STUDY

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Tax Incentives and Investments in the EU

Best practices and ways to stimulate private investments and prevent harmful tax practices

Policy Department for Economy and Growth
Directorate-General for Economy, Transformation and Industry
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Best practices and ways to stimulate private investments and prevent harmful tax practices

Abstract

This study evaluates the effectiveness of tax incentives, with a particular focus on incentives for research and development (R&D). It analyses different design options for tax incentives and shows that input-based R&D tax incentives appear to be the most effective in stimulating additional R&D investment. Taking into account the lessons learnt from empirical evaluations and the restrictions imposed by Pillar Two, refundable, volume-based tax credits with a broad scope remain a convincing way forward for R&D tax incentives.

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LIST OF ABBREVIATIONS

BEPS	Base Erosion and Profit Shifting
CIT	Corporate Income Tax
EEA	European Economic Area
ETR	Effective Tax Rate
EU	European Union
G20	Group of Twenty
GBER	General Block Exemption Regulation
GloBE	Global Anti-Base Erosion
IIR	Income Inclusion Rule
IP	Intellectual Property
MNE	Multinational Enterprise
MTTC	Marketable Transferable Tax Credit
Non-MTTC	Non-Marketable Transferable Tax Credit
Non-QRTC	Non-Qualified Refundable Tax Credit
NPV	Net Present Value
OECD	Organisation for Economic Co-operation and Development
OTC	Other Tax Credit
PCT	Platform for Collaboration on Tax
PWHT	Payroll Withholding Tax
QDMTT	Qualified Domestic Minimum Top-up Tax
QRTC	Qualified Refundable Tax Credit
R&D	Research and Development
SBIE	Substance-based Income Exclusion
SME	Small and Medium-sized Enterprise

SSC	Social Security Contribution
TFEU	Treaty on the Functioning of the European Union
UNCTAD	United Nations Conference on Trade and Development
UTPR	Undertaxed Profits Rule

EXECUTIVE SUMMARY

Background

Governments offer tax incentives to correct market failures and promote economic growth through increased innovation, investment, and employment. Moreover, tax incentives are strategically used to attract mobile capital in a competitive international environment while maintaining higher taxes on less mobile factors, thus safeguarding domestic tax revenues. Despite the intended positive impacts on economic activity, tax incentives may also have undesirable consequences, especially in an integrated market like the European Union (EU). Rather than stimulating overall economic activity, tax incentives may reflect a beggar-thy-neighbour policy, designed to induce the relocation of mobile economic activity and/or income rather than to increase overall levels of investment. Boundaries for the design of tax incentives are therefore set by regulations addressing harmful tax practices as well as by the global minimum tax.

Aim

The study aims to evaluate the effectiveness of tax incentives within EU, focusing particularly on incentives for research and development (R&D). The scope of the study covers an extensive analysis of both input-based incentives, such as tax credits and super deductions, and output-based incentives, including intellectual property (IP) box regimes. Its main objectives include assessing the impact of these incentives on private investment decisions, innovative activity in particular, as well as examining their compatibility with international tax regulations, specifically the OECD's global minimum tax rules under Pillar Two. On that basis, the study identifies best practices in designing and implementing these incentives to effectively stimulate private investment while minimizing risks such as aggressive tax planning and harmful tax competition.

Key Findings

The empirical literature provides robust evidence that input-based R&D tax incentives (e.g. tax credits, super deductions) effectively stimulate additional R&D investment by reducing after-tax costs. More specifically, a 10% decrease in the cost of R&D through input-based tax incentives can increase R&D spending by approximately up to 10% in the long-term. The impact is particularly strong when incentives are refundable or specifically accessible to SMEs and start-ups, primarily due to their tighter financial constraints. On the other hand, the empirical evidence on the effectiveness of output-based R&D tax incentives in the form of so-called IP box regimes is mixed. While they were originally criticised for encouraging profit shifting and providing limited additional R&D stimulus, recent evidence highlights the potential of well-designed IP boxes under the modified nexus approach to retain high-value IP, encourage commercialisation, and support domestic innovation ecosystems. Still, concerns about their effectiveness remain as potential benefits tend to be concentrated among large multinational enterprises (MNEs) and increases in patent applications may be accompanied by a decrease in patent quality.

Despite generous policy frameworks, incomplete uptake of R&D tax incentives remains a key challenge. Even in countries with mature R&D tax systems, many eligible firms, particularly small and medium sized enterprises (SMEs), fail to claim available support, moderating the overall effectiveness of these incentives. Addressing awareness and accessibility barriers should therefore be a priority for policymakers seeking to maximise the impact of (input-based) R&D tax incentives.

With the introduction of the global minimum tax (Pillar Two), policymakers must carefully assess how the various R&D tax incentives interact with this complex legal framework. Since Pillar Two imposes a 15% minimum effective tax rate on large companies, tax incentives risk being neutralised or even reversed by top-up taxes as soon as the critical effective tax rate (ETR) is undercut. An important criterion in the impact analysis is therefore the extent to which the advantage conferred by a tax incentive affects the ETR. It turns out that output-based incentives (IP boxes), which have full impact on the ETR due to the implied tax rate reductions, are at a high risk of being neutralised by Pillar Two. Meanwhile, the effectiveness of input-based incentives depends strongly on their specific design. Refundable, volume-based tax credits are more robust and likely to remain effective under Pillar Two.

Against this background, it is essential to examine best practices for designing compelling and sustainable R&D tax incentives under Pillar Two. To maximise their effectiveness, R&D tax incentives should be targeted at fostering activities associated with positive spillovers and additionality while minimising windfall gains. A well-balanced incentive design should incorporate broad eligibility, targeted scope, simplicity, timely liquidity, and streamlined administration to maximise its impact. Among the available instruments, volume-based R&D tax credits are regarded as best practice for delivering input-based support, as they directly reduce the tax liability based on qualifying R&D expenditure while minimising uncertainty and administrative burdens for taxpayers. To grant liquidity to taxpayers as directly as possible, tax credits that may be credited against payroll withholding taxes (PWHT) or social security contributions (SSC) are highly effective. Even under Pillar Two, volume-based tax credits that are refundable within four years and have a broad scope remain a best practice.

Interestingly, a comparison of R&D tax incentives across EU Member States reveals that no single country fully meets all identified best practice criteria. However, several countries have adopted key elements that serve as models. To enhance the effectiveness of R&D tax incentives while ensuring fairness, efficiency, and alignment with international frameworks like Pillar Two, governments should strive to incorporate these best practices into their policy design.

Despite the positive impact on R&D activity, R&D tax incentives can have unintended consequences, especially in an integrated region like the EU. Rather than increasing global R&D investment, R&D tax incentives can increase the risk of beggar-thy-neighbour policies, i.e. shifting R&D activities across borders rather than expanding the overall level of global R&D investment. These cross-border distortions are particularly pronounced among MNEs operating in geographically proximate countries. Larger MNEs with significant R&D operations are especially responsive, as the benefits of tax planning scale with firm size, while implementation costs remain relatively fixed.

1. INTRODUCTION

Governments use tax incentives to boost investment, innovation and employment. Since tax incentives reduce the effective tax liability, they may effectively steer economic activities in favour of pre-defined policy targets. For the purpose of this study, cross-country differences in tax regulations are not considered as a tax incentive. Likewise, direct subsidies or grants, which countries may alternatively or additionally introduce to reach the desired policy goals, are not part of this report, either.

The main justification for tax incentives are market failures and positive spillover effects that benefit the society. In particular, R&D tax incentives are considered well-justified (Spengel et al., 2022) and they are widely used throughout the world (OECD, 2024c). Given the high tax policy relevance of R&D related tax incentives and in view of broad empirical evidence highlighting strengths and weaknesses of potential design elements of R&D related tax incentives, this study will put its focus on this type of incentives.

A sustainable tax policy, in particular under tight budgets, requires a careful balancing between tax revenues and policy goals (Gundert et al., 2024). Thus, it is relevant to analyse what characterises compelling and sustainable tax incentives. Boundaries for the design of tax incentives are set by regulations addressing harmful tax practices as well as by the global minimum tax. The global minimum tax, also known as Pillar Two, levies a minimum effective tax rate of 15% on profits generated by large companies by means of a top-up tax. Since tax incentives potentially reduce the tax liability below these 15%, an interaction between tax incentives and Pillar Two is key to identify the way forward for tax incentives.

Against this background, the aim of this study is to examine the effectiveness of R&D tax incentives and to provide guidance on best practices in the design of R&D related tax incentives in light of Pillar Two. The analysis of the empirical evidence on existing R&D tax incentives leads to the conclusion that combining broad eligibility, targeted scope, simplicity, timely liquidity, and streamlined administration offers the greatest potential to foster innovation and generate sustainable economic benefits. With respect to the targeted scope, empirical evidence shows that input-based R&D tax incentives seem to be the most effective in stimulating additional R&D investment since they provide a stronger link to R&D activity as opposed to output-based incentives. In addition, the analysis shows that output-based tax incentives, e.g. in the form of IP box regimes, are likely to be affected by Pillar Two. The effect of Pillar Two on tax credits, by contrast, depends on their particular design. Accelerated depreciation and immediate expensing schemes for tangible assets turn out to be unaffected by Pillar Two. To sum up, taking the lessons learnt from empirical evaluations and the restrictions imposed by Pillar Two into account, refundable, volume-based tax credits with a broad scope remain a convincing way forward for R&D tax incentives.

This study is structured as follows: Section 2 provides some basic considerations on the design and implementation of tax incentives. Section 3 analyses the main design and administrative features of existing R&D tax incentives. It also provides a comprehensive review of the empirical evidence on the effectiveness of different R&D tax incentives. Section 4 examines how different types of tax incentives interact with the Pillar Two provisions and to what extent their effectiveness might be affected under Pillar Two. Based on the insights from Sections 3 and 4, Section 5 derives country best practices. Section 6 concludes.

2. BASIC CONSIDERATIONS ON THE DESIGN AND IMPLEMENTATION OF TAX INCENTIVES

KEY FINDINGS

Tax incentives grant special tax treatment to eligible taxpayers or eligible economic activity.

- Tax incentives induce temporary or definite tax savings, which increase the present value of the after-tax cash flow of the incentivized investment.
- This may incite additional investment relative to activity levels under standard tax treatment.
- The main justification for tax incentives is that they should help to overcome underinvestment due to market failures.

Boundaries for the design of tax incentives are set by regulations addressing harmful tax practices as well as by the global minimum tax. Since tax incentives may result in revenue losses, it is crucial to evaluate whether the incentive is in line with its policy objective.

The idea of tax incentives is that a targeted group of taxpayers and/or a targeted activity is subject to a special tax treatment. This special tax treatment deviates from the standard tax treatment in a way that those taxpayers/activities face a reduced or postponed tax liability. The intention is that these reductions in the effective tax liability steer economic activities in favour of pre-defined policy targets. The generosity of tax incentives is measured relative to the standard tax treatment in the respective country. The OECD is providing detailed country overviews on available tax incentives (OECD, 2025a; OECD, 2025b; Celani et al., 2022).

Tax incentives may be available for any type of tax (corporate income tax, value added tax, payroll tax or other) and differ with respect to (a) eligibility conditions, (b) the way the incentive reduces the tax burden, (c) design elements limiting the revenue costs.

In line with the objective of the particular tax incentive, governments need to define eligibility conditions. These stipulate the necessary criteria to be met by the taxpayer in order to benefit from the particular tax incentive. The most common eligibility conditions refer to the sector of activity, the geographic region, ownership conditions, size thresholds, investment thresholds, or outcome conditions. As one outcome of the OECD Base Erosion and Profit Shifting (BEPS) report, the criterion of economic substance has gained importance (OECD, 2015a). Eligibility criteria may also refer to required outcomes, for example productivity improvements, environmental improvements (e.g. increased energy efficiency, use of renewable energy sources), development of human capital (e.g. increased amounts spent on skills development and job creation) or trade promotion (Celani et al., 2022).

As with direct subsidies, it is usually difficult for governments to anticipate which technology or sector features the best growth perspectives or offers the largest potential for positive spillover effects. This is why narrowly defined eligibility conditions targeting very specific groups of taxpayers or types of activity can prove inefficient or ineffective in achieving broader policy goals. If tax incentives are too selective, they may induce competitive distortions and ultimately even conflict with EU State Aid law. Finally, stability and awareness of the introduced tax incentives have been shown to be highly relevant for the uptake of the incentives by investors.

When eligibility conditions are met, there are different ways a specific instrument reduces the tax burden. Tax incentives are either input- (expenditure-)based or output- (income-)based. Input-based tax incentives either grant tax deferrals (e.g. accelerated depreciation) or provide for definite tax relief (e.g. super deduction of qualifying expenditure). Furthermore, the tax liability can

be reduced by tax credits determined as a percentage of qualifying expenditure. Tax incentives for R&D activity tend to be input-based in many countries. These are analysed in Section 4. Output-based tax incentives can either offer a reduced tax rate on qualifying income or take the form of a tax holiday, i.e. a pre-defined timespan in which the income is fully or partially exempt from taxation. IP box regimes constitute a very common output-based tax incentive in developed countries (González Cabral et al., 2023).

The mechanism of how tax incentives work is that they induce temporary or definite tax savings, which are cash effective. Firms thus improve their liquidity and the present value of the after-tax cash flow of the incentivized investment increases. Hence, the incentive lowers the minimum required pre-tax rate of return - i.e. the cost of capital - of the investment, inciting additional investment relative to activity levels under standard tax treatment. Still, investment activity also depends on non-tax factors. In particular, there can be fundamental barriers to investment (underdeveloped infrastructure, weak institutions, low education of the workforce). Tax incentives may turn out ineffective as long as such fundamental barriers persist (James, 2013).

Purposes of Tax Incentives

Tax incentives are a very common tax policy tool in many countries and they are granted for a variety of purposes. The main justification for tax incentives is that they should help to overcome market failures. More specifically, the aim is to encourage investments associated with positive spillovers to the society. Positive spillovers imply that social benefits exceed the private benefits which are priced in private market transactions. As a consequence, activity levels achieved in private market equilibrium are insufficient from a social perspective. For example, R&D tax incentives are commonly justified on the grounds that private sector investment into R&D falls below the socially desirable level due to positive spillovers from R&D (Spengel et al., 2017; Appelt et al., 2016). The fact that R&D tax incentives can be justified with reference to market failure may explain why they are the most widely used type of tax incentive. Hence, the focus in Sections 3 to 5 will be on R&D tax incentives.

Beyond market failure and public good provision, international tax competition creates an additional and powerful driving force behind the introduction of tax incentives. According to broad empirical evidence, foreign direct investments as well as profits derived from real activities are tax sensitive (Feld and Heckemeyer, 2011). The scope for a general race to the bottom of the corporate income tax rate is, however, limited when countries face revenue constraints. Against this background, introducing tax incentives is a rational policy instrument to attract mobile tax bases while keeping tax rates up on less mobile activities or factors other than (income from) capital (Janeba and Smart, 2003; Keen, 2001). International tax coordination, e.g. by the OECD and the EU, intends to prevent harmful tax competition based on aggressive, opaque forms of tax incentives.

Moreover, tax incentives can be put in place to mitigate undesirable behavioural distortions emanating from the current tax system. One timely example of a tax incentive designed to correct undesirable existing distortions in the tax code is the debt-equity bias reduction allowance (DEBRA) (European Commission, 2022). In standard income tax systems, due to the tax deductibility of interest expenses, debt financed investments face a lower cost of capital than equity financed investments. The DEBRA proposal intends to relieve the tax discrimination of equity financing by granting a tax allowance on new equity and restricting the deductibility of interest expenses. Several studies comprehensively analyse and discuss this proposal (e.g. Gschossmann et al., 2025; Bettens, 2022; Ismer, 2022).

Finally, political economy reasons may play a role as well in the introduction or retention of certain tax incentives. First, politicians might favour tax incentives over direct spending as they do not

directly affect budgets and the outcome is difficult to scrutinize. Second, in the political process of introducing a specific tax rule there will be an interaction between political stakeholders and institutions. Santos de Souza (2013) and Di John (2006) discuss this issue for developing countries in particular when there exist weak institutions and powerful elite groups. They argue that when interest groups benefit from a preferential tax regime they will lobby in favour of its implementation, generosity and permanence. Third, evidence shows that once a country introduces some preferential tax treatment, there is political pressure to expand its scope of application (Klemm and van Parys, 2012).

Desired and Undesired Effects of Tax Incentives

For the reasons pointed out above, governments all over the world make extensive use of tax incentives as a tax policy tool. When incentives are well designed and successful in inducing additional economic activity, governments can achieve revenue gains. Still, depending on the incentives' generosity and induced competition effects, tax incentives can also erode tax revenue and induce unintended distortions. The revenue costs might increase even more when the system can be abused (Bird, 2008). Indirect revenue costs associated with the tax incentive result when the tax favoured investment type crowds out higher taxed alternative investments, which are not subject to the incentive (James, 2013). Beyond revenue costs, the tax incentive might also cause non-revenue costs, which take the form of new distortions introduced, administrative and planning costs to receive the incentive, as well as compliance costs. In view of the mentioned cost related to the introduction of tax incentives and the limited public resources available, a thorough evaluation and cost-benefit analysis is crucial for taking informed decisions about the appropriateness of each incentive (Beer et al., 2022; Heady and Mansour, 2019).

The effects of a particular tax incentive may be difficult to quantify. First, taxpayer responses to tax incentives may materialize only in the medium or longer term due to adjustment costs. Second, counterfactual developments that would have occurred in absence of the particular incentive are difficult to observe if suitable control groups are missing. Third, an incentive might not increase investments overall but simply induce relocation of activities (Knoll et al., 2021). Fourth, when more than one tax incentive is in place, which is mostly the case, these potentially interact and the resulting spillovers are difficult to attribute (Mosquera Valderrama, 2021).

Despite these fundamental difficulties in quantifying the effects of tax incentives, state-of-the-art econometric research has managed to produce an impressive amount of empirical evidence on the functioning and the behavioural effects of tax incentives. This evidence on the benefits of tax incentives shows that the specific design and the specific context are crucial for achieving desired policy goals. Section 3 summarises this evidence for R&D related tax incentives.

Legal Boundaries to the Design of Tax Incentives

Since tax incentives have repercussions on international tax competition, the EU Code of Conduct, EU State Aid Rules, as well as the OECD Forum on Harmful Tax Practices are meant to provide guidance and boundaries for the design of tax incentives.

On the basis of the Code of Conduct for business taxation, EU Member States agreed to abandon tax regulations considered harmful. The preferential tax measure is considered harmful when (1) the tax advantages are ring-fenced (granted to non-residents only), (2) the tax advantage is granted regardless of any real economic activity taking place, and (3) the rules are not made transparent. Several examples show how Member States modified their preferential tax regimes that were considered harmful according to the Code's criteria (Fuest, 2013; Cattoir, 2006). As a direct outcome of OECD BEPS Action 5, many countries had to revise their IP box regimes to incorporate the modified nexus approach which essentially makes the tax benefit of these regimes conditional on R&D activity performed in the respective country (OECD, 2015a).

