OECD TIME-SERIES ESTIMATES OF GOVERNMENT TAX RELIEF FOR BUSINESS R&D

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Abstract

This report [D2.3] presents time-series indicators of tax expenditures for R&D, based on the latest 2017 OECD data collection on tax incentive support for R&D expenditures that was completed in July 2017. These new estimates of the cost of R&D tax incentives have been combined with data on direct R&D funding (i.e. comprising R&D grants and purchases), to provide a more complete picture of government efforts to promote business R&D over time. These figures highlight the extent to which governments support R&D through tax incentives – over the 2000-15 period and relative to other mechanisms – and provide new information on the structure and composition of such support in 2015 or closest year. This report also provides some indicative new evidence on the aggregate relationship between government support for R&D and business R&D intensity.

¹ This report has been prepared by Ana Cinta Gonzalez-Cabral, Silvia Appelt and Fernando Galindo-Rueda from the OECD Directorate for Science, Technology and innovation. The opinions expressed and the arguments employed herein do not necessarily reflect the official views of OECD member countries.

³ The contributions of official representatives from OECD countries and partner economies to the 2017 OECD R&D tax incentive survey and follow-up data validation exercise are greatly appreciated.

³ This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. 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.
TABLE OF CONTENTS

1. Introduction .................................................................................................................. 4

2. Measuring tax expenditure for R&D ............................................................................... 5
   2.1. Background and scope ............................................................................................. 5
   2.2. Estimation of tax relief for R&D ............................................................................ 6
   2.3. Compilation of time-series estimates ...................................................................... 8

3. Government tax support for business R&D in 2015 ....................................................... 9
   3.1. Tax expenditures for business R&D compared to direct government funding ........... 9
   3.2. Distribution of R&D tax and direct support for business R&D .............................. 11
   3.3. Other governmental sources of support for BERD .................................................. 14

   4.1. Changes in the magnitude of tax support for business R&D ................................. 16
       Changes in the magnitude of R&D tax support, 2006 vs. 2015 .............................. 16
       Changes in the magnitude of R&D tax support, 2000-2015 .................................. 17
   4.2. Changes in the relative importance of tax support for business R&D .................... 21
       Composition of public support for business R&D, 2006 vs. 2015 ....................... 21
       Composition of public support for business R&D, 2000-15 ............................... 21
   4.3. Changes in the distribution of government tax relief for business R&D by firm size ... 25

5. Government support for R&D and BERD intensity ......................................................... 26

6. Conclusions and next steps ........................................................................................... 29

References .......................................................................................................................... 30

Annex 1. Direct funding of business R&D as percentage of GDP, selected countries, 2000-2015... 31
Annex 2. General and country-specific notes for main reference ...................................... 34
Annex 3. General and country-specific notes for indicators on direct and tax support by firm size ... 38
Annex 4. Industry sector classification - indicators on public support by main economic activity ... 40
FIGURES

Figure 1. Direct government funding of business R&D and tax incentives for R&D, 2015.................10
Figure 2. Government budgets for R&D and tax incentive support for business R&D, 2015 ..........11
Figure 3. Distribution of R&D tax incentive support, 2015 ......................................................12
Figure 4. SME share in BERD, direct funding and tax incentive support, 2015 ..............................13
Figure 5. BERD, direct funding and tax incentive support for BERD by industry, 2015 ...............13
Figure 6. National and subnational sources of R&D tax support, Canada, 2000-15.......................14
Figure 7. Domestic government and international organisation support for BERD, 2015 ...............15
Figure 8. Changes in government support for business R&D, 2006-15....................................17
Figure 9. Trends in government tax incentive support for business R&D, 2000-15......................18
Figure 10. Change in public support for business R&D through direct and tax support, 2006-15....21
Figure 11. Trends in government tax incentive and direct support for business R&D, 2000-15........22
Figure 12. Tax incentive and direct support for business R&D and BERD by SMEs, 2011-15 ........25
Figure 13. BERD intensity and government support to business R&D, 2015 .............................27
Figure 14. BERD intensity and government support to business R&D, 2006-15 .........................28

TABLES

Table 1. Changes in the provision of government tax relief for business R&D, 2000-17 .................16
1. Introduction

In 2017, 30 of the 35 OECD members, 21 out of 28 EU member states, and a number of other major economies (Brazil, the People’s Republic of China – China henceforth –, the Russian Federation and South Africa) give preferential tax treatment to R&D expenditures. Tax incentives have become a major tool for promoting business enterprise expenditure on R&D (BERD) in OECD and partner economies. The share of tax relief out of total government support in the OECD area increased on average from 36% in 2006 to 46% in 2015. In 2015, the total value of R&D tax relief across OECD, EU and other major economies (Brazil, China, the Russian Federation and South Africa) reached more than USD 60 billion, and amounted to nearly USD 45 billion in the OECD area alone.

Tax expenditures are complex objects of measurement, and not all statistical systems separately capture all types of tax relief measures. However, because government policy objectives for R&D tax relief are also achievable in principle through grants or other direct outlays such as through purchases of R&D services, there is widespread acknowledgement that reporting such tax support can facilitate transparency and more balanced international comparisons of public support for innovation. Providing evidence on the extent of efforts made by governments in OECD, EU and other major economies is the objective of this OECD project and this report in particular.

In this report, as in previous OECD work, estimates of the cost of R&D tax incentives have been combined with data on direct R&D funding, as compiled by National Statistical Offices based on reports from firms, in order to provide a more complete picture of government efforts to promote business R&D. The latest indicators and information on R&D tax incentives now also feature on the dedicated OECD website Measuring R&D tax incentives (http://oe.cd/rdtax).

This report focuses on indicators of the foregone revenues and additional costs incurred by government as a result of provisions for tax-based relief that is specifically targeted towards reducing the cost to firms of R&D efforts. These indicators reflect the result of tax support supply and demand decisions by governments and business across countries and over time. This report complements time-series indicators of implied marginal R&D tax subsidy rates, presented in a companion report [D3.4]. This report is based on data provided by national authorities to the OECD through the 2017 OECD data collection on tax incentive support for R&D expenditures.

This report is structured as follows:

- Section 2 provides an introduction to the measurement of government tax relief for R&D, highlighting the guidance under which data have been collected, and highlights some of the specificities and challenges that arise in measuring government tax relief for R&D over time.
- Section 3 examines the structure of government tax support for R&D among countries for which relevant data breakdowns (firm size and economic activity) are available and have been reported to OECD. This is followed by a snapshot overview of the relative magnitude of public support for BERD from national vis-à-vis foreign sources of funding.

