A Novel Fuzzy Inference Approach to Models of Taxation Optimization by Transfer Prices

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Abstract - The paper presents a fuzzy inference model for assessing the degree of conformity of the taxation optimization mechanism to the requirements of a business entity based on the justification of the sequence of tax parameters that comprehensively characterize the modern processes of taxation.

Keywords - optimization of taxation; fuzzy logic model; export scenario; transfer prices

I. INTRODUCTION

The taxation optimization mechanisms that are implemented directly or in a delegated manner are becoming increasingly relevant. The practice of using the mechanisms of taxation optimization has long since expanded beyond the territory of the country and has obtained the international significance.

The international economic activity of business entities has become a positive environment for organizing and developing the taxation optimization mechanisms, in particular, due to using the transfer pricing. The variety of the taxation optimization mechanisms is preconditioned by the specific features of capital raising, the flow of which occurs only under certain conditions that can be described with corresponding tax parameters. The level of the conformity of the aggregate tax parameters to the requirements of raising capital into the country is becoming the object of research within the context of the tax competition theory.

Further, the lack of reliable statistical information regarding the results of the interaction among the authorities, supervisory bodies, and businesses within the sphere of taxation has led to its active replacement with the corresponding linguistic information; scientific papers dedicated to the issues of fuzzy mathematics [1-3] deal with applied studies thereof.

II. THE PRACTICE OF IMPLEMENTING FUZZY MATHEMATICS WITHIN THE SPHERE OF TAXATION

The authors would like to consider the practice of implementing fuzzy mathematics within the sphere of taxation, where the activity of subjects of taxation is aimed at taxation optimization at each stage of the business processes. In this case, the taxation optimization is restricted by the measures of the tax parameters justified by business entities, namely:

- the level of tax risk accepted by a business entity;
- the level of taxable income planned by a business entity;
- the level of taxation optimization expenses accepted by a business entity.

The acceptability of levels of the specified tax parameters is formed within the accepted taxation policy of a business entity; its type is characterized by a format of legality (legal or illegal). In turn, a multitude of the tax parameters accompanying the corresponding taxation processes belongs to the i-th mechanism of the taxation optimization Mi.

Thus, the taxation optimization mechanism can be characterized by the compositional analysis of the sequence of the following linguistic variables:

< NPti ,Ri ,Vi ,Pi ,ΔT >       (1)

Where:
- NPti is the taxation policy of the business entity of the i-th mechanism of the taxation optimization;
- Ri is the tax risks of a business entity when using the i-th mechanism of the taxation optimization;
- Vi is the expenses on using the i-th mechanism of the taxation optimization;
- Pi is the taxable income when using the i-th mechanism of the taxation optimization;
- ΔT is the period of keeping the stability of the structure and the integrity of the system of parameters.

A business entity takes managerial decisions based on building an expert system of justifying the selection of the taxation mechanism by developing a fuzzy inference system that would allow determining the degree of its ideality based on own subjective assessments of the taxation parameters.

Thus, depending on the accepted taxation policy, a business entity takes the decision regarding the usage of a taxation optimization mechanism and the multitude of accepted taxation parameters. A business entity selects a certain taxation optimization mechanism \( M^{id} \) that is ideal for this business entity.

Based on the above, the authors can justify the model for assessing the degree of the conformity of the taxation optimization mechanism to the requirements of a business entity using the fuzzy inference method.

III. FUZZY INFERENCE MODEL FOR ASSESSING THE DEGREE OF CONFORMITY OF THE TAXATION OPTIMIZATION MECHANISM TO THE REQUIREMENTS OF A BUSINESS ENTITY

Four linguistic variables are considered as the input parameters of the expert system – "taxation policy", "taxation expenses", "taxable income", and "tax risk".

A fuzzy linguistic variable – "the level of ideality of the taxation optimization mechanism" – is considered as the output parameter. Further, the authors suggest considering the term sets for the above-mentioned input and output linguistic parameters, where each term \( T_i \in T \) is given by a fuzzy set

\[
T_i = \{(x, \mu_{T_i}(x)) : x \in X, \mu_{T_i}(x) \in [0;1]\}
\]  

(2)

Where: \( \mu_{T_i}(x) \) is the membership function of the corresponding fuzzy set. Further, term sets are represented by a fuzzy set with triangular and trapezoidal membership functions \( T_i \), \( i = 1, \ldots, 4, j = 1, \ldots, 3 \) that characterize a certain level of the i-th tax parameter:

- input parameters:

\[
T_{NP} = \begin{cases} 
"legal" \\
"partially legal" \\
"illegal" \\
"high"
\end{cases}
\]

(3)

\[
T_R = \begin{cases} 
"average" \\
"low" \\
"substantial"
\end{cases}
\]

\[
T_P = \begin{cases} 
"average" \\
"nonsubstantial" \\
"substantial"
\end{cases}
\]

(4)

\[
T_V = \begin{cases} 
"average" \\
"nonsubstantial"
\end{cases}
\]

- output parameters:

\[
M^{id} = \begin{cases} 
"close" \\
"approximate" \\
"distant"
\end{cases}
\]

The above-mentioned terms can be estimated on the scale of \( X = [0;1] \) or \( X = [0;100] \) in the following manner:

1. The taxation policy is estimated under the conditions of complete uncertainty, thus the following area of term determination is taken:

\[
T_{NP} = \begin{cases} 
"legal" \in [0;0.5] \\
"partially legal" \in [0.25;0.75] \\
"illegal" \in [0.5;1]
\end{cases}
\]

(5)

2. The taxable income under the current legislation is taken as 100%, thus the data of the term set are estimated on the scale of 100%.

Using the taxation optimization mechanism, the volume of the taxable income is reduced over the range from 0% to 10% (offshore financial centers) of the actual one, from 10% to 50% (onshore financial centers) of the actual one, so the area of determining the term set "taxable income" is as follows:
3. The tax expenses on using the taxation optimization mechanism through offshore and onshore financial centers may contain such components as the annual state fee; expenses on obtaining a license; using auditor’s services; payment for managing an agency firm; logistics; etc. In general, the aggregate cost of opening an offshore company varies from USD 320 to USD 18,000 and depends on the time and place of registration and the related services [4-5].

In order to be objective, the volumes of tax expenses on implementing the taxation optimization are assessed in comparison with the corresponding tax saving.

Consequently, taking into account the specified limits of offshore company opening costs and their average value, the area of the term set "tax expenses" is created as follows:

\[
T_{\text{exp}} = \begin{cases} 
  \text{"substantial"} & \in [8,840;18,000] \\
  \text{"average"} & \in [320; 8,840] \\
  \text{"non-substantial"} & \in [0;320] 
\end{cases}
\]  

4. Further, the area of determining the term set "tax risk" can be presented on the basis of the area of determining the degree of risk by a variation factor that is estimated on the scale of 100%, where the term "low level of risk" corresponds to the interval [0;10]; the term "average level of risk" corresponds to the interval [10;25]; and the term "high level of risk" corresponds to the interval [25;100], then:

\[
T_{\text{ri}} = \begin{cases} 
  \text{"high"} & \in [25;100] \\
  \text{"average"} & \in [10;25] \\
  \text{"low"} & \in [0;10] 
\end{cases}
\]  

5. For the term set of the output variable "the level of ideality of the taxation optimization mechanism" that is assessed within the conditions of complete uncertainty, the following area of determining the term is taken:

\[
M^{\text{d}} = \begin{cases} 
  \text{"close"} & \in [0.5;1] \\
  \text{"approximate"} & \in [0.25;0.75] \\
  \text{"distant"} & \in [0;0.5] 
\end{cases}
\]  

The considered improvements of the indistinct information regarding the ideality of the taxation optimization mechanism can be presented as the knowledge base formed on the set of Mamdani-type fuzzy inference rules according to the following scheme:

\[
\text{if}\left(\sum_{g=1}^{L} m_{ig} \text{ and } R = m_{tg} \text{ and } V = m_{pg} \text{ and } P = m_{4g}\right) \quad \text{then } M_{\text{d}} = b_g, \quad g = 1, L
\]  

Where:
- \(L\) is the number of rules,
- \(b_g\) is the fuzzy term that corresponds to a specified output value,
- \(m^{i g}\) is the fuzzy term of the \(i\)-th factor in the \(g\)-th rule.

The number of rules to be formed by the economic content of the tax parameters will be determined by expertise based on determining the economic interrelation between the variables of terms (\(T\)) and a set of the rule components (\(p\)).

Besides, in order to justify the knowledge base, the potential polarity of the taxation optimization mechanism ideality value should be taken into account based on the accepted taxation policy, as the values of the mechanism that are close to the ideal for one business entity can be obtained only within the conditions of legality, and for another – within the conditions of illegality.

