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R&D TAX INCENTIVES VERSUS INTERNATIONAL TAX COMPETITION – SPATIAL ANALYSIS[1]

Summary

Purpose – To examine the existence and strength of the relationship between international tax competition and tax treatment of R&D in spatial analysis.

Research method – The research hypothesis implies that the increase in the strength of business ties between economies takes place simultaneously with the disappearance of the differences in the tax treatment of R&D activities. As a measure of spatial differentiation, the trade cooperation indicator was adopted. Meanwhile, as a measure of the disproportions in the tax treatment of R&D, it was assumed that a difference exists in the amount of the B index. The occurrence of the relationship was verified based on the construction of the panel regression models for four scenarios, depending on the size and profitability of enterprises being the potential beneficiaries of tax incentives: large profitable and large unprofitable enterprises as well as profitable and unprofitable SMEs.

Results – The analysis conducted enabled the Author to find the negative relationship between the variables in three out of the four scenarios. Therefore, the research hypothesis was rejected.

Originality /value – An approach to spatial analysis was employed where the indicator of business ties rather than a geographical indicator was adopted as the key measure of spatial differentiation.

Keywords: R&D activity, tax incentives for R&D, international tax competition, spatial analysis

JEL Classification: E62, H25, O38

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1. Introduction

The research and development sector and the resource of technological knowledge in the endogenic theory of economic growth are listed among the most essential determinants of stable growth and development in a longtime perspective[2]. Appropriate technological facilities not only constitute the basis for creating innovations in the economy, but they also accelerate the diffusion of innovations from other countries. According to Griffith et al. [2004, pp. 883-884] in those economies that are not leaders in technological terms, the R&D sector is also important owing to the provision of enterprises with so-called 'tacit knowledge", i.e. specialist information which constitutes the starting point for the rapid imitation of new solutions from other countries. However, most economists agree that the key importance in the increase of the resources of technological knowledge (both in innovative and imitational economies) is played by the expenditures that are made by enterprises on R&D activity.

R&D activity is the process where the final product (technological knowledge) and expenditures (among others, on human capital in the form of knowledge of the workers employed for the project, financial capital) have mostly non-material character. Therefore, it may be easily relocated, especially by large transnational corporations, the activity of which is based chiefly on direct foreign investments [Santos-Paulino et. al, 2014, pp. 1693-1697]. Among the most important determinants of the way that enterprises specify their R&D activity, analysts list various factors: fiscal incentives [Kafouros et al., 2018, pp. 1252-1253, Alstadsæter et al., 2015, pp. 24-25], the competition on the product market [Belderbos et al., 2008, pp. 770-777], large industrial centers [Malecki, 1980, pp. 15-20], qualified research personnel [Ekholm, Hakkala, 2007, p. 537] or large scientific centers [Belderbos et al., 2017, pp. 705-706; Abramovsky et al., 2007, pp. C136-C137].

