



Rationality of the Tax and Economic Behavior of Enterprises in the Russian Forestry Sector

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ABSTRACT

The study focuses on the problem of rationality of economic entities, in particular the rationality of their tax and economic behavior in a given period. The data on enterprises in the Russian foreign sector are used to examine the relationship between the levels of rationality observed in their economic and tax behavior. The representative sample includes 1,206 micro-, small and medium-sized enterprises that specialize in logging, wood processing and wholesale timber trade and have forest lease agreements. The study covers the period from 2017 to 2021. Rationality of corporate behavior is understood as profit maximizing behavior or, in other words, as companies' pursuit of maximum utility. Our theoretical review of the research on rationality in economic and tax behavior has led us to formulate the following assumptions. In economic behavior, rationality manifests itself primarily in companies' efforts to improve the efficiency of resource use (labor, finance, and tangible assets). Rationality in tax behavior is associated with companies' efforts to minimize their tax expenditures. Therefore, to assess the rationality of economic behavior, we used such indicators as labor productivity, return on own capital, return on borrowed capital, return on fixed assets, return on operating assets, business profitability, the stage of the lifecycle, and tax risk management. To assess rationality of tax behavior, we estimated the level of audit risk, that is, each company's chances of being audited. Our study has confirmed the hypothesis that the rationality of tax and economic behavior has an inverse relationship. In other words, the more rational is the economic behavior of a firm, the less rational is its tax behavior. The strength of this relationship is impacted by three main factors: 1) the size of a business; 2) the level of opportunism; and 3) the type of activity. For the enterprises in the forestry sector covered by our analysis, we found that a change in the level of rationality of their tax behavior in 72.9% of cases leads to a change in the level of rationality of their economic behavior.

KEYWORDS

tax behavior, economic behavior, rationality of behavior, economic entity, forestry sector, correlation, size of business, type of activity, opportunism

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АННОТАЦИЯ

Исследование посвящено изучению основных положений концепции рациональности, когда деятельность хозяйствующего субъекта за определенный период времени исследуется одновременно с позиций проявления его нало-

гового и экономического поведений. Цель исследования – провести оценку рациональности налогового и экономического поведения предприятий лесопромышленного комплекса России, а также определить наличие взаимосвязи между уровнями рациональности двух видов поведения. Репрезентативная выборка исследования составила 1206 микро, малых и средних предприятий, занятых в лесозаготовке, распиловке и оптовой торговле древесиной. Выборка формировалась из предприятий, у которых заключены договоры аренды лесных участков. Период исследования 2017–2021 гг. Под рациональностью корпоративного поведения понималась деятельность предприятий, направленная на максимизацию выгод. При этом максимизация выгод определялась как максимальная полезность для предприятия. По результатам теоретического обзора сущности понятия рациональности экономического и налогового поведения принято допущение, что в экономическом поведении рациональность проявляется в стремлении максимально использовать имеющиеся трудовые, финансовые и материальные ресурсы, а в налоговом поведении рациональность выражается в минимизации издержек. Соответственно, для оценки рациональности экономического поведения применялись такие показатели, как производительность труда, рентабельность собственного капитала, рентабельность заемного капитала, фондоотдача, рентабельность оборотных активов, рентабельность экономической деятельности, уровень развития предприятия, саморегулирование налоговых рисков. Рациональность налогового поведения оценивалась уровнем налогового риска. По результатам исследования подтверждена гипотеза, что рациональность налогового и экономического поведений имеет обратную взаимосвязь: чем выше рациональность экономического поведения, тем ниже рациональность налогового поведения. При этом на величину корреляции в данную взаимосвязь оказывают влияние три основных фактора: (1) масштаб предпринимательской деятельности; (2) уровень оппортунизма; (3) вид деятельности. По трем исследуемым видам деятельности изменение значения уровня рациональности налогового поведения в 72,9% случаев приводит к изменению значения уровня рациональности их экономического поведения.

КЛЮЧЕВЫЕ СЛОВА

налоговое поведение, экономическое поведение, рациональность поведения, хозяйствующий субъект, лесной сектор, взаимосвязь, масштаб бизнеса, вид деятельности, оппортунизм

1. Introduction

Rationality is an abstract philosophical concept that underlies the majority of approaches to the study of human behavior in different disciplines.

The rationality principle is often seen as crucial to modern economic theory. The evolution and expansion of this concept reflects major trends in the development of economics and its specific areas of study. Nowadays, a vast body of research provides evidence that there are in fact different degrees of agent rationality, ranging from relatively rational to completely irrational behavior. Most of the modern studies dealing with this problem are focused on the two key questions: what motivates economic entities to act rationally? and can an economic entity behave rationally?

The assumption of perfect rationality in decision-making was challenged by behavioral economists, which led to a major revision in the concept of rationality, although it still remains one of the cornerstones of the theoretical models of tax behavior and economic behavior.

The common points shared by the theories of tax and economic behavior are mostly centred around the concept of rationality, which defines the evolution and relationship of these research areas. It should be noted, however, that in both of these behavior models, rationality as the maximization of the objective function is characterized by different resource constraints, different goals, and different mechanisms of justification.

The relevance of this study stems from the fact that it seeks to bring together

the main concepts of rationality for the analysis of the interrelation between the manifestations of rationality in tax and economic behaviour of firms.

