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TAX INSTRUMENTS SUPPORTING SCIENCE AND RESEARCH AS A FACTOR OF ECONOMIC GROWTH – EVIDENCE FROM THE SLOVAK REPUBLIC

Abstract

Objective: The main aim of this paper is to provide a united view on the issue of tax instruments supporting science and research in the Slovak republic and to evaluate their impact on state budget revenues.
Research Design & Methods: The research question that this paper tries to answer is whether the support of research and development in the Slovak Republic through tax instruments is sustainable and suitable for the business sector. Qualitative and quantitative methods are used in the research. The paper analyzes legislation related to the issue of super deduction in order to identify the factors that affect this tax instrument. At the same time, the authors adopt the descriptive and normative economic approaches. Based on the deduction, procedures are subsequently chosen

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to quantify selected factors and their impact on state budget revenues in the Slovak Republic.
Findings: Apart from the last seven years, the Slovak Republic has been characterized by almost no state support for research and development. However, since 2015, new forms of tax incentives have included the provision of tax relief in the form of a deduction of research and development costs, a patent box, as well as tax breaks for new investments. In 2015, 83 entities claimed a deduction of research and development costs amounting to more than EUR 9 million, while in 2019 the amount of this deduction increased to more than EUR 119 million. The statistics of the Financial Administration of the Slovak Republic also show that small companies with 10 to 49 employees apply the deduction to the highest degree, followed by medium-sized companies with 50 to 249 employees, micro-enterprises with up to 9 employees, and large companies with over 250 employees. The highest rate of deduction of research and development cost in terms of regional distribution was recorded in the Bratislava, Trenčín and Trnava regions.
Implications/Recommendations: Tax incentives for research and development encourage investment and are therefore considered an appropriate form of support for the business environment. However, the biggest positive is the duplication of the possibility of claiming costs with respect to the reported corporate tax base. The question arises here: how often should the percentage rate for duplicate costs be changed? The analysis of applicants for a deduction of research and development costs in the Slovak Republic also showed that the number of new applicants for the tax benefit is constantly growing. This may encourage the re-use of such a tax credit in future years. The decrease in the volume of the deduction of research and development costs in 2019, with a 1.5-times increase in its rate, can be assessed negatively. It is clear that the success of this instrument of tax stimulation of private investment in research and development in Slovakia may encounter a barrier such as the inability to claim the costs incurred in the form of a deduction of research and development costs against a sufficient tax base.
Contribution: The question arises here: how often should the percentage rate for duplicate costs be changed? The success of this instrument of tax stimulation of private investment in research and development in Slovakia may also run into the barrier of not being able to claim the costs incurred in the form of a deduction of research and development costs against a sufficiently high tax base, especially in the current period, when there has been a significant decline in Slovak companies' profits. What, then, is the perspective for deducting research and development costs in the pandemic period and in the post-pandemic period, respectively?

Keywords: corporate tax, tax instruments, science and research, competitiveness, Slovak Republic.
JEL Classification: H25, L31, O30.

1. Introduction

The role of tax policy is not only to ensure enough funds for public budgets, but also to support the entrepreneurship and innovation of tax entities. A country's tax policy should, therefore, through the tax system, help to solve the problems of employment and price stability, but mainly

support economic growth. These aims can be supported by selected tax instruments. Close cooperation between experts from OECD countries has resulted in the creation of a database of tax instruments for research and development, which makes it possible to analyze the effects of these incentives on research and development activities. With the support of the European Union's Horizon 2020 programme, these efforts have intensified. The growing interest in the use of indirect tax instruments to support research and development can be observed in OECD countries in particular, where direct support has been gradually declining for some time. The decline in direct support has been partly due to imposed budgetary constraints, economic pressures, and changing government funding priorities (Czarnitzki & Fier 2001). In individual OECD countries, we can notice two basic approaches to supporting research and development, the first being fiscal (tax) support, and the second involving financial instruments. The introduction of fiscal instruments gives innovative companies the opportunity to reduce their tax liabilities to the state, which ultimately reduces their overall costs (Frank, Kozovský & Prčová 2005).

