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Tax incentives for innovation

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Tax incentives for innovation

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Tax incentives for innovation

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Abstract:

Tax incentives for innovation, including in particular the incentives for R&D investments, are universally used policy tools. Their availability and generosity have significantly increased over the past three decades. The observed proliferation of R&D tax incentives raises the question of the effectiveness (as well as other potential unknown advantages) of these policy instruments. The purpose of this paper is to carry out an analysis of the reasons (1) why R&D tax incentives became such a popular policy tool and (2) why there was an increase in generosity of this kind of incentives in recent years. As far as the theoretical base for the analysis is concerned, the paper refers particularly to (1) the inter-jurisdictional competition theories relating to tax competition and (2) the (quasi-) public-good nature of knowledge and innovation. The analysis is carried out with the use of the existing data and research on the subject. The results indicate that these are the changes (processes taking place) in the international environment that have considerably stimulated the proliferation and the increase in generosity of R&D tax incentives.

Introduction

Tax incentives for innovation, including in particular the incentives for R&D investments, constitute one of the main instruments for the science, technology and innovation (STI) policy. Although there are advanced economies that still do not offer any tax arrangements for innovation (e.g., Estonia¹, Germany, New Zealand and Switzerland), R&D tax incentives can be regarded as universally used. The availability and generosity of

¹ It is worth mentioning that Estonia, despite the lack of tax incentives for innovation, achieved the largest increase in innovative performance among the European Union member states over the period 2006-2013 (European Commission, 2014b, p. 20).

these incentives have increased significantly, both in a long-run perspective (i.e., since the mid-1980s.) and over the past decade (see OECD, 2014, pp. 164-169; Westmore, 2014, pp. 126-127). The observed proliferation of various types of tax incentives for innovation as well as the increase in their generosity raise a question about the reasons for such a state of affairs. The answer to this question is all the more puzzling if one takes into account the fact that tax incentives for innovation – as indirect policy instruments – seem not to be more effective than direct policy tools, and their use may involve significant risks (described later in this article). The purpose of this article is to analyze the potential factors stimulating the increasing prevalence and generosity of the most popular tax incentives for innovation.

While reviewing the existing tax incentives one can observe that in recent years countries have become more creative in using novel incentives to spur research and innovation² (compare Atkinson, 2012, p. 172). However, these are the R&D tax incentives (and among them the R&D tax credit) that are the most commonly used. For this reason, as well as for the reason of data availability, the analysis carried out in this paper is delimited to the R&D tax incentives, with a particular focus on the R&D tax credit.

Methodology and structure of the research

The article addresses the reasons for proliferation and increasing generosity of R&D tax incentives. As a growing prevalence of a given policy tool is usually related to the advantages of its use, and in particular – to its effectiveness, the first problem analyzed in this paper addresses the relationship (and more precisely – the disparity) between (1) the effectiveness of the implementation of R&D tax incentives and (2) the increasing prevalence and generosity of this policy tools. The analysis is carried out with the use of the existing data and research on the subject. At this point, it is necessary to emphasize that the disparity indicated above is closely connected to the methodological approaches used while evaluating the effectiveness of the R&D tax incentives. The results of the existing evaluations of the R&D tax incentives effectiveness³ that are used for the

² ‘For example, some countries – including Denmark, the Netherlands, and Norway – have begun to extend R&D tax credits to cover process R&D activities, effectively extending the R&D tax credit from goods to services industries as well. [...] Several countries have recently adopted or expanded tax incentives designed to spur the commercialization of R&D. These incentives [...] allow corporate income from the sales of patented products (or in some cases from innovation-based products) to be taxed at a lower rate than other income’ (Atkinson, 2012, p. 172).

³ Covering mainly the effectiveness of the R&D tax credit.

analysis, represent a method based on a comparison between the amount of incremental industrial R&D and the loss in tax revenue.⁴ ‘The implicit assumption in this method is that the size of the subsidy has been determined and that the only question to be answered is whether it is best administrated as a tax credit or a direct subsidy’ (Hall & Van Reenen, 2000, p. 457).