To this end, we are going to examine the rationality of the tax and economic behavior of micro-, small and medium-sized enterprises in Russia specializing in logging, wood processing and wholesale timber trade. The period covered by the study is from 2017 to 2021. We intend to examine rationality for the whole forestry sector and for specific types of economic activity.

The *research questions* are as follows:

1. Can the behavior of an economic entity be considered rational when viewed simultaneously from the perspective of its economic performance and its tax-related decisions?

2. Is there a connection between the rationality of tax behavior and the rationality of economic behavior of a firm?

The *purpose* of the study is to assess the rationality of tax and economic behavior of enterprises in the Russian forestry sector and to examine the relationship between the levels of rationality these companies exhibit in these two types of behavior.

We are going to test the *following hypotheses*:

H1. The behavior of economic entities can be described as rational both in terms of their economic behavior (profit maximization) and at the same time as irrational in their tax-related decision-making.

H2. There is an inverse relationship between the rationality of tax behavior and the rationality of economic behavior of firms.

2. Literature review

In this section, we are going to survey four groups of writings: first, studies dealing with the problem of rationality in economic behavior; second, studies dealing with rationality in the economic behavior of firms; third, studies devoted to rationality in the tax behavior of firms; and, finally, studies discussing the relationship between rationality in the economic and tax behavior of firms.

2.1. Rationality of economic behavior

Smith [1] put forward the concept of a rational economic man – *homo economicus*, which is one of the core concepts of the classical school: not only is *homo economicus* completely rational but he also has access to complete information and unlimited resources when making his decisions [1].

Walras [2] used mathematical methods (including modeling) to substantiate the concept of a rational economic man. Walras [2] and Marshall [3], who are among the founding fathers of neoclassical economic theory, expanded the concept of *homo economicus*. From the neoclassical perspective, the egoistic motivations guiding the choices of *homo economicus* are affected by various factors of production (personification).

Neumann & Morgenstern [4] formulated the expected utility theory and showed that in a situation when an individual agent is faced with several options (lotteries), their behavior can be described as rational if they choose the optimal option, that is, the one that maximizes the expected utility. The expected utility as a concept and measurable indicator includes two main components: probability and utility amount. The expected utility theory also takes into account the decision-maker's attitude to risk. Probabilities are assumed to be "objective" (random events of exogenous nature) and are the same for all economic actors.

Savage [5] formulated the theory of risk attitudes, differentiating between two types of behavior – risk-averse and risk-seeking.

The theoretical analysis conducted by Harstad and Selten [6] led them to the conclusion that all neoclassical models are based on the premise that economic decision-making can be reduced to the (rational) maximization of profit or utility.

Simon [7] proposed the concept of bounded rationality to describe the process of decision-making based on limited information. He argues that a person who makes a choice in everyday life and is faced with a variety of alternatives will not rationally analyze and compare each

of the proposed alternatives, but will establish a criterion (the level of aspiration) that the alternative must meet in order to be acceptable (or “good enough”) rather than optimal.

Simon’s [8; 9] bounded rationality theory comprises the following theoretical provisions:

Multiple goals theory. Since it is difficult to find an absolutely best goal in real economic activity, the possibility of finding an absolutely optimal solution in the real world is extremely small [8].

Cognitive limits theory. Since people need to take into account not only quantifiable economic benefits, but also non-quantifiable factors such as social and environmental benefits, they often cannot make accurate decisions and forecasts [9].

Theory of resource scarcity. Being “bounded” by limitations, e.g. time constraints, people often make suboptimal decisions [9].

Lichtenstein & Slovic [10] used the methods of experimental economics to demonstrate the drawbacks of classical economics in dealing with the problem of rational economic behavior. They were the first to describe the phenomenon of reversals of preference.

Kahneman & Tversky [11], the fathers of behavioral economics, formulated the theory of prospects and put forward the principle of limited rationality, which takes into account subjective probabilities, thus contradicting the axioms presented by von Neumann & Morgenstern [4].

Hayek [12] formulated the evolutionary theory of rationality. He distinguishes between two kinds of rationalism – evolutionary (or critical) and constructivist. These types of rationalism correspond to two distinct schools of thought – the French rationalist and the British evolutionary traditions – and the two different approaches to the understanding of human reason. While constructivist rationalism is characterized by a profound regard for the constructive powers of reason and attributes social order to rational design, evolutionary rationalism, on the contrary, emphasizes the limits to the constructive powers of reason and sees social order

as an unintended outcome of the long process of social evolution. According to Hayek [13], society should be understood as an organism that contains a multiplicity of interconnected elements but due to the limitations of the human mind, people are incapable of fully understanding what is going on within this extremely complex “organism”.

Becker [14] laid the foundations for the theory of rational households by putting forward two fundamental ideas: first, that economic decisions are taken by the family and not by individuals; and, second, that the family is economically rational.

Zouboulakis [15] traced back the historical evolution of the rationality concept and identified 12 main ways of approaching it. He divides these interpretations (or varieties) of economic rationality into two groups: the initial concept (Adam Smith’s concept of homo economicus) and the more complicated visions co-existing in contemporary economics (the common knowledge theory, theory of rational expectations, theory of rational households, and the theory of standard rationality).

Jones [17] confirmed that the rationality assumption in economics, including the above-described interpretations, in fact, stems from Adam Smith’s rational choice theory. From this perspective, bounded rationality may be seen as an attempt to redefine the concept of economic rationality and to make the classical models of rationality somewhat more realistic.