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1 In 2017, the exceptions are Estonia, Finland, Germany, Luxembourg and Switzerland.
2 In 2017, the exceptions are Bulgaria, Croatia, Cyprus, Estonia, Finland, Germany and Luxembourg.
3 Belgium and Spain provided updated R&D tax support figures for 2015 for this report. These figures represent an update relative to those reported in the 2017 OECD edition of R&D tax incentive country profiles. In the case of Greece and South Africa, time-series estimates of R&D tax support for the 2000-2015 period are pending validation. For Greece, available R&D tax relief figures refer to 2013-14, and for South Africa, available cost estimates of government tax relief for R&D refer to 2014 and 2006.
• Section 4 documents the trends in government tax relief for business R&D over the 2000-15 period, looking at the relative importance of tax support vis-à-vis direct funding and the magnitude of tax support as a percentage of GDP. This is complemented by an analysis of the more recent trends in the share of public support (direct and tax support) and BERD accounted for by SMEs across OECD and other major economies for which relevant data are available.

• Section 5 examines in a purely descriptive fashion the link between government support for business R&D (direct and tax support for BERD) and BERD intensity across countries.

• Section 6 concludes with a summary of the main findings of the report and an outlook on future OECD work in this area.

The time-series estimates of government tax relief for business R&D (GTARD) presented in this report will feature in the OECD R&D tax incentive database (OECD, 2018). Moreover, these estimates are envisaged to feature in the OECD Corporate tax database that shall be launched in autumn 2018, together with synthetic indicators of implied R&D tax subsidy rates.

2. Measuring tax expenditure for R&D

2.1. Background and scope

Measuring how much governments dedicate to R&D support schemes through R&D tax incentives involves a number of 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.

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, 2015a), which for the first time provides guidelines on the measurement of government tax relief for R&D (GTARD) (OECD, 2015b). 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 as closely as possible the guidelines provided. 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 compendium of R&D tax incentive schemes (www.oecd.org/sti/rd-tax-incentives-compendium.pdf).
Focus on business

This report is primarily concerned with tax relief provided by 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.7

Focus on central government

For practical reasons, only estimates of tax relief at central (or federal) level are generally included. Where additional information is available at subnational level, this dimension is discussed within country notes that are the subject of a separate deliverable [D7.4]. Known instances where tax incentives are provided at the subnational level are Canada’s provinces and states within the United States. Section 3.3 highlights the role of provincial tax incentives in Canada over the 2008-14 period as part of an own-standing section on other government sources of support for BERD within this report.

Focus on relief for R&D inputs

Estimates reported in this report exclude income-based tax incentives8 – 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 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.

2.2. 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 as closely as possible the guidelines provided. 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 focusses on the cost of provisions that imply a more favourable treatment of R&D relative to non-R&D expenditure. 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

7 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), Netherlands (WBSO and RDA), Slovenia (R&D tax allowance), Turkey and the United States (R&D tax credits). In Hungary, private entrepreneurs are eligible to claim R&D tax relief in form of an exemption of social security contributions paid for their employees but not for their own social security contributions.
8 Excluded are similarly 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.
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 the current R&D expenditures.  

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 tax expenditure metadata available to OECD at present do not provide any details on whether estimates are reported on a gross or net basis.

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 government regardless of the time when it is paid in cash by 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:

- 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 possibly 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 such surplus is effectively dealt with. In some jurisdictions, eligible enterprises will under certain circumstances be able to claim a direct payment from the authorities. Such provisions are known as payable or refundable tax incentives.

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).

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9 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.

10 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.
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 records systems that allow 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 and it is foreseen in several international and national rules that provisions may favour small and medium sized enterprises (SMEs). These may be entitled to more generous conditions for direct funding or tax support in order to compensate for other potential barriers to innovation. Here and in other cases 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. Annex 3 highlights the criteria adopted by countries in defining SME status and based on which indicators on business R&D as well as direct and tax support for BERD by firm size are reported in this document.

Economic activity is another dimension for which the distribution of R&D tax incentive support can be of particular interest is. There is a widespread concern that overall government support for industry may be flowing mainly to sectors that carry out manufacturing-based R&D. Annex 4 highlights the industry sector classification adopted in producing indicators on public support by main economic activity across countries for which relevant data are available.

2.3. 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 of 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-back unused tax benefits or claim those retrospectively, an update of cost estimates may be required over some time period. 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, covering not 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.

### 3. Government tax support for business R&D in 2015

Based on the methodology presented in the previous section, this section lays out the most recently available evidence on the cost of central (federal) government support for R&D through tax relief and direct funding measures. Data correspond to 2015 for 38 countries (including those providing no tax support), 2014 for 7 countries, 2013 for 1 country. Data on R&D tax incentives are not available for 2015 for four countries (Sweden, Israel, Poland and Malta), while no such incentives were provided by six OECD countries (Estonia, Finland, Germany, Luxembourg, Mexico and Switzerland) and three other EU countries (Croatia, Cyprus and Bulgaria) in 2015. 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 or error.

#### 3.1. Tax expenditures for business R&D compared to direct government funding

Based on estimates traditionally available of direct government support for business R&D, the Russian Federation, Hungary, the United States and Korea provided the most direct funding for business R&D as a percentage of GDP in 2015 (Figure 1a). The weighted average rate in the OECD area is close to 0.10%. Direct support accounts for 6.4% of BERD in the OECD area. In absolute terms (current USD million), the United States, Russian Federation, China, Korea and France provided the largest volumes of direct funding to firms.

The compilation of data on tax support for business R&D indicates levels of support which are not accounted for in the direct funding statistics are on a very similar order of magnitude for a majority of countries that use this form of support. The average rate of tax support in the OECD area - including countries that do not provide this type of support - is close to 0.09% (Figure 1b). Tax support accounts for 5.4% of BERD in the OECD area.

As a percentage of GDP, tax relief for R&D expenditures is largest for Belgium, France, Ireland and Korea, followed by Australia. New Zealand reintroduced R&D tax support in form of an R&D tax credit for deficit-related R&D tax expenditure in 2015. Since July 2013, New Zealand also operates a direct grant support scheme (R&D Growth Grants) with significant non-discretionary features. Mexico which converted its previous R&D tax credit into direct assistance in 2009, reintroduced R&D tax incentive support with effect from 2017. This recent reform is not yet reflected in the tax expenditure estimates available.

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11 Footnote by Turkey: 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. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey 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 Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
Figure 1. Direct government funding of business R&D and tax incentives for R&D, 2015 or latest year
As a percentage of GDP

Panel 1a. Direct government funding of business R&D (GovFundBERD)

Panel 1b. Tax support for business R&D (GTARD)

Panel 1c. Combined GovFundBERD and GTARD

Combining both types of support (direct funding and tax relief), the Russian Federation, Belgium, France, Korea and Hungary provided the most combined support for business R&D as a percentage of GDP in 2015. By taking into account tax support, it is not only possible to get a better sense of the full extent of government support for R&D across OECD, EU and other major economies, but it is also possible to see how some countries, which appear to give little support on the sole basis of direct funding, are in fact providing significant assistance through the tax system. This is the case of countries such as Australia, Canada and the Netherlands.

