the value of tax support for business R&D in the broader context of overall budgetary support for R&D activities undertaken by governments. This presentation has the advantage of relying on more directly comparable types of administrative data sources, as opposed to comparing reports by R&D performers with tax support data, which may not fully align in time.

# Figure 9. Government budgets for R&D and tax incentive support for business R&D, 2020



### As percentage of GDP

*Note:* Data on subnational tax support for business R&D are only available for a group of countries. For Canada, Chile, Germany, the Russian Federation, Switzerland and the United States latest available figures refer to 2019 instead of 2020. For New Zealand, figures refer to 2017. *Source:* OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

Government budget allocations for R&D (GBARD) include direct funding provided to all sectors, including contributions to R&D programmes abroad. On average, tax support represented in 2020 the equivalent of 11% of all support reported for R&D. In the case of countries with R&D tax incentives in place, this figure is equal to 14%. The relative importance of tax incentives in the total financial effort incurred by governments for R&D is largest in the case of Ireland (43%), Portugal (39%), the United Kingdom (32%), and Türkiye (31%), followed by France (28%), Australia, Belgium and Austria (24%) and Canada (20%). In these countries, R&D tax incentives are not only major policy instruments for supporting business R&D but also play a first order role in the overall R&D policy mix.

International organisations such as the European Commission provide public support for business R&D. In a number of transition economies, such international government-like sources of public support play an important role in financing business R&D. **Figure 10** shows the magnitude of direct and tax support for BERD by national governments as well as the amount of direct funding (e.g. R&D grants, procurement of R&D services) provided by the European Commission and other international organisations as a percentage of BERD. This breakdown is

presented - as a percentage of GDP (Panel A) and as percentage of BERD (Panel B) - for a number of OECD-EU countries for which relevant data are available for 2020 (or closest year).

# Figure 10. Domestic government and international organisation support for BERD, 2020





*Note:* Tax relief figures for Hungary exclusively refer to government tax relief for R&D at central government level.

Source: OECD R&D Tax Incentives Databasehttp://oe.cd/rdtax, April 2023.

When national and international support for BERD is combined, a different picture arises of the degree of government support for business R&D. The share of foreign sources of funding in total public support for BERD (national and international) ranges from 1% in Türkiye and the United Kingdom to 78% in Latvia and amounts on average to 18% among the countries considered. As a percentage of GDP (Panel A), national and international government support for BERD varies from 0.03% of GDP in Latvia to 0.43% of GDP in France. The overall share of BERD financed by national and international government institutions (Panel B) ranges from 2% in Switzerland to 35% in Portugal.

# Distribution of R&D tax support by firm size, main economic activity and economic ownership

This section presents a range of indicators that aim to identify how the distribution of tax support for R&D within countries compares to the distribution of R&D performance and government direct funding and R&D performance in general. This is relevant for understanding what types of firms benefit more and less from tax support. Firm size and economic activity are often dimensions of particular interest. SME definitions for tax purposes typically vary across countries and may differ from those adopted for the purpose of R&D statistics. **Table F.1** (**5.Annex F**) presents the criteria adopted by countries in defining SME status and based on which indicators on business R&D, direct and tax support by firm size are reported in this document. **Table F.2** (**Table F.3**) specifies the broad (detailed) industry sector classification adopted in producing indicators on public support by main economic activity across countries for which relevant data are available. **Table F.4** in turn specifies the economic ownership definitions employed in presenting the new indicator on shares of R&D tax relief allocated to foreign controlled affiliates and domestic enterprises with multinational presence in this report.

### Figure 11. Distribution of R&D tax incentive support, 2020



Panel A1. By firm size (broad classification), share in percent

Panel A2. By firm size (detailed classification), share in percent





Panel B. By main economic activity, share in percent

*Note*: Panel A: Figures for China refer to 2017 instead of 2020, for Spain they refer to 2014 and in the case of the United States, they refer to 2013 and only to corporate claimants. In the case of Austria, Belgium and Norway, SME figures refer to small companies. Panel B: Figures for the United States refer to 2019 instead of 2020, for China they refer to 2017 and for Spain figures refer to 2014. In the case of the United States, they refer only to corporate claimants. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Belgium, figures refer to the payroll withholding tax exemption and R&D tax credit, for Italy, they refer to the incremental R&D tax credit introduced in 2015, and for Hungary, they refer to the R&D tax allowance and development incentive. For Spain, figures refer to the R&D&I tax credit and for the Slovak Republic, they refer to the R&D tax allowance. Furthermore, figures are generally not available for accelerated depreciation provisions (see Table A.1).

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

**Figure 11** (Panel A) sheds light on the distribution of R&D tax relief in 2020 (or closest year) by business size for a number of countries for which relevant data are available. As R&D is highly concentrated in large firms, the latter tend to be the main recipients of direct and tax support for business R&D (BERD). The share of R&D tax support accounted for by SMEs ranges between 7% in Belgium and Japan, 16% in Chile and Hungary, 56% in Canada, 70% in the United Kingdom, 80% in Australia and 90% in Lithuania. A total of 11 countries (Panel A2) are in the position to report more granular data on GTARD for small and medium-sized companies, for the first time collected in 2022. Among those 11 countries, medium-sized companies tend to account for most of the R&D tax benefits that accrue to SMEs.

R&D-intensive industries typically account for the largest share of business enterprise expenditure on R&D in manufacturing. In line with this notion, firms in manufacturing tend to account for a substantial share of R&D tax support across OECD and other major economies (**Figure 11**, Panel B), for which relevant data are available for 2020 (or closest year). This percentage ranges from around 20% in Norway, 35% in the Netherlands, 55% in France, close to 80% in Korea and Japan to nearly 100% in China.

**Figure 12** provides additional insights into the distribution of government tax relief for R&D expenditure by industry, leveraging the more granular industry information collected for twelve selected R&D intensive industry sectors. Such information is currently available for seventeen OECD countries. Overall, there is a significant variation in the distribution of R&D tax support across these twelve industry sectors among the eighteen countries under consideration. Among the countries under consideration, firms in information and communication (e.g. Norway, Türkiye) and computer and electronics (e.g. Hungary, Türkiye, United States) often account for a significant share of R&D tax benefits.



# Figure 12. Distribution of R&D tax incentive support by industry, 2020

*Note*: Figures for the United States refer to 2013 and only to corporate claimants. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Belgium, figures refer to the payroll withholding tax exemption and R&D tax credit, for Italy, they refer to the incremental R&D tax credit introduced in 2015, and for Hungary, they refer to the R&D tax allowance and development incentive. For Spain, figures refer to the R&D&I tax credit and for the Slovak Republic, they refer to the R&D tax allowance. Furthermore, figures are generally not available for accelerated depreciation provisions (see Table A.1). *Source*: OECD R&D Tax Incentives Database, <a href="http://oe.cd/rdtax">http://oe.cd/rdtax</a>, April 2023.

**Figure 13** provides a comparison of the SME shares in direct and tax support for BERD with the SME share in BERD. While direct support is by and large discretionary, the SME share in tax support tends to be more closely aligned with the SME share in BERD, confirming the notion that tax incentives are generally a demand-driven complement to direct government support for R&D. The SME share in tax support exceeds the share of direct funding in Canada, Denmark, France, Italy, Lithuania, the Netherlands, New Zealand, Norway, Sweden and Türkiye. It is worth noting that with the exception of Denmark, Lithuania and New Zealand, these countries offer refundable R&D tax incentives (or tax incentives redeemable against payroll withholding taxes and/or social security contributions) that primarily target small and medium sized R&D performers. Refunds allow eligible firms to make use of earned tax credits even in the case of insufficient tax liability where any excess credits are paid in full or in part to the taxpayer.<sup>30</sup> In Denmark and New Zealand, the R&D tax credit is limited to R&D tax losses, facilitating a reinstatement of baseline tax deductions for eligible R&D expenditure in the loss case. The entirety of support under the tax credit for R&D tax losses in New Zealand is provided to SMEs.<sup>31</sup>

 $<sup>^{30}</sup>$  In the case of Italy, companies may offset earned credits against regional taxes (IRAP), VAT, PIT withholdings and social security contributions, besides their income tax liability, making the incremental R&D tax credit effectively refundable.

<sup>&</sup>lt;sup>31</sup> The figures for New Zealand do not yet account for the Research and Development Tax Incentive introduced in 2019.

# Figure 13. SME share in BERD, direct funding and tax incentive support, 2020

SME share in direct government funding of BERD SME share in tax incentive support for BERD SME share in BERD % 100 Small No R&D tax 90 companies incentives 80 70 60 50 40 30 20 10 ٥ SWE AND Ont GBP ' 28-408 N 45 CHE OF  $\mathbf{x}^{\mathbf{y}}$ 4P top ent the fee can en 61A CRC FRP Rt Clt CH IN JSA JAN di) JV.

As a percentage of BERD and government support for BERD in each category

*Note:* Figures for Austria, Belgium, Estonia, Finland, Germany, Hungary, Italy, Lithuania, the Netherlands, New Zealand, Norway, Slovenia, and Switzerland, refer to 2019 instead of 2020. For Chile, figures refer to 2018, for Denmark and France, they refer to 2017 and for Spain to 2014. Figures for Canada and the United States (corporate claimants only) refer to 2013. In the case of Sweden, estimates of government tax relief refer to 2020 while direct funding figures refer to 2013. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Belgium, figures refer to the payroll withholding tax exemption and R&D tax credit, for Italy, they refer to the incremental R&D tax credit introduced in 2015, and for Hungary, they refer to the R&D tax allowance and development incentive. For Spain, figures refer to the R&D tax credit and for the Slovak Republic, they refer to the R&D tax allowance. Furthermore, figures are generally not available for accelerated depreciation provisions (see Table A.1).

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

**Figure 14** provides information on the share of government tax relief for R&D accounted for by domestic standalone enterprises, domestic enterprises that are part of a group without multinational presence (without affiliates abroad) domestic enterprises that are part of a group with multinational presence (with affiliates abroad) and foreign-controlled affiliates. This breakdown, for the first time collected in 2021, is currently available for seven OECD countries.

Among this subset of OECD countries, the share of R&D tax benefits attributable to domestic firms without multinational presence – domestic standalone enterprises and domestic enterprises that are part of a group (available for six OECD countries) – ranges from 14% in Greece to around 80% in Norway, while the share of R&D tax benefits attributable to foreign-controlled affiliates varies from 12% in Italy to 60% in the Czech Republic. As only a subset of OECD countries and other selected economies have reported this information in 2022, this indicator should be treated as exploratory and used at this point principally for relevance demonstration purposes.
# Figure 14. Distribution of R&D tax incentive support by economic ownership, 2020



Share of foreign-controlled affiliates and domestic enterprises with multinational presence

*Note*: Domestic enterprises with multinational presence are those with affiliates abroad. In the case of the Czech Republic, data on domestic enterprises (with or without) multinational presence are not available. *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

# 4.1.2. Statistics on the number of firms applying for and receiving R&D tax support

This section presents available statistics on the number of R&D tax relief recipients. The experimental nature of these data calls for caution when interpreting the available figures, as some differences exist in the way such data are recorded and reported by countries. The OECD R&D tax incentives survey asks respondents to flag whether they report data on applicants or claimants instead of beneficiaries but not all conceptual differences may be fully captured in this survey and flagged in this report.

#### R&D tax relief beneficiaries, claimants and applicants

Different tax systems provide R&D tax support using different reporting systems and milestones for the administration process that impact on available indicators of taxpayer demand for and use of R&D tax support. **Table 1** proposes an indicative schema for understanding differences in reported figures. The schema accounts for the fact that some R&D tax incentive processes are based on individual projects that sometimes have to be put forward for pre-assessment and approval for eligibility. A single firm or enterprise group may put forward one or more of these in a given year.

Different units of analysis (e.g. enterprise or enterprise group) may be adopted for reporting purposes. The term "claims" is used here to denote requests for support for eligible R&D and is distinguished from the concept of claimants as referring to the unique firms behind one or more claims. Because there is a gap between claims and realised support, the concept of tax support beneficiaries is also important. This difference has a direct translation in the expenditure figures provided on an accrual or cash basis.

Status Entity	Submission of request for R&D tax support	Entitled to R&D tax support	Realisation of R&D tax support
Project/activity/schemes	Applications (Can be project or activity specific, or for separate types of incentives)	Claims (Can be part of tax returns, a company may submit more than one)	Realised claims
Firms (enterprises or groups)	Applicants (A company may submit more than one application within a year)	Claimants (Claims can be kept separate or combined within a firm)	Tax support recipients (beneficiaries)
Link to tax expenditure measurement	N/A	Accruals basis	Cash basis (Yet in some cases the value will only be realised in future periods)

# Table 1. Schema for statistics on the number of R&D tax relief beneficiaries

Source: OECD.

Overall, 35 countries have reported data on the number of R&D tax relief beneficiaries as part of the OECD R&D tax incentive data collections carried out since 2016. In the case of the United Kingdom, available figures correspond to claims rather than beneficiaries, while the figures for Sweden and the United States refer to claimants, and those for Colombia to applicants. **Figure 15** reports the latest statistics available for 2020 or closest year. Among those countries that have contributed information on the number of R&D tax support beneficiaries (or claims or claimants or applicants), it is possible to note that at face value, the United Kingdom have the largest number of beneficiaries (claims), followed by Korea at around 48 thousand tax relief beneficiaries, well above other large and R&D intensive economies.

Another comparison shows the United States, Canada and France as having significantly higher numbers of R&D tax relief beneficiaries than Japan, suggesting lower levels of uptake, which may in turn relate to higher levels of R&D concentration. In relation to the size of the economy and BERD estimates, the estimates for numbers of beneficiaries appear to be larger in countries providing refundable or equivalent forms of tax relief, especially those favouring smaller firms (e.g. Australia, Canada, France).

In more than a third of the countries surveyed (Panel C), less than 1000 firms benefit from R&D tax support in 2020 (or closest year). Overall, there is a significant variation in the number of R&D tax relief beneficiaries among countries. This variation does not seem to be entirely attributable to differences in economic size as such. Factors such as business R&D intensity, industry structure, awareness and ease of use of R&D tax incentives (e.g. administration and compliance costs) likely shape the uptake of R&D tax incentives among corporate R&D performers in OECD countries and other major economies to some extent.

Unfortunately, official statistics on the number of R&D performers in the business sector within OECD countries are not widely available. Furthermore, when these are available, they may not align with definitions of enterprises used for tax purposes. As a result, it is not possible to assess whether a small or large percentage of R&D performers are using tax support. This is something that the OECD is investigating as part of the microdata workstream - the microBERD project. The OECD is also trying to mainstream the provision of demographic information on R&D performers as part of its international data collection.