The analysis carried out in the first part of the paper leads to a formulation of a hypothesis that the increased prevalence and generosity of the R&D tax incentives has been caused mainly by changes (or factors) external to the economic systems of individual countries, that is, by the changes in the international environment.

The second part of the article is devoted to the verification of the hypothesis presented above and contains the analysis of the factors that might have influenced the process of proliferation and the increasing generosity of R&D tax incentives. The analysis is carried out through the lens of the changes taking place in the international economy (listed later in this article), with the use of existing data and research.

As far as the theoretical background is concerned, the analysis, on one hand, relates to the inter-jurisdictional competition theories that focus on tax competition. On the other hand, it relates to the fact that technology and innovation have some characteristics of a public good (even though they can hardly ever be regarded as pure public goods). The basic downside of tax competition is that attempts by governments to attract (a given kind of or various kinds of) business investment may lead to inefficiently low levels of local public goods, termed in the literature as ‘under-provision’ of public goods or ‘allocative inefficiency’ (compare Lee, 2009, pp. 9-10). However, once the tax competition is directed at attracting investments to the R&D sector, it may at the same time positively influence supply of public goods (through the stimulation of technology and innovation development that – as it was mentioned above – are quasi-public goods). Moreover, the R&D financed by the state indirectly by the implementation of tax breaks may lead to the creation of a radical innovation and thus positively influence the state budget through other channels than corporate taxes.

On a more general level, the analysis of the factors that might have influenced the process of proliferation and the increasing generosity of R&D tax incentives is rooted in (1) the growth theory approaches for explaining the relation between growth and technology, that is: the

⁴ B. Hall and J. Van Reenen (2000) provide a detail description of possible approaches to evaluating the effectiveness of any tax policy designed to correct the insufficient supply of quasi-public goods.

neoclassical approach and the neo-Schumpeterian (evolutionary) approach⁵; (2) the concept of international competitiveness of countries, developed by, *inter alia*, X. Sala-i-Martin et al. (2013, pp. 3-51) and indicating innovation as one of the most important competitiveness factors.

Proliferation and generosity of R&D tax incentives versus their effectiveness and the balance of potential benefits and risks

The proliferation of R&D tax incentives and their increasing generosity raise expectations that (1) these policy instruments (in comparison with other policy measures) are characterized by better effectiveness and/or (2) there are some unique advantages of using them or the potential risk associated with their use is lower. The aim of this section is to check whether these expectations coincide with the reality.

The existing research results on the effectiveness of R&D tax incentives, in most cases, confirm that these policy tools are effective.⁶ However, they do not indicate that R&D tax incentives are characterized by any outstanding performance. That is to say, it is possible to achieve similar level of effectiveness through implementation of other policy tools. A literature overview concerning the effectiveness of R&D tax incentives⁷ is presented by B. Hall and J. Van Reenen (2000); they indicate methodological weaknesses of individual studies, as well as present their own research results. In general, Hall and Van Reenen confirm that fiscal incentives fulfill the function of R&D stimulators and conclude that ‘a dollar in tax credit for R&D stimulates a dollar of additional R&D’ (Hall and Van Reenen, 2000, p. 449). However, it is worth pointing that the conclusion cited above constitutes also a kind of evidence that the tax credit for R&D (which is the most popular among fiscal R&D incentives) cannot be regarded as a more effective R&D stimulator than direct policy tools. The dollar which a given state is losing in taxes (because of the implementation of R&D tax incentives) is simply spent on a given firm’s R&D project. Hence, it is almost the same as in case of – for example – R&D grant: one dollar granted to a given firm with the aim to support some R&D project reduces the budget of a given state by 1 dollar. In this case,

⁵ Although these are competing approaches, they agree on basic issues such as the importance of technology and innovation for economic growth, as well as the positive role that can be played by government policy for science and technology (Verspagen, 2006, p. 492).