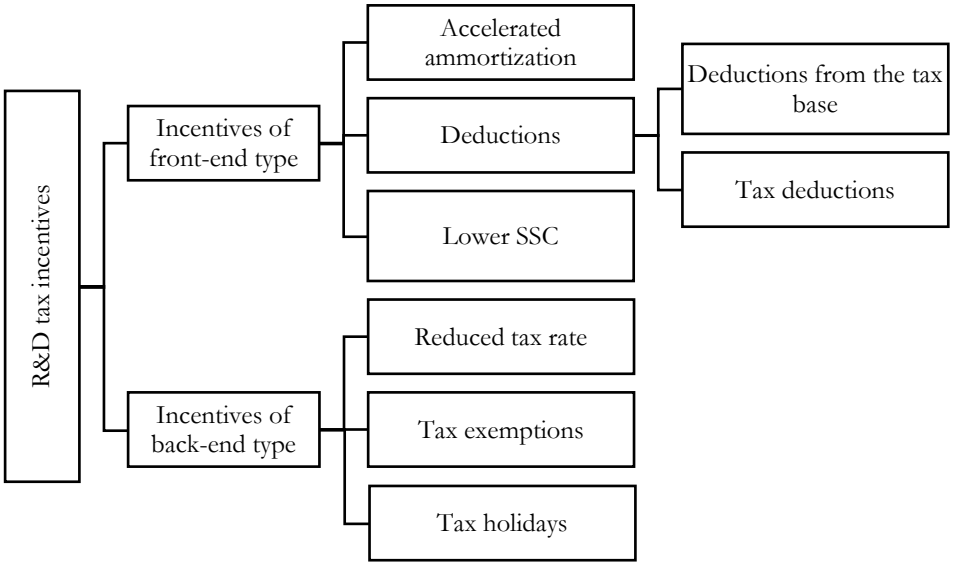
Therefore, many countries attempt to attract enterprises investing in R&D through the introduction of tax incentives. From the beginning of the 21st century until 2015, the number of OECD countries who experienced their tax systems being enriched with at least one preference directly connected with R&D activity has almost doubled and amounts to more than three quarters of all the members of the organization [Zegarowicz, 2018a, pp. 363-365]. Tax incentives may adopt the form of instruments of either front-end or back-end types (chart 1). The incentives of a front-end type are related to expenditures on R&D activity. The accelerated amortization of the assets used in R&D activity may be isolated, the reduction of social contributions for R&D employees and the most popular ones – the allowances connected with deducting the expenditures made on R&D from the tax base or tax. Meanwhile, the incentives of back-end type refer to the taxation of incomes from

[2] See: [Arrow, 1962, pp. 155-160; Nelson, Phelps, 1966, p. 75; Romer, 1986, pp. 1034-1035; Lucas, 1988, pp. 39-41; Rebelo, 1991, pp. 519-520; Grossman, Helpman, 1991, pp. 60-61; Aghion, Howitt, 1992, p. 349; Segerstrom, 1998, pp. 1305-1307; Guellec, van Pottelsberge de la Potterie, 2001, pp. 14-15; Sener, 2008, p. 3914; Ang, Madsen, 2013, pp. 1537-1538; Minniti, Venturini, 2017, pp. 324-325].

R&D activity. These occur mostly in the form of incentives such as the Patent Box (Innovation Box, IP Box) which imply the preferential treatment of incomes from the intellectual property by reducing the effective tax rate, the temporary tax holiday or the complete tax exemption.

CHART 1

The division of R&D tax incentives



Source: own elaboration on the basis: [Zegarowicz, 2018b, p. 156].

Due to considerable mobility of the location where enterprises commence their R&D activity, tax preferences may be introduced not only in order to encourage their own enterprises to begin such activity or to attract foreign investment, but also for the fear of the outflow of investment in R&D activity to other countries. The simultaneous occurrence of all three factors may lead to international tax competition. According to numerous analysts, the occurrence of tax competition between countries may be noticeable particularly in the economic activity where mobile production factors are used [Andersson, Forslid, 2003, pp. 279-303; Devereux et al., 2008, pp. 1210-1219; Mongrain, Wilson, 2018, pp. 177-180]. Undoubtedly, R&D activity may be included in this group. Meanwhile, the advanced tax competition may lead to negative phenomena such as the erosion of the tax base and transfer pricing as well as the shift of profits. In the case of R&D tax incentives, the preferences of the Patent Box type are the instruments which are particularly prone to such phenomena [Evers et al., 2013, pp. 37-39; Karkinsky, Riedel, 2012, p. 185].

There is extensive research which focuses on the selection of the location for R&D activity by enterprises and on the efficiency of tax incentives in the stimulation of the expenditures on R&D by both domestic and foreign enterprises. However,

only a handful of scientists make an attempt to analyze the relationship between the countries implementing the preferential treatment of R&D activity for their tax systems. Therefore, the research aims at analyzing those factors that determine the introduction of incentives on R&D from a spatial aspect. For the realization of this aim, it was necessary to verify the research hypothesis which implied that the increasing power of trade connections between economies takes place simultaneously with the disappearing differences in the tax treatment of R&D activity, i.e. the occurrence of tax incentives supporting the activity. The effect ought to be strongest in the case of the taxation of large transnational corporations.