# Figure 15. Number of R&D tax relief beneficiaries, 2020



Panel A. Countries with more than 5000 beneficiaries



Panel B. Countries with less than 5000 and more than 1000 beneficiaries

Panel C. Countries with less than 1000 beneficiaries



*Note*: Figures for the United Kingdom correspond to claims, while those for Sweden and the United States refer to claimants, and those for Colombia to applicants. Figures for Spain and the United States refer to 2019 instead of 2020 and in the case of the United States, they only include corporate claimants. Figures for China refer to 2017. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Belgium, figures refer to the payroll withholding tax exemption and R&D tax credit, for Italy, figures refer to the incremental R&D tax credit introduced in 2015, and in the case of Hungary, they refer to the R&D tax allowance and development incentive. Furthermore, beneficiary figures are generally not available for accelerated depreciation provisions (see Table A.1), with the exception of Brazil.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Distribution of R&D tax relief beneficiaries by firm size and main economic activity

**Figure 16** shows how R&D tax relief beneficiaries are distributed by firm size and industry sector. Across the 28 countries, where a breakdown of the number of beneficiaries by firm size is available (Panel A1), SMEs account for the majority of R&D tax relief recipients. SMEs represent at least 70% of tax relief recipients in 21 out of 28 countries, ranging from around 70% in Japan and 90% in the Netherlands and Sweden to (close to) 100% in Denmark (New Zealand). In Belgium and Mexico, SMEs account for around 45% of R&D tax relief recipients, while this number is around 30% in the case of Chile. It is noteworthy that self-employed individuals feature among R&D tax relief recipients in Korea, the Slovak Republic, Sweden and the Netherlands. In the Slovak Republic (2%), the Netherlands (6%) and Sweden (4%) they account for less than 10% of tax relief recipients in contrast to Korea (20%).

# Figure 16. Distribution of R&D tax relief beneficiaries, 2020



Panel A1. By firm size (broad classification), share in percent



Panel A2. By firm size (detailed classification), share in percent



### Panel B. By main economic activity, share in percent

*Note:* Figures for the United Kingdom correspond to claims, while those for Sweden and the United States refer to claimants, and those for Colombia to applicants. Panel A1: Figures for Denmark refer to 2019 and those for China refer to 2017. In the case of the United States, figures refer to 2013 and only include corporate claimants. Panel B: Figures for China refer to 2017. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Belgium, estimates refer to the payroll withholding tax exemption and R&D tax credit, for Hungary, they refer to the R&D tax allowance and development incentive, and for Italy, figures refer to the incremental R&D tax credit introduced in 2015. Furthermore, beneficiary figures are generally not available for accelerated depreciation provisions (see Table A.1), with the exception of Brazil. *Source*: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Overall, SMEs frequently seem to benefit from tax relief throughout the surveyed countries, while the distribution of R&D tax support is skewed towards large firms which account for the bulk of R&D is most economies (**Figure 11**, Panel A). Out of the 28 countries under consideration, 11 countries (Panel A2) are in the position to report more granular R&D tax relief figures for small and medium-sized companies, for the first time collected in 2022. Among those, small companies typically account for the largest share of SME tax relief recipients.

Economic activity is another dimension for which the distribution of R&D tax relief recipients can be of particular interest. Firms in manufacturing tend to account for a substantial share of R&D tax support across OECD and other major economies (**Figure 11**, Panel B) in line with R&D-intensive industries in manufacturing typically accounting for the largest share of business R&D expenditure. Across the 25 countries (Panel B), where a breakdown of the number of beneficiaries by industry is available, firms in manufacturing account for the largest group of R&D tax relief recipients in 9 out of 25 economies, ranging from around 50% in Korea and Italy to close to 100% in China. Firms in services in turn represent the largest group of R&D tax relief recipients in 17 out 25 economies, whereby their share varies from around 50% in Austria and Greece, 70% in the United Kingdom and the United States, to 80% in Sweden. The share of firms in other sectors is overall small, equivalent to 5% or less in 15 out of 25 countries where relevant data are available. Overall, the distribution of R&D tax relief beneficiaries by broad industry sector is more mixed compared to the distribution of R&D tax benefits, which is skewed towards firms in manufacturing, often owing to differences in the scale of R&D activity.

# 4.1.3. Comparing business expenditures qualifying for R&D tax relief and R&D reported in business R&D surveys

For the first time, the 2020 OECD R&D tax incentives survey collected information on the total amount of declared business expenditures qualifying for R&D tax relief. Together with statistics

on R&D tax relief beneficiaries, such data allow for a more comprehensive interpretation of the cost of government tax relief for R&D across countries and its evolution over time. This report presents the preliminary figures reported by countries for 2020 (or closest year) in the 2022 OECD R&D tax incentives data collection, comparing them with total business expenditure on R&D (BERD) as reported by firms in national business R&D surveys in line with the OECD Frascati Manual definition of R&D (OECD, 2015b). Total business expenditures qualifying for R&D tax relief denotes the amount of business R&D expenditure that is eligible for R&D tax support but does not represent all R&D performed by business in a country. Definitions of R&D or other types of expenditures<sup>32</sup> eligible for tax relief differ across jurisdictions and with respect to the OECD Frascati Manual (OECD, 2015b) although in a number of instances the manual's definitions are part of the national tax legislation. More specifically, measurement related differences can arise in the following contexts:

- BERD measures intramural R&D expenditure, i.e. R&D performed by businesses within a country but does not cover extramurally performed (outsourced) R&D expenditure either domestically or abroad. In a number of countries, R&D outsourced to third parties, such as business, universities and other research institutions, qualifies for tax relief. The most common approach (**Table A.2**) is to restrict the eligibility for R&D tax relief to the contracting or purchasing party. Likewise, business expenditures qualifying for R&D tax relief may not be limited to business R&D performed within country borders and may comprise R&D performed abroad. Within the European Union, for instance, several countries consider subcontracted R&D performed in other member states as eligible R&D expenditure.
- Some R&D tax incentive schemes explicitly target specific types of R&D costs. Overall, there is a general preference for considering within the scope of eligible R&D costs those relating to labour and other current expenditures. R&D personnel costs account for the largest share of intramural R&D costs, and in principle the focus on R&D personnel does incentivise investment in human resources based in the domestic economy. Acquisition of capital assets for R&D is less typically supported as assets may subsequently be disposed of or used for other purposes.
- R&D tax incentives may be available to non-corporate R&D performers such as higher education institutions. The OECD R&D tax incentive survey specifically focuses on tax relief for business R&D and asks countries to report cost, R&D and beneficiary data for non-business entities separately. In principle, this ensures an alignment between business expenditures qualifying for R&D relief and BERD. However, not all corporate R&D performers may claim R&D tax relief.
- BERD figures are reported on a calendar year basis while tax relief statistics are typically reported on a tax year basis, which may often not coincide with the calendar year. The OECD R&D tax incentive survey asks countries to report cost, R&D and beneficiary data on a calendar year basis and match tax years to the most closely related calendar year. This aids the comparison of business expenditures qualifying for R&D tax relief and BERD.

Figure 17 presents exploratory figures on business expenditures qualifying for R&D tax relief expressed as a percentage of GDP for 2020 or closest year. At this stage, relevant data are available for 26 countries. In the majority (16 out of 26) of surveyed countries, business expenditures qualifying for R&D tax relief amount to less than 0.5% of GDP. In some economies, this percentage is equal or smaller than 0.1%. This includes Chile (0.02%), Colombia (0.04%) and Greece (0.12%), Lithuania (0.12%), and Mexico (0.002%). Out of the 10 countries, where business expenditures qualifying for R&D tax relief amount to 0.5% of GDP or more, four countries report business expenditures qualifying for R&D tax relief close

<sup>&</sup>lt;sup>32</sup> See <u>http://www.oecd.org/sti/rd-tax-stats-expenditure.pdf</u>

to or larger than 1% of GDP: France (0.98%), the United Kingdom (1.81%), the United States (2.01%), and Denmark (2.97%). While some of this variation can be related to differences in BERD intensity, this correlation is far from perfect. As noted, various conceptual differences may lead to a divergence in BERD and business expenditures qualifying for R&D tax relief.

# Figure 17. Business expenditures qualifying for R&D tax relief compared to BERD, 2020 or latest

As percentage of GDP (left-hand scale); ratio of tax relief qualifying R&D to BERD (right-hand scale)



*Note:* For Australia and the United States figures refer to 2019 instead of 2020. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. In the case of Hungary, figures refer to the R&D tax allowance, for Italy, figures refer to the incremental R&D tax credit introduced in 2015, and for Türkiye, they refer to the R&D tax allowance. Furthermore, figures are generally not available for accelerated depreciation provisions (see Table A.1). *Source:* OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

The ratio of tax relief qualifying R&D to BERD, expressed as a percentage of the latter, is smaller than 50% (75%) in 14 (21) out of 26 OECD countries in 2020 or closest year. It amounts to 3% in Mexico, 10% in Sweden, around 30% in New Zealand and Hungary, 50% in Italy and the Netherlands, around 65% in France, 70% in Australia and Norway, 80% in Portugal, close to 90% in the United Kingdom and approximately 85% in the United States, and it reaches 160% in Denmark%. Differences in the definition and scope of business expenditures qualifying for R&D tax relief and BERD, as explained above, particularly in connection with new software development and the companies that provide such services, may be the cause of the observed divergence between tax relief qualifying R&D and BERD figures.

Overall, this shows that a comprehensive and careful assessment of design changes and data related differences across countries is important in ensuring a correct interpretation of business expenditures qualifying for R&D tax relief and meaningful comparison with BERD. Furthermore, the production of BERD statistics needs to closely monitor the impact of tax support availability on survey response patterns. This and improving the rate of reporting and comparability of data on business expenditures on R&D qualifying for tax relief , including documentation of available metadata, are objectives of future OECD work.

# 4.2. Trends in government tax support for business R&D

# 4.2.1. Statistics on tax expenditures for business R&D

Over the last decade, a majority of OECD and other major economies have progressively moved towards tax support measures in order to incentivise business R&D. This section describes trends in the central (federal) government tax relief for business R&D over the 2000-20 period.

Tax support for business R&D compared to direct government funding

The shift in the policy mix towards R&D tax incentives is reflected in the available indicators of the composition of government support for business R&D. **Figure 18** provides a comparison of two snapshots of the structure of public support for business R&D in 2020 and 2006 (or closest years). This shows an increase in the relative importance of tax incentives among 25 out of 37 countries for which relevant data are available. Canada, Colombia, Croatia, Mexico and Hungary, starting from a high share of tax relief, moved over this period towards rebalancing their support mix, increasing their reliance on direct funding. Argentina offered R&D tax support until 2017 but has not carried out any calls ever since and Malta discontinued its main R&D tax incentive with effect of 2018.Overall R&D tax relief increased across most countries.

# Figure 18. Changes in the composition of government support for business R&D, 2006-20



R&D tax incentive support as a percentage of total government support

*Note:* Figures for Canada, Hungary and Japan exclusively refer to government tax relief for R&D at central government level. For Australia, the Russian Federation, South Africa and the United States figures refer to 2019, while those for Brazil and China refer to 2017. For Argentina, Denmark, and Korea, refer to 2007 instead of 2006. For China and Malta, they refer to 2009. For Greece and the Russian Federation, they refer to 2010, for the Netherlands, they refer to 2013, and for South Africa, figures refer to 2012 instead of 2006. *Source:* OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

New Zealand had offered an R&D tax credit in 2008 on a temporary basis and re-introduced R&D tax support in form of an R&D tax credit for deficit-related R&D expenditure in 2015, introducing a broader (going beyond R&D tax losses) volume-based tax credit for R&D in 2019. Nine other countries - Chile, Croatia, Iceland, Lithuania, Poland, Romania, the Slovak Republic, Sweden and Türkiye - also introduced tax incentives for R&D over the 2006-20 period.

The increased use and generosity of R&D tax incentives (**Figure 1**, **Figure 6**) does not only result into a shift in the composition of the government R&D support mix towards R&D tax incentives (**Figure 18**) but also appears to go hand in hand with an increase in the magnitude of total (direct and tax) government support over the 2006-20 period.

**Figure G.1** documents the aggregate trends in BERD and tax and direct support for BERD in the OECD and EU-27 area. Over the 2000-2020 period, total government support for business R&D (as percentage of GDP) increased by around 50% (80%) in the OECD (EU-27) area, driven by the increased use and generosity of R&D tax incentives. In the OECD (EU-27) area, government tax relief for R&D accounted for 0.04% (0.02%) of GDP 2000, reaching 0.06% (0.03%) in 2006 and 0.12% (0.10%) in 2020. R&D tax incentives surpassed direct funding in terms of value as percentage of GDP in 2016 (2015) in the OECD (EU-27) area.

**Figure 19** provides some first evidence on the magnitude of R&D tax support and direct government funding of business R&D in the first year of the COVID-19 crisis, tracking the value (Const. USD billion) of BERD and tax and direct support for BERD in the OECD and EU-27 area over the 2000-20 period. After more than a decade of spending cuts, the level of government direct funding for business R&D rose sharply in the OECD area (Panel A) in 2020, at a rate not seen since the 2008 crisis. Government tax relief for R&D continued to rise in absolute levels but at a lower rate as business R&D growth slowed down in 2020. Total government support for business R&D, combining both direct funding and tax support elements, increased notably in in the OECD area in 2020, at a rate outpacing the growth of business R&D. By contrast, total government support for business R&D in the EU-27 area (Panel B) dropped in the first year of the COVID-19 crisis. In 2020, the EU-27 area witnessed the first instance of a decrease in R&D tax support. While direct funding of business R&D increased in 2020, this increase was in absolute terms not large enough to offset the decline in R&D tax support.

# Figure 19. Government tax and direct support for business R&D, OECD and EU area, 2000-2020

# Const. USD billion



# Panel A. OECD-38 countries



#### Panel B. EU-27 countries

*Note*: Direct support estimates include government R&D grants and public procurement of R&D services but exclude loans and other financial instruments that are expected to be repaid in full. Preliminary OECD estimate of government tax relief for R&D expenditures (GTARD) for the OECD area in 2020. *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

**Figure 20** sheds light on country specific changes in the volume of R&D tax support (Panel A) and direct funding of BERD (Panel B) in the first year of the COVID-19 crisis. Changes in the magnitude of government tax relief for R&D between 2019 and 2020 may reflect changes in the availability and design of R&D tax incentives – a number of countries introduced enhancements in the generosity and terms of claiming R&D tax relief in response to the COVID-19 outbreak (OECD, 2021b) – but they may also reflect adjustments in the level of business R&D investment and demand for tax support by firms as well as firms' ability to claim it. With a reduction in corporate income and tax liability due to the downturn in economic activity, the COVID-19 crisis limited firms' scope to fully use earned tax credits and deductions in the current or subsequent period unless refund provisions were in place.

As **Figure 20** (Panels A and B) shows, the volume of tax (direct) support for business R&D (direct funding of BERD) increased in 17 (24) out of 31 (35) countries for which relevant data are available. Overall, these initial results suggest that around one in two countries increased the level of financial support for business R&D through tax incentives and/or direct funding in the first year of the COVID-19 crisis. A net increase in the total volume of government support for BERD can be observed in 12 out of 23 countries for which data on changes in both tax and direct support are available (Panel C). However, there is a substantial cross-country variation the magnitude of upward and downward changes in tax and direct support from 2019 to 2020.

A comparatively large drop in the magnitude of R&D tax relief is observable in the case of Italy, for instance. This drop can at least in parts be attributed to the introduction of a new volumebased R&D tax credit in 2020, replacing the existing incremental R&D tax credit and imposing a lower ceiling on the maximum annual amount of R&D tax relief per company (EUR 3 million, previously 10 million). The introduction (e.g., New Zealand, 2019) and repeal (e.g., Malta, 2019) of R&D tax incentives likewise drive some of the observed increases and decreases in government R&D tax relief from 2019 to 2020. Some of the drops in GTARD (e.g., Czech Republic, Hungary, and Slovenia) also appear to be linked to decreases in the amount of business expenditures qualifying for R&D tax relief (**Figure 23**) in line with the demand-driven nature of R&D tax relief.

