## R&D tax incentives

This section discusses the use of R&D tax incentives to foster innovation. It starts with a description of the different types of R&D tax incentives governments can use to finance innovation (tax credits, enhanced deductions, and depreciation allowances). It follows with a discussion of their characteristics (target group, eligible costs, base amount, and carry-forward and refund options) and finishes with the advantages and disadvantages of using them compared with other forms of government support. Finally, the section presents the main findings regarding their impact.

#### *What it is.* An R&D tax incentive reduces the tax liability of firms undertaking R&D and innovation activities, thereby lowering the private cost of R&D and stimulating additional investment in innovation activities. There are several types of tax incentives, described in more detail by Correa and Guceri (2013) and Van Pottelsberghe et al. (2003):

1. *Tax credits:* They allow firms to reduce their tax obligations by deducting a share of their R&D expenditures. Thus, a tax credit affects corporate taxes directly instead of taxable income. The firm’s cost reduction depends on R&D expenditures and the applicable tax credit rate.
2. *Enhanced deductions:* They allow firms to deduct 100 percent of eligible R&D expenditures, plus the deduction rate, from their taxable income. Thus, firms can deduct a larger amount than their actual R&D expenditures. The firm’s cost reduction is the product of R&D expenditures, the applicable tax allowance, and the applicable corporate income tax rate.
3. *Depreciation allowances:* These are tax deductions that recognize the loss in value of a fixed asset. R&D depreciation allowances treat R&D expenditures as capital goods that depreciate over several years because they are supposed to have a positive impact on firms’ future revenues and are less related to variable operational costs. In some cases, the depreciation allowance permits a deduction from taxable income of the capital expenditure used to conduct innovation activities.

#### *Characteristics.* The design of a tax incentive requires governments to define the target group, the list of eligible costs, the base amount, and the treatment of firms without profits (Correa and Guceri 2013; OECD 2010; Van Pottelsberghe et al. 2003):

1. *Target group:* Tax incentives are generally neutral. That is, they are applied to all the innovators without distinguishing by region, size of the company, sector, or type of innovative activity. There are circumstances, however, under which incentives are designed to benefit a particular group, such as small and medium-sized enterprises (SMEs). SMEs can be targeted by different mechanisms. For example, governments can explicitly limit access to the tax incentive to these companies. Or they can grant higher tax exemption rates to them or impose upper limits on the tax credit that are easily exceeded by large firms. Finally, governments can offer other instruments, such as cash refunds for loss-making companies.
2. *Eligible costs:* Most countries use the Frascati Manual (OECD 2002) as the basis for their definition of R&D to classify eligible and ineligible expenditures. They take three different approaches, however, to defining eligible R&D, which focus in turn on wages, current R&D, and current and capital R&D (Van Pottelsberghe et al. 2003). The first approach promotes investment in human capital. This is important, as nearly all R&D activities revolve around skilled staff from a variety of disciplines. But the other two options better reflect total R&D costs (Van Pottelsberghe et al. 2003). Governments sometimes extend eligible expenditures to include the costs of acquisition of intangibles, such as patents, licenses, know-how, and design (OECD 2010). Obviously, the more activities that are deemed eligible, the greater the potential incentive to promote innovation activities. A larger list, however, may impose significant costs on the government. No matter the definition of expenditure chosen, this is a very complex area, as many firms are tempted to maximize their potential exemptions by manipulating and relabeling activities.
3. *Base amount:* The value of a firm’s tax credit can be calculated by either volume-based or incremental assessment (Correa and Guceri 2013). A volume-based scheme corresponds to the total eligible R&D expenditures of the last fiscal year. An incremental approach calculates the tax credit from the increase in R&D, above a particular base amount established by the fiscal authority. A first-best policy would use the incremental approach to subsidize only the R&D activity that would have not been conducted in the absence of the fiscal stimulus. This information is not available to the government, however. In fact, the traditional assumption is that firms’ R&D would have been stable in the absence of the tax credit, which supports a volume-based scheme (Lentile and Mairesse 2009). Most countries use volume-based tax incentives. A few use an incremental base (including the United States and Ireland) or a hybrid scheme that combines volume and incremental R&D as eligible expenditures (for example, Portugal, Japan, and Spain) (OECD 2010). Sometimes both are used within the same instrument but with R&D that occurs above a baseline (which is often the previous year’s R&D) attracting a higher level of subsidy. The volume-based approach imposes more revenue forgone for the government, but it minimizes the likelihood of firms engaging in opportunistic behavior by changing their R&D strategies to maximize tax gains (Correa and Guceri 2013). It is also relatively easy to implement, although it has its own administrative challenges.
4. *Carry-forward and refund option:* If firms have no profits, they do not have any company tax obligation, and so cannot benefit from these schemes. This entails that tax credit is an instrument aimed at established companies and will have little impact on the innovation activities of startups. Some countries allow firms to request a tax refund be paid in cash, while others allow it to be used in the future when the financial situation of the firm improves (Correa and Guceri 2013). Thus, firms may carry forward unused R&D credits.