2. Research methods

The research comprised 41 economies[3] during the period 2000-2017[4]. The realization of the adopted objective required at least two variables: the variable representing the treatment of R&D activity by the tax system in the analyzed countries and the variable representing the spatial relationship between the countries.

As the variable representing the existence of tax incentives in the analyzed countries and the power of their preferential character the B index[5] was adopted. The B index is the measure of the level of profit before tax that a representative enterprise must generate in order to achieve marginal profitability from the unit outlay on R&D taking into consideration the way R&D is treated by the tax system [OECD, 2013, pp. 1-2]. The coefficient shows how many monetary units a particular enterprise needs to generate in order to finance the investment in R&D in the amount of one monetary unit within a certain tax system. It may be shown using the following equation [OECD, 2013, p. 1]:

$$\text{B index} \equiv \frac{1 - A}{1 - \tau}$$

where:
A – the total current value of all tax preferences connected with R&D expenditures;
τ – CIT tax rate.

[3] The countries included in the research: Australia, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Great Britain, USA, Brazil, China, Russia, RSA, Columbia, Cyprus, Bulgaria and Romania. The research comprised OECD countries (without Austria, Greece and Turkey, which were excluded owing to the incomplete data concerning foreign trade – Austria or B index – Greece, Turkey) in the years 2000-2017 and the countries for which OECD organizes the statistic analysis of the value of the B index.

[4] The time range of the research is dictated by the availability of information on the value of the B index. The value of the coefficient has been estimated for OECD countries since 2000.

[5] The research used data representing the value of B index coefficient in the analyzed countries in the years 2000-2017 from the OECD database [2019a, b].

The value of the coefficient may be interpreted in three divisions. When the B index is equal to one, the rate of the tax subsidy amounts to zero – all the expenditures on R&D activity are treated as tax costs and there are no additional preferences. When the B index equals less than 1 – the system includes the preferential treatment of R&D activity, 1 basic unit of investment in R&D requires the generation of less than 1 basic unit of profit before tax. When the B-index amounts to more than 1 – the tax system treats R&D activity in a discriminating way e.g. owing to the exclusion of some costs from R&D activity from the tax costs. The coefficient is frequently shown as '1 – B index' in order to present only the rate of the tax subsidy. The coefficient is calculated for representative enterprises in four scenarios depending on their size and profitability: large profitable and large unprofitable enterprises as well as profitable and unprofitable SMEs.

In order to illustrate the divergences in the tax treatment of R&D activity, in each of the scenarios the coefficient of the difference between all the possible pairs of two countries in the analyzed set expressed was calculated using the following formula:

$$\text{Diff } 1 - \text{B index LP/LN/SP/SN}_{t_{ij}} = \left|(1 - \text{B index}_{t_i}) - (1 - \text{B index}_{t_j})\right|,$$

where:

$\text{Diff B index}_{t_{ij}}$ – the difference in the value of coefficient 1 – B index between *i* country and *j* country in year *t* in the scenario respectively: large profitable (LP) / large unprofitable (LN) / profitable SME (SP) / unprofitable SME (SN);

$1 - \text{B index}_{t_{i(j)}}$ – the value of coefficient 1 – B index in *i(j)* country in year *t*.