*Figure 2* 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 2. Government budgets for R&D and tax incentive support for business R&D, 2015 or latest year**

As a percentage of GDP

![Graph showing government budgets for R&D and tax incentive support for business R&D](image)


Government budget appropriations or outlays for R&D (GBAORD) include direct funding provided to all sectors, including contributions to R&D programmes abroad. On average, tax support represents 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 closer to 14%. The relative importance of tax incentives in the overall financial effort incurred by governments for R&D is largest in the case of Ireland (49%), Hungary (35%)\(^{12}\), Belgium (35%), France (29%) and Australia (28%). In these countries, tax incentives are not only major policy instruments for supporting business R&D but also play a first order role in overall R&D policy.

### 3.2. Distribution of R&D tax and direct support for business R&D

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). *Figure 3* (Panel 3A) sheds light on the distribution of tax relief in 2015 (or closest year) by business size for a number of countries for which relevant data are available. The share of R&D tax support accounted for by SMEs ranges from 5% in Hungary to 54% in Latvia, to 70% in the Netherlands and 79% in Norway (small companies only).

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\(^{12}\) The relative importance of tax incentives in the overall budgetary support for R&D in Hungary, while one of the highest among OECD and partner countries in 2015, declined in recent years, during which Hungary rebalanced its policy mix towards direct support (Figure 10 and Figure 11D). One of its R&D tax incentive schemes - the innovation contribution allowance for own and subcontracted R&D - was abolished by Hungary with effect of 2012.
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 partner economies (Figure 3, Panel 3B) for which relevant data are available for 2015 (or closest year). This percentage ranges from 23% in New Zealand to 60% in the United States to 86% in Japan.

**Figure 3. Distribution of R&D tax incentive support, 2015 or latest year**

Panel 3A. By firm size, share in percent

Panel 3B. By main economic activity, share in percent

Note: Figures (Panel 3A and B) for Greece, Finland, France, Spain and Norway refer to 2014 instead of 2015 and to 2013 in the case of the United States. Finland abolished its temporary R&D tax incentive with effect from 2015.


**Figure 4** 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.
It is worth noting that the SME share in tax support exceeds the share of direct funding in Austria, Canada, France, the Netherlands, Norway and the United Kingdom. All these countries offer refundable R&D tax incentives that particularly target smaller R&D performers, allowing them 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.

**Figure 4. SME share in BERD, direct funding and tax incentive support, 2015 or latest year**

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

Note: Figures for Finland, Spain, Latvia and Norway refer to 2014 instead of 2015 and to 2013 in the case of the Canada, France and Greece. For the United States, tax support figures refer to 2013 and the data on BERD and direct funding of BERD to 2015. Finland abolished its temporary R&D tax incentive with effect from 2015.


**Figure 5** provides an overview of the distribution of BERD, direct and tax support for BERD in 2015 by main economic activity. This breakdown is currently available for the Czech Republic and the United Kingdom where data are granular enough and sufficient details available to ensure the adoption of a consistent industry classification across direct and tax support estimates within each country.

**Figure 5. BERD, direct funding and tax incentive support for BERD by industry, 2015 or latest year**

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

Note: For the Czech Republic, figures refer to 2014 instead of 2015. In the case of the United Kingdom, “Services” includes “not attributable” as a category to ensure a consistent treatment of the latter category in computing the SME shares in tax and direct support and BERD. Given the small weight of this category the effect of this aggregation is minimal.

In the Czech Republic, tax support is relatively skewed towards firms in manufacturing and direct funding to firms in services. In the United Kingdom, the services account for a large share of R&D tax support and direct funding of BERD is evenly distributed among manufacturing and services.

### 3.3. Other governmental sources of support for BERD

Other governmental sources of support for BERD include subnational/regional subsidies and R&D tax incentives as well as direct funding from international organisations. For international comparability, estimates of tax relief and direct funding generally refer to support provided at central (or federal) level in this report. This section aims to enhance the existing evidence and inform about the role that subnational tax incentives and direct funding from international organisations play in countries where additional information on these sources of funding are available.

**Subnational sources of tax support for business R&D**

Canada is one country where tax incentives are provided at national and subnational level. Provinces account for around 30% of total tax support in Canada from 2008 to 2014 (Figure 6). Around 28% of BERD is financed through provincial and federal tax support from 2008 2013, dropping to 21% in 2014. In this year, the base of eligible expenditures was narrowed by removing capital expenditures and lease costs. The general SR&ED tax credit rate was also reduced from 20% to 15% from 2014.

![Figure 6. National and subnational sources of R&D tax support, Canada, 2000-15](Figure 6. National and subnational sources of R&D tax support, Canada, 2000-15)

As a percentage of BERD, share provincial in total tax support (right-hand scale)


**Direct funding from international organisations**

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 7 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 for a number of OECD-EU countries for which relevant data are available for 2015 (or closest year).
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 Turkey to 94% in Latvia and amounts on average to 16% among the countries considered. The overall share of BERD financed by national and international government institutions ranges from 2% in Switzerland to 43% in Latvia.


This section describes the trends in the central (federal) government tax relief for R&D through tax incentives and direct funding measures over the 2000-15 period. Table 1 provides a timeline of R&D tax incentive introductions and repeals by OECD and other major economies from 2000 to 2017. In 2017, 30 OECD countries offer tax relief for business R&D expenditures, up from 18 OECD countries in 2000. 12 additional OECD countries launched tax incentives over this time period (excluding the temporary R&D tax incentive introductions by Finland and New Zealand and the temporary suspension of the R&D tax credit in Portugal). These changes in the availability of R&D tax incentives also become apparent in the time-series estimates of government tax relief for business R&D, available for the 2000-15 period.
### Table 1. Changes in the provision of government tax relief for business R&D, 2000-17

<table>
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<th>Year</th>
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<td>2004</td>
<td>Ireland*, Portugal</td>
<td>-</td>
</tr>
<tr>
<td>2005</td>
<td>Belgium*, Czech Republic*, Slovenia*</td>
<td>-</td>
</tr>
<tr>
<td>2006</td>
<td>China13, Portugal, South Africa</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2008</td>
<td>Chile*, Lithuania, New Zealand, Turkey*</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>-</td>
<td>[New Zealand], Mexico1</td>
</tr>
<tr>
<td>2010</td>
<td>Romania, Slovak Republic*</td>
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<tr>
<td>2011</td>
<td>Iceland*</td>
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<td>2012</td>
<td>-</td>
<td>-</td>
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<tr>
<td>2013</td>
<td>Finland</td>
<td>-</td>
</tr>
<tr>
<td>2014</td>
<td>Latvia*, Sweden*</td>
<td>-</td>
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<tr>
<td>2015</td>
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<tr>
<td>2016</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2017</td>
<td>Mexico1</td>
<td>(Japan, partial)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Net: 16 (OECD*: 12)</td>
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Note: *OECD countries that introduced R&D tax incentives over the 2000-17 period and still offer those in 2017. Countries in squared brackets introduced or repealed R&D tax incentives on a temporary basis over this time period. Mexico repealed its previous R&D tax credit with effect from 2009 and reintroduced an R&D tax credit in 2017. Japan (in round brackets) repealed its incremental R&D tax credit with effect of April 2017 but continued to offer three other R&D tax credits.

