Indirect R&D Support as a Tool for Enhancing Innovations: the Case of the Czech Republic and the Netherlands

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Abstract
The main advantage of the indirect support for research and development is that this type of support is not selective and each company that meets the legal requirements can use it for financing of its research and innovation activities. Thus, this support is more compatible with economic competition. It also represents one of the means to reach the Europe 2020 target in the field of research and development and most of the EU countries use it. This paper deals with indirect support for R&D that is used for promotion of innovation activities in the Czech Republic and the Netherlands. The aims of the article are to compare indirect R&D support in both countries, to provide new empirical evidence on using this type of support, and to find some inspiration for the Czech Republic from the Dutch example. It has been observed that this instrument is used in different ways in both analysed countries. The Netherlands has more experience with tax incentives and the impact of the support is regularly evaluated.

Keywords: *Czech Republic, European research policy, indirect R&D support, Netherlands, tax incentives*

JEL Classification: *H25, O38, R12*

1. Introduction

Innovations are generally perceived as a decisive factor for competitiveness of enterprises and for socio-economic development of regions and countries. They represent a way to achieve economic growth, productivity increase, new jobs and wealth creation. Research and development (R&D) is one of the most important sources for innovations, particularly the radical ones, because it brings new knowledge that are vital for revolutionary innovations with high value added (Žítek, 2014; Halásková et al., 2016). The importance of innovations for economic and social development was also confirmed by the Europe 2020 Strategy (European Commission, 2010) and an increase in expenditures on R&D is the main way to improve the innovation performance and competitiveness of the European economies. The EU2020 target is to invest 3% of GDP in research and development in 2020 and member states determine their own targets. The most innovative countries invest more than 3 per cent of GDP in R&D now and a significant part of it is financed by enterprises. The role of public support is to boost private expenditures on R&D and the countries that are the innovation leaders put a strong emphasis on innovation and research policy (Gál, 2014; Mynarzová and Štverková, 2015).

In the scientific literature, public interventions are justified by the neoclassical argument about market failures (Arrow, 1962) and the institutionalist argument about systemic failures (Woolthuis et al., 2005). The market failures and imperfections discourage companies from

investing in R&D (Bronzini and Piselli, 2016). Results of R&D have a character of a public good, because knowledge is regarded as non-rival and non-excludable goods (Arrow, 1962). New knowledge cannot be fully appropriated and due to knowledge spillovers (Fischer et al., 2009) the firm's rivals may be able to free-ride on its investment (Aerts and Schmidt, 2008). It decreases private rate of returns of R&D for the company that invested in R&D. On the other hand, creation and diffusion of new knowledge is vital for the development of society. The decrease in private investment means that the level of R&D expenditures is below the socially desirable optimum (Brown et al., 2017). The systemic failures are discussed in the concept of innovation systems and they are comprised of infrastructural, institutional, interaction and capabilities failures (Woolthuis et al., 2005).

Research projects in businesses can be supported in a direct or an indirect way. The direct way is usually based on providing subsidies to companies in tenders. The less frequent way is providing favourable bank loans or guarantees. The indirect support for R&D usually lies in some type of tax incentive (see table 1). This paper deals with the indirect support of R&D in the Czech Republic and the Netherlands. The Dutch Promotion of Research and Development Act (WBSO) was introduced in 1994, with the aim to stimulate research and development growth. The argument behind WBSO was the classical market-failure discussion, as well as the concern about the high labour costs in the Netherlands that had a negative impact on the business environment (Verhoeven et al., 2012 in CPB et al., 2014a). In the Czech Republic, indirect support of R&D has been provided since 2005 in the form of expenses as deductible items from the tax base of income tax.

The aims of this article are to compare indirect R&D support in both countries, to provide new empirical evidence on using this type of support, and to find some inspiration for the Czech Republic from the Dutch example. Empirical data for our research come from European Commission, OECD, Eurostat and Czech and Dutch administrative resources. The comparison of both countries is carried out with respect to the setting of the tax incentive system, extent of use of the indirect support by enterprises, and the evaluation of public intervention impacts.