The selection of a variable representing the spatial differentiation of the analyzed countries was a much more complex task. The frequently used measures of spatial differentiation are variables including the length of borders between the countries or the distance between the capitals. However, as Montmartin and Herrera [2015, pp. 1070-1071] indicate, in relation to R&D activity, the usage of these measures would be ineffective. The reason relates to the fact that the expenditures and effects in R&D activity have a non-material character and the activity is realized by large transnational corporations. Therefore, according to these authors, in this case a much better measure of spatial differentiation is the coefficient of trade cooperation. The coefficient illustrates the meaning of the bilateral trade between any two countries in the foreign trade of a certain country[6]. The relation may be presented using the following formula [Montmartin, Herrera, 2015, p. 1075]:

$$\text{TC}_{t_{ij}} = \frac{1}{2}\left(\frac{\text{exp}_{t_{ij}}}{\text{exp}_{t_i}} + \frac{\text{imp}_{t_{ij}}}{\text{imp}_{t_i}}\right),$$

[6] Data concerning export and import of the analyzed countries in the years 2000-2017, which was useful for calculating the indicator of trade cooperation, was taken from OECD database [2019a].

where:
$TC_{t_{ij}}$ – the indicator of trade cooperation of in year *t*;
$exp_{t_{ij}}$ – export from country *i* and into country *j* in year *t*;
$imp_{t_{ij}}$ – import from country *i* and into country *j* in year *t*;
$exp(imp)_{t_i}$ – the sum of export (import) of country *i* in year *t*.

The increase of the indicator indicates a higher degree of cooperation between country *i* with country *j*. The basic statistics representing both variables are presented in Table 1[7].

TABLE 1

The basic statistics illustrating the analyzed variables

Variable	Obs	Average	Median	Std. Dev.	Min	Max
Diff 1-B index LP	29520	0.1288	0.1100	0.1175	0.0000	0.5000
Diff 1-B index LN	29520	0.1030	0.0800	0.09901	0.0000	0.4500
Diff 1-B index SP	29520	0.1410	0.1200	0.1218	0.0000	0.5000
Diff 1-B index SN	29520	0.1211	0.1000	0.1125	0.0000	0.4700
TC	29520	0.01997	0.005161	0.04361	4.775e-7	0.7967

Source: own elaboration.

In order to measure the occurrence of the relationship between trade ties and the differences in the tax treatment of R&D activity models of panel regression in each of the scenarios were constructed. As the dependent variable there were adopted differences in the value of the 1 – B index, whereas the coefficient of trade connections was taken as the independent variable. Such logical arrangement results from the adopted objective of the research which aims at checking whether spatial differentiation has impact on the preferential treatment of R&D activity in the analyzed countries. The general form of the model may be presented using the following equation:

$$\text{Diff } 1 - \text{B index LP/LN/SP/SN}_{t_{ij}} = \beta TC_{t_{ij}} + \vartheta_{ij} + \varepsilon_{t_{ij}},$$

where:
β_1 – variable parameter;
ϑ_{ij} – individual effect;
$\varepsilon_{t_{ij}}$ – pure random error.

[7] For the calculations the following programs were used: GRETL and Microsoft Excel.

TABLE 2

The panel diagnostic tests

Model/Test	F-test*		Breusch-Pegan**		Hausman***	
	p-value	ef. ind.	p-value	ef. ind.	p-value	ef. ind.
Diff 1-B index LP	0.0000	Fixed	0.0000	Random	0.0105	**fixed**
Diff 1-B index LN	0.0000	Fixed	0.0000	Random	0.1126	**random**
Diff 1-B index SP	0.0000	Fixed	0.0000	Random	0.0024	**fixed**
Diff 1-B index SN	0.0000	Fixed	0.0000	Random	0.0001	**fixed**

* H_0 = the estimation of MNK, H_1 = fixed effects; ** H_0 = the estimation of MNK, H_1 = random effects; *** H_0 = random effects, H_1 = fixed effects.

The critical value in all the tests: p=0,05.

Source: own elaboration.