Since the mid 2010s, the number of OECD countries providing tax incentives to support research and development has been steadily growing. In 2021, this included 23 EU Member States. The results of an OECD study on tax incentives for research and development showed that 2020 saw several significant changes in the field of tax incentives for research and development (Balsalobre-Lorente *et al*. 2021). The availability of research and development tax incentive measures has been increased, and new research and development tax incentive schemes have been introduced. The pandemic was the driving force behind the 2021 reforms in this area. Because of the pandemic, nine countries have introduced research and development adjustments or management. Governments in these countries seek to support investment in research and development in the economy through a certain preferential tax treatment of research and development costs and costs generated by companies in this area (OECD 2019). The share of research and development costs in OECD countries reached 0.1182% of GDP in 2019. The corresponding figure for the Slovak Republic was 0.0273%.

Between 2000 and 2018, tax support for research and development increased in many OECD countries, although this increase was often interrupted by the onset of the global financial and economic crisis. In general, we can say that the amount of tax support for research and development will usually increase significantly either immediately after its introduction

(Ireland, the Czech Republic) or after the introduction of new, revised tax measures (France in 2008). The possibility to pass on the deduction of research and development costs in the case of non-reporting of the tax base also affects how the tax relief curve for research and development companies develops. This can be seen in Ireland, Hungary, and even Austria, where the deduction of research and development expenditure peaked just after the financial crisis as companies did not achieve a sufficiently high tax base during the crisis (Agrawal, Rosell & Simcoe 2020).

The Slovak Republic is also one of the OECD countries that has been using the tax advantage for taxpayers carrying out research and development since January 2015 in the form of a deduction of research and development costs. The deduction of research and development costs is a transparent, fair, and administratively less demanding form of support for corporate research and development than funds provided in the form of a targeted or institutional subsidy. In other OECD economies, this method of additional deduction has been used for several years.

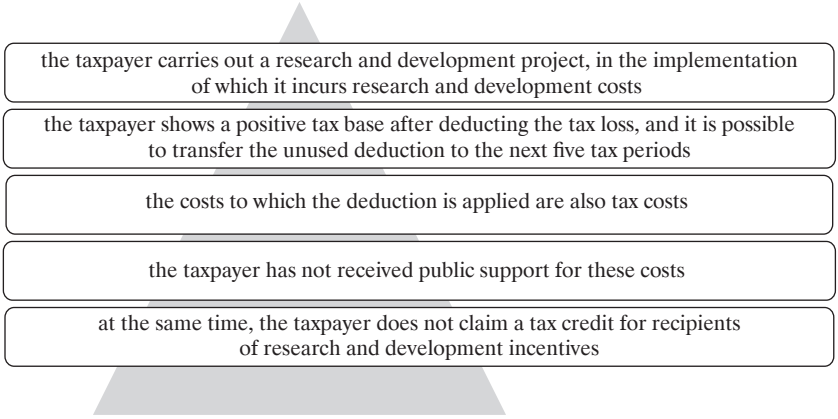

Fig. 1. Basic Conditions for Applying a Deduction of Research and Development Costs in the Slovak Republic

Source: prepared by the authors.

A new tax instrument, the super deduction, consists in deducting research and development costs from the tax base. This deduction can be made by a natural or legal person that implements a research and development project. In connection with this, the person incurs costs which are part of the economic result and which are eligible for deduction from the tax base,

less a deduction of tax loss of 100% (in the years 2020 and 2021, the value of the indicator was 200%; from 2017 until the end of 2019, it was 100%; for the first two years from the creation of this instrument, a rate of 25% was applied). In practice, this means that tax-deductible costs that have been used for research and development can be deducted from the tax base twice – first, as a regular, tax-deductible expense, and second, as another super deduction. No approval process precedes the application of the deduction. Tax legislation defines the basic conditions that a taxpayer must meet when applying a deduction. These are summarized in Figure 1.