# Figure 20. Tax incentive support and direct government funding of business R&D, 2020 vs. 2019

# Const. USD billion

## Panel A. Tax incentive support for BERD



# Panel B. Direct government funding of BERD



## Panel C. Changes in tax incentive and direct support for BERD



OECD R&D TAX INCENTIVES DATABASE, 2022 EDITION

Note: This table reports data on the magnitude of tax incentive support and direct government funding of BERD (Const. USD billion) in 2019 and 2020, and changes therein from 2019 to 2020, for all OECD countries and non-member economies for which relevant data are available for both 2019 and 2020. Panel A excludes countries that did not offer R&D tax incentives in both 2019 and 2020 (Bulgaria, Cyprus, Estonia, Finland, Germany, Israel, Latvia and Luxembourg) or where data on R&D tax relief are not available for both years (China, Romania, Russian Federation, Spain and the United States) at the time of reporting. Panel B excludes countries (Australia, Austria, Belgium, Bulgaria, Brazil, Cyprus, Denmark, France, Israel, Ireland, Malta, Luxembourg, South Africa, Sweden, and the United Kingdom) where data on direct funding of BERD are not available for both 2019 and 2020 at the time of reporting. Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

## Foregone tax versus payable credits

Tax support for R&D comprises both taxes that are foregone by authorities, which the company is in a position to use to reduce its current tax liability, and the amounts that a firm can expect to reduce its future liability or receive a compensating direct payment if provisions allow for that. All these categories represent tax expenditures and the impact on the government's fiscal balances compared to the counterfactual of no tax support for R&D. One specific breakdown of interest is the component of support that results from payable credits. A tax credit becomes "payable" or refundable when any credit excess on top of the tax liability can be paid in full or in part to the taxpayer. Refundability can be particularly beneficial for young, innovative firms, at the stage of investing in developing and launching their products. In 2020, 38 out of the 33 OECD countries that provide tax support for R&D offer refundable (payable) or equivalent incentives. A detailed breakdown of foregone tax versus payable credits is not available for most countries that report estimates of the cost of R&D tax support. **Figure 21** reports on the status of five countries that allow for payable credits under some conditions.

# Figure 21. Role of payable R&D tax benefits over time



Percentage of refunds in total tax support (forgone tax revenue and refundable amounts)

*Note:* Figures for the United Kingdom refer to the payable credits available under the tax allowance provision for SMEs. Relevant data for the payable RDEC tax credit, introduced for large companies in the United Kingdom in 2013, are not available.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

It is possible to note that Norway has the largest refundable component of 80% in 2020. This is explained by the existence of upper limits that constrain the extent to which larger, profitable firms with high levels of R&D can benefit from support, and the existence of provisions that make the level of support more predictable regardless of the profit situation of the firm. Recent trends point to an increasing use of refundable credits in recent years for Australia, Canada,

Spain and the United Kingdom. In Australia, the share of the refundable component increased notably following the replacement of the R&D tax concession by the R&D tax incentive in 2012. While both incentives have been exclusively refundable for SMEs, the R&D tax incentives applies a less restrictive SME definition.<sup>33</sup>

# 4.2.2. Changes in the number of R&D tax relief beneficiaries

**Figure 22** shows how the number of R&D tax relief beneficiaries has evolved in overall 37 countries over time. In line with the increasing importance of R&D tax incentives in the business innovation support policy mix of OECD countries and other major economies, the period 2010-20 has witnessed a significant increase in the number of firms receiving (claiming) R&D tax support. In 28 out of 37 countries, for which two or more years of data are available, the number of R&D tax relief beneficiaries increased over the said period. In 16 of these countries, the number of tax relief recipients increased twofold or more, comparing the first and last year of observation (when R&D tax incentives are in place).

# Figure 22. Number of R&D tax relief beneficiaries, 2010-20



Panel A. Countries with 15 000 or more beneficiaries per year on average





<sup>&</sup>lt;sup>33</sup> Under the R&D tax Concessions, firms (SMES) are eligible to claim the corresponding refundable tax offset if both of the following apply: 1. the firm is not controlled by one or more exempt entities; and 2. the firm's aggregated turnover is less than AUD 5m. Under the R&D Tax Incentive, this turnover threshold was raised to AUD 20m.



Panel C. Countries with less than 3 000 and more than 1000 beneficiaries per year on average



Panel D. Countries with less than 100 beneficiaries per year on average



*Note*: Figures for the United Kingdom correspond to claims, while those for Sweden and the United States refer to claimants, and those for Argentina and Colombia to applicants. Those for the United States include only corporate claimants. Some countries offer multiple R&D tax incentive schemes but are only able to report information for selected instruments. For Australia, figures refer to the R&D Tax Incentive, for Austria, they refer to the R&D premium, and for Belgium, figures refer to the payroll withholding tax exemption and the R&D tax credit. For Hungary, figures refer to the R&D tax allowance and development incentive, and in the case of the Slovak Republic, they refer to the R&D tax allowance. Furthermore, beneficiary figures are generally not available for accelerated depreciation provisions (see **Table A.1**), with the exception of Brazil.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Growth is particularly pronounced in the case of Italy and the United Kingdom (claims) where respective figures increased by a factor of ten and eight respectively. In the case of the United Kingdom, several factors possibly explain this upward trend, including the increased generosity of tax support and a break in series (**Section 4.1.3**). In Italy, the number of tax relief recipients started to increase following the introduction of an incremental R&D tax credit in 2015, replaced by a volume-based R&D tax credit in 2020. Significant growth is also observed in the case of Brazil, China, Chile, Denmark, Greece, Iceland, Korea, Poland, Portugal, Romania, the Slovak Republic, Türkiye and the United States. However, there are also cases where the number of R&D tax relief recipients remained fairly constant or increased at a comparatively more moderate rate between the first and last year of observation (when R&D tax incentives are in place). This includes Australia, Belgium, Canada, the Czech Republic, France, Lithuania, the Netherlands, Norway, Ireland, Japan, Slovenia and Sweden.

# 4.2.3. Evolution of business expenditures qualifying for R&D tax relief and R&D reported in business R&D surveys

Differences in the definition and scope of business expenditures qualifying for R&D tax relief and BERD (**Section 4.1.3**) may lead to a divergence between business expenditures qualifying for R&D tax relief and BERD. Furthermore, not all corporate R&D performers may claim and receive R&D tax relief. The latest figures collected for 2020 (**Figure 17**) show that the ratio of tax relief qualifying R&D to BERD tends to be smaller than one in the majority of OECD countries for which relevant data are available, this ratio amounting to less than 50% (75%) in 14 (21) out of 26 OECD countries in that year.

Figure G.2 presents the evolution of business expenditures qualifying for R&D tax relief and BERD over the 2000-20 period in 25 out of 26 OECD countries, for which relevant data are available for two or more years, providing additional insights into how this ratio has evolved over time. Interestingly, the ratio of tax relief qualifying R&D to BERD, expressed as percentage of the latter, remains relatively stable over time in most OECD countries under consideration. Some exceptions with more pronounced fluctuations include Australia, Canada, Colombia, Croatia, Denmark, Hungary, Ireland, Lithuania, Norway, the Netherlands, Poland, Portugal, the Slovak Republic, and Slovenia. These fluctuations can be connected to the introduction of new R&D tax incentives, changes in the definition and scope of business expenditures qualifying for R&D tax relief among other changes in the design of R&D tax incentives that may affect the uptake and amount of R&D expenditures used by firms to claim R&D tax support. Revisions in R&D statistics may also affect the comparison of tax relief qualifying R&D and BERD over time, as in the case of the Netherlands which revised its BERD figures in 2013 and 2019.<sup>34</sup>

Chile, for instance, introduced an R&D tax credit for extramural R&D in 2008, extending its scope in 2012 to cover intramural R&D expenditure. This is visible in an increase in business expenditures qualifying for R&D tax relief in 2013. Likewise, Canada's reform of its SR&ED tax credit in 2014, narrowing the base of eligible expenditures by removing capital expenditures and lease costs, can be associated with a drop in the ratio of tax relief qualifying R&D to BERD, whereas the introduction of a new R&D tax allowance in Denmark in 2018 goes hand in hand with a significant increase in this ratio. In the United Kingdom, the sharp increase in business expenditures qualifying for R&D tax relief in 2013 in the United Kingdom can be attributed to a number of factors (HMRC, 2022), which include an increase in SME allowance rates (2012-

<sup>&</sup>lt;sup>34</sup> In 2013, the Netherlands revised their R&D statistics for BERD to capture from 2011 onwards R&D performed by enterprises with less than 10 persons as well as firms with small-scale level of R&D. In 2019, the Netherlands revised their R&D statistics for BERD to capture from 2013 onwards R&D activities undertaken by hired personnel as part of a company's own R&D and those of public entities that acquire a large share of income on the market. For additional details (in Dutch), see <a href="https://www.cbs.nl/nl-nl/publicatie/2013/27/ict-kennis-en-economie-2013">https://www.cbs.nl/nl-nl/publicatie/2013/27/ict-kennis-en-economie-2013</a> and <a href="https://www.cbs.nl/nl-nl/publicatie/2019">https://www.cbs.nl/nl-nl/publicatie/2013/27/ict-kennis-en-economie-2013</a>

13, 2015-16) and the payable credit rate (2014-15), the introduction of a new payable tax credit for large companies in 2013 as well as the inclusion of additional claims from 2014-15 onwards. In other cases (e.g., Lithuania, Slovenia), changes in the ratio of tax relief qualifying R&D to BERD may at least in parts be attributable to differences in the way BERD and tax relief qualifying R&D are reported, as tax relief qualifying R&D evolves alongside a similar trajectory as BERD with a lag of 1 to 2 years. Such differences would, for instance, arise if business expenditures qualifying for R&D tax relief are reported in alignment with the year in which tax benefits are paid out (cash basis) rather than the year in which the qualifying R&D activity was carried out (accrual basis).

**Figure 23** sheds light on changes in the level of business expenditures qualifying for R&D tax relief (Panel A) and total business expenditure on R&D (BERD, Panel B) in the first year of the COVID-19 crisis, completing the evidence on changes in tax and direct support from 2019 to 2020 (**Figure 18**). In 14 out of 25 countries (around 55%), for which relevant data on tax relief qualifying R&D are available for both 2019 and 2020, an increase in the amount of business expenditures qualifying for R&D tax relief can observed from 2019 to 2020. Similarly, an increase in the level of BERD can be witnessed for 24 out of 42 countries (around 55%) over the said two years. Overall, these initial results seem to suggest that both the level of tax relief qualifying R&D and BERD (as a percentage of GDP) increased in the first year of the COVID-19 crisis in around half of all countries for which data are available at the time of reporting.

Overall, there is a notable cross-country variation in the direction and magnitude changes in business expenditures qualifying for R&D tax relief and BERD from 2019 to 2020 (Panel C). In 18 out of 25 countries, for which data on changes in both tax relief qualifying R&D and BERD are available, changes in business expenditures qualifying for R&D tax relief and BERD have the same direction, i.e. tax relief qualifying R&D and BERD follow a similar trend. However, the size of the changes observed for tax relief qualifying R&D vis-à-vis BERD varies often largely. As discussed in **Section 4.1.3**, differences in the definition and scope of business expenditures qualifying R&D are reported (accrual vs cash-basis) may lead to a divergence between business expenditures qualifying for R&D tax relief and BERD and differences in the patterns observed for tax relief and BERD and differences in the patterns observed for tax relief and BERD and differences in the patterns observed for tax relief and BERD and differences in the patterns observed for tax relief and BERD and differences in the patterns observed for tax relief and BERD and differences in the patterns observed for tax relief qualifying R&D vs BERD over time.

As the snapshot overview of business expenditures qualifying for R&D tax relief vs BERD in 2020 (**Figure 17**) and trends in tax relief qualifying R&D and BERD (**Figure 23, Figure G.2**) show, a comprehensive and careful assessment of design changes and data related differences across countries is important in ensuring a correct interpretation of business expenditures qualifying for R&D tax relief and meaningful comparison with BERD. The production of BERD statistics also needs to closely monitor the impact of R&D tax support availability on survey response patterns. This and improving the rate of reporting and comparability of data on business expenditures qualifying for R&D tax relief, including documentation of available metadata, are objectives of future OECD work.

# Figure 23. Business expenditures qualifying for R&D tax relief and BERD, 2020 vs. 2019



#### Panel A. Business expenditures qualifying for R&D tax relief





Panel C. Change in business expenditures qualifying for R&D tax relief and BERD from 2019 to 2020

Note: This table reports data on the magnitude of business expenditures qualifying for R&D tax relief and BERD (Const. USD bn.) in 2019 and 2020, and changes therein from 2019 to 2020, for all OECD countries and non-member economies for which relevant data are available for both 2019 and 2020. Panel A excludes countries that did not offer R&D tax incentives in both 2019 and 2020 (Bulgaria, Cyprus, Estonia, Finland, Germany, Israel, Latvia and Luxembourg) or where relevant data on qualifying R&D are not available for both 2019 and 2020 (Austria, Belgium, China, Iceland, Japan, Korea, Malta, Romania, the Russian Federation, Spain and the United States). Panel B excludes countries (Austria and Thailand) where BERD data are not available for both 2019 and 2020 at the time of reporting.

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

# 5. Conclusions and next steps

Following prior editions, this report has documented the main qualitative and statistical findings arising from the 2022 OECD data collection on expenditure-based R&D tax incentives in OECD and EU countries and other major economies. Several policy developments took place in 2022 in the area of R&D tax incentives.

While some countries increased the generosity of R&D tax support in 2022 through the enhancement of existing R&D tax relief provisions or introduction of new incentives, there are several OECD and EU countries where tax allowances and tax credit rates for R&D declined. Average OECD and EU tax subsidy rates declined slightly in 2022 but still exceeded pre-COVID-19 tax subsidy levels by some margin. This reduction in average tax subsidies, while small in scale, applied across all the modelled business scenarios. It is however too early to conclude whether this represents a one-off blip or a first sign of a trend reversal following decades of documented increases in tax subsidy rates for business R&D, as several countries are increasingly outspoken about directing support for R&D to priorities. The changing global corporate tax landscape is another factor that will shape the future use of tax incentives to promote business R&D.

Indicators of government tax expenditures to promote R&D included in this report are based on outturn data, available up to 2020 for most reporting countries, and therefore less timely than estimates of notional R&D tax subsidy rates. Tax incentives maintain a preeminent role in the policy mix of financial support for business R&D in OECD and EU countries (close to 55% of total (direct and tax) support for business R&D in the OECD and EU-27 area) after two decades in which growth for tax relief for R&D has outstripped that of direct government support.

OECD estimates of government tax relief for R&D expenditures presented in this report provide insights into supply and demand of R&D support in the first year of the COVID-19 crisis. In the OECD area, the total amount of government support for business R&D increased in absolute, inflation-adjusted levels in 2020, as the estimated volume of government tax relief for R&D expenditures continued to rise – albeit at a lower rate – while the level of direct funding increased sharply. By contrast, the total amount of government support for business R&D declined in 2020 in the EU-27 area. The EU experienced for the first time a decrease in total R&D tax support which was not offset by a simultaneous increase in direct funding.

In addition to portraying in detail indicators available in the established OECD database of indicators on R&D tax incentives, this report has highlighted several other indicators that help provide insights into what types of firms claim and benefit from tax relief. This report helps demonstrate the relevance and feasibility of producing several indicators, prompting other countries to follow suit in the production of internationally comparable indicators that help map the relative importance of specific industries in terms of tax support received, the distribution of tax support and numbers of beneficiaries by business size. This report has showcased new exploratory indicators of R&D tax support by economic ownership, documenting differences in the relative importance of domestic standalone enterprises, domestic multinationals and foreign-controlled affiliates in terms of tax relief distribution. The indicators of claimed expenditures eligible for R&D tax relief facilitate valuable comparisons with official statistics of R&D expenditure that can inform countries efforts to improve the management of their tax schemes as well as their statistical production activities.