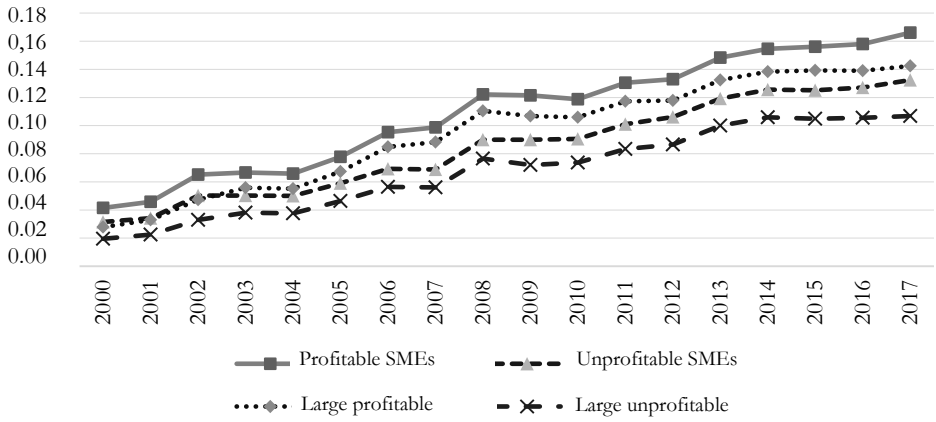
The panel diagnostic tests above demonstrate the existence of two types of individual effects (table 2). In the case of both scenarios with an SME enterprise and a large profitable enterprise the occurrence of the intended effects was observed. Meanwhile, in case of a large unprofitable enterprise random effects were noticed.

3. Results

Starting from 2000, there has been an increase in the number of countries having tax systems enriched with R&D incentives, but also with regards to the average rate of incentives' preferential character in the analyzed countries (chart 2). In 2000, the average value of the 1-B index in the analyzed countries amounted to 0.04, 0.03, 0.03 and 0.02 respectively for profitable and unprofitable SMEs and for large profitable and unprofitable enterprises. In this year the largest tax return from the investment in R&D was recorded in Spain where the tax subsidy rate amounted to 0.44 for the profitable enterprises irrespective of the size and 0.35 for the unprofitable ones (chart 3, attachment 1). At that time the indicator amounting to more than 0.1 was observed in 9 countries as regards profitable SMEs, while in 6 countries in case of unprofitable SMEs and large profitable enterprises and only in three countries in case of large unprofitable enterprises.

CHART 2

The average value of the 1 – B index in the analyzed countries in the years 2000-2017



Source: own elaboration on the basis: [OECD, 2019b].

Over the subsequent 17 years, the average value of the coefficient demonstrated dynamic increases and in 2017 it amounted to 0.17, 0.13, 0.14 and 0.11 respectively (chart 2). The rate of tax subsidy in that year was the highest in France – it amounted to 0.35 for large unprofitable enterprises and 0.43 for other scenarios (chart 4, attachment 1). In 2017 a considerably larger group of countries offered tax return from the invested monetary unit in R&D activity at the level above 10%. There were 26 countries as regards profitable SMEs, 17 countries as regards large unprofitable enterprises and 22 countries in the other scenarios.