By using this deduction, assistance is given to the company in the form of a reduction in its tax obligations, as it allows the deduction of a higher amount of research and development costs when filing an income tax return. The deduction of research and development costs thus has a stable place in tax legislation. However, it undergoes significant changes every year and can therefore have a demotivating effect on the business environment.

2. Literature Review

Empirical studies (OECD 2020a, 2020b, 2019) examining the impact of enterprise size on the emergence or magnitude of the additional research and development funding effect show that small and medium enterprises tend to invest more of their own resources for research and development if they also draw on public funding resources. Small companies need to overcome the barrier to entry into the sector, whereas large ones have relatively sufficient resources for ongoing as well as interim investments to maintain competitiveness. Medium-sized companies tend to invest almost the same amount of money in research and development, regardless of whether they receive public support or not. In estimating the effects of public funding on the extent of corporate research and development investment according to whether research and development is carried out regularly or only occasionally, the study identified that non research and development enterprises regularly show a slightly higher leverage effect of public support (Streicher, Schibany & Gretzmacher 2004).

Statistics-based research shows that investment in research and development is the key factor in economic growth (Congressional Budget Office 2005). In a group of seven industrialized countries, research has shown that in the United States, Japan, Germany, France, the United Kingdom, Italy and Canada between 1971 and 1990, every USD 100 invested in research and development led to GDP growth of USD 123 (Coe & Helpman 1995).

Research conducted in EU Member States between 1980 and 1998 showed that for every USD 100 spent on research and development in a company, it increased the country's GDP by USD 113 (Guellec & van Pottelsberghe de la Potterie 2001).

Investment in research and development also brings social benefits, which can be considered as externalities. Among the external effects, we also include knowledge transfer, whereby the investment of one entity is the basis for the creation of new knowledge of another entity. The result is an increase in the competitiveness of both entities (Żabiński & Pohulak-Żołędowska 2014). Knowledge transfer is crucial, especially in sectors that base their advancement on research and development costs and highly qualified staff. The stronger the knowledge, the smaller the distance between the recipient companies. This can be explained by the significance of change that facilitates the work of experts in a particular field, and by the importance of interpersonal contacts. Such a claim seems to challenge the geographical location of many industrial groupings that have developed in the vicinity of one or more universities (Audretsch & Feldman 1996). Indirect financial effects occur when knowledge created in a particular subject affects the financial performance of other companies. An assessment made based on the increase in productivity or usability by the buyer is higher than the market price taken over by the seller (Griliches 1992).

3. Research Methodology

The main aims of this paper are to: provide a united view on the issue of tax instruments supporting science and research in the Slovak Republic and to evaluate their impact on state budget revenues; identify taxpayers who use these tax stimuli to the most significant extent, both in terms of size and from the regional aspect; and outline the impacts of these stimuli as one of the factors behind the gradual growth of competitiveness of the European Union as whole. The research question that the paper tries to answer is whether the support of research and development in the Slovak Republic through tax instruments is sustainable and suitable for the business sector.

In terms of research methodology, the paper was designed in four phases: a review of secondary academic and professional theoretical sources and their systematization, with an emphasis on the deduction of research and development costs in OECD countries as well as in the Slovak Republic; the creation of databases and a summary of academic research on the issues under analysis; the evaluation of the research results; and the proposal of

recommendations for the reform of tax benefits for science and research in the Slovak Republic.

The initial steps of the research were aimed at comparing the deduction of research and development costs as a tool for improving the tax competitiveness of companies in the European area. Qualitative and quantitative methods were used in the research. The authors analyzed legislation related to the issue of super deduction in order to identify the factors that affect this tax instrument. At the same time, the authors adopted the descriptive and normative economic approaches. Based on the deduction, procedures were subsequently chosen to quantify selected factors and their impact on state budget revenues in the Slovak Republic.