⁶ The effectiveness of R&D tax incentives is dependent not only on the method of its evaluation but also on the design of R&D tax incentives (for details concerning the relationship between design and effectiveness see e.g. Elschner et al., 2009).

⁷ Focusing mainly on R&D tax credit.

the only arguments in favor of the implementation of the R&D tax incentives (instead of direct measures) are: the fact that private companies have usually better knowledge (or intuition) concerning successful projects (so that they make better choices), as well as the fact that the administrative cost of the implementation of indirect measures is lower than in case of the direct ones. However, direct measures are more likely to support projects with a higher social rate of return (Bérubé and Mohnen, 2009, p. 207), and that can constitute a kind of ‘recompense’ for the downsides mentioned above.

What the above indicates is that the increasing prevalence of R&D tax incentives cannot be explained by their unique effectiveness.⁸ It is all the more so, if one takes into account the fact that there are also less optimistic studies as far as the effectiveness of tax R&D incentives is concerned; for instance, C.-H. Yang et al. (2012, p. 1586) indicate that:

‘The R&D preferential policy of a tax credit has indeed induced additional R&D investment undertaken by firms in Taiwan, while the R&D-enhancing effect is much lower compared with experiences in developed countries surveyed by Hall and Van Reenen (2000). This casts the susceptible view regarding the effectiveness of R&D tax credit policy from the view of public finance.’

In addition, there are also studies finding that one euro of foregone tax revenue on R&D tax credits raises expenditure on R&D by less than one euro (for examples of such studies see: European Commission, 2014a). Apart from that, the empirical studies that compare the effectiveness of R&D grants and tax credits give ambiguous results; for example:

‘A firm level research of Norwegian firms conducted by Hægeland and Møen⁹ suggests that tax credits appeared to have a slightly larger effect than direct support measures [...]. Empirical findings from a panel of 19 OECD countries¹⁰ indicate that direct support seems to have a larger impact than (volume-based) R&D tax incentives [...]. Instrument design and implementation might be more important determinants of additionality than whether the instrument is a direct subsidy or a tax incentive’ (European Commission, 2014a, p.39).

⁸ However, one should remember that the methodology of the R&D tax incentives effectiveness evaluation does not refer to the potential social return from R&D whereas, for example, J.W. Fedderke and B.G. Teubes (2011, p. 1787) argue that ‘it is possible that the social return from R&D might be sufficient to allow R&D incentives to more than pay for themselves’.

⁹ Hægeland & Møen, 2007.

¹⁰ Westmore, 2013.

As the effectiveness of R&D tax incentives does not explain the reasons for their increasing prevalence and generosity, there is a question whether these instruments are characterized by unique advantages and/or whether the risk associated with their use is smaller than in case of direct measures. When a government decides to implement R&D incentives, then it has a wide range of instruments to choose, as tax incentives are only one way of stimulating the amount of R&D undertaken within the country. The use of all the potential R&D stimulators has its advantages and disadvantages, and the R&D tax incentives seem not to be any exemption (i.e., any distinguishing instrument) in this respect.

A. Carvalho (2012, p. 125) presents a brief literature overview on the pros and cons of R&D tax incentives in comparison with direct policy measures, and the OECD publications provide numerous descriptions of the risks associated with the use of these instruments (see, e.g., OECD, 2014, p. 164). The list of the most important downsides of R&D tax incentives, *inter alia*, includes (Carvalho, 2012; OECD, 2014; Busom et al., 2014):

- Greater (than in case of direct measures) risk of so called dead weight loss (i.e., risk of supporting projects which would have been carried out anyway);
- Risk of enterprises relabeling other activities as R&D;
- Risk related to the fact that private firms are likely to choose R&D projects with the highest private rate of return (whereas it would be desirable to spend public money on R&D research projects with the highest social rate of return);
- Risk related to high unpredictability as far as the amount of 'tax loss' is concerned, which means that governments, while using the instrument, face the problem of poor budget control;
- Risk of tax competition for R&D that could result in a zero-sum game at international level, and thus reduce government revenues in all countries involved.