CHART 3

The value of B index coefficient in the analyzed countries in 2000

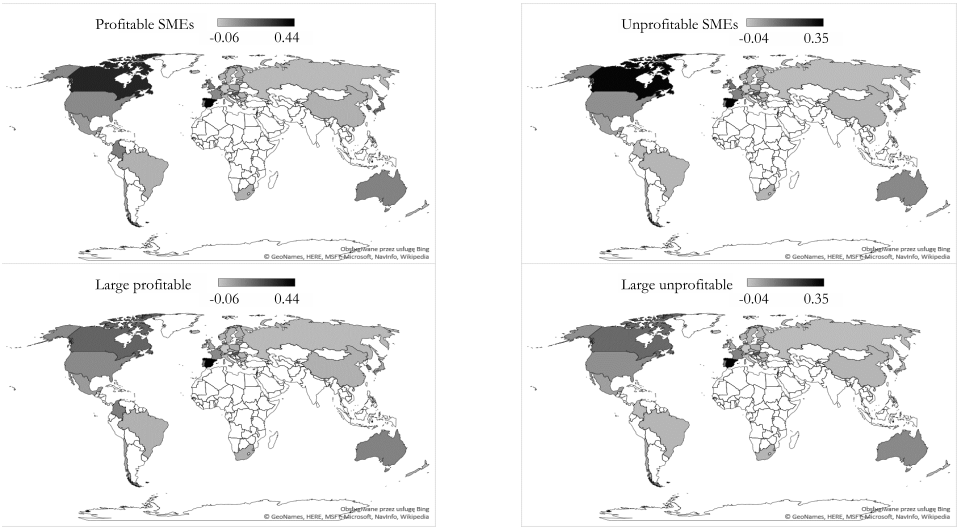
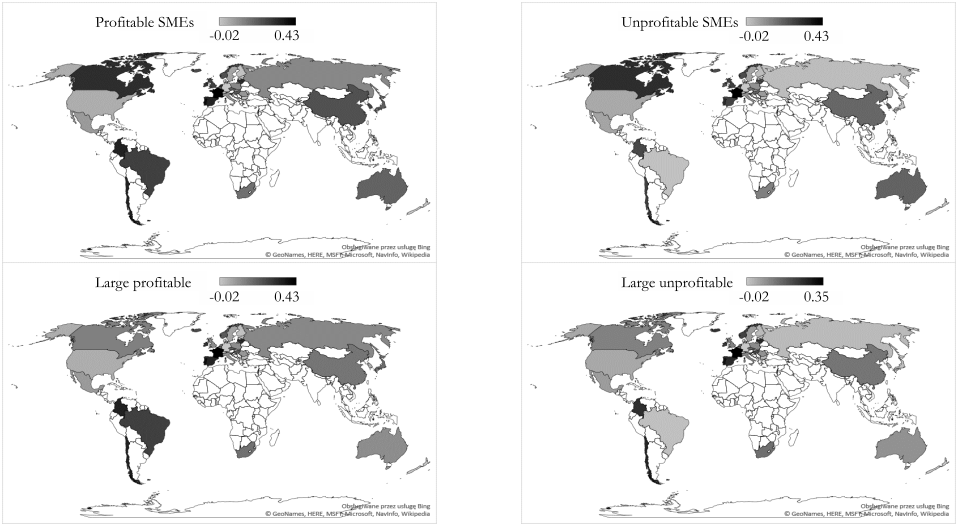


CHART 4

The value of coefficient B index in the analyzed countries in 2017



The results of the estimation (table 3) of the panel data for 41 countries in the years 2000-2017 confirmed the existence of the relationship between the trade cooperation indicator in the values of 1 – B index in three out of four analyzed scenarios. Low values of determination coefficient and the relevance level of the independent variable do not enable the confirmation of the analyzed relation in case of

large unprofitable enterprises. In all the other scenarios, as regards to the analyzed countries there is negative correlation between the degree of trade cooperation and the differences in the tax treatment of R&D activity, which is an expected result. In each of these scenarios simultaneously with the increase of trade cooperation indicator by one unit, the differences in the tax treatment of R&D activity disappear by more than one quarter of the unit. Although the values of parameters are similar in all three scenarios, one may observe a minimum difference between profitable enterprises and the unprofitable ones from the SME sector. In the case of an unprofitable enterprise, the estimated parameter is lower by approx. 0.01 unit and amounts to 0.253375.

TABLE 3

The results of the panel regression estimation

Model / Variable	Large profitable	Large unprofitable	Profitable SMEs	Unprofitable SMEs
const.	0.134079***	0.104259***	0.146284***	0.126174***
TC	-0.263410***	-0.061683*	-0.264688***	-0.253375***
LSDV (Between) R^2	0.478262	(0.004518)	0.497399	0.554308
Within R^2	0.000570	0.005289	0.000556	0.000674

*, **, *** means the changeability of the variable at the level of 0.1, 0.05 and 0.01 respectively.

Source: own elaboration.