It should be noted that the concept of a rational economic man (economic actors are “economically rational”) underlies much of the contemporary research in this field. Economic rationality is seen primarily in terms of optimization: consumers seek to maximize utility while manufacturers maximize their profit and minimize their costs.

The multitude of approaches to the key concepts such as utility, risk, uncertainty, and probability is reflected in the diversity of extensions and applications resulting from the evolution of the homo economicus concept.

2.2. Rationality of the economic behavior of firms

Smith [1], the founder of the traditional (economic) theory of the firm, saw it as a production (technological) unit whose activity is described by the production function and whose goal is to maximize profits.

Cyert & March [18] formulated the behavioral theory of the firm that views it as a coalition of key stakeholders – individuals and groups. They believed that a firm may pursue multiple goals and most of firms' strategic goals fall into one of the five key categories: production; inventory; market share; sales and profits.

Nelson & Winter [19] developed the evolutionary theory of the firm, according to which firms evolve while being subjected to the pressure of internal and external selection. Due to incomplete information and their limited information-processing capacity, firms cannot rationally choose optimal alternatives. To survive, however, firms need to choose the right strategies (the choice is determined by their corporate philosophy) in order to adapt to the surrounding economic environment but sometimes their survival is merely a matter of luck and chance.

Veblen [20] proposed the institutional theory of the firm, which defines the firm as a system of internal and external contracts. He argued that the firm's performance reflects the key characteristics of society's organization.

Knight [21] examined categories of risk and uncertainty in entrepreneurial activity and found that a rational reaction to uncertainty would be to reduce it to 'measurable' uncertainty (or risk) or, if it is impossible, to avoid investing altogether. Knight believed that rational decisions are only possible under risk, which implies the need to compute expected values and determine whether the situation provides adequate compensation for the capital placed at risk.

Knight [21] also proposed a theory of rational entrepreneurship, positing that entrepreneurs have the ability to convert situations of uncertainty into situations of risk. Rational entrepreneurs accrue profits

because their decision-making is based on probabilistic estimates that are clearer and more attractive than what others perceive.

The studies of the relationship between risk and rational economic behavior can be roughly divided into three groups depending on their understanding of what lies at the core of entrepreneurial activity: 1) opportunities recognition; 2) opportunities discovery; and 3) opportunities creation. Let us look at each of them in more detail.

1. *Entrepreneurial process as opportunities recognition*

Norton & Moore [22] in their discussion of the difference between entrepreneurial and non-entrepreneurial decision-making argue that entrepreneurs can use disparate information and estimate probabilities that differ in their values and accuracy. This concept of risk agrees with the notion of rationality as the maximization of subjective utility of a possible outcome weighted according to the probability that the act will lead to that outcome. The risk stems from our inability to predict the changes in the environment (there is more than one state with a non-zero probability of occurrence). Rational entrepreneurs seek to control or hedge unforeseen circumstances affecting their companies' performance.

Wiklund & Shepherd [23] associate rationality in entrepreneurship with prior knowledge and experience.

Chitsaz et al. [24] interpret the concept of rationality in relation to the knowledge, skills, and abilities of entrepreneurs. The rational behavior of entrepreneurs enables them to make predictions and manage their expectations about future entrepreneurial projects.

Pokrovskaya [25] argues that the rationality of economic behavior should be defined as a function of effectiveness determined as a ratio of goals to resources. She relies on the principle of resource constraints and trade-offs and shows that when seen in the short term, rationality is mostly understood from the perspective of the classical economic approach, while in the long term, it corresponds to the institutional and sociological approach. The

achievement of rationality in the mid- or long-term is possible only by regulating economic behavior through the implementation of common reference frameworks and agreements.

Yeşilyurt & Türker [26] contend that economic rationality defined as the achievement of a certain outcome with minimum spending is important in ensuring economic sustainability.

2. *Entrepreneurial process as opportunities discovery*

Gavetti & Levinthal [27] found that the search for opportunities in entrepreneurship can be cognitive and experiential. Experiential-based logic of choice is described as “backward-looking” wisdom, accumulated as a result of “positive and negative reinforcement of prior choices” The cognitive (or forward-looking) approach includes thought experiments and modeling of action-outcome linkages.

Huber [28] found that the search for opportunities may also happen when an entrepreneur is learning by observing the experience of other firms.

Gavetti et al. [29] in their study of analogical reasoning in managerial decision-making found that the personal experience of a firm’s owner or top manager stimulates rational decision-making and reduces the risks inherent in the entrepreneurial search for opportunities.

Miller [30] conducted a theoretical review of the academic literature on rationality and risk in the entrepreneurial search for opportunities and found that this process is usually aimed at finding a satisfactory, rather than an optimal, result. He found that although the dimensions in which the goals for the owners and managers of enterprises are defined are exogenously given, their aspirations adapt based on their own experience as well as the experiences of others in a relevant reference group.

Aldrich & Zimmer [31] studied rationality in entrepreneurship in the light of the social network’s theory. A social network is seen as a potential source of human capital for an entrepreneur: the more access an entrepreneur has to human capital, the more expertise he or

she has, the more rational is his or her behavior.

Jia et al. [32] propose a new concept of CEO reflective capacity as a behavior-oriented cognitive capability. This concept is particularly relevant to dynamic and complex environments where the cognitive capacity of the top management can provide the company with a significant competitive advantage, thus ensuring its long-term resilience and viability.

