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# Tax regulation of small and medium-sized science-based business: scales and productivity

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**Abstract.** The best experience of developing high technologies indicates that very often breakthroughs are made by small companies; one of their advantages is possibility of using special tax conditions for small business. The aim of this study is estimation of scales and productivity of the accepted practice of the state tax support for small and medium-sized science-based business in developed and developing countries. Countries have been emphasized where direct financing of innovations or using tax incentives prevails, and also the countries where fiscal expansion is focused on large or small and medium-sized businesses. The research has helped to make a conclusion that providing more significant privileges for small and medium-sized science-based business will positively influence the growth of innovation activity in the developing countries, Russia in particular.

## 1. Introduction

Digitalization of social relations creates challenges for promoting high-technology spheres of economy [1]. At that, a very important instrument is represented by imposition of taxes, creating special tax conditions for strategically important branches and directions, regulating innovative processes [2, 3] having crucial significance for economic growth and development of territories [4, 5]. At the same time, not only branch focus has significance for innovative business but also sizes of companies. In order to create and promote science-based production it is important that all organizational structures participate. But a special role is given to small and medium business. On the one hand, such business – is a mobile carrier of non-standard ideas, on the other hand, it is an activity poorly protected from the environment. Therefore, additional fiscal expansion of small and medium science-based enterprises is an important direction of technologies' development. Such experience is vast enough, its economic efficiency and social consequences require additional estimations.

The aim of our research is evaluating the common practice of the state tax support of small and medium science-based business in certain European, Asian and other countries for determining the prospects of wide application of this instrument in Russia. Within the framework of this research and



according to the results of previous works, approaches to estimating consequences of applying tax privileges for small and medium science-based enterprises will be generalized. Then, statistical data will be analyzed as related to using tax incentives in the countries of OECD and Russia for fiscal expansion for Research, Development and Engineering with the focus on small business. We suppose that small and medium science-based business, as less protected but more mobile for developing non-standard innovative ideas, should have more tax privileges than large business. This supposition will be correlated with the accepted practice and possible directions of development of tax instruments for stimulating Research, Development and Engineering.

## **2. Regulating Research and Technological Development depending on peculiarities of running a business**

The first attempts of estimating the consequences of tax instruments for promoting innovations in separate countries were made in 1980-1990 (see, for instance, the works on tax privileges in Canada [6], USA [7, 8], Japan [9], Sweden [10]).

The accumulated data allowed undertaking international studies widely distributed in 1990-2000 [11, 12]. In some of the works the branch of activity of the analyzed companies which contribute to Research, Development and Engineering is taken into account, especially since expenses on innovations significantly differ branch-wise, as it was demonstrated in [13]. Metanalysis [14], which includes results of 34 articles published from 1991 to 2013 according to the USA, Canada, Japan, France, Norway, Netherlands, Spain, Italy, the Republic of Korea, China and India data, the aim of which was to determine the influence of tax privileges on innovations in business branches, had another important conclusion as well – the influence of tax privileges in the sector of high technologies turned out to be most productive for enterprises of small and medium business.

Despite the fact that the main part of works is based on the analysis of data for the countries of North America and Europe, there appear studies of tax policy for promoting innovations in developing countries as well. The tax policy of China, coordinated with stages of economic growth [15], has ambiguous estimations in relation to support of studies and elaborations. Crespi et al. [16] was revealed for Argentina that large companies are more sensitive to tax stimulating. It can be connected with the limitedness of means of small and medium enterprises for contributing to Research, Development and Engineering; over the longer term, differences of small and large companies haven't been found. The given conclusions on prior use of tax privileges by large companies look a bit paradoxical in comparison with the results [14].

The efficiency of tax incentives for studies and elaborations of small and medium-sized enterprises was also revealed in the works [17–20]. Koga [17], considering malleability of expenses on innovations as a result of provided tax privileges, as illustrated by Japanese companies in 1980es, concludes that tax credits definitely stimulate investments into studies and elaborations of large companies. At the same time this study was limited as there were no data on small enterprises. The study of Baghana & Mohnen [18] is specialized for small and large companies of Quebec in 1997–2003. Small companies turned out to be more sensitive to tax privileges and more significantly increased their investments into studies and elaborations in order to decrease the basis of corporate income tax, in comparison with large companies. Yohei [20] addresses the information on Japanese companies. Considering investments into innovations from small and medium business in Japan in 2000s, the author concludes that tax privileges have a significantly greater effect for small and medium companies that lack liquidity and thus offer the opportunity for strengthening internal sources of innovations.

A review of these studies allows making a supposition that the countries-leaders in technological development, and also those which have a long story of fiscal expansion for investing into studies and elaborations actively support innovation initiatives of small and medium-sized business. At that, the potential of stimulating territorial entities of developing countries hasn't been sufficiently used.