The area of tax incentives to support research and development was thoroughly analyzed to identify the reasons for the high volatility of this instrument. We have thus quantified the amount of state budget revenues allocated to the said tax instrument. Based on a summary of national and international statistics on the amount of support for research and development, it was subsequently possible to make a basic comparison in the international arena. Part of the work involved mapping the support for research and development in the Slovak Republic from 2015 to the present, taking into account the influence of the European Union, OECD, and the direction of government tax policy. Mathematical and statistical calculations and time series analysis are also part of the paper.

The researched period (2015 to 2020) was analyzed using selected indicators. The authors also undertook a short-term analysis of selected factors which, especially on an annual basis, significantly affected budget revenues through the deduction of research and development costs. By applying the methods of deduction and induction, a statistically significant time-period was evaluated, on the basis of which it was possible to form general conclusions and recommendations about the direction of tax policy in the Slovak Republic with an emphasis on support for research and development. The subject of the research was the position of the deduction of research and development costs in tax systems as well as its impact on the business environment. The most important sources of statistical data were the databases of the Statistical Office of the Slovak Republic and OECD statistics. The secondary data sources were mainly Slovak legislation, European Commission and OECD studies, and FINSTAT data.

4. Results

A favourable business environment is a prerequisite for long-term competitiveness as well as economic growth. The basic conditions for its operation are thus created not only by business entities, but also by the state, which can influence employment, savings, and investments through tax incentives. Tax incentives are one of the forms of support aimed at increasing the volume of investment in the Slovak Republic and improving the business environment. The alignment of tax policy with the policy of state aid and selected tax relief for science and research has also had its place in the Slovak tax system since 2015. The deduction of research and development costs to support research and development is one of the most effective tax instruments. The advantages and disadvantages of super deduction are summarized in Table 1.

Table 1. Advantages and Disadvantages of a Deduction of Research and Development Costs in the Slovak Republic

Specification	Advantages	Disadvantages
Deduction of research and development costs to support research and development	Little intervention in the market Stable support for research and development Less bureaucratic, more predictable Easily applicable form of support Higher potential results of innovation	Planar tool which does not allow support for research and development in specific locations Insufficient return from completed projects

Source: prepared by the authors.

Work on the issue of support for research and development in the Slovak Republic followed on from professional discussions and the findings of studies. Selected partial analyses of the position of this tax instrument in the national as well as international arenas have become key. The position of the deduction of research and development costs in the context of the Slovak Republic is depicted in Figure 2.

Research and development represents an irreplaceable intensifying factor for Slovakia's continued economic development. Global pressure to increase competitiveness and guarantee sustainable growth requires making the process of transferring science and technology knowledge into business

development plans more effective. The quantification of indicators related to the deduction of research and development costs is documented in Table 2.

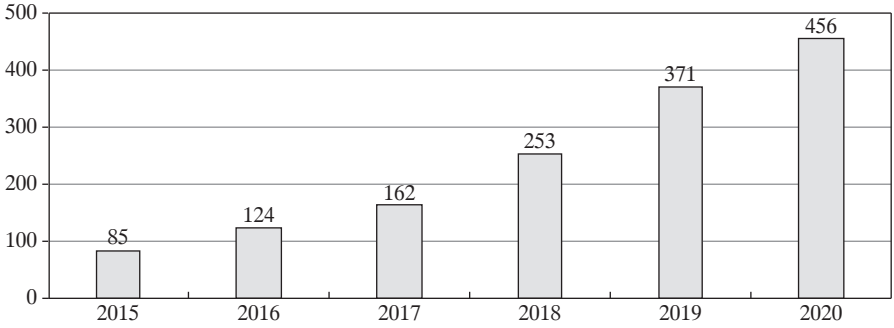

Fig. 2. Number of Taxable Persons Deducting Expenditure on Science and Research
Source: prepared by the authors.

