# Manageability and Tax Risks in the Digital Economy

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## Abstract

The purpose of the article is to conduct a systematic analysis of the "tax risk" category and related categories for their scientifically based classification. The main hypothesis of the study used: the tax system should take into account (predict) evolutionary processes in the economy. In the mathematical models in question, new, "model" hypotheses are also added. For example, the problem of modeling budget losses from tax shortages uses the statistical hypothesis of distribution according to the normal law. Systemic research methods were used. For example, analysis and synthesis, composition and decomposition, mathematical and situational modeling, decision-making and others. The main results of the work are systemic conclusions, mathematical and information-logical analysis of the severity of the tax burden, tax decisions, etc. The problems of digital taxation and tax features of digital business are analyzed. The author's regression and factor analysis is presented, emphasizing the relevance of the system-analytical approach to tax problems considered in the work. Proposed tax and legal adjustments of electronic business interactions taking into account network effects.

**Keywords:** tax risks, Russian taxes, digital economy, optimization, digitalization.

## Introduction

The system of taxation in the short term can be considered as deterministic, but in its long-term analysis it's necessary to take into account stochastic parameters. Key parameters of the system evolution (tax collection, accounting for inflation and benefits, production structures, etc.) depend on the relevance of tax burden forecasting.

The tax system should effectively develop its key liabilities (Aganbegyan, 2017).

1) Support of evolutionary budgetary potential (fiscal and virtual functions);
2) Support for socio-economic development (stimulating planning and function);

3) Support for a fair balance sheet social and regulatory policy (salaries, income, consumption, distribution, savings, etc.).

It is important not only to identify risks for the tax system, but also to determine the interpretation of the "tax risks" category. There are other approaches, for example, taking into account the territorial distribution of human capital (Sheredeko, Pinska,2016), the distribution of state risks in compliance with the rules and principles in the system (Semenova, 2011), etc.

Tax risk is the risk of not receiving (on time and/or in the required amount) budget revenues. There are many reasons for the risks, from "effects" of the influence of shadow business, offshore tax evasion to asymmetry in the legislation of the Tax Code, the Civil Code of the Russian Federation and "double taxation" of foreign economic activity.

Adaptive risk management, systematic analysis of their interactions in the digital economy, information-logical and mathematical modeling of digital processes, and transformations in taxation are the goal of this work.

## Theoretical foundations

The Russian tax system works well in standard, deterministic situations, which is confirmed by crises (pandemic, sanctions, oil and gas prices, etc.). But the risks are growing quantitatively and multiplying qualitatively, in terms of diversity. Trends in budgetary dynamics copy regional trends, which leads to a deterioration in life in the regions, failure to fulfill the fiscal function. There is also no balanced socio-regulatory policy for all citizens: the income of the richest decile group in the country is 15-20 times the income of the poorest decile group (in the EU, the spread is 7-10 times).

A histogram of average per capita income by year (last decade) in Q4(beginning of the first quarter of next year) is shown in Figure 1 (data from EMISS state statistics, http://fedstat.ru/indicator/57039).

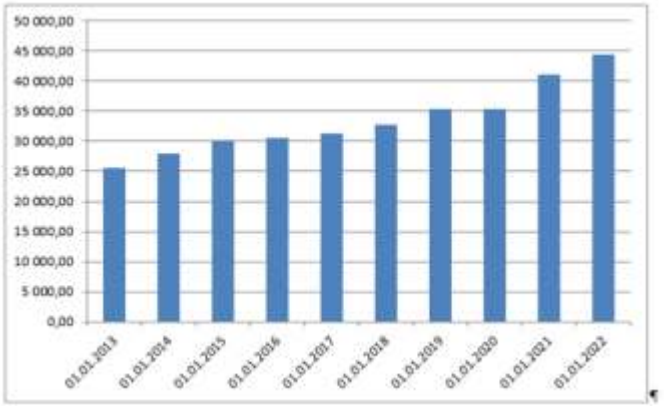


**Figure 1. Histogram of average per capita income**

The rarely recommended progressive taxation scale, in addition to comfort for financial services, has no special reasons, like the luxury tax. The tax burden in the Russian Federation is comparable to the burden in developed countries (10-35%): by enterprises – the average European level, by population – twice as low.

"Digital economy", "digital business" is categories reflecting post-industrial models of the economy, where the main factor is human capital, its quality. Taxes under this model should stimulate science, education, IT, medicine, etc. Reducing taxes and contributions to GDP by 30% and increasing the rate of investment in fixed capital to 30% will raise the share of products of the "digital economy" ("knowledge economy") in GDP to 30%.

But the effectiveness of taxes lies in the redistribution of funds "from rich to poor", stimulating the craving for additional income, social support in the real economy.