Table 2, based on Correa and Guceri (2013), provides some examples of the design choices made by different countries when designing their R&D tax incentive schemes.

**Table 2: Examples of R&D incentives**



Source: Correa and Guceri (2013).

#### *Advantages and disadvantages.* R&D tax incentives effectively reduce the marginal cost of investing in R&D, and, by reducing the cost, they encourage businesses to undertake more R&D. Specifically, they equal the marginal cost and the marginal revenue of a profit-maximizing firm at a higher level of investment in R&D. Bringing the private return closer to the social return helps rectify the suboptimal level of investment caused by the externalities in innovation activity, which results in innovators not fully appropriating the benefits of their inventions.

Empirical studies show these incentives are effective in fostering private R&D, even if they also inevitably subsidize R&D activities that would have occurred anyway. In the United States, according to Hall and Van Reenen (2000), “The R&D tax credit produces roughly a dollar-for-dollar increase in reported R&D spending on the margin. However, it took some time in the early years of the credit for firms to adjust to its presence, so the elasticity was somewhat lower during that period.” Similar results have been found for other countries, with similar conclusions arising from an analysis of the incremental R&D tax credit in France from 1993 to 2003, for which “one Euro of tax credit would give slightly more than one Euro of total R&D . . . and increases the growth of the number of researchers” (Duguet 2012).

Cross-country studies have also supported the positive effect of R&D tax incentives. Using data on tax changes and R&D spending in nine OECD countries over a nineteen-year period (1979–97), Bloom et al. (2002) found that “a 10 percent fall in the cost of R&D stimulates just over a 1 percent rise in the level of R&D in the short-run, and just under a 10 percent rise in R&D in the long-run.”

A result of this evidence has been an increase in the use and generosity of R&D tax incentives in recent years, with the number of OECD countries using them rising from eighteen in 2004 to twenty-six in 2011 (Correa and Guceri 2013), while their design has been simplified. Several economies have also increased their R&D tax incentives to ameliorate the negative consequences of the economic crisis of 2008–9,[[1]](#footnote-1) when many businesses significantly cut their research activity.

Another motivation for their growing use is tax competition. R&D tax incentives can help attract international R&D to locate in particular jurisdictions. This is particularly the case within multinationals, where some R&D can be footloose and different business units are competing for it. On the other hand, large multinationals can engage in sophisticated tax planning, reducing the effectiveness of R&D tax incentives.

As discussed in the previous section, the choice between direct and indirect mechanisms to support innovation activity in the private sector involves several tradeoffs. An ongoing debate questions whether it would be convenient to partially rebalance government support toward direct mechanisms, particularly in those countries where the quality of institutions is high, which enables them to allocate funding efficiently as well as resist rent-seeking attempts.

At the core of this debate is whether neutrality or targeting is more desirable. Tax incentives are typically neutral with regard to field of research and type of firm and designed to target all R&D performers, so they have a wider reach and are more accessible than R&D grants (OECD 2010).

Tax incentives therefore provide discretion to innovators to decide where to spend resources. Given that firms have more information than governments about the costs, benefits, and risks of different innovation projects, they may be expected to be better at selecting projects. But firms will select profit-maximizing projects that align with their corporate strategies and may not choose innovation projects with high social returns. In fact, by definition, the marginal project undertaken as a result of the availability of R&D tax incentives is not the project with the highest private return, either (since those are already profitable), but the one that is only potentially profitable if a tax credit subsidizes it. Therefore, these may be relatively poorer R&D projects that may have failed to get through a competitive grant process. The targeting inherent in grants and loans programs may make them better tools to foster long-run R&D initiatives, while tax incentives risk ending up promoting short-run R&D activities.

Also, tax incentives are not totally neutral. A few large R&D performing firms typically capture a large proportion of the tax incentives provided, while small and young firms, as well as firms in non-R&D-intensive sectors (such as service sectors), benefit much less. Attempts have been made to extend tax incentives to cover non-R&D-based innovation investments, but the evidence on the externalities emerging from these investments is much less developed.