A key defining feature of OECD work on R&D tax incentives is the way in which qualitative and statistical information reinforce and complement each other. With the launch of the OECD INNOTAX portal in March 2022, a new and interactive OECD tool provides a single access point to the latest policy design information, quantitative indicators and OECD analysis on R&D tax incentives. This portal is likely to play an important role in the future as a window for communicating, interpreting and helping consolidate novel policy-relevant indicators.

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# Annex A. Policy design

# Table A.1. Main features of R&D tax incentives in OECD, EU and other major economies, 2022

Expenditure-based R&D tax incentives						
Tax relief redeemable against CIT Tax relief redeemable						
R&D tax credit		R&D tax allowance	against payroll withholding tax or social			
Volume	Incremental/hybrid		security contributions			
Taxable: Australia, Canada, Chile, United Kingdom (large firms) Non-taxable: Austria, Belgium (incompatible with allowance), Colombia (general and SME-specific), Denmark (deficit), France (general and collaboration specific), Germany, Hungary, Iceland, Ireland, Italy, Japan (volume and special R&D), Korea (investment), New Zealand (general and deficit specific), Norway	<i>Taxable</i> : United States (credit on fixed, indexed base and incremental for simplified credit) <i>Non-taxable</i> : Japan (high R&D intensity), Korea, Mexico, Portugal, Spain	Non-taxable: Belgium, Brazil, China, Croatia, Cyprus, Czech Republic (hybrid), Denmark, Finland, Greece, Hungary, Italy (eligible intangible assets), Lithuania, Poland (general and R&D Centres), Romania, Russian Federation, Slovak Republic (hybrid and volume-based), Slovenia, South Africa, Switzerland (cantonal level - optional), Thailand, Türkiye (incremental), United Kingdom (SMEs)	<i>Taxable</i> : Belgium, France, Hungary (exemption and credit, incompatible in use), Netherlands, Spain, Sweden, Türkiye			
	Treatment of u	unused claims				
	Refund	option				
Australia (SMEs), Austria, Belgium (after five years), Canada (CCPCs), Colombia (SMEs), Denmark, France (general tax credit), Germany, Iceland, Ireland, Italy, New Zealand (general and deficit tax credit), Norway, United Kingdom (large companies)	Spain (reduced, payable credit optional), United States (payroll tax offset for certain start-ups)	Poland (R&D tax allowance - start-ups), United Kingdom (SMEs)	Automatic refund through wage system (limited to PWHT and SSC liability)			
Carry-forward option						
Australia, Belgium, Canada, Chile, Colombia, France, Hungary, Ireland, New Zealand (general tax credit), United Kingdom	Korea, Portugal, Spain (unreduced, non- payable credit), United States	Belgium, China, Croatia, Cyprus, Czech Republic, Denmark, Greece, Hungary, Italy, Lithuania, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, South Africa, Türkiye, United Kingdom	Not applicable			
Prefe	rential tax incentive provision	sions or more favourable terms				
	SM	IEs				
Australia, Canada (CCPCs), Colombia, France (general and collaboration specific tax credits), Iceland, Japan (volume)	Korea, Portugal (start- ups), United States (certain start-ups)	Belgium, Croatia, Poland (R&D tax allowance - start-ups), United Kingdom (SMEs)	Belgium (young innovative firms), France (JEI/JEU), Netherlands (start-ups), Spain (innovative SMEs)			
	Collab	oration				
France (collaboration specific tax credit)	Iceland, Japan	Hungary	Belgium			
	Limitation of	R&D tax relief				
	Threshold-deper	ndent credit rates				
Canada (CCPCs), France (general tax credit)			Netherlands			
Ceilings	on amount of eligible R&D e	expenditure or value of R&D tax relief				
<ul> <li>R&amp;D expenditure: Australia, Austria (subcontracted R&amp;D), Chile, Colombia, Denmark, France (subcontracted R&amp;D), Germany, Iceland, Ireland (subcontracted R&amp;D), Norway</li> <li>R&amp;D tax relief: Colombia, Hungary, Italy, Japan (volume and special R&amp;D), New Zealand (general and deficit tax credit)</li> </ul>	R&D expenditure: Portugal (incremental) R&D tax relief: Japan (incremental and high R&D intensity), Korea (large firms), Spain, United States	R&D expenditure: China (subcontracted R&D), Croatia, Türkiye (subcontracted R&D), Switzerland (cantonal level - optional) R&D tax relief: Finland, Hungary (R&D collaboration), United Kingdom (SMEs) R&D expenditure and tax relief: Slovak Republic (volume-based tax allowance)	Belgium, France, Hungary (exemption and credit, incompatible in use), Spain, Sweden, Türkiye			
Accelerated depreciation provisions for R&D capital						
Belgium, Brazil, China, Denmark,	France, Ireland, Lithuania, F	Russian Federation, Spain, Thailand, Türkiye, Unite	ed Kingdom			
	No expenditure-base	d R&D tax incentives				

Bulgaria, Costa Rica, Estonia, Israel, Latvia, Luxembourg, Malta

*Notes:* No call for R&D tax incentives in Argentina in 2022. The extension of the R&D tax allowance in Thailand is pending approval. Hungary also offers a KIVA exemption and credit which are mutually exclusive in their use with the SSC exemption and credit. Israel offers an accelerated depreciation provision for R&D capital assets which is not specific to R&D and thus not considered as an R&D tax incentive. *Source:* OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

# Table A.2. Tax relief eligibility in the case of R&D subcontracting, 2022

#### Party entitled to claim R&D tax benefits

#### R&D funder

Australia, Brazil, China (except for R&D contracted abroad), Colombia, Croatia, Cyprus, Czech Republic, Finland (tax deduction for R&D-related research cooperation expenditures), France (Tax credit for collaborative research), Germany, Greece, Iceland, Italy, Japan, Korea (R&D tax credits), Mexico (R&D tax credit), New Zealand (tax credit for R&D tax losses, R&D tax credit if the funder carries on a business through a fixed establishment in New Zealand), Norway, Slovak Republic (tax relief for incentive recipients), Slovenia, Spain, Thailand, United Kingdom (Corporate Tax Credit for Research & Development), United States

#### R&D performer

Australia (under very specific circumstances)<sup>35</sup>, Belgium (R&D investment deduction and R&D tax credit), Denmark, France (R&D tax credit), Hungary (Tax allowance, tax credit, SSC credit, SSC exemption, KIVA credit and KIVA exemption), Romania, United Kingdom (RDEC)

#### R&D funder or performer

Austria, Chile (R&D tax credit for intramural and extramural expenses, accelerated depreciation for R&D capital), Hungary<sup>36</sup> (R&D tax allowance CIT, local business tax base allowance and local business tax deduction and innovation contribution), Ireland (R&D tax credit), Lithuania, New Zealand (R&D tax credit, only if the funder doesn't carry on a business through a fixed establishment in New Zealand), Slovak Republic (Super deduction), South Africa

#### R&D funder and performer

Canada, China (in the case of cost-sharing agreements), Chile (R&D tax credit for intramural and extramural expenses), Denmark (Enhanced Tax allowance on R&D capital), Russia, Türkiye (R&D tax allowance and SSC)

#### No details available

Finland (Corporate Research and Development Tax Relief), France (PWHTC, Accelerated depreciation for R&D capital assets), Ireland (Accelerated depreciation for R&D capital), Italy (Tax credit, Tax credit for R&D collaboration), Malta (innovation aid for SMEs, 50% enhanced tax deduction), Mexico (Accelerated depreciation of R&D capital), Poland, Türkiye (Accelerated depreciation for R&D capital), United Kingdom (RDA)

#### Not applicable (subcontracted R&D does not qualify for R&D tax support)

Belgium (PWHTC, Accelerated depreciation for R&D capital), Brazil (Accelerated depreciation for capital assets), China (Accelerated Depreciation), Korea (R&D investment credit), Malta (Tax Credits for R&D and Innovation), Netherlands (WBSO), Portugal, Sweden

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

 $<sup>^{35}</sup>$  Under subsection 355-210(1) of the ITAA 1997, an enterprise may qualify for the R&D tax incentive if: (i) the R&D activities are conducted for an associated foreign corporation that is a resident of a country with which Australia has a comprehensive double tax agreement – if certain conditions are met, (ii) the enterprise is a foreign corporation carrying on its business through a permanent establishment in Australia and the R&D activities are conducted for it and not for the permanent establishment – if certain conditions are met. In most cases, expenditure incurred on R&D activities conducted to a significant extent for another entity is unable to be claimed by the enterprise (as a subcontractor).

 $<sup>^{36}</sup>$  Tax benefits may be shared by the R&D funder (customer) and R&D performer (service provider) by means of a written statement made jointly by the customer and the service provider, up to the amount that can be claimed by the service provider. This provision shall apply on condition that the customer and the service provider declare jointly by the deadline for filing the tax return in a written statement the quality of the research and experimental development services, the sum that can be claimed by the service provider, including the share of the customer and of the service provider from that sum.

# Table A.3. Trade/exchange or use of R&D tax benefits as security, 2022

Trade/exchange or use of R&D tax benefits as security

Colombia (SMEs)<sup>37</sup> France (CIR, CII)<sup>38</sup>, Norway<sup>39</sup>, Belgium<sup>40</sup>

#### No trade/exchange or use of R&D tax benefits as security

Argentina, Australia, Austria, Belgium<sup>41</sup>, Canada, Chile, Croatia, Czech Republic, Finland, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Lithuania, Malta, Mexico, Netherlands, New Zealand, Russian Federation, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Thailand<sup>42</sup>, Türkiye, South Africa, United States

#### No details available

Brazil, China, Denmark,, Poland, Portugal, Romania, United Kingdom

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

# Table A.4. Aggregation rules applicable in determining R&D tax benefits, 2021

#### Treatment of R&D tax incentive claims of enterprises that are part of a group

Joint assessment of associated parties

Argentina, Australia, Canada, Colombia, Czech Republic (same legal entity), Croatia (R&D tax allowance), Denmark, Germany, Ireland (R&D tax credit), Japan, New Zealand, Poland, Russian Federation, Spain (R&D&I tax credit), Sweden, Thailand, United States

#### Separate assessment of associated parties

Austria, Belgium, Brazil, Chile, Cyprus, Czech Republic (separate legal entities), Finland, France (R&D tax credit, PWHTC and Acc. Dep. for R&D capital assets), Greece, Hungary, Italy, Korea, Lithuania, Latvia, Mexico, Netherlands, Norway, Portugal, Romania, Slovak Republic,

South Africa, Spain (SCC and Accelerated depreciation for R&D capital assets), Türkiye

#### No details available

Austria (R&D tax allowance), Belgium, Brazil (Acc. Dep. for R&D capital assets), China, Croatia, France (Accelerated depreciation for R&D capital assets, CiCo), Iceland, Ireland (Accelerated depreciation for R&D capital), Israel, Japan (Incremental-based R&D tax credit), Mexico, Slovenia, Spain (Tax credit for R&D wages), Türkiye, United Kingdom

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

<sup>39</sup> Some banks and Innovation Norway use the tax advantage as part of the overall assessment of loan applications. It is unclear to what extent they will be able to use it as security.

<sup>40</sup> As of 2019 and for the first time in Belgium's income tax history, tax consolidation was introduced through the socalled "deduction of the group contribution". In practice, Belgian will be able to transfer taxable profits to other Belgian affiliated companies with the aim of offsetting these profits against current year tax losses.

<sup>41</sup>As of 2019, a tax consolidation was introduced in Belgium through the so-called "deduction of the group contribution". In practice, Belgian companies will be able to transfer taxable profits to other Belgian affiliated companies with the aim of offsetting these profits against current year tax losses. In the event of a merger, demerger or contribution as referred to in Art. 46, § 1, first paragraph, 2°, 211, § 1 or 231, § 2, first paragraph, BITC '92, a tax benefit may be transferred to the acquiring or acquiring company. Other than that no exchange of tax benefits is possible. For more details, see https://financien.belgium.be/sites/default/files/downloads/704-brochure-RD-TaxIncentives-2018-en.pdf

<sup>42</sup> In case of a change of ownership of approved R&D projects, tax benefits can be transferred to the new owner.

<sup>&</sup>lt;sup>37</sup> SMEs benefiting from tax credit (50% investment in R&D projects) can request a tax refund through "tax refund titles" (Títulos de Devolución de Impuestos TIDIS, in Spanish) marketable to third parties.

<sup>&</sup>lt;sup>38</sup> Faced with the growing need for cash in companies, financing organizations such as commercial banks offer prefinancing of Research Tax Credit (CIR) and / or Innovation (CII). This system makes it possible to support companies' efforts in Research and Development (R&D) investments by considerably shortening the time between the initiation of expenditure and the payment of aid. Indeed, the pre-financing of the CIR consists of a cash advance on the CIR expenses incurred in previous years but also on those of the current year. It is released following an audit and can concern all companies without restriction of size and sector or financial conditions. Pre-financing takes the form of a loan that is automatically closed upon payment of the tax credit. Through this, the company can obtain a considerable cash advance to undertake research work.