Hogarth & Karelaia [33] apply the modeling method to show that entrepreneurs may demonstrate rational as well as irrational (or “boundedly rational”) behavior. Rational behavior is understood here as a process of decision-making in the situation of a trade-off that involves enhanced information processing according to established rules but takes more time than intuitive choices.

3. *Entrepreneurial process as opportunities creation*

Littlechild [34] connected rationality in entrepreneurial activities with the creation of entrepreneurial opportunities. He compared three types of market processes – neoclassical, Austrian and radical subjectivist. The neoclassical model characterizes future prospects in terms of a probability distribution over known possible states. The Austrian model allows for present ignorance and the discovery of new possibilities in the future. The radical subjectivist model emphasizes the role of human imagination in creating future possibilities that would otherwise not exist. In Littlechild’s words, “the future is not so much unknown as it is non-existent or indeterminate at the time of the decision. The agent’s task is not to estimate or discover, but to create” [34].

Alvarez & Barney [35] argue that entrepreneurial opportunities do not exist before an entrepreneur starts to take action.

Hatchuel [36] defines opportunities formation as a creative process involving unconventional thinking and the ability to see new opportunities in vague or ill-defined problems.

Agarwal et al. [37] argue that in socio-economic systems, creativity is bound

to engender risk, only a certain part of which is borne by the entrepreneur who has started a new venture. What one person or firm considers an act of creative construction, others may see as creative destruction.

Sarasvathy [38] found that rationality in the economic behavior of a firm engaging in opportunity creation is determined by causal reasoning, which requires setting clearly defined goals and examining the particular set of means or causes available to realize these goals. She believes that rational entrepreneurship starts with identifying accessible resources and choosing one of the possible goals. Preferences and more specific goals in entrepreneurial activity are formed only in the process of realization. Formation of preferences is a continuous learning process in which the entrepreneur's choices matter along with other social and situational factors.

Miller [30] showed that entrepreneurship stems not only from foresight (valuations of probabilistic payoffs) but also from hindsight (learning from past experiences) as well as from insights resulting from the entrepreneur's self-awareness.

Troise et al. [39] used statistical analysis to show that the prevalence of intuition-related and rationality-related factors in entrepreneurship depends on the specific national and cultural contexts as well as on specific time periods.

Thus, it should be noted that the above-described variety of co-existing theories of entrepreneurship and behavioral theories reflects the complexity of the entrepreneurial process. The latter, in its turn, is considered in the light of three key aspects: a) opportunity recognition; b) opportunity discovery; and c) opportunity creation. These aspects correspond to different understandings of rational economic behavior. While the idea of opportunity recognition is more in line with the expected utility theory, the idea of opportunity discovery and creation fits well into the theory of bounded rationality.

The prevailing view is that in their rational decision-making, firms seek to maximize their expected utility. It

should be noted, however, that the three above-mentioned aspects of entrepreneurship are inextricably connected with each other and that it is precisely this interrelationship that is essential for the existence of entrepreneurial activity as such. Thus, a firm's rational economic behavior implies not only profit maximization but also the efficient use of limited resources and ensuring its stable development in the long term.

2.3. Rationality of the tax behavior of firms

Allingham & Sandmo [40] put forward the classical model of tax behavior based on the rational choice of a taxpayer to evade taxes or not under uncertain conditions.

Neumann & Morgenstern [4] demonstrated that in their choices to comply with tax requirements or not, taxpayers seek to maximize their expected utility. In relation to tax behavior, the expected utility theory makes the following assumption: an economic entity will continue evading taxes until the point when the government decides to tighten the screws by imposing a rigorous penal policy.

Coricelli et al. [41] examined the relationships between emotions, deception, and rational decision-making by means of an experiment on tax evasion. They found that the intensity of anticipated and anticipatory emotions before reporting income positively correlates with both the decision to cheat and the proportion of evaded income. The risk of being subjected to a tax audit, which strengthens the emotional dimension of cheating, favours tax compliance and makes tax behavior less rational.

It can be said that the fundamental model of tax behavior relies on the classical concept of the rationality of homo economicus. The rationality of tax behavior is usually defined as the desire to maximize benefits and minimize tax expenditures. The "red flags" indicating non-compliance of firms are usually determined by each country's own tax laws and regulations. The significant constraints that may shape tax behavior include the chances of being audited, tax penalties, and tax rates.

2.4. Relationship between rationality in the economic and tax behavior of firms

Dabla-Norris et al. [42] investigated the causal impact of the productivity of firms operating within the same industry in developing countries on their tax evasion and found that productivity improvements can lead to lower tax evasion.

Bachas et al. [43] showed the impact of taxation on firms' performance depending on the size of the firm in different countries.

Blackburn et al. [44] revealed a link between firms' financial development and tax evasion.

Labunets & Mayburov [45] showed a strong direct relationship between audit risk and opportunism in the tax behavior of economic actors by analyzing the behavior of firms in the Russian forestry sector. The indicator "Return on fixed assets" was used to detect the relationship between audit risk and the level of opportunism in tax behavior. They found that firms' propensity for non-compliance has a negative influence on the development of their material and technical potential.

Alm et al. [46] argue that companies facing financial constraints are more likely to evade taxes, mostly because evasion helps them deal with the issues created by financial constraints. The effects of financial constraints are heterogeneous across firm ownership, firm age, and firm size.

