The Basis of Greening the Tax System of Russia

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Abstract. The need for greening the Russian tax system is increasingly determined by the vector of its modernization. However, this popular term has many variations of its interpretation. This article defines "greening" the tax system. In addition, in the course of the study, the author identified the functions and roles performed by environmental taxes for the purpose of greening. It is concluded that the greening of the tax system implies the subordination of its functioning to the goals of ensuring environmental safety. This can be achieved in different ways, including the introduction of the concept of "environmental tax" into the tax code, the transition from indirect to direct taxation, shifting the tax burden on activities that harm the environment, and making the imposed environmental taxes targeted. To write the article, the materials of the scientific works of domestic scientists were used, the analysis of the information obtained was carried out; modeling was carried out using mathematical and econometric methods. In order to rank and prioritize the functions of environmental taxes, a system of equations was drawn up that simulates the situation when taxes perform the function of a price in a market of imperfect competition. However, according to the results of the research carried out in the article, it was concluded that this theory is inconsistent: the transposition of the principles of the functioning of economic entities in the market of imperfect competition cannot be applied to the taxation system.

Keywords: Greening tax system · Functions of taxes · Tax elasticity coefficient

1 Introduction

The need for greening the Russian tax system is increasingly determined by the main vector of its modernization. This is due to the fact that the greening of the economic basis as a set of financial and economic relations is a multidimensional concept that affects the solution of economic, industrial, and social problems. At its core, greening consists of changing the approach to the analysis of the activities of economic entities. It is about focusing not on the characteristics of activity as a process, but on the effects that such activity and its results provoke.

There are several approaches to determining the nature of the interaction of economic and environmental parameters of development, common to which is the establishment of a direct mutual relationship between changes in economic and environmental parameters, based on the synergistic aspect, which is usually represented within the framework of the institutional theory of social development [1–8].

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Although, based on the definition of the environmental tax [9], the fiscal function should not be the main one, but can be applied from the position of the tax administration in relation to conditionally non-renewable resources, the use of which cannot be stopped due to their importance for the stable functioning of social-economic systems of the state and society, according to a number of researchers [10–12], modern taxes, conventionally considered environmental in Russia, are only fiscal in nature, without performing compensatory or stimulating functions. In this regard, tax rates are often equated to the price for the right to use natural resources or for the right to exert a negative impact on them, and tax revenues for the state acquire the character of proceeds from the sale of goods and rights, the main goal being their maximization. The article analyzes the possibility of applying to the state tax system the principles of the functioning of monopolists in a market of imperfect competition, which, according to the analysis of information sources, the state appears at the moment in tax relations.

In addition, the objectives of this study are to define the category of "greening" of the tax system and designate the pyritization of the functions of environmental taxes.

2 Materials and Methods

To write the article, materials of scientific works of Russian scientists were used. For the purposes of the study, a number of various sources of information were studied, the analysis and synthesis of the information obtained were carried out, modeling was carried out using mathematical and econometric methods. In particular, the author has built an econometric model consisting of three equations, combined on the basis of applying the laws of the imperfect competition market to tax calculations.

The first equation of the model is a function of maximizing budget revenues of the state as a monopolist in the rights to own and dispose of public goods, which, among other things, include ecology and environmental parameters. The second equation of the model describes the dependence of the volume of environmental impact on changes in the rates of environmental taxes. The third equation describes the relationship for calculating the degree to which the propensity to cause environmental harm responds to a change in the environmental tax as the price of that opportunity. The described relationship is based on the principle that sources of pollution must bear the burden of the cost of pollution in order to reduce its consequences of an amount corresponding to the damage caused to society or exceeding the cost of eliminating pollution. The principle is based on the idea that natural objects are a public good, and everyone who harms them must pay compensation to society. Suppose that the burden of compensating for environmental damage expressed as a tax will fall on the polluter if the demand for the right to pollute is relatively elastic compared to the supply and if the supply in the form of allowing polluting is relatively inelastic compared with demand, the burden of compensation for environmental damage will fall on the state and society.

The elasticity of the tax system shows the relationship between tax rates and tax revenues to the budget. Thus, we obtain by what percentage the volume of demand for pollution, or the propensity to harm environmental safety, will change if the rate of the environmental tax on this impact changes by 1%. Since there is always an inverse relationship between the price (tax) and the volume of demand, the indicator $E_D^P < 0$

must be correct. If an increase in the tax by 1% leads to a greater reduction in pollution ($E_D^P < -1$), then it can be considered elastic, in this case, the negative technogenic impact on environmental safety will decrease, an increase in the tax will lead to a sharp reduction in the tax base, and budget revenues in parts of environmental taxation will decrease, which means that the burden of eliminating environmental problems will fall on the state and society, that is, compensation will be carried out at the expense of other non-environmental taxes. If it turns out that $E_D^P > -1$, then a tax increase will lead to an increase in budget revenues since the increase in the tax will exceed the reduction in the tax base, and the change in the tax will lead to a smaller change in the volume of environmental impact, in which case the principle "polluter pays" can be fully implemented.