# **Annex B. Policy implementation**

# Table B.1. R&D tax relief administration models and pre-approval mechanisms in the OECD area and beyond, 2022

#### Administration model

#### Single

Argentina, Belgium (Payroll withholding tax credit), Canada (SR&ED tax credit), China (R&D tax allowance), Colombia (R&D tax allowance), Czech Republic (R&D tax allowance), Denmark, Finland, France (Payroll withholding tax credit), Hungary, Ireland, Italy, Japan, Lithuania, Poland (R&D tax allowance), Portugal, Slovak Republic (R&D tax allowance), Sweden, United Kingdom

#### Dual

Australia, Austria, Belgium (tax credit, investment deduction), Brazil, Chile, Germany, Spain, France, Greece, Croatia, Iceland, Korea, Latvia, Netherlands, Norway, New Zealand (Research and development tax incentive), Romania, Slovenia, Türkiye (tax allowance), South Africa, United States

#### Multiple

Colombia (R&D tax credit, R&D tax credit for SMEs), Mexico (R&D tax credit), New Zealand (Tax credit for R&D tax losses), Slovak Republic (R&D tax allowance for grant recipients)

#### No Details

China (Accelerated depreciation for R&D capital), Cyprus (Enhanced tax deduction for R&D expenses), Russian Federation, Türkiye (Compensation for social security contributions, Accelerated depreciation for R&D capital)

#### Pre-approval/registration

Australia, Austria, Belgium (tax credit, investment deduction), Canada (optional), Chile, China, Colombia, Czech Republic, Germany (optional), Spain (optional), France (optional), United Kingdom (optional), Greece, Hungary (optional), Iceland, Italy (tax credit for R&D wages), Korea, Lithuania (optional), Latvia, Mexico, Malta, Netherlands, Norway, New Zealand, Portugal, Romania (optional), Slovak Republic, Slovenia, Türkiye (tax allowance), United States (optional), South Africa

*Notes:* Administration models can be distinguished according to the number of institutions involved in the administration and monitoring of national R&D tax incentive schemes. *Source:* OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

# Annex C. Policy changes

# Table C.1. Changes in main design features of R&D tax incentives in selected OECD countries, 2022

Change	Country	Tax Incentive	Description	COVID-19 related
Availability a	nd scope of R&D	tax incentive s	chemes	
	Cyprus	Enhanced tax deduction for R&D expenses	Eligible R&D expenses incurred during 2022, 2023 and 2024, including expenses of a capital nature, for which deduction is granted in accordance with the provisions of Article 9(1)(I), an extra tax deduction of 20% is granted for R&D expenses. Therefore, 120% of the actual eligible R&D expenses can be deducted from the taxable income. The additional deduction cannot be claimed in conjunction with the deduction provided under the Cyprus IP regime (Article 9(1)(k) of the ITL). https://accesstaxaccounting.com/increased-tax-deduction-for-rd-companies-in-cyprus-2022	no
Introduction of new scheme	France	Tax credit for collaborative research - Crédit d'impôt collaboration s de recherche (CiCo)	Introduction of a tax credit for collaborative research (CiCo, Article 69) to compensate for the abolition of the doubling of the research tax credit (CIR) base for expenditure subcontracted to public bodies from 2022 onwards. The CiCo is applicable to industrial, commercial, or agricultural enterprises which conclude a collaboration contract between 1 January 2022 and 31 December 2025 with private or public law bodies carrying out fundamental research, industrial research, or experimental development. The companies concerned are similar to those covered by the CIR. The CiCo is equal to 40% of the invoiced expenses for the realisation of the research operations provided for in the collaboration contract within the limit of EUR 6 million per year for the period from 1 January 2022 to 31 December 205, after deduction of the grants received. This rate is increased to 50% for SMEs in the European sense (less than 250 employees and turnover of less than EUR 50 million or total assets of less than EUR 43 million). Expenditure included in the CIRC base cannot be considered for the calculation of another tax credit or tax reduction.	no
	Italy	Tax allowance for R&D expenses related to eligible intangible assets	Art. 6 of Law Decree n. 146 of 21 October 2021, as modified by Law 234/2021, replaced the previous income-based patent box regime with a cost-based incentive allowing for a 110% enhanced tax deduction from business taxable income (IRES and IRAP tax base) of R&D expenses related to eligible intangible assets (i.e., software protected by copyright, industrial patents, designs, and models).	no

Change	Country	Tax Incentive	Description	COVID-19 related
	Finland	TA for R&D coop.	Term of temporary scheme expanded until 2027 (from initially 2025).	no
	Iceland	R&D tax credit	On June 15, 2022, the Icelandic Parliament approved a law providing for an extension to 2023 of the temporary measure which allows for the deduction of 35 percent (SMEs) / 25 percent (large companies) of qualifying research and development (R&D) expenses. The deduction is capped at ISK 1 billion (approx. MEUR 7,41) in 2022 for repayment in 2023.	yes
Extension of temporary scheme	Italy	Volume- based R&D TC	The 2022 Budget Law (Law 234/2021) extended the tax credit until tax year 2031 for R&D activities, until tax year 2025 for technological innovation and design and aesthetical conception and until tax year 2023 for green and 4.0 technological innovation.	no
	Japan Innovation activity- based R&D TC	Extension of the tax credit program by two years.	no	
	South Africa	R&D TA	Research and development tax incentive extended to 31 December 2023 in its current form to allow for finalization of the incentive review. http://www.treasury.gov.za/documents/national%20budget/2022/review/Chapter%204.pdf The R&D tax incentive is currently under review. On 15 April 2023, a discussion document titled Reviewing the Design, Implementation and Impact of South Africa's Research and Development Tax Incentive was published. The R&D tax incentive review (which included a survey) sought to determine whether to extend the R&D tax incentive.	no
Expiry of temporary scheme	Spain	R&D&I tax credit	Article 7 of Royal Decree Law 23/2020, of June 23 (modified by Royal Decree Law 34/2020, of November 17) increases the percentage of deduction of expenses in technological innovation from 12% to 50% (for SMEs) and 15% (for large firms), for expenses in technological innovation activities aiming at new or relevant improvements in production processes in the value chain of the automotive industry in Spain. This is a temporary measure for fiscal exercises 2020 and 2021. Expiration of the temporary increase of the rates thus reduction of the tax credit rate back to 12% from 50%.	yes
Expansion of scope	United Kingdom	Corporate R&D TC	At Spring Statement 2022, the government announced that R&D tax reliefs would be reformed to include some cloud and data costs and refocus support on R&D carried out in the UK. However it also recognises that that there are some cases where it is necessary for the R&D to take place overseas. The government will, therefore, legislate so that expenditure on overseas R&D activities can still qualify where there are: • material factors such as geography, environment, population or other conditions that are not present in the UK and are required for the research – for example, deep ocean research • regulatory or other legal requirements that activities must take place outside of the UK – for example, clinical trialsTo support the growing volume of R&D underpinned by mathematical advances, the definition of R&D for tax reliefs will be expanded by clarifying that pure mathematics is a qualifying cost. Where required, legislation will be published in draft before being included in a future Finance Bill to come into effect in 2023.	no

Change	Country	Tax Incentive	Description	COVID-19 related
	United Kingdom	Corporate R&D TC & R&D TC (RDEC)	At Autumn Budget 2021, the government announced that R&D tax reliefs would be reformed to support modern research methods by expanding qualifying expenditure to capture more effectively the benefits of R&D funded by the reliefs, through refocusing support towards innovation in the UK. The government intends that: • where companies subcontract R&D activity to a third party, they will in future only be able to claim relief for that expenditure where that third party performs the work within the UK. The rules for subcontracting will not otherwise change. This will apply to the SME scheme, and a similar principle will apply in RDEC, where subcontracting occurs and where a company claims for contributions it makes for independent R&D of a qualifying body• under both schemes, where companies incur expenditure on payments for externally provided workers (EPWs), they will only be able to claim relief on such expenditure where those workers are paid through a UK payroll	no
	Austria	Research premium	A fictitious entrepreneur's salary is now also base for the premium.	no
	United Kingdom	Corporate R&D TC & R&D TC (RDEC)	At Autumn Budget 2021, the government announced that R&D tax reliefs would be reformed to support modern research methods by expanding qualifying expenditure to include data and cloud costs. The changes set out above are planned to come into effect from April 2023 and HMRC will now be working to deliver them. Any necessary legislation will be published in draft in summer 2022 for comment from stakeholders and will then be included in Finance Bill 2022- 23.https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1037348/RD_Ta x_Reliefs.pdf	no
	Korea	R&D TC	<ul> <li>Tax Credit for R&amp;D Expenses (STTCL §10)</li> <li>(1) Basic Technology : 0~2% (8%~15% for middle-standing enterprises, 25% for SME)</li> <li>(2) New growth Technology R&amp;D : 20% (30% for SME) + maximum of 10% {(expenses/sales for new growth technology R&amp;D) x3}</li> <li>(3) National strategy Technology R&amp;D : 30% (40% for SME) + maximum of 10% {(expenses/sales for national strategy technology R&amp;D) x3}</li> <li>-&gt; Korean Government implemented 'National strategy Technology R&amp;D' from July.2021.</li> </ul>	no
	Korea	R&D investment credit	Expansion of the R&D investment tax reduction given to new growth engines and core technologies: i. Apply a R&D investment tax credit of up to 40 percent to technologies such as carbon emissions reduction technologies and phase 3 clinical trials for biosimilars, ii. Work on the careful selection of technologies for the support and extend it to the end of 2024, iii. Extend the tax payment deferral for the government share of investment in those technologies to the end of 2023.	no
			R&D tax credit/enhanced R&D tax allowances rates	
Increased	China	R&D TA	For technology-based small- and medium-sized enterprises (TSMEs), starting from January 1, 2022, if the R&D expenses do not form intangible assets and are included in the current profits and losses, on the basis of actual deduction, an additional 100 percent of such R&D expenses could be deducted from the taxable income amount; if the R&D expenses have formed intangible assets, they can be amortized before CIT at 200 percent of the actual cost of intangible assets.	

Change	Country	Tax Incentive	Description	COVID-19 related
	Finland	TA for R&D coop.	Rate increased from 50 % additional deduction to 150 % additional deduction.	no
	Poland	R&D TA	Taxpayers who carry out R&D activities, as defined by the Polish law, will be entitled to deduct 200% of the costs of employees involved in R&D projects from the tax base (currently the additional deduction was 100%, and will be raised to 200% from 2022 onward). Taxpayers with R&D Centre status will also have the possibility to deduct 200% of other eligible costs. (Increase from 150 to 200%).	no
	France	R&D TC (CIR)	With the Finance Law for 2021, France harmonised the tax treatment of outsourced expenditures - R&D operations conducted by state service providers and accredited private providers. According to previous rules, the expenses incurred on R&D works subcontracted to state-funded service providers could be double counted when calculating the R&D tax credit. Moreover, the ceiling on subcontracted R&D expenditures could be raised from EUR 10 million to EUR 12 million in the case of R&D conducted by state-funded with effect from 1 January 2022.	no
	Hungary	SSC exemption	The SSC exemption of 100% applies to a reduced SSC rate of 13% with effect of January 2022 (previously 15.5%).	no
	Hungary	SSC credit	The SSC credit of 50% applies to a reduced SSC rate of 13% with effect of January 2022 (previously 15.5%).	no
	Hungary	R&D TC (KIVA)	The KIVA credit of 50% applies to a reduced KIVA rate of 10% with effect of January 2022 (previously 11%).	no
	Hungary	R&D TC (KIVA)	The KIVA exemption of 100% applies to a reduced KIVA rate of 10% with effect of January 2022 (previously 11%).	no
Reduced	Italy	Volume- based R&D TC	The 2022 Budget Law (Law 234/2021) revised the applicable tax credit rates, only for the extension period. The R&D tax credit rate is reduced to: 10% (from 20%) for R&D activity for tax years 2023-2031; 5% (from 10%) for technological innovation for tax years 2024-2025; 10% (from 15%) for green or 4.0 technological innovation for tax year 2023; 5% (from 10%) for design and aesthetical conception for tax years 2024-2025.	no
	Netherlands	WBSO	Rates reduced in 2022, as a consequence of the expiration of the temporary COVID measures in the WBSO, which were in effect during the whole year 2021. In 2022, the benefit amounts to 32% (40% in 2021) of the first EUR 350,000 of R&D costs and 16% of the excess (both salary and other costs and expenses). For start-ups, this amounts to 40% of the first EUR 350,000 of R&D costs (50% in 2021). In 2023 these rates and the bracket amount of EUR 350,000 will not change. Note that the maximum benefit cannot exceed the total amount of wage tax due.Instead of applying for the real costs and expenses (non-salary costs), the taxpayer may choose to consider a fixed amount based on R&D hours. The fixed amount is EUR 10 per hour for the first 1,800 R&D hours and EUR 4 per hour for all R&D hours exceeding the first 1,800 R&D hours. These amounts per hour and number of R&D hours have not changed since the integration of the WBSO and RDA in 2016.	no
	Slovak Republic	R&D tax allowance	Volume based rate was reduced from 200% to 100%	no

Change	Country	Tax Description		COVID-19 related
Threshold/ceiling on amount of eligible R&D expenditure or value of R&D tax relief				
Ceiling increased	Italy	Volume- based R&D TC	The 2022 Budget Law (Law 234/2021) changed the ceiling of the maximum amount of tax credit used, only for the extension period. Ceilings were raised for: R&D activity from € 4 million to € 5 million, for tax years 2023-2031; Green and 4.0 technological innovation from € 2 million to € 4 million, for tax year 2023.	no
	United States	Federal R&E TC	The Inflation Reduction of 2022 (P.L. 117-169) doubled the limit of the payroll tax offset for certain start-ups from USD 250,000 to USD 500,000 for taxable years beginning after December 31, 2022.	no
Ceiling reduced	Iceland	R&D TC	On June 15, 2022, the Icelandic Parliament approved a law providing for an extension to 2023 of the temporary measure which allows for the deduction of 35 percent (SMEs) / 25 percent (large companies) of qualifying research and development (R&D) expenses. The deduction was capped at ISK 1.1 billion (approx. MEUR 8,15) in 2021 and is ISK 1 billion (approx. MEUR 7,41) in 2022.	yes
Administration of R&D tax incentive schemes				
	Austria	Research premium	If the character of a project as R&D is disputed, a partial payment of the premium for the undisputed part is now possible.	no
	Ireland	R&D TC	Administrative changes concerning the timelines regarding instalments of the R&D tax credit.	no
Change in process of claiming tax relief	United Kingdom	R&D TA & R&D TC (RDEC)	HMRC has already allocated additional resources to R&D tax relief compliance and is undertaking work to better understand the nature and scale of the error and fraud associated with the reliefs. As part of the next stage of this strategy, HMRC will further increase the resource for R&D tax credit compliance, with the creation of a new cross-cutting team focussed on abuse. The government further intends to make the following changes: all claims to the R&D reliefs – either for a deduction or a tax credit – will in future have to be made digitally (except from those companies exempt from the requirement to deliver a Company Tax Return online) these digital claims will in future require more detail – for example, on what expenditure the claim covers, the nature of the advance sought, the field of science or technology, the uncertainties overcome • each claim will need to be endorsed by a named senior officer of the company • companies will need to inform HMRC, in advance, that they plan to make a claim • claims will need to include details of any agent who has advised the company on compiling the claim	no
Related policy developments				
Baseline tax deductions	United States	Federal R&E TC	As a result of 2017 US tax reform, for tax years beginning after 31 December 2021, amounts defined as specified research or experimental expenditures will be required to be capitalized and amortized rateably over a five-year period. Further, expenditures attributed to research that is conducted outside the United States will be required to be capitalized and amortized rateably over a 15-year period. Furthermore, such specified research or experimental expenditures will be required to be capitalized and amortized rateably over a 15-year period. Furthermore, such specified research or experimental expenditures will include internally developed software. Legislation delaying the implementation of amortization has not been enacted yet.	no

Change	Country	Tax Incentive	Description	COVID-19 related
Other	Brazil	R&D TA	Improvements of the information form on research, development and innovation activities of companies benefiting from the Lei do Bem, the FORMP&D Base Year 2021. FORMP&D to minimize risks of completion, in a simplification effort that contributes to legal certainty, good safety practices and compliance by companies. FORMP&D is open every year for legal entities benefiting from the tax incentives set out in Chapter III of the Good Act. In the form, the companies detail information about the activities of technological research and development of technological innovation.	no
changes	Japan	Innovation activity- based R&D TC	Ease the eligibility requirement for start-ups: start-ups are firms established within the past 15 years or less (previously 10 years) with carry forward losses and not subsidiary of a large corporation and an R&D expense to sales ratio of 10% or more	no

*Notes:* This summary table presents country-scheme level information based on country responses to the 2022 OECD data collection on tax support for R&D expenditure. The table is limited to expenditure-based R&D tax incentives for the business sector and does not cover income-based R&D tax incentives. *Source:* OECD R&D Tax Incentive Database, <u>http://oe.cd/rdtax</u>, April 2023.

# **Annex D. B-index methodology**

#### **General formula**

The B-index specifies the pre-tax income needed for a "representative" company to break even on a marginal, monetary unit of R&D outlay (OECD, 2013; Warda, 2001), taking into account provisions in the tax system that allow for an enhanced treatment of R&D expenditures. A "representative firm" is typically defined for convenience as one with sufficiently large profits to be able to fully make use of earned tax credits in the reporting period. It is customary to present this indicator in the form of an implied subsidy rate, namely one minus the *B index*. More generous provisions imply a lower "breakeven" point and therefore a higher subsidy. The *B index* is defined, in the case of a "representative" firm with sufficiently large profits and only current R&D expenditures<sup>43</sup>, as:

# $B index \equiv \frac{1-A}{1-\tau}.$

In this expression,  $\tau$  is the corporate tax rate and A is the combined net present value of allowances and credits applying to the marginal R&D outlay. For example, in the case of a  $\theta$  allowance rate on R&D (deduction from taxable profits), it is defined as: A =  $\tau \cdot \theta$ . When  $\theta$  = 1, current expenditures are fully (100%) deductible but no enhanced incentive is provided, the benchmark scenario in most countries, B index =1 and the subsidy rate is zero.