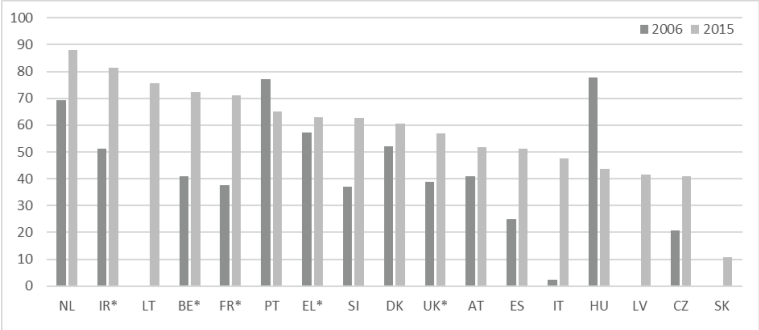
2. Tax Incentives for Research and Development

The indirect support for R&D has some advantages as well as disadvantages in comparison with the direct support. Czarnitzki et al. (2011) recommended providing the indirect support rather than the direct type. They pointed out the government failure that is usually connected with direct support. In the case of indirect support, this risk is minimized. They also stressed that indirect support is considered to be a neutral form of encouragement to R&D as all companies, irrespective of the industry, size and innovation activity, can claim it. Tax incentives are market-based and thus they are considered more neutral than direct support. On the other hand, it means that the government cannot influence the structure of research and choice of R&D projects (Elschner et al., 2011). We think that this is true only to some extent. Some countries have more favourable conditions for specific groups of enterprises, e.g. for small and medium-sized enterprises, or specific industries, e.g. energy (see CPB et al., 2014b; OECD, 2018). Some authors argue that private companies use indirect support to implement projects with high private returns inducing investments with a short-term horizon that would have been implemented in any case, i.e., without public aid (Crespi et al., 2016).

Berube and Mohnen (2009) argued that companies should combine both types of support. They found out that companies using both instruments introduce more new products than their counterparts that only receive the indirect support. Busom et al. (2014) connected the type of public support with the character of companies. They stated that direct and indirect funding are not perfect substitutes with respect to their ability to reach firms facing barriers associated

to market failures. Subsidies may be better suited than tax reliefs to encourage companies to start doing R&D, which is valid especially for young knowledge-based companies. Brown et al. (2017) tested the relation between indirect support and the character of industry. They argue that private R&D investment is below the socially optimal level, particularly in high-tech industries, and that the indirect support is more effective in promoting low-tech R&D, but it is not sufficient for promoting high-tech R&D. Figure 1 shows a proportion between indirect and direct support for R&D. The higher share of indirect support can be observed in the Netherlands. The Czech Republic can be found on the opposite side of the ranking.

Figure 1: Tax Incentive Share of Public Aid for R&D in Selected EU Countries (%)



Note: * data for 2006 and 2014
Source: OECD (2017b)

Table 1: Typology of R&D Tax Incentives in EU Countries

Tax credit	Tax allowance	Payroll withholding tax	Social security contribution	Accelerated depreciation of R&D capital
Austria (AT), Belgium (BE), Denmark (DK), France (FR), Hungary (HU), Ireland (IR), Italy (IT), Portugal (PT), Spain (ES), United Kingdom (UK)	Austria (AT), Belgium (BE), Czech Republic (CZ), Greece (EL), Hungary (HU), Latvia (LV), Lithuania (LT), Poland (PL), Romania (RO), Slovakia (SK), Slovenia (SI), United Kingdom (UK)	Belgium (BE), Netherlands (NL), Spain (ES)	France (FR), Hungary (HU), Netherlands (NL), Sweden (SE)	Belgium (BE), Denmark (DK), France (FR), Lithuania (LT), Poland (PL), Romania (RO), Spain (ES), United Kingdom (UK)

Source: authors' own processing based on OECD (2017a)

Experts at the European Commission state that 26 EU countries use some type of R&D tax incentive (CPB et al., 2014b), whereas OECD (2017b) quote only 22 countries. The difference is caused by the fact that the EC also analyses states that use tax incentives for acquisition of intellectual property rights. In our paper, we only deal with tax incentives for research activities. Table 1 provides an overview of various types of R&D tax incentives that are applied in EU countries. The most frequent forms of incentives are tax credits and tax allowances.

3. Indirect Support for R&D in the Czech Republic and the Netherlands

As shown in Figure 1, the Netherlands belongs to European leaders in providing indirect public support for R&D activities. This country is also well-known for its high patent activity and quite high expenditures on R&D, although some EU countries such as Sweden, Finland and

Austria invest more. Table 2 compares expenditures on R&D in both analysed countries. It can be surprising that the Czech Republic set out a higher EU2020 target for itself than the Netherlands.