### 4.1. Changes in the magnitude of tax support for business R&D

**Changes in the magnitude of R&D tax support, 2006 vs. 2015**

A comparison of the magnitude of total (direct and tax) government support (as a percentage of GDP) provided in 2015 and 2006 shows an increase in national government support for BERD in 31 out of 45 countries (Figure 8, Panel 8A). A comparison of the magnitude of R&D tax support (as a percentage of GDP) provided in 2015 and 2006 shows an increase in national government support for BERD in 29 out of 41 countries (Figure 8, Panel 8B) for which relevant data are available. This suggests that the increase in total government support for BERD, noticeable in many countries from 2006 to 2015, is largely driven by the increased use and generosity of R&D tax incentives. In 2015, the average rate of tax support in the OECD area - including countries that do not provide this type of support - is close to 0.09%, compared to 0.06% in 2006. As a percentage of GDP, tax relief for R&D expenditures is largest for Belgium, France, Ireland and Korea, followed by Australia.

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13 The R&D super deduction was introduced as part of China’s "Medium to Long Term Plan for the Development of Science and Technology" in 2006 but broadly implemented by provinces not before 2008. In this year, the State Administration of Taxation issued "Administrative Measures for the Pre-tax Deduction of Enterprise Research and Development Expenses" which provided a unified and simplified framework for implementing this R&D tax incentive in China (Zhen et al., 2018).
Over the 2006-15 period, the largest nominal increases in tax support for business R&D (as a percentage of GDP) are similarly observed for Belgium (0.28 percentage points), Ireland (0.23 percentage points), and France (0.19 percentage points), followed by the United Kingdom (0.11 percentage points). At the OECD median, R&D tax support as a percentage of GDP increased by 0.03 percentage points between 2006 and 2015.

Changes in the magnitude of R&D tax support, 2000-2015

A more detailed analysis of the time series data on tax support for R&D is now possible. A country-specific analysis of such trends is provided in the 2017 edition of R&D tax incentive country profiles, a separate project deliverable [D7.4]. It is important to note that data on direct funding are subject to methodological changes driven by modifications to the way business are asked to report R&D performance and the support received from governments to that effect. More detailed information on those trends and breaks in series is provided in the annex section (Annex 1).
Figure 9 provides a potential basis for identifying the onset of different provisions and the role of factors impacting on the demand for tax support by firms as well as their ability to claim it. Figure 9 (Panels Figure 9A - Figure 9E) highlights the typically strong increase in the volume of R&D tax support following the launch (Panel 9A: Belgium, Ireland, the United Kingdom; Panel 9B: Slovenia; Panel 9C: China, Japan, Norway) or the reintroduction (Panel 9C: Portugal) of R&D tax incentives. Among the largest users of R&D tax incentives (Panels 9A and 9B) stand out the very fast growth in Ireland, Belgium and France and the declining importance of this instrument in Hungary and Canada.

Figure 9. Trends in government tax incentive support for business R&D, 2000-15
Tax support as a percentage of GDP, selected countries
A marked increase in the cost of R&D tax support is observable for France in 2008 (Panel 9A) when the French tax credit became entirely volume-based and the amount of tax support for business R&D as percentage of GDP more than doubled (from 0.10% in 2007 to 0.23% of GDP in 2008). As a temporary measure, France also offered an immediate refund of all unused credit to all firms (instead of 3 years waiting period) in 2009. In Hungary, the volume of tax incentives for business R&D as a share of GDP oscillated between 0.14% and 0.18% of GDP from 2004 to 2011, and dropped to 0.12% of GDP in 2012 (Panel 9B). In this year, the innovation contribution related R&D tax credit expired, and advance assurance provisions for firms applying for R&D tax relief were introduced.

In the United Kingdom (Panel 9A), an R&D tax allowance was first introduced for SMEs in 2000 and extended to large companies in 2002. In the case of large firms, this scheme was replaced by a volume-based tax credit in April 2016. Norway introduced R&D tax relief (Panel 9C) in form an R&D tax credit in 2002. The cost of this support rose sharply in 2003 after the scheme was extended to large firms, and in 2014, when total ceilings on R&D eligible expenditure doubled. In Japan (Panel 9C), the cost of R&D tax support increased sharply since the launch of a volume-based tax credit in 2003, declined during the crisis to revert back and increase significantly in 2013 when a tax credit for collaborative R&D was introduced.

Other countries that introduced R&D tax incentives over the 2000-15 period (Panel 9D and E) include the Czech Republic (2005), Chile (2008), Turkey (2008), Latvia (2014), Lithuania (2008), even if on a temporary basis as Finland (2013-14), New Zealand (2008) and Mexico (1995-2001; 2002-2008). Overall, and across the different panels, it is possible to note that the global financial and economic crisis had a temporary depressing impact on the use of R&D tax incentives when governments did not adopt measures to increase the generosity of the existing relief measures. In the Netherlands, for instance, the threshold amount and rates of the WBSO tax credit were raised as a temporary relief measure from 2009 to 2011 and the cost of R&D tax support as a percentage of GDP (Panel 9B) increased significantly during those years.
4.2. Changes in the relative importance of tax support for business R&D

Over the last decade, OECD and partner economies have progressively moved towards tax incentive support measures in order to incentivise business R&D. This is clearly reflected in the available indicators on the composition of government support for business R&D that are discussed below.

*Composition of public support for business R&D, 2006 vs. 2015*

*Figure 10* provides a comparison of two snapshots of the structure of public support for business R&D provided in 2015 and 2006 (or closest years). This shows an increase in the relative importance of tax incentives among 24 out of 33 countries for which relevant data are available.

*Figure 10. Change in public support for business R&D through direct funding and tax incentives, 2006-15*

As a percentage of total government support

Canada and Hungary, starting from a high share of tax support, moved towards rebalancing their support mix, increasing their reliance on direct funding. Overall tax support increased across most countries, while Mexico abolished its R&D tax credit scheme. 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. Mexico reintroduced an R&D tax credit, this time incremental in nature, with effect from 2017. Three other EU countries, Latvia, Lithuania and Romania also introduced tax incentives for R&D over this period.

*Composition of public support for business R&D, 2000-15*

Combining the trends on R&D tax support with direct funding estimates (*Figure 11*), it is possible to examine the changes in relative importance of tax incentives as a policy instrument. *Panel 11A* shows the fast introduction of R&D tax incentives in Ireland (2004) and Lithuania (2008), alongside the sustained growth in importance in Australia, Japan and the Netherlands. In Canada, R&D tax support declined from a peak in 2007.