Incremental R&D tax incentives have been modelled considering the impact that current decisions have on future baseline R&D levels. This is formally equivalent to implementing adjustments to the credit or allowance rates, a correction that also needs to be made when modelling the provisions in countries that treat credits as taxable income. The net present value of an incremental tax credit provided at rate c on qualifying R&D expenditure in excess of the base amount (average R&D expenditure in the previous n years), can be derived as follows:

NPV Incremental Tax credit = 
$$c \cdot \left(1 - \frac{1}{n \cdot r} (1 - (1 + r)^{-n})\right)$$
.

The formula for incremental tax allowances can be derived analogously. For companies with planned declining R&D profiles over time, the modelled B index may overstate the level of incentive as these firms are unlikely to qualify for the incremental component of the incentive, as the formula assumes that the marginal outlay qualifies for the incentive.

#### Insufficient tax liability scenarios

To provide a more accurate representation of different, relevant, scenarios, B-indices have been calculated for "representative" firms according to whether they can claim tax benefits against their tax liability in the reporting period. When credits or allowances are fully refundable, the B-index of a firm in such a position is identical to the profit scenario. Carry-forwards are modelled as discounted options to claim incentives in the future. The adverse economic climate experienced by some countries in the aftermath of the global economic and financial crisis has dented the profitability of many companies, particularly in the early phase of the global economic crisis where operating surplus has been negative

<sup>&</sup>lt;sup>43</sup> This assumption is only made for illustrative purposes. This general framework has been adapted to account for R&D capital expenditures or specific types of eligible current expenditures. Across the OECD, current expenditures account on average for 90% of R&D expenditures and hence capital provisions account for a very minor component of the final estimate.

in many countries' corporate sector. This calls into question the relevance of the headline B index or related measures as a representative indicator for all R&D-performing companies, especially R&D start-ups. In recognition of the fact that there are significant differences in the provisions made by countries for scenarios in which companies cannot immediately realise the entire value of tax incentives on R&D, the B-index formula has been generalised as follows:

$$B index \equiv \frac{1-\tau \cdot (x+(1-x) \cdot \psi) \cdot \theta}{1-\tau \cdot (x+(1-x) \cdot \psi)},$$

In this formula, x denotes whether the firm has a sufficiently large profit to claim the incentives (x = 1 if so, x = 0 otherwise).  $\psi$  is the net present value adjustment factor for the allowance (or equivalent incentive) in the scenario with an insufficiently large profit base ("loss making" for brevity).  $\psi = 1$  if the incentive is fully and immediately refundable in the "loss" case and  $0 < \psi < 1$  if the incentive can be carried forward.<sup>44</sup> The value of  $\psi$  has been modelled, using some additional, simplifying assumptions, to reflect the terms of carry-forward provisions as well as instances when refunds are postponed for a given number of years if not previously used.

A firm with low or negative profits faces an implicit lower tax rate  $\hat{\tau} = \tau \cdot \psi$  through which to realise the incentives theoretically available. For this reason, when  $\theta > 1$ , i.e. when the tax system subsidises R&D, B index(loss) > B index(profit) and the subsidy rate is lower for loss than for profit making firms. In the opposite case, when  $\theta < 1$  (e.g. where no incentives are provided and R&D capital costs cannot be immediately amortised), a net tax is in place and the breakeven point is thus higher in the profit-making case B index(loss) < B index(profit). In the case where authorities apply different carry forward provisions to general losses and special allowances and credits, the following formulation has been derived:

$$B index \equiv \frac{1 - \tau \cdot \left[ x \cdot \theta + (1 - x) \cdot \psi_{\infty} \cdot \left( 1 + \frac{(\theta - 1) \cdot \psi_T}{\psi_{\infty}} \right) \right]}{1 - \tau \cdot (x + (1 - x) \cdot \psi_{\infty})}$$

where  $\psi_{\infty}$  is the expected net present value of a unit of loss which can be carried forward indefinitely, and  $\psi_T$  is the net present value that reflects a time limit T for carrying forward special credits and allowances.

## **Data requirements**

For the derivation of B-index estimates, general tax system information and qualitative data on the design of R&D incentives are required. Information on the general tax system relates to corporate income tax rates for large firms and SMES, whenever targeted rates apply, as well as baseline/standard tax treatment provisions for current and capital expenditure. In addition to this information, a number of design parameters feed into the B-index calculation such as:

#### • Type of Tax instrument

- o Tax credit vs. allowance/exemption
  - Tax base
  - Volume-based, incremental, hybrid
- o Temporary nature of support
- o Taxability

<sup>&</sup>lt;sup>44</sup> The NPV of an allowance carried forward depends is  $\psi(T, \lambda, i) \coloneqq [1 - (\frac{\lambda}{1+i})^T](\frac{\lambda}{1+i})/(1 - (\frac{\lambda}{1+i}))$  in the case of a constant probability  $\lambda$  of returning to profit (arbitrarily set to 50%), and interest rate i (10% in line with the literature). It can be noted that  $\psi(T, \lambda, i) < \psi(\infty, \lambda, i)$ . This formula has been further adapted to the case of specific countries which allow a full refund of outstanding credits at the end of the period.

# • Expense base

- Current (expensing, incompatibility with enhanced tax relief provisions)
- Machinery and equipment (acquisition costs vs. depreciation expenditure)
- Buildings and land (acquisition costs vs. depreciation expenditure)
- Headline tax credit/allowance rates
  - By type of R&D expenditure
  - By type of beneficiary
- Provisions for firms with insufficient tax liability
  - Carry-over provisions (availability, number of years)
  - Refund provisions (availability, timing of payment)

Weights are applied to account for differences in the treatment of the various components of R&D expenditures and to model the net present value of incremental incentives and carry-forwards as discounted options to claim tax relief in the future.

Specific challenges arise in measuring the generosity of R&D tax relief measures over time. Such provisions may vary across several design features which need to be tracked over time, amplifying the dimensionality of the measurement task at hand. Furthermore, applying a consistent methodology in estimating time-series B-indices for a country is a prerogative for the interpretability of estimates within countries over time. This prevents the emergence of measurement related breaks-in-series that are unrelated to the generosity of the tax system. Like in the cross-section, caution must also be taken in defining the relevant firm populations (e.g. SMEs and large firms) and in assigning the correct design parameters to them. Sub-group-specific design parameters (e.g. for start-ups, young firms, new claimants) prevail in a number of countries.

*Note*: For general and country-specific notes on the calculation of B-index estimates, see <u>http://www.oecd.org/sti/rd-tax-stats-bindex-notes.pdf</u>. *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

# Annex E. Measuring tax expenditures for R&D

# **Background and scope**

The experiences accumulated over the past series of OECD R&D tax incentive data collections have fed into the guidance contained in the 2015 OECD Frascati Manual (OECD, 2015b), which for the first time provides guidelines on the measurement of government tax relief for R&D (GTARD) (OECD, 2015c). The estimation of the value of tax relief provided for R&D falls under the responsibility of national governments which report to the OECD following the provided guidelines as closely as possible. These guidelines seek to find a common, meaningful perspective that is consistent with different national R&D tax relief and data source systems.

## Focus on R&D

Definitions of R&D or other types of expenditures eligible for tax relief differ across jurisdictions and with respect to the OECD Frascati Manual, although in a number of instances the manual's definitions are part of tax legislation. Definitions of R&D for tax purposes are under continuous evolution and reinterpretation by national tax authorities. For more information on R&D definitions used by countries, see the OECD INNOTAX portal (https://stip-oecd.org/innotax/).

## Focus on business beneficiaries

This report is primarily concerned with tax relief provided by the government for R&D expenditures incurred by tax-paying units in the business sector. The business enterprise sector is usually the main intended direct recipient of tax relief for R&D. However, provisions may allow relief for R&D expenditures subcontracted to third parties, in other domestic sectors such as higher education or located abroad. These are within the scope of this report. Outside the scope of the report are incentives provided outside the business sector, including firms other than incorporated companies. This may include in some cases self-employed individuals<sup>45</sup> subject to personal income taxation. By contrast, self-employed individuals subject to corporate income taxation would fall within the scope of this report.

# Focus on central government

For practical reasons, this report focuses on estimates of tax relief at central (or federal) government level. Known instances where tax incentives are provided at the subnational level are Canada's provinces and states within the United States. Where additional information is available at subnational level (Canada, Hungary, Japan) – typically cost estimates are available for some but fewer years than those at central government level – this dimension is presented separately in this report.

# Focus on relief for R&D inputs

Estimates reported in this report exclude income-based tax incentives<sup>46</sup> – preferential treatment of incomes from licensing or disposal of assets attributable to R&D (e.g. patents) or other innovation activities – and incentives to taxpayers other than companies. Figures refer to expenditure-based R&D tax incentives applied at a national level through corporate income taxes, employer social security contributions and withholding taxes for R&D personnel. Personal and consumption tax incentives are

<sup>&</sup>lt;sup>45</sup> Self-employed individuals are reported to be eligible to claim R&D tax relief in Belgium (R&D investment deduction), Canada (SR&ED tax credit), Denmark (R&D tax credit for deficit-related R&D expenditure), Japan (R&D tax credits), Korea (R&D tax credits), Netherlands (WBSO and RDA), Slovak Republic (R&D tax allowance), Slovenia (R&D tax allowance), Sweden (Partial exemption of social security contributions), Türkiye and the United States (R&D tax credits). In Hungary, private entrepreneurs are eligible to claim R&D tax relief in the form of an exemption of social security contributions paid for their employees but not for their own social security contributions.

<sup>&</sup>lt;sup>46</sup> Similarly excluded, are income-based tax incentives (e.g. reduced CIT rates) for firms that meet specific R&D investment criteria (e.g. R&D intensity) where tax exemptions apply to the entirety of income and not income derived from R&D or other innovation related activity.

not included. While typically non-discretionary, some countries require pre-approval of R&D projects or accreditation of R&D performers by government agencies or third parties.

# Estimation of tax relief for R&D

The estimation of the value of tax relief provided for R&D falls under the responsibility of national governments which report to the OECD following the provided guidelines as closely as possible. These guidelines seek to find a common, meaningful perspective that is consistent with different national R&D tax relief and data source systems.

# Choice of benchmark

The OECD information request focuses on the cost to governments (benefit to firms) of provisions that imply a more favourable treatment of R&D activities relative to otherwise comparable activities that do not qualify as R&D. This approach is proposed in order to ensure comparability with countries that do not report dedicated R&D tax relief but allow for the deductibility of current R&D expenses. In the absence of enhanced incentives, companies generally have the ability to report the current expenditure components of R&D as the deductible costs of sales, without necessarily identifying the R&D nature of the activity. An exception may arise when companies capitalise their current R&D expenditures.<sup>47</sup>

# Estimation

Most countries adopt an initial revenue loss approach, which yields the amount by which tax revenue is reduced as a consequence of the introduction (or extension) of R&D tax relief measures, based on the assumption of unchanged behaviour and unchanged revenues from other taxes.

# Net or gross basis reporting

The OECD R&D tax incentive survey collects information on the taxability of R&D tax benefits. In some countries, R&D tax incentives are taxable, i.e. tax benefits represent taxable income in the current or following income year, in others they are effectively taxable because in order to claim the headline tax credit rates the taxpayer has to renounce to the deductibility of the R&D expenses that are claimed. The new metadata collected in 2020 (**Table E.1**) provides additional details on whether estimates are reported on a gross or net basis whenever R&D tax benefits are taxable.

# Table E.1. Gross vs net-of-tax reporting of GTARD

GTARD – Gross of tax	GTARD – Net of tax
<ul> <li>Belgium (Payroll withholding tax exemption)</li> <li>Canada (SR&amp;ED tax credit)</li> <li>Hungary (SSC exemption)</li> <li>Netherlands (payroll withholding tax credit)</li> <li>Spain (SSC exemption)</li> <li>Sweden (SSC exemption)</li> <li>Türkiye (SSC exemption)</li> <li>United States (R&amp;E tax credit)</li> </ul>	<ul> <li>Australia (R&amp;D Tax Incentive)</li> <li>Chile (R&amp;D tax credit)</li> <li>Thailand (R&amp;D tax allowance)</li> <li>United Kingdom (RDEC scheme for large firms)</li> </ul>

*Note:* Responses to 2022 OECD R&D tax incentives data collection. \*SSC exemption: exemption of social security contributions. Source: OECD.

Source: OECD.

As **Table E.1** shows, most countries report gross of tax estimates of GTARD for taxable R&D tax relief provisions. However, several countries either additionally provided (e.g. CAN) or indicated (e.g. BEL,

<sup>&</sup>lt;sup>47</sup> Accounting rules significantly restrict the instances in which R&D expenditures can be capitalised (IAS38) and implicitly confer significant discretion to firms as to whether to capitalise. To a first order of approximation and pending future analysis, this effect is considered to have a negligible impact on the relevant baseline.

NLD, USA<sup>48</sup>) that they would also be able to report net of tax estimates of GTARD. Such estimates reflect the net of tax value of government tax relief to firms and account for the interaction of taxable schemes and other incentives, the former reducing the amount of qualifying expenditure (e.g. reduction of wage costs in the case of payroll or wage tax related incentives) based on which other R&D tax incentives are determined. Additional measurement efforts and metadata collection are required to further enhance the cross-country comparability and interpretability of GTARD vis-à-vis direct funding estimates. This should also come hand in hand with more detailed information on the gross vs. net-of-tax reporting of direct funding by firms in R&D surveys. Country responses to a question on the tax treatment of direct funding, included for the second time in the 2020 survey (**Table E.2**), suggest that direct funding of R&D represents taxable income in a number of OECD countries. 27 out of 42 countries that completed this question (6 countries provided no details) stated that direct funding (e.g. R&D grant funding) is treated as taxable income, often noting however that certain exceptions do apply.

# Table E.2. Taxability of direct government R&D funding

#### Taxable

Argentina, Australia, Bulgaria, Canada, Croatia, Cyprus, Denmark, , France (except repayable advances), Germany, Hungary (increases total revenue subject to CIT/KIVA, is not subject to local business taxes or SSC), Israel, Italy, Japan (however, if the firm acquires fixed assets with the subsidies suitable for its intended use, it may postpone taxation by entering a reduction), Korea, Latvia (however, if the taxpayer carried out R&D, they were able to decrease their taxable income by applying an augmented coefficient of 3 to their expenses), Lithuania (direct funding of R&D does not represent taxable income, however it is effectively taxable as it reduces the amount of expenditure deductible from taxable income), Mexico, Netherlands, New Zealand (associated expenditure is not deductible from income), Norway, Romania, Slovenia, Slovak Republic (financial grants are tax exempt only if they are awarded by an applicable international agreement), South Africa (however, there are 5 specific grants provided by the Department of Science and Technology that are exempt from tax), Spain, Sweden, Switzerland, Thailand, United Kingdom, United States (generally considered taxable, though there could be exceptions)

#### Non-taxable

Austria, Belgium (capital and interest subsidies granted by regional institutions), Brazil, Chile, Colombia, Czech Republic, Estonia, Greece, Iceland, Ireland, Israel (unless the grant was received by a person for the production of his income), Malta, Poland (subsidies from the State budget and the EU budget), Portugal, Russian Federation, South Africa, Türkiye

No details available

China, Costa Rica, Finland, Luxembourg

*Note:* Responses to 2022 OECD R&D tax incentives data collection. Source: OECD.