Governments have also targeted particular groups of interest, such as SMEs, offering them more generous schemes. This can be justified as well by the evidence showing higher additionality of R&D tax incentives in small firms than in larger firms.[[2]](#footnote-2) Some tax schemes provide credits to small companies on their R&D expenditure (rather than on taxable revenue), which provides an additional source of working capital for young, pre-revenue firms starting to commercialize technology.

Tax incentives usually involve fewer bureaucratic procedures than R&D grants, as governments do not have to evaluate, select, and monitor projects. They also have lower administrative costs, as governments do not need to administer financial resources or manage contracts. They are, however, complex to design, and they require specialized administrative skills and a robust and skilled audit capability within government to ensure they are not abused. If this capability is not in place, it should be developed before a concession is introduced.

Tax incentives also create administrative burdens for firms, especially SMEs, as tax officials typically demand considerable paperwork (Correa and Guceti 2013). Filling out application forms and complying with regulations cost firms’ time and money, and in many countries a lucrative consultancy market has grown around such incentives. To remediate this problem, some countries have established specialized R&D units, which help firms prepare documentation and alleviate problems that arise when application procedures are not well documented in program regulations.

Tax incentives are, in principle, less exposed to rent-seeking behavior than grants because they are entitlement schemes rather than competitive programs (that is, if applicants are eligible they automatically receive the entitlement), but they are not immune to rent-seeking activities.[[3]](#footnote-3) If they are narrowly based or have differentiated levels of support, they can lead to distortionary behavior as business seeks to continue to maximize their benefits. So, if a higher rate is provided to SMEs, they may seek to restrict their growth artificially or change their corporate structures to keep receiving the concession.

Finally, most tax incentives programs are large initiatives, often making up one of the largest components of innovation support, so introducing a tax incentive is usually a significant policy and budgetary commitment. Furthermore, from a government budget management perspective, tax incentives are less attractive than grants because governments can only guess what the revenue forgone will be, whereas with grants the expenditure parameters are neatly defined.

Table 3 provides a summary of observations regarding tax incentives

**Table 3. Design and implementation observations—tax incentives**

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| --- | --- |
| **Instrument** | **Observations** |
| Tax incentives for R&D | * Tax incentives can be quite a flexible instrument; they can have a standardized, broad-based approach or contain different levels of incentives for different types of activities. For example, some provide higher subsidy levels for particular types of companies (such as SMEs) or for “additional” R&D expenditure that is significantly higher than the businesses’ previous average of R&D expenditure. * There are variations in how to apply the incentives—credit/concession/depreciation—all of which have slightly different accounting impacts on the claimant businesses. * Decision making on what innovations to support is entirely in the hands of businesses, so government has no involvement in choosing which innovation activities to support. As long as activities are eligible, they will be supported by the measure. * Tax incentives can be used as a strategic instrument by governments to attract overseas R&D via foreign direct investment, often as part of place-based schemes like science parks. * Most schemes work by reducing the corporate tax owed by the claimant business, which is paid on profits. If the business is not profitable, it generally cannot claim any benefit (although it may be able to make a claim in the future, when it is profitable); this may reduce the impact of the incentive. * Like all tax instruments, simple and broad-based schemes are the easiest to design and administer. The more complex and multifaceted schemes are not only harder to administer; they can lead to distortionary behavior (for example, SMEs trying to stay a certain size to remain eligible). * Because there are various approaches to defining, measuring, and applying tax incentives, they are complex to design. As they are generally legislatively based, they are also complex to change. Care should be taken to ensure they support the right types of innovation activity, are well integrated into the existing tax system, and have robust audit and compliance functions. * They work best in environments where the tax system is relatively robust, as they will be subject to extensive tax minimization efforts by users, particularly large companies with the resources to make such efforts. * These are generally large schemes with significant budgetary implications. Large schemes can make government budget management difficult, as predicting their usage accurately can be difficult. Since they operate on the revenue (forgone) rather than the expenditure side of the budget, however, only their administration requires a budget allocation. |

1. Increased indirect support has included enhanced deduction rates, a broadening of the definition of eligible R&D expenditures, and relaxed carry-forward provisions. [↑](#footnote-ref-1)
2. Lokshin and Mohnen (2012) studied the R&D fiscal incentives program in the Netherlands, and, while they found the program fostered R&D investment, they could only reject the hypothesis of crowding-out effects for small firms. [↑](#footnote-ref-2)
3. See the example of the Patent Box in the UK, the benefits of which will be concentrated among a small number of large R&D-intensive businesses. [↑](#footnote-ref-3)