The second and complementary strategy to combat harmful tax competition in the EU is the administrative control over State Aid provided by the Member States. Essentially, EU State aid rules ensure that Member States do not grant selective government support to companies because this could provide them with an unfair advantage over competitors. Depending on the specific design of tax incentives, they may qualify as State Aid in accordance with to Article 107 (1) of the Treaty on the Functioning of the European Union (TFEU), Article 107 TFEU prohibits State Aid unless the aid is exceptionally justified because it is compatible with fostering a well-functioning and equitable economy. This opens up leeway for some particular fields of tax incentives such as for R&D or the green transition. Based on the General Block Exemption Regulation (GBER), certain categories are considered compatible with the internal market at the condition that benefits to society outweigh distortions. This captures also incentives for R&D and innovation as well as environmental protection. In addition, the Community framework for State Aid for Research and Development and Innovation includes an economic assessment whether the regulation addresses a well-defined market failure, is well targeted and does not introduce distortions considered incompatible with the Common Market.

The third set of relevant supranational influence on the design of tax incentives is the OECD Forum on Harmful Tax Practices, which reviews and monitors preferential tax regimes. While the motivation is similar to the EU Code of Conduct for business taxation, the OECD puts special emphasis on regulation for mobile activities. To give some examples, the tax regimes recently reviewed include IP boxes, investment promotions, headquarters regimes, distribution centre and service centre regimes, holding companies regimes. In its latest version, a particular focus of the monitoring has been on the lack of substantial activity. Despite not being legally binding, the progress reports on these regimes reveals its practical relevance in the sense that countries indeed adjust or abolish the regimes under review.

Beyond regulations addressing harmful tax practices, the global minimum tax, which was introduced to combat aggressive tax planning and to set a floor on international tax competition, has an impact on the design of tax incentives for large firms (see Section 4).

3. THE DESIGN AND USE OF R&D TAX INCENTIVES

KEY FINDINGS

Countries employ a diverse mix of R&D tax incentives, each with distinct economic rationales and implications for policy outcomes:

- Input-based R&D tax incentives seem to be the most effective in driving additional R&D investment by lowering after-tax costs, with strong empirical evidence confirming their positive impact, especially when refundable or accessible to start-ups and SMEs.
- Output-based incentives have evolved with the modified nexus approach, showing potential to retain high-value IP, drive commercialization, and support innovation ecosystems, but concerns remain about their benefits favouring large multinational firms and their potential to distort competition.

Thus, well-designed input-based incentives should be prioritized due to their stronger link to R&D activity and robust empirical evidence supporting their effectiveness in driving additional R&D while minimizing windfall gains, especially when features like refundability and clear eligibility criteria are included.

3.1. Input-based Incentives

The most common form of fiscal R&D incentives are input-based tax incentives. These measures directly link their eligibility to a firm's R&D expenditures, typically defined according to the OECD's Frascati Manual (OECD, 2015b). As of 2023, there were 76 different input-based R&D tax incentives in place across OECD countries (OECD, 2025a). Within the EU Member States, 43 different input-based R&D tax incentives existed (see Table 8, Annex). These figures reflect the fact that several countries offer multiple incentives simultaneously, while others, such as Bulgaria, Estonia, Latvia, and Malta, do not provide any input-based R&D tax incentives at all.

The generosity of R&D tax incentives largely depends on their specific design features. However, the significant variation of the existing incentives across countries makes direct cross-country comparisons complex. The following sections will therefore outline the rationale, core design elements, and key differences of the existing input-based R&D tax incentives.

3.1.1. Economic Mechanism

Input-oriented R&D tax incentives aim to stimulate private R&D investments by reducing the after-tax cost of eligible R&D expenditure (Rao, 2016). At the core of the mechanism is the price effect. By reducing the effective cost of R&D inputs – such as wages for researchers, equipment, and materials – firms face a lower marginal cost when deciding whether to invest in R&D. This makes additional R&D projects financially viable, especially those closer to the firm's threshold of profitability. The result is an outward shift of firm's demand curve for R&D inputs (Hall, 1993), leading to an increase in R&D activity at the firm level.

In addition, input-based R&D tax incentives act as a tax shield, which reduces the overall corporate tax burden in proportion to the firm's qualified R&D expenses. This tax shield is not tied to the success of a particular R&D project (in contrast to outcome-based schemes like IP boxes). Thus, it provides certainty that the investment will generate tax benefits regardless of the project's outcome. Firms can claim benefits based on actual, documented expenditures rather than uncertain future income streams. This certainty makes such incentives more attractive, especially in a high-risk environment.

However, the definition of eligible R&D activities and the documentation requirements can still impose an administrative burden. Clear guidance and simplified compliance procedures can enhance accessibility and uptake. In addition, the pre-requisite of a sufficient corporate income tax (CIT) liability is a significant limitation of existing input-based R&D tax incentives. This is because such incentives typically operate by reducing a company's taxable income or directly offsetting its corporate tax liability. If a firm generates little or no taxable profit, common among early-stage companies or those heavily investing in R&D without immediate returns, it may not have enough tax liability to fully benefit from the incentive. In cases without a refund mechanism, only firms that are profitable – and thus have a sufficiently large CIT liability – can utilise the full value of the R&D tax incentive. This structure may disadvantage less-profitable firms, such as start-ups or small and medium-sized enterprises (SMEs), which are often key drivers of innovation (see Acheson and Malone (2020) for an overview). As noted by Hall and Van Reenen (2000), this dynamic can discourage firms with limited taxable income from applying for R&D tax incentives altogether, potentially reducing the overall effectiveness of the policy.

3.1.2. Design Elements

a. Eligible Taxpayer

Eligible taxpayers for input-based R&D tax incentives typically include (corporate) entities subject to (corporate) income tax within a country. Eligibility criteria often focus on the nature of the R&D activities conducted rather than the legal form of the entity. Thus, most input-based tax incentives support firms regardless of their size or industry sector. However, many countries introduce specific provisions to ensure broader access for SMEs, recognising their potential innovation capacity and financial constraints.

In most cases, both resident and, under certain conditions, non-resident firms with a taxable presence (e.g., a permanent establishment) can claim the incentive, provided the R&D is performed within the country or within specified areas, such as the EU or European Economic Area (EEA), to comply with legal requirements. Some regimes also allow partnerships or sole proprietors to benefit if they are subject to income tax on business profits. Importantly, eligibility may be contingent on the taxpayer bearing the financial risk of the R&D project and retaining rights to the resulting intellectual property or knowledge, ensuring alignment with policy goals to stimulate domestic R&D investment.

To limit administrative costs, which can be disproportionately high relative to the fiscal benefit for small claims, some countries impose minimum R&D expenditure thresholds as a condition for accessing R&D tax incentives. While this approach can improve administrative efficiency by reducing the number of low-value claims, it risks excluding younger, smaller, or cash-constrained firms that are less able to meet such thresholds. As a result, these requirements may inadvertently distort competition by limiting access to public support for firms that often face greater financing barriers but have high innovation potential.

b. Eligible R&D Expenditure

Definitions of R&D or other types of expenditures eligible for tax relief differ across countries and sometimes deviate from the OECD Frascati Manual. Nevertheless, most governments aim for consistency with the Frascati standards to ensure a clear delineation of qualifying R&D activities and expenditures (Spengel et al., 2017). A precise definition is essential to effectively target support and avoid unintended subsidies for non-R&D activities.

The scope of eligible R&D expenditures varies significantly across existing tax incentive regimes. Some countries limit eligibility to R&D wages, while others employ a much broader definition that

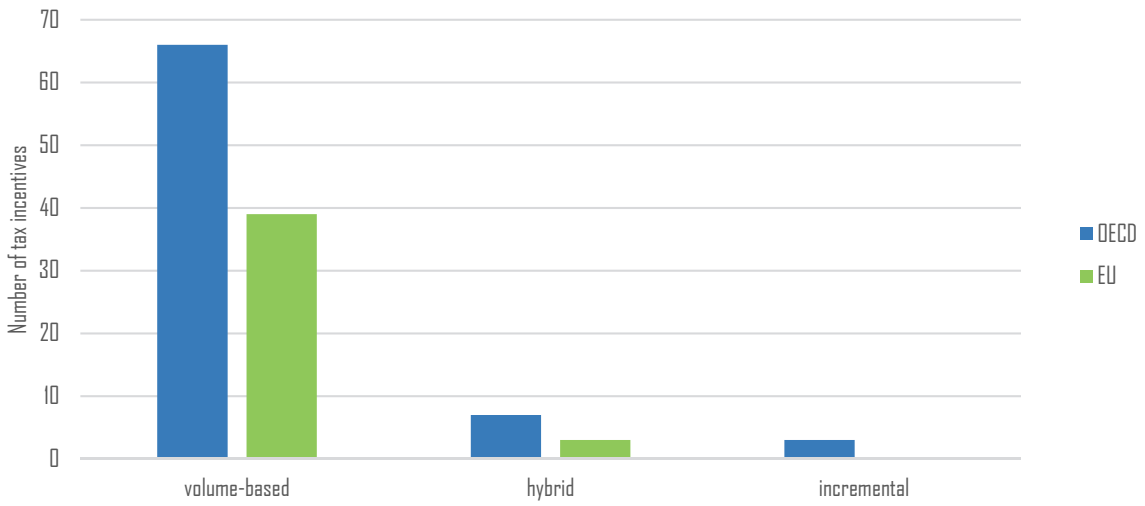
includes allowances for machinery and buildings as well as overhead costs. Most incentives focus on current expenditures, particularly labour costs, given the labour-intensive nature of R&D. Emphasising labour costs also encourages investment in domestic human capital, generating positive spillovers (Appelt et al., 2016). Capital acquisitions are less frequently supported. In addition to internal R&D costs, many regimes allow for the inclusion of subcontracted or outsourced R&D. This ensures that external research activities are not disadvantaged compared to in-house R&D. Typically, the commissioning firm - bearing the financial risk and retaining the rights to the results - qualifies as the beneficiary of the incentive. This is particularly relevant for SMEs, which often lack sufficient internal R&D capacity (Spengel et al., 2017). To comply with EU law, particularly the freedom of establishment (Articles 49 et seq. TFEU) and the freedom to provide services (Articles 56 et seq. TFEU), eligibility for subcontracted R&D should not depend on the location of the service provider. Any geographic restriction should be limited to R&D activities conducted within the EU or EEA.

c. Tax Base: Volume-based, Hybrid or Incremental

The generosity of R&D tax incentives primarily depends on how governments define the tax base, i.e. the amount of eligible R&D expenditure. In practice, three types of base definitions can be distinguished: volume-based, incremental and hybrid approaches. Figure 1 provides an overview of the different approaches used in OECD and EU countries in 2023.

In 2023, most governments apply volume-based R&D tax incentives, which cover all qualifying R&D expenditure. For firms, a volume base is simple, reduces administrative and compliance costs, and makes the financial benefit easier to predict. However, from a government perspective, volume-based R&D tax incentives are often more expensive and carry a higher risk of subsidising infra-marginal R&D activities that would have occurred without the incentive. They are also more vulnerable to relabelling, where firms reclassify non-R&D expenses to benefit from the scheme (Larédo et al., 2016; Chen et al., 2021).

Figure 1: Overview on Tax Base Definitions (Volume-based, Hybrid, Incremental)



Source: Own illustration, based on data of OECD (2025a), INNOTAX.

Note: This figure shows the distribution of volume-based, hybrid and incremental tax base definitions for R&D tax incentives in EU and OECD countries in 2023, based on the OECD's INNOTAX homepage.

In contrast, incremental tax bases - used to a limited extent in OECD and EU countries - aim to target additional R&D effort by providing relief only for spending above a predefined threshold, such as a rolling average of past expenditure or a fixed reference period. This approach reduces

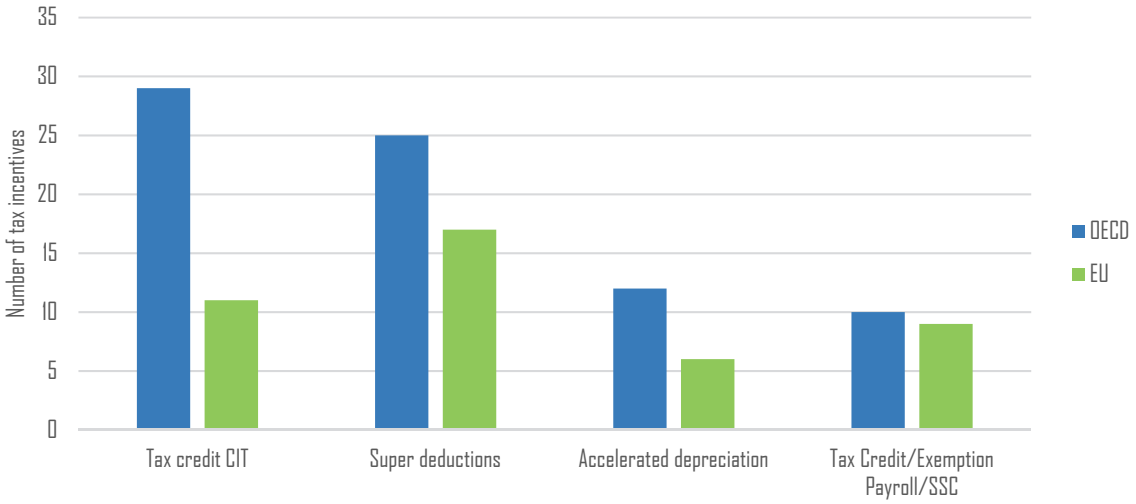
the risk of subsidising infra-marginal R&D projects (Bozeman and Link, 1984) or systematic re-labelling (Larédo et al., 2016). Thus, they may better support firms with rapidly growing R&D activities. However, the main drawback of incremental tax bases is the increased complexity, which increases the administrative and compliance burden for both firms and governments. In addition, depending on the definition of the incremental tax base, firms may be discouraged from sustainably increasing R&D activities as this would increase future thresholds (Straathof et al., 2014; Correa et al., 2013). In stagnating economic environments, this type of incentive may be less effective, as incremental R&D spending may be zero or negative (Appelt et al., 2016). In 2023, only Japan, Mexico and Türkiye applied an incremental tax incentive.

To balance predictability and targeting, some countries rely on hybrid schemes, combining elements of both approaches. These schemes offer a basic incentive for all R&D expenditure (i.e. volume-based), with a higher incentive rate applied to incremental spending. While hybrid models aim to optimise cost-effectiveness, they can further increase complexity for taxpayers and tax administrations (Criscuolo et al., 2009).

d. Tax Incentive Type

Most countries allow current R&D costs to be written off in the same year in which they are expensed. In addition to this immediate expensing, governments use various input-based R&D tax incentives to stimulate private investment in R&D. The main types include R&D tax credits, super deductions, accelerated depreciation schemes, and reductions in payroll taxes or SSCs. Figure 2 shows that R&D tax credits are the most common form of fiscal support among OECD countries, while super deductions dominate in EU Member States. Accelerated depreciation and payroll or SSC tax incentives are less frequently used, but offer alternative ways of reducing the cost of R&D activities.

Figure 2: R&D Tax Incentive Types: An Overview of OECD and EU Practices



Source: Own illustration, based on data of OECD (2025a), INNOTAX.

Note: This figure shows the number of R&D tax incentive types among the existing R&D tax incentives in EU and OECD countries in 2023.

Although all these measures directly link to firms' R&D expenditure, they differ in terms of predictability and liquidity. Accelerated depreciation and super deductions reduce the (corporate) income tax base, while (partial) exemptions from the payroll tax or SSC and tax credits reduce the corporate tax liability. Among these, tax credits - particularly volume-based tax credits - are valued for their ease of integration into R&D investment planning, as firms only need to know their planned R&D spending and the applicable credit rate (OECD, 2003). They also do not reduce pre-tax earnings, maintaining reported profitability. This visibility makes them especially attractive for multinational firms, where capital allocation often depends on pre-tax earnings (HM Treasury, 2012).

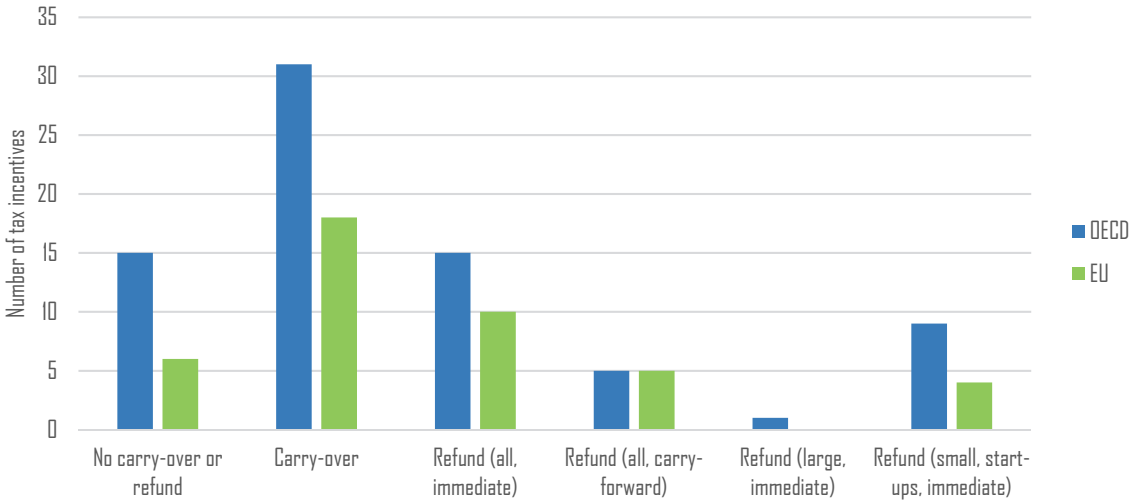
Reductions in payroll taxes and SSCs linked to R&D staff costs provide upfront subsidies that do not depend on profitability, making them particularly useful for start-ups and SMEs with limited or no taxable income. As payroll taxes are usually paid monthly, these incentives improve liquidity earlier than income tax reliefs. Moreover, payroll-based incentives may be simpler to monitor and less prone to accounting manipulation than profit-based measures. However, they carry a higher risk of being absorbed by increased wages for R&D personnel rather than expanding R&D employment (Lokshin and Mohnen, 2012; Haegeland and Moen, 2007; Goolsbee, 1998).

e. Treatment of Unused Claims

EU and OECD governments use several options to alleviate the limitations that arise when firms are unable to fully utilise the tax benefit due to insufficient tax liability (see Figure 3). These limitations can in particular occur when input tax incentives are not functioning via the reduction of payroll taxes or SSCs[1]. Within EU Member States, the most common approach is the carry-forward of unused R&D tax incentives. This mechanism allows firms to claim unutilised tax relief in future fiscal years, once they have sufficient taxable income. While carry-forwards prevent the complete loss of the tax benefit, they often introduce significant time lags between when the R&D investment is made and when the benefit is realised. This delay can particularly disadvantage less-profitable firms and SMEs, which often face tighter cash flow constraints and greater uncertainty regarding future profitability. Some governments address this issue by combining carry-forwards with cash refunds. In such cases, firms may receive a refund if they have been unable to use the carried-forward benefit within a specified period.

[1] Unused claims of R&D tax incentives can potentially affect all types of input-based incentive, regardless of whether they are offset against CIT or payroll taxes and SSCs, albeit in different ways. Incentives linked to CIT have a higher risk to be confronted with unused R&D tax incentives, as firms only benefit when they have taxable profits. In contrast, incentives offset against payroll taxes and SSCs are generally less prone to being unused, since these obligations arise independently of a firm's profitability. Nevertheless, unused R&D claims may still occur, particularly among SMEs, start-ups and for self-employed individuals, due to refund limitations tied to the total amount of payroll tax and SSC liabilities of a pre-specified period.