Fajnzyblber et al. [47] in their review of research literature on this topic show that the firms that opt for operating formally show higher levels of productivity.

Gordon & Li [48] reveal the positive impact of the use of the financial sector by manufacturing firms on tax compliance because the economic benefits these firms gain are inseparable from the resulting tax liabilities. In other words, getting loans and other services from banks automatically puts companies in the spotlight of tax authorities because this way they can get access to these companies' records and information about their transactions.

Sarte [49] found that tax evasion and informal activities are associated with lower aggregate income levels and lower productivity.

La Porta & Shleifer [50] showed a cross-country correlation between the productivity of firms and the propensity to go formal and comply with tax requirements.

Thus, the up-to-date research evidence points to the connection between the financial, material, and technological development of a firm and the level of tax evasion in its behavior. These findings underpin the hypotheses that are tested in this study and determine the avenues for further research on rational economic and tax behavior.

3. Methodology and data

3.1. Sampling of enterprises

For our study, we built a sample of micro-, small, and medium-sized enterprises in different segments of the forestry sector. In total, the sample comprises 1,206 units. The sample included enterprises in the Russian forestry sector, specializing in logging, wood processing, and wholesale timber trade.

For our sample, we selected only the firms that were registered until 01.01.2017 and that had forest lease agreements. The latter condition is necessary to make sure that the companies included in our sample are not shell companies but are actually engaged in business operations or have significant assets.

The study covers the period from 2017 to 2021.

The key characteristics of the enterprises in our sample (size, type of activity, etc.) are shown in Table 1.

The sample and general population are statistically homogeneous. The representative sample makes up 20.3% of the general population of all enterprises in the forestry sector in Russia.

3.2. Assessment of the rationality of tax behavior

The rationality of tax behavior was assessed by looking at the level of audit risk, that is, companies' chances of being audited. The level of audit risk for each firm in the sample was determined for each year of the given period. This indica-

Table 1

Sample of enterprises of the Russian forestry sector by size, units

No.	Type of activity	Number of enterprises by size			Total	Number of enterprises by size			Total
		Medium-sized	Small	Micro		Medium-sized	Small	Micro	
1	Logging	13	245	496	754	24	328	975	1327
2	Wood processing and manufacture of products of wood and cork	10	156	195	361	31	755	2883	3669
3	Wholesale timber trade	2	25	86	113	5	95	957	1057
Total		25	426	777	1228	60	1178	4815	6053

Table 2

Relationship between audit risk and the rationality of tax behavior

No.	Level of audit risk	Degree of minimization of tax expenditures	Level of rationality
1	Low audit risk (higher than normal audit risk results in 0-1 criterion)	low	high
2	Medium audit risk (higher than normal audit risk results in 2-3 criteria)	medium	medium
3	High audit risk (higher than normal audit risk results in 4 or more criteria)	high	low

tor is defined as the accumulated indicator of misstatements that were detected by comparing the calculated values in the criteria described in the Conceptual Framework for the On-Site Tax Audit Planning System with their normative values. This method of assessing audit risk levels was tested in our previous studies [45].

The highest level of rationality is achieved if companies manage to minimize their tax expenditures through tax avoidance and evasion. Table 2 shows the relationship between the level of audit risk and the rationality of tax behavior.

3.3. Assessment of the rationality of economic behavior

To assess the rationality of economic behavior, we examined how efficiently companies use their economic resources: labor, capital, land, entrepreneurial activity, and information.

The indicators reflecting the efficiency of resource use by each enterprise in our sample are described in Table 3.

The efficiency of resource use was calculated for each enterprise in our sample for each year of the given period. The calculations were performed according to the following procedure.

1. *Labor productivity*. This indicator was calculated as a ratio of specific output to the average number of employees engaged in its production.

Output in monetary terms is understood here as the revenue received by a given company. This indicator was calculated for all the enterprises – small and medium-sized. For micro-enterprises, we calculated labor productivity only for those companies that had at least 10 employees. This staff size is the required minimum for companies in the Russian forestry sector¹.

¹ The Decree of the Ministry of Labor of the Russian Federation of 21.04.1993 No. 90 “Intersectoral Output Standards, Standards of Time and Staff Number for the Preparatory and Auxiliary Activities in the Logging Industry”.

Since each enterprise had a forest lease contract, we assume that all enterprises in the sample could engage in logging. This assumption was confirmed by the analysis of the enterprises' reports on the volume of timber output. These data are available from the federal accounting data system of the forestry industry (LesEGAIS).

Thus, we did not calculate labor productivity for enterprises with less than 10 employees. These enterprises were automatically classified as enterprises failing to use labor efficiently.

2. *Return on own capital.* This indicator was calculated as the ratio of a company's net profit to its average equity capital. "Own capital" is understood as all the assets owned by the enterprise, including registered capital, surplus capital, reserve funds, and retained earnings. The amount of a company's own capital was determined by looking at line 1300 ("Total Equity") in the balance sheet report.

3. *Return on borrowed capital.* This indicator was calculated as the ratio of net profit to the average amount of borrowed funds. The amount of borrowed funds was understood as the sum of short-term and long-term borrowed funds and was calculated as the sum of the figures cited in lines 1400 and 1500 in the balance sheet report.

4. *Return on fixed assets.* This indicator was calculated as the ratio of the company's revenue to the amount of fixed assets for each year of the given period.