Table 2: Expenditures on Research and Development

	GERD (share in GDP, %)			BERD (share in GERD, %)		BERD (share in GDP, %)		BERD (PPS per inhabitant)	
	2010	2015	EU2020 target	2009	2015	2010	2015	2010	2015
CZ	1.34	1.93	2.7	39.8	34.5	0.77	1.05	163	267
NL	1.72	2.00	2.5	45.1	48.6	0.83	1.12	282	420

Source: authors' own processing and calculation based on Eurostat (2017)

In the Czech Republic, enterprises can deduct the expenditures on R&D from the tax base and in reality, these expenses are deducted twice (KDP, 2017). They are first deducted within the tax base calculation and for the second time they are deducted from the calculated tax base. Tax rate for corporate income tax is 19%; therefore, the taxpayer can save up to 19% of the R&D costs. If the tax base does not cover all expenses, they can be deducted within the three following years (so called carry forward). Companies have to elaborate their research project in a written form and submit it together with their tax return to the Tax Office. Enterprises can ask the relevant Tax Office in advance for a binding assessment whether the project expenses are really tax deductible. The research project has to identify some element of novelty and to resolve some technology uncertainty. The second condition for using this type of support is that the same research project cannot be subsidized by any type of direct public aid. The innovative company has to decide whether it prefers a direct or an indirect form of support.

Since 1994, the Dutch government has offered the opportunity for companies that perform R&D-activities to decrease their R&D costs through the fiscal scheme 'Wet Bevordering Speur- en Ontwikkelingswerk' (WBSO). This scheme is implemented by the Netherlands Enterprise Agency (CPB et al., 2014b). The WBSO scheme is designed for Dutch companies as well as self-employed entrepreneurs. Companies performing R&D activities may benefit from a 32% tax credit (40% for start-ups) of the first €350,000 in R&D wage costs and other expenses and investments, and 16% for those costs and investments exceeding €350,000. Self-employed persons are entitled to a fixed tax deduction of €12,522 (and additional €6,264 for start-up self-employed persons). The R&D project has to meet the following conditions before the company can apply for the tax incentive: the proposed R&D activities take place in their own company, the technological development is new to the organisation, the development is accompanied by technical problems, the R&D work has yet to take place (companies have to submit a WBSO application in advance) (RVO, 2017b). Firms are automatically guided through the process of application by the Agency, which administers the scheme. Application is carried online and the decision is made within three months. (CPB et al., 2014b)

Comparing both systems we can find several differences (details in table 3). The Czech Republic uses tax incentives in the form of extra-deductions from the taxable base that exceed the really invested expenditures. This way can be called a reduction of taxable base. Dutch companies use a special form of tax incentive, which lies in reduction of costs for personnel. It means that companies are able to either employ more researchers or to compete successfully for researchers by offering higher net salaries. (Elschner et al., 2011) Furthermore, special incentives are provided to self-employed persons. The differences can also be found in the type of deductible expenses (table 4) and they are related to contracted research and long-term assets (expenses for acquisition vs. depreciation).

Table 3: Comparison of R&D Tax Incentive Schemes

	Czech Republic	Netherlands
Type of scheme	R&D tax allowance	Payroll withholding tax credit for R&D wages / social security contribution
Deducted from	Taxable income	R&D wage cost and non-R&D wage related costs and expenses attributable to R&D
Vol-based rate	100%	32% for eligible R&D costs up to EUR 350 thous., 16% above EUR 350 thous.
Incremental rate	10%	-
Ceiling on amounts that can be claimed	no	yes
Carry forward	3 years	-
Deductible R&D expenses	wages and salaries, R&D services (contracted research), consumables, depreciation	wages and salaries, consumables, M&E (acquisition of plant, machinery or equipment for R&D), land and buildings (acquisition)

Source: OECD (2017a)

Tables 5 and 6 show the extent to which the indirect support is used by enterprises. However, it is quite difficult to find some statistical data that would be mutually comparable. In this respect, the Czech Republic publishes more data than the Netherlands. When looking at number of companies (table 5), we can state that R&D tax incentives are more popular in the Netherlands. The increase in their number between 2007 and 2015 is higher in the Czech Republic, but this can be explained by the Czech shorter history.