Note that in the market of imperfect competition for a monopolist, maximization of its revenue occurs if the elasticity index E = 1. This state corresponds to the Laffer point – the extremum of the parabola (Laffer curve), which occurs at a tax rate at which tax revenues to the budget reach a maximum [13].

3 Results

The greening of the tax system in Russia appears to us as a transformation process within the framework of changing the functions of taxes present in the system, for the implementation of priority goals through the impact both on the entire financial and economic system of the state, and on the activities of its individual subjects, realizing their economic interests within its individual sectors, by encouraging economic entities to level or completely eliminate environmental stress that impedes the smooth functioning and expanded reproduction of financial and economic processes.

This means that environmental taxes should serve as a tool for ensuring sustainable environmental and economic development of the country, which is a long-term priority task, the solution of which can be achieved if environmental taxes present in the tax system meet not only formal criteria, fulfilling the function of filling the budget, but also perform:

- Preventive function – the impact of the power of tax instruments on the behavior of economic agents, aimed at preventing their environmentally unsafe behavior;
- Compensatory function – the restoration of environmental characteristics, including replenishment of the resource base and optimization of natural conditions in which the implementation of economic activities is carried out, by channeling funds accumulated from the proceeds of the environmental tax for these purposes;
- Stimulating function – the impact of the tax burden on economic processes and the incentive to use environmental, resource-saving technologies, the use of which in the process of economic activity costs the taxpayer cheaper than paying taxes;
- Accounting and information function – for collecting and analyzing statistical information in order to determine the indicator of environmental safety for the analyzed region, making a forecast of its development and plans for leveling negative trends;
- Ideological function – the tax is a reflection of the priority goals and directions of development of the state;

- Punitive function – the punishment of persons guilty of causing harm to environmental safety is expressed in imposing a tax burden on them, and the tax, in this case, acts as a price for the right to violate environmental safety.

Based on the foregoing, a system was compiled that simulates the relationship of individual indicators of the greening process, and consists of three equations:

$$\mathrm{TR}' = \mathrm{MR} = \frac{\Delta TR}{\Delta Q} = \frac{TR_1 - TR_0}{Q_1 - Q_0} = \frac{P_1 * Q_1 - P_0 * Q_0}{Q_1 - Q_0} = 0 \tag{1}$$

$$\begin{aligned} Q_1 &= \left(\left(\frac{P_1}{P_0} - 1\right) * \mathrm{E} + 1\right) * Q_0 = \left(\frac{P_1 * E}{P_0} - \mathrm{E} + 1\right) \\ &* Q_0 = \frac{P_1 * E * Q_0}{P_0} - \mathrm{E} * Q_0 + Q_0 \end{aligned} \tag{2}$$

$$E_D^P = \frac{\frac{\Delta Q}{Q_{\mathrm{cp}}^D} \cdot 100\%}{\frac{\Delta P}{P_{\mathrm{cp}}} \cdot 100\%} = \frac{Q_1 - Q_0}{\frac{Q_1 + Q_0}{2}} * \frac{\frac{P_1 + P_0}{2}}{P_1 - P_0} = \frac{Q_1 - Q_0}{Q_1 + Q_0} * \frac{P_1 + P_0}{P_1 - P_0} \tag{3}$$

where TR is the total tax revenue of the budget,

MR is the derivative of the TR function, the marginal total budget revenue,

P_0 – existing tax rates (known variable),

P_1 – optimal tax rates at which the negative impact on the environment is reduced (unknown variable),

Q_0 – existing volumes of environmental impact (known variable),

Q_1 – optimally minimized volumes of impact on the environment – volumes of impact at which the environment does not cause irreparable damage (unknown variable).

Note that for each of the taxes the indicators TR and MR should be calculated separately, as a separate item of budget revenues and can be summed up only as the final financial result in monetary form, and maximization of budget revenue is possible if the marginal revenue of the monopolist is zero.

By means of mathematical transformations described in Eqs. (1) and (2), we obtain a new system of Eqs. (4) and (5), respectively:

$$P_1 * Q_1 - P_0 * Q_0 = 0 \tag{4}$$

$$Q_1 = \frac{P_1 * E * Q_0}{P_0} - E * Q_0 + Q_0 \tag{5}$$

Thus, expressing the unknown variable P1 in terms of the unknown variable Q1, we obtain the Eq. (6):

$$P_1 = \frac{P_0 * Q_0}{\frac{P_1 * E * Q_0}{P_0} - E * Q_0 + Q_0} = \frac{P_0}{\frac{P_1 * E}{P_0} - E + 1} \tag{6}$$

The Eq. (6) we obtained can be transformed into a quadratic Eq. (7), which can be solved as an algebraic equation of the general form $ax^2 + bx + c = 0$ through the discriminant:

$$\frac{E}{P_0} - E * P_1^2 + (1 - E) * P_1 - P_0 = 0 \tag{7}$$

$$D = b^2 - 4 * a * c \tag{8}$$

where D > 0 – 2 solutions: $x_{1,2} = \frac{-b \pm \sqrt{D}}{2a}$

D = 0 – 1 solution: x = $\frac{-\mathrm{b}}{2\mathrm{a}}$

D < 0 – no solutions.