Creating a tax mechanism that allows you to quickly, flexibly and adequately assess systemic risks and manage them is a state task. Accounting and analytical procedures are required for relevant risk modeling, both current and potentially expected. Tax risk monitoring does not come down to audit, control of tax revenues to the budget.

Within the framework of international RMS (Risk Management Standards), we will highlight the following system problems of the state:

1) Identification of probability, investigation of trends, hazards and response to potentially unacceptable risk;

2) Assessment of potential damage to the budget and business;
3) Prediction of risk situations, vulnerability scenarios;
4) Planning and implementing actions to mitigate, level and control (eliminate) the vulnerability, taking into account uncertainties and "noise" in the system.
5) Analysis/synthesis of relevant decisions, assessment of the expected effect, response of the system to adaptive amendments to the existing risk assessment (actions taken later).

Classification of tax risks is a multifactorial process, often non-deterministic and poorly structured, identified by time, damage, depending on the specific causes of risks. The tax outcome can be latent, deferred, with a "lag" of decision making, for example, until the next tax period.

The tax burden is formed real and nominal, as the share of mandatory budget payments of GDP, and their difference can be an indicator of "tax evasion", tax discipline. If the nominal part is larger, then the risks are high (both for the state and for the taxpayer).

If the nominal load grows (in Russia, according to the Ministry of Finance, about 32-38%), then the risks of "going into the shadows" by fraudulent or "optimization" schemes also increase. In the digital economy, the systemic task (Naumenko, Nesterenko, 2019).of state bodies is to identify the load level with minimal risks of the state, the payer, i.e. based on tax culture, discipline.

To minimize systemic risks, an effective tax policy is needed, with a balance of public interests (individual, institutional, regional, internal corporate, etc.). Risks in small businesses are dangerous, which, when the tax burden increases, will "lead to the shadow" of payers. There are also special risks of choosing alternative conditions and rational solutions (Rad, 2016) Such risks, reflecting the objective reasons for the activities of enterprises, companies and organizations, can lead to close losses and distant income.

Risks are reduced by organizational impacts, transfer of effects of their impact from the enterprise management area of responsibility, risk delegation, for example, tax outsourcing and audit. A systematic approach to increasing tax revenues to the regional budget is guided by the identification of control parameters, connections (micro, macro-economic).

"Effective taxation" in a digital society is a category with social, evolutionary content that determines the effectiveness of the IT infrastructure (IT ecosystem). The development of digital infrastructure (indicators, technologies, situations, methods, etc.) makes a systematic approach to solving tax problems more relevant.

Development, research and application of predictive and risk models are important here.

## Research methodology

To predict the collection and severity of taxes, tax capacity, in addition to traditional methods (Altman, regression, etc.), it's important to use non-classical methods, models – information-logical, fuzzy, neural network, multi-agent and other, taking into account evolutionary diversity (Pechenegina, 2016).

Each model has its own "pros and cons". In this work, in the methods and approaches used, we pay attention to the "timing disadvantages", we take into account that:

1) Binary models converge slowly;
2) Neural network models need to be trained for a long time and carefully; they will require deep machine learning.

**Research hypothesis:** interdependencies of digitalization of the tax system and indices, models of the evolutionary digital economy are key, requiring systematic analysis and approach.

The work uses methods of system analysis (analysis-synthesis, composition-decomposition, formalization, structuring, modeling and situational decision-making).

## Results

Tax analytics is multifaceted and complex. We have to analyze the taxable base, non-payment, ways of "leaving the shadows", etc. This is important for making a decision, predicting the sustainability of the tax system. Research is possible not only with relevant hypotheses and decision-

making procedures, but also for adequate performance criteria, for example, such as "tax incentives – budget revenues", "tax optimization – risk of going into the shadows", etc.

The profitability and manageability of the business, the possibility of its control and adjustment is based on:

1) Information availability;
2) Intelligent analytics;
3) Organization of personnel;
4) Consistency of business procedures;
5) Standardization (MFI, IFRS, SWOP);
6) Monitoring and audit;
7) Analysis of financing and investment;
8) Business process cycles and management strategies.

Tax analytics is effective in situational modeling in case of uncertainty of tax situations, multi-criteria of modeling scenarios. Situational modeling adaptively takes into account the problem situation, and the immersion efficiency depends on the quality of analytics and analytical tools, including digital capabilities – cloud structure, Big Data, Data Science, Data Mining, etc.

For example, situational tax analysis scenarios are possible to clarify:

1) Risks of hiding taxable income, reducing debt on payments to the regional budget;
2) Rationality of preferential policy;
3) Reducing the tax burden by expanding the base;
4) The effectiveness of combating "leaving for a corruption scheme", etc.