Figure 3: Treatment of Unused R&D Claims: An Overview of OECD and EU Practices



Source: Own illustration, based on data of OECD (2025a), INNOTAX.

Notes: This figure provides an overview of the common practices for the treatment of unused R&D credits among the existing R&D tax incentives, and how often they are used in the EU and OECD countries in 2023.

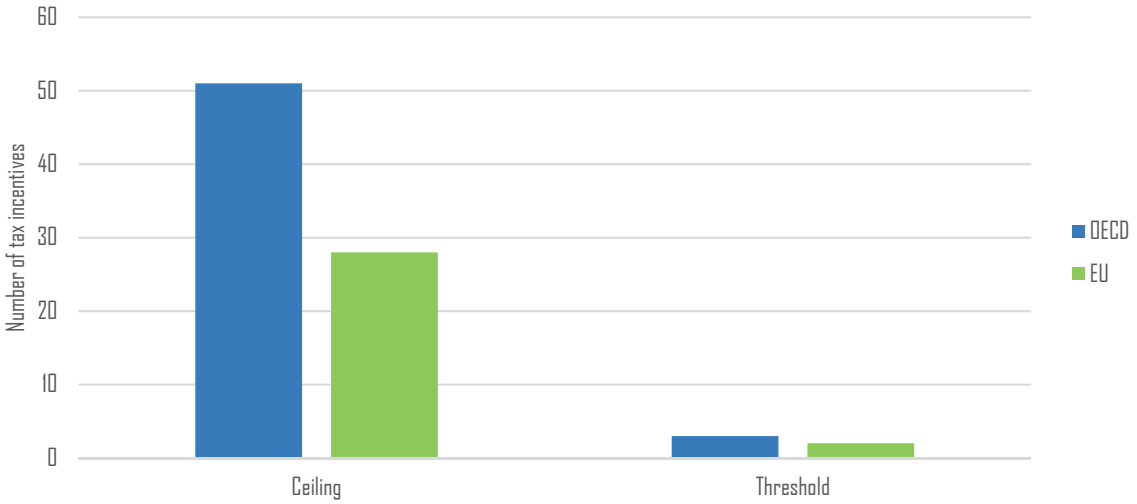
The most beneficial approach is the provision of immediate cash refund[2], which is provided for 10 EU tax incentives. This approach provides firms with direct payments or refundable amounts when their tax liability is too low to offset the full value of the incentive. Functioning similarly to a direct subsidy, refundable tax incentives can relax financial constraints, enhance liquidity, and lower the risks associated with R&D investment—particularly for early-stage or high-risk projects. Moreover, immediate refunds or refunds within a short timeframe increase the predictability of the financial support, which can play a crucial role in firms' investment planning and decision-making processes.

f. Limitations of Tax Benefits

Governments can use brackets/thresholds or ceilings to control the fiscal cost of R&D tax incentives and promote a more efficient and equitable distribution of benefits. These measures often result in implicit targeting of smaller firms, which typically have lower R&D expenditures compared to larger companies. Bracket systems generally offer higher incentive rates for expenditures within the lower brackets, benefiting firms with modest R&D budgets. Alternatively, ceilings place a cap on either the amount of eligible R&D expenditure or the total tax benefit a firm can claim. While these mechanisms help managing public finances, they may also distort firms' optimal R&D investment decisions. Firms may adjust the timing or structure of their R&D activities, such as spreading expenditures over time or among subcontractors, to maximise their access to tax benefits. Among EU and OECD countries, ceilings are commonly used to limit the R&D tax benefit (see Figure 4).

[2] An immediate tax refund for R&D tax incentives refers to the process by which a company receives the financial benefit of excess tax benefits without delay, either through a direct cash payment or by offsetting current or past tax liabilities. The term immediate recognizes that the timing of the refund depends on the tax base to which the incentive applies. The fastest form of immediate settlement occurs when the benefit is credited against periodic obligations such as monthly payroll taxes and SSC. Alternatively, an immediate refund can also occur through the annual CIT return. In all cases, immediate contrasts with mechanisms like carry-forwards, where the benefit is postponed to future tax periods. The key principle is that the tax benefit is made available to the taxpayer as soon as administratively possible under the applicable tax system.

Figure 4: Limitations of Tax Benefits: An Overview of OECD and EU Practices



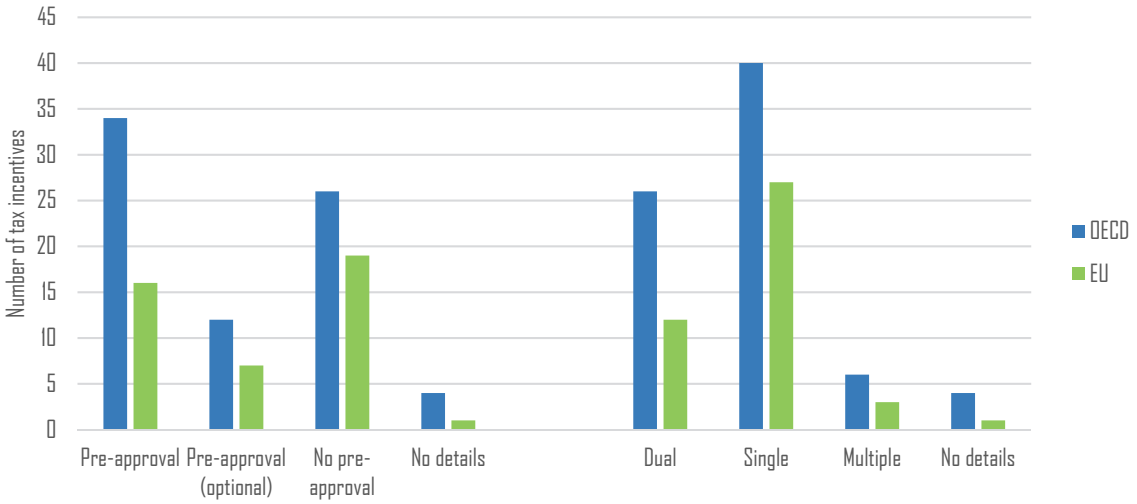
Source: Own illustration, based on data of OECD (2025a), INNOTAX.

Note: This figure provides an overview of the common practices on the limitation of R&D tax benefits, and how often they are used in the EU and OECD countries in 2023.

3.1.3. Administration

An alternative to closely monitoring the fiscal burden of R&D tax incentives is the implementation of pre-approval procedures for eligible R&D expenditures. Under such systems, firms must apply in advance to document and justify the nature of their R&D activities before they are able to claim tax benefits. Within the EU, 23 R&D tax incentive schemes include a pre-approval mechanism (16 of which are mandatory and seven optional). A similar pattern can be observed across OECD countries (see Figure 5). In mandatory pre-approval regimes, the assessment of R&D eligibility is often delegated to specialised authorities outside the tax administration (dual application). These agencies are better equipped to evaluate the scientific and technological merits of R&D projects. Once eligibility is established, tax authorities then calculate the specific amount of the tax benefit. This division of responsibilities helps to address the fact that tax administrations typically lack the specialised expertise required to assess innovative activities in detail. Pre-approval increases predictability for both governments and firms, as it provides clarity regarding which projects and expenditures qualify for support. However, these procedures can impose significant administrative costs on both sides, due to the need for detailed audits and evaluations of the submitted R&D projects.

Figure 5: Administration of Tax Incentives: An Overview of OECD and EU Practices



Source: Own illustration, based on data of OECD (2025a), INNOTAX.

Note: This figure provides an overview of the administrative aspects of existing R&D tax incentives in the EU and OECD countries in 2023. The left part indicates the amount of tax incentives that require or offer the possibility of a pre-approval to apply for the tax benefit. The right part indicates the amount of authorities that are included in the application process.

3.1.4. Empirical Evidence

Input-based R&D tax incentives—policies that reduce firms' tax liabilities in proportion to their qualifying R&D expenditures—are a central tool in many countries' innovation strategies. Empirical studies consistently confirm their ability to stimulate private R&D spending. However, the magnitude and scope of their effectiveness vary considerably across different contexts and methodological approaches.

a. Effectiveness in Stimulating R&D Expenditures

A consistent finding across studies is that input-based tax incentives generally lead to increased private R&D spending, demonstrating input additionality in the country where the input-oriented R&D tax incentives is implemented. Meta-analyses, such as those by Becker (2015) and Castellacci and Lie (2015), suggest a positive, though heterogeneous, effect. Bloom, Griffith, and Van Reenen (2002) estimate a price elasticity of R&D with respect to its user cost of around -0.5 (-1) in the short-term (long-term), indicating that a 10% decrease in the cost of R&D through tax incentives can increase R&D spending by approximately 5% (10%) in the short-term (long-term). In contrast, more recent firm-level studies find substantially larger elasticities, ranging from -1.6 (Guceri and Liu, 2019) to -4.1 (Dechezleprêtre et al., 2023) for the UK R&D tax credit or to -2 for the US federal R&D tax credit (Rao, 2016).

Appelt et al. (2025) offer a compelling explanation for the differences in estimated magnitudes between cross-country studies and firm-level analyses. Cross-country studies often assume that all eligible firms take up R&D tax incentives. In reality, however, fewer than half of R&D-performing firms receive R&D tax relief in an average country-industry pair. When adjusting for real uptake, the estimated impact of R&D tax incentives on expenditures increases significantly, aligning more closely with the higher elasticities reported in firm-level studies. This finding aligns with broader evidence on tax incentives, including the work of Cui et al. (2022) and Zwick (2021), suggesting that failure to account for actual utilization leads to underestimating the effectiveness of tax relief programmes.

b. Uptake and Design Heterogeneity

The incomplete uptake of R&D tax incentives is a key factor moderating their effectiveness (Labeaga et al., 2014; Hægeland and Møen, 2007). Even in countries with mature systems, many eligible firms - particularly SMEs - do not claim available support. Appelt et al. (2025) document striking variation: while uptake rates reach 80% among medium and large firms in France, they drop to just 10% among SMEs in New Zealand. The (descriptive) analysis shows that uptake is lower in the initial years after introduction due to limited awareness and complexity in the application process. If firms become more familiar with the incentives, uptake rises over the first 4 years, and remains (on average) stable afterwards. Another potential explanation is that firms require time to adapt their R&D processes to benefit from the incentives. Appelt et al. (2025) find that large firms, in particular, take longer to adjust their internal procedures than smaller firms. Nevertheless, even SMEs appear to favour increasing expenditures on subcontracted R&D, rather than hiring new employees, to maximise tax benefits and R&D activity (Agrawal et al., 2020).

In addition, Appelt et al. (2025) observe a higher uptake if the value of the benefits for which they are eligible is greater and if more generous design features (such as volume-based, immediate refund) are implemented. This is in line with findings that immediate refund options as well as a more generous credit rate to SMEs enhance the effectiveness of input-based R&D tax incentives (Agrawal et al.,2020). Estimates related to more uncertain schemes (i.e. shift in the scheme features, super deductions instead of tax credits, carry-forward versus immediate refund rules) are on average less significant than estimates associated with more clear and stable tax schemes (Blandinières and Steinbrenner, 2021). Furthermore, introducing a cap or a pre-approval process does not relate to a decrease in the averaged effectiveness of R&D tax incentives.

c. Heterogeneous Effects across Firms

Smaller firms tend to be more responsive to R&D tax incentives, likely because they face tighter credit constraints. This pattern is well documented in the empirical literature (Appelt et al., 2025; Kasahara et al., 2014; Labeaga et al., 2014; Lokshin and Mohnen, 2012; Baghana and Mohnen, 2009; Hægeland and Møen, 2007). Agrawal et al. (2020) provide further evidence, showing that the impact of tax incentives on R&D spending was particularly strong among SMEs that claimed refundable tax credits due to insufficient corporate income tax liabilities. Among SMEs, young firms appear to be especially responsive to R&D tax incentives, reflecting their heightened exposure to financing constraints (Appelt et al., 2025; Dechezleprêtre et al., 2023; Rao, 2016; Kasahara et al., 2014). By contrast, several studies suggest that R&D tax incentives are less effective in R&D-intensive or high-tech industries. This view is supported by evidence from Appelt et al. (2025), Acconcia and Cantabene (2018), Castellacci and Lie (2015), and Hægeland and Møen (2007). However, Bodas Freitas et al. (2017) report contrasting findings, identifying stronger effects of R&D tax incentives in these industries.

d. Cross-border Implications and Crowding Out Effect

The global operations of multinational enterprises (MNEs) add a cross-border dimension to the effects of R&D tax incentives, with important implications for both policy effectiveness and international competition. Empirical evidence suggests that MNEs often reallocate R&D activities within the group to respond to changes in tax policy at the country level (Hanappi and Whyman, 2023). This pattern is also confirmed for policies concerning R&D tax incentives (Knoll et al., 2021). Increasing R&D activity in the host country, which introduced or increased the generosity of R&D tax incentives, is frequently associated with reduced R&D investments in other locations within the same MNE group. These cross-border effects tend to be more pronounced for MNEs operating in geographically proximate countries, consistent with regional R&D preferences or lower transaction costs for relocating activities within nearby countries. Larger MNEs with sub-

stantial R&D operations appear particularly responsive, likely because the benefits from tax planning scale with firm size, while implementation costs remain relatively fixed. Overall, these dynamics suggest that R&D tax incentives increase the risk of beggar-thy-neighbour policies, shifting R&D activities across borders rather than expanding the overall level of global R&D investment.

Despite these concerns, targeted public support for R&D in foreign-owned subsidiaries can yield positive domestic outcomes. For example, Lenihan et al. (2024) find that public funding of R&D in foreign-owned subsidiaries in Ireland resulted in increased R&D expenditure, higher turnover, improved exports, and greater gross value added for the host economy. This suggests that carefully designed policy interventions can incentivise domestic R&D activity even when directed at multinational firms.

3.2. Output-based Incentives

Besides input-based R&D tax incentives, governments are increasingly adopting output-based R&D tax incentives (such as IP box regimes and tax exemptions) to promote and attract R&D activity, while encouraging the retention and commercialisation of intellectual property and, consequently, the right to tax the resulting income within their country. As of 2023, 14 EU Member States have implemented an IP box regime (see Table 7, Annex), while 20 OECD countries offer tax incentives related to IP income. Within EU Member States, tax exemptions are a less common instrument to stimulate R&D activity. Therefore, the following analysis focuses on IP box regimes. These regimes reduce the taxation of profits derived from intangible assets, such as patents and other forms of IP. However, the benefits are only realised ex post if the innovation proves commercially successful. While the overarching policy objectives of IP box regimes are similar, they vary considerably in terms of the generosity and structure of the benefits they provide.

3.2.1. Economic Mechanism

The motivation for the implementation of IP boxes is twofold: First, introducing a reduced corporate income tax rate on IP income discourages the shifting of highly mobile IP income to lower-tax countries (González Cabral et al., 2023; Lester, 2022). By offering preferential tax treatment on income derived from qualifying IP, governments seek to retain taxable income within their country and maintain a competitive tax environment for MNEs. The strategic location of intangible assets in low-tax countries has long been found to be one of the strategies by which MNEs can obtain a tax advantage (Evers et al., 2015; Griffith et al., 2014; Dischinger and Riedel, 2011). In addition, establishing reduced tax rates on mobile income such as IP may allow countries to sustain their ordinary rates for other less mobile bases (Keen and Konrad, 2013).

Second, IP boxes increase the ex-ante incentive to invest in R&D by increasing the expected after-tax rate of return to such investments through a reduction in the tax rate on future IP profits. This increase in after-tax income can affect firms' investment decisions by providing firms with greater internal funding capacity, which could be reinvested in R&D activities. In addition, the decreasing profit tax rates leads to a reduction of the cost of capital. Theory shows that with decreasing profit tax rates, the marginal benefit of investment increases (Evers et al., 2015; Hall and Jorgenson, 1967; Jorgenson, 1963) as the return derived from the investment incurs a lower tax cost. This should motivate firms to increase their overall amount of investment spending. However, it is important to note that the incentive effect of IP boxes operates conditionally—it only benefits firms whose R&D leads to commercially successful outcomes. Thus, firms need to anticipate a successful outcome from the investment in order to adopt their investment behaviour due to IP boxes (Hall, 2019).

3.2.2. Design Elements

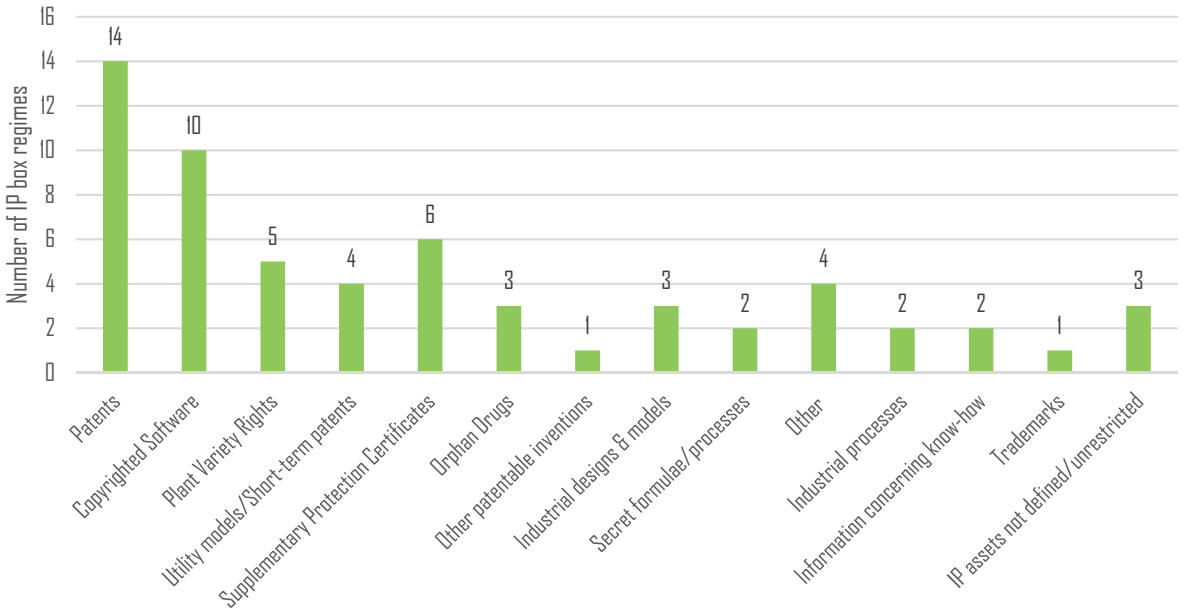
a. Definition of Eligible Taxpayer

An eligible taxpayer under existing IP box regimes is generally defined as a corporate entity that is subject to corporate income tax within the country offering the preferential tax regime. In some countries, unincorporated businesses may also qualify. In addition, the majority of governments does not restrict the access to IP boxes to either specific firm sizes or certain types of R&D and innovation activities. Still, eligible taxpayers need to earn qualifying income from qualifying IP assets. For the latter, economic ownership of the qualifying IP asset suffices to qualify for the tax relief in most countries. Full ownership is typically not required (González Cabral et al., 2023).

b. Qualifying IP Assets - Types of IP Assets Covered

Regarding the scope of qualifying IP assets, all observed IP box regimes in the EU follow the OECD guidelines in 2023 and restrict the eligibility to trade intangibles, which should provide higher positive spillover effects due to real R&D activity (Müller et al., 2022). In particular, the scope of qualifying IP assets ranges from narrowly defined categories focused primarily on patents, to broader regimes encompassing a wide array of IP rights, both formal and informal (see Figure 6). While all observed IP box regimes in the EU Member States provide relief for patents, most extend eligibility to assets with similar characteristics, such as utility models, supplementary protection certificates, plant variety or plant breeder's rights. All IP box regimes include software protected by copyright in addition to patents. Some regimes also include additional categories, such as orphan drug designations, secret formulas and processes, and certain design rights, provided they are linked to substantial R&D activities.