Thus, the solution of Eq. (7) by mathematical transformations through the discriminant (9) acquires the solutions presented in formulas:

$$D = (1 - E)^2 + 4 * \frac{E}{P_0} * P_0 = 1 - 2E + E^2 + 4E = E^2 + 2E + 1 = (E + 1)^2 \tag{9}$$

$$P_{11,2} = \frac{E - 1 \pm (E + 1)}{2 * \frac{E}{P_0}} \tag{10}$$

$$P_{11} = \frac{(E - 1 + E + 1) * P_0}{2E} = P_0 \tag{11}$$

$$P_{12} = \frac{(E - 1 - E - 1) * P_0}{2E} = \frac{-2P_0}{2E} = \frac{-P_0}{E} \tag{12}$$

This means that the system consisting of Eqs. (1–3) has solutions described in formulas (11–14).

If $P_1 = P_0$, then

$$Q_1 = \frac{P_0 * E * Q_0}{P_0} - E * Q_0 + Q_0 = Q_0 \tag{13}$$

If $P_1 = \frac{-P_0}{E}$, then

$$\begin{aligned} Q_1 &= \frac{\frac{-P_0}{E} * E * Q_0}{P_0} - E * Q_0 + Q_0 = \frac{-P_0 * Q_0}{P_0} - E * Q_0 + Q_0 \\ &= -Q_0 - E * Q_0 + Q_0 = -E * Q_0 \end{aligned} \tag{14}$$

In this case, if the modulus of elasticity is equal to one, that is, E = 1 or E = −1, then the considered indicators will be equal either to their current known values or to their opposite values, which is impossible based on the economic meaning of the variables under consideration, since the values tax rates cannot be negative. From which it follows that the applied theory of transposition of the principles of functioning of economic entities in the market of imperfect competition is not applicable to the taxation system.

4 Discussion

Earlier, a number of works were published on the issue considered in the study, including ideas that are similar in their essence but focusing on different aspects of the issue.

In particular, relying on the principles of an environmentally friendly economy, based on the understanding of the impossibility of infinite expansion of the sphere of influence in conditions of limited space, limited resources, the relationship of everything with

everything, it is possible to define the greening of the economy as "a set of relationships between the state, society, and enterprises arising from ensuring sustainable harmonization of the interests of the economy and the environment and aimed at reducing the socio-economic costs of economic activity by ensuring the elimination of the negative consequences of the intensification of the use of natural resources" [14].

Another version of the interpretation of this term is the definition, which consists in maximizing the results obtained while maintaining the ecological balance in the environment and preventing its pollution on the basis of the development and implementation of low-waste, environmental, energy, and resource-saving technologies [15].

The concept of greening the tax system in Russian theory is presented by researchers in accordance with the ideas of Benoit Bosquet as the implementation of "environmental" reforms in taxation through taxation of rent received for the right to use natural resources and through taxation of environmental pollution (shifting the tax burden from the tax on personal income and corporate income tax on payments for the emission of pollutants) [16]. In this aspect, the greening of the tax system is often interpreted by modern Russian researchers as:

- Introduction to the tax code of the concept of "environmental tax";
- The transition from indirect to direct taxation;
- Shifting the tax burden on activities that harm the environment;
- Giving targeted environmental taxes to be introduced [17, 18].

Agreeing with the outlined postulates, an author's definition was created that describes the process of greening, taking into account the functions and roles performed by taxes.

5 Conclusion

The study provides an interpretation of the concept of greening the tax system, defines the functions performed by environmental taxes. In order to rank and prioritize the functions of environmental taxes, a system of equations has been drawn up that simulates the situation when taxes perform the function of a price in the market of imperfect competition. It is concluded that the greening of the tax system implies the subordination of its functioning to the goals of ensuring environmental safety. This can be achieved in different ways, including the introduction of the concept of "environmental tax" into the tax code, the transition from indirect to direct taxation, shifting the tax burden on activities that harm the environment, making the imposed environmental taxes targeted. Environmental taxes should meet not only formal criteria, fulfilling a fiscal function. Taxes, conventionally considered environmental in Russia, in current realities are only of fiscal nature, as evidenced by a number of studies. In this regard, tax rates are often equated to the price for the right to use natural resources or for the right to negatively affect them. However, according to the results of the research carried out in the article, it was concluded that the transposition of the principles of the functioning of economic entities in the market of imperfect competition cannot be applied to the taxation system.

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