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Statistical Learning as a Tool for Optimizing the Level of Excise Tax of Mineral Oils in Slovakia

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Abstract

Excise taxes are one of the oldest taxes in the world. Countries have used these taxes to ensure profits of public finances. However, countries also have used these taxes as an indirect tool for removing negative externalities which cause damage the environment. One of the most significant excise taxes is the excise tax on mineral oils. This tax generates circa 10 per cent of all taxes coming to the public budget of the Slovak Republic. In Slovakia, the tax burden is the highest in our region. The state can influence the final price of gasoline products; however, it does not want to lose tax profits. It is due to the fact that these taxes generate remarkable profit in the Slovakian budget. We believe that there is a space for decreasing this tariff what would cause the decrement of gas and diesel prices. In this paper authors suggest a way how to use statistical methods based on linear regression and neural networks for modelling the decrement of excise tax tariff on gasoline with the same tax profits. We also suggest methodology of identification and modelling of these factors influencing the excise tax revenue.

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Keywords: excise tax, mineral oils, gasoline, Slovakia, linear regression, neural network.

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1. Introduction

Excise taxes are one of the oldest types of taxes in the world. Countries have used these taxes in their tax assessments to ensure revenues of public finance. They also have used these taxes as an indirect tool in removing negative externalities which cause damage of environment as well as the health of citizens. The tax is applied selectively, only on certain types of products, according to the rules of the country. The member countries of European Union in applying this tax have to respect the Directive of the Council 2008/118/ES regarding the general system of excise taxes which obliges the member countries to apply harmonized rules and tax rates according to EU laws regarding energetic products, electricity, alcohol, tobacco and tobacco products. There is, however, the privilege of member countries to set excise taxes to other products and services. Slovakia, however, applies excise taxes only on following items: mineral oils, alcoholic beverages, tobacco products, electricity, coal and natural gas.

From the fiscal point of view as well as from the number of applied subjects, the excise tax on gasoline is the most significant excise tax in Slovakia. It is the state-fiscal type of tax with extensive fiscal significance. Revenues from this tax create more than 50 percent of all revenues of all excise taxes in Slovakia. The proportion of excise taxes on the whole tax revenues of Slovakia is in the interval 15 to 20 percent (Table 1). Moreover, the fact that excise taxes create the price of products causes that the base of value added tax automatically rises by the level of excise tax and then revenues from value added tax rise too.

Burden of taxation suffer all final consumers of mineral oils because the products which are subject to this tax is mainly gasoline and diesel. It is no surprise the excise tax is part of the price of these products. The excise tax from mineral oils hits all legal as well as physical persons in the tax region regardless whether they buy mineral oils or not as the price of these products influences the price of all products and services on the national market.

As we stated before, the excise tax is an indirect tool to influence negative externalities resulting from using mineral oils, e.g. pollution of environment. The excise tax in mineral oils causes two effects. It influences on change in behavior of a subject. Also, the subject which creates an externality, thanks to paid excise tax creates sources which can be used to eliminate this externality.

Table 1. Proportion of excise taxes on all tax revenues of public sector [in thousands of Euro]

	2013	2014	2015
Total tax revenues of the public sector	11 758 118	12 032 398	13 678 456
Excise taxes	1 976 667	2 009 327	2 096 600
hereof: mineral oils	1 042 082	1 070 414	1 132 891
spirit	200 449	201 149	203 727
beer	55 232	55 347	57 119
wine	4 220	4 331	4 447
Tobacco and tobacco products	631 584	640 879	661 496
electricity	16 811	13 952	13 407
Natural gas	25 548	22 829	23 098
coal	741	426	415
Proportion of excise taxes on all revenues of the public sector [in %]	17	17	15
Proportion of the excise tax from mineral oils on all revenues from excise taxes in Slovakia [in %]	53	53	54

2. Theoretical Aspects of Excise Tax from Mineral Oils

The excise tax from mineral oils is legislatively specified according to the law no. 98/2004 about the excise tax from mineral oil. According to this law the subject of this law are mineral oils produced in the tax region, delivered

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