#### Recording

It is more difficult to ensure a common approach with respect to the recording of the provision of tax relief. In principle, this should occur when the R&D generating the basis for claiming tax relief has taken place; in practice, this may be possible only when the claim is recognised by the government regardless of the time when it is paid in cash by the government or used to decrease the tax liability of the firm. In many cases, tax authorities are only able to provide information based on payments, i.e. on a cash-based approach which more closely follows the actual flow of money between authorities and tax-paying units. Two practical challenges arise:

<sup>&</sup>lt;sup>48</sup> The totals in the SOI data include a mix of gross and net of tax credit amounts. This is a unique situation for USA tax credits. The net amount of the credit is generally 5 percent less than the SOI total.
- Accounting for the timing of the actual settlement of tax liabilities, which in some cases may only take place up to a year after the reference period when the R&D generating the basis for claiming tax relief took place. Most countries report adapting the reference cycle of tax expenditure statistics to refer to the tax year to which the settlement applies.
- Accounting for the possibility of carry-forwards or carry-backwards, when the firm has insufficient profits to fully use earned tax credits or allowances. There are significant differences across countries in terms of how this surplus is effectively dealt with. In some jurisdictions, under certain circumstances, eligible enterprises will be able to claim a direct payment from the authorities. Such provisions are known as payable or refundable tax incentives.<sup>49</sup>

Because of the variety of support mechanisms and administrative accounting practices, the questionnaire submitted to national official contacts provides the basis for reporting either total relief earned by taxpayers within the current year (accruals basis) and/or total relief provided in the current year (cash basis).

A-Relief earned and claimed in the current year - including refunds.

- B-Relief earned in previous year(s), claimed in the current year
- C-Relief earned in the current year, carried back
- D-Relief earned in the current year, carried forward

Therefore, a measure of tax relief on an accruals basis would be based on A+C+D while for tax support on a cash basis, this would be based on the sum A+B+C. Ideally, authorities should strive to maintain comprehensive record systems that allow for the production of estimates on both an accruals and cash expenditure basis. The amount of tax relief carried forward (item D) may not, or only partially, be claimed in the future due to insufficient tax liabilities, for example, and be reported by countries. Relief carried forward may be accumulated over time but there is uncertainty regarding when it will be used. The value of this component of relief may be expressed in nominal terms (thus overstating the true value to the firm) or as an estimate of its net present value based on past patterns.

#### Breakdowns

Firm size is one of the main business attributes that shape the provision of tax relief. Several international and national rules favour small and medium sized enterprises (SMEs) relative to large firms. The former may be entitled to more generous conditions for direct funding or tax support in order to compensate for other potential barriers to innovation and bureaucratic challenges in claiming support. It is important to take into account the scope for different definitions of SMEs for the purposes of general R&D statistics and tax purposes and the coverage. Economic activity is another dimension for which the distribution of R&D tax incentive support can be of particular interest. There is a widespread concern that overall government support for industry may mainly be flowing to sectors that carry out manufacturing-based R&D.

<sup>&</sup>lt;sup>49</sup> Payroll withholding tax remissions and relief on employer taxes and social contributions are typically akin to refundable incentives because the relevant liability is rarely lower than the notional value of the relief.

#### **Compilation of time-series estimates**

Some measurement challenges arise specifically in the compilation of time-series estimates of R&D tax expenditure:

- **Time-lag**: information on the cost of tax and direct support for R&D becomes available at different frequencies and the former typically with a time-lag of two to three years. Reliable data on R&D tax incentives are based on tax returns for completed tax years. Budgetary data can be timelier but it is also subject to a greater degree or error. To provide information on R&D tax support over time, tax return and budget-based estimates may be combined.
- **Data revisions**: to the extent that countries allow firms to carry-forward unused tax benefits or claim those retrospectively, an update of cost estimates may be required over a certain period of time. Such an update can affect multiple data points in the time-series.
- **Missing and incomplete estimates**: information on the cost of R&D tax incentive for a specific year may be missing or only partial, not covering all R&D tax relief instruments offered by a country in a given year. Missing or incomplete estimates are generally flagged and not imputed by means of interpolation or other estimation methods.
- **Breaks-in series:** attention needs to be paid to the time-consistency of reported estimates of the cost of R&D tax relief. Breaks-in-series may arise as a result of changes in the estimation or projection method of R&D tax expenditure, and are generally flagged.

*Note*: For general and country specific notes, see <u>http://www.oecd.org/sti/rd-tax-stats-gtard-notes.pdf</u> *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

# Annex F. SME definition and other classifications

### Table F.1. SME definitions

Country	Definition
Austria	Figures refer to small enterprises with 1-249 employees (direct and tax support). R&D tax relief estimates, on a cash
Australia	basis, refer to the refundable research premium. Figures refer to SMEs with less than AUD 20 million annual aggregated turnover. Estimates, on an accruals basis, refer to R&D Tax Incentive, as published in the Tax Benchmark and Variations Statement. The R&D Tax Incentive replaced the previous R&D Tax Concession from July 2011 onwards.
Belgium	Figures refer to small enterprises with 1-49 employees (direct support). A new definition of SMEs applies as of 01.01.2016 with different regimes for microsocieties, small enterprises, medium enterprises and big enterprises (transposition of European Directive). Enterprises are considered SMEs if they do not exceed more than one of the following in the last two years: i) average annual number of employees below 50, ii) revenue under EUR 9 million, iii) balance sheet under EUR 4.5 million. Enterprises with average annual employees above 100 are not eligible. https://www.nbb.be/fr/centrale-des-bilans/etablir/criteres-de-taille/criteres-de-taille-pour-les-societes Estimates, on an accrual basis, refer to the refundable tax credit for R&D and the payroll withholding tax credit for young innovative companies, private companies and partnership agreements with universities. They exclude the investment deduction for environmental projects, as the R&D component cannot be identified.
Brazil	No details.
Canada	Figures refer to SMEs with 1-249 employees (direct support) and to CCPCs, Canadian Controlled Private Corporations (R&D tax support). For a definition of CCPCs, see <a href="http://www.cra-arc.gc.ca/tx/bsnss/tpcs/crprtns/typs-eng.html">http://www.cra-arc.gc.ca/tx/bsnss/tpcs/crprtns/typs-eng.html</a> R&D tax relief estimates, on a cash basis, refer to the scientific research and experimental development tax credit for current R&D expenditures. They do not reflect the cost of provincial governments' R&D tax incentives provided by many Canadian provinces. Estimates for the cost of accelerated depreciation provisions are not available.
Chile	Figures refer to SMEs with 1-249 employees (direct support) and to firms that sell 100.000 "Unidades de Fomento (UF)" per year (R&D tax support) as per Chilean regulation. R&D tax relief estimates, refer to the tax credit for intramural and extramural R&D (Law 20.570), which replaced the R&D tax credit for extramural R&D (Law 20.241) in September 2012.
China	No details available.
Croatia	SME are defined as undertakings fulfilling the criteria laid down in Annex I to the General Block Exemption Regulation
Colombia	Figures refer to SMEs meaning micro, small, and medium companies that have 1 to 200 employees. Estimates refer to the R&D tax allowance and R&D tax credit, the latter replacing the former in 2017. No further details are available.
Cyprus	No details.
Czech Republic	Figures refer to SMEs with 1-249 employees (direct and tax support). R&D tax relief estimates, on a cash basis, refer to the R&D tax allowance scheme introduced in 2005.
Denmark	Figures refer to SMEs with 1-249 employees (direct and tax support). Estimates, on a cash-basis, refer to the cost of the accelerated depreciation of R&D capital. From 2012 onward, estimates, on an accrual basis, further reflect the value of the R&D tax credit for deficit related R&D expenditures. From 2018 onwards, the figures also include the cash-based value of the enhanced tax allowance on R&D capital.
Estonia	Figures refer to SMEs with 1-249 employees. No R&D tax incentives in 2020 (closest).
Finland	Figures refer to SMEs with 1-49 employees.
France	Figures refer to SMEs with 1-249 employees (direct and tax support). R&D tax relief estimates, on an accrual basis, refer to the Crédit d'Impôt Recherche (CIR) and special provisions for social security contributions by young and innovative firms (JEIs) and young university enterprises (JEU), but exclude the cost of accelerated depreciation incentives for capital R&D.
Germany	Figures refer to SMEs with 1-249 employees.
Greece	Figures refer to SMEs with 1-249 employees (direct and tax support). Estimates refer to the volume-based R&D tax allowance, which replaced the previous, incremental R&D tax allowance scheme in 2013. Estimates include the tax benefits earned and claimed in the current year only.
Hungary	Figures refer to SMEs with 1-249 employees (direct support). Figures refer to enterprises (R&D tax support) that comply with the EU SME definition (The enterprise employs less than 250 employees and (i) its annual turnover does not exceed EUR 50 million or (ii) its annual balance sheet does not exceed EUR 43 million). Estimates, on an accrual basis, refer to the R&D tax allowance, the innovation contribution related R&D tax allowance (available since 2010; estimates include the tax benefits earned and claimed in the current year only) and the payroll withholding tax remission, but exclude the local business tax allowance. The estimates for 2004-2011 (2005-2014) also include the value of the innovation contribution related R&D tax credit (R&D tax credit on wages of researchers), and those for

	2010-2017, the value of the innovation contribution related R&D tax allowance. From 2014 onwards, the figures also include the value of the development tax incentive. The breakdown of R&D tax support by firm size refers to the R&D tax allowance and development tax incentive.
Iceland	Figures refer to SMEs with 1-249 employees (direct support) and to SMEs (R&D tax support) according to criteria
	identified by the EU definition: the enterprise employs less than 250 employees and (i) its annual turnover does not
	exceed EUR 50 million or (ii) its annual balance sheet does not exceed EUR 43 million. Estimates, on a cash basis,
	refer to the R&D tax credit providing a deduction of eligible R&D expenses from the income tax at an enhanced rate of 20 percent
Ireland	Figures refer to SMEs with 10-249 employees (direct support) and to SMEs (R&D tax support) with 1-249 employees.
	Estimates, on a cash basis, refer to the R&D tax credit on current, machinery and buildings expenditures, introduced
	in 2004. Estimates for the cost of accelerated depreciation provisions are not available.
Italy	Figures refer to SMEs with 1-249 employees (direct support) and to SMEs (R&D tax support) according to criteria
	identified by EU Commission in terms of employees, turnover and balance sheet total. From 2015 onwards, cash-
	based estimates refer to the following tax credits: R&D tax credit for SMEs (Law 449/1997), volume-based tax credit
	credit (Law 296/2006), incremental R&D tax credit for collaboration (L Z0/2011), and an incremental R&D tax credit of
	50% (Leage di Stabilità 2015, Article 1, par 35). The breakdown of R&D tax support by firm size refers to the
	incremental R&D tax credit of 25-50% (Legge di Stabilità 2015, Article 1, par 35).
Japan	For reporting purposes (Figures 10 and 12 in this report), figures refer to SMEs with 1-249 persons employed (direct
	support) and to firms with a stated capital no larger than JPY 100 million (R&D tax support). Estimates are on an
	accrual and final revenue loss basis. The volume-based R&D tax credit (permanent measure) is currently available in
	addition to the open innovation activity-based R&D tax credit (permanent measure) and high R&D intensity-based tax
	alternative option to the incremental P&D tay credit, which was abolished with effect of 1 April 2017
Korea	Figures refer to SMFs with 1-249 employees (direct support) and to SMFs (R&D tax support) that satisfy four
	conditions: (i) total asset amount is less than 500 trillion KRW, (ii) total sales are less than 40-150 trillion KRW
	(threshold varies by business sector). (iii) firms are not related to other large firms, (iv) firms do not run a lodging
	business or bar management. Estimates refer to the tax credit for research and human resources development and
Lithursula	the R&D investment credit.
Litnuania	Figures refer to SMEs with 1-249 employees (direct support) and to SMEs (R&D tax support) with 1-249 employees,
	Estimates on an accruals basis, refer to the R&D tax allowance on current R&D expenditures, available since 2008
	Estimates for the cost of accelerated depreciation provisions are not available.
Mexico	Figures refer to SMEs with 1-249 employees (R&D tax support). R&D tax relief estimates refer to the incremental
	R&D tax credit introduced in Mexico in 2017. Estimates for the cost of accelerated depreciation provisions (2002-
	2013, 2016-18 for taxpayers with an annual income of less than 100 million pesos) are not available.
Netherlands	Figures refer to SMEs with 0-249 employees (direct support) and to SMEs (R&D tax support) which comply with the
	50 million or (ii) its annual balance sheet does not exceed ELIR 43 million). Budget-based estimates refer to the
	WBSO payroll tax credit for R&D labour and to the R&D tax allowance (RDA) for non-labour related R&D
	expenditures, which was introduced in January 2012 and merged with the WBSO scheme in 2016.
New Zealand	Figures refer to SMEs with 1-249 employees (direct support) and to SMEs with 0-199 employees (R&D tax support).
	R&D tax relief estimates refer to the tax credit for research and development tax losses, effective as of April 2015.
Norway	Figures reter to SMEs with 10-49 employees (direct support) and to SMEs with 1-49 employees (R&D tax support).
Portugal	Figures refer to SMEs with 1-249 employees (direct support). The SME definition for R&D tay incentives complias with
i onugai	the EU SME definition: the enterprise employees (direct support). The onic definition for road tax incentives complete with
	EUR 50 million or (ii) its annual balance sheet does not exceed EUR 43 million. Estimates, on an accrual basis, are
	for the SIFIDE-II tax credit which includes current and R&D-related capital expenditures
Slovak Republic	Figures refer to SMEs with 1-249 employees (direct support). Figures (R&D tax support) refer to SMES in compliance
	with the EU SME definition (The enterprise employs less than 250 employees and (i) its annual turnover does not
	exceed EUR 50 million or (ii) its annual balance sheet does not exceed EUR 43 million). R&D tax relief estimates, on
Slovenia	Figures refer to SMEs with 1-249 employees (direct and tax support) R&D tax relief estimates on a cash basis, refer
elevenia	to the R&D tax allowance scheme introduced in 2005.
Spain	Figures refer to SMEs with 1-249 employees (direct support). Figures (R&D tax support) refer to SMEs with 1-249
	employees and (i) whose annual turnover does not exceed EUR 50 million or (ii) whose annual balance sheet does
	not exceed EUR 43 million. R&D tax relief estimates refer to the R&D and innovation tax credit, including support for
	technological innovation. Estimates do not include the cost of the accelerated depreciation provision for R&D capital.
	The estimates for 2014-2017 also refer to allowances for employers social security contributions introduced through Royal Decree 475/2014 of 13 June Estimates for the cost of subhastional R&D tay incentive provisions (Rescue
	Country, Navarre, and Canary Islands) are not available. The breakdown of R&D tax support by firm size refers to the
	R&D and innovation tax credit.