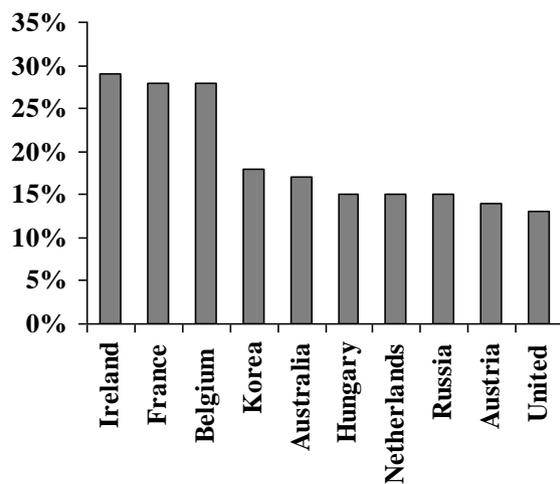
## **3. Methodology of research**

In order to implement the task set in the study, the state support of small and medium science-based entrepreneurship in different countries is evaluated according to statistical data of OECD [21–22]. For that, the level of tax stimulation of Research, Development and Engineering in relation to GDP related to the whole science-based business for 27 advanced countries of Europe, America, Asia, Australia, Africa, has to be determined. That allows revealing the countries the priority of which is tax support for scientific activities and the countries which pay attention to that least of all. However, considering the role of tax regulation for developing science-based business alone is incorrect without understanding the other possible component of state support – direct financing of innovations. Therefore, grouping of countries in accordance with the level of applying tax methods in their practice is further implemented.

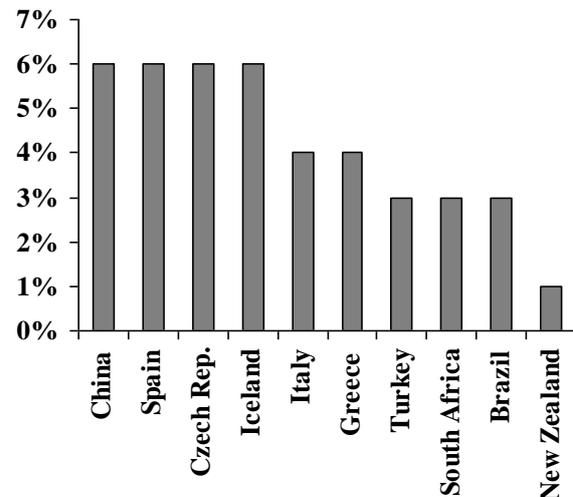
Then, for analysis and estimation of small and medium business in Research, Development and Engineering, its share in science-based business has to be determined. As a result, 10 countries with the highest indicators and 10 countries with the lowest indicators are then being selected. An analogous approach to selection of countries is being applied when analyzing another indicator which characterizes the level of the state tax support per unit of Research, Development and Engineering – 1-B index. At that, two categories of companies are being considered: profitable and loss-making.

#### 4. Results and discussions

The tendency to apply tax privileges for stimulating Research, Development and Engineering for the whole business sector (small, medium and large) for 10 most advanced and 10 least advanced countries is presented in figures 1 and 2.



■ State expenditures on tax benefits, % of GDP



■ State expenditures on tax benefits, % of GDP

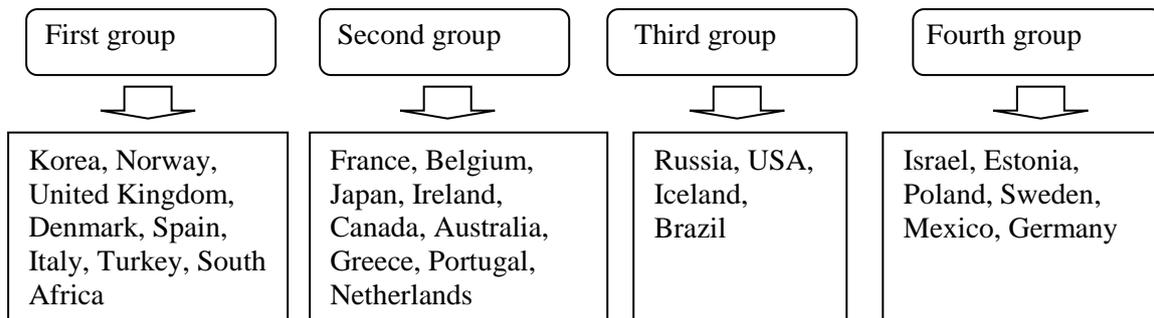
**Figure 1.** Countries with a high level of tax regulation of RD&E (in % to GDP, 2015).