5. *Return on operating assets.* This indicator was calculated as the ratio of net profit to the enterprise's operating assets. Operating assets are cited in line 1200 of the balance sheet report.

6. *Business profitability (profitability of production).* This indicator was calculated as the ratio of profit to production costs.

7. *Stage of the enterprise's life cycle.* The life cycle stage of a business was determined by applying the methodology described in our previous study (see [45]).

Table 3

Indicators characterizing the efficiency of resource use

No.	Economic resource	Efficiency of resource use	Description
1	Labour	Labor productivity	This indicator measures the efficiency of the workforce and shows output per one employed worker.
2	Capital	Return on own capital	This indicator determines the return on the invested funds of the owners and on borrowed funds, respectively.
		Return on borrowed capital	This indicator characterizes the efficiency of the use of borrowed funds.
3	Land, tangible assets and technological potential	Return on fixed assets	This indicator shows the efficiency of the use of fixed assets.
		Return on operating assets	This indicator shows the efficiency of the use of operating assets.
4	Entrepreneurial activity	Business profitability (profitability of production)	This indicator characterizes the overall performance of the given enterprise.
		Stage of life cycle	This indicator shows which phase of the life cycle the given enterprise is currently in.
5	Access to information	Tax risk management	This indicator reflects the company management's ability to use the available information effectively to avoid unnecessary tax costs, whilst ensuring compliance with legislative requirements.

8. *Tax risk management.* This indicator reflects the effectiveness of managerial decision-making regarding the company’s compliance with the criteria described in the Conceptual Framework for the On-Site Tax Audit Planning System.

The former six indicators are quantitative. The latter two indicators (the stage of the company’s life cycle and tax risk management) are qualitative and were not included in our calculations but were used as auxiliary parameters to reveal the connection between the rationality of tax behavior and the rationality of economic behavior.

The procedure for determining the level of rationality of economic behavior is shown in Figure 1.

If the calculated value in a specific indicator corresponded to the normative value, then in this indicator the company was assigned 0, otherwise, it was assigned 1.

The normative values for each indicator are shown in Table 4.

For each enterprise, we have measured the rationality of their economic behavior in a given year by looking at six quantitative indicators. As a result, the following levels of rationality were identified:

1) *high level of rationality:* the results in all the indicators correspond to the normative values or only one indicator does not correspond to the normative value;

2) *medium level of rationality:* the results in 2–3 indicators do not correspond to the normative values;

3) *low level of rationality:* the results in 4 or more indicators do not correspond to the normative values.

The rationality of the economic and tax behavior of enterprises in the given period was analyzed by looking at the whole sector as well as specific types of economic activity within the sector.

3.4. Assessment of the relationship between levels of rationality of economic and tax behavior

To find the relationship between the rationality of economic and tax behavior, we applied the method of correlation regression analysis. This relationship was evaluated at the final stage following the evaluation of the rationality of tax behavior and the rationality of economic behavior. We examined the whole sample as well as specific types of activity within the forestry sector.

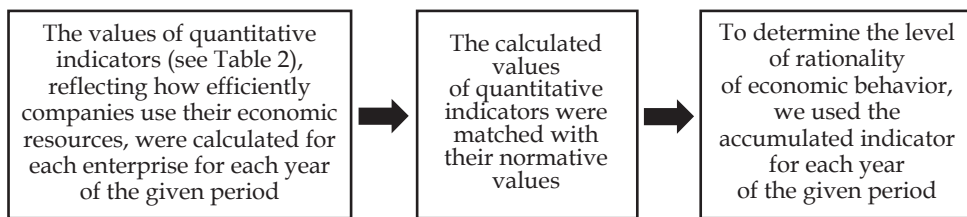


Figure 1. Procedure for assessing the level of rationality of economic behavior

Table 4

Indicators characterizing the efficiency of resource use		
No.	Efficiency of resource use	Normative value
1	Labor productivity, rbs per person	Positive dynamics in this indicator signifies the efficient use of labor.
2	Return on own capital, %	from 20% and above
3	Return on borrowed capital, rbs/rbs	from 0.2 to 0.5
4	Return on fixed assets, rbs/rbs	Positive dynamics in this indicator signifies the efficient use of fixed assets.
5	Return on operating assets, rbs/rbs	from 1 to 3
6	Business profitability (profitability of production), %	5% and above

4. Results

4.1. Identification of rationality levels

For the given period, we have identified the following rationality levels (see Table 5). To reveal the relationship between rationality levels of economic and tax behavior, comparable value ranges were introduced.

In total, we have identified six levels of rationality of economic and tax behavior. The upper and lower bounds of the ranges correspond to the minimum and maximum values denoting rationality levels in the behavior of each enterprise in our sample.

It should be noted that out of all the values given in Table 5, the level of rationality ranging from low to high has the

highest instability of behavioral characteristics. This means that the behavior of a firm is difficult to predict and, therefore, hard to control; such firms are usually extremely vulnerable to the impact of internal and external factors.

4.2. Assessment of the rationality of tax behavior

Figure 2 illustrates the distribution of rationality levels across the sample.

