

The Impact and Effectiveness of Fiscal Incentives for R&D

Tax incentives have become a popular policy instrument to boost research and experimental development (R&D) activities of businesses. They offer a reduction to a firm's tax burden depending on the volume, or increase, of the expenditure the firm devoted to R&D. The popularity of this instrument arises from the fact that it is rather simple to implement through the existing system of corporate taxation, implying low additional administrative costs both at the side of authorities and firms. R&D tax incentives do not burden the budget of research ministries (as the costs are borne by lower revenues of the Treasury), and they can easily be altered in size and scope without much change in the administration of the measure (as compared to a grant or loan programme where a doubling or halving of the measure often implies an according change in the resources to run the scheme). In addition, R&D tax incentives are neutral in terms of the content of R&D activity being supported, and they reach out to all types of firms, including small firms and service firms. When run on a long-term legal base, this instrument provides a reliable base for financial planning and R&D decisions of companies. R&D tax incentives offer a wide range of design features to policy makers that allow a flexible use for different policy objectives. They can be targeted to specific types of R&D activities (including innovation activities other than scientific research), they can be varied by firm size, region or sector, and they can be applied differently to different types of R&D expenditures. By using carry-forward or cash refund options, R&D tax incentives can be effective also for firms with no payable taxes in a certain fiscal year. Depending on the system of corporate taxation, tax incentives may be designed either as an allowance or a credit, though one could also choose other taxes such as withholding tax on wages in the Netherlands. In recent years, some Governments have expanded tax incentives to income from intellectual property generated by R&D (the so-called "patent box").

The main disadvantage of the measure is potentially very high costs for the Government, the extent of the costs being difficult to determine in advance. This is particularly true for volume-based tax incentives that offer tax reduction for any amount of R&D spending. Governments can limit these costs by opting for an incremental tax incentive that provides tax reduction only for the amount of R&D expenditure that exceeds a certain baseline. Another way to limit costs is to apply a cap per company. R&D tax incentives have been used by many Governments for a long period of time, providing a wide empirical base for evaluating the effectiveness of this instrument. This report summarises the findings of more than 20 econometric studies on the effectiveness of R&D tax incentives, covering programmes in 12 countries from the 1970s to the 2000s. Most studies look at input additionality, i.e. the change in business R&D expenditure resulting from R&D tax incentives. Most evaluations find a significant input additionality in the short run. The magnitude of positive input effects varies a lot, depending on the country, the period considered and the econometric method applied. Positive effects are found for different types of R&D tax incentives, including both volume-based and incremental schemes as well as for tax credits and tax allowances. One may conclude that R&D tax incentives are a useful tool to stimulate private R&D and raise the level of business R&D expenditure to a higher level. With respect to design features of R&D tax incentives, volume-based incentives and tax credits tend to produce higher additionality, as holds for more generous schemes. Incremental schemes turn out to be little effective in situations when the market environment for additional R&D activities is unfavourable, e.g. during recessions. The higher positive effects of volume-based and more generous schemes have to be balanced against their higher costs. The net welfare effects of R&D tax incentive have not been studied extensively, however. A recent longitudinal study on the welfare effects of a volume-based tax credit programme in the Netherlands suggests that input additionality diminishes over time, and that crowding out of private R&D can only be avoided for small firms while for large firms the scheme turned out to be ineffective. This finding would suggest to differentiating R&D tax incentives by firm size or the volume of R&D expenditure, e.g. through introducing caps or applying different rates for small and larger firms. In addition, a tax incentive could be lowered for firms that have used the credit for some time. While increasing the volume of R&D activities is the primary objective of R&D tax incentives, Governments also often expect impacts on the competitiveness of their industry, and regard fiscal incentives as a tool to improve the international attractiveness of their country as a location for innovation. Evaluations of output additionality of tax incentives are rather scarce, however. Among the few studies on the effects of R&D tax incentives on innovation success and firm performance some find positive effects on a firm's probability to introduce new products and new processes. At the same time, there is no clear evidence on the firm level that using an R&D tax incentive raises productivity

or other measures of firm performance. This result may indicate that R&D tax incentives stimulate R&D projects with a lower marginal rate of return so that productivity impacts of these projects are minor. Despite a growing number of sophisticated and reliable studies on the impacts of R&D tax incentives, our knowledge about the effectiveness of R&D tax incentives and how a scheme should be designed to maximise its impacts remains limited. Most studies refer to programme effects that emerged in the 1980s and 1990s when tax incentives had been introduced rather recently and were run by a small number of countries only. Little is known about the effects of recently introduced or redesigned fiscal incentive schemes, which often show different design features compared to older programmes. In addition, most empirical studies use data from the manufacturing sector while analyses on the impacts for service firms are rare. In order to draw more reliable conclusions on the role of design features, more cross-country comparisons would be needed. Furthermore, existing results seem to be sensitive to the empirical approach used, the variation in results for the same country can be quite significant. What is more, very little is known about the interaction between R&D tax incentives and direct subsidies for R&D. Linking administrative data from R&D tax claims and data on direct Government subsidies for R&D on a firm level would provide a useful base for future research along this vein.

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