Figure 6: Qualifying IP Assets of IP Box Regimes in the EU



Source: Own illustration, based on data of OECD (2024a), Corporate tax statistics - Intellectual properties.

Note: This figure provides an overview of the scope and use of qualifying IP assets among the existing IP box regimes in EU countries in 2023.

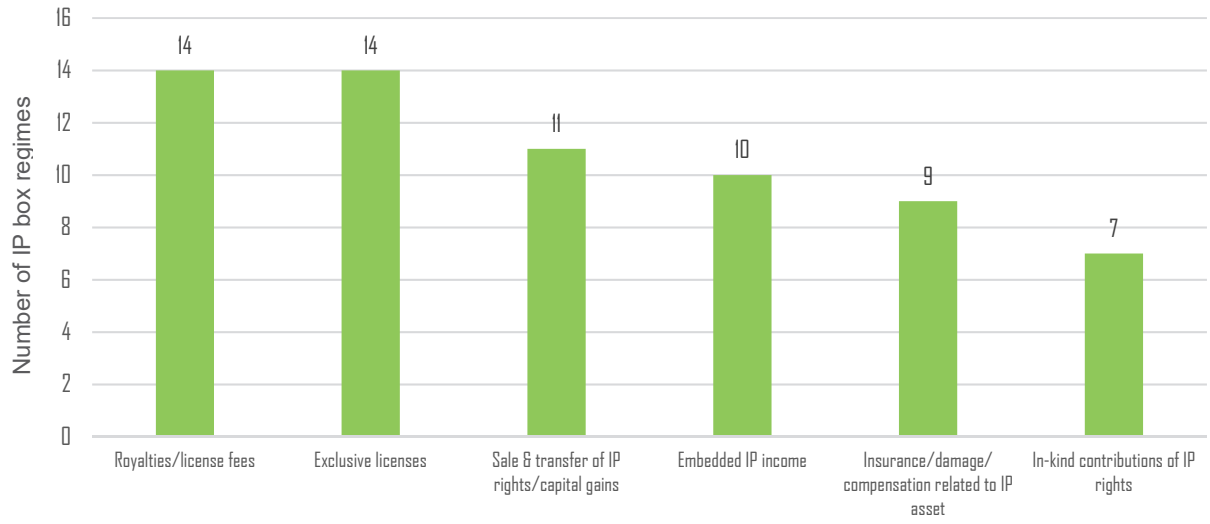
In the EU, the entity approach is mandatory for the design of IP boxes. This means that in addition to self-created eligible IP assets and IP assets acquired from unrelated parties, acquired IP assets outsourced to related parties may be included. This is typically subject to the condition that the acquiring entity has undertaken further development. This condition of tax relief on the requirement that the taxpayer performs the underlying R&D activity is consistent with the nexus

approach established under OECD BEPS Action 5 (OECD, 2015a). In countries not belonging to the EU, the jurisdictional approach may be implemented which allows even acquired IP from related parties as long as the development of this IP took place within the country offering the IP box. Most of the regimes do not establish geographical restrictions to where the taxpayer performs R&D activity or to which countries it can outsource R&D costs, with some exceptions. For regimes using the entity approach, the taxpayer may also perform R&D itself outside the country through a permanent establishment. In most cases there is no restriction as to where the permanent establishment sits, i.e. R&D can occur in any country (González Cabral et al., 2023).

c. Qualifying Income

Qualified types of income, i.e. income that is subject to the preferential treatment of the IP box, are income from the transfer of use of licences (royalties), income from the sale of the qualified IP, as well as from the internal exploitation or use of qualified IP (see Figure 7). The consideration of the latter category shall prevent an unequal treatment of companies that internally use qualified IP. Thereby, it must be distinguished if the income is generated by sales revenue from products or services that contain qualified assets (i.e. embedded income) or if the income results from fictitious licensing. The majority of countries make use of the broad range of qualifying types of income, which is suitable to achieve a tax incentive that is not sector or industry-specific and thus avoids distortions of competition (Spengel, 2016).

Figure 7: Overview of Qualifying IP Income of IP Box Regimes in the EU



Source: Own illustration, based on data of González Cabral et al. (2023).

Note: This figure provides an overview of the scope and use of qualifying IP income among the existing IP box regimes in EU countries in 2021.

Box 1: OECD Modified Nexus Approach

Under the OCED Modified Nexus Approach, the tax benefit of IP box regimes is conditional to the extent of R&D activities of the taxpayer receiving these tax benefits, i.e. the nexus ratio.

Entity Approach vs. Jurisdictional Approach

In EU Member States, the mandatory entity approach limits qualifying expenditures to those incurred by the taxpayer or subcontracted to unrelated parties, including R&D in a foreign permanent establishment. Non-EU countries may use the jurisdictional approach, allowing related party outsourcing or acquisitions if the R&D occurs domestically.

Nexus Ratio

The nexus ratio includes qualifying expenditures such as expenditures incurred directly by the taxpayer benefiting from the IP box regime (a) and the costs of outsourcing to related parties (b). Countries can introduce an uplift of 30% to qualifying expenditures, which is capped at the amount of overall expenditure. Overall expenditures include on top of qualifying expenditures costs for acquisition (c) and outsourcing to related parties (d). The nexus approach is additive in that both qualifying and overall expenditures represent expenditures incurred over the life of the IP asset.

Step 1 $$\text{Nexus ratio} = \frac{\text{Qualifying expenditures to develop IP (QE)}}{\text{Overall expenditures to develop the IP (OE)}} = \frac{\text{Min}((a+b)\text{x}1.3,\ \text{OE})}{a+b+c+d}$$

Step 2 Income subject to IP box rate = Nexus ratio x overall IP income from IP asset

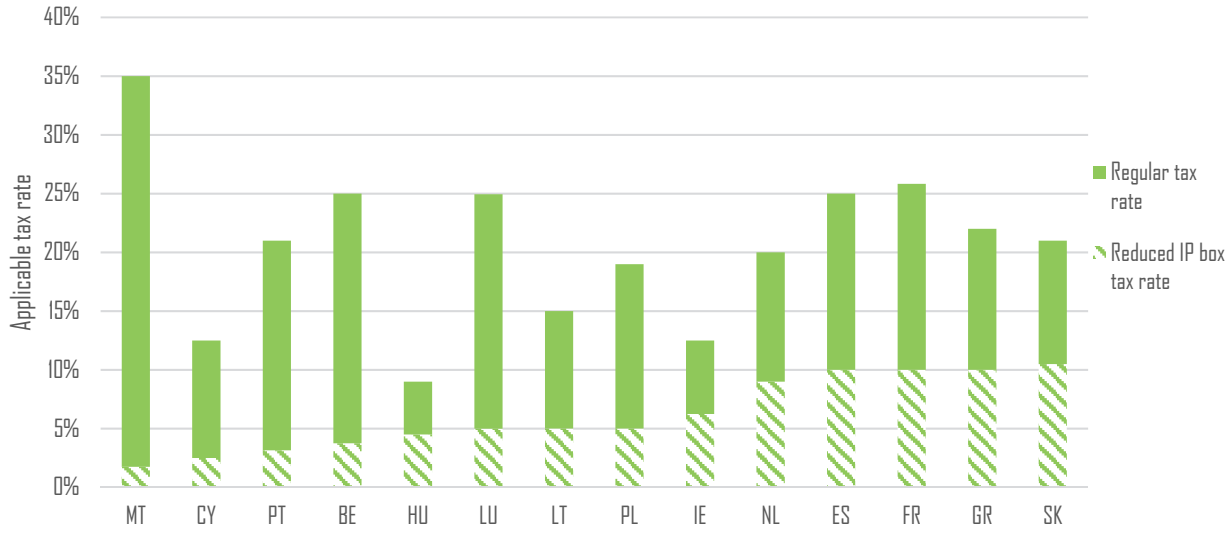
Source: OECD (2015a).

The nexus ratio (for further information, see Box 1) is a central feature of modern IP box regimes. It determines the proportion of IP income eligible for relief by comparing qualifying R&D expenditures to total expenditures related to the IP asset. This nexus ratio is cumulative on an asset-per-asset basis (if possible) and changes over time with the acquisition and development strategies used by firms. Thus, the nexus ratio may create variation in the extent of relief available for different qualifying IP assets within the firms' IP portfolio as well as for the same asset over time. These differences come on top of differences across countries in the definition of the nexus ratio that would also affect the eligibility of support across countries.

d. Preferential Tax Rates

The most salient feature of IP box regimes is their preferential tax rate on IP income. As of 2023, the effective IP box rates range from 1.75% in Malta to 10.5% in the Slovak Republic (see Figure 8). This results in a significant percentage point decrease in the statutory tax rate applicable to IP income (e.g. of up to 33.25 percentage points in Malta). The covered IP box regimes typically apply a reduced tax rate or a partial exemption of qualifying IP income. Most governments rely on a partial exemption of the qualifying IP income, i.e. a reduction of the tax base by either a total (pro-rata) exemption of qualifying income or a lump-sum deduction of business expenses. Therefore, adjustments to the IP box tax rate occur not only when the share of tax-exempt income changes but also when the corporate tax rate changes.

Figure 8: Overview of Regular and Reduced IP Box Tax Rates in EU IP Box Countries



Source: Own illustration, based on data of OECD (2024a), Corporate tax statistics - Intellectual properties.

Note: This figure provides an overview of the regular corporate income tax rates and the reduced IP box tax rates among the existing IP box regimes in EU countries in 2023.

e. Definition of the Tax Base

The generosity of IP box regimes depends not only on the preferential tax rate but also on the definition of the tax base, typically referred to as qualifying IP profits. This base reflects the income attributable to eligible IP assets, adjusted for associated expenses, the nexus ratio, the treatment of potential losses, and interactions with input-based tax incentives. Despite alignment efforts under BEPS Action 5, significant differences remain in the design of the tax base across countries.

Under the net approach, taxpayers deduct current IP-related expenses at the reduced IP box rate. However, countries differ in their definition of associated expenses. While some countries adopt a broad interpretation—allowing deductions for direct, indirect, and overhead costs—others apply stricter rules that exclude, for example, financial expenses or building depreciation (González Cabral et al., 2023). In addition to current expenses, several regimes require the recapture of past R&D expenses before IP income qualifies for preferential treatment. This ensures that previously deducted costs, often claimed at the full CIT rate, are effectively revalued at the lower IP box rate, eliminating implicit tax subsidies (Lester, 2022; Evers et al., 2015). The scope of recapture varies by country, particularly in terms of the look-back period and potential adjustments, such as for inflation. As an alternative to recapture, some regimes require the capitalisation of R&D expenses. Under this approach, firms must recognise the IP asset on their balance sheet, with tax relief linked to capital allowances applied once the asset generates income (González Cabral et al., 2023). Regimes that neither recapture past expenses nor require capitalisation are generally the most generous, as they allow taxpayers to deduct development costs at the full CIT rate while benefiting from reduced taxation on IP income. This creates an intertemporal asymmetry, effectively resulting in a double benefit.

Consistent with the treatment of current expenses, many countries have rules ensuring that IP losses are deducted at the same rate as IP income is taxed, maintaining symmetry between profit and loss. However, the generosity of loss treatment varies depending on the method applied (Müller et al., 2022). Under the recapture method, losses are deducted at the regular CIT rate, and IP income is taxed at the standard rate until losses are fully recouped. The reduced-value method permits partial relief at the CIT rate, while the separate loss method is the least generous,

as it allows IP losses to offset only IP profits, with no deferral of ordinary income taxation; unutilised IP losses may ultimately be forfeited. Some countries allow a combination of the methods outlined above or combine them to address different loss outcomes.

f. Limitations of Tax Benefits and Treatment of Unused Benefits

The majority of existing IP box regimes do not limit the tax benefit (González Cabral et al., 2023). Deductions typically reduce taxable income or, if insufficient, create a general loss to which standard loss-offset rules apply. However, within the EU, three countries impose some restrictions on the use of IP box benefits. In Belgium and Cyprus, deductions cannot create a loss, and unused amounts are carried forward. Hungary caps relief at 50% of taxable income, with excess amounts also carried forward. These limits aim to prevent excessive base erosion while maintaining incentives for innovation.

3.2.3. Administration

Across many countries, taxpayers are required to submit formal applications to access IP box benefits. For example, in the Netherlands, firms must obtain an R&D statement through the government's R&D tax credit scheme (WBSO). In other jurisdictions, such as Luxembourg and Spain, advance rulings may be requested; however, in most cases, the burden of proof remains with the taxpayer. This typically involves maintaining detailed records and implementing 'track-and-trace' mechanisms to link R&D expenditures to specific IP assets and their associated income streams. Such requirements impose considerable administrative burdens on both businesses and tax authorities.

In particular, tax administrations must verify whether the assets and income concerned meet the qualifying criteria—an exercise that is both resource-intensive and administratively costly, whether carried out ex-ante during application procedures or ex-post through audits (Rizzo, 2023). Further complexity arises in calculating the income eligible for the preferential tax rate. When IP is exploited internally, isolating the revenue attributable to the IP often necessitates complex transfer pricing analyses and subjective assessments. Moreover, the modified nexus approach requires an additional calculation to determine the portion of income linked to qualifying R&D expenditure. This process frequently involves advance pricing agreements or tax rulings.

3.2.4. Empirical Evidence

a. Effectiveness in Stimulating R&D Expenditures

The effectiveness of IP box regimes in stimulating genuine R&D activity remains contested in the academic literature. While several studies document an increase in patenting activity following the introduction of IP boxes, the extent to which these regimes drive substantive innovation rather than tax-motivated behaviour is unclear.

There is evidence that IP boxes can have positive effects on firms' R&D investment and employment. Prior and contemporaneous research analysing different IP boxes across multiple countries provides evidence of substantial, yet variable, increases in patent applications (Davies et al., 2021; Alstadsæter et al., 2018; Bradley et al., 2015). However, the increases in patent applications are highly depended on the industry (Alstadsæter et al., 2018; Bradley et al., 2015). Furthermore, the variation in impact often reflects differences in regime design. Countries with stricter substance and nexus requirements, such such as Belgium, tend to show stronger links between IP box benefits and real economic activity, including increased employment of highly skilled workers and higher wages (Bornemann et al., 2023). Conversely, in countries with weaker substance requirements, increases in patent activity are more likely driven by patent relocations or acquisitions rather than new R&D investments (Bradley et al., 2021; Bösenberg and Egger,

2017). Still, these gains often come with a decline in average patent quality, raising concerns about the underlying innovative value of the additional patents (Bornemann et al., 2023; Davies et al., 2021). Gaessler et al. (2021) describe patent boxes as a "relatively inefficient" tool for promoting inventive behaviour, particularly where preferential tax treatment extends beyond patents to include broader categories of IP income. In such cases, the incentive to prioritise patented inventions diminishes, undermining the regime's intended purpose (Lester, 2022). Summarising the earlier evidence, Hall (2019) concludes that there is little evidence that the introduction of a patent box increases either patentable invention or R&D investment in a country, controlling for country characteristics and overall time trends.

In contrast, more recent studies show that IP boxes can have positive effects on firms' R&D employment and investment. Bornemann et al. (2023) show that post-IP box firms employ 38.8% more university graduates, suggesting a shift towards a more highly skilled workforce. These findings align with Chen et al. (2023), who report changes in labour composition rather than overall employment levels attributable to IP box regimes. Mohnen et al. (2017) report that the Dutch IP box had a positive impact on the person-hours allocated to R&D by participating firms.

Moreover, the literature highlights divergent responses between MNEs and domestic firms. MNEs are often better positioned to exploit IP boxes for tax planning, while domestic firms exhibit more substantive increases in patenting activity, albeit with lower patent quality and fewer tax benefits from IP boxes (Bornemann et al., 2023).

b. Heterogeneous Uptake across Firms and Industry

Appelt et al. (2023) show first descriptive evidence on the uptake of IP box regimes, which varies significantly across countries. While in some countries one observes less than 250 firms benefitting from output-based R&D tax incentives, other countries support 2'000 to 3'000 firms. In addition, the descriptive data available for six countries shows that despite SMEs are the largest category of applicants in most countries, the distribution of R&D tax benefits is skewed towards large firms. This distribution of income-based tax support may be a reflection of the fact that patents are found to be largely concentrated among a small number of large, typically multinational, corporations that generate the bulk of IP income (Dernis et al., 2019; Appelt et al., 2016).

Overall, no clear-cut pattern seems to emerge in the take-up of certain industries as well as for the distribution of tax benefits, looking at the six economies for which relevant data are available. In this context, it is important to note that differences in the classification of the IP holding beneficiary across countries could also have an impact on these results.

c. Cross-border Implications

IP box regimes have important cross-border implications, particularly regarding the location of IP, profit shifting practices, and the real allocation of R&D activities. Early evidence suggests that, prior to the implementation of stricter international standards such as the OECD's BEPS Action 5, many IP box regimes primarily incentivised the MNEs often transferred ownership of patents and other intangibles to low-tax jurisdictions in order to benefit from preferential rates on IP-derived income, with little or no change in the underlying real activity (Ciaramella, 2023).

More recent research, however, indicates that when IP box regimes impose substantive development conditions, such as those required by the modified nexus approach, the incentives for purely tax-motivated IP relocations diminish. Thus, it limits the attractiveness of simple IP transfers (Ciaramella, 2023; Gaessler et al., 2021; Alstadsæter et al., 2018). For example, Gaessler et al. (2021) find that such conditions substantially reduce cross-border patent transfers and the associated income flows out of implementing countries. In particular, generous IP boxes can

reduce IP income shifting out of a country by significant margins while being linked to increased local employment and wages (Chen et al., 2023).

Despite these positive developments, challenges remain. The modified nexus approach, while curbing some forms of IP profit shifting, does not eliminate all avenues for tax planning. Firms may shift profits through other channels, such as internal debt arrangements, to minimise their overall tax burden. Koethenbuerger et al. (2019) find that companies benefiting from IP boxes may simultaneously increase profit shifting via interest payments, exploiting differences in tax treatment between standard corporate income and IP-derived income.

Moreover, the nexus requirements themselves may create new distortions in global investment decisions. As patent relocations become less viable, MNEs may choose to relocate real R&D activities to countries offering the most favourable IP box regimes. Schwab and Todtenhaupt (2021) argue that while these rules prevent cross-border spillovers of IP rights within multinational groups, they may incentivise firms to reallocate substantive functions and personnel, potentially leading to distortions in the global distribution of R&D investment.