Appendix 1 contains a comparison of advantages and disadvantages related to the use of tax incentives and direct measures. Briefly, it can be said that the pros and cons of using R&D tax incentives, in comparison with direct policy measures, do not explain the phenomenon of proliferation and increasing generosity of R&D tax incentives. Only the risk of tax competition created by the use of R&D tax incentives indicates that the popularity of these policy tools may be caused by factors that are external to the economic systems of individual countries and induced by the changing international environment.

The increasing prevalence and generosity of R&D tax incentives versus the changes in the international environment

Some of the important factors that influenced the development of R&D tax incentives (as the STI policy tool) could be described as external to the economic systems of individual countries, because they are related to the changes in the international environment. These changes include: advancing globalization (and the associated trade liberalization), increasing FDI flows, regional integration of countries and the increasing role of innovation (and consequently – innovation policy) in the countries' economic development. The changes indicated above resulted in an additional set of factors for the implementation of R&D tax incentives by the national governments, and thus led to the increasing prevalence and generosity of these incentives.

The first factor influencing the development of R&D tax incentives is closely related to the globalization and regionalization processes and the growing importance of the foreign direct investment (FDI) inflows in the economic development of countries. On one hand, the globalization (and regionalization) of the world economy have made FDI incentives more important from the national governments' economic policy point of view.¹¹ On the other hand, the globalization and the accompanying trade liberalization have reduced the importance of market size as a factor determining the location of FDI. As a result, even small countries have gained the opportunity to successfully compete for FDI, provided they focus their actions on other FDI determinants, including the implementation of an attractive set of incentives. In consequence, the number of countries competing for the inflows of FDI considerably increased, and thus the competition became more intense. Moreover, the countries competing for inward FDI often try to attract the inflow of FDI to the R&D sector, as such investments are regarded to be the most profitable, because of the potential transfer of knowledge and/or technology.¹² From this point of view, R&D tax incentives can play a double role, that is, not only the role of R&D investment incentives (implemented to encourage

¹¹ The increasing prevalence of investment incentives as a tool to attract FDI took place in the 1990s. As a result, in the mid-1990s more than 100 countries have already provided various investment incentives, and their number has been increasing rapidly (see Blomström & Kokko, 2003, p. 4).

¹² The experiences of Intel provide a good example of such competition. R.D. Atkinson and S.J. Ezell (2013, p. 174) describe the incentives offered by Israel, India, Vietnam and China in order to attract this multinational company.

domestic companies to develop R&D activities) but also the role of incentives for FDI in the R&D sectors.

The above processes and factors influence the generosity and proliferation of R&D tax incentives. They are closely related to one of the downsides of R&D tax incentives implementation, i.e.: the risk of tax competition between regions and/or countries. So, paradoxically, the generosity and popularity of R&D tax incentives is related, *inter alia*, to the development of its negative feature. It is the more so, as there is also one more reason for the R&D tax competition. The globalization and regional (or interregional) integration processes in the world economy made it much easier for the domestic companies to move their businesses abroad in a situation when the cost of running a particular business in another country is lower. Because of that, the R&D tax incentives may also be used to prevent the potential transfers of innovative domestic companies to other countries.