Interesting results can also be seen when undertaking analysis of the differences between the determination coefficient (LSDV) and the coefficient within the group. A decisively higher value of LSDV R^2 in all the three scenarios implies that the model explains the dependent variable while taking into consideration mainly the individual effects. Hence the dependence is based on the differences between particular countries in cross section. The value within R^2 close to zero implies that the impact of changes of the independent variable in time is insignificant. This may be caused by the fact that the value of both variables in time is subject to relatively small fluctuations. The changes of the 1 – B index may be caused solely by the modifications of the tax law regulating the functioning of incentives on R&D in particular countries. In turn, these changes are not introduced each year, which results in the existence of relative stability of differences in terms of the occurrence of tax incentives on R&D activity and the degree of their preferential character in particular countries. The relative share in import and export in specific countries, which is characteristic for their trade partners, is subject to annual changes but these changes are relatively moderate.

4. Conclusions

The analysis conducted enabled the confirmation of the negative correlation between the degree of trade connections between the analyzed countries and the differences in R&D activity in the tax system in three scenarios: profitable and unprofitable SMEs and profitable large enterprises. The obtained results appear to be consistent with the previous research studies concerning fiscal policy in relation to the available support for R&D activity. Montmartin and Herrera [2015, p. 1077] observed the substitutability between the domestic and external incentives on R&D in shaping the national expenditures on R&D, which indirectly may be the sign of the occurrence of tax competition. In the case of incentives of Patent Box type, Evers et al. [2013, pp. 37-39] and Alstadsæter et al. [2015, pp. 24-25] have noticed that one of the main reasons of introducing incentives of this type may be the process of international tax competition, especially in the countries with a relatively small tax base.

However, such dependence has not been observed in this research with regards to large unprofitable enterprises. The lack of dependence in one of the scenarios for large enterprises does not coincide with the author's expectations. According to literature, transnational corporations are characterized by considerable capital mobility and in the effect ought to be the strongest in their case. Therefore, despite the confirmed existence of the reverse effect the results obtained do not enable complete confirmation of the research hypothesis. Owing to this, in accordance with the falsification principle, it ought to be rejected. While using the methods adopted in the research one may not confirm the existing relationship between trade contacts and the tax treatment of R&D activity as certain facts.

The results of the research also provide essential information on the introduction and shape of fiscal incentives in R&D activity. It has been observed that the dependence is slightly stronger in the case of profitable enterprises. This may be caused by the fact that not all countries introducing incentives make it possible to either postpone or return the value of unused preferences. Therefore, despite the existence of tax incentives having similar construction and general attractiveness in the "neighboring countries", the difference in the way the unused preferences are treated may weaken their effect in case of unprofitable enterprises.

Another essential issue appears to be the divergence between the impact of individual effects and the effects that time changes of dependent variable have on the dependent variable in the estimated model. The obtained results imply that the reverse between 'trade/commercial neighborhood' and the differences in the tax treatment of R&D activity is most visible in case of cross-section differences between particular countries. The changes at the level of trade connections in time do not have considerable influence/largely affect the differences in the attractiveness of tax systems in relation to R&D activity. This may be attributed to the fact that the construction of incentives is rarely changed. Therefore, as regards to tax competition, the high degree of trade connections ought to be stable over long time perspective so that particular countries will create their own incentives while taking

into consideration the preferences existing in the neighboring country. The impact of single fluctuations of these connections in time should be irrelevant.

Additionally, one ought to keep in mind several limitations in the interpretation of the obtained results which result from the applied methods. Firstly, the B index does not take into consideration the tax incentives of the back-end type. Especially as regards such type of instruments (Patent Box in particular) one may observe the intensification of tax competition. Therefore, the Author will devote further research on the more detailed analysis of this particular instrument. The determination coefficient oscillating at 0.5 also implies that there are other essential factors which may give rise to the differences in the tax treatment of R&D activity. The impact of trade ties is only one of numerous determinants. Undoubtedly, there is the necessity for further research in this respect which may identify them.