**Figure 2.** Countries with a low level of tax regulation of RD&E (in % to GDP, 2015).

We can see in the figures that Ireland, France, Belgium are the leaders. New Zealand, Brazil, RSA and Turkey pay attention to tax regulators least of all. Russia is in the first group and, according to its relation to tax privileges for RD&E; it is close to Hungary and Netherlands.

However, the other results of OECD research are interesting as well; it reflects correlation of direct state financing and fiscal expansion for RD&E in relation to business. In this context, one may distinguish four groups of countries (figure 3).

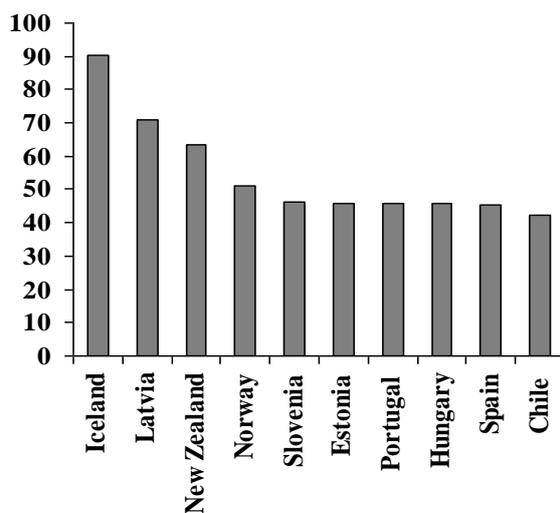
The first group: the volumes of both types of support are approximately equal. The second group: tax stimulating prevails. The third group: direct state financing is principal. The fourth group: only state investments are applied, there are no tax privileges.



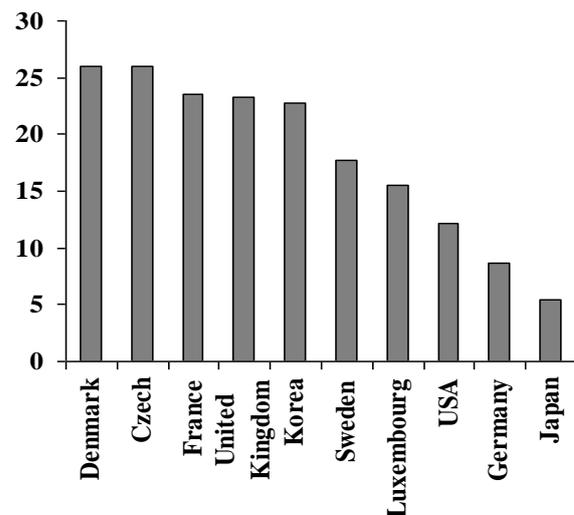
**Figure 3.** Classification of countries into groups by reference to the correlation of direct state financing and tax privileges for RD&E.

Among all these countries the most indicative is Russia (for further information refer to [23]). The greatest state support for companies engaged in research, including direct financing (0.39% to GDP) and tax stimulating (0.15%), is observed here. Next are France and Belgium with equal values of these indicators – 0.11 and 0.28% correspondingly.

Further we'll consider the share of small and medium enterprises in science-based business (figures 4 and 5). Selection is made on the basis of the principle specified before.