3.3. Interim Evaluation

R&D tax incentives are a key policy tool for stimulating private investment in innovation, addressing market failures, and fostering long-term economic growth. Their effectiveness, however, depends not only on the generosity of the incentives themselves but also on their specific design features and the broader investment climate in which they operate. As explored in this section, countries employ a diverse mix of R&D tax incentives, each with distinct economic rationales and implications for policy outcomes.

A key distinction is made between input-based and output-based incentives. Input-based incentives, such as tax credits and super deductions linked to R&D expenditures, are the most common and are generally more effective in fostering additional R&D activity. They directly lower the after-tax cost of R&D investment, providing predictable and immediate benefits, particularly when refundable. Empirical evidence consistently confirms their positive impact on stimulating additional R&D investments, particularly when incentives are designed to be refundable or accessible to firms with limited tax liabilities, such as start-ups and SMEs. These incentives are generally regarded as effective policy tools, especially when they align with broader efforts to create favourable conditions for innovation.

Output-based incentives, most notably IP box regimes, have a more complex empirical record. Originally criticised for encouraging profit shifting and providing limited additional R&D stimulus, IP boxes have evolved significantly in recent years. The introduction of the modified nexus approach has tied preferential tax treatment to substantive R&D activity carried out within the granting jurisdiction. As a result, several studies now highlight the potential of well-designed IP boxes to retain high-value IP, encourage commercialization, and support domestic innovation ecosystems. Moreover, in some cases, IP box regimes have been associated with increased employment in R&D-intensive sectors and higher wages for skilled workers. However, concerns remain about their distributional effects, as benefits tend to be concentrated among large multinational enterprises, and the potential for these regimes to distort competition if not carefully monitored.

The evidence suggests that well-designed input-based incentives should be prioritised for their superior capacity to encourage additional R&D efforts and minimise windfall gains. Furthermore, targeting design features, such as immediate refunds, volume-based schemes with ceilings, and clear eligibility criteria, enhance the accessibility and efficiency of these incentives. Despite the positive effects of stimulating R&D expenditure, Cheng et al. (2020) highlight that one unintended consequence of these incentives is that they lead to the possession of assets, such as patents,

that give taxpayers an additional tax planning opportunity to avoid taxes aggressively through income shifting.

As the policy landscape evolves with the introduction of global minimum tax rules under Pillar Two, further consideration is needed to ensure that R&D tax incentives remain effective and compliant. The next section will address these emerging challenges and explore how R&D incentives can be adapted within the new international tax framework.

4. THE FUTURE OF TAX INCENTIVES UNDER PILLAR TWO

KEY FINDINGS

To combat aggressive tax planning and to set a floor on international tax competition, the EU Member States implemented the Minimum Tax Directive in 2022. This regulation, also known as Pillar Two, aims to levy a minimum effective tax rate of 15% on profits generated by large companies by means of a top-up tax.

On the other hand, tax incentives usually reduce the amount of taxes paid and thus a firm's effective tax rate. Therefore, it is indispensable to examine the interaction between tax incentives and Pillar Two. Under Pillar Two, the investment incentives provided by tax reliefs could be diminished or even entirely reversed by the top-up tax. However, the specific impact of Pillar Two on tax incentives depends on the country's tax system, on the affected firm's characteristics and activities, and on the design of the incentive.

Overall, super deductions, exemptions and IP box regimes are likely to be affected by Pillar Two. While the effect on tax credits depends on their design, accelerated depreciation and immediate expensing schemes for tangible assets are unaffected by Pillar Two. Against this background, governments may consider to reassess their tax incentive system to incentivise investment even after the implementation of Pillar Two.

4.1. Institutional Background

In 2021, under the OECD/G20 Inclusive Framework on BEPS more than 130 countries agreed on a fundamental reform of the international corporate tax system. This reform was proposed by the OECD/G20 Member States and is known as the two-pillar model. While Pillar One provides for a (partial) reallocation of taxing rights to market countries, Pillar Two aims to levy a minimum effective tax rate of 15% on profits generated by large companies. The objective of Pillar Two is to combat aggressive tax planning and to set a floor on international tax competition. Only a few days after the publication of the OECD/G20 Global Anti-Base Erosion (GloBE) Model Rules in December 2021 (OECD, 2021), the European Commission presented a draft directive for the implementation of the global minimum tax in the EU Member States. With the enactment of the Minimum Tax Directive[3] in 2022, EU Member States were required to transpose the directive into national law by the end of 2023. However, Member States with less than twelve ultimate parent entities of groups within the scope of the directive were granted the option to delay the transposition of the directive until 2030 (Article 50 Minimum Tax Directive, 2022).

The global minimum tax applies to affiliates of groups with annual consolidated revenues above 750 million EUR in at least two of the previous four years (Article 2 Minimum Tax Directive, 2022). In contrast to the OECD model rules, the scope of the Minimum Tax Directive includes not only multinational groups but also large domestic groups. Some entities such as governmental entities and non-profit organizations are excluded from the scope (Article 2 (3) Minimum Tax Directive, 2022).

The core element of Pillar Two is the top-up tax, which is levied if a group is effectively taxed at a rate below 15%. The top-up tax percentage equals the difference between 15% and the group's

[3] Council Directive (EU) 2022/2523 of 14 December 2022 on ensuring a global minimum level of taxation for multinational enterprise groups and large-scale domestic groups in the Union.

effective tax rate (ETR), which is determined under a jurisdictional blending approach, i.e. all group affiliates in a country are aggregated. The ETR under Pillar Two is defined as the ratio between the adjusted covered taxes and the net qualifying income of all affiliates in one country. First, the starting point for determining the net qualifying income is the net income used to prepare the consolidated financial statements, which must be based on an acceptable accounting standard such as International Financial Reporting Standards or US Generally Accepted Accounting Principles (Article 15 Minimum Tax Directive, 2022). This net income has to be adjusted for various items such as net tax expenses, excluded dividends and asymmetric foreign currency gains or losses (Article 16 Minimum Tax Directive, 2022). Moreover, income from international shipping is exempt from the calculation (Article 17 Minimum Tax Directive, 2022). Second, the adjusted covered taxes are derived from the current tax expenses following financial accounting standards. These current tax expenses have to be adjusted for different items (Articles 21, 22 Minimum Tax Directive, 2022). For example, temporary differences between financial and tax accounting are accounted for by adding deferred taxes to the current tax expenses. Both covered taxes and the net qualifying income can be affected by firms' use of tax incentives. The impact of specific tax incentives on the ETR is discussed in the following subsections.

As mentioned above, a top-up tax is imposed if the group's jurisdictional ETR is below 15%. However, the top-up tax percentage (i.e. the difference between 15% and the group's ETR) applies only to residual profits. Thus, a routine profit from substantial economic activity is exempt from the top-up tax and subject to the national tax level. This so-called substance-based income exclusion (SBIE) amounts to 8% of the carrying value of tangible assets and 10% of employee-related costs in the year of introduction of Pillar Two. Both percentage levels are reduced continuously to 5% within ten years (Articles 27, 46 Minimum Tax Directive, 2022). As a result, the impact of Pillar Two may be limited if affected groups have a high value of tangible assets and payroll costs in a low-tax country. Box 2 summarises the steps of calculating the jurisdictional ETR and the top-up tax.

Box 2: Calculation of the Top-up Tax under Pillar Two

Step 1	Determine the group's jurisdictional *ETR*	$\text{ETR} = \frac{\text{Adjusted covered taxes (of all group affiliates in the jurisdiction)}}{\text{Net qualifying income (of all group affiliates in the jurisdiction)}}$
If ETR < 15%, the jurisdictional top-up tax is calculated as follows:		
Step 2	Calculate the *top-up tax percentage*	Top-up tax percentage = 15% – ETR
Step 3	Calculate the *substance-based income exclusion (SBIE)*	SBIE = 8% x carrying value of tangible assets + 10% x employee–related costs
Step 4	Calculate the *excess profit*	Excess profit = Net qualifying income - SBIE
Step 5	Jurisdictional top-up tax = Excess profit x top-up tax percentage – domestic top-up tax	

Source: Articles 26, 27 Minimum Tax Directive (2022).

To reduce the compliance burden and improve tax certainty for companies, the Minimum Tax Directive requires Member States to implement a set of safe harbour rules for calculating the top-up tax (Article 32 Minimum Tax Directive, 2022). Some of these rules apply during a transition period, while others grant permanent relief under specific circumstances[4].

Pillar Two builds on three main mechanisms to collect the top-up tax. First, the income inclusion rule (IIR) stipulates that the residence country of the parent company imposes a top-up tax on all low-taxed group affiliates (Article 5 Minimum Tax Directive, 2022). Second, the untertaxed profits rule (UTPR) is applied as a backstop if the IIR is not implemented in the ultimate or intermediate parent company's residence country (Article 12 Minimum Tax Directive, 2022). Under the UTPR, either certain intra-group payments are no longer tax-deductible or a top-up tax is imposed on the group's EU subsidiaries. Besides the IIR and UTPR, the third mechanism for collecting the top-up tax is the qualified domestic minimum top-up tax (QDMTT, Article 11 Minimum Tax Directive, 2022). The QDMTT, which takes precedence over the IIR and UTPR, enables countries to directly impose a top-up tax on low-taxed group affiliates resident in their territory. Thus, low-tax countries may increase the effective tax burden for groups within the scope of Pillar Two while maintaining low-tax benefits for any other resident company (Devereux, 2023).

4.2. Interaction of Pillar Two and Tax Incentives

While tax incentives usually reduce the amount of taxes paid and thus a firm's ETR, Pillar Two aims to impose a minimum effective tax level of 15%. As a result of the top-up tax under Pillar Two, the investment incentives provided by tax reliefs could be diminished or even entirely reversed. However, the specific impact of Pillar Two on tax incentives depends on the country's tax system, on the affected firm's characteristics and activities, and on the design of the incentive (OECD, 2022a).

First, the effect of Pillar Two on tax incentives depends on the corporate income tax system in a country. Countries with an overall lower level of taxation are more affected by Pillar Two, as firms are already more likely to have an ETR close to, or even below, the 15% threshold. Moreover, the definition of the tax base in the corporate tax system determines the extent to which tax incentives are affected. If a country offers substantial exemptions for certain income categories within the scope of Pillar Two, the emergence of a top-up tax is more likely (OECD, 2022a).

Second, the affected firm's characteristics determine the extent to which Pillar Two increases the effective tax level by imposing a top-up tax. As Pillar Two only applies to affiliates of groups with consolidated revenues above 750 million EUR, smaller groups and standalone firms are not subject to a top-up tax. Thus, tax incentives granted to these firms are not affected by Pillar Two (Perez-Navarro, 2023). As described in Section 4.1, the SBIE exempts a routine profit on real economic activity from the top-up tax. Therefore, in-scope firms with higher levels of substance as measured by tangible assets and payroll are less affected by Pillar Two (OECD, 2022a).

Third, the extent to which tax incentives are affected by Pillar Two depends on their design. If an incentive is targeted to specific types of income only, it is less affected since the tax-reducing effect exists only for a fraction of the net qualifying income. Furthermore, tax incentives applicable for activities out of scope of Pillar Two are unaffected. As discussed in Section 3.1, most investment incentives link their tax benefit directly to the amount of capital or payroll expenses. Due to the SBIE, these types of incentives are less impacted by Pillar Two, as they encourage firms to increase their real economic activity (Bammens and Bettens, 2023). Finally, if firms are allowed

[4] For further information on the safe harbour rules, see OECD (2024c).

to combine various tax incentives, this may result in lower ETRs. Thus, the tax benefit of the incentives may be reversed by Pillar Two to a larger extent than if the combination of different incentives is not permitted (OECD, 2022a).

Overall, the impact of Pillar Two on a tax incentive depends on the extent to which the incentive affects the ETR – either by reducing the covered taxes or by increasing the net qualifying income – and on the interaction of the incentive with the SBIE (OECD, 2022a). In the following, these aspects will be discussed for specific R&D tax incentives commonly used by governments[5].

4.2.1. Input-based Incentives

a. Accelerated Depreciation and Immediate Expensing

As described in Section 3.1.2, countries grant accelerated depreciation or immediate expensing schemes for tax purposes to incentivise R&D activities. While the cost of an asset is also depreciated for accounting purposes, the specific tax depreciation rules usually differ from the accounting rules. Specifically, tax laws often permit a more favourable depreciation by allowing to expense the cost of an asset at a rate that is higher than the economic rate of depreciation (OECD, 2022a). A more favourable depreciation can be implemented by a shorter depreciation period, a different method or an immediate expensing, i.e. the deduction of the entire cost in the year of purchase.

As Pillar Two relies on financial accounting standards to determine the ETR, the differences in depreciation rules are important to consider. An accelerated depreciation results in lower taxable profits and consequently lower taxes paid in early years (i.e. when the tax depreciation exceeds the accounting depreciation). This timing difference between tax and financial accounts is taken into account by creating a deferred tax liability (Ferreira Liotti et al., 2022). However, the book-tax difference arising from accelerated depreciation is only temporary since it reverses over the lifetime of an asset, i.e. in later years the taxes paid are higher compared to the taxes that would have been due based on accounting rules (Chand and Romanovska, 2023).

When considering the impact of accelerated depreciation schemes on a firm's ETR, the deferred tax liability is of key importance. If the covered taxes in the numerator of the ETR only took into account current taxes paid, an accelerated depreciation would have reduced a firm's ETR in the early years after purchasing an asset. However, the OECD recognises that accelerated depreciation schemes are common incentives adopted by countries, which are not prone to taxpayer manipulation (OECD, 2022b). Therefore, covered taxes do not only include current taxes but also deferred taxes (Articles 21, 22 Minimum Tax Directive, 2022). If the book-tax difference is not reversed within five years, a recapture applies for the deferred tax liability, i.e. after five years, the covered taxes are reduced by the recaptured deferred tax liability. However, for specific items, such as the accelerated depreciation of tangible assets, this recapture does not apply (Article 22 Minimum Tax Directive, 2022). As a result, the ETR under Pillar Two is not affected by accelerated depreciation or immediate expensing schemes granted for tangible assets and short-term intangible assets (Bammens and Bettens, 2023; Ferreira Liotti et al., 2022; OECD, 2022a). In contrast, due to the recapture rule, accelerated depreciation or immediate expensing of long-term intangible assets is likely to be affected and could generate a top-up tax (Chand and Romanovska, 2023; OECD, 2022a). Table 1 illustrates how immediate expensing of an asset affects the ETR over the lifetime of the asset.

[5] The following sections refer to the interaction of Pillar Two and tax incentives specifically granted for R&D activities. For the interaction of the DEBRA proposal with Pillar Two, please refer to Gschossmann et al. (2025).

Table 1: The Impact of Immediate Expensing on the ETR under Pillar Two

		Year 1	Year 2	Year 3	Year 4	Year 5
Statutory tax rate	(1)	20%	20%	20%	20%	20%
Asset (tax value)	(2)	0	0	0	0	0
Asset (book value)	(3)	800	600	400	200	0
Financial accounting profit before depreciation and tax	(4)	1000	1000	1000	1000	1000
Accounting depreciation	(5)	200	200	200	200	200
Tax depreciation	(6)	1000	0	0	0	0
Financial accounting profit after depreciation and before tax (= Net qualifying income)	(7) = (4)-(5)	800	800	800	800	800
Local tax base for current tax expense	(8) = (4)-(6)	0	1000	1000	1000	1000
Current tax expense	(9) = (8)x(1)	0	200	200	200	200
Temporary difference between tax and financial accounts	(10) = (3)-(2)	800	600	400	200	0
Less: opening temporary difference	(11) = $(10)_{t-1}$ after year 1		800	600	400	200
Net temporary difference for deferred tax expense	(12) = (10)-(11)	800	-200	-200	-200	-200
Deferred tax expense (recast at 15%)	(13) = (12)x15%	120	-30	-30	-30	-30
Covered taxes	(14) = (9)+(13)	120	170	170	170	170
Effective tax rate	(15) = (14)/(7)	**15%**	**21.25%**	**21.25%**	**21.25%**	**21.25%**
Top-up tax percentage (if ETR < 15%)	(16) = 15%-(15)	-	-	-	-	-
Top-up tax (if ETR < 15%)	(17) = (16)x(7)	**0**	**0**	**0**	**0**	**0**

Source: Own elaboration.

Note: This table illustrates how immediate expensing affects the ETR under Pillar Two over the lifetime of the asset. It is assumed that the asset has an acquisition value of 1000, which is immediately expensed for tax purposes and depreciated on a straight-line basis over five years for accounting purposes. The statutory tax rate is assumed to be 20% and the financial accounting profit before depreciation and tax is assumed to be 1000.

As outlined above, the impact of Pillar Two on tax incentives depends in part on its interaction with the SBIE. Both the SBIE and accelerated depreciation or immediate expensing schemes target investment in tangible assets. As a result, accelerated depreciation and immediate expensing schemes can still be granted as incentives without being affected by Pillar Two.

b. Super Deductions

In addition to granting accelerated depreciations, some countries even allow deductions that exceed the actual expense by a certain percentage. These super deductions are often granted for R&D expenses, allowing firms to deduct a higher amount of expenses for personnel and/or assets used for R&D from their tax base than actually incurred. While super deductions are reflected in tax accounts, they do not exist for financial accounting purposes. Therefore, they affect the ETR under Pillar Two as follows: Since the super deduction reduces the tax base, the covered taxes also decrease compared to a scenario without such a deduction. In contrast, the net qualifying income is unaffected as the super deduction does not exist for financial accounting purposes (Chand and Romanovska, 2023). Overall, the super deduction results in a permanent book-tax difference, for which, in contrast to a temporary difference, the net qualifying income is not adjusted under Pillar Two (UNCTAD, 2022). In sum, the ETR therefore decreases and could potentially give rise to a top-up tax liability under Pillar Two (Chand and Romanovska, 2023; OECD, 2022a). Table 2 illustrates this relationship based on an example calculation.

Table 2: The Impact of a Super Deduction on the ETR under Pillar Two

		Without Super Deduction	With Super Deduction
Statutory tax rate	(1)	20%	20%
Financial accounting profit before tax (= Net qualifying income)	(2)	1000	1000
Add back: R&D expenses	(3)	-	500
Less: Super deduction for R&D expenses (200%)	(4)	-	1000
Tax base for covered taxes	(5) = (2)+(3)–(4)	1000	500
Covered taxes	(6) = (5)x(1)	200	100
Effective tax rate	(7) = (6)/(2)	**20%**	**10%**
Top-up tax percentage (if ETR < 15%)	(8) = 15%-(7)	-	5%
Top-up tax (if ETR < 15%)	(9) = (8)x(2)	**0**	**50**

Source: Own elaboration.

Note: This table illustrates how a super deduction affects the ETR under Pillar Two. It is assumed that the firm has R&D expenses of 500 and the super deduction is 200%. The statutory tax rate is assumed to be 20% and the financial accounting profit before tax is assumed to be 1000.

However, as the super deduction requires R&D personnel and/or investments in assets, firms also benefit from the SBIE. As described above, for the SBIE, the local level of taxation continues to apply. Thus, if firms have a high level of substance, they are less affected by Pillar Two and can at least partly benefit from the super deduction under the SBIE.

c. Tax Credits

While the previously outlined tax deductions reduce the tax base, tax credits directly reduce the tax liability. They are based on the value of expenditures on qualifying investments, such as R&D investments. For Pillar Two purposes, there is an important distinction between various types of tax credits that have different consequences. Although all tax credits reduce the amount of taxes

paid, their impact on the ETR is less significant when they affect the net qualifying income (denominator) compared to the covered taxes (numerator), which will be further outlined below.