Table 5: Number of Companies Using R&D Tax Incentives

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Increase
Number of companies										
CZ	574	598	634	716	859	1021	1120	1264	1306	228%
NL	13 000	13 450	16 620	19 450	20 530	22 220	22 640	22 970	22 980	177%
Number of companies per million inhabitants										
CZ	56	58	61	68	82	97	107	120	124	-
NL	795	820	1 008	1 173	1 233	1 328	1 349	1 365	1 360	-

Source: authors' own calculation based on CSO (2017), Eurostat (2017) and RVO (2017a)

Table 6 shows the amount of expenses and the amount of indirect support. When we calculate the volume of tax incentives in USD purchasing power standard (PPS) per inhabitant, we can observe that the support in the Netherlands is about 4 times higher than in the Czech Republic.

Table 6: Indirect Government Support Through R&D Tax Incentives in 2015

	Deductible expenses (mil. EUR)	Deductible expenses (EUR per inhabitant)	Volume of R&D tax incentives (mil. USD PPS)	Volume of R&D tax incentives (USD PPS per inhabitant)	Tax incentives (as a % of GDP)
CZ	492	47	198	19	0.06
NL	3,870	229	1,265	75	0.15

Source: authors' own processing and calculation based on CSO (2017), Eurostat (2017), OECD (2017b) and RVO (2017a)

For the sake of completeness, we would like to emphasize that the impact of the Dutch tax incentives is regularly evaluated by the government, which is not carried out in the Czech Republic. We can also find several research studies that deal with the Dutch system. The official WBSO evaluations were carried out in 2002, 2007, and 2012. In general, these evaluations found out large and significant benefits of the WBSO, indicating that one euro

spent as foregone tax revenue results in around one euro of additional R&D (CPB et al., 2014). The WBSO has also been proven to be effective in creating absorptive capacity and additional R&D expenditures, especially among SMEs (Brouwer et al., 2002; Poot et al., 2003). The study by Cornet and Vroomen (2005) outlined that the WBSO provides large positive benefits for start-ups. Lokshin and Mohnen (2007) concluded their research by outlining that the program of R&D incentives in the Netherlands has been effective in reducing the user cost of R&D and therefore has been successful in stimulating firm R&D capital formation. In terms of the effect on R&D wages, Lokshin and Mohnen (2008) found out that elasticity between the effective rate of the Dutch payroll tax withholding R&D tax credit and average R&D wage is 0.2 in the long run. Lokshin and Mohnen (2012) defined that, on average, ten percent decrease in the user-cost of R&D capital induced by the tax credit leads to four percent more R&D capital in the short run and six percent more in the long run.

4. Conclusion

The Dutch system of indirect R&D support has much longer history than the Czech system. Whereas it has been running since 1994, the Czech system has been provided since 2005. Both systems differ in their basic elements, because the Czech system has a form of reduction of the taxable base while the Dutch system focuses on the reduction of the costs for personnel. The Dutch tax incentives are also available for self-employed persons that carry out R&D activities. It is the same for the Czech Republic, however, in this case the self-employed persons do not use that opportunity very often. There is also a practice by the Dutch system of targeting young start-ups by offering them a preferential rate, which could be inspiring for the Czech Republic.

In the Netherlands, it is very usual and customary to use indirect tax support in contrast to the direct support. This is mostly because of the historical development of the support system, the cultural differences, the mentality of entrepreneurs and the character of the business environment. The Czech Republic lacks behind the Netherlands in this case. This is partly influenced by the fact that the Czech Republic is eligible for higher support from the Structural Funds through the Operational Program Enterprise and Innovation (2007–2013) and the Operational Program Enterprise and Innovation for Competitiveness (2014–2020).

The statistical data concerning the indirect support are well managed and regularly published by the Czech Statistical Office. The Dutch system does not have the same qualities in these terms and Statistics Netherlands does not publish relevant data regularly. On the other hand, the official evaluation of the scheme is missing in the Czech Republic. The Czech Republic can learn from the Dutch experience of evaluation practices that reinforces better policy making and policy effectiveness.

The WBSO system is governed by Netherlands Enterprise Agency that aims to help the entrepreneurs with administration and guides them through the process with available consultations. In the Czech Republic, the assessment of the application is in the competence of the Tax Office and the application is submitted together with the tax return. Hence, Czech entrepreneurs see the rules for the tax reduction unclear, fear sanctions, and therefore are less willing to use the support. These good Dutch administrative practices can be adopted in the Czech Republic by offering guidance through the process and by making the system more transparent to give businesses greater legal certainty.

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