Table 2. Number and Amount of Deductions on Research and Development in the Slovak Republic

Specification	2015	2016	2017	2018	2019	2020
Number of taxpayers	83	112	163	264	373	460
Amount of deduction of research and development costs in EUR million	9.23	16.49	40.12	120.28	119.53	156.20
Amount of deduction of research and development costs in %	25	25	25	100	150	200
Nominal corporate rate in %	22	22	21	21	21	21
Amount of saved corporate income tax in EUR million – revenue missed by the state budget	2.027	3.626	8.424	25.257	25.101	32.802
State budget revenue from corporate income tax in EUR billion	2.728	2.740	2.744	2.698	2.713	2.699

Source: prepared by the authors on the basis of Slovak Financial Institution data.

The statistics of the Financial Administration of the Slovak Republic also show that small companies with 10 to 49 employees apply the deduction to the highest degree, followed by medium-sized companies with 50 to 249 employees, micro-enterprises with up to 9 employees, and large companies with over 250 employees. The highest rate of deduction of research and development cost in terms of regional distribution was recorded in the

Bratislava, Trenčín and Trnava regions. The breakdown of the deduction of research and development costs by industry is summarized in Figure 3.

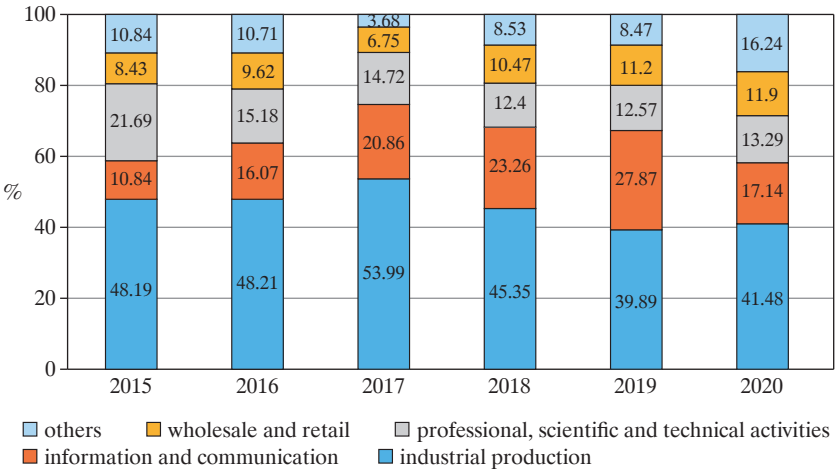

Fig. 3. Share of Industries Deducting of Research and Development Costs in the Slovak Republic

Source: prepared by the authors.

The decrease in the volume of the deduction of research and development costs in 2019, with a 1.5-times increase in its rate, can be assessed negatively. It is clear that the success of this instrument of tax stimulation of private investment in research and development in Slovakia may encounter a barrier such as the inability to claim the costs incurred in the form of a deduction of research and development costs against a sufficient tax base. The decline in the profits of Slovak businesses across almost all sectors of the economy appeared as early as 2018 and developed in the same way in 2019, i.e. in the years before the pandemic. Although tax legislation has made it possible to increase the rate of deduction of research and development costs to 200% in 2020, the question remains as to how many entities will have a chance to use this rate given the economic effects of the pandemic. Since 2020, a new tax incentive aimed at supporting research and development in the form of a patent box has also been introduced in the Slovak Republic, and since 2022 a new tax instrument in the form of a deduction of investment costs has been introduced.

A partial evaluation of the operation of this tax incentive in the Slovak Republic is also documented by OECD statistics (OECD 2021, 2020a,

2020b), which examined the marginal level of tax support for research and development for small and medium-sized companies. Slovakia has achieved the best results among the EU countries and has even overtaken France, which provides companies with the highest support for research and development in the EU. It is clear that these newly introduced tax instruments in Slovak tax legislation have great potential and enable companies investing in research and development to generate significant financial savings that would otherwise be paid to the state in the form of tax.