*Panel 11B* depicts the introduction of R&D tax incentives in Belgium (2005) and Slovenia (2007), and the temporary suspension of the Portuguese R&D tax credit from 2004 to 2005. *Panel 11C* shows the introduction of R&D tax support in the China (2009), Norway (2002) and the United Kingdom (2000).
Worthwhile noting is the continuously increasing reliance on R&D tax support in France (Panel 11B) and the United Kingdom (Panel 11B) where an R&D tax allowance, introduced for SMEs in 2000, was extended to large firms in 2002. The decline in the relative importance of tax support observed for Slovenia (Panel 11B) and Austria (Panel 11C), for instance, can be related to the global financial and economic crisis. In Korea (Panel 11C) the share of tax relief as a percentage of total government support to BERD remained fairly stable from 2007 to 2015.

Figure 11. Trends in government tax incentive and direct support for business R&D, 2000-15
Tax support as a percentage of total (direct and tax) government support for business R&D, selected countries

Panel 11A

Panel 11B
The Netherlands (Panel 11 A) provide R&D tax relief through a payroll withholding tax credit (WBSO) for R&D wage costs and introduced an R&D tax allowance for non-labour related R&D expenses (RDA) in 2012 which was integrated into the WBSO scheme in 2016. Italy (Panel 11C) has experimented with various, temporary R&D tax credits since 2006. The cost of this support fluctuated significantly until 2015, with a marked funding related drop and significant increase observable in 2010\textsuperscript{14} and 2015 respectively. In 2015, an incremental R&D tax credit was introduced as part of a reform of the Italian R&D tax incentive system (Legge di Stabilità 2015).

Panel 11D displays the increased adoption of R&D tax incentives in OECD economies among countries with mid to low levels of reliance on tax support. It shows the introduction of R&D tax incentives in Chile (2008), the Czech Republic (2005), Iceland (2011), Latvia (2014) and Denmark (2012). The reliance on R&D tax support increased in most of these countries following their introduction. In Spain, the relative importance of tax relief fluctuated over the 2000-2015 period, the share of tax incentives in total government support increasing in more recent years to reach 32\% in 2015. A rebalancing of the policy mix towards direct support can be observed for Hungary. In the case of the United States it is possible to note how the boost to direct funding throughout the global financial crisis (2008-2009) and temporary drop in demand for tax support resulted in a further decline in business reliance on R&D tax support.

Panel 11E focuses on countries with the lowest levels of reliance on R&D tax incentives. The chart displays the introduction of R&D tax incentives in Brazil (2006), Romania (2010) and the Slovak Republic (2015), and the repeal of R&D tax incentives in Finland, New Zealand and Mexico. In Mexico, an R&D tax credit was available from 2000-2008, converted into direct assistance in 2009.

\textsuperscript{14} This drop is related to the 10\% volume-based R&D tax credit, available until 31 December 2009. Due to a lack of funds in that year, the Decree of the Ministry of Economy and Finance (4 March 2011) allowed for further usage of this tax credit at a reduced rate (47.53\% of the tax credit) in 2010 and 2011.
4.3. Changes in the distribution of government tax relief for business R&D by firm size

Figure 12 highlights recent changes in the distribution of government tax relief for business R&D by firm size among OECD countries for which relevant data are available for 2011 and 2015 (or closest years). Panel 12A (Panel 12B) compares the share of tax (direct) support for BERD in 2011 and 2015 that is accounted for by SMEs, comparing those with their contribution to BERD in each year. While direct support is by and large discretionary, the SME shares in tax support in 2011 and 2015 (Panel 12A) tend to be more closely aligned with the SME shares of BERD in these years, confirming the notion that tax incentives are generally a demand-driven complement to direct support for R&D.

Figure 12. Tax incentive and direct support for business R&D and BERD by SMEs, 2011-15 or closest

Panel 12A. SME share in GTARD and BERD

Panel 12B. SME share in direct government funding of BERD and BERD

Notes: For the United States, R&D tax support estimates refer to 2012 (Panel 12A), while figures of direct funding refer to 2011.

It is worth noting that the SME share of BERD stayed either constant or declined slightly across most of the countries considered from 2011 to 2015. Exceptions include France, Portugal, Hungary and the United Kingdom, where smaller scale increases in the SME share in BERD can be observed over this period. In most cases (e.g. the Czech Republic, Spain), this drop (or stagnation) in the SME share of BERD is not matched by a decline but increase in the SME share in tax support (Panel 12A). This may suggest that small R&D performers increasingly make use of tax incentives and that those incentives include more favourable provisions for SMEs vis-à-vis large companies.

From 2011 to 2015, the SME share in R&D tax support generally moves in the same direction as the one observed for direct funding of BERD. In Portugal, Slovenia and the United Kingdom, for instance, increases in the SME share in tax support go hand in hand with increases in the SME share in direct funding (Panel 12B). This may reflect efforts by governments to incentivise R&D by SMEs.

5. Government support for R&D and BERD intensity

Government financial support for business R&D seeks to encourage firms to invest in R&D within their countries. Part of the alluded rationale is to correct or alleviate difficulties by firms to appropriate the returns to their investment and shortcomings in the market for the financing of risky projects, especially for small start-up firms without collateral. Tax incentives aim to achieve this goal while leaving the choice of how to conduct and pursue R&D programmes in the hands of the private sector, and are thus considered as market-based instruments. Compared with direct, discretionary subsidies, they are more easily compliant with competition and trade laws (OECD, 2016).

Countries differ in the degree of scrutiny imposed on R&D projects for which tax incentives are claimed, and sometimes overall budgetary limits may apply, but in general they require lower administrative costs to monitor relative to direct support. A downside of this is the limited scope for identifying and supporting projects with the highest expected social returns that would have not taken place in the absence of relief. Another potential downside of “on-demand” tax incentives is the challenge of accurately forecasting the impact on public finances and managing budgets without creating uncertainty about the availability or magnitude of tax support among potential R&D tax relief recipients.

Despite the growing literature on the impact of different forms of support for business R&D, there is no simple, widely applicable answer to the question of what the right volume of total support and the appropriate mix of tax incentive and direct support are within countries. Tax incentives are not equally beneficial to all types of potential R&D performers. The impact of tax incentives may depend on the nature and structure of a country’s innovation system, as well as current conditions such as the business cycle. Indicators such as those presented in this report help provide an illustrative benchmark against which countries can compare themselves and bring about relevant dimensions that raise follow on questions and avenues for analysis.