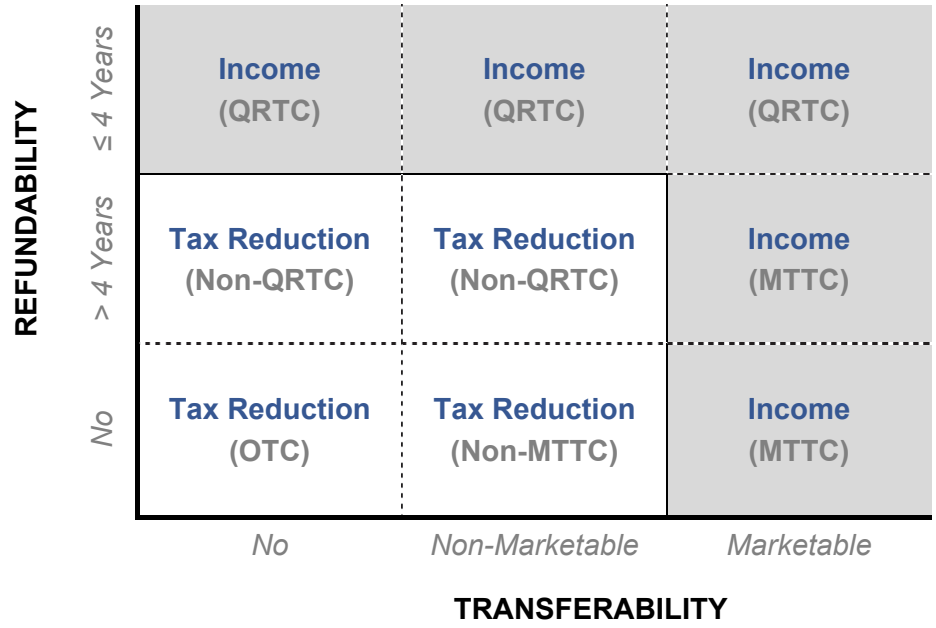
The treatment of tax credits under Pillar Two was already discussed before the GloBE Model Rules were published. However, a detailed guidance and further classification of tax credits was only published in the Administrative Guidance of the OECD in July 2023 (OECD, 2023). Here, tax credits are categorised into the following five types: Qualified Refundable Tax Credits (QRTCs), Non-Qualified Refundable Tax Credits (Non-QRTCs), Marketable Transferable Tax Credits (MTTCs), Non-Marketable Transferable Tax Credits (Non-MTTCs), and Other Tax Credits (OTCs). In the Minimum Tax Directive, MTTCs are not explicitly mentioned, but the preamble of the directive refers to the GloBE Model Rules and Commentaries to ensure a consistent implementation across Member States. Thus, the aforementioned categories of tax credits are also relevant for firms and tax authorities in EU Member States.

In general, a refundable tax credit denotes a tax credit that must be refunded to the extent that it exceeds the tax liability owed (Bammens and Bettens, 2023). The treatment of refundable tax credits under Pillar Two is based on the financial accounting standards applicable to tax credits, such as IAS 20 (government grant accounting) and IAS 12 (income tax accounting) (OECD, 2023). A Qualified Refundable Tax Credit is defined as a refundable tax credit that must be paid as cash or cash equivalent within four years from when a firm is entitled to receive the credit (Article 3 (38) Minimum Tax Directive, 2022). In contrast, a Non-Qualified Refundable Tax Credit is defined as a tax credit that is refundable as cash or cash equivalent after four years (Article 3 (39) Minimum Tax Directive, 2022). If the refundability criterion is not fulfilled, i.e. a credit is classified as Non-QRTC, the transferability criterion has to be assessed subsequently (OECD, 2023).

A transferable tax credit can either be used to directly pay income taxes or sold to another party. The proceeds of this transaction can then be used to pay the tax liability. However, as the tax credit has to be sold at a discount, it is not as valuable as a refundable tax credit (OECD, 2023). To be qualified as Marketable Transferable Tax Credit, the tax credit has to fulfil the legal transferability standard and the marketability standard. First, the legal transferability standard is fulfilled if the tax credit regime is designed in a way that the eligible taxpayer can transfer the credit to an unrelated party in the fiscal year in which the eligibility arises or within 15 months of the end of the origination year. From the perspective of the purchaser of the tax credit the standard is met if the tax credit regime allows the purchaser to transfer the credit to an unrelated party in the fiscal year in which the entity purchased the credit. Second, the marketability standard is met if the tax credit is transferred to an unrelated party at a price equal or above the marketable price floor, which equals 80% of the net present value (NPV)[6] of the tax credit. If both criteria are met, the tax credit is classified as MTTC (OECD, 2023). In contrast, a Non-MTTC is defined as a tax credit that is transferable but is not a MTTC. Finally, an OTC is a non-refundable and non-transferable tax credit that can only be used to offset the tax liability of the eligible taxpayer (OECD, 2023).

[6] The NPV is calculated based on the yield to maturity on a debt instrument issued by the government with equal or similar maturity in the same fiscal year as the tax credit is transferred (OECD, 2023).

Figure 9: Classification of Tax Credits under Pillar Two



Source: OECD (2023).

The classification of the tax credits has different consequences for the ETR under Pillar Two (see Figure 9). QRTCs and MTTCs are treated as income and thus are added to the net qualifying income in their origination year (Article 16 (5) Minimum Tax Directive, 2022; OECD, 2023). In contrast, Non-QRTCs, Non-MTTCs and OTCs reduce the covered taxes (OECD, 2023). As a result, all types of tax credits reduce the ETR, but the effect is less significant for QRTCs and MTTCs as they affect the denominator rather than the numerator of the ETR. At the same time, however, the treatment of QRTCs and MTTCs as income also increases the tax base for the top-up tax, which is defined as the net qualifying income (UNCTAD, 2022). Table 3 illustrates these effects for different types of tax credits.

Table 3: The Impact of Tax Credits on the ETR under Pillar Two

		Without tax credit	With QRTC/MTTC	With Non-QRTC/Non-MTTC/OTC
Statutory tax rate	(1)	20%	20%	20%
Financial accounting profit before tax	(2)	1000	1000	1000
Tax expense before tax credit	(3) = (2)x(1)	200	200	200
R&D tax credit	(4)	-	150	150
Tax expense with tax credit	(5) = (3)-(4)	200	50	50
Covered taxes	(6) = (2) for QRTC/MTTC (6) = (5) for Non-QRTC/ Non-MTTC/OTC/ without credit	200	200	**50** tax credit reduces covered taxes
Net qualifying income	(7) = (2)+(4) for QRTC/ MTTC (7) = (2) for Non-QRTC/ Non-MTTC/OTC/ without credit	1000	**1150** tax credit increases income	1000
Effective tax rate	(8) = (6)/(7)	**20%**	**17.4%**	**5%**
Top-up tax percentage (if ETR < 15%)	(9) = 15%-(8)	-	-	10%
Top-up tax (if ETR < 15%)	(10) = (9)x(7)	**0**	**0**	**100**

Source: Own elaboration.

Note: This table illustrates how different types of tax credits affect the ETR under Pillar Two. It is assumed that the R&D tax credit amounts to 150. The statutory tax rate is assumed to be 20% and the financial accounting profit before tax is assumed to be 1000.

Similar to accelerated depreciation schemes and super deductions for R&D, R&D tax credits require a certain level of substance in terms of personnel and/or tangible assets. Firms eligible for R&D tax credits are therefore likely to benefit from the SBIE and thus be less affected by Pillar Two if they have a high level of substance.

4.2.2. Output-based Incentives

a. Exemptions

In addition to input-based incentives, output-based incentives can have an impact on a firm's ETR under Pillar Two and thus potentially trigger a top-up tax. Some governments offer tax exemptions granting a temporary or permanent reduction or elimination of taxes (Celani et al., 2022). Exemptions can take different forms: for example, tax holidays exempt firms from income

taxation, i.e. they offer a full exemption, while specific exemptions are targeted towards certain industries, locations or company types (Ferreira Liotti et al., 2022). In the context of Pillar Two, these exemption regimes reduce the amount of covered taxes. At the same time, the exempt income is part of the net qualifying income as it is included in the financial accounting income and the Pillar Two rules do not allow for an exclusion of untaxed income. As a result, the permanent book-tax difference that reduces the ETR could potentially trigger a top-up tax if it results in an ETR below 15% (Ferreira Liotti et al., 2022; UNCTAD, 2022). Table 4 illustrates this relationship based on an example calculation. Overall, however, the ETRs in EU Member States are less likely to be affected as tax exemptions are less common in EU Member States and more often implemented in developing countries (Celani et al., 2022; OECD, 2022a; Hanappi, 2018).

Table 4: The Impact of a Tax Exemption on the ETR under Pillar Two

		Without Tax Exemption	With Tax Exemption
Statutory tax rate	(1)	20%	20%
Financial accounting profit before tax (= Net qualifying income)	(2)	1000	1000
Less: income subject to tax exemption	(3)	-	600
Tax base for covered taxes	(4) = (2)–(3)	1000	400
Covered taxes	(5) = (4)x(1)	200	80
Effective tax rate	(6) = (5)/(2)	**20%**	**8%**
Top-up tax percentage (if ETR < 15%)	(7) = 15%-(6)	-	7%
Top-up tax (if ETR < 15%)	(8) = (7)x(2)	**0**	**70**

Source: Own elaboration.

Note: This table illustrates how a tax exemption affects the ETR under Pillar Two. It is assumed that the income subject to the tax exemption is 600. The statutory tax rate is assumed to be 20% and the financial accounting profit before tax is assumed to be 1000.

b. IP Box Regimes

Under IP box regimes, qualifying IP income is treated preferentially for tax purposes, either by exempting the income (partially) or by granting a reduced tax rate. Similar to general exemptions such as tax holidays, IP box regimes reduce the covered taxes, while the IP income is reflected in the net qualifying income. If a firm benefits from an IP box regime in a country, the ETR is therefore likely to decrease. However, the specific effect on the ETR depends on the design of the regime, the tax rate that applies to other types of income and the share of IP income to other income in a country (Ferreira Liotti et al., 2022). Due to the jurisdictional blending approach, for example, lower-taxed IP income may be offset by higher-taxed ordinary income, which could result in an overall ETR above 15% even if the ETR on IP income was below 15% (Ferreira Liotti et al., 2022; UNCTAD, 2022). Table 5 shows an example calculation of the effect of IP box regimes on the ETR.

Table 5: The Impact of an IP Box Regime on the ETR under Pillar Two

		Without IP Box Regime	With IP Box Regime	
			Low Share of IP In-come	High Share of IP In-come
Statutory tax rate	(1)	20%	20%	20%
Tax rate on IP income	(2)	20%	5%	5%
Financial accounting profit be-fore tax (= Net qualifying in-come)	(3) = (4)+(5)	1000	1000	1000
Thereof ordinary income	(4)	500	800	500
Thereof IP income	(5)	500	200	500
Tax expense on ordinary in-come	(6) = (4)x(1)	100	160	100
Tax expense on IP income	(7) = (5)x(2)	100	10	25
Covered taxes	(8) = (6)+(7)	200	170	125
Effective tax rate	(9) = (8)/(3)	**20%**	**17%**	**12.5%**
Top-up tax percentage (if ETR < 15%)	(10) = 15%-(9)	-	-	2.5%
Top-up tax (if ETR < 15%)	(11) = (10)x(3)	**0**	**0**	**25**

Source: Own elaboration.

Note: This table illustrates how an IP box regime affects the ETR under Pillar Two. The statutory tax rate is assumed to be 20% and the preferential tax rate on IP income is assumed to be 5%. Moreover, it is assumed that the financial accounting profit before tax is 1000, of which 200 (500) is IP income in the low (high) IP share scenario.

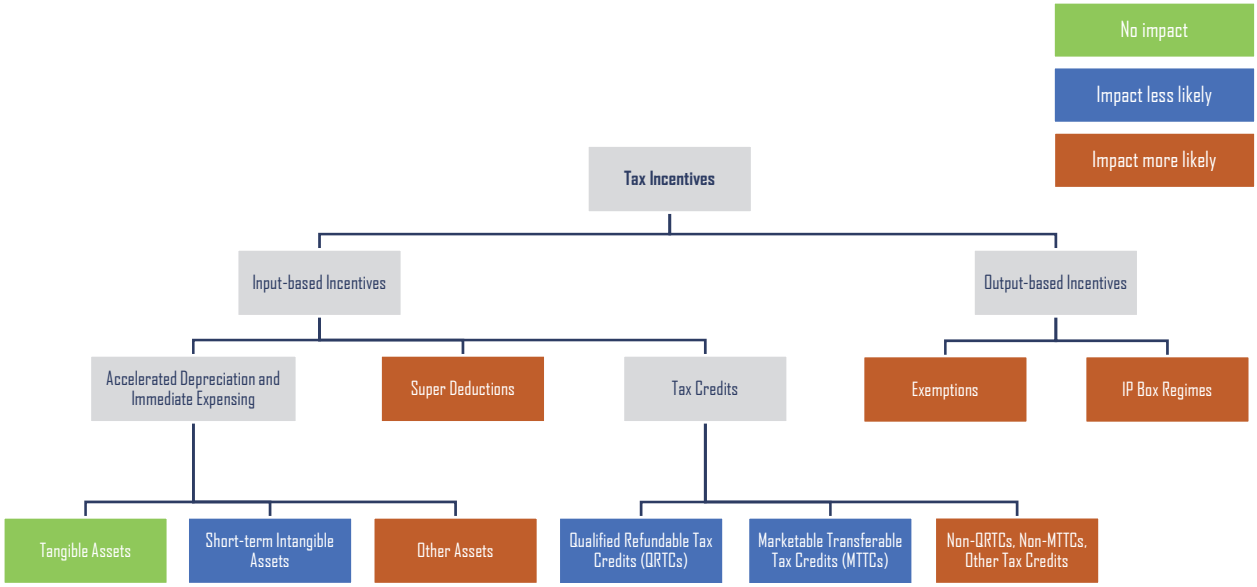
A further factor particularly determining the impact of Pillar Two on IP box regimes is the SBIE. As discussed in Section 3.2, under BEPS Action 5, the so-called nexus approach was introduced to ensure that IP box regimes are substance-based. Thus, to benefit from a preferential tax treatment, firms have an incentive to perform the R&D activities in the country that grants the IP box regime. At the same time, the SBIE under Pillar Two exempts a routine profit from substantial economic activity from the top-up tax. Therefore, if a firm's R&D activities heavily depend on personnel and tangible assets, it may still benefit from the preferential IP box regime under the SBIE (UNCTAD, 2022). Overall, the tax incentive granted by IP box regimes is likely to be reduced rather than completely reversed under Pillar Two.

4.3. Implications for the Design of Tax Incentives under Pillar Two

The previous sections have shown that on the one hand, the design of tax incentives varies significantly and on the other hand, the incentives are affected by Pillar Two to varying degrees. Figure 10 summarises to what extent Pillar Two is likely to affect the tax benefits granted by different types of tax incentives. While super deductions, exemptions and IP box regimes are likely to be affected, the interaction of tax credits and Pillar Two depends on their design. The

effect on tax credits that are classified as QRTCs or MTTCs is less significant than for Non-QRTCs, Non-MTTCs and OTCs. Finally, accelerated depreciation and immediate expensing schemes for tangible assets are unaffected by Pillar Two.

Figure 10: The Impact of Different Tax Incentives on the ETR under Pillar Two



Source: Own illustration.

Note: This figure shows to what extent Pillar Two is likely to affect the tax benefits granted by different types of tax incentives.

Against this background, governments may consider to reassess their tax incentive regimes to incentivise investment even after the implementation of Pillar Two. In general, however, it has to be taken into account that Pillar Two only applies to a subset of firms, i.e. firms that are affiliates of large multinational or domestic groups. Firms that are out of scope of Pillar Two continue to benefit from tax incentives without being affected by any interactions between the incentives and Pillar Two. Therefore, governments may continue to grant incentives, especially if they are effective, to out-of-scope firms (OECD, 2022a). On the other hand, for in-scope firms the effectiveness of tax incentives may be curtailed by Pillar Two, as discussed in Section 4.2. However, it is important to consider that the tax benefit granted by incentives may only be reduced or reversed by Pillar Two if a firm's ETR is below 15%. As a result, high-tax countries may not necessarily have to redesign their tax incentive policies since the likelihood of firms being affected by a top-up tax is relatively low.

Governments considering to revise the design of their tax incentive regimes in light of Pillar Two should take into account the aforementioned interactions between the different types of incentives and Pillar Two. Overall, input-based incentives are less affected and thus favoured under Pillar Two, in line with the empirical literature supporting the implementation of input-based rather than output-based incentives (see Section 3.3). Specifically, governments may grant accelerated depreciation schemes for tangible assets, as they are unaffected by Pillar Two (OECD, 2022a). In addition, tax credits classified as QRTCs or MTTCs are less impacted by Pillar Two, which may result in more governments introducing or revising their tax credits such that they meet the definition of a QRTC or MTTC (Bammens and Bettens, 2023; Chand and Romanovska, 2023). Furthermore, countries could be incentivised to offer grant schemes, which are treated similar to QRTCs and MTTCs (Chand and Romanovska, 2023).

As discussed in Section 4.2, the impact of Pillar Two on tax incentives depends on the SBIE. Thus, policymakers should consider to what extent their tax incentives require substance as measured by employment and investment in tangible assets, as these types of incentives are less affected by Pillar Two (OECD, 2022a). Overall, governments should reassess the specific

design of their incentives, since certain design features could undermine the tax benefits of the incentives under Pillar Two. For example, tax incentives that apply to an incremental base instead of a volume-based incentive are less affected. Similarly, incentives targeted to certain types of income as well as ceilings that limit the tax benefit to a specific amount reduce the impact of Pillar Two (OECD, 2022a).

In response to the implementation of the Minimum Tax Directive, some EU governments already announced to reform their tax incentive regimes in light of Pillar Two[7]. As described in Section 3.1.2, the predominant forms of tax incentives in the EU Member States are super deductions and tax credits. While super deductions are likely to be affected by Pillar Two, the effectiveness of QRTCs is less likely to be impacted. Therefore, EU governments may consider revising their super deductions and tax credits such that they meet the definition of a QRTC. While as of 2023, the majority of tax credits in the EU are refundable within a period of four years and thus likely to be classified as QRTCs, the tax credits in Hungary and Poland are not refundable (OECD, 2025a). However, Hungary as well as Malta announced to introduce R&D tax credits that are in line with the QRTC definition. Moreover, Belgium and Ireland amended their R&D tax credits to ensure that they are considered QRTCs. In Belgium, the investment deduction, which is a super deduction, was also amended to be classified as QRTC. Finally, Poland announced to replace its R&D tax credit with a cash grant system (KPMG, 2025). Overall, while so far only some governments announced concrete measures to address the implications of Pillar Two for tax incentives, it is to be expected that more governments will follow.

[7] The following reforms were announced by January 31, 2025 (KPMG, 2025).