**Figure 4.** Countries with a high share of small and medium enterprises in science-based business (in %, 2015).

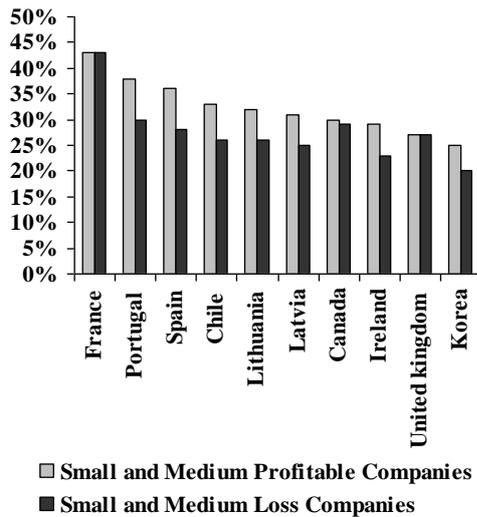


**Figure 5.** Countries with a low share of small and medium enterprises in science-based business (in %, 2015).

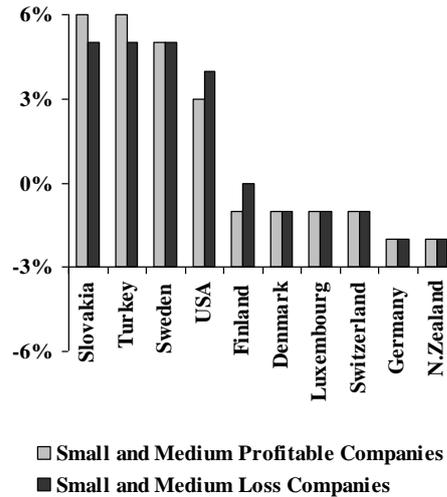
Such picture is stipulated, first of all, by the existing level of financial support of the state [22, 24]. The biggest part of budget contributions in small and medium science-based business is related to Latvia and Estonia, Iceland, Greece, Hungary. A small part of such support is characteristic of the business in the USA, Japan, Sweden, France and Great Britain. As compared with 2005, in some countries with poor financing, such as the USA and Sweden, there is a tendency to decrease of the state investments (in 2005 the analyzed indicators amounted to 15.3 and 22.4% correspondingly), and in France and Great Britain – to their increase (13.5 and 10.4% correspondingly).

The biggest share of small and medium science-based enterprises, which are stimulated by means of tax methods, is related to the following countries: Norway, Latvia, Netherlands, Portugal and Great Britain. Poor tax regulation is noted in Hungary, Japan and the USA.

Another indicator slightly differs in the results; this indicator is used for evaluating tax and state support for science research and development – 1-B index, (figures 6 and 7). B index represents correlation between net expenditure on RD&E (total expenses decreased by deduction from the profit tax base) and the company income after profit tax deduction [25]. If expenses for RD&E are being totally deducted from the profit tax base – B index is equal to unity, if the deduction is greater than the actual expenses – B index is less than unity and if special rules are being applied – greater than unity. Consequently, the 1 minus B index indicator reflects the level of tax support for RD&E unity; the lower the indicator is, the greater this support is.



**Figure 6.** Countries with a high indicator of 1-B index, 2017.



**Figure 7.** Countries with a low indicator of 1-B index, 2017.

The analysis has been undertaken for 38 states. 10 countries with a high index (firstly, France, Portugal, Spain), and also 10 countries with a low value (Sweden, Germany, New Zealand, etc.) have been distinguished. Russia is in the 26 place.

Thus, it is necessary to note the variety of responses of countries to tax support for RD&E, implemented by small and medium business. At that, the rule of supporting the weakest, not protected economic entity is not always observed. In some countries direct financing of innovations prevails (the USA, China, the Czech Republic), in other ones – using tax incentives (Ireland, France, Belgium).

The indicator "the share of small and medium-sized enterprises in science-based business" explains the significance of such segment for the national economy. Among the countries considered in the OECD report the highest indicator belongs to Iceland, Latvia, New Zealand, Norway, Portugal, Spain; the lowest value – Japan, Germany, the USA, Luxembourg, Sweden, Korea, Great Britain, France and the Czech Republic. Substantiation of such status of small and medium-sized enterprises in most of the specified countries-leaders is based on serious state financial support – 70–100%. The role of tax stimulating is great only in Norway and Portugal (79.1 and 46.8% correspondingly). Correlation of state investments and tax privileges is equally the same in Spain (55.1 and 40.4%).

The countries where large science-based business is more developed have different attitude towards small and medium-sized business entities. For example, Japan and the USA do not pay due attention to them (the levels of fiscal expansion are 5.4 and 9.2% correspondingly, and the levels of state investments are 14.4 and 12.2%). Investments into small and medium science-based entrepreneurship are increasing in Great Britain (they were equal to 10.4% in 2006 and 25.2% in 2014), Germany (24.4% in 2005 and 43.5% in 2015), Korea (43.7 and 56.8% correspondingly), France (13.5 and 24.8%). Great Britain and France should be noted in relation to applying tax methods (their share is

44.8 and 31.7%). Serious state support is observed in the Czech Republic (tax support – 32.8%, financial support – 67.4%).

Concerning Russia, the business implemented here by RD&E has high state support. However, the values of 1-B index indicator are low. It is equal to 0.11% for small and medium business and 0.001% – for unprofitable business. Such equal attitude to business entities of different sizes allows concluding that there is no priority for small and medium science-based enterprises.

## 5. Conclusion

A review of previous work on assessing the economic efficiency of tax incentives for innovation showed the different impact of tax incentive instruments depending on the size of the company. Together with that, our research has afforded no ground for confirming the supposition about a greater volume of tax privileges for small and medium business to undertake studies and carry out elaborations in comparison with large business. Nevertheless, the authors' opinion remained the same: providing more significant privileges for small and medium-sized business will positively influence the growth of innovation activity in the developing countries, Russia in particular. At that, complex analysis of possibilities of fiscal expansion for studies and elaborations of small and medium-sized companies in comparison with large business may become a promising trend for further investigations.

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