Figure 13 displays the magnitude of R&D tax support (bubble sizes represent the total amount of tax incentive support for R&D expenditures in USD PPP) and the relationship between total (direct and tax) government support for business R&D and BERD intensity. For example, in the United States, tax support for R&D is just above USD 11 billion. Total government funding of business R&D is equivalent to 0.24% of GDP and business R&D is approximately 1.9% of GDP. Across countries, R&D intensity in the business sector has a positive correlation (0.35) with the level of government funding of business R&D. It should be noted that correlations do not necessarily imply the existence of a causal
relationship between R&D support and performance. Furthermore, it is possible to observe that there are several outliers to the observed relationship between government support and R&D performance, the reasons for which can relate to several factors, including differences in sector composition, the presence of other indirect mechanisms of government support. For example, Germany and Korea present relatively high levels of business R&D intensity compared to their degree of measured government support, while France, Ireland and the Russian Federation have high rates of support relative to countries with similar business R&D-to-GDP ratios.

**Figure 13. BERD intensity and government support to business R&D, 2015**

BERD as a percentage of GDP

![Graph showing BERD intensity and government support](source)


A complementary and potentially more insightful indicator of the relationship between government support for R&D and business R&D performance is the analysis of the correlation in changes over time. The annualised change figures are mapped out in Figure 14. As Panel 14A shows, changes in total measured government support appear to account for around one tenth of the observed variation in BERD intensity. Panel 14B indicates that changes in R&D tax support alone explain nearly 6% of the observed variation in the data. This suggests that direct and tax support account for a similar rate of variation in BERD intensity.

The results presented in Figures 13 and 14 provide a first illustration of the aggregate data patterns which will also be investigated at the micro level. Future OECD work will examine these correlations in more detail and assess their robustness to competing explanations for the observed changes, including country specific economic and policy changes as well as discontinuities in the statistical methodologies underpinning the R&D data. The potential relationship between the provision of government support and the reporting of R&D data to national statistical offices over and above actual changes in R&D performance is also an important priority in order to assess the true impact of government support and the international comparability of business R&D statistics.
Figure 14. BERD intensity and government support to business R&D, 2006-15 (or closest year)

Panel 14A. Change in total (direct and tax) government support per year (in percentage points)

Panel 14B. Change in R&D tax support per year (in percentage points)

6. Conclusions and next steps

This report has presented and discussed the update of the time-series indicators of tax expenditures for R&D, based on the 2017 OECD R&D tax incentive data collection that was completed in July 2017. The measurement of tax expenditures associated to the provision of relief for R&D efforts incurred by firms is a necessary complement to other available statistics on direct government funding of R&D as well as information on the design of support based which can be used to construct notional R&D tax subsidy rates.

The analysis in this document highlights the extent to which governments support R&D through tax incentives over the 2000-15 period, assessing the relative and absolute magnitude of tax support vis-à-vis direct funding of business R&D. This report has confirmed existing evidence concerning trends towards increasing reliance on R&D tax incentives, extending coverage to a number of countries that were not previously the object of OECD analysis. It has also provided new evidence on the dynamics of such trends, providing time series indicators that highlight the overall increasing relative importance of tax incentives. These can be used for analytical purposes to link to a number of policy and economic developments. The evidence appears to confirm that R&D tax incentives exhibit less discretionary features than direct support for R&D and that the overall cost to government is highly dependent on the level of business demand for R&D.

The report also contains for the first time, on an experimental basis, indicators on the share of R&D tax support, R&D performance and direct funding for BERD that is accounted for by SMEs, as well as mapping changes over time. While the SME share of total BERD has decreased slightly or stayed constant from 2011-15 in most of the countries considered, increases in the SME share of R&D tax support and direct funding for BERD can be observed across a number of economies. This appears to suggest that governments have been making a special effort to incentivise R&D among SMEs.

This report also provides some new, descriptive evidence on the aggregate relationship between government support for R&D and business R&D intensity. This evidence provides a resource for further analysis of the extent and causal effects of R&D tax incentives, in connection with other indicators and data sources. This will be the object of other work conducted in the framework of this project, including future distributed microdata analysis and annual updates to this report.
References


Annex 1. Direct funding of business R&D as percentage of GDP, selected countries, 2000-2015

Panel A

Panel B
Panel E

Note: Countries are placed in panels according to their level of direct funding of BERD as a % of GDP in 2015 (or closest).

Annex 2. General and country-specific notes for main reference

General notes

- For Canada, Chile, France, Latvia, Lithuania, Netherlands, Norway, Portugal, Romania, Spain and the United Kingdom, preliminary R&D tax incentive estimates are reported for 2015 (or closest year). Figures are rounded to the second decimal unless rounding would result in a value of zero.
- For Brazil, France, Greece, Iceland, South Africa, Sweden and Turkey, figures refer to 2014 instead of 2015. For the United States, figures refer to 2013.
- For Argentina, Belgium, Denmark, Korea, Luxembourg, Mexico, Slovenia and Sweden, figures refer to 2007 instead of 2006. For China, figures refer to 2009 instead of 2006. For the Russian Federation and the Slovak Republic, figures refer to 2010, and for Iceland, figures refer to 2011 instead of 2006.
- In 2015 (or closest year), estimates of direct funding for Sweden are based on imputing the share of direct government-funded BERD in the previous year to the current ratio of BERD to GDP.
- In 2006 (or closest year), figures of direct funding for the Netherlands are an average of the 2005 (or closest year) and 2007 (or closest year) values.
- In Austria and South Africa, R&D tax incentive support is included in official estimates of direct government funding of business R&D. It is removed from direct funding estimates to avoid double counting. In the case of South Africa, where the overlap of estimates cannot be identified based on available budget data, this transformation was not undertaken.
- In 2015 (or closest year), Bulgaria, Croatia, Estonia, Finland, Germany, Mexico and Switzerland did not provide expenditure-based R&D tax incentives. For Israel, the R&D component of incentives cannot be identified separately at present. No data on the cost of expenditure-based R&D tax incentive support are currently available for Poland and Sweden.
- Estimates do not cover sub-national and income-based R&D tax incentives and are limited to the business sector (excluding tax incentive support to individuals). Data refer to estimated initial revenue loss (foregone revenues) unless otherwise specified.
- Estimates refer to the cost of incentives for business expenditures on R&D, both intramural and extramural, unless otherwise specified. Direct support figures refer only to intramural R&D expenditures, except for Brazil.