5. COUNTRY BEST PRACTICES ON R&D TAX INCENTIVES UNDER PILLAR TWO

KEY FINDINGS

Tax incentives are used to boost investment, innovation and employment. However, they are costly and do not always reach their stated goals. Therefore, it is reasonable to reflect on principles, which characterise compelling and sustainable tax incentives. These principles cover justification, evaluation, international considerations, design, legislation, and implementation.

R&D tax incentives should be limited to those that increase positive spillover effects and additionality, and minimise windfall gains, i.e. input-based incentives. Comprehensive and regular evaluations of the incentives are essential to assess whether they achieve their intended objectives. In terms of design, a balanced approach that combines broad eligibility, targeted scope, simplicity, timely liquidity, and streamlined administration offers the greatest potential to foster innovation and generate sustainable economic benefits. Overall, refundable, volume-based tax credits with a broad scope remain a best practice, even under Pillar Two.

The objective of this section is to integrate the insights from the basic considerations on tax incentives (Section 2), the analysis of the design and evidence of R&D tax incentives (Section 3) as well as the discussion of the interaction of tax incentives with Pillar Two (Section 4). Based on these insights, this section will identify country best practices on R&D tax incentives.

Governments use tax incentives to boost investment, innovation and employment. However, tax incentives are costly and do not always reach their stated goals. They also frequently trigger unwanted side effects. Against this background and keeping in mind that a good tax system should be fair (i.e. non-selective), efficient and simple, it is reasonable to reflect on principles, which characterise compelling and sustainable tax incentives. According to the Platform for Collaboration on Tax (PCT), these principles cover justification, evaluation, international considerations, design, legislation, and implementation (PCT, 2024).

The key justification for the introduction of a tax incentive is that the incentive helps to overcome market failures and thus leads to net social benefits. Essentially, the benefit should go beyond the private benefit of the recipient of the incentive. Governments should in particular support R&D activities that would have been successful with more funds to invest. Thus, to limit the associated revenue costs, the objective should be to cut back incentives to those that increase positive spillover effects and additionality and minimise windfall gains. For input-based R&D tax incentives, empirical evidence confirms their effectiveness in stimulating additional private R&D expenditure, thereby increasing the potential for positive spillover effects that benefit the wider economy (see Section 3.1.4). In contrast, the evidence regarding output-based R&D tax incentives is mixed, particularly with respect to their capacity to enhance positive spillover effects. Thus, comprehensive and regular evaluations are essential to assess whether each incentive continues to achieve its intended objectives, to minimise windfall gains and to facilitate meaningful comparisons with alternative policy instruments.

The relevance of tax incentives for international tax competition has been widely acknowledged. In order to prevent harmful tax practices, aggressive tax planning and distortions of the single market, the EU Code of Conduct, the EU State Aid Rules, as well as the OECD Forum on Harmful Tax Practices provide some boundaries to the design of tax incentives. In recent years, specific emphasis has been on the criterion of economic substance as well as non-selectivity, in particular

for output-based incentives. In light of the implementation of Pillar Two in the EU Member States, governments may consider to further redesign their tax incentives in future years to avoid triggering top-up taxes that offset the tax benefit.

The principles outlined above are in line with some distinct design elements of tax incentives that can be considered best practices. In particular, these are:

(a) non-selective incentives with respect to eligibility groups,

(b) incentives targeted in scope,

(c) incentives with direct impact on liquidity,

(d) salient and transparent incentives to maximise uptake and minimise compliance costs, and

(e) incentives that are easy to administer and monitor.

First, tax incentives should be non-selective with respect to eligibility groups, i.e. they should be granted to all taxpayers independent of specific characteristics, in line with the general idea of a good tax system being fair. A narrow targeting of specific taxpayers is prone to misjudgements as it is usually hard for governments to correctly anticipate which technology or sector has the most promising growth perspectives or the most convincing potential for positive spillover effects. In particular, the de facto industry selectivity of IP box regimes is a key disadvantage. Not all outputs of R&D activity benefit from IP boxes, which are with few exceptions limited to profits from patents and related rights. However, patents and associated royalty payments play a central role in only a limited number of industries (Rizzo, 2023; Spengel et al., 2022). Firms operating in the chemical, electrical engineering, information and communication technology, and pharmaceutical sectors account for approximately 99.5% of all granted patents (Alstadsæter et al., 2018). As a result, the benefits of IP box regimes tend to be concentrated among these industries, raising concerns about unequal access to tax advantages and the potential distortion of competition across sectors.

By contrast, input-based R&D tax incentives that are granted universally to all taxpayers engaged in eligible R&D activities represent a best practice. Such incentives avoid sectoral bias and help to ensure a more neutral allocation of support. In the context of Pillar Two, only affiliates of large multinational and domestic groups are affected by any interactions of Pillar Two and R&D tax incentives. However, a distinction between different incentives for firms within and out of scope of Pillar Two should be avoided. Therefore, as outlined above, tax incentives should be targeted to all firms independent of their size, sector and other characteristics. This also reduces complexity of the tax incentive system. As of 2023, most EU Member States apply a broad definition of eligible taxpayers including all companies and self-employed that are liable to income taxation (see Table 6). Yet, some incentives are restricted to taxpayers with green R&D investment (e.g. Belgium), specific activity (e.g. R&D centres in Belgium or research facilities in Hungary), and/or young innovative companies (e.g. France).

Table 6: Overview of Input-based R&D Tax Incentives in the EU based on Best Practice Criteria

	Type			Offset against			Scope					Liquidity			
	Tax Credit	Accelerated Depreciation	Super Deduction	CIT	PWHT/SSC	Other Taxes	Eligible Taxpayer	Incentive Base	Expense Base	Subcon-tracted R&D	Ceiling	Immediate Refund	Carry-over & Refund ≤ 4 Years	Carry-over	Pre-approval
AT	**x**			x			**All**	**V**	C	**x**	x	**x**			**x**
BE		x		x			**All**	**V**	ME	-	-	-	-	-	-
BE	**x**				**x**		Research facilities	**V**	L	-	x	**x**			-
BE			**x**	x			**All**	**V**	Green R&D: ME, I, B	-	x			x	**x**
BE	**x**			x			Firms with research centre	**V**	ME, I, B	-	x		(x)[a]		**x**
HR			**x**	x			**All**	**V**	**C, MED**	**x**	x			x	**x**
CY			**x**	x			**All**	**V**	**C, I**	**x**	-			x	-
CZ			**x**	x			**All**	H	**C, MED**	**x**	-			x	**(x)[b]**
DK		**x**		x			**All**	**V**	ME	-	-	-	-	-	-
DK			**x**	x			**All**	**V**	**C, ME, BD**	**x**	x			x	-
DK	**x**			x			All (deficit-related R&D)	**V**	**C, ME, BD**	**x**	x	**x**			-
FI			**x**	x			**All**	**V**	Collaborative R&D	**x**	x			x	-
FI			**x**	x			**All**	**V**	C	**x**	x			x	-
FR		**x**		x			**All**	**V**	ME	-	-			x	-
FR	**x**				**x**		Young innovative firms	**V**	L	-	x	**x**			**(x)[b]**
FR	**x**			x			**All**	**V**	**C, MED, BD**	**x**	x	(x)[c]	x		**(x)[b]**
FR	**x**			x			**All**	**V**	Collaborative R&D	**x**	x	-	-	-	**x**
DE	**x**			x			**All**	**V**	**C, MED[a]**	**x**	x	**x**			**x**

	Type			Offset against			Scope					Liquidity			Pre-approval
	Tax Credit	Accelerated Depreciation	Super Deduction	CIT	PWHT/SSC	Other Taxes	Eligible Taxpayer	Incentive Base	Expense Base	Subcon-tracted R&D	Ceiling	Immediate Refund	Carry-over & Refund ≤ 4 Years	Carry-over	
GR	-	-	**x**	x			**All**	**V**	**C, MED**	**x**	-			x	**x**
HU	**x**			x			**All**	**V**	**C, ME, B, I**	-	x			x	**x**
HU			x			x	Large, medium-sized firms	**V**	**C, ME, B, I**	**x**	-	-	-	-	**(x)**[b]
HU			**x**	x			**All**	**V**	**C, ME. B, I**	**x**	x			x	**(x)**[b]
HU	**x**				**x**		Research facilities	**V**	L	-	x	**x**			-
HU	x[d]				**x**		Research facilities	**V**	L	-	x	**(x)**			-
HU	**x**				**x**		SME Research facilities	**V**	L	-	x	**x**			-
HU	x[d]				**x**		SME Research facilities	**V**	L	-	x	**(x)**			-
IE		**x**		x			**All**	**V**	ME, B	-	-	-	-	-	
IE	**x**			x			**All**	**V**	**C, ME, B, I**	**x**	x	(x)[e]		(x)[e]	-
IT			**x**	x			**All**	**V**	**C, MED, I**	**x**	-			x	-
IT	**x**			x	**x**		**All**	**V**	**C, MED**	**x**	x	(x)[e]		(x)[e]	-
LT		**x**		x			**All**	**V**	ME, I	-	-			x	**x**
LT			**x**	x			**All**	**V**	C	**x**	-	-	-	-	**(x)**[b]
NL	**x**				**x**		**All**	**V**	**C, ME, B, I**	-	-	**x**			**x**
PL			**x**	x			**All**	**V**	**C, MED, ID**	**x**	-	**-**	**-**	**-**	-
PT	**x**			x			**All**	H	**C, ME, I**	**x**	x			x	**x**
RO			**x**	x			**All**	**V**	**C, MED, BD, ID**	**x**	-			x	**(x)**[b]
SK			**x**	x			**All**	**V**	**C, ME, B, I**	**x**	x			x	**x**
SK			**x**	x			**All**	H	**C, ME, B, I**	**x**	-			x	-
SL			**x**	x			**All**	**V**	**C, ME, I**	**x**	x			x	**x**

	Type			Offset against			Scope					Liquidity			Pre-approval
	Tax Credit	Accelerated Depreciation	Super Deduction	CIT	PWHT/SSC	Other Taxes	Eligible Taxpayer	Incentive Base	Expense Base	Subcon-tracted R&D	Ceiling	Immediate Refund	Carry-over & Refund ≤ 4 Years	Carry-over	
ES		**x**		x			**All**	**V**	ME, I, B	-	-	-	-	-	**x**
ES	**x**			x			**All**	H	**C, ME, I**	**x**	x	(x)[f]		x	**x**
ES	x[d]				**x**		**All**	**V**	L	-	x	**(x)**			**x**
SE	x[d]				**x**		**All**	**V**	L	-	x	**(x)**			-

Source: Own illustration, based on OECD (2025a).

Note: Best practices within each evaluation and design criterion are highlighted in grey. Incentive bases are either volume-based (V) or hybrid (H). Expenses could include current expenses (C), labour expenses (L), machinery and equipment (ME), buildings (B), intangibles (I), depreciation on machinery and equipment (MED), buildings (BD) or intangibles (ID). [a] Considering current legislative changes. [b] Pre-approval is optional. [c] Only applicable for SMEs. [d] SSC exemption. [e] Payable in 3 instalments. [f] Refund available at 20% discount. See Table 8 in the Annex for more detailed information on individual R&D tax incentives.

Second, there is inevitably a trade-off with respect to the ideal scope of a R&D tax incentive. According to the PCT, incentives should be targeted as closely as possible to the expected source of social benefit. While it is clear that this notion rules out output-based incentives, it is rather impractical to pin down the exact type of expense creating the spillover effect. A simple solution is to define a broad base of eligible expenses, such as R&D wages, allowances for machinery and buildings, and overhead costs. Moreover, subcontracted or outsourced R&D expenditures should be included to ensure that external research activities are not disadvantaged compared to in-house R&D. To limit windfall gains for large MNEs and to reduce the fiscal cost for governments, governments may rely on a ceiling, i.e. a cap on the maximum benefit that can be claimed. At the same time, the ceilings are often not binding for SMEs, which are the most responsive to R&D tax incentives, as their R&D expenditures generally fall below the threshold, allowing them to fully benefit from the incentives. Finally, as shown in Section 3.1.4, the introduction of ceilings does not appear to negatively affect the uptake of R&D tax incentives or input additionality. The majority of EU Member States implements these best practices of establishing a broad base of eligible expenses combined with the use of ceilings (see Table 6).

Third, the mechanism of how tax incentives stimulate investment involves the liquidity impact of the tax saving. To maximise this effect, the liquidity should be granted as direct as possible. Incentives that can be offset against payroll taxes or SSCs are highly effective in this regard, as the liquidity effect of the tax benefit occurs promptly within the same month. In addition, even firms with a negative CIT base benefit from this incentive design. This is of particular relevance during economic crisis or for firms experiencing losses at the beginning of their lifecycle. Instead of crediting against payroll taxes, the second best option for loss-making firms would be an immediate cash refund, allowing them to benefit from the tax incentive earlier rather than having to carry it forward to future years. As displayed in Table 6, the best practice of an offset against payroll taxes or SSCs is implemented in Belgium (research facilities), France (young innovative companies), Hungary (research facilities), Italy and the Netherlands. However, the tax credit in Italy is only payable in three instalments, which prevents rapid liquidity benefits. In contrast, the vast majority of tax incentives in the EU Member States are offset against CIT. Out of these, only Austria, Denmark, and Germany grant an immediate cash refund to taxpayers in case of insufficient tax liabilities.

Fourth, for input-based R&D tax incentives to be effective, they must be designed to be salient, transparent, and easily accessible in order to maximise uptake and minimise compliance costs. Empirical evidence shows that stability and predictability are crucial factors influencing firms' decisions to engage with R&D tax incentive schemes. Among the available instruments, R&D tax credits are considered best practice for delivering input-based support. They offer a clear, direct reduction in tax liability based on qualifying R&D expenditures and are generally easier for firms to integrate into their financial planning. In particular, volume-based R&D tax credits that apply to the total amount of qualifying expenditure provide predictability and simplicity, reducing both uncertainty and administrative burdens for taxpayers. By contrast, incremental schemes often require extensive documentation of historical R&D spending and introduce complexity that may deter participation. As of 2023, eleven EU Member States grant R&D tax credits. In line with the aforementioned best practice, the vast majority of tax credits are volume-based (see Table 6).

Under Pillar Two, volume-based tax credits classified as Qualified Refundable Tax Credits (QRTCs) are less likely to be impacted, provided they are refundable within four years. While such credits can reduce a firm's ETR and potentially trigger a top-up tax, in particular with a broad definition of expenses and a volume-based tax base, ceilings and the SBIE offer mitigating effects. Overall, refundable, volume-based tax credits with a broad scope remain a best practice, even under Pillar Two. As of 2023, several EU Member States have implemented refundable, volume-based tax credits that are likely to qualify as QRTCs and are less affected by Pillar Two.

In addition, R&D incentives should be structured as permanent features of the tax system rather than temporary measures. Permanence increases certainty and allows firms to incorporate expected benefits into long-term R&D planning. While temporary incentives may be appropriate for general investment support during economic downturns where time-limited measures can prompt companies to accelerate planned investments, the same approach is less effective for fostering sustained R&D activity, which typically requires long-term commitment. In the context of current legislative changes, a recent Belgian incentive reform proposal included a provision that would fix the applicable rates and include them in law instead of being subject to annual changes, with the explicit aim to improve legal certainty and foreseeability[8].

Furthermore, limiting the number of parallel R&D tax incentives within a country helps to simplify the system, thereby reducing compliance costs for businesses and easing administration burden on tax authorities. For instance, the UK recently merged two of their tax incentives into a single scheme with the objective to simplify their R&D incentive regime[9]. A streamlined, transparent incentive structure not only facilitates uptake, especially by SMEs, but also enhances the overall effectiveness of fiscal R&D policies.

Finally, a best practice for R&D tax incentives is to ensure that the incentives are easy to administer and monitor, especially for small firms. A simplified, transparent structure minimises the administrative burden and encourages more companies to apply. To further ease the process, the application should be straightforward and follow a digital one-stop system. The empirical literature supports the implementation of digital application procedures. For example, Lin et al. (2025) show that the Chinese government's tax management information system was a key factor in increasing the uptake of the tax incentive for high-tech enterprises. In the EU, several Member States such as Belgium[10], Germany[11], and Sweden[12] recently announced to reform their tax incentive systems by simplifying and streamlining their application procedures. While the implementation of pre-approval procedures may impose administrative costs on the involved parties, they increase predictability for both taxpayers and governments by providing clarity on which projects and expenses qualify for support. Pre-approval procedures are common in the EU, with some Member States granting optional pre-approval (see Table 6).

Overall, Table 6 shows that most EU Member States perform well in terms of scope. The majority does not restrict access based on the type of eligible taxpayers, and all 43 incentives examined include a volume-based component. However, hybrid instruments – observed in four cases – introduce additional complexity and are therefore not recommended as a best practice. All Member States offer at least one R&D incentive covering labour and current R&D expenditures, which typically represent the largest share of R&D costs. Yet, best practice suggests that integrating both current and capital R&D expenses into a single incentive enhances administrative efficiency for both firms and tax authorities. Taken together, 20 R&D incentives feature a comparably broad base that includes subcontracted R&D expenses, an important feature particularly for SMEs, which often lack sufficient internal R&D capacity.

However, greater variation emerges with regard to the instrument type and the liquidity impact, depending on the offset or refund mechanism applied. Among the 43 R&D incentives examined,

8 https://www.ey.com/en_be/technical/tax/tax-alerts/2024/belgium-modernizes-its-investment-deduction-regime-and-enhances-its-ip-regime.

9 https://www.grantthornton.co.uk/insights/guide-to-rd-reform-as-uk-moves-to-a-merged-regime/.

10 https://www.ey.com/en_be/technical/tax/tax-alerts/2024/belgium-modernizes-its-investment-deduction-regime-and-enhances-its-ip-regime.

11 https://clever-funding.de/blog/forschungszulage/.

12 https://www.ey.com/en_se/insights/tax/why-sweden-s-proposed-r-d-tax-changes-mark-a-positive-step-forward.

only 14 qualify as volume-based tax credits, and just eight of these incentives offer immediate refunds, either through offsets against CIT or against payroll taxes and SSCs. Thereby the latter provides the fastest liquidity effects. In contrast, countries like Italy and Ireland provide refunds over a three-year period, while Belgium and France delay refunds for up to four years in their CIT credits, potentially limiting the short-term cash flow benefits for firms. Nevertheless, all of these refundable tax credits are likely to qualify as QRTCs and are therefore less impacted by Pillar Two.

A final comprehensive comparison of R&D tax incentives across EU Member States reveals that, while no single country fully meets all identified best practice criteria, some countries have implemented several key features that exemplify best practice (see Table 6). Among the existing R&D tax incentives, the Dutch R&D tax credit (WBSO) stands out as fulfilling most of the identified best practice criteria. It is accessible to all types of taxpayers engaged in R&D activities, is designed as a volume-based R&D tax credit offset against monthly payroll taxes and SSCs, and allows for a broad base of internal R&D expenses. However, the WBSO does not permit the inclusion of subcontracted R&D expenses. In contrast, the German tax credit (Forschungszulage) has a broader scope than the WBSO, including outsourced R&D expenses, yet it is offset against the CIT, resulting in a less immediate liquidity impact. Similarly, the R&D tax credits in Ireland and Italy are generous in terms of the scope of eligible taxpayers and expenses, but they limit the immediate cash benefit by distributing refunds over three annual instalments. Austria, meanwhile, restricts eligibility for the volume-based, refundable tax credit to current R&D expenditures only. Finally, the payroll and SSC tax credits available in Belgium (for research facilities) and France (for young innovative firms) offer rapid liquidity benefits but are limited in scope, as they apply only to certain taxpayer categories and cover labour costs exclusively.