Let T be the marginal rate and the effect of the rate on the tax base be determined by law:

$$y(x) = y_0 \exp(f(x)),$$

$y_0$ – initial income (initial base), $y(x)$ – income to the budget, x – current rate, $f$ (x) – yield rate, which is often dictated by the Laffer curve, but we will offer a certain dependence of the form by an expert heuristic approach:

$$f(x) = a\left(1 - e^{-\frac{x-x_0}{b}}\right).$$

Coefficients *a, b* are set by experts or identified during tax monitoring. The criteria for selecting the function "to the bank" are simple and obvious:

1) At a low rate $x$, the rate of return $f(x)$ does not decrease;
2) With the growth of the rate $x$ the rate of return decreases.

The function $f(x)$and its parameters are then selected from the minimum residual dispersion.

Let $x_1, x_2$ be the absolute and current liquidity ratios; $x_3, x_4$ – receivables and payables; $x_5$– the scope of payables and receivables; $x_6$ – coefficient of financial dependence; $x_7$– ratio of attracted funds and own funds; $x_8, x_9$ – payables for budget and social insurance, extra-budgetary payments; $x_{10}$– tax collection ratio.

According to the data of the test cluster of enterprises, screening, regression and correlation experiments aimed at identifying factors affecting the tax collection rate, tax and financial potential of enterprises more strongly.

In particular, searching for, for example, dependencies of the form:

$$x_{10} = f(x_1, x_2, x_3, x_4, x_6, x_8, x_9),$$
$$x_{10} = f(x_1, x_2, x_6),$$
$$x_6 = f(x_3, x_4, x_8, x_9),$$
$$x_{10} = f(x_1, x_2, x_3, x_4, x_7, x_8).$$

For example, in one of the clusters of the studied region, a species dependency was found:

$$x_{10} = -3.045643 - 0.036464x_1 - 0.000357x_2 + 0.000018x_3 - 0.000071x_4 - 3.571500x_7 + 0.000036x_8.$$

The multiple correlation coefficient is 0.98. This indicates the accuracy of the found connection.

In another test situation, for example, a model of the form is obtained:

$$y(x) = (94.1x + 18.1)x^{-(0.00008x+0.21)}$$
$$(R^2 = 0.95).$$

It's useful to have an automated workplace for the taxpayer and tax employee, which will allow you to quickly lose various tax and economic situations.

The head menu of the program system with a simple, intuitive interface for an unprepared user. We offer an expert system based on the survey of experts on the following indicators (issues):

1) Profitability assessment (net profit);
2) Cost structure (share of profit)
3) Insurance premiums (share of wages)

4) Personal income tax (share of the wage fund);
5) Property tax (fixed assets);
6) Income tax (accruals on net income);
7) Revenue without value added tax;
8) Value-added tax to the budget;
9) Land tax;
10) Utility bills;
11) Tax burden on net income;
12) Tax burden (this is a special hypothetical case, with zero tax), etc.

You can edit questions and answers, assess the tax burden, and adjust the knowledge base. As a database model, we consider the simplest and most relevant knowledge model of the production type. The dialog script itself is also configured for the base. For example, as a result of evaluating a situation by an automated system, a solution may be formed that evaluates:

1) Financial independence;
2) Excess of accounts payable receivable;
3) Income tax collection;
4) Collection of all taxes.

It's possible to supplement the system with the procedure of asymptotic comparison of scenarios of tax burden severity and vary them, making asymptotic conclusions for different distributions, testing hypotheses and building confidence intervals (Kirov, Morozova, Bezverkhiy, 2019). Asymptotic estimates make it possible to form a virtual profile of the tax system, which allows reflecting exogenous parameters.

In the longer term, more complex and "powerful" models are needed for long-term forecasting and tax optimization. For example, based on the application of optimization methods. Let's offer such a model.

Let$x = (x_1, x_2, \dots, x_n)$be the tax base vector, $y_i (i = 1,2,\dots, m)$ be the tax of type $i$, $x_{\text{imax}}$, $x_{\text{imin}}$, $x_{\text{iopt}}$respectively, the maximum, minimum and optimal values of this tax type.