Country specific notes

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<th>Country</th>
<th>Details</th>
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<tr>
<td>Argentina</td>
<td>Estimates, based on data provided by MINCyT (Ministerio de Ciencia, Tecnología e Innovación Productiva), refer to the tax credit for R&amp;D projects and exclude non-R&amp;D-specific tax credits awarded as part of the same call (i.e. &quot;Technological modernization&quot;, &quot;Technological services&quot; or &quot;Advisory services&quot;). Estimates reflect the value of tax credits of R&amp;D projects approved by Fondo Tecnológico Argentino (FONTAR), and may thus potentially overstate the actual cost of R&amp;D tax support.</td>
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<td>Estimates, on an accrual basis, refer to R&amp;D Tax Incentive, as published in the Taxation Expenditures Statement. The R&amp;D Tax Incentive replaced the previous R&amp;D Tax Concession from July 2011 onwards.</td>
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<td>Estimates, on a cash basis, refer to the refundable research premium. 2006 also includes an R&amp;D tax allowance, which was abolished in 2011. Break in BERD data series in 2006.</td>
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<td>Estimates, on an accrual basis, refer to the R&amp;D tax credit 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&amp;D component cannot be identified. Break in</td>
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<td>Estimates, based on data from the Ministry of Science, Technology, Innovation and Communications (MCTIC), refer to the R&amp;D tax allowance. Direct funding estimates for Brazil based on national sources.</td>
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<td>Estimates, on a cash basis, refer to the scientific research and experimental development tax credit for current R&amp;D expenditures (expenditures of a capital nature or expenditures for the right to use capital property (lease) do not qualify for SR&amp;ED tax incentives if incurred after 2013). They do not reflect the cost of provincial governments' R&amp;D tax incentives provided by many Canadian provinces in order to ensure the comparability of R&amp;D tax incentive estimates across countries. Estimates for the cost of accelerated depreciation provisions are not available.</td>
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<td>Estimates, on a cash basis, refer to the R&amp;D tax credit on current, machinery and buildings expenditures.</td>
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<td>Estimates, on a cash basis, refer to the WBSO payroll tax credit for R&amp;D labour and to the R&amp;D tax allowance (RDA) for non-labour related R&amp;D expenditures which was introduced in January 2012. Break in BERD data series in 2011 and 2012.</td>
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<td>Estimates for the fully refundable SKATTEFUNN R&amp;D tax incentive cover current and machinery costs.</td>
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<td>Estimates for the cost of accelerated depreciation provisions and tax deductions for R&amp;D Centres are not available. New Technology Tax Relief scheme for the acquisition of intangible assets is excluded as it does not necessarily apply to R&amp;D.</td>
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<tr>
<td>Portugal</td>
<td>Estimates, on an accrual basis, for the SIFIDE-II tax credit which includes current and R&amp;D-related capital expenditures.</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Figures, based on data published by the Ministry of Finance of the Russian Federation, refer to the R&amp;D tax allowance, accelerated depreciation provision for R&amp;D capital and the R&amp;D tax credit, which covers value-added tax exemptions on R&amp;D and property tax credits for national R&amp;D centres and organisations implementing state-approved R&amp;D projects. No estimates are available for the cost of reductions in social security contributions.</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>Estimates, on an accrual basis, refer to the R&amp;D tax allowance scheme restricted to grant recipients (Tax relief for subsidy recipients: Income Tax Act §30b). The estimate for 2015 also includes the R&amp;D super deduction introduced that year.</td>
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<tr>
<td>South Africa</td>
<td>Figures, on a cash basis, refer to the R&amp;D tax allowance and are based on the National Budget Review 2016.</td>
</tr>
<tr>
<td>Spain</td>
<td>Figures refer to the R&amp;D and innovation tax credit, including support for technological innovation. According to data from a non-random subset of firms,</td>
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<td>Country</td>
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<td>this instrument (Informes Motivados) accounts for around 40% of qualifying expenditures and deductions for R&amp;D and technological innovations. Estimates do not include the cost of the accelerated depreciation provision for R&amp;D capital. The estimates for 2014 and 2015 also refer to allowances for employers' social security contributions introduced through Royal Decree 475/2014 of 13 June. Break in BERD data series in 2008.</td>
</tr>
<tr>
<td>Sweden</td>
<td>Estimates for the cost of the partial exemption of social security contributions for R&amp;D employees introduced in Sweden in 2015 are not available.</td>
</tr>
<tr>
<td>Switzerland</td>
<td>No R&amp;D tax incentives in 2015.</td>
</tr>
<tr>
<td>Turkey</td>
<td>Estimates, on a cash basis, refer to deductions for current R&amp;D and machinery expenditures in eligible R&amp;D centres and companies (R&amp;D discount under Corporate Tax Law and Law No 5746) and to partial relief on social security contributions. Figures may include the cost of standard deductions for current R&amp;D expenditures and may therefore overstate tax support in relation to other countries. Estimates for the cost of accelerated depreciation provisions are not available.</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Estimates, on an accrual basis, refer to the Research &amp; Development Relief for Corporation Tax, and the Research and Development Expenditure Credit (RDEC) Scheme for large companies, introduced for expenditure incurred on or after 1 April 2013. Estimates for the cost of accelerated depreciation provisions are not available.</td>
</tr>
<tr>
<td>United States</td>
<td>Estimates refer to the federal research and experimentation tax credit (only corporations), based on SOI corporate tax return data. For international comparability, the cost of allowing for the expensing of research expenditures is not included. Break in BERD data series in 2008.</td>
</tr>
</tbody>
</table>

Annex 3. General and country-specific notes for indicators on direct and tax support by firm size

**General notes**

- This is an experimental indicator. International comparability may be limited, e.g. due to variations in SME definitions for business R&D vs. R&D tax relief reporting purposes. For more information on R&D tax incentives, see [http://oe.cd/rdtax](http://oe.cd/rdtax).
- For BERD and government funded BERD, SMEs figures generally refer to enterprises with 1-249 employees (i.e. excluding firms with zero employees), unless specified otherwise. A number of countries adopt additional criteria to define SME status. Independence is one relevant criterion which is currently adopted only by few countries (e.g. Canada, United Kingdom) in reporting government funded BERD and R&D tax support by firm size. This further limits international comparability. For SME definitions, see country-specific notes. For Austria, Finland and Norway, figures refer to small enterprises rather than SMEs.
- Coverage limited to countries for which relevant data on direct funding of BERD and tax incentive support for R&D by firm size are available for 2015 (or closest year). New Zealand is not included as R&D tax incentive support is limited to R&D tax losses (100% of this support is provided to SMEs).
- For the Finland, Latvia, Norway and Spain figures refer to 2014 instead of 2015. For Canada, France, Greece and the United States, figures refer to 2013.
- For Austria, France, Latvia, the United Kingdom preliminary R&D tax incentive estimates are reported for 2015 (or closest year).
- Estonia, Germany, and Switzerland did not provide expenditure-based R&D tax incentives in 2015 (or closest year).
- R&D tax incentive estimates do not cover sub-national and income-based R&D tax incentives and are limited to the business sector (excluding tax incentive support to individuals). Data refer to estimated initial revenue loss (foregone revenues) unless otherwise specified.
- R&D tax incentive estimates refer to the cost of incentives for business expenditures on R&D, both intramural and extramural, unless otherwise specified. Direct support figures refer only to intramural R&D expenditures.