The process of regional integration in Europe that led to the establishment of European Union (European Communities), contributed to the emergence of another factor which influenced the increasing R&D tax incentives prevalence and/or generosity. This factor is related to the creation of innovation policy, coordinated at a supranational level. The policy guidelines formulated within the framework of the European Union innovation policy – because of their supranational character – can be regarded as an additional external factor that contributed to the development of R&D tax incentives in Europe. In 2000, the European Union member states launched the Lisbon Agenda that, *inter alia*, called for an increase in R&D expenditure (up to 3% of GDP), with a special focus on the private share of R&D expenditure which was to reach two thirds of the total expenditure by 2010. R&D tax incentives, as policy instruments stimulating private R&D expenditure, appeared to be useful as far as meeting the above innovation policy guidelines is concerned (compare Carvalho, 2012, p.128). Nevertheless, not all the countries managed to meet the objective set out in the Lisbon Agenda; some of them still have a low level of R&D expenditure and/or a relatively small private share of R&D expenditure. Hence, taking into account the fact that the strategy ‘Europe 2020’ (which replaced the Lisbon Agenda) as well set the target for the EU member states to invest 3% of GDP in R&D (and that private R&D investments are regarded to be better than public), the policy effect, stimulating the R&D tax incentives development in the European Union, still exists. Of course, similar stimulating effect can be also achieved at the national level by setting ambitious goals as far as the level of private R&D investment is concerned.

Conclusions

This article explores the reasons for the increasing prevalence and generosity of R&D tax incentives. The analysis carried out in the paper partly confirmed the hypothesis that the increased prevalence and generosity of the R&D tax incentives has been caused mainly by changes (or factors) external to the economic systems of individual countries, that is, by the changes in the international environment.

There is no doubt that the changes (processes) taking place in the world economy – such as: advancing globalization, increasing FDI flows, regional integration of countries, the increasing role of innovation in the countries' economic development – influenced the growth of prevalence and generosity of R&D tax incentives. These changes resulted in an additional set of factors for the implementation of R&D tax incentives by the national governments, and thus stimulated the proliferation and generosity of the above instruments. First of all, some of the changes contributed to the emergence and/or intensification of tax competition, and the tax competition led to the increased generosity and prevalence of R&D tax incentives. Furthermore, in case of European Union, the coordination of innovation policy at a supranational level appeared to be an additional external factor for proliferation and increasing generosity of R&D tax incentives in Europe. Nevertheless, it cannot be taken for granted that the changes in the international environment constituted the main cause for the proliferation and generosity of R&D tax incentives, as the decisions of the national governments concerning the implementation of R&D tax incentives could be also related to the believe that the social return on innovation was so high that it exceeded the tax loss related to R&D tax incentives implementation (and thus there was no need to take into account other potential advantages of this policy instrument).

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Appendix 1

Advantages and disadvantages of tax incentives versus direct measures

	Advantages	Disadvantages
Direct measures	<ul style="list-style-type: none"> - Best suited to encourage high risk projects and to meet specific policy goals - Adequate to target R&D activities with the highest discrepancy between social and private returns - Competition between firms ensures that public resources are directed to the best R&D projects - Can be used to target specific technologies or scientific areas to overcome cyclical or sectoral slowdowns - Encourage cooperation and technology transfer - Better budget control 	<ul style="list-style-type: none"> - High administrative costs - Administratively not feasible to process a high number of applications - Firms may not undertake R&D projects not approved for public funding - Tendency to reward lobbyists and bureaucrats
Tax incentives	<ul style="list-style-type: none"> - Encourage an increase of R&D across the whole spectrum of firms (but can be used to target specific groups of firms) - The private sector can decide what is the most productive way to invest - Non-discriminatory nature in terms of research, technology fields or industrial sectors - Less risk of governmental failure in ‘picking winners’ (choosing the wrong R&D projects) - Encourage companies to report their profits more accurately - Avoid misappropriation of funds and rent-seeking activities by government’s civil servants - Avoid an up-front budget since support is by means of forgone tax revenues - Lower administrative costs of planning, allocation and management - Least burdensome way of increasing business R&D 	<ul style="list-style-type: none"> - Poor budget control - Greater risk of dead weight loss (supporting projects which would have been performed anyway) - Less additionality in the case of very large companies - Risk of firms relabeling other activities as R&D - Government are not more successful than the private sector in ‘picking winners’ - Private firms will choose R&D projects with the highest private rates of return - Risk that the globalisation of R&D may reduce local R&D spillovers to society

Source: Carvalho (2012, p.125)¹³.

¹³ Carvalho based this comparison on research results coming from numerous sources; for details see his article.