If you designate the $a_i$is the effort (cost) for accounting for the $x_i$ unit, and $b_i$is the tax type $i$ required for payment, then you can formulate an optimization task: minimize the $x_j (j = 1.2,\dots, m)$ per unit of tax:

$$F = \frac{1}{y_i}\sum_{j=1}^{m} a_i x_i \Longrightarrow \min,$$

$$i=1,2,\dots,n,$$

$$x_{\text{imin}} \le x_i \le x_{\text{imax}}.$$

As a forecast model for $y_i$, we offer a logistic type model:

$$y_i = \frac{\varepsilon(1-u_i)y_i e^{\varepsilon h}}{\varepsilon + \lambda(1-u_i)y_i(e^{\varepsilon h}-1)},$$

$$i = 0, \dots, n-1,$$

where the growth rates of tax collections ε and the "shadow" of taxpayers are λ set by experts or identified based on statistical data.

For practical purposes, both empirical, regression dependencies and fuzzy models can be used.

Digital transformations raise the question of the relevant adaptation and optimization of key tax rates, taking into account digital relations and sources for the tax base (Kirov, Morozova, Bezverkhiy,2019).

Tax analytics reflects not only the relationships of the subsystems of taxation, production, investment, but also global indices of the entire socio-economic system. We will introduce and analyze only one type of such index.

Analytics, modeling of digital relations will make it possible to predict (in the current period, at least) internal and latent sources and the completeness of the tax base, risks, uncertainties, "going into the shadows", etc. Research is underway according to the paradigm of tax law, "corporate taxes" (Wilde, 2015).

Risk analysis and risk management of the tax system will allow you to obtain:

1) Both qualitative and quantitative and mixed estimates;
2) Conduct technological tax monitoring;
3) Improve expert heuristic and analytical procedures;
4) Apply the methods and tools of Value at Risk, Stress (Situational) Testing
5) Interval analysis and multivariate scales;
6) Cognitive maps (risk profiles), etc.

To organize tax risks, they can be evaluated by information entropy. For example, by Shannon-Weaver formula:

$$H = -\sum_{i=1}^{n} \frac{u_i}{S} \log_2 \frac{u_i}{S},$$

where $u_i$ are taxes of type *i, n* are their total number, *S* is their sum. To reduce risks, you can connect the task of risk reduction, as in work (KazievaKaziev, 2014).

The improvement of models and approaches to accounting for tax risks (for example, (Petruzzi, 2018; Schön, 2018). will streamline digital taxation and taxation in the digital economy, including in the legal distribution of net profit (. Chand, 2019).taking into account political and legal processes in the digital economy.

## Discussions

The Global Digital Development Index (denoted by DEGI) should be a global key index, as should the HDI index. In 2020, Russia has a modest 37-38 position in the digitalization ratings of 115 national economies, but the growth rate is not bad, the share of the digital part of the economy is predicted to 10-12% of GDP.

Digital tax activity is controlled both simply and difficult. Difficulties arise due to the insufficient reflection of this activity and its control in tax and legal categories. The method of precedent works – "adjustment, when it's no longer possible, as the risks increase".

Special services and IT infrastructure of tax administration of digital economic relations are needed. For example, it's difficult to calculate taxes and payments from electronic services on digital platforms.

Under Article 174.2 of the Russian Tax Code, online services subject to VAT include advertising, partnerships, consulting, etc. It's hard to control. From 2019, VAT on digital services must be paid by foreign organizations (regardless of person, structure). They are administered by a special VAT declaration. But its application is limited, in particular, for large translations.

It's difficult to establish taxing nexus, the fact of a "strong" business presence in the jurisdiction of a certain territory. Without a physical presence in digital relationships and the mobility of intangible assets, this is also difficult. Partially helps out the category "offshore buyer" (a resident of preferential taxation who has software license and provides reimbursable access to software opportunities for non-residents).

There are many problems with e-Commerce taxation. For example, the underdevelopment of the digital transaction tracking infrastructure often leads to tax evasion, especially in the B2C- and C2C-business. As a possible solution abroad, declaration by the buyer himself by IP address, EDS, account is often used. The Russian Federation already has a platform for foreign tax services for digital taxation with small risks. There is no classification of digital interactions, products in the legislation of the Russian Federation. Differentiated rates are used, in particular, imports of a digital product can be subject to 20% VAT, and exports can't be taxed at all.

We believe that a "digital tax" is needed, which, as in the EU, has its own tax base (for example, 1-5%).

Digital transformations, the possibilities of the economy allow not only to automate, but also to intellectualize tax administration, tax control and audit. But you need to improve tax legislation.

## Conclusions

The analysis of tax risks, tax collection is aimed at improving the situation in the economy, tax revenues to the budget, as well as tax legal relations, identification and neutralization of risks.

Proposed analytics, presented models and modeling procedures, examples are important for system research, in the transition to new forms of organization and management designed for use in the digital economy.

It's necessary to develop methods and methods for assessing the measure of removed uncertainty (tax certainty, economic policy).

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**Declarations**

Author declares that all works are original and this manuscript has not been published in any other journal.

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