**Country specific notes**

<table>
<thead>
<tr>
<th>Country</th>
<th>Details</th>
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<tbody>
<tr>
<td>Austria</td>
<td>Figures refer to small enterprises with 1-49 employees. R&amp;D tax relief estimates, on a cash basis, refer to the refundable research premium in 2015. Direct support figures, available for 2013, partially include the cost of R&amp;D tax support.</td>
</tr>
<tr>
<td>Canada</td>
<td>Figures refer to SMEs with 1-249 employees (direct support) and to CCPCs, Canadian Controlled Private Corporations (R&amp;D tax support). For a definition of CCPCs, see <a href="http://www.cra-arc.gc.ca/txcrdt/sred-rsde/clmng/glssry-eng.html#cdn">http://www.cra-arc.gc.ca/txcrdt/sred-rsde/clmng/glssry-eng.html#cdn</a>. R&amp;D tax relief estimates, on a cash basis, refer to the scientific research and experimental development tax credit for current R&amp;D expenditures. They do not reflect the cost of provincial governments’ R&amp;D tax incentives provided by many Canadian provinces in order to ensure the comparability of R&amp;D tax incentive estimates across countries. Estimates for the cost of accelerated depreciation provisions are not available.</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on a cash basis, refer to the R&amp;D tax allowance scheme introduced in 2005.</td>
</tr>
<tr>
<td>Estonia</td>
<td>Figures refer to SMEs with 1-249 employees. No R&amp;D tax incentives in 2015.</td>
</tr>
<tr>
<td>Finland</td>
<td>Figures refer to small enterprises with 1-49 employees. R&amp;D tax relief estimates refer to the R&amp;D tax allowance for R&amp;D labour costs, provided on an experimental basis over the tax years 2013 and 2014.</td>
</tr>
<tr>
<td>France</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the crédit d'impôt recherché, and exclude special provisions for social</td>
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<td>Country</td>
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<tr>
<td>security contributions by young and innovative firms (JEIs) and young university enterprises (JEUs). Estimates for the cost of accelerated depreciation incentives for capital R&amp;D are not available.</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Figures refer to SMEs with 1-249 employees. No R&amp;D tax incentives in 2015.</td>
</tr>
<tr>
<td>Greece</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the R&amp;D tax allowance.</td>
</tr>
<tr>
<td>Hungary</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, refer to the R&amp;D tax allowance but exclude special provision for social security and vocational training contributions for researchers (including Ph.D. students and doctoral candidates), the innovation contribution related R&amp;D tax allowance and the R&amp;D tax credit on R&amp;D wages.</td>
</tr>
<tr>
<td>Ireland</td>
<td>Figures of R&amp;D tax support refer to SMEs with 1-249 employees. The tax return (CT1) for companies does not differentiate between companies according to the number of employees, this information is highly tentative. The source of the employment information is the Corporation Tax return matched against employer returns. As company structures are sometimes organised in such a way that employees are paid by one company in a group, it may appear that a company has no employees but actually the employees are paid by a different company within the group.</td>
</tr>
<tr>
<td>Japan</td>
<td>Figures refer to SMEs with 1-249 employees (direct support) and to firms with a stated capital no larger than JPY 100 million (R&amp;D tax support). R&amp;D tax relief estimates are on a cash and final revenue loss basis.</td>
</tr>
<tr>
<td>Latvia</td>
<td>Figures refer to SMEs with 10-249 employees (direct support) and to SMEs with 1-249 employees (R&amp;D tax support). R&amp;D tax relief estimates refer to the R&amp;D tax allowance on current R&amp;D expenditures introduced in 2014.</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on a cash basis, refer to the WBSO payroll tax credit for R&amp;D wage cost and non-R&amp;D wage related costs and expenses attributable to R&amp;D.</td>
</tr>
<tr>
<td>Norway</td>
<td>Figures refer to small enterprises with 10-49 employees (direct support) and to small enterprises with 1-49 employees (R&amp;D tax support). R&amp;D tax relief estimates for the fully refundable SKATTEFUNN R&amp;D tax incentive cover current and machinery costs.</td>
</tr>
<tr>
<td>Portugal</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the SIFIDE-II R&amp;D tax credit.</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the R&amp;D tax allowance scheme introduced in 2015.</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the R&amp;D tax allowance scheme.</td>
</tr>
<tr>
<td>Spain</td>
<td>Figures refer to SMEs with 1-249 employees. R&amp;D tax relief estimates refer to the R&amp;D and innovation tax credit, including support for technological innovation. According to data from a non-random subset of firms, this instrument (Informes Motivados) accounts for around 40% of qualifying expenditures and deductions for R&amp;D and technological innovation. This breakdown do not account for the cost of the accelerated depreciation provision for R&amp;D capital and allowances for employers' social security contributions (worth EUR 6 million in 2014 and EUR 41 million in 2015).</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Figures refer to SMEs with 1-249 employees. No R&amp;D tax incentives in 2015.</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Figures refer to SMEs with 1-499 employees. R&amp;D tax relief estimates, on an accrual basis, refer to the Research &amp; Development Relief for Corporation Tax and the Research and Development Expenditure Credit (RDEC) scheme for large companies, introduced for expenditure incurred on or after 1 April 2013. Estimates for the cost of accelerated depreciation provisions are not available.</td>
</tr>
<tr>
<td>United States</td>
<td>Figures refer to SMEs with 1-249 employees (direct support) and to enterprises with...</td>
</tr>
</tbody>
</table>
Country | Details
--- | ---
Czech Republic | Manufacturing: NACE C; Services: NACE G-T; Other sectors: NACE A,B,D,E,F.
France | Data updated in June 2016 using the shares of the official notes (May 2013, June 2014, Nov 2015)
Japan | Manufacturing: Corporations with non-consolidated tax declaration only. Includes Textile, Chemical, Steel and metals, Machinery, Food, Publishing and printing, Other manufacturing (until 2011); Services / other sectors: Corporations with non-consolidated tax declaration only (until 2011). "Not attributed" includes corporations with approval of consolidated tax declaration and medical corporations (until 2011).
Norway | Sums by economic activity differs slightly from totals in 6.1
United Kingdom | OECD calculation based on 2017 HMRC report "Research and Development Tax Credits Statistics", September 2017. Services includes industry sector G-S (SIC 2007). Manufacturing covers sector C. The "Other sectors" category includes industry codes A, B, D, E and F. In the case of claims, "Non attributable" is calculated as difference between total claims made under the SME and large company R&D Schemes (RD1) and total number of claims made by firms for which Industry sector information is available (RD6). In the case of R&D tax benefits, "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 information is available (RD6).
United States | OECD calculation based on IRS SOI 2013 corporate tax return data. Services includes wholesale and retail trade, transportation and warehousing, information, finance and insurance, real estate, rental and leasing, professional scientific and technical services, management of (holding) companies, administrative support and waste management services and various services. The "Other sectors" category includes agriculture, forestry, fishing and hunting, mining, utilities and construction.


Annex 4. Industry sector classification - indicators on public support by main economic activity