Further, a legal activity is accompanied by a partial risk as the absence of risk in modern business conditions is impossible. The illegal activity preconditions a risky strategy for the development of a business entity. On this basis, a scenario of selecting a taxation optimization mechanism can be built based on the "permissible risky" format of the legality of a business entity’s activity.

Under such conditions, a taxation optimization mechanism is characterized by a format of partial legality and a high level of tax risk, has substantial expenses on optimization and the average level of the taxable income. In this case, the degree of conformity of the taxation optimization mechanism corresponds to the "approximate to ideal" level.

IV. THE MODEL OF EVALUATING THE EXPORT SCENARIO OF THE TAXATION OPTIMIZATION THROUGH TRANSFER PRICES

In this case, the taxation optimization of a company is aimed at reducing own trade profit in order to minimize the payment of tax on profits. Thus, a regulated price under the export scheme consists of the sum of the cost price of products and the non-substantial margin (for example, 5% of the cost price of goods).

The financial results (profits or losses) before tax, determined by correction (increased or reduced), are the object of the tax on profits; taxes are determined in the financial statements of a company in accordance with the national accounting standards (regulations) or the
international financial reporting standards for the differences arising under the provisions of the Tax Code of the Russian Federation; a company will actually have to pay a tax on profits from the sum of the included margin (5%).

The general scheme is as follows: an exporting company supplies goods to an offshore company with a minimal additional charge over its cost price in order to minimize the tax on profits. Further, an offshore company (the profits of which are not taxable) sells the supplied goods to a foreign company at an actual market price. At the same time, a manufacturer actually supplies goods to a buyer under fake documents provided by an offshore company.

In general, there are two stages of implementing the said scheme.

The first stage is the conclusion of a contract at a regulated price with a Russian company under the terms of FCA customs bonded warehouse, acceptance of goods with further complete settlement (not later than the set limit (180 days)) upon the execution of a customs bill of entry. A Russian company may include only the expenses on transportation to the warehouse.

The second stage is the conclusion of a contract with a foreign buyer at a world market price, receiving payments for goods and organizing transportation of such goods from Russia (from the customs bonded warehouse) to a country of destination.

Thus, the profit of an offshore company amounts to the difference between the regulated price (the sum of the cost price and the non-substantial margin) and the world market price, reduced by possible costs on transportation and insurance. Yet the received trade profits will not be taxable in a classical offshore area (by virtue of the territorial principle) or in a low-tax jurisdiction having no corporate tax.

The formation of the tax risks for such taxation optimization scheme is as follows. From the legal point of view, the limits of a tax risk are: the lower limit is the norms of the financial or administrative law, and the upper limit is the norms of the criminal law.

Actually, the heaviest tax risk in the export and import operations is the disclosure of the fictitious nature of the operation and its participants as it will lead to cancellation of the operation and its results by the court and, consequently, to charging additional taxes and fees. Schematically, this can be presented as follows:

\[ VPR = DPZ_i + SH_i \]
\[ SH_i = DPZ_i \times 25\% \]  

Where:
- VPR is the cost of the tax risk in case of liability to prosecution;
- DPZ is the amounts of taxes and fees additionally charged by supervisory bodies during the inspection;

\[ VPR = P(DPZ_i + SH_i + Pdqz_i) \]
\[ SH_i = SH_i \times 10\% \]  

where SH is the penalties for taxes and fees additionally charged by supervisory bodies during the inspection.

A tax risk also occurs in the transfer pricing process, and the penalties for the noncompliance therewith are stipulated by the legislation.

In general, a business entity must pay additionally charged tax debt, a penalty for additionally charged tax debt, and a fine for late payment of tax debt. The calculation of the tax debt is corrected by the probability of tax inspection and the period of late-paid tax debt within the conditions of complying with the legal rules of transfer pricing.

Consequently, the model of evaluating tax risks in export and import operations using transfer pricing can be presented as follows:

\[ VPR = P(DPZ_i + SH_i + Pdqz_i) \]  

where SH is the penalties for taxes and fees additionally charged by supervisory bodies during the inspection;

\[ P_i = \pi \]  

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Consequently, the model of evaluating tax risks in export and import operations using transfer pricing can be presented as follows:
MatLab package, and be used as a basis for simulation not only within the framework of the offshore activity but also within the domestic market by specifying or expanding the tax parameters.

REFERENCES