5. Discussion

The main advantage of the deduction of research and development costs is its simple application as well as the lower administrative burden compared to obtaining relief in the form of state investment aid. Tax incentives for research and development encourage investment and are therefore considered an appropriate form of support for the business environment. However, the biggest positive is the duplication of the possibility of claiming costs with respect to the reported corporate tax base. The question arises here: how often should the percentage rate for duplicate costs be changed? The success of this instrument of tax stimulation of private investment in research and development in Slovakia may also run into the barrier of not being able to claim the costs incurred in the form of a deduction of research and development costs against a sufficiently high tax base, especially in the current period, when there has been a significant decline in Slovak companies' profits. What, then, is the perspective for deducting research and development costs in the pandemic period and in the post-pandemic period, respectively?

Although tax legislation in the 2020–21 period introduced an attractive increase in the rate of deduction of research and development costs up to 200%, the question remains as to how many entities will have a chance to use this rate given the economic effects of the pandemic. A tax loss or an insufficient tax base postpones the deduction of research and development costs to the next tax period, when a sufficient tax base allows them to be claimed. So far, this option has been limited in time to a maximum of four years, and from 2020 it was extended to five years. Another important question is how many entities had to reduce or completely abandon their research and development activities due to the pandemic.

Understanding the legislation regarding the deduction of research and development costs remains a challenge for Slovak companies. Many

companies are not entirely sure whether the deduction of research and development costs can be applied to their projects. Some companies are also afraid of being sanctioned by the financial administration if they wrongly apply for a deduction of research and development costs, and therefore they are waiting until there are enough methodological guidelines on how to apply the deduction correctly.

6. Conclusions

The world economy has found itself in crisis again, and this fact has had a significant impact on the Slovak economy. There have been significant economic losses. Due to these macroeconomic problems in particular, the role of the tax administration has been constantly growing, with an emphasis on eliminating the negative effects on both the revenue and expenditure sides of the state budget. To mitigate the effects of the crisis, OECD member countries are responding with changes to economic policies and with measures of a fiscal and non-fiscal nature. A new challenge in the field of tax policy are tax reliefs aimed at supporting research and development, creating new investment, and creating new jobs. In the long run, it is higher investment that will support the growth of productivity and employment.

Apart from the last seven years, the Slovak Republic has been characterized by almost no state support for research and development. However, since 2015, new forms of tax incentives have included the provision of tax relief in the form of a deduction of research and development costs, a patent box, as well as a tax deduction for new investments. The results of our analysis of the support for research and development in the Slovak Republic make it possible to identify key areas that affect budget revenues the most and that affect the business environment in terms of providing tax benefits for taxpayers performing research and development. These include maintaining or reducing the corporate tax rate to bolster economic growth and competitiveness, and carrying out an audit and a more detailed analysis of the impacts of the aforementioned tax incentives, as their impact on research and development has had a positive effect both in terms of the number of applicants and the amount of funds drawn. In 2015, 83 entities claimed a deduction of research and development costs amounting to more than EUR 9 million, while in 2019 the amount of this deduction increased to more than EUR 119 million.

Another motivation for companies in Slovakia to invest in research and development is the new patent box regime. It has been in force since January

2018 and was introduced as a separate tax regime that provides an exemption from income tax for reasons of granting the right to use protected patents, utility models or software from the taxpayer's own development activities in Slovakia. The analysis of applicants for a deduction of research and development costs in the Slovak Republic also showed that the number of new applicants for the tax benefit is constantly growing. This may encourage the re-use of such a tax credit in future years. The latest tool to support research and development is the deduction of investment costs, which means that the Slovak Republic currently provides several tax instruments to support research and development. However, a more comprehensive analysis of the impacts on budget revenues as well as on the business environment cannot be provided at this time.

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