To maximise the effectiveness of R&D tax incentives, while ensuring fairness, efficiency, and compliance with international frameworks such as Pillar Two, governments should aim to integrate these best practices into their policy design. Notably, the continued reliance on super deductions in several EU Member States may present challenges, particularly when aiming to implement a single, unified incentive accessible to all types of eligible taxpayers. A balanced approach that combines broad eligibility, targeted scope, timely liquidity, simplicity, and streamlined administration offers the greatest potential to foster innovation and generate sustainable economic benefits.

6. CONCLUSION

To stimulate private investment in innovation, address existing market failures and foster long-term economic growth, many countries grant R&D tax incentives. The effectiveness of these R&D tax incentives in stimulating additional R&D activity depends on the generosity of the incentives themselves, their specific design and administrative features and the broader investment climate in which they operate.

The empirical literature overview for input-based (e.g. tax credits, super deductions) or output-based (e.g. IP box regimes) incentives suggests that R&D tax incentives are effective in stimulating R&D activities, measured by increasing R&D expenses or patenting activities. In particular, a 10% decrease in the cost of R&D through input-based tax incentives can increase R&D spending by approximately up to 10% in the long-term. The impact is particularly strong among SMEs and start-ups benefiting from refundable tax credits, as these firms often lack sufficient corporate tax liabilities to fully utilise non-refundable incentives. On the other hand, the empirical evidence on the effectiveness of IP box regimes is mixed. While they were originally criticised for encouraging profit shifting and providing limited additional R&D stimulus, recent evidence highlights the potential of well-designed IP boxes under the modified nexus approach to retain high-value IP, encourage commercialisation, and support domestic innovation ecosystems. Still, concerns remain about their distributional effects as benefits tend to be concentrated among large MNEs.

Despite generous policy frameworks, incomplete uptake of R&D tax incentives remains a key challenge. Even in countries with mature R&D tax systems, many eligible firms, particularly SMEs, fail to claim available support, moderating the overall effectiveness of these incentives. Addressing awareness and accessibility barriers should therefore be a priority for policymakers seeking to maximise the impact of (input-based) R&D tax incentives.

With the introduction of the global minimum tax (Pillar Two), policymakers must carefully assess how R&D tax incentives can remain both effective and compliant. Since Pillar Two imposes a 15% minimum effective tax rate on large companies, tax incentives that lower a firm's tax liability risk being neutralised or even reversed by top-up taxes. However, the specific impact of Pillar Two on tax incentives depends on different aspects, such as countries' general tax provisions, the affected firms' activities and the design of the incentives. Overall, super deductions, tax exemptions and IP box regimes are likely to be affected by Pillar Two, while accelerated depreciation and immediate expensing schemes for tangible assets remain unaffected. Moreover, tax credits that are classified as qualified refundable tax credits or marketable transferable tax credits are less affected than other tax credits. This distinction has led to a growing preference for refundable or transferable tax credits, which preserve the incentive effect without undermining the minimum tax threshold.

Against this background, it is essential to examine best practices for designing compelling and sustainable R&D tax incentives under Pillar Two. To maximise their effectiveness, R&D tax incentives should be targeted at generating positive spillover effects and additionality while minimising windfall gains. Empirical evidence consistently supports input-based incentives as the most effective mechanism for stimulating additional R&D investment and fostering broader economic benefits.

A well-balanced incentive design should incorporate broad eligibility, targeted scope, simplicity, timely liquidity, and streamlined administration to maximise its impact. Among the available instruments, volume-based R&D tax credits are regarded as best practice for delivering input-based support, as they directly reduce the tax liability based on qualifying R&D expenditure while minimising uncertainty and administrative burdens for taxpayers. To grant liquidity to taxpayers as directly as possible, tax credits that may be credited against payroll taxes or SSCs are highly

effective. Even under Pillar Two, volume-based tax credits that are refundable within four years and have a broad scope remain a best practice.

A comparison of R&D tax incentives across EU Member States reveals that no single country fully meets all identified best practice criteria. However, several countries have adopted key elements that serve as models. To enhance the effectiveness of R&D tax incentives while ensuring fairness, efficiency, and alignment with international frameworks like Pillar Two, governments should strive to incorporate these best practices into their policy design.

Despite the positive impact on R&D activity, R&D tax incentives can have unintended consequences, especially in an integrated region like the EU. Rather than increasing global R&D investment, R&D tax incentives can increase the risk of beggar-thy-neighbour policies, i.e. shifting R&D activities across borders rather than expanding the overall level of global R&D investment. These cross-border distortions are particularly pronounced among MNEs operating in geographically proximate countries. Larger MNEs with significant R&D operations are especially responsive, as the benefits of tax planning scale with firm size, while implementation costs remain relatively fixed.

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ANNEX

Table 7: Overview of Ordinary and IP Box Regime Tax Rates in the EU

Country	Ordinary Tax Rate in %	Reduced Tax Rate in %
AT	-	-
BE	25	3.76
BG	-	-
HR	-	-
CY	12.5	2.5
CZ	-	-
DK	-	-
EE	-	-
FI	-	-
FR	25.83	10
DE	-	-
GR	22	10
HU	9	0 in case of capital gains of reported qualifying IP
IE	12.5	6.25
IT	-	-
LV	-	-
LT	15	5
LU	24.94	4.99
MT	35	1.75
NL	25.8	7
PL	19	5
PT	21	10.5
RO	-	-
SK	21	10.5
SL	-	-
ES	25	10
SE	-	-

Source: Own illustration, based on OECD (2025a, 2024a, 2024b).

Note: Italy had an IP box regime in place from 2015 to 2021, granting a reduced tax rate of 13.91%. In 2022, the patent box regime has been replaced by a super deduction for qualifying R&D expenses.

The B-index measures the pre-tax income that a company needs to fund one unit of R&D expense (Warda, 2001). The more generous the tax provisions for R&D, the lower the before-tax breakeven economic return required by firms and the higher the implied marginal R&D tax subsidy. A subsidy rate of zero represents no tax incentives to conduct additional R&D activities; a subsidy rate above (below) zero indicates the existence of positive (negative) incentives to conduct additional R&D activities. The OECD time-series estimates of implied R&D tax subsidy rates is based on headline tax credit and allowance rates (OECD, 2024b).

Table 8: Detailed Overview of Input-based R&D Tax Incentives in the EU based on Best Practice Criteria

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
AT	**Tax credit** (*Forschungs-prämie*)	**All**	**Volume**	C (incl. subcon-tracted R&D)	Ceiling (R&D ex-pense) if subcon-tracted: EUR 1Mio.	14	CIT	**Immediate re-fund CIT**	**Yes**	Dual
BE	Accelerated de-preciation	**All**	**Volume**	ME	No	33.3	CIT	No carry-over or refund	No	Single
BE	**Payroll WHT credit** (*Dispense de versement du précompte*)	Re-search facilities	**Volume**	L	Ceiling (tax relief): PWHT liability; bache-lor degrees 25% of PWHT liability	80	**PWHT/SSC**	**Immediate re-fund PWHT/SSC**	No	Single
BE	Super deduction (*Déduction pour investissement*)	**All**	**Volume**	for environ-ment-friendly investment: ME, I, B	Ceiling (R&D ex-pense) if EUR 1,034,100 < allow-ance < EUR 4,136,390: EUR 1,034,100/year; if al-lowance > EUR 4,136,390: 25% of al-lowance	113.5[a]	CIT	Carry-over (indefinite)	**Yes**	Dual
BE	**Tax credit** (*Crédit d'impôt pour recherche et développe-ment)*	Firms with re-search centre	**Volume**	ME, I, B	Ceiling (tax relief) if EUR 175,800 < tax credit < EUR 703,190: EUR 175,800/year; if tax credit > EUR 703,190: 25% of tax credit	3.38[a]	CIT	Carry-over & re-fund after 5 years	**Yes**	Dual

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
HR	Super deduction	**All**	**Volume**	**C, MED (incl. subcontracted R&D)**	Ceiling (R&D ex-pense) per firm per project depending on type of research activ-ity and on firm size	125/150/200 for experi-mental/ industrial/ basic re-search	CIT	Carry-over (5 years)	**Yes**	Single
CY	Super deduction	**All**	**Volume**	**C, I (incl. sub-contracted R&D)**	No	120	CIT	Carry-over (5 years)	No	Single
CZ	Super deduction	**All**	Hybrid	**C, MED (incl. subcontracted R&D)**	No	200 + 10 (in-cremental)	CIT	Carry-over (3 years)	Optional	Single
DK	Accelerated de-preciation (*Straksafskrive*)	**All**	**Volume**	ME	No	100	CIT	No carry-over or refund	No	Single
DK	Super deduction	**All**	**Volume**	**C, ME, BD (incl. subcon-tracted R&D)**	Ceiling (R&D ex-pense): DKK 910 Mio.	108	CIT	Carry-over (in-definite)	No	Single
DK	**Tax credit**	All if defi-cit-re-lated R&D ex-penses	**Volume**	**C, ME, BD (incl. subcon-tracted R&D)**	Ceiling (R&D ex-pense): DKK 25 Mio.	22	CIT	**Immediate re-fund CIT**	No	Single
FI	Super deduction	**All**	**Volume**	Collaborative R&D expense	Ceiling (tax relief): EUR 500,000	250	CIT	Carry-over (10 years)	No	Single
FI	Super deduction (*yleinen lisävä-hennys*)[b]	**All**	**Volume**	C (incl. subcon-tracted R&D)	Ceiling (tax relief): EUR 500,000	150	CIT	Carry-over (10 years)	No	Single
FR	Accelerated de-preciation	**All**	**Volume**	ME	No	40	CIT	Carry-over (Infi-nite)	No	Single

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
FR	**Payroll WHT credit** (*Jeune entreprise innovante, de croissance ou universitaire*)	Young innovate/ growth/ univer-sity firms	**Volume**	L	Ceiling (tax relief): 4.5 times the minimum salary (employee level); 5 times the an-nual social security ceiling (firm level)	100	**PWHT/SSC**	**Immediate refund PWHT/SSC**	Optional	Single
FR	**Tax credit** (*Crédit d'impôt recherche*)	**All**	**Volume**	**C, MED, BD (incl. subcon-tracted R&D)**	Ceiling (R&D ex-pense) if subcon-tracted: EUR 10 Mio.	30; 5 if R&D expense > EUR 100 Mio.	CIT	Carry-over and refund after 3 years, **Immediate re-fund CIT (SME)**	Optional	Dual
FR	**Tax credit** (*Crédit d'impôt collaborations de recherche*)	**All**	**Volume**	Collaborative R&D expense	Ceiling (R&D ex-pense): EUR 6 Mio.	40; 50 for SME	CIT	No carry-over or refund	**Yes**	Dual
DE	**Tax credit** (*For-schungszulage*)	**All**	**Volume**	**C, MED (incl. subcontracted R&D)**	Ceiling (R&D ex-pense): EUR 10 Mio.	25	CIT	**Immediate refund CIT**	**Yes**	Dual
GR	Super deduction	**All**	**Volume**	**C, MED (incl. subcontracted R&D)**	No	200	CIT	Carry-over (5 years)	**Yes**	Single
HU	**Development tax credit**	**All**	**Volume**	C, ME, B, I	Ceiling (tax relief): 80% of CIT liability	0-70 de-pending on firm size and region of in-vestment	CIT	Carry-over (16 years)	**Yes**	Single
HU	Super deduction	Large, medium-sized firms	**Volume**	**C, ME, B, I (incl. subcon-tracted R&D)**	No	200	other taxes: innovation contribution	No carry-over or refund	Optional	Single

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
HU	Super deduction	**All**	**Volume**	**C, ME. B, I (incl. subcon-tracted R&D)**	Ceiling (tax relief) if collaboration: HUF 50 Mio. per year and or-ganization	200; 300 if collaboration	CIT	Carry-over (5 years)	Optional	Single
HU	**Payroll WHT credit**	Re-search facilities	**Volume**	L	Ceiling (tax relief): lim-ited to 50% of total SSC liability	50	**PWHT/SSC**	**Immediate refund PWHT/SSC**	No	Single
HU	Payroll WHT re-mission (SSC ex-emption)	Re-search facilities	**Volume**	L	Ceiling (tax relief): up to twice the monthly minimum wage; lim-ited to total SSC liabil-ity	100 for PhDs; 50 for PhD stu-dents	**PWHT/SSC**	**Immediate refund PWHT/SSC**	No	Single
HU	**Tax credit in Small Business Tax (KIVA)**	SME Re-search facilities	**Volume**	L	Ceiling (tax relief): lim-ited to 50% of total SSC liability	50	**PWHT/SSC**	**Immediate re-fund PWHT/SSC**	No	Single
HU	Tax exemption in Small Business Tax (KIVA)	SME Re-search facilities	**Volume**	L	Ceiling (tax relief): up to twice the monthly minimum wage; lim-ited to total SSC liabil-ity	100 for PhDs; 50 for PhD stu-dents	**PWHT/SSC**	**Immediate re-fund PWHT/SSC**	No	Single
IE	Accelerated de-preciation	**All**	**Volume**	ME, B	No	100	CIT	No carry-over or refund	No de-tails	No details
IE	**Tax credit**	**All**	**Volume**	**C, ME, B, I (incl. subcon-tracted R&D)**	Ceiling (tax relief) if subcontracted: 15% of qualifying R&D ex-penditures	25	CIT	Tax credit paya-ble in 3 instal-ments[c]	No	Single
IT	Super deduction	**All**	**Volume**	**C, MED, I (incl. subcontracted R&D)**	No	210	CIT	Carry-over (infi-nite)	No	Single

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
IT	**Tax credit**	**All**	**Volume**	**C, MED (incl. subcontracted R&D)**	Ceiling (tax relief): EUR 5 Mio. per year	10; higher rates for certain PhDs and investment regions	**CIT, IRAP, SSC**	Tax credit payable in 3 equal instalments	No	Dual
LT	Accelerated depreciation	**All**	**Volume**	ME, I	No	50	CIT	Carry-over (infinite)	**Yes**	Multiple
LT	Super deduction	**All**	**Volume**	C (incl. subcontracted R&D)	No	300	CIT	No carry-over or refund	Optional	Multiple
NL	**Tax credit** (*WBSO*)	**All**	**Volume**	C, ME, B, I	No	32; 16 if R&D expense > EUR 350,000	**PWHT/SSC**	**Immediate refund PWHT/SSC**	**Yes**	Dual
PL	Super deduction (*Kosztami kwalifikowanymi*)	**All**	**Volume**	**C, MED, ID (incl. subcontracted R&D)**	No	300 (L); 200 (C, MED, ID)	CIT	**Immediate refund CIT (SMEs)**	No	Single
PT	**Tax credit** (*SIFIDE*)	**All**	Hybrid	**C, ME, I (incl. subcontracted R&D)**	Ceiling (R&D expense): EUR 1.5 Mio. of incremental expenses	32.5 + 50 (incremental)	CIT	Carry-over (8 years)	**Yes**	Single
RO	Super deduction	**All**	**Volume**	**C, MED, BD, ID (incl. subcontracted R&D)**	No	150	CIT	Carry-over (7 years)	Optional	Dual
SK	Super deduction (grant recipients)	**All**	**Volume**	**C, ME, B, I (incl. subcontracted R&D)**	Ceiling (tax relief incl. R&D grants) depending on type of research activity and on firm size	200	CIT	Carry-over (3 years)	**Yes**	Multiple

	Incentive Type (Name)	Scope				Incentive Rate in %	Liquidity		Administration	
		Eligible Tax-payer	Incentive Base	Expense Base	Ceiling		Tax Offset Against	Treatment of Unused Claims	Pre-ap-proval	Administra-tion Process
SK	Super deduction	**All**	Hybrid	**C, ME, B, I (incl. subcon-tracted R&D)**	No	200 + 100 (incremen-tal)	CIT	Carry-over (5 years)	No	Single
SL	Super deduction	**All**	**Volume**	**C, ME, I (incl. subcontracted R&D)**	The total reduction of the tax base from re-liefs and prior-period losses is capped at 63% of the current tax base	200	CIT	Carry-over (5 years)	**Yes**	Single
ES	Accelerated de-preciation	**All**	**Volume**	ME, I, B	No	100 (ME, I); 10 (B)	CIT	No carry-over or refund	**Yes**	Dual
ES	**Tax credit** (*Deducción I+D+i*)	**All**	Hybrid	**C, ME, I (incl. subcontracted R&D)**	Ceiling (tax relief): if tax credit < 10% tax due: 25% gross CIT due; if tax credit ≥ 10% tax due: 50% gross CIT due	25 (C); 17 (L); 8 (ME, I); 12 (technologi-cal innova-tion) + 17 (incremen-tal)	CIT	Carry-over (18 years), Immedi-ate refund op-tional at 20% discount (max. EUR 3 Mio.)	**Yes**	Dual
ES	SSC exemption	**All**	**Volume**	L	Ceiling (R&D ex-pense): up to 60% of annual wage bill	40	**PWHT/SSC**	**Immediate re-fund PWHT/SSC**	**Yes**	Dual
SE	SSC exemption	**All**	**Volume**	L	Ceiling (R&D ex-pense): SEK 36.8 Mio.	19.59	**PWHT/SSC**	**Immediate re-fund PWHT/SSC**	No	Single

Source: Own illustration, based on OECD (2025a).

Note: Best practices within each evaluation and design criteria are highlighted in bold. Expenses could include current expenses (C), labour expenses (L), machinery and equipment (ME), buildings (B), intangibles (I), depreciation on machinery and equipment (MED), buildings (BD) or intangibles (ID). The incentive rates for super deductions include the regular deduction of 100% plus any additional deductions.

[a] ***Belgium***: In case of a spread-deduction over four years, the R&D super deduction rate (tax credit rate) is 20.5% (5.125%) instead of an initial allowance of 13.5% (3.38%) in the first year. Companies have to choose between the tax credit for R&D and the investment deduction for patents or for "green" R&D investments. This choice is irrevocable (Source: Belgian Ministry of Finance, 2018, Tax Survey n°30, August, p 120, https://finance.belgium.be/en/figures_and_analysis/analysis/tax_survey).

[b] ***Finland***: Starting from the 2024 tax year, a second component, the additional supplementary deduction - *ylimääräinen lisävähennys* - can be claimed, which is based on the increase in the taxpayer's R&D expenditure compared to the previous year. This deduction is 45% and is limited to EUR 500,000.

[c] ***Ireland***: The R&D tax credit is claimed in three instalments: 50% of the credit in Year 1, a further 30% in Year 2 and the remaining 20% in Year 3, regardless of the company's profitability. Each year, the company can choose to offset the credit against tax liabilities or request a cash refund. This election applies separately to each instalment, including those from previous periods.

This study evaluates the effectiveness of tax incentives, with a particular focus on incentives for research and development (R&D). It analyses different design options for tax incentives and shows that input-based R&D tax incentives appear to be the most effective in stimulating additional R&D investment. Taking into account the lessons learnt from empirical evaluations and the restrictions imposed by Pillar Two, refundable, volume-based tax credits with a broad scope remain a convincing way forward for R&D tax incentives.

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