As Figure 2 shows, firms in our sample are facing a high chance of being audited. Therefore, we can conclude that the prevalent levels of rationality in these companies' tax behavior are medium and high. These enterprises resort to similar strategies of tax evasion to obtain certain benefits at all the stages: before, during

Table 5

Rationality levels of economic and tax behavior

No.	Level of rationality	Dynamics of rationality levels	Behavior description
1	Consistently low	The level of rationality did not change over the entire period from 2017 to 2021	The same behavior patterns and responses to different pressures and factors were reproduced
2	Consistently medium		
3	Consistently high		
4	Low-to-medium	The level of rationality in different years of the given period ranged from low to medium	
5	Medium-to-high	The level of rationality in different years of the given period ranged from medium to high	
6	Low-to-high	The level of rationality in different years of the given period ranged from low to high	

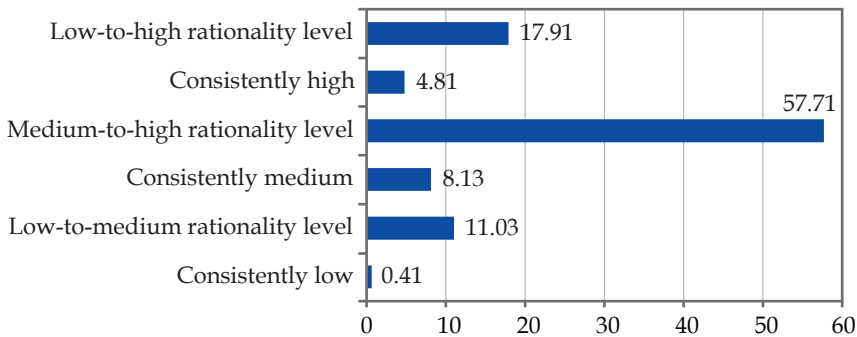


Figure 2. Percentage of forestry enterprises by rationality level (%)

and after an on-site tax audit [45]. These enterprises seek to minimize their tax expenditures by evading taxes. In other words, we are dealing here with the increased level of rationality of tax behavior.

It should be noted that a large proportion of the firms demonstrate the low-to-high level of rationality.

Figure 3 illustrates the distribution of rationality levels by type of activity.

Regardless of their specialization, over 57% of the firms in our sample exhibit a medium-to-high or consistently high level of rationality. Among the firms that specialize in wood processing, the share of firms with a low-to-high rationality level is the largest – 23.3%. This figure is the smallest among the enterprises in wholesale timber trade – 15.1%.

4.3. Assessment of the rationality of economic behavior

Figure 4 shows the distribution of rationality levels across the sample.

The economic behavior of firms is mostly characterized by a low level of rationality or the level of rationality ranging from low to medium – 55.5%. The majority of enterprises in our sample, regardless of their size, use their economic resources inefficiently. Most of them are still in their growth phase, even though they have been in business for a long time.

A large proportion of enterprises (22.7%) demonstrate the low-to-high level of rationality of their economic behavior.

The distribution of rationality levels across different types of activity is shown in Figure 5.

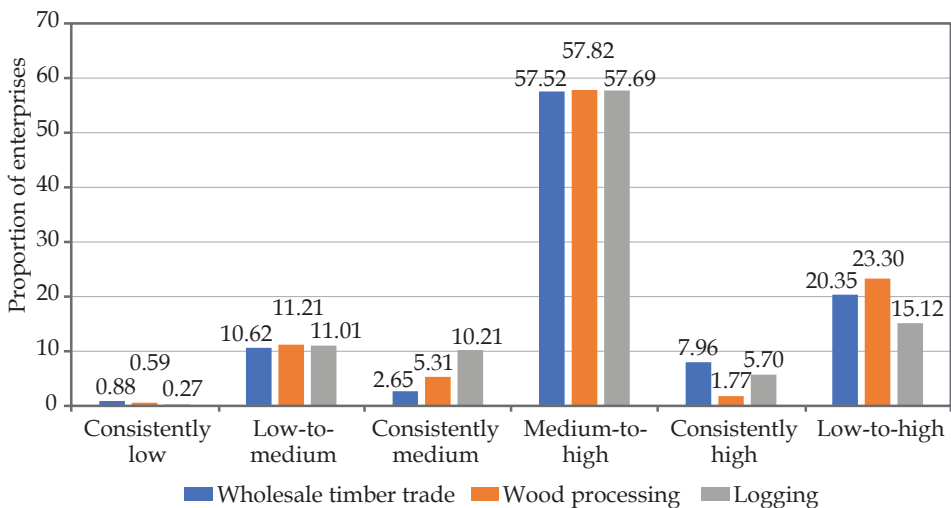


Figure 3. Distribution of rationality levels among forestry enterprises by type of activity (%)

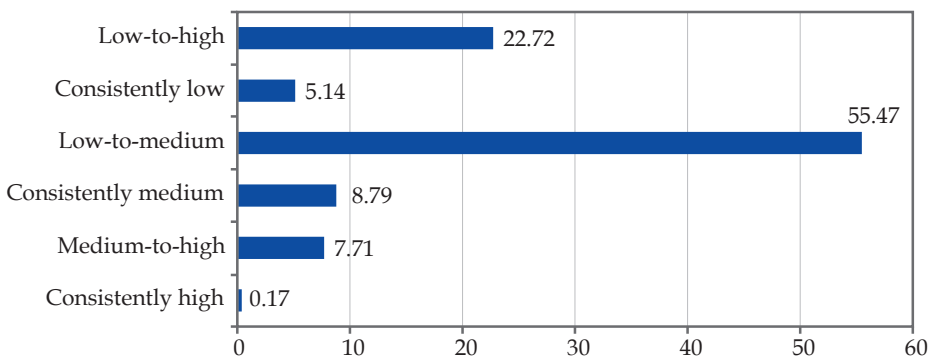


Figure 4. Percentage of forestry enterprises by rationality level (%)

We found that a large proportion of enterprises of all specializations in the forestry sector (over 54%) demonstrate the level of rationality ranging from low to medium.