Sweden	Figures refer to SMEs with 10-249 employees (direct and tax support). Estimates, on a cash-basis, refer to the partial exemption of social security contributions for R&D employees introduced in Sweden in 2014.
Switzerland	Figures refer to SMEs with 1-249 employees. No R&D tax incentives in 2019 (closest).
Türkiye	Figures refer to SMEs with 1-249 employees (direct and tax support). Estimates, on a cash-basis, refer to the R&D tax allowance. They may include the cost of standard deductions for current R&D expenditures and may therefore overstate tax support in relation to other countries.
United Kingdom	Figures refer to SMEs with 1-499 employees (direct support). An SME is defined (R&D tax support) as a company that meets the normal conditions specified in the EU SME definition, except that it can have up to 500 employees, turnover up to EUR 100m and have a balance sheet total of up to EUR 86m. Estimates, on an accrual basis, refer to the R&D Relief for Corporation Tax, and the R&D Expenditure Credit (RDEC) Scheme for large companies introduced for expenditure incurred on or after 1 April 2013. The RDEC scheme was initially optional, running alongside the Large Company enhanced-deduction scheme, which it replaced in April 2016. Estimates for the cost of accelerated depreciation provisions are not available.
United States	Figures refer to SMEs with 1-249 employees (direct support) and to enterprises with gross receipts of less than USD 50 million (R&D tax support). R&D tax relief estimates refer to the federal research and experimentation tax credit (only corporations). For international comparability, the cost of allowing for the expensing of research and experimentation expenditures is not included.

Source: OECD, R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023

Country	Description
Argentina	Economic activity was defined with ISIC Rev 3
Austria	Industry classification based on ÖNACE 2008 (NACE Rev. 2).
Belgium	Manufacturing: NACE, C (10-33) Services: NACE, G-U (45-99) Other sectors: NACE, A. B, D, E, F (01-03, 05-09, 35-39, 41-43)
Chile	Manufacturing: All metallic and non-metallic manufacturing Services: Activities of human health and social assistance, Telecommunications and Information; Transport and Storage, Commerce, Vehicle reparation, Finance, Arts, Entertainment and Recreation, Biotech, Education, Scientific & Technical services; Mining services. Other sectors: All the sectors not considered in the two prior definitions.
China	No details available
Colombia	Manufacturing: companies described in section C according to CIIU rev.4 Services: CIIU Sections not mentioned above and below Other sectors: Primary sector (section A and B in CIIU rev.4)
Croatia	Manufacturing: activities within section C defined by ISIC, rev.4 Services: activities within sections G-Q defined by ISIC, rev.4 Other Sectors: activities within sections other than C and G-Q defined by ISIC, rev.4
Czech Republic	Manufacturing: NACE C; Services: NACE G-T; Other sectors: NACE A,B,D,E,F.
Denmark	No details available.
Finland	Standard Industrial Classification TOL 2008 (see http://tilastokeskus.fi/meta/luokitukset/toimiala/001- 2008/index_en.html): Manufacturing: B-F Services: G-X Other Sectors: A (Agriculture, forestry and fishing)
France	An enterprise's economic activity is determined by the 'Sirene' index developed by the Insee (variable: "ActivitePrincipaleUniteLegale": code NAFrév2).
Greece	Manufacturing: Nace rev 2 10-33 Services: Nace rev 2 45-82 Other sectors: Any other activity despite of manufacturing and services
Hungary	Manufacturing: 4 digit level NACE Rev2.: 1011-3320 Services: 4 digit level NACE Rev2.: 3511-9609 Other sectors: All the rest
Iceland	Manufacturing: https://www.hagstofa.is/utgafur/nanar-um-utgafu?id=54698 Services: https://www.hagstofa.is/utgafur/nanar-um-utgafu?id=54699 Other sectors: https://www.hagstofa.is/utgafur/nanar-um-utgafu?id=54700
Ireland	Manufacturing: no details available Services: Wholesale and retail trade/Repair of motor vehicles and motorcycles, Information and Communication, Financial and Insurance Activities, Professional Scientific and Technical Activities and N Administrative and Support Service Activities Other sectors: no details available
Italy	Manufacturing: NACE Section C Services: NACE sections H-U Other sectors: all activities different from C and H-U
Japan	Economic activity is classified based on the Japan Standard Industrial Classification (JSIC) Rev.13 and a concordance between JSIC Rev.13 and ISIC Rev.4 for corporations with consolidated and non-consolidated tax declaration as follows: Manufacturing: JSIC Rev.13, E (i.e. 09–32), corresponding to ISIC Rev.4, 10–33 (i.e. C); Services: JSIC Rev.13, F–P, Q (partly), R (partly) (i.e. 33–80, 83–85, 87, 88–92), corresponding to ISIC Rev.4, 45–82, 86–96 (i.e. G–N, Q–S); Other Sectors: JSIC Rev.13, A–D (i.e. 01–08), corresponding to ISIC Rev.4, 01–03, 05–09, 35–39, 41–43 (i.e. A, B, D, E, F); Not attributed: JSIC Rev.13, Q and T (i.e. 81–82, 99), corresponding to ISIC Rev.4, 85 and N e.c. (i.e. P and N e.c.)
Korea	Manufacturing: Steel, automobiles, food, etc. All kinds of products made in a factory Services: Legal, consulting, advertisement, education, etc. Other sectors: Agriculture, mining, fishing, construction, wholesale, retail, finance, healthcare, etc.
Latvia	Manufacturing: No details available Services: No details available Other sectors: Real estate development

# Table F.2. Industry sector classifications (broad industry sectors)

Lithuania	Manufacturing: NACE rev. 2 section C taxpayers.
	Other sectors: taxnavers in other NACE rev. 2 sections, not covered in manufacturing or services categories
Mexico	Manufacturing: according to the SCIAN classification
MCXICO	Services: Administrative and support waste management and remediation services. Finance and insurance
	Professional, scientific and technical services (According to the SCIAN classification)
	Other sectors: Transportation and Warehousing, Wholesale trade, Agriculture, forestry, fishing and hunting
	(According to the SCIAN classification)
Netherlands	Manufacturing: BERD ISIC, Revision 4 Classification   10-33
	Services: BERD ISIC, Revision 4 Classification   45-99
	Other sectors: BERD ISIC, Revision 4 Classification   01-09 & 35-43
New Zealand	Manufacturing: no details available
	Services: no details available
	Other sectors: no details available
Norway	Manufacturing: SIC2007 [10-33]
	Services: SIC2007 [45-96]
	Other sectors: other
Portugal	Manufacturing: Consider section C of NACE code list.
	Services: Consider sections D to U of NACE code list.
Claugh Danublia	Uther sectors: Consider sections A and B of NACE code list.
Slovak Republic	Manutacturing: NACE Rev.2 10-33
	Selvices, NACE Rev. 2 43-99 Other sectors: NACE Rev. 2 01.03.05.09.35.39.41.43
Slovenia	Manufacturing: C (according to NACE Day, 2)
Olovenia	Services: G - II (according to NACE Rev. 2.)
	Other sectors: A. B. D. F and F (according to NACE Rev. 2.)
Spain	Firms are classified by their main economic activity following the national classification based on NACE Rev.2.
Sweden	Manufacturing: 01-43 NACE rev.2
	Services: 45-99 NACE rev.2
Türkiye	Manufacturing: section C of NACE Rev.2
•	Services: section G to N of NACE Rev.2
	Other sectors: other NACE sections
United Kingdom	Manufacturing: sector C.
	Services: industry sector G-S (SIC 2007).
	The "Other sectors" category includes industry codes A, B, D, E and F.
	"Non attributable" is calculated as the difference between the cost of support claimed for all R&D schemes on an
	accounting period basis (RD2) and the total amount of R&D tax benefits claimed by firms for which Industry sector
United States	Information is available (KDb).
United States	UEUD calculation based on IKS SUI 2013 corporate tax return data.
	Services includes wholesale and retail trade, transportation and warehousing, information, finance and insurance,
	real estate, remai and leasing, professional scientific and technical services, management of (notaing) companies, administrative support and waste management services and various services.
	auministrative support and waste management services and validus services. The "Other sectors" category includes agriculture, forestry, fishing and hunting, mining, utilities and construction

Source: OECD, R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Country	Description
Belgium	Food and beverages: NACE CA (10-12) Chemicals: NACE CE (20) Pharmaceuticals: NACE CF (21) Machinery and equipment: NACE CK (28) Computer and electronics: NACE CI (26) Electrical equipment: NACE CJ (27) Transport equipment: NACE CL (29-30) Information and Communication: NACE JC (62-63) Finance: NACE K (64-66) Mining: NACE B (05-09)
Czech Republic	Food and beverages: NACE 10+11 Chemicals: NACE 20 Pharmaceuticals: NACE 21 Machinery and equipment: NACE 28 Computer and electronics: NACE 26 Electrical equipment: NACE 27 Transport equipment: NACE 27 Transport equipment: NACE 29-30 Information and Communication: NACE J Finance: NACE K Mining: NACE B (Data for this economic activity is not available due to the confidentiality reason)
France	Food and beverages: div 10 et 11 Chemicals: div 20 Pharmaceuticals: div 21 Machinery and equipment: div 28 Computer and electronics: div 26 Electrical equipment: div 27 Transport equipment: div 30 Information and Communication: Section J Finance: div 64 Mining: Section B
Greece	No details available
Hungary	No details available
Italy	Food and beverages: NACE Classification of economic activities Division 10 and 11 Chemicals: NACE Classification of economic activities Division 20 Pharmaceuticals: NACE Classification of economic activities Division 21 Machinery and equipment: NACE Classification of economic activities Division 28 Computer and electronics: NACE Classification of economic activities Division 26 Electrical equipment: NACE Classification of economic activities Division 27 Transport equipment: NACE Classification of economic activities Divisions 29 and 30 Information and Communication: NACE Classification of economic activities Section J Finance: NACE Classification of economic activities Section K Minjor: NACE Classification of economic activities Section R
Lithuania	Food and beverages: 10-12 Chemicals: 20 Pharmaceuticals: 21 Machinery and equipment: 28 Computer and electronics: 26 Electrical equipment: 27 Transport equipment: 29-30 Information and Communication: 62-63 Finance: 64-66 Mining: 05-09
Netherlands	BERD ISIC, Revision 4 Classification:         Food and beverages: 10-11 food products and beverages         Chemicals: 20 chemicals         Pharmaceuticals:         21 pharmaceuticals         Basic metals and fabricated metal products, except machinery and equipment: 24-25 Basic metals and fabricated metal products, except machinery and equipment

# Table F.3. Industry sector classifications (detailed industry sectors)

N	Computer and electronics:       26 computer, electronic and optical products         Electrical equipment:       27 electrical equipment         Machinery and equipment:       28 machinery and equipment         Transport equipment:       30 other transport equipment         Information and Communication:       58-63 information and communication         Finance:       64-66 financial and insurance activities         Mining:       05-09 mining and quarrying
Norway	No details available
Portugal	Food and beverages: NACE Code 10 and 11 Chemicals: NACE Code 20 Pharmaceuticals: NACE Code 21 Machinery and equipment: NACE Code 28 Computer and electronics: NACE Code 26 Electrical equipment: NACE Code 27 Transport equipment: NACE Code 29 and 30 Information and Communication: NACE Section J Finance: NACE Section K Mining: NACE section B
Slovak Republic	Food and beverages: NACE Rev.2 10-12 Chemicals: NACE Rev.2 20 Pharmaceuticals: NACE Rev.2 21 Machinery and equipment: NACE Rev.2 28 Computer and electronics: NACE Rev.2 26 Electrical equipment: NACE Rev.2 27 Transport equipment: NACE Rev.2 29-30 Information and Communication: NACE Rev.2 62-63 Finance: NACE Rev.2 64-66 Mining: NACE Rev.2 05-09
Slovenia	Food and beverages: CA Chemicals: CE Pharmaceuticals: CF, if less than 5 beneficiaries, N/A due to confidentiality standards Machinery and equipment: CK Computer and electronics: CI Electrical equipment: CJ Transport equipment: CL Information and Communication: JC Finance: JK Mining: B
Sweden	No details available
Türkiye	No details available
United States	Food and beverages: no details available Chemicals: includes Pharmaceuticals Pharmaceuticals: Pharmaceuticals are included the Chemicals subsector. Machinery and equipment: no details available Computer and electronics: no details available Electrical equipment: no details available Transport equipment: no details available Information and Communication: no details available Finance: no details available Mining: no details available

Source: OECD, R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

Country	Description
Czech Republic	<ul> <li>Foreign-controlled affiliates: the foreign affiliate means an enterprise resident in the compiling country over which an institutional unit not resident in the compiling country has control [Foreign Affiliates Statistics (FATS)].</li> <li>Domestic enterprises with multinational presence (with affiliates abroad): no details available.</li> </ul>
Greece	Foreign-controlled affiliates: no details available.
	<ul> <li>Domestic enterprises with multinational presence (with affiliates abroad): no details available.</li> </ul>
Italy	<ul> <li>Foreign-controlled affiliates: figures only refer to tax credit used by corporations (società di capitali), therefore tax credit used by other types of businesses is not included. Foreign controlled affiliates are resident corporations reporting to be controlled (either directly or indirectly) by a non resident enterprise or to be related with a non resident company and both are controlled (either directly or indirectly) by a non resident enterprise. This information is reported in the CIT tax return form in the section dedicated to Transfer Pricing.</li> <li>Domestic enterprises with multinational presence (with affiliates abroad): figures only refer to tax credit used by corporations (società di capitali), therefore tax credit used by other types of businesses is not included. Domestic enterprises with multinational presence are resident corporations reporting to control (either directly or indirectly) foreign enterprises. This information is reported in the CIT tax return form in the CIT tax return form in the section dedicated to Transfer Pricing.</li> </ul>
Norway	Foreign-controlled affiliates: as in FATS.
	<ul> <li>Domestic enterprises with multinational presence (with affiliates abroad): no details available.</li> </ul>
Slovak Republic	Foreign-controlled affiliates: no details available.
	<ul> <li>Domestic enterprises with multinational presence (with affiliates abroad): no details available.</li> </ul>
Sweden	<ul> <li>Foreign-controlled affiliates: enterprises controlled by majority from outside Sweden.</li> </ul>
	Domestic enterprises with multinational presence (with affiliates abroad): no details available.

# Table F.4. Economic ownership definitions

Source: OECD, R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.

### **Annex G. Additional results**

#### Figure G.1. Government tax and direct support for BERD, OECD and EU area, 2000-20

### As percentage of GDP



Panel A. OECD-38 countries





*Note*: Direct support estimates include government R&D grants and public procurement of R&D services but exclude loans and other financial instruments that are expected to be repaid in full. Preliminary OECD estimate of government tax relief for R&D expenditures (GTARD) for the OECD area in 2020. *Source*: OECD R&D Tax Incentives Database, <u>http://oe.cd/rdtax</u>, April 2023.

Direct funding

# Figure G.2. Business expenditures qualifying for R&D tax relief compared to BERD, selected OECD countries and other major economies, 2000-20

As percentage of GDP (left-hand scale); ratio of tax relief qualifying R&D to BERD (right-hand scale)















Panel D. Colombia





#### Panel J. Hungary















#### Panel X. United Kingdom

*Note:* BERD measures expenditure on R&D carried out in the country, whereas business expenditures qualifying for R&D tax relief reflect the amount of R&D expenditures that is used by firms to claim R&D tax relief in a country which may include overseas R&D and R&D subcontracted to third parties such as universities and other institutions. For additional details on business expenditures qualifying for R&D tax relief, see http://www.oecd.org/sti/rd-tax-stats-expenditure.pdf

Source: OECD R&D Tax Incentives Database, http://oe.cd/rdtax, April 2023.