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ATTACHMENT 1

The value of B index coefficient in the analyzed countries in the years 2000 and 2017 illustrated in graphs number 2 and 3

The country ISO code	Large				SME			
	Profitable		Unprofitable		Profitable		Unprofitable	
	2000	2017	2000	2017	2000	2017	2000	2017
AUS	0.1	0.1	0.07	0.07	0.1	0.19	0.07	0.19
BEL	-0.01	0.16	-0.01	0.14	-0.01	0.16	-0.01	0.14
BGR	-0.02	0	-0.01	0	-0.02	0	-0.01	0
BRA	-0.01	0.27	-0.01	-0.01	-0.01	0.27	-0.01	-0.01
CAN	0.17	0.13	0.13	0.1	0.33	0.31	0.33	0.31
CHE	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
CHL	0	0.34	0	0.27	0	0.34	0	0.27
CHN	-0.01	0.15	-0.01	0.12	-0.01	0.23	-0.01	0.18
COL	0.11	0.34	-0.02	0.25	0.11	0.34	-0.02	0.25
CYP	-0.02	-0.01	-0.01	0	-0.02	-0.01	-0.01	0
CZE	-0.02	0.21	-0.01	0.15	-0.02	0.21	-0.01	0.15
DEU	-0.06	-0.02	-0.04	-0.02	-0.06	-0.02	-0.04	-0.02
DNK	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
ESP	0.44	0.33	0.35	0.26	0.44	0.33	0.35	0.26
EST	0	0	0	0	0	0	0	0
FIN	-0.01	-0.01	-0.01	0	-0.01	-0.01	-0.1	0
FRA	0.08	0.43	0.08	0.35	0.08	0.43	0.08	0.43
GBR	0	0.1	0	0.1	0.11	0.27	0.11	0.27
HUN	0.21	0.22	0.17	0.21	0.21	0.22	0.17	0.2
IRL	0	0.29	0	0.23	0	0.29	0	0.23
ISL	-0.02	0.24	-0.02	0.24	-0.02	0.24	-0.02	0.24
ISR	0	0	0	0	0	0	0	0
ITA	-0.04	0.09	-0.03	0.09	-0.04	0.09	-0.03	0.09
JPN	0.01	0.17	-0.02	-0.01	0.12	0.2	-0.01	-0.01
KOR	0.13	0.03	0.1	0.02	0.17	0.26	0.13	0.21
LTU	-0.01	0.31	-0.01	0.25	-0.01	0.31	-0.01	0.25
LUX	-0.02	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01

The country ISO code	Large				SME			
	Profitable		Unprofitable		Profitable		Unprofitable	
	2000	2017	2000	2017	2000	2017	2000	2017
LVA	-0.01	0.31	-0.01	0.25	-0.01	0.31	-0.01	0.25
MEX	0.04	0.07	0.03	0.05	0.04	0.07	003	0.05
NLD	0.06	0.15	0.06	0.15	0.22	0.31	0.21	0.3
NOR	-0.02	0.21	-0.01	.21	-0.02	0.23	-0.01	0.24
NZL	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
POL	0	0.1	0	0.08	0	0.11	0	0.09
PRT	0.13	0.39	0.1	0.31	0.11	0.39	0.09	0.31
ROU	-0.02	0.08	-0.01	0.07	-0.02	0.08	-0.01	0.07
RUS	-0.03	0.11	-0.02	0	-0.03	0.11	-0.02	0
SVK	-0.01	0.1	-0.01	0.08	-0.01	0.1	-0.01	0.08
SVN	-0.01	0.21	-0.01	0.17	-0.01	0.21	-0.01	0.17
SWE	-0.02	0.05	-0.01	0.05	-0.02	0.05	-0.01	0.05
USA	0.08	0.03	0.06	0.03	0.08	0.03	0.06	0.04
ZAF	-0.01	0.16	-0.01	0.13	-0.01	0.16	-0.01	0.13

Source: own elaboration on the basis: [OECD, 2019b].