Similarly, the proportion of companies of all sizes with the low-to-high level of rationality is quite substantial. Among the firms that specialize in wood processing, the share of firms with low-to-high rationality levels is the largest – 28.3%. This figure is the smallest for the enterprises specializing in logging – 20.4%.

4.4. Assessment of the relationship between the rationality of tax and economic behavior

Our study has confirmed the relationship between the rationality of tax and economic behavior. It should be noted

that within the given value ranges, the rationality of economic and tax behavior can take similar values. This is mostly true of the low-to-high and consistently medium ranges.

For the low-to-medium, medium-to-high, consistently high and consistently low rationality levels, we found a strong inverse relationship between economic and tax behavior (Table 6).

The inverse relationship is the strongest for firms specializing in wood processing and the weakest, for firms in wholesale timber trade.

Considering the whole forestry sector, it can be said that a change in the level of rationality of tax behavior in 72.9% of cases leads to a change in the level of rationality of economic behavior.

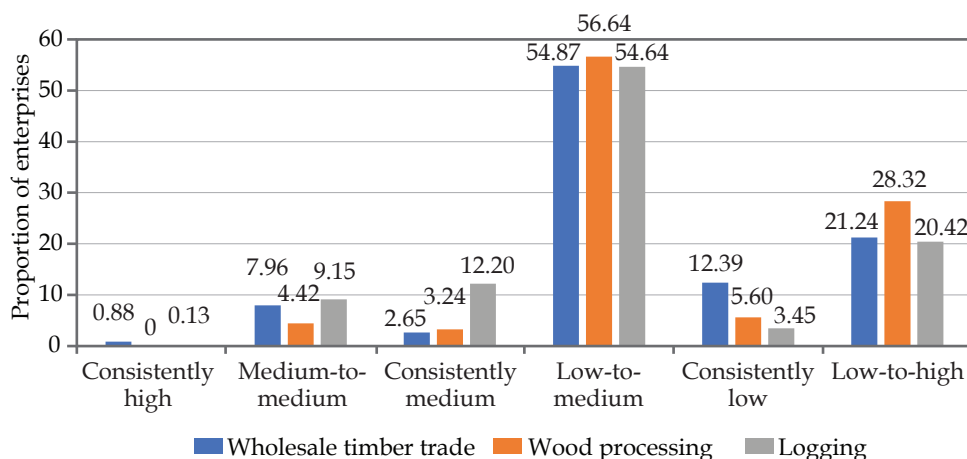


Figure 5. Distribution of rationality levels among forestry enterprises by type of activity (%)

Table 6 Relationship between the level of rationality of economic and tax behavior

Type of activity	Equation for the relationship between the level of rationality of tax behavior and economic behavior	Indicators of relationship
Logging	$y = -0.0121x^2 + 5.5663x - 56.404$	$R = 0.8068$ $R^2 = 0.651$
Wood processing	$y = -0.0332x^2 + 6.6544x - 13.308$	$R = 0.977$ $R^2 = 0.9546$
Wholesale timber trade	$y = -0.0885x^2 + 5.9906x - 10.35$	$R = 0.6926$ $R^2 = 0.4798$
In total for all types of activity	$y = -0.0082x^2 + 6.008x - 91.019$	$R = 0.8538$ $R^2 = 0.729$

5. Discussion

In this study, we sought to evaluate the level of rationality of tax and economic behavior and to shed light on the relationship between rationality levels in these two types of behavior.

We found that the rational economic behavior of firms can go hand in hand with some irrational compliance decisions.

Thus, hypothesis *H1* is confirmed. The results of our research do not contradict previous studies on the rationality of tax and economic behavior [1; 4; 18-41].

Correlation and regression analysis revealed a strong inverse relationship between the rationality of tax behavior and the rationality of economic behavior of the same firms.

Hypothesis *H2* is confirmed for the enterprises in our sample. Our findings agree with the previous research on the relationship between economic and tax behavior [42-50].

The focus on the Russian forestry sector, characterized by the prevalence of small-sized businesses, determined some peculiarities of our sample. In our further research, we intend to use longer periods to study the distribution patterns of values within each range and examine the

concentrations of values of a certain level of rationality.

In addition, in order to gain a more in-depth understanding of the relationship between the rationality of economic and tax behavior under different economic conditions, it would make sense to extend the observation period. It would also be productive to conduct similar research for other sectors of economy.

6. Conclusion

In our study, we focused on the relationship between the rationality of economic and tax behavior of micro-, small and medium-sized enterprises in the Russian forestry sector.

Both of our hypotheses were confirmed: we found that enterprises may simultaneously demonstrate rational economic behavior and irrational tax behavior; there is also a strong inverse relationship between the rationality of tax behavior and the rationality of economic behavior in the same economic entities.

On the practical level, our findings may be of interest to policymakers in the sphere of state regulation and entrepreneurship support. Our research results may also contribute to the development of behavioral economics in taxation and the